SELF PROPELLED CUTTER SUCTION DREDGER

XXX

SPECIFICATION OF REPAIR - AND MAINTENANCE WORKS
Ships particulars
Name XXX
type SELF PROPELLED CUTTER SUCTION DREDGER
BUILT 1986
FLAG XXX
OWNER XXX
MANAGER XXX
CLASSIFICATION Bur. Veritas I 3/3 E Dredger Deep Sea
LENGTH O.A 127,09 m
LENGTH BETWEEN PP 107,44 m
WIDTH 22,4 m
DEPTH 8,15 m
DRAUGHT 5,18 m
LIGHT SHIP 9163.131 ton
GRT 5760 T
NRT 1728 T


Docking conditions
Dry docking plan IHC 01175-0357-010
Docking conditions will be communicated between the captain and the dock master several days prior the dry docking.

From the stability booklet, assume condition 3: LIGHT SHIP + 50 %, ladder horizontal at lower turning point, spuds tilted.

Draft fore (Fpp) 4.604 m
Draft aft (App) 5.817 m
trim -1.213 m
weight 10420.493 ton

Owner’s Representative

Fleet Manager
XXX

Technical Superintendent
XXX
REPAIR SPECIFICATION – INDEX

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Verify Excell lists:
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  • ld_con.XLS
GENERAL CONDITIONS

1. General

1.1. The intent of this specification and drawings is to describe the repair - and maintenance works to be executed on board the cutter suction dredger "XXX”.

1.2. Drawings and technical documentation will be supplied by the owner, and will remain his property.

1.3. The yard is responsible for checking the specification and supplied documentation for their completeness, correctness and accuracy and for collecting any missing data in as far as required.

In the event there are any errors and/or defective descriptions in this specification and accompanying documents, these shall be rectified by mutual agreement between parties.

All materials and workmanship will be to the best ship repairing standards in practice.

Any works and/or items which are not expressly called for in the specification, but related to the specified works and required by the applicable rules, regulations and regulatory bodies described here after, have to be included in the quoted prices.

1.4. If the conditions mentioned in our specification, are contradictory to the rules or customs imposed by the yard, then our specification will overrule the yard's condition.

1.5. The vessel will be kept insured by the owners during the currency of the contract, but this provision is not intended and is not to be constructed to release the yard from any liability which the law may impose on him.

The yard is to fully protect the vessel and the owner against any claim for injury to workmen, also for any damage done to the vessel, her machinery and/or fittings, while the vessel is undergoing repairs.

1.6. Any particulars and specifications for the works specified here after, are given for the guidance only of the yard, who is in any case to take her own particulars and dimensions; the intention of these specifications is to restore the vessel, in as far as repair- and maintenance works are concerned, to the good conditions as original.

1.7. Any additional work required, beyond that specified here-in, will not be executed by the yard before a written agreement about specification and price between owner and yard, exists.

The yard has the obligation to present in writing to the owners representative the price for the required extra repair work within 24 hours.

The given price must also be an "All in price" as described under 2.1.
No extension of time will be allowed, unless it is mutually agreed that the specified additional work cannot be concurrently carried out with the other work, already described in this specification.

The owners reserve themselves the right to cancel eventually any item in this specification: specified items are only to be carried out after explicit agreement by the owner.

1.8. The amount of work to be done will be decided after inspection of the dredger in dry dock and/or after dismantling major parts.

For repairs not described in detail in this specification and for which it is impossible to estimate, or in case of disagreement, the price will be based on the unit prices given.

These rates must include all overheads.
The yard has in that case the obligation to present daily a specified list of all spent hours for each repair job.

The daily list will be signed by the owners’ representative and the yard.

Any other charges without written agreement will not be accepted on the final invoice.

1.9. All material which will not be reused for the specified works (e.g. propellers, etc.) shall be dismounted, landed ashore, recorded, kept in a secure and protected space, and redelivered to the owner.

All owner's supplied material, will be taken in reception by the yard, recorded, inspected, stored in a secure and protected space until needed, and transported on board for further use.

1.10. During the stay of the vessel at the yard's berth or in dry dock the owner is allowed to have repairs and maintenance work performed on board by the vessels' own crew. Specialists from outside aided by own crew will be allowed to execute repairs and maintenance work. The ship's superintendent will inform the yard about the activities of ship's crew and specialists. If the own crew needs additional helpers these will be supplied by the yard. Own crew will be allowed to operate and use the vessels' deck cranes.

1.11. It is understood that the yard disposes of a stock of plates, profiles and pipes for any reasonable repair.
Required pipe diameters and wall thickness are indicated in this specification. Plate thickness and stiffener scantlings can be seen on the construction plan.
By galvanizing hot dip zinc coating is to be understood.
Galvanizing to be done in accordance with Dutch Standards NEN 1332 and NEN 1275 or equivalent standard.

1.12. Repairs will be surveyed by Bureau Veritas.
Bureau Veritas surveyor will be contacted directly by ship's superintendent.
The repair manager of the yard will inform the ship's superintendent when repaired items can be surveyed by BV at least one weekday in advance.

1.13. The yard will give the necessary assistance to receive spare parts and to fulfil the custom-formalities.

1.14. The yard is not entitled to subcontract parts or parts of the repair work without prior approval of the owners’ representative.

1.15. Only one representative of the owner is entitled to order extra work or decide about the amount of work. Any job carried out without his written approval won't be paid for.

1.16. Since after discussion and inspection, the actual situation of the vessel, its layout and condition, the scope of work, the position of the repair items, are well known to the yard, all prices, whether lump sum or unit prices, are all included and firm.

1.17. If the yard decides to work in 2, 3 or more shifts, on Saturdays and Sundays to fulfil the contract conditions (delivery time) the prices remain, based upon the unit and lump sum prices in the tender.

Overtime rates can only be calculated, if the owner demands to carry out works in overtime of items not mentioned in the work list.

1.18. If the yard decides, for any reason, during the repair period, to shift, move, undock and or dock the vessel, all costs and delays are for the yard's account.

1.19. If the general conditions of the yard are contradictory to the conditions mentioned herein, the latter will overrule!

1.20 Disposal of sand, and/or mud can be done inside the hopper of the ship, if allowed by law or local regulations. If disposal in the hopper is admitted, include the price for storage and disposal in the hopper, in the price related to the activities and the specific repairs, services, works or deliveries.

1.21. The yard will carry out works according to the International Security Procedures, set by … Hereto the yard will keep a traceable record of all personnel boarding and leaving the vessel.

1.22. During the dry docking manoeuvres of the vessel, the ships winches or propulsion will not be used for towing or positioning the vessel in the dock.
2. Quotations

The way in which quotations have to be submitted is indicated here-after for each chapter separately.

Particularly, all quoted prices whether unit price or lump sum shall be "all-in prices", including additional works and/or activities related to the specified repairs, services, works or deliveries, such as for instance:

- Transport costs on and off the ship, between dock or wharf and workshop, of yard or subcontractor, for all parts, tools, equipment, scaffolding, etc.
- Assistance of cranes and floating shearlegs.
- Erecting, use and after works removal of all necessary scaffolding. Independent if it is mentioned in the particular specification or not, the quotation must always include cost for scaffolding.
- Removal and afterwards refitting up to original standard of all parts necessary for access.
- Supply, fitting, use and afterwards removal of necessary ventilation equipment.
- Supply, fitting, use and afterwards removal of lighting on board and/or in dock and/or on the wharf.
- Removal of scrap, garbage, fuel rests, lube oil rests, mud, sand or clay, etc.
- Fire watch.
- Painting of repaired constructions according to the specifications of the coating for the surrounding areas.
- Protection (e.g. canvas cover) of parts of the vessel, required for safety, for protection from rain, sun, wind, dust, grit or for any other reason beyond owner's responsibility.
- Installation, permanently maintaining in working condition, and afterwards removal of all necessary fire fighting equipment.
- Making and afterwards removal of all electric connections and/or generators, and supply of electricity for execution of quoted works, ventilation, lighting, etc. in connection with the works.
- Cleaning work before and after repairs.
- Testing of (repaired) tanks, bulkheads, shell plating, WT doors, weldings, etc., according to classification and regulatory bodies' requirements.
- After completion: cleaning, preservation, painting, etc. of all fitted and/or removed and/or replaced parts, repaired and new steelwork, etc., all this up to original standard or specifications.
- All works necessary to execute the works to a standard of good workmanship and all works necessary for the safety of the personnel and of the vessel.
- It is obvious that minor modifications or adjustments might be required to the owner's supplied parts; this will be taken into consideration when submitting the quotation.
- Should the yard require the removal of any parts of the vessel, fittings, engines, boilers and/or their fittings, or of any fuel, oils, stores, outfit, etc., same is to be done by him. All such removals - in as far as these parts are not to be replaced by new parts - must be subsequently replaced, any damage resulting therefrom to be made good by the yard and at his expense. Should
the yard require the removal of any ashes, dirt, debris, etc., he shall remove same from the vessel at his expense.

- All gear, tools, equipment and services, together with all material necessary to carry out the work, to be supplied by the yard, who are to have full responsibility for same.
- Cleaning for hot works, making gas free and maintaining gas free of tanks and/or other components; gas free inspection and issue of gas free certificate.
- Opening and closing of manholes for access and/or ventilation.
- Removing/refitting of docking blocks or placing additional supports.
- Cutting of ventilation/access holes, openings and closing afterwards.
- All paints will be supplied by the owner.
- Where measurements are to be made a report in duplicate will be made for the owner.
- The general remarks mentioned under steelwork, painting, cleaning, surface preparation, etc. are applicable to all jobs described in other paragraphs where this kind of works are to be executed.
A. PILOTAGE, BERTHING AND UNBERTHING

A.1. Pilot charges
.../movement

A.2. Shifting of vessel
From the anchorage or quay to yard’s berth and/or drydock or back. Providing: tugs, riggers and line handlers.
.../movement

A.3. Mooring and unmooring
Providing line handlers on shore to assist vessel on arrival, shifting and sailing, incl. gangway (install, remove and maintain during complete repair period).
.../movement

Remark: the vessel only has sufficient mooring bollards on SB side

A.4. Wharfage dues at Yard's berth
.../day

A.5. Launch service
.../hour
B. DRYDOCKING

If the yard decides to organise intermediate floodings, the owner has to be informed in due time. If steelworks are ongoing, approval to be granted by the owner to avoid structural damage, example tank top repairs.

B.1. Docking and undocking

Including:

- Assistance of riggers, line handlers, tugboats, etc. to dock the vessel,
- Cleaning of the dock floor after docking,
- Installation of gangway arrangement,
- maintaining gangway during the complete repair period,
- Inspection by divers for final setting on blocks, if necessary or according yard practice,
- For undocking the filling and connections of ballast tank (100cbm).

Lump sum price

During docking, the vessel will open the dredge inlet valves to drain the dredge line system.

B.2. Preparation of docking-blocks

According to the docking plan IHC 01175-0357-010;
Including removal and refitting of keel and side blocks.
Including dock rent while removing / refitting the blocks.

Lump sum price:

B.3. Dry-docking charges, first 2 days

Lump sum price:

B.4. Dry-docking charges, each subsequent day

Lump sum price:

B.5. Dry-docking charges during weekend, holiday

Lump sum price:

Remark: No dry-docking charges on Saturdays, Sundays and holidays, if dock personnel is not working on board of the ship or in the dock.

B.6. Removing and refitting bilge block/keel block while vessel is in dry-dock.

Lump sum price:
C. SERVICES

C.1. Fire-precaution
- Fire-watchman 24h/day  .../cal. day
- Connection and disconnection to vessels fire main  .../connection
- Maintain pressure on fire line per connection  .../cal. Day

C.2. Power supply - A.C. 3 phase 50Hz - 380V - 1000 A.
- Connection and disconnection including cables and terminating:.../connection
- Shore power  .../kWh

Alternatively:
- Provide generator with power cables AC 3 phase 50Hz 380V 1000A  .../day
- Provide fuel including delivery  ..../ton

Remarks:
- For ship’s own use only.
- Power supply for yard’s equipment, tools, lighting, ventilation etc. is to be included in the relevant quoted prices.

C.3. Cooling water - 400 cum/hr maximum 2 bar
- Connection and disconnection  .../connection
- Supply per connection  .../cal. day

Remark: pressure not to exceed 2.bar. If necessary yard will install pressure regulating valve in main supply line.

C.4. Fresh water
- Connection and disconnection  .../connection
- Supply  .../ton

C.5. Garbage removal
- Plastic waste  .../cal. day
- Domestic waste  .../cal. day
- Hazardous waste  .../cal. day
- Steel waste  .../cal. day

C.6. Telephone / internet line 2 MB/sec
- Connection and disconnection  .../connection
- Local calls  .../min
- International calls surcharge  ... %

C.7. Portable toilet and accommodation containers
- Toilet container with 10 toilets.  .../ day
- Office containers for 20 persons  .../ day
• Meeting room container for 20 persons .../ day
• Pantry / kitchen container for 20 persons .../ day

Remark: inclusive cleaning on daily basis including weekend and holidays.

**C.8. Compressed air (7 bar)**

• Connection and disconnection .../connection
• Supply from yard main per day (24 hrs) per connection .../conn. / day

Remarks:
• For connection to the ship’s system and ship’s use.
• Compressed air to be included in the tender.

**C.9. Ventilation**

• Connection and disconnection of 1 fan .../piece
• Maintaining ventilation per piece incl. hoses, cost for compressed air or electric power, standby labour .../cal. Day

Remarks:
• For repairs not expressly called for in this specification.
• All ventilation to be included in the tender.

**C.10. Temporary lighting**

• Connection and disconnection .../connection
• Maintain lighting per piece .../cal. day

Remarks:
• For repairs not expressly called for in this specification.
• All temporary lighting to be included in the quoted prices.
• Inclusive standby labour, shore power, cables, etc.

**C.11. Security man**

• Provide and maintain aily safety and security of vessel undergoing repairs in yard’s premises.

    • Gangway watch … / day

**C.12. Hire of mobile crane and forklifts**

**C.12.a. Mobile cranes**

• Supply, lift and install mobile crane on the dock floor or at the wharf side near the vessel.
• This crane will be used for ship’s parts only: lifting engine parts and other supplies from / into the engine room on to owner’s arranged transport.
• Crane to be provided including fuel, standard lifting gear, operator and rigger / signal man.
• Tender for capacities:
• 20 ton crane
50 ton crane
150 ton crane

Lump sum for mob / demob & installation: ... / lot
Hourly rate ... / hr
Minimum charge per time: ... / hrs
Price per day from 08:00 am – 18:00 pm ... / day
Hourly rate overtime & night : ... / hr
Hourly rate rigger normal hours : ... / hr
Hourly rate rigger overtime & night : ... / hr

C.12.b. Forklifts

Forklift will be used for transporting the ships spares near the ships containers, on the dock floor or at the wharf side near the vessel.
This forklift will be used for ship’s parts only.
Forklift to be provided including fuel, standard lifting gear, operator and rigger / signal man.
Tender for capacities:
5 ton fork lift
10 ton fork lift
35 ton fork lift

Lump sum for mob / demob & installation: ... / lot
Hourly rate ... / hr
Minimum charge per time: ... / hrs
Price per day from 08:00 am – 18:00 pm ... / day
Hourly rate overtime & night : ... / hr
Hourly rate rigger normal hours : ... / hr
Hourly rate rigger overtime & night : ... / hr

C.13. X-ray inspection

Making of X-ray photo of butt weld in bottom, deck or hull plating by class approved inspector.
Including necessary preparation work, all required personnel.
Excluding access works, staging, and cranage.

Lump sum price .../shot

C.14. US inspection

Inspection of weldings or other pieces by class approved inspector.
Including preparation work, all required personnel.
Excluding access works, staging, and cranage.

Lump sum price .../hour

C.15. Penetrant testing

Including preparation work, all required personnel.
• Excluding access works, staging, and cranage.

• Inspection of weldings by means of penetrant testing .../m
• Inspection of steel construction by penetrant testing .../m²

C.16. Catering
• Providing meals for vessels crew, staff and service engineers.

• Price per meal, per person: …./meal

C.17. Thickness measurement (ultrasonic)
• Thickness measurement of bottom plating, bulkheads …./meas
• Thickness measurement of inside of 900 mm pipes …./meas

Remarks:
• Inclusive of surface preparation, lighting and all required personnel.
• Excluding staging.

C.18. Sewage overboard
• Erect a staging in the dock floor under the sewage outlet: l*w*h = 3x3x7m
• One pipe connection to be welded to the ship's hull at the ship's sewage system overboard, connect this pipe with hoses to the drainage, upon completion of repairs all above to be disconnected, cut, ground and removed.

• Lump sum for the complete repair period …./
• Collection and disposal of ship’s sewage if required …./day

C.19. Gas free Inspection
• Daily gas free tests to ensure continuous gas free condition:

• Lump sum price …./day
• Lump sum price …./tank

C.20. ISPS
• In accordance with ISPS enforcement, provide and maintain Daily safety and security of vessel undergoing repairs in yard’s premises.

• ISPS charges per day … / day
• Gangway watch … / day

C.21. Fill of ballast tank before undocking
• Connection and disconnection … conn.
• Fill from shore by seawater per ton …./ton
C.100. Handling and storage of owner’s containers and spare parts.

C.100.1. JDN accommodation containers to be provided by the yard

- Toilet container for 10 persons (toilets and washing basins, soap, towel, paper).
- Change room container with lockers for 40 persons.
- Pantry / kitchen container for 20 persons (for refreshments during the working time, breakfast, lunch and diner will be taken at the hotel and the yard’s refectory).
- Office containers with desks, chairs, cabinets, magnetic white boards for 20 persons.
- Meeting room container with table and chairs and magnetic white board for 20 persons.
- To store near the vessel since no accommodation facilities will be available on the ship for the duration of the repairs.
- Daily cleaning of the containers and security 24 hrs / 7 days a week (we prefer to have a dedicated office cleaning team and security guards).
- 10 bikes with locks and basket.

Lump sum price for the complete duration of the dry-docking: …/.

C.100.2. Yard storage facilities

Yard to provide storage area.

JDN spare parts containers:
- 20 feet container, +/- 20 units
- 40 feet container, +/- 10 units

JDN spare parts as loose components:
- Secure area, +/- 1000 m2

Hydrosan workshop container:
- Hydraulic workshop container for sub contractor “Hydrosan”, preferably to store near the vessel. Alternative near the hydraulic workshop of the yard.
- To foresee 3 x 400 V – 50 Hz, 63 A.

Acopafi parts containers:
- These contain the accommodation components (sanitary units, panelling, etc).
- 40 feet container, +/- 20/25 units

*Storage for these containers is only temporary as they have to be returned to the container line. Un-stuffing of all these containers has to be done by the Yard (see also MLR-D3) and the content stored in the Yard’s warehouses as long as is required for the repairs.*

Yard to provide warehouse for storage of loose components.
- Secure warehouse, +/- 500 m3.
General remarks to Yard storage facilities

- Owner’s and subcontractors containers and spare parts required to carry out the repairs will be delivered to the yard by truck. A list will be provided in due time.
- The yard is to offload all and store in a safe and designated storage area.
- Handling of all spares to / from workshop and / or ship.
- Unstuffing / stuffing and sea fasten the items delivered in containers. After repairs, items as dredge pipes and other ship’s parts to be returned to owner, including stuffing and sea fastening in containers, loading on owners arrange trucks.
- Provide and maintain daily safety and security of ships spares and containers stored at the yard’s premises.
- Including watch house and security man 24 h / day, lights, etc.
- JDN will foresee dedicated storekeeper to keep track of the stock movements. This person needs access to the containers, warehouse, etc.

Lump sum price for the duration of the dry-docking: …. /
D. GENERAL

D.1. Hourly rates during normal working hours of:

- foreman .../hour
- rigger .../hour
- welder .../hour
- steel fabricator .../hour
- pipe fitter .../hour
- cleaner .../hour
- mechanic .../hour
- electrician .../hour

- Rate of normal overtime ...%
- Sunday, Saturday and public holiday’s rate ...%

Remark: Only to be used for the cost calculation of eventual additional jobs.

D.2. Rate of following equipment:

- Diesel welding set (400 Amp) .../day
- Diesel welding set (600 Amp) .../day
- Diesel compressor (50 l/s) .../day
- Diesel compressor (120 l/s) .../day

- Lathe machine large/medium/small, with operator .../hour
- Milling machine large/medium/small, with operator .../hour
- Boring machine large/medium/small, with operator .../hour
- Drilling machine large/med/small, with operator .../hour
- Sawing machine - with operator .../hour

- Transportable boring machine (dia. approx. 1m, length approx. 2m), with operator(s), incl. (dis)mounting .../hour
- Transportable boring machine (dia. approx. 0,1m, length approx. 0,5m), with operator(s), incl. (dis)mounting .../hour

- Supply to be included in all quoted prices;
- For vessel’s own use only, or in case of additional rated jobs.
D.3. Opening and closing of manhole cover.

Drawings
- IHC 01175-0353-010 Tank Testing Plan
- IHC 01175-1023-040 Modification manhole covers

- Erect a safety barrier around the manhole. Open / close the manhole.
- Two types of manhole: round flush type dia 620mm & rectangle type 600 x 500.

Repacking, cleaning and renewing bolts, nuts & gasket (oil and sea water resistant), all yard's supply.

D.4. Bottom plugs

Drawing
- IHC 01175-0353-010 Tank testing plan
- IHC 49162 docking plug for water and oil tanks

Removing, repacking and refitting of bottom plugs of dry tanks, ballast tanks, .../plug
Removing, repacking and refitting of bottom plugs of oil tanks, fueltanks .../plug

After mounting, cementing of plug to be included.

D.5. Staging

Erection and removal of staging.
- on dockfloor .../m3
- in tanks .../m3
- in engineroom, pump room, store, etc .../m3

Daily rate for staging per m3, per day.
- on dockfloor .../m3
- in tanks .../m3
- in engineroom, pump room, store, etc .../m3

Prices are including cranage, lighting and all required auxiliaries.
E. SURFACE PREPARATION

Drawings:
- LD 12-00-025 shell expansion

The “total m²” figures given below apply to the complete areas. For spot blasting, the exact figures of the areas to be coated, however, have to be determined after the vessel is docked.
- Flat bottom, total 1585 m²
- Sides below waterline, total 1250 m²
- Topsides, total 1036 m²

E.1. Light scraping
- flat bottom .../m²
- vertical sides .../m²
- top-sides .../m²
- cutter ladder internal .../m²

E.2. Hard scraping (whatever the hardness of the fouling, barnacles, ...)
- flat bottom .../m²
- vertical sides .../m²
- top-sides .../m²
- tanks (incl. removal of dirt) .../m²
- cutter ladder internal .../m²

E.3. Hosing down with fresh water
- flat bottom .../m²
- vertical sides .../m²
- top-sides .../m²
- decks .../m²
- cutter ladder internal .../m²

E.4. H.P. washing to 3000 psi
- flat bottom .../m²
- vertical sides .../m²
- top-sides .../m²
- cutter ladder internal .../m²

E.5. Degreasing (incl. supply of chemicals)
- flat bottom .../m²
- vertical sides .../m²
- top-sides .../m²
- tanks (incl. removal of dirt) .../m²
- decks .../m²
• cutter ladder internal .../m2

**E.6. Power wire brushing**
- flat bottom .../m2
- vertical sides .../m2
- top-sides .../m2
- tanks (incl. removal of dirt) .../m2
- decks .../m2
- cutter ladder internal .../m2

**E.7. Gritsweeping to SA 1**
- Assume the existing coating thickness is higher than 600 mic.
- If the yard decides to hydroblast in stead of gritblasting, this is to include in the price.
- According ISO 8501-1:2007

- flat bottom .../m2
- vertical sides .../m2
- top-sides .../m2
- tanks (incl. removal of dirt) .../m2
- decks .../m2
- cutter ladder internal .../m2

**E.8. Gritblasting to SA 2.5**
- Assume the existing coating thickness is higher than 600 mic.
- If the yard decides to hydroblast in stead of gritblasting, this is to include in the price.
- According ISO 8501-1:2007

- flat bottom .../m2
- vertical sides .../m2
- top-sides .../m2
- tanks (incl. removal of dirt) .../m2
- decks .../m2
- cutter ladder
  - inner bottom of ladder near trunnions .../m2
  - outer bottom of ladder .../m2
  - outside of ladder i.w.o. and including suction line .../m2
  - cutter ladder internal .../m2

**E.9. Gritsweeping of under water area's to remove antifouling**
- Sweeping to remove all the antifouling, and to roughen the old Colturiet Tiecoat layer. After sweeping, only the bases (height less than 0.5 mm) of the most resistant barnacles remain. Assume the existing coating thickness is higher than 600 mic.
- If the yard decides to hydroblast in stead of gritblasting, this is to include in the price.
- flat bottom \( .../m^2 \)
- vertical sides \( .../m^2 \)
- cutter ladder internal \( .../m^2 \)

**E.10. Grit sweeping of under water area's to remove barnacles and antifouling**

- Sweeping to remove all the antifouling and seagrowth, and to roughen the old Colturiet Tiecoat layer. Even the bases of the most resistant barnacles should be removed.
- Assume the existing coating thickness is higher than 600mic.
- If the yard decides to hydroblast in stead of gritblasting, this is to include in the price

- flat bottom \( .../m^2 \)
- vertical sides \( .../m^2 \)
- cutter ladder internal \( .../m^2 \)

**E.11. Spotblasting to SA 2.5**

- Assume the existing coating thickness is higher than 600mic.
- If the yard decides to hydroblast in stead of gritblasting, this is to include in the price

- flat bottom \( .../m^2 \)
- vertical sides \( .../m^2 \)
- top-sides \( .../m^2 \)
- tanks (incl. removal of dirt) \( .../m^2 \)
- decks \( .../m^2 \)
- cutter ladder internal \( .../m^2 \)

**E.12. Chipping, Flogging off the rust scale**

- tanks (incl. removal of dirt) \( .../m^2 \)
- decks \( .../m^2 \)
- cutter ladder internal \( .../m^2 \)

**E.15. funnel and main mast, degreasing and washing of the.**

Dwg IHC 01175-1072-020  signal mast on funnel

- A staging is to be erected around the main mast from the crane deck funnel to the top of the mast (lxhx= 5x4x12 m). Total staging for the funnel and the mast is 250 m³. *(DWD 2011 invoice.)*
- The mast and topdeck of the funnel is covered by thick and sticky soot from the exhausts.
- Hoses to be connected to the drainpipes from topdeck funnel. All water with soot risidue to be collected and disposed off. The exhaust pipes, venting pipes on the funnel and navigation lights in the mast are to be covered by tarpauline cover prior washing.
• The main mast and the top deck of the funnel are to be completely degreased and washed down by 3000psi high pressure washing.
• After minor steelwork and maintenance by ship’s electricians, the tarpauline covers and stagings to be removed.

Lump sum price:  
• Additional in case more then 20 tons sand:  

**E.100. Degreasing and washing of the deck crane**

Drawing:  
• HMC 7430-01 deck crane general view

Scope:  
• Assume the deck crane is covered with a sticky layer of oil and dust.  
• Assume the vessel is dry docked or alongside a repair berth.  
• Assume the deck crane is secured with the boom in its pedestal on the ladder gantry (frame -5 – 0).  
• Erect a staging around the boogies, portal, engine room, operator cabin, and boom from the crane deck level. Assume 1100 m3. Include 3 time modification of 100 m3 each.  
• The deck crane complete with boogies, portal, engine room, operators cabin and jib is to be completely degreased and washed down with fresh water by 3000psi high pressure washing.  
• All water with grease residue to be collected, disposed off and decks in way to be degreased and washed down.

Lump sum price:  

Lump sum for additional washing off with sweet water while scaffolding remains in place  

**E.101. Scraping and cleaning of the in- and outside of the cutter ladder**

IHC 5242839 Cutter ladder general arrangement

• The inside and the outside of the cutter ladder is to be cleaned, scraped and washed.  
• Erect staging under the complete bottom of the cutter ladder: l*w*h = 37x7.5x8/12m. Erect tower and hanging staging’s inside the open to sea spaces: 5 units l*w*h=8x6x6m. Supply and install sufficient temporary lighting and ventilation.  
• Note the limited and difficult access to the open to sea spaces inside the cutter ladder.  
• Hard scraping of the complete bottom, side walls and all the inside of the open to sea spaces in the cutter ladder including internals as indicated on the drawing.  
• Remove, dispose off all sand, mud & marine growth assume 20 tons.  
• HP wash entire bottom and the inside of the open spaces of the cutter ladder.
E.102. hydro jetting
Applicable standard is SSPC: The Society for Protective Coatings.

Hydro jetting to standard WJ2 \( \ldots \)/ m²
Hydro jetting to standard WJ3 \( \ldots \)/ m²
Mobilisation and demobilisation of equipment \( \ldots \)/set

E.103. Deck crane sand blasting
Drawing:
- HMC 7430-01  deck crane general view

Scope:
- Assume the deck crane has been degreased and washed according specs E.100. and the scaffolding is still in place.
- On the deck crane, install / remove covering of the operators’ cabin windows, ventilations and openings of engine room and operators cabin.
- On the crane deck, install / remove covering of open hatches during grit blasting. Assume:
  - PS and SB pump room hatches (fr 60 – 74)
  - Engine room hatch (fr 114-122)
  - PS and SB Bosun store hatches (89 – 93)
- Sandblasted to SA 2.5 according specs E.8. the deck crane complete with boogies, portal, engine room, operators cabin and jib.
- All grit to be collected and disposed off, and decks in way to be washed down.

Lump sum price:
\( \ldots \)/
**General remarks to E**

1. All prices given in E are including:
   - staging
   - temporary lighting
   - ventilation
   - cranage
   - cleaning of dock floor and vessel, removing, disposal and destruction of grit, dirt, mud, sand, fouling (barnacles, etc.), etc...
   - all required auxiliaries (e.g. air supply, water supply,...)

2. When gritting, sandblasting or water jetting all machinery and openings are to be sufficiently protected and/or closed. Any cleaning of the vessel, the vessel’s interior and cleaning and repairing contaminated machinery will be for the yard's account. No gritting and painting to be done simultaneously. Before painting all surfaces should be cleaned and free of dust (by brushing or washing with fresh water) and dry.

3. All scuppers and outlets to be plugged with wooden plugs and fitted with drain pipes or whatever required to prevent stripes of water flow on ship's sides during painting.

4. Prices for vertical sides resp. topsides, will also apply to:
   - Ladder and spud carrier well
   - Spud carrier (exterior parts, assume carrier has been removed)
   - Outside surface of cutter ladder
   - Rudder protection
   - Rudders
   - Stern tube, stern tube A-frame, etc.
   - Guides for forward anchor pole
   - Door, hinges, etc. for auxiliary spud
   - Swivel bend construction on the fore ship
   - Bulwark (outside)

5. Any extra surface preparation mentioned under paragraph E due to:
   - Bad weather
   - High humidity
   - Interference with other repair jobs
   - Oil spill by yard
   - Any other reason beyond owner's responsibility

   **will be for the yard's account.**

6. Prices for decks will also apply to:
Beams, winch foundations, hatch covers, coamings, bollard bases, bulwarks, fairleads, etc.
7. Extra care has to be taken for the spud carrier travel cylinder, located frames 132 ~ 140. The piston rod if exposed, should be fully protected. Assume 10 m² of canvas is required.
F. PAINTING (HEMPEL paint)
All paint is owner supplied

F.1. Casco
Drawings:
- LD 12-00-025 shell expansion

The “total m2” figures given below apply to the complete areas. For touch up, the exact figures of the areas to be coated, however, have to be determined after the vessel is docked.
- Flat bottom, total 1585 m2
- Vertical sides below waterline, total 1250 m2
- Topsides above water line, total 1036 m2

F.1.1. Flat bottom
- T/U HEMPADUR 15570, DFT 75 .../m2
- T/U HEMPADUR QUATTRO 17634, DFT 175 .../m2
- T/U HEMPADUR 45182, DFT 50 .../m2
- F/C HEMPEL'S ANTIFOULING OLYMPIC+ 72900, DFT 100 .../m2

F.1.2. Vertical sides below waterline
(incl. Spud carrier well, ladder well, tank 58, swivel bend.)
- T/U HEMPADUR 15570, Grey 12170, DFT 75 μm .../m2
- T/U HEMPADUR QUATTRO 17634, Red 50630, DFT 175 μm .../m2
- T/U HEMPADUR 45182, Yellowish grey 25150, DFT 50 μm .../m2
- F/C HEMPEL'S ANTIFOULING OLYMPIC+ 72900, Brown 60600, DFT 125 μm .../m2
- F/C HEMPEL'S ANTIFOULING OLYMPIC+ 72900, Red 51110, DFT 125 μm .../m2

F.1.3. Topsides above waterline
(incl. Spud carrier well, ladder well, tank 58, swivel bend)
- T/U HEMPADUR 15570, DFT 75 .../m2
- T/U HEMPADUR QUATTRO 17634, DFT 125 .../m2
- T/U HEMPADUR MASTIC 45880, DFT 100 .../m2

F.2. Repainting of marks
- 6 draught marks, 2 plimsoll marks, 45 tank & bulkhead markings, 20 bottom marks, 24 bottom plug marks to repaint.
- vertical sides below water line F/C HEMPATEX ENAMEL 56360, DFT 50
- top sides above water line F/C HEMPELADUR MASTIC 45880, DFT 50

Lump sum price .../
F.3. Repainting of name and homeport
- Ship’s name, IMO number and homeport on stern, ship’s name on PS and SB bow.
- Top sides above water line F/C HEMPADUR MASTIC 45880, DFT 50

Lump sum price: ...

F.4. Cutting the line between underwater and topside
Lump sum price: ...

F.5. decks
- T/U HEMPADUR 15570, DFT 75 \( .../m^2 \)
- T/U HEMPADUR QUATTRO 17634, DFT 125 \( .../m^2 \)
- T/U HEMPADUR MASTIC 45880, DFT 100 \( .../m^2 \)
- Lumpsum renewal of complete coating system: ...

F.6. Ladder and its internals
- T/U HEMPADUR 15570, DFT 75 \( .../m^2 \)
- T/U HEMPADUR QUATTRO 17634, DFT 175 \( .../m^2 \)
- T/U HEMPADUR 45182, DFT 50 \( .../m^2 \)
- F/C HEMPEL'S ANTIFOULING OLYMPIC+ 72900, DFT 100 \( .../m^2 \)
- Lumpsum renewal of complete coating system: ...

F.7. Cover and paint fixed Portholes, cover anodes and fit scupper plugs
Drwg. : IHC 1175-1024-010 : Plan of Windows and Portholes
- Cover all the glasses of 48 pcs fixed portholes (pos. 1 Drwg. 1175-1024-010) below upper deck with a suitable plywood or cardboard plate diameter 300mm or similar. Fix the plate with glue or silicone to the glass. High pressure wash and sweep blast the portholes to SA 1.0 in conjunction with the hull blasting. After the blasting and painting, remove all covers, remove and clean any remains of glue, paint, dirt from the glass.
- Cover all 205 Aluminium anodes
- Fit wooden and cement plugs at 24 locations.

Lump sum price: ...

F.8. Tank 58 in spud carrier well
Drawings:
- IHC 1175-1618-010 Intermediate piece Spud carrier well.
- IHC 01175-1618-030 Sea fastening dummy in spud carrier well.
- IHC 01175-0353-010 Tank Testing Plan.
F.8.1 Removing and painting of tank 58 in spud carrier well

- The dummy tank construction no 58 is to be removed to gain complete access to the sides of the casco and the spud carrier.
- Disconnect, lift out dummy (17 ton) and lower it down onto dock blocks on the dock floor. Including fabricating, fitting, welding and testing lifting eye plates if it is required by the yard.
- Disconnect, remove, clean, dress up the securing pins 01175-1618-030 pos 20. Refit with new ships supplied seals and other parts if required.
- Turn the dummy on the dock floor as required to complete the grit blasting and painting.
- Erect, remove and re-erect staging to access to complete outside area as required.
- Lift, return and re-install dummy in the vessel’s seats.
- Grit blast and paint the complete outside of the dummy as per item E10 and F1 in conjunction with the hull blasting and painting. Assume 80 % to SA1 & 20% to SA2 ½.
- If yard decides to transport and gritblast the dummy in another location then in the dry-dock, all handling and other additional charges are included.
- After completion works, return and refit the dummy tank in the ship’s construction.

- Lump sum price: ...

F.8.2 Staging in the spud carrier well for access during blasting and painting

- Assume the dummy tank has been removed as per item F8.1
- Assume the spud carrier is positioned in the middle
- Erect a tower staging in the well between spud carrier and aft wall spud carrier well from the dock floor to upper deck: l*w*h = 5x6x12m

- Lump sum price: ...

F.9. superstructures

- T/U HEMPADUR 15570, Grey 12170, DFT 75 μm .../m2
- T/U HEMPADUR QUATTRO 17634, Red 50630, DFT 175 μm .../m2
- F/C HEMPATHANE TOPCOAT 55210, DFT 50 μm .../m2

Remark on different shade for final coat:
- central accommodation tower from crane deck to top deck is white, Hempel shade 17760 (RAL 9016);
- funnel is black, Hempel shade 17970 (RAL 9017);
- company emblem on funnel is white, Hempel shade 17760 (RAL 9016) and signal red;
- All other superstructures (central accommodation tower below crane deck, forward accommodation, ladder gantry and barge loading gantries) are light grey, Hempel shade 17380 (RAL 17380).
F.10. Dry tanks or void spaces
Refer to chapter H concerning cleaning, access, etc.

- T/U HEMPADUR 15570, DFT 75 .../m2
- T/U HEMPADUR QUATTRO 17634, DFT 125 .../m2
- F/C HEMPADUR MASTIC 45880, DFT 100 .../m2

F.11. Ballast tanks
Refer to chapter H concerning cleaning, access, etc.

- T/U HEMPADUR 15570, DFT 75 .../m2
- T/U HEMPADUR QUATTRO 17634, DFT 125 .../m2
- F/C HEMPADUR QUATTRO 17634, DFT 125 .../m2

F.12. Fresh water tanks
Refer to chapter H and E concerning surface preparation, cleaning, access, etc.
Assume staging is already in place for blasting.
Please note some special items in the paint specification: Hardening time of 12 days after which the tank has to be filled with water and drained 24 hours afterwards (2 times) and afterwards flushing with fresh water from top to bottom.

For Painting
- T/U HEMPADUR 35560, DFT 300 .../m2
- F/C HEMPADUR 35560, DFT 100 .../m2
For tank filling, draining & flushing,
- Tank N°10 (156 m³) .../Lumpsum
- Tank N°19 (97 m³) .../Lumpsum

F.13. Life boat PS + SB, coating repair
Assume the life boats are removed from the vessel and stored at the yard premises.

- Surface preparing with sand paper or light tools
- T/U HEMPATHANE TOPCOAT 55210, DFT 50 μm

Unit price. .../m2

F.100. Blasting and painting of compartment around SB seawater inlet in separator corridor.
Drwg. : 1175-0323-020 sh 1/2
The coating of the recess in the bottom i.w.o. the seawater inlet valve is damaged.
• Seal off the area to be blasted.
• Approx. 25 m²
• Remove scale on heavily rusted spots by flogging.
• HP washing total area
• Degreasing total area
• Grit blast to SA2.5 and paint with 300 µ SIGMA TCP/CSF coating (1T/U by brush + 1 F/C + 1 stripe coat by brush).
• All general remarks under E, F and G are applicable
• Remove and dispose of, all scale, mud, etc.
• All staging included.
• Clean up all contaminated area’s. (Clean up means: remove all grit and dust, wash with fresh water and soap all wall’s, ceilings and equipments)

All remarks under E and F are applicable

Lump sum price: …/
**F.101. Repair paint system void space in cutter ladder near turning points Fr.**

5242778 Aft part cutter ladder

- The paint system of the bottom part of the void spaces in the cutter ladder is to be repaired. Location void spaces: dwg 5242778, between frame -1 to 1 & 1350-2650 out of CL.
- Assume cutter ladder in high turning point and vessel in dry-dock.
- Opening and closing of 1 pcs manhole cover (incl. repacking, cleaning and renewing of washers, bolts and nuts if necessary).
- Ventilation to allow for inspection of tank, inclusive obtain and maintain a gas free certificate, and the inspections required for this.
- Cutting / rewelding necessary holes in bottom of ladder to evacuate scale, sand / mud from tank.
- Scraping out mud and dirt from the tank.
- HP washing 3000 PSI of complete tank, pump out and mop dry.
- Grit blast SA 2 ½ the bottom area of the tank up to 2.0 m above tank top
- HP wash and chemical cleaning, hosing down with fresh water after blasting.
- Apply 2 stripe coats on areas where DFT can not be reached by spray painting. (edges, scallops, weld seams etc.)
- Paint with 1 x 75 µm T/U EP Universal primer and 2 x 125µm F/C TCN 300.
- Air testing of tank.

Lumpsum price: …/

**F.102. Repair paint system in void space 51.**

01175-0353-010 Tank plan

- The bottom plating in the void space 51 is corroded. The walls and stiffeners are corroded from bottom to around 200mm above base
- Works only to be carried out in dry-dock. Manholes in the pump room are to remain closed.
- Cut temporary access openings in the bottom plating. Install temporary ventilation, lighting, access staging. After works, close and weld plate in temporary access opening.
- Clean, HP wash the entire void space.
- Install a humidifier unit to keep the humidity in the tank below 70 %
- Grit blast the bottom plating and the walls & stiffeners from bottom to 200 above base to SA 2 /1/2. Sweep blast the remaining surface of the void space. Void space to be blasted from from 29 to 59 and between 6650mm portside & starboard side from centre.
- Clean, blow, remove all grit and dust prior painting.
- Apply a manual strip coating on the blasted stiffeners and corners. Spray paint the tank with two layers full coat, paint owner’s supply.
- All under supervision by paint supplier’s representative.
F.103. Repair paint system in void space 46.

01175-0353-010   Tank plan

- The bottom plating in the void space 46 is corroded. The walls and stiffeners are corroded from bottom to around 200mm above base. The other parts of the tank are still coated with a bituminous paint.
- Works only to be carried out in dry-dock. Manholes in the pump room are to remain closed. Note that the dredge pump well is integrated in this void space. This well is excluded.
- Cut temporary access openings in the bottom plating. After works, refit and re-weld temporary access openings. Including vacuum box testing of welds.
- Supply and install sufficient temporary lighting, ventilation and access staging.
- Clean, HP wash the entire void space.
- Install a humidifier unit to keep the humidity in the tank below 70%.
- Grit blast the complete inside of the void space, the bottom-, the top plating, the walls & stiffeners to SA 2 /1/2. Void space to be blasted from frame 59 to 78 and between 6650mm portside & starboard side from centre. Excluding the dredge pump well.
- Clean, blow, remove all grit and dust prior painting.
- Apply stripe coating on the blasted stiffeners and corners. Spray paint the complete tank with two layers full coat, paint owner’s supply.
- All under supervision by paint supplier’s representative.

Lumpsum price : ...

F.104. Repair paint system tank top pump room between frame 38 & 59.

01175-0319-510 sh1   Arrangement view on tank top

- The paint system on the tank top in the pump room is to be repaired between frame 38 to 59 and between 6650 mm from centre to portside and 1500mm from centre to starboard side.: 125 m2.
- The tank top to be cleaned, degreased, HP washed.
- Tank top to be de-rusted 100 % to ST3. Tank top under the gland pump unit including drip-tray wall and the well in way of the inlet sluice valve to be included as well.
- Paint with 3 layers ships supplied paint.

Lumpsum price : ...

F.105. Clean and repair paint system tank top tank 55

01175-0353-010   Tank plan
• Open 2 manholes of tank 55. Install ventilation & temporary lighting
• Clean, wash out and pump empty the tank. Assume 1m³ mud in the tank to be removed & disposed of.
• Repair the paint system inside the tank in way of a repaired steel damage by grinding to ST3 and painting with 3 layers ships supplied paint. Assume surface of 4 sqm.

Lumpsum price : ...

F.106. Degreasing, de-rusting and painting of upper and crane deck

01175-0338-030 General arrangement

• Part of the upper and crane deck is to be degreased, de-rusted and painted.
• Degrease, HP wash the entire upper and crane deck.
• Derust the rusty spots by power brushing to ST3. Assume 50% of the surface to be de-rusted.
• Touch up the decks with primer and fully paint the deck with two layers paint. All paint supplied by ship.
• Note that the yard is to complete sections in order to provide access for all labour and crew during the ship repair.
• If yard proposes to grit blast of water blast in lieu, this must be included in the lump sum price.

Price per sqm : ...

F.107. Degreasing, de-rusting and painting of deck- & wheelhouse

n.a.

F.108. Degreasing, de-rusting and painting of spud towers

01175-0338-030 General arrangement
LD-10-00-072 Arrangement spud carrier

• The two spud towers from crane deck to top is to be degreased, HP washed, derusted and painted. Spud towers located on the forecastle deck, frame 130 – 148.
• Erect a staging around the two spud towers from crane deck to top. Install tarpaulin covers all around
• Assume that the hoisting and clamping mechanisms and cylinder are removed.
• Degrease, HP wash the entire spud towers
• Derust the rusty spots by power brushing to ST3. Assume 20% of the surface to be de-rusted.
• Including all platforms, stairs and ladders in way.
• Touch up de-rusted parts with primer and fully spray-paint the spud towers with two layers paint. All paint supplied by owner.

Lumpsum price : …/ 

F.109. Repair paint system ballast tank no. 9

Drawings:
• IHC 01175-0353-010 Tank plan

Scope:
• Assume job to be performed after steel works G.186.
• Assume tank is dry
• The paint system of the ballast tank is to be repaired. Capacity ballast tank is 185.7 m³.
• Assume that the tanks are opened and staging is erected under specification item G.186. If the staging needs to be adjusted topside, this is included.
• Open / close dock plug. Supply and install lighting and ventilation
• Wash the inside of the ballast tank with 3000 PSI HP washing. Collect, dispose washing water.
• Supply, install a dehumidifier to keep humidity below 70%.
• Assume rusted area of total 20 m² spread in the tank on various locations / levels.
• Perform full blasting of the in G.186. renewed areas (complete underside of the tank top and several renewed profiles/webframes) to SA 2.5 according specs E.11.
• Perform spot blasting to SA 2.5 of the other rusted areas (20m³)
• Perform grit sweeping ot SA1 of all the other areas in the tank
• Perform coating repair according specifications F.10:
  o Pre-stripe and fully spray paint the ballast tank with 3 layers of special thick layered ballast tank coating. Paint supplied by owner.
• Including ventilation, temporary lights, permits, etc.

Lumpsum price: …/ 

• Cut, refit & re-weld openings in the side or bottom of the tank for access. Including vacuum box testing of welds.
• Supply, install a dehumidifier to keep humidity below 70%.
• Grit blast the inside of the complete tank to SA 2 ½
• Perform coating repair according specifications F.10:
  o Pre-stripe and fully spray paint the ballast tank with 3 layers of special thick layered ballast tank coating. Paint supplied by owner.

Lump price for full grit blast and re-paint: …/

F.110. Grit blasting and painting of internals of dummy tank 58 in spud carrier well

Dwg : 1175-1618-010 : Intermediate piece Spud carrier well

49/568
Assume the dummy is removed and on the dock floor as per item F8.
- The complete internal paint system is to be renewed.
- The yard is to removed / refit the capstan fitted on the deck.
- If the yard decides to transport the dummy from the dock floor to the workshop, this is to be included.
- Cut, refit & re-weld the necessary openings in the side or bottom of the tank for access. Including vacuum box testing of welds.
- HP wash and dry out tank.
- Supply, install a dehumidifier to keep humidity below 70%.
- Grit blast the inside of the dummy tank completely to SA 2 ½. Including gritblasting of the well in way of the capstan. Works are done in conjunction with the painting of the outside as per item F8.1.
- Pre-stripe and fully spray paint the ballast tank with 3 layers of special thick layered ballast tank coating. Paint supplied by owner.
- If yard requires additional pad eyes for lifting, this is to be included. Allow for fabrication, welding, cutting and repair of burn marks of max 6 eyes.

Lump price for full grit blast and re-painting:

F.111. Repair paint system main and crane deck

Assume the main and the crane deck is corroded on average 35%
- Cover all electrical lights, panels, switches by tarpaulin covers
- Degrease and clean the decks by high pressure washing to 3000 PSI
- The corroded area’s on the decks are to be spot water blasted to SA 2 ½ and deck to be fully sweep blasted.
- Area’s of paint system to be repaired include deck surface, all platforms in way, stair casings, railings, drip tray’s, crane tracks, deck machinery hatch covers.
- Re-paint the decks with 3 layers of paint, paint. Paint spray only. Including stripe coating in way of the walls.
- All as per existing paint colors. Note that top of crane tracks and other tripping hazards are to be re-painted with yellow / black stripes and top of railings to be painted yellow.
- During the works, deckhouses and walls to be protected by plastic during the works.

Lump sum price to repair the paint system main and crane deck:

F.112. Repair complete paint system tank top pump room

01175-0319-510 sh1 Arrangement view on tank top
The paint system on the tank top in the pump room is to be repaired between frame 37 to 78 and between 6650 mm from center to portside and starboard side. : 385 m2.
Assume that the wooden floor is removed as per item G154.
Assume that the spare parts will be removed from the pump room by the crew.
The complete tank top is to be cleaned, degreased and high pressure washed.
The tank top to be fully water blasted to SA 2 1/2. Including the tank top under the gland pump unit, drip-tray walls, the well in way of the inlet sluice valve, the two dredge pump wells, the drain wells, all area’s under floor plates, under dredge pump bearing and shaft.
The dredge pump well of 75cbm is only partly open. The well covered by deck plate is to be fully blasted internally.
Including removal & disposal of grit, dirt, mud, grease, water.
A dehumidifier is to be arranged by the yard to keep the humidity in pump room and in pump well below 70%.
Paint tank top, pump well and other wells with 3 layers ships supplied paint.

Lumpsum price :

\[ \text{F.113. Re-paint complete pump room} \]

\[ \begin{align*}
01175-0319-510\_1 \text{ revG} & \quad \text{Arrangement pumproom – new situation} \\
01175-0319-510\_2 \text{ revC} & \quad \text{Arrangement pumproom – new situation} \\
01175-0319-510\_3 \text{ revC} & \quad \text{Arrangement pumproom – new situation}
\end{align*} \]

The walls, the ceiling, the machinery and pipes in the pump room are to be repainted.
The complete space tween frame 37 to 78 and between 6650 mm from to portside and starboard side is to be repainted.
Staging’s are to be erected to access all walls, ceiling, pipes & machinery in the pump room.
The ceiling, the walls, the piped and the machinery in the pump room are to be cleaned, degreased and high pressure washed.
The rusted area’s are to be derusted by power brushing to ST3. Assume 5% on walls and ceiling, 30 % of the pipe area’s, 50% of the machineries (dredge pumps, other pumps, valves,..)
Including removal & disposal of grit, dirt, grease, water.
A dehumidifier is to be arranged by the yard to keep the humidity in the pump room and in pump well below 70%.
All to be painted with 3 layers ships supplied paint.

Lumpsum price :

\[ \text{F.114. Repaint complete barge loading gantries} \]

LD-01-02-141 Arrangement barge loading system
Dwg 01175-0338-030 General arrangement
Refer to pictures file names P104.34a.pdf, P104.34b.pdf, P104.34c.pdf, P104.34d.pdf, P104.34e.pdf & P104.34f.pdf

Picture F114.

- Assume staging is erected around the 4 the barge loading gantries and supports pipes as per items P104.34 & U104. Modification of staging if required is included.
- Degrease & HP wash the barge loading gantries, supports pipe, hose, hydraulics and attachments.
- Derust the rusty spots to ST3. Assume 10% of total area. T/U with 3 layers of paint.
- Apply 2 full coats on all area. All by paint spray. Note that the color of the gantry and support pipe is different as shown in the pictures. Cover the complete gantry and staging using plastic to prevent overspray to other parts of the vessel.

Lumpsum price for 4 barge loading gantries: ....
F.115. Spud carrier, inside and outside area, coating repair and renewal.

Drawing:
- IHC 5242777 section plan spud carrier
- IHC 5242783 spud carrier section 2 - construction
- IHC 5242785 spud carrier section 6 - construction
- IHC 5242786 spud carrier section 5 - construction
- IHC 5242772 spud carrier section 4 - construction

F.115.1. Inside area.

Scope:
- Open/close manhole covers, 3 pieces.
- Pump out remaining sea water from section 5 and 6.
- Grit blasting to SA 2.5 according specs E.8.
- Coating renewal only after completion of all the hot works specs K.7.2. and G.174.
- Section 2,
  - Bottom side and vertical sides spot blasting 30 %.
  - Coating renewal according specs F.10. dry tanks.
  - Final coat, one full coat.
- Section 4,
  - Bottom side full blasting 100 %.
  - Vertical sides spot blasting 50 %.
  - Sandblasting of one (1) manhole cover size 650 x 375 (access from section 4 to sections 5).
  - Access cutting can be done on PS and SB, sizes 1500 x 350. including vacuum testing of the welds.
  - Coating renewal according specs F.10. dry tanks.
  - Final coat, one full coat.
- Section 5 (=ladder passage from section 4 to section 6),
  - Complete blasting 100 %.
  - Existing ladders will be renewed in this section according specs G.174.
- Section 5 water tight compartment, wash and clean out.
- Section 6 (A + B),
  - Complete blasting 100 %.
  - Full sandblasting of two (2) manhole covers size 650 x 375 (access between sub sections 6 A and 6 B).
  - One job will take place in section 6 B according specs K.7.4.
- Washing out of complete inner side of the spud carrier after completion of the coating works.
- Including ventilation, gas free certification, temporary lightning, permits, etc.

Lumpsum price: .../
F.115.2. Outside area.

Job may clash with K.113.

- Spud carrier section 4-5-6, complete coating renewal.
- Spud carrier section 1-2-3, spot repair 30% and final full coat.
- Grit blasting to SA 2.5 according specs E.8.
- Hosing down with fresh water according specs E.3, complete spud carrier.
- Coating according specs “F.1.2. vertical sides below water line”.

Lumpsum.price : ...

F.116. Ladder PS dry tank, coating renewal

Drawings:
- IHC 5242778 cutter ladder after part
- IHC 5242839 General arrangement cutter ladder

Volume of the ladder PS dry tank is 63 m³, located between ladder frames -1 till 4, 2650 ~ 3700 from the centre line. Manhole access is via the outside of the ladder, in way of the suction / pressure hose recess between frames 3 and 4, PS.

Scope:
- Assume vessel is dry docked. Ladder can be in position or been driven out from the ship.
- Install / remove scaffolding in the suction / pressure hose recess, assume 25 m³ scaffolding (including the movements for intermediate floodings). Open / close two (2) manhole covers, including renewal of packing (section 2650 from CL) and cleaning and dressing up the bolts / nuts / threads.
- Complete interior surface including the stiffeners.
  - Sandblasting to SA 2.5 according specs E.8. of
  - Coating renewal according specs “F.10. void spaces or dry tanks”
  - Hosing down with fresh water according specs E.3.
- Including ventilation, temporary lightning, staging, removal of grit, cleaning, permits, access, etc.

Lumpsum.price : ...

F.117. Ladder well coating renewal for special area

Drawings:
- LD 00-01-014 working plan for coating casco

When the ladder is not removed from the ship, an area on the casco is not accessible for coating repair / renewal. When the ladder is driven out from the vessel, this area requires a dedicated coating.

Scope:
• Assume the ladder has been driven out from the ship’s ladder well. The previous inaccessible area’s on PS and SB (LD 00-01-014) can now be serviced. Total area is 90 m².

• Perform on the ladder well areas vertical sides:
  o Scraping of barnacles (100%)
  o H.P washing 3000 PSI (100%)
  o Gritblasting SA 2.5 (100%)
  o Take note that thickness measurements will have to be taken in order to assess the condition of this part of the hull.
  o Hosing down with FW (100%)
  o 2 Sub layers:
    ▪ F/C Hempadur 15570, DFT 75µm
    ▪ F/C Hempadur Quattro 17634, DFT 175µm
  o 3 Silicone layers
  o First finish all surrounding non silicone coatings and mask these areas to prevent paint contamination
    ▪ F/C Hempasil Nexus 27310, DFT 100 µm
    ▪ F/C Hempaguard X7 89900, DFT 125µm
    ▪ F/C Hempaguard X7 89900, DFT 125µm
  o All paints to be applied in close cooperation with Hempels coating advisor and according to Hempels standards.
  o Yard to arrange DFT measurements of each coating layer, to be taken in presence of Hempel inspector / ships crew

• Including all means like cherry picker, staging, temporary lightning, permits.

Lump sum price:

F.118. Available

F.119. SB void space around refrigeration units, re-coating of tween deck area.

Drawings:
• IHC 01175-0334-060 accommodation dry provision store room
• IHC 01175-0338-030 general arrangement drawing

The void space is located on the tween deck, SB frames 41 – 56, above fuel oil tank no. 50. It is accessible from the dry store (pos 10 / IHC 01175-0334-060). The area surrounds the two (2) refrigeration units.
The floor area (20 m²) and the lower 20 cm of the surrounding walls (5 m²) are corroded and covered with a layer of hydraulic oil.

Scope:
• Limited access due to pipe lines running alongside the side shell.
• Remove / refit the pipe lines located on the lower part of the side shell. Pipe lines and bulkhead penetrations to be blinded off. Yard to supply the blinds.
  Inclusive opening / closing of pipe brackets.
  ▪ Thermal oil lines, 2 lines, dia 1 ½”, flanged connections.
  ▪ Grease lines, 3 lines, dia 1” with cutting ring couplings (ERMETO S).
• Hydraulic line, 1 line, dia 3 “with SAE flanges 3000 PSI.

• Remove / renew the insulation around the thermal oil lines. Assume 25 m length including 10 flanges.

• Remove / renew the wall insulation on the lower side of the walls. Assume 25 m2 of Rockwool.

• Degrease the floor area. Assume additional 25 m2 of walls and pipelines to degrease. According specifications “E.5. Degreasing (incl. supply of chemicals)”.

• Perform power wire brushing of the floor area and the lower 20 cm of the surrounding walls according specifications “E.6. Power wire brushing”.

• Hose down with fresh water the area according specifications “E.3. Hosing down with fresh water”.

• Coating renewal of the area according specifications “F.10. void spaces or dry tanks”.

• All insulation to be supplied with an asbestos free certificate. Technical specifications to be submitted to owner representative for approval prior the commencement of works.

• Including all means like ventilation, temporary lightning, permits, transport of equipment – consumables – parts, disposal of cleaning debris, oily water, etc.

Lumpsum price:

F.120. Casco complete coating renewal

Drawings:

• LD 12-00-025 shell expansion

Definitions:

• Flat bottom total area is = 1585 m2
• Vertical sides below waterline (including spud carrier well and dummy tank 58, ladder well, swivel bend on bow) total area is = 1250 m2
• Topsides (including spud carrier well and dummy tank 58, ladder well, swivel bend on bow) total area is = 1036 m2
• The ladder well runs from frames -5 till 38 and 3850 from centre line on PS and SB.
• The spud carrier well runs from frames 121 till 154 and 1050 / 1850 mm from centre line PS and 3850 / 4650 from centreline SB.
• The dummy tank no. 58 is installed in spud carrier well frames 150 till 154.
• The swivel bend (=shore connection) is installed on the bow.

Scope:

• Hoist in / out dummy tank no. 58.
• Sand blasting of flat bottom, vertical sides below water line and topsides above water line to SA 2.5 according specs E.8.
• Coating renewal (full coating for each layer) of flat bottom, vertical sides below water line and topsides above water line according specs F.1.
• Including all means required, like staging, cherry picker, covering port holes, blocking scuppers, covering in way of upper deck railing and fore castle deck,
removing grit from upper deck, permits, equipment and manpower for DFT measurements, sufficient temporary lightning for works at night time, etc.

- General remarks to chapters E and F apply.
- All paint is owner supplied.

Lump sum minus the swivel bend arrangement (U.7. dry dock 2014 only)  

**F.121. deck crane coating repair and renewal**

Drawing:
- HMC 7430-01 deck crane general view

Scope:
- Assume the crane has been sandblasted to SA 2.5 according specs E.103. and the scaffolding is still in place.
- Coat according the Hempel deck crane specification:
  - F/C HEMPADUR 15570, Metal grey 19840, DFT 50 μm
  - F/C HEMPADUR QUATTRO 17634, Red 50630, DFT 125 μm
  - F/C HEMPADUR 45880, Beige 22090, DFT 75 μm
  - F/C HEMPATHANE TOPCOAT 55210 Yellow 27230, DFT 75 μm

Lump sum minus the swivel bend arrangement (U.7. dry dock 2014 only)  

**F.122. Funnel outside coating renewal**

Drawings:
- IHC 01175-0323-100 plan of main dimensions
- IHC 01175-0323-110 construction plan funnel
- IHC 01175-1072-020 signal mast on funnel
- IHC 01175-1807-020 funnel emblem

Definitions:
- The funnel area is 405 m2, including the front wall, aft wall, PS and SB wall, top deck and signal mast.
- The company emblem on PS and SB side of the funnel is 7 m2.
Scope:
- Sand blasting of complete area to SA 2.5 according specs E.8.
- Coating renewal (full coating for each layer) of complete area according specs F.9. super structures.
- Including all means required, like staging erecting-modification-removal, cherry picker, blocking scuppers, covering of ventilation blinds in funnel and exhaust pipes, removing grit from upper deck or any inside the funnel, permits, equipment and manpower for DFT measurements, sufficient temporary lightning for works at night time, etc.
- General remarks to chapters E and F apply.
- All paint is owner supplied.

Lumpsum.price: …/

F.123. Ladder gantry outside coating renewal

Drawings:
- IHC 01175-0323-100 plan of main dimensions
- IHC 01175-2851-030 cutter ladder gantry
- IHC 01175-2581-090 platform in cutter ladder gantry

Definitions:
- The ladder gantry is installed on the aft side, frames -5 ~ 1, from upper deck till 23.6 ma above base.
- The total surface of the ladder gantry area is 330 m2.

Scope:
- Assume the cutter heads are removed from the gantry.
- Degreasing of the inner vertical sides (PS and SB) of ladder gantry according specs E.5., assume 75 m2.
- Sand blasting of complete outside area of the ladder gantry to SA 2.5 according specs E.8.
- Hosing down with fresh water of complete outside area of the ladder gantry according specs E.3.
- Coating renewal (full coating for each layer) of complete outside area of the ladder gantry according specs F.9. super structures.
- Including all means required, like staging including erecting-modification-removal, cherry picker, blocking scuppers, covering of access in gantry and winches on the gantry, removing grit from upper deck or any inside the gantry, permits, equipment and manpower for DFT measurements, sufficient temporary lightning for works at night time, etc.
- General remarks to chapters E and F apply.
- All paint is owner supplied.

Lump sum with ladder in place …/
Lump sum with ladder removed …/

Additional for coating renewal on inner vertical sides (PS and SB) of ladder gantry
- Assume the inner vertical sides (PS and SB) of ladder gantry from upper deck level to 5 m above the crane deck, total surface 50 m2.
• Degreasing according specs E.5.
• Sand blasting to SA 2.5 according specs E.8.
• Hosing down with fresh water according specs E.3.
• Coating renewal (full coating for each layer) according specs F.9. super structures.
• Including all means required, like staging including erecting-modification-removal, cherry picker, blocking scuppers, covering of access in gantry, removing grit from upper deck or any inside the gantry, permits, equipment and manpower for DFT measurements, sufficient temporary lightning for works at night time, etc.
• General remarks to chapters E and F apply.
• All paint is owner supplied.

Lump sum with ladder in place
Lump sum with ladder removed

F.124. Fore peak tank no. 1 and coffer dam no. 5 coating repair

Scope tank no.1
• Assume job to be performed after steel works G.169.
• Assume job to be combined with cofferdam tank no.5 coating repair F.133. since tank 5 is accessible from inside tank no.1 only.
• Assume tank is dry.
• Assume rusted area of total 20 m2 spread in the tank on various locations / levels.
• Perform spot blasting to SA 2.5 according specs E.11.
• Perform coating repair according specifications F.10.
• Including ventilation, temporary lights, permits, etc.

Scope tank no. 5
• Assume tank has 1 cm water left on the bottom.
• Assume job to be combined with fore peak tank no.1 coating repair F.124. since tank 5 is accessible from inside tank no.1 only.
• Open / close and renew packing on two (2) manhole covers.
• Complete bottom area to be grit blasted to SA 2.5 according specs E.8.
• Perform on area of 5 m2 spot blasting to SA 2.5 located on several locations in the tank according specs E.11.
• Perform coating repair according specifications F.10. on grit blasted area’s.
• Including ventilation, temporary lights, permits, etc.

Lumpsum.price : […]

F.125. Fore peak tank no.2 and coffer dam tank no.6 coating repair

Scope tank no.1
• Assume job to be performed after steel works G.169.
• Assume job to be combined with cofferdam tank no.6 coating repair F.139. since tank 6 is accessible from inside tank no.2 only.
• Assume tank is dry.
• Assume rusted area of total 10 m² spread in the tank on various locations / levels.
• Perform spot blasting to SA 2.5 according specs E.11.
• Perform coating repair according specifications F.10.
• Including ventilation, temporary lights, permits, etc.

Scope tank no.6
• Assume tank is dry.
• Assume job to be combined with fore peak tank no.2 coating repair F.125. since tank no.6 is accessible from inside tank no.2 only.
• Open / close and renew packing on two (2) manhole covers.
• Perform on area of 5 m² spot blasting to SA 2.5 located on several locations in the tank according specs E.11.
• Perform coating repair according specifications F.10. on grit blasted area’s.
• Including ventilation, temporary lights, permits,

Lumpsum.price : …/ 

F.126. Double bottom tank no.52 coating repair
• Assume tank is dry.
• Open / close and renew packing on three (3) manhole covers.
• Complete bottom area and 10 cm of all vertical sides to be grit blasted to SA 2.5 according specs E.8.
• Perform coating repair according specifications F.10.
• Including access cutting on bottom side and vacuum testing of the welds.
• Including ventilation, temporary lights, permits, etc.

Lumpsum.price : 

F.127. Double bottom tank no.53 coating repair
• Assume tank is dry.
• Open / close and renew packing on three (3) manhole covers.
• Complete bottom area and 10 cm of all vertical sides to be grit blasted to SA 2.5 according specs E.8.
• Perform coating repair according specifications F.10.
• Including access cutting on bottom side and vacuum testing of the welds.
• Including ventilation, temporary lights, permits, etc.

Lumpsum.price : 

F.128. Coffer dam tank no.8 coating repair
• Assume tank is dry.
• Open / close and renew packing on two (2) manhole covers.
• Complete bottom area and 10 cm of all vertical sides to be grit blasted to SA 2.5 according specs E.8.
• Perform coating repair according specifications F.10.
• Including access cutting on bottom side and vacuum testing of the welds.
• Including ventilation, temporary lights, permits, etc.

Lumpsum.price : ...

F.129. Dry tank no.2a coating repair
• Assume tank is dry.
• Open / close and renew packing on one (1) manhole cover.
• Area of 10 m2 to be grit blasted to SA 2.5 according specs E.8.
• Perform coating repair according specifications F.10.
• Including access cutting on bottom side and vacuum testing of the welds.
• Including ventilation, temporary lights, permits, etc.

Lumpsum.price : ...

F.130. Double bottom tank no.39 coating repair
• Assume tank is dry.
• Open / close and renew packing on two (2) manhole covers.
• Complete bottom area and lower 10 cm of all vertical sides to be grit blasted to SA 2.5 according specs E.8.
• Perform coating repair according specifications F.10.
• Including access cutting on bottom side and vacuum testing of the welds.
• Including ventilation, temporary lights, permits, etc.

Lumpsum.price : ...

F.131. Double bottom tank no.23 coating repair
Prior the coating works, the hot works according G.192 and G.194. have to be completed.

• Assume tank is covered with an oily residue.
• Open / close and renew packing on four (4) manhole covers.
• Perform cleaning of tank H.1.7. including deposit of oil water residue due to cleaning of 10 m3.
• Complete bottom area and lower 10 cm of all vertical sides to be grit blasted to SA 2.5 according specs E.8.
• Assume after grit blasting a crack repair will need to be done. Assume 0.5 m on one location according specs G.1.
• Perform coating repair on complete bottom area and grit blasted area’s according specifications F.10.
• Including access cutting on bottom side and vacuum testing of the welds. Testing to be witnessed by the captain or first officer.
• Including ventilation, temporary lights, permits, crack repair, etc.

Lumpsum.price : ...

F.132. Double bottom tank no.40 coating repair
• Assume tank is dry.
- Open / close and renew packing on two (2) manhole covers.
- Bottom area is only shop primered. Perform a grit sweeping to SA 1 according specs E.7.
- Assume area of 5 m2 to be spot blasted to SA 2.5 according specs E.11.
- Perform coating repair according specifications F.10. on grit blasted area and complete bottom area.
- Including access cutting on bottom side and vacuum testing of the welds.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : …/

**F.133. Pump room, bilges for hull inlet dredge valve lower position 528, renew coating.**
Tank top area is located between frames 37 ~ 42, 1.05 m to PS and SB from centre line, total surface of 10 m2. Job can be combined with F.142.

Scope:
- Assume the valve and pipe (pos 2, 3 and 4 / LD 01-01-163) have been removed according specs U.3.1.a.
- Pump out and dispose any remaining water from the bilges, assume 1 m3.
- Perform hydro jetting according specs E.102. including pumping out of water. Alternatively perform grit blasting to SA 2.5 on according specs E.8. Including cleaning of grit in pump room.
- Perform coating renewal according specifications F.11. Ballast tank.
- Included shielding / covering of the area.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : …/

**F.134. Double bottom tank no.51 coating renewal**
The tank manholes are accessible via the pump room. Prior the coating, steel works according specs G.199 to be completed.

- Assume tank is dry.
- Open / close and renew packing on four (4) manhole covers.
- Combine the job with coating repair of tank 51A according specs F.138.
- Complete inner area (bottom, sides and top) to be grit blasted to SA 2.5 according specs E.8.
- Assume after grit blasting a pitting repair by welding will need to be done. Assume 50 man hours according specs G.1.1.
- Perform thickness gauging of complete bottom area after the grit blasting according specs C.17. and report to owner.
- Perform coating renewal on complete inner according specifications F.10.
- Including access cutting on bottom side and vacuum testing of the welds.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : …/
F.135. Double bottom tank no.12 coating repair

- Assume tank is dry.
- Assume fresh water tanks no. 10 and 19 are empty and their manholes have been opened. Tank no. 12 is located below tank 10 and 19.
- Open / close and renew packing on two (2) manhole covers.
- Assume a total area of 4 m² spread out over four (4) locations to be power wire brushed according specs E.6.
- Perform coating repair according specifications F.10.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : …/

Additional for access cutting in flat bottom (in case job is clashing with repairs in tanks 10 and 19). Including vacuum testing of the welds, witnessed by the ships captain or first officer.

Lumpsum.price : …/

F.136. Fresh water tank no.19 coating repair

- Open / close and renew packing on two (2) manhole covers.
- Pump out remaining fresh water, assume 5 m³.
- Erect staging, assume 15 m³ in total on 5 different locations.
- Assume a total area of 5 m² spread out over ten (10) locations to be power wire brushed according specs E.6.
- Perform coating repair according specifications F.12.
- Including ventilation, temporary lights, permits, pumps, hoses, etc.

Lumpsum.price : …/

F.137. Coffer dam tank no.8 coating repair

- Assume tank is dry.
- Open / close and renew packing on two (2) manhole covers.
- Complete bottom area and lower 10 cm of all vertical sides to be grit blasted to SA 2.5 according specs E.8.
- Perform coating repair on complete bottom area and grit blasted area’s according specifications F.10.
- Including access cutting on bottom side and vacuum testing of the welds.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : …/

F.138. Dry tank no. 51A coating repair

Drawings:
- IHC 01175-1117-010 sheet 1 ladder well end part

63/568
Scope:
- Assume tank is dry.
- Combine the job with coating renewal tank 51 according specs F.134. since the manhole is accessed via tank 51.
- Open / close and renew packing on one (1) manhole cover.
- Assume a total area of 5 m² spread out over five (5) locations to be spot blasted according specs E.11. include the manhole cover.
- Perform coating repair according specifications F.10.
- Including access cutting on bottom side and vacuum testing of the welds.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : …/

**F.139. Water ballast tank no. 11 coating renewal**

Drawings:
- IHC 01175-0353-020 tank testing plan
- IHC 01175-1605-010 water ballast tank fr 124 ~ 131

Volume: 74.6 m³

Job to be combined with steel works according specs G.184.

Scope:
- Assume the ship is in dry dock.
- Assume the tank has been cleaned according specs H.1.4.
- Erect / remove staging, assume 50 m³ and allow for 3 times modification.
- Cut / weld access in the bottom plate. Include vacuum testing of the welding seams, witnessed by the captain or first officer.
- Grit blast the complete tank to SA 2.5 according specs E.8.
- Complete coating renewal according specs F.11.
- Close the manhole cover of frame 124 (generator room) during the grit blasting and coating.
- Prior coating works, all hot works to be completed.
- Including all means like ventilation, lights, permits, coating thickness measurements, reporting, etc.

Lumpsum.price : …/

**F.140. Aft peak tank PS no. 54 coating repair**

- Assume tank is dry.
- Open / close and renew packing on one (1) manhole cover.
- Perform on area of 3 m² power wire brushing located on several locations in the tank according specs E.6.
- Perform coating repair according specifications F.10. on treated area’s.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : …/
**F.141. Aft peak tank SB no. 55 coating repair**
- Assume tank is dry.
- Open / close and renew packing on one (1) manhole cover.
- Perform on area of 3 m² power wire brushing located on several locations in the tank according specs E.6.
- Perform coating repair according specifications F.10. on treated area’s.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price :...

**F.142. dredge pumps well in pump room complete coating renewal**

**Drawings:**
- IHC 01175-1301-010 double bottom fr 69-80
- IHC 01175-1302-010 double bottom fr 58-69

The area is above tank 46 A and is open to the pump room. Frames 63 till 75. During the work, grit will be thrown in the pump room. Job can be combined with F.133., pipe renewal item P.104.174., and coating works of G.171.

- Assume a volume of this open tank with stiffeners is 40 m³.
- Install / remove temporary covering of the area to limit the grit pollution in the pump room.
- Perform hydro jetting according specs E.102. including pumping out of water. Alternatively perform grit blasting to SA 2.5 on according specs E.8. Including cleaning of grit in pump room.
- Perform coating renewal according specifications F.11. Ballast tank.
- Including access cutting in way of tank 46 A and the flat bottom and the vacuum testing of the welds.
- Including ventilation, temporary lights, permits, etc.

Lumpsum.price : ...

**F.143. PS cofferdam in ER coating repair**

**Drawings:**
- IHC 01175-0338-030 sheet 2 General Arrangement Drawing

The area is between main deck and upper deck, frames 85-113. Two (2) manholes are present in the ER.

**Scope:**
- Assume tank has 1 cm water left.
- Open / close and renew packing on two (2) manhole covers.
- Pump and bail out any remaining water.
- Complete bottom area and lower 10 cm of all vertical sides to be grit blasted to SA 2.5 according specs E.8.
- Perform pitting repair by welding, on location frame 112, according specs G.1.1.
- Perform coating repair on complete bottom area and grit blasted area’s according specifications F.10.
- Including access cutting on shell side and vacuum testing of the welds.
- Including ventilation, temporary lights, permits, etc.

Lumpsum price:

**F.144. Chain lockers coating repair**
- Assume both chain lockers have been washed out according specifications T.2. and the manhole covers are open.
- Perform wire brushing according specs E.6., assume 4 m2, spread out all over the locker.
- Perform coating repair on treaded area’s according specifications F.11. Ballast tank.
- Including ventilation, temporary lights, permits, etc.

Lump sum

**F.145. Fresh water tank no. 10 coating renewal**

Drawings:

Tank volume is 155.6 m3.

Job to be combined with steel works according specs G.172.

Scope:
- Assume tank has been cleaned according specs H.1.5.
- Assume staging is in place.
- Cut / weld access cutting in ships side. Include vacuum testing of the welds, witnessed by the captain or first officer.
- Grit blast complete area to SA 2.5 according specs E.8.
- Coat the complete area according specs F.12.
- Close the three (3) manhole covers on main deck (engine parts store) and to double bottom tank no. 12 prior the grit blasting and coating.
- Prior coating works, all hot works to be completed.
- Including all means like ventilation, lights, permits, coating thickness measurements, reporting, etc.

Lumpsum price:

**F.147. Aux spud door coating renewal, in and outside area’s.**

Drawings:
- IHC 01175-1607-010 Spud keeper for auxiliary spud.
- IHC 01175-1682-010 bulwarks on spud keeper on PS
The aux spud door weighs 36 ton and will be removed according specification K.6.3. Job to be combined with steel works K.7.3. and G.176.

Scope:
- Assume the unit has been removed and is available at the yard’s workshop / repair area according specs K.6.3.
- Assume wear plates pos (124 and 125 / IHC 01175-1607-010) have been removed according specs K.7.3.
- Open / close and provide with new packing the dock plug (pos 3) and manhole cover.
- Mark the cutting line with stainless steel welds.
- Assume access has been cut according specs G.176.
- Grit blast complete door to SA 2.5 according specs E.8., applicable for the outside area and the inside area. Expect heavy corrosion on the inside. Remove all the rust and grit from the inside.
- After completion of the steel works, perform complete coating renewal for the outside area according specs F.1.2. and F.1.3 and for the inside area according specification F.10.
- Including all means like ventilation, lights, staging, permits, reporting, paint thickness measurements, etc.

Lumpsum.price : …/

**F.148. Cutter ladder, fan room on PS hatch, coating renewal.**

Drawings:
- IHC 01175-2410-170 fan room on PS hatch cutter ladder
- IHC 49307 sheet 1 water tight door 600 x 1000
- Pictures F.148. ladder fan room

Scope:
- Assume the hatch has been removed for job S.3.
- Disconnect / connect and remove / refit two (2) axial ventilators, light and switch in the fan room. Supply and renew rubber seals on ventilators (508 x 600 mm, pos 1 / IHC 01175-2410-170).
- Remove / refit filter frames (625 x 560 mm), twelve (12) pieces.
- Disconnect / connect door (650 x 1050 mm, IHC 49307). Renew seal (yard supply, moose rubber 20 ° shore), dress-up hinges and handles.
- Remove / refit the upper ventilation duct from the fan room, loosen / tight bolts and nuts (pos 3, 4 / IHC 01175-2410-170). Supply and renew the seal (detail II).
- Grit blast the complete inner area and the loose flange (1210 x 710) to SA 2.5 according specs E.8. Spot blast the outer area to SA 1, assume 3 m3 over three (3) locations.
- Renew the complete coating on the inner side and the loose flange according specs F.10. and touch-up the other area according F.9.

Lumpsum.price : …/
General remarks to F

- Same remarks as under paragraph E.
- Painting done by airless spray.
- Paint supplied by Owner.
- Prices include reception and storage of the supplied paint in an appropriate yard store (closed, with temperature as indicated by paint manufacturer) and transport from the store to the dock by the yard.
- Prices include collection, transport, disposal and destruction of empty or nearly empty tins.
- Price includes staging, lighting, cranage, templates, covering of sacrificial anodes and openings, all auxiliary means.
- Painting can only be done after approval by the superintendent of the surface preparation.
- Painting will not be done during rainfall, with too low temperatures or on humid surfaces.
- Drying times as indicated by the paint manufacturer, taking into account the air humidity, to be respected.
- DFT thickness measurements are compulsory. Hempel inspector must do the DFT measurements and he shall provide an analyse report of his measurements.
- Following rules apply:
  - 80/20 rule in general, except for ballast tanks, FW tanks and sewage tanks. This means: 20% of the measurements are allowed to be lower than the required DFT, but the minimum measured thickness may not be lower than 80% of the required DFT.
  - 90/10 rule apply for ballast tanks, FW tanks and sewage tanks
  - In general take 1 DFT measurement per 5 m²
  - Random DFT or wet film measurements for each intermediate layer
G. STEELWORK

G.1. Repairs steelwork - general

Drawings:
- IHC 01175-0323-010. Construction plan fore ship
- IHC 01175-0323-020. Construction plan mid ship
- IHC 01175-0323-030. Construction plan aft ship

G.1.1. Repair of cracks

Gouging out and welding afterwards: near the ladder turning point, in tanks, cofferdams, the ladder, the spud carrier, the ship's hull, etc.

Building up by welding
- Of weld seams which are in bad condition, or of pitting in plates of or worn surfaces of machinery parts.
- Welder, inclusive his equipment, power supply, basic electrodes, and everything required to perform the job.
- Assume area is gas free.
- Exclusive staging.
- Sandblasting of welding seams, grinding (no gouging) and applying maximum 3 welding seams.

Unit price ........../hour-welder
Unit price ........../meter weld

G.1.2. Repairs to hull and internals, stiffeners, brackets, beams, etc. in way of the ladder lower turning points.

Assume ladder is in upper turning point or tilted position.
Quantity: 0-500 kg.
Price per kg: ........../kg

G.1.3. Bottom plating min. 5 tons

a) Straight plates - thickness:
- 10 to 15 mm ....../kg
- 15 to 20 mm ....../kg
- 20 to 30 mm ....../kg
- 30 to 40 mm ....../kg

b) Single curved plates - thickness:
- 10 to 15 mm ....../kg
- 15 to 20 mm ....../kg
- 20 to 30 mm ....../kg
- 30 to 40 mm ....../kg
G.1.4. Hull plating (incl. ladder and spud carriage well) min 5 tons

a) Straight plates - thickness:
   - 10 to 15 mm  .../kg
   - 15 to 20 mm  .../kg
   - 20 to 30 mm  .../kg
   - 30 to 40 mm  .../kg

b) Single curved plates - thickness:
   - 0 to 15 mm  .../kg
   - 15 to 20 mm  .../kg
   - 20 to 30 mm  .../kg
   - 30 to 40 mm  .../kg

c) Double curved plates - thickness:
   - 0 to 15 mm  .../kg
   - 15 to 20 mm  .../kg
   - 20 to 30 mm  .../kg
   - 30 to 40 mm  .../kg

G.1.5. Internals in way or damaged plating

a) Internal plates:
   - 100 to 300 kg  .../kg
   - 300 to 500 kg  .../kg
   - Over 500 kg  .../kg

b) Brackets, profiles, beams, pipes:
   - 50 to 100 kg  .../kg
   - 100 to 250 kg  .../kg
   - Over 250 kg  .../kg

Eventual extra:

- For shaped internals.
- For single plates in one tank or compartment.
- For plates only, leaving internals or stiffeners in place for 75 % or more.
- For internals only (without renewing attached plating in way).
- For work in double bottom tank, pump room, engine room, cofferdam, peak tank, settling tank or bunker tank.
- For work in all other tanks.
- For work in chain locker.
- For small quantities:
  - less than 5m2
  - more than 2m2
G.2. Hull cathodic protection

Drawings
- IHC 01175-2636-010 sh01 & Sh02 Anodes Hull & Ballast tanks
- NICOV15....NICOV87 Aluminium Anodes

Scope
Renewing of Yard’s supplied aluminium anodes, on ladder and spud carrier well, hull, cutter ladder in- and outside, sea chests, rudders, ballast tanks, A-frame, rudder protection, spud carrier, dummy, spud door, etc. according to drwg. 01175-2636-010 - 2 sheets.

- 38 pcs. of type NICOV 15 (1.5 kg / L=300mm) .../pc
- 18 pcs. of type NICOV 17 (1.7 kg / L=430mm) .../pc
- 7 pcs. of type NICOV 23 (2.3 kg / L=330mm) .../pc
- 30 pcs. of type NICOV37 (3.7 kg / L=450mm) .../pc
- 63 pcs. of type NICOV 62 (6.2 kg / L=700mm) .../pc
- 61 pcs. of type NICOV 87 (8.7 kg / L=1060mm) .../pc

Lump sum price for renewal of all anodes, assume all the anodes delivered by owner at the yard. … / set

Incl. cutting of remains of old aluminium anodes, staging, cranage, access, etc.

REMARKS:
- The ship is fitted with doubler plates i.w.o. the locations where the straps of the aluminium anodes have to be welded. If the yard cannot supply aluminium anodes of the same type as specified, yard to adjust the supplied Aluminium anodes by welding an extension flat bar to the straps of the aluminium anodes, at yards expense.
- In order to have a full paint system also behind the aluminium anodes, those aluminium anodes which need replacement have to be removed before Surface preparation on hull starts and have to be installed only after hull painting is finished. Burn marks to be touched up by power tooling and 1 coat of A/F.

G.3. Repairs of damaged railing

- Assume the railing is partly damaged on upper- and crane deck, on cutter gantry and –platform
- Existing railings are made from stanchions 50x20x1000mm height.
- The top horizontal railing pipe is made from pipe D42mm. Two intermediate horizontal railings pipes are made from pipe D25 mm. All pipes are schedule 40 and all parts are hot dipped galvanized.
- The damage parts are to be cut and partly renewed. Butt welds on the railing pipes are grind smooth.
- After repairs, paint system to be repaired to ST3 and 3 layer’s ships supplied paint.
- assume min. 2 meter pipe per location
Price per renewal stanchion: .../stanchion
Price per renewal of railing pipe 42mm: .../meter
Price per renewal of railing pipe 25 mm: .../meter

**G.4. hawse pipe PS and SB to renew**

Drawings:
- IHC 01175-1041-010 sheet 1 & 2 arrangement anchors.

The hawse pipes are located in dry space / store on main deck and in the dry space / store on the upper deck. PS is in way of frames 132 ~ 136, SB is in way of frames 130 ~ 137.

Scope:
- Assume the anchor chains have been lowered to the dock floor according specs T.1.
- Remove the stored spare parts from the room, to create good working circumstances. Assume 1 m³ per location.
- Remove / refit scaffolding of 2 m x 2 m x 8 m.
- Gouge out existing, supply and weld new seamless steel pipe 508 x 20, length: 2.2 m. Remove / refit chamfered wear strip (80 x 40) in anchor pocket. Pay special attention to the intersection of the pipe with the girders / stringers.
- Fabricate, fit and weld 180° liner (pos 180, yard supply) on lower end of the hawse pipe.
- Coating according specs E.6. and F.10.

Lump sum. /PS and SB hawse pipe

**G.101. Installation of container dove tails on crane deck**

0175-0323-020 Construction midship
FR-31 U-frame
B-45 U-frame twistlock
LE-1 D lashing ring

- The yard is to supply and install U-frame type container twistlocks on the crane deck.
- In total 2 x 4 pieces twistlocks to be installed on the maindeck.
- 4 twistlocks for one 20ft container to be installed between frame 96 & 105, from center vessel to 2450mm to portside.
- 4 twistlocks for one 20ft container to be installed between frame 106 & 115, from center vessel to 2450mm to portside.
- The crane deck in way of the container fittings is protected by wood. Angle bars holding the wood to be cut, the wooden beams in way of the container fittings to be removed and modified. Angle bars to be supplied and fitted in a square of 500mm around the container fittings to secure the wooden beams to the deck.
• The ceiling panels & insulation in the accommodation space under the crane deck are to be removed in way of the hot work. After the works, the insulation in way of the works to be renewed and ceiling panels to be refitted. The yard will cover the flooring and wall panels in way of the works.
• Erect stagings.
• The yard is to fabricate a filling block of 50mm thickness to fit under the dove tail. Yard is to supply and weld U-frames as per drawing FR-31 or similar. Container twistlocks as per drawing B-45 or similar to be supplied and installed.
• At each container fitting a 30 tons D-ring type lashing ring as per drawing LE-1 to be supplied and installed. Deck to be re-inforced underneath by a 200x15x1200 stiffener
• The yard will install and weld transversal re-inforcements of 300x15x1200 under the crane deck in way of each container fitting
• After welding, paint system to be repaired by wire brushing to ST3 and painting 3 layers ship’s supplied paint.
• The yard will test the container fittings using an owner’s supplied 20ft container and present to owner’s representative

Lumpsum price : …/  

G.102. Installation of container dove tails above the delivery pipe

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0175-0323-020</td>
<td>Construction mid ship</td>
</tr>
<tr>
<td>FR-31</td>
<td>U-frame</td>
</tr>
<tr>
<td>B-22</td>
<td>Base twist lock</td>
</tr>
<tr>
<td>LE-1</td>
<td>D-ring lashing ring</td>
</tr>
<tr>
<td>G102</td>
<td>Picture container support</td>
</tr>
</tbody>
</table>

• Four container foundations with a twist lock on top are already installed over the delivery pipe between frame 113 and 122.
• Four additional similar removable container foundations are to be fabricated and installed between frame 103 & 112. Foundations are 1970mm height above the crane deck. Foundations are made of H-beams 200x200 which are closed at the sides. The two portside foundations are vertical pillars only. The 2 foundations starboard side are constructed from vertical and horizontal pillars. Yard is to supply and weld U-frames as per drawing FR-31 or similar on top of the supports. 4 container twist locks as per drawing B-45 or similar to be supplied and installed.
• Removable longitudinal supports on two of the existing containers foundations at frame 122 and on two of the new foundations at frame 112 to be fabricated and installed. Supports are made from pipe and are removable by flanges.
• At each container foundation a 30 tons D-ring type lashing ring as per drawing LE-1 to be supplied and installed.
• The ceiling panels & insulation in the accommodation space under the crane deck are to be removed in way of the hot work. After the works, the insulation in way of the works to be renewed and ceiling panels to be refitted. The yard
will cover the flooring and wall panels in way of the works. Staging’s to be included.

- The yard will install and weld transversal re-enforcements of 300x15x1200 under the crane deck in way of the foundation and D-ring type lashings on all locations.
- After welding, paint system to be repaired by wire brushing to ST3 and painting 3 layers ships supplied paint.
- The yard will test the container fittings using an owner’s supplied 20ft container and present to owner’s representative

Lumpsum.price :

---

**G103. Enlarging of two openings in web frames of the cutter ladder**

5242768 Cutter ladder – first section

- The two round holes of diameter 500 in the web frames 15 & 16, 1100 above bottom cutter ladder are to be enlarged.
- Cut the existing round opening of 500mm out to a vertical oval opening of 500x1000mm.
- Supply, form, fit and weld re-enforcement flat bar of 100x15mm in the new openings.
- After the steelwork, repair the paint system by grinding to ST3 and painting 3 layers ships supplied paint.

Lump sum price for two openings :

---

**G.104. Repair steel damage in way of void space no. 55**

01175-1115-010 p1-3 construction afship, frame -5-17

- The starboard longitudinal bulkhead of 3850mm from center and the bottomplating in way of frame -4 to -2 is damaged.
- The damage is in way of void space no. 55. The two manholes to be opened, tank to be vented, temporary lighting to be installed and gasfree certification to be provided.
- Erect a staging.
- Wash out, clean the tank. Remove, dispose around 200 kgs mud.
- Note that the void space is very small. If yard requires temporary access holes, this is included in the lumpsum price.
- Assume that the damage is temporary repaired by doubler plates from the outside. Two doubler plates of 1.5 x 1.5 m x 16mm thickness to be cropped off and removed.
- The opening of 500mm diameter in longitudinal 5950 starboard, between frame -4 & -3 is temporary closed. The opening 600x500 in the webframe -2
is temporary closed. Cut out the 10mm closing plates, grind smooth the openings.

- If yard
- Repair the damaged bottom- & bulkhead plating by insert as indicated on the drawings. Assume total steel to be renewed: 800 kg. Damage in webframe -3 to be repaired partially by insert.
- Repair the paint system inside the tank by grinding to ST3 and painting with 3 layers ship’s supplied paint. Tank to be fully washed and cleaned after the repairs.
- The bottomplating the side plate to be gritblasted to SA 2½ and painted with 4 ship’s supplied layers paint as per paint system.

Lumpsum price for 800 kgs steel renewal: ..../
Price per kg for more or less kg steelwork: ..../

G.105. Renewal of deckplating on crane deck frame 100-115.

01175-1814-010 (3p) Crane deck frame 94-111
01175-1815-010 (3p) Crane deck frame 111-124
01175-2615-010 Wooden work deck
01175-0338-030 General arrangement

- The deckplating on the crane deck from frame 100 to 115, from centreline to 5050mm to portside is corroded and need to be replaced. Thickness plate 9mm – grade A.
- The spaces below this area are: washplace & ‘drawing room’, currently equipment with cabin furniture, fan rooms and boatswain store room.
- The yard is to be remove the furniture from the affected cabins. Furniture may be stored in other not affected cabins. The ceiling panels are to be removed and stored safely. The vertical wall are to be covered fully or removed if necessary. The toilets cubicles, the lockers and all sanitary equipment in the wash place to be covered and protected during the works. Assume the inventory of the boatwain store will be removed by the ship’s crew. Lockers, desks and all fixed storage equipment to be covered and protected during the works. The yard will install sufficient tarpauline covers and extraction fans to insure that no dust and welding fumes enter the remaining part of the accommodation space. Note that this works are to be done in conjuction with item… - cleaning of the accommodation space. All dirt and dust entering the accommodation spaces are to be cleaned and washed off by the yard.
- The wooden protection beams above the crane deck is to be numbered, removed and refitted in the same manner. Angle bars holding the wooden beams to be cut, and wood to be removed, cleaned and stored safely. All wood to be removed from frame 95 to 116. The crane deck to be cleaned and washed.
- Thickness of the crane deck to be measured by UT every 0.5 meter.
- Deckplating to be renewed as indicated on the drawings. Assume total weight of 3800 kg deck plating to be renewed.
- Price including staging, ventilation, lighting, access works.
• After steelwork, the inside to be derusted to ST3 and painted with 3 layers ship’s supplied paint. The crane deck in way of the steelwork and the surrounding deck under the complete wooden floor to be gritblasted to SA 2½ and painted with 3 layers ship’s supplied paint.

Lumpsum price for 3800 kg :

Price per kg less or more steelwork :

Additional price to remove furniture, ceiling panels and cover wall panels of cabin marked on general arr. Dwg ‘ archives’ :

G.106. Repair bottom damage in way of void space no. 51 & no. 53

01175-0323-020 (2p) Construction plan mid ship

• The bottom plating is indented in way of void space no. 51 & 53 and between frame 40 and 44.
• The manholes to be opened, void spaces to be vented, temporary lighting, ventilation to be installed and gas free certification to be provided. Tank to be cleaned and washed out.
• Erect a staging.
• Repair the damaged bottom plating by insert. Assume total steel to be renewed : 2000 kg. Damages on stiffeners to be repaired by insert.
• Repair the paint system inside the tank by grinding to ST3 and painting with 3 layers ships supplied paint. Tank to be fully washed and cleaned after the repairs.
• The outside of the bottom plating to be grit blasted to SA 2½ and painted with 4 ship’s supplied layers paint as per paint system.

Lump sum price for 2000 kgs steel renewal :

Price per kg for more or less kg steelwork :

G107. Replace manhole cover in void space no. 51 by insert

01175-0323-020 (2p) Construction plan mid ship

• Assume that the void space 51 is opened and gas freed under item G106.
• The square manhole cover of 600x1000mm size with coaming made of angle bar is to be cropped off from the tank top. The manhole is situated in a free area in the pump room at frame 50. The hole is to be cut larger with round corners.
• The yard is to supply, fit and weld an insert plate of 11 mm thickness grade A.
• The paint system inside the tank and on the tank top to be repaired by grinding to ST3 and painting with 3 layers ship’s supplied paint.

Lump sum price for one insert :

Additional price for opening and gas freeing the void space 51 in case item G106 is not carried out :
G.108. Install removeable platforms in the dredgepump wells.

dwg G108. Removeable platforms dredgepump well

- Cropp off, remove the existing platforms & steps fitted in the dredgepump wells
- Cropp off, remove temporary supports from the pipe foundation fitted in way.
- Cropp off, remove horizontal angle bar, welded on the bottom of the dredgepump well. Assume 30 meter angle bar 50x50 in each dredgepump well. Grind smooth.
- Open up the manholes of void space 46. Install temporary lighting, vent and gasfree the void space.
- Extend the tanktop at the aft side of the dredgepump well by 200mm. Supply, fit & weld a plate of 10mm, 4200mm by 200mm. Plate to be supported with flat bar 50x10x4200 and 6 stiffeners underneath.
- Fabricate two removeable platforms as per enclosed sketch. The yard will measure, make a construction sketch for approval by owner’s representative. Special attention to be paid that the platform can be removed easily. Note that opening is to be provided in way of the installed flushing pipe. Platforms are made of angle bar 100x100x10, heavy duty grating and kickbords in 8mm steel plate.
- After fabrication, platform to be gritblasted to SA 2 ½ and painted with 3 layers ship’s supplied paint.

Lumpsum price for platforms in SB & PS dredgepump wells : ..../

G.109. Repair bottom deck plating upper deck frame -3 to 2 Portside.

LD 11-00-036 Extension aft ship for fenders
G109 Picture damage deck plating

- The upper deck is indented in way of the extension aft ship portside between frame -3 and frame 2.
- Erect a staging.
- Repair the damaged deck plating of 12mm by insert as per shaded area on the drawing LD 11-00-036 Assume total steel to be renewed : 300 kg. The round bar and stiffeners in way of the area to be renewed as well.
- New deck plating on top and bottom and surroundings to be grit blasted to SA 2 ½ and painted with 4 ship’s supplied layers paint as per paint system.

Lump sum price for 300 kgs steel renewal : ..../
Price per kg for more or less kg steelwork : ..../

G.110. Renewal guide for power cable deck crane

- Erect a staging
• The steel guide for the power cable deck fitted on the crane deck at starboard side is to be renewed from frame 0 to frame 141.
• Assume that the deck crane is moved away from the work area. Cable guide to be renewed in several parts.
• Old cable guide to be cropped off. A new cable guide, made from U-channel 100x50 to be installed. U-channel to be supported every 2100mm on flat bar 100x50x10, a height of 50mm above the crane deck. The U-channel to be welded to each other and to the existing deck penetration.
• Total length of U-channel to be renewed: 99m.
• U-channels are prefabricated in longest length as possible. Supports are welded in the workshop. Cable guides are grit blasted to SA 2 ½ and painted with 3 layers paint prior installation.
• Butt welds of the U-channels and all sharp edges are to be grinded smooth.
• Paint system of the butt welds, in way of the welds to the crane deck and damages of surroundings are to be de-rusted to ST3 and painted with 3 layers of paint. All paint is supplied by the ship.

Lumpsum price: …/}

G.111. Re-position the entrance to the sea fastenings locker

01175-0338-030 General arrangement

The entrance to the sea fastenings locker on main deck at frame 124 has two doors. The electrical cables and hydraulic piping in way of the entrance to be covered by tarpaulin cover and sheetmetal. The hatch of the seafasteningslocker on upper deck to be opened. Lift out the owners steel palletized containers in way of the door. Store in a safe location. The fire door 1100x700 mm with its frame at the emergency generator room is to be removed and disposed off completely. The steel watertight door with central closing system at the side is to be removed with the frame. Frame to be faired / repaired for re-use purpose. Door size: 700x1100mm. Transport the frame + door to the emergency generator room to the workshop. Install metal sheeting over the central closing mechanism. Install A60 insulation material on top of this and cover with sheetmetal. Fit, weld the door at the side of the emergency generator room. Adjust door hinges and carry out a water tightness test. Repair the paint system in way to ST3 and 3 layers ship’ supplied paint. Clean the area in way.

Lumpsum price: …/}

G.112. Repair support mast anchor boom

5242500 Anchor boom mast
5242499 Arrangement anchor boom mast

Erect a staging
Renew the outer vertical support 5242500 pos 373 and the part of the horizontal support pos 370, with a length of 1200. Supports are made from I-beam 280mm. Renew the blocks pos 372.
De-rust the new steel and damaged paint system in way to ST3 and apply 3 layers ship’s supplied paint.

Price per anchor boom mast :

 **G.113. Modification of access to the generator room**

General arrangement
G113 Modification access to the generator room

The entrance door and the stair casing to the generator room fitted between frame 116-120 & from the main deck is to be relocated.
Erect a staging.
The entrance door to be disconnected and removed. The door frame to be cut loose and removed. An insert plate of 8mm thickness to be fitted and welded in the old door opening. Opening of 700x2000mm.
A new door opening to be cut at the longitudinal wall at from 116.5 from the workshop I. The wall insulation in way of the new door location to be removed and the insulation sheeting to be modified. The old door frame to be fitted and welded.
Old door to re installed on this new location.
The opening in the main deck is to be modified: cut the opening larger towards the fore ship and fit an insert deck plate of 800x500x8mm and stiffener underneath at the new location door.
The old stair casings and platform in the generator room to be removed. The longer stair casing to be extended using parts of the short stair. Install, fit the modified stair from the main deck to the floor plate of the generator room. Install, fit new supports for this stair casing. Modify floor plates in way.
Install a railing around the cross-over pipes in way of the removed platform.
Two coolingwater pipes in way of the new location of the stair to be modified.
Remove the inlet and outlet pipe from the cooler of the generator no. 2. Fabricate, fit and install two new cooling water pipes. 2 Pipes ND75, each 2.5 meter long and each 3 bends x 90degrees.
Relocate 1 telephone including hood, 1 fire extinguisher & 1 EEBD unit.
Repair the paint system in way by grinding to ST3 and painting with 3 layer’s ship’s supplied paint.

Lumpsum.price :

 **G.114. Convert bottom side of the forward barge loading gantries to chemical lockers**

LD11-00-068 Gantry barge loading pipe (fwd)
G114pic 1-5 5 pictures
The bottom side of foundation of the SB & PS forward barge loading gantries are to
be closed and one entrance door to be provided
On SB & PS barge loading foundation, the opening in the aft wall at frame 83, the
openings in the longitudinal walls at 8050 and 11200m from ship’s centre to be
closed. Railings in way to be removed. The opening in the forward wall at frame 88 is
to be reduced to a door size of 1600x600mm. Yard is to supply, fit and weld the
necessary insert plates of 12mm thickness. The yard is to install an owner’s supplied
watertight door in the forward wall of each barge loading gantry foundation.
The following pipe systems are to be modified in way of the Starboard forward barge
loading foundation:
Venting valve of tank36 to be disconnected, turned 90 degrees and refitted
The venting pipe of ECR toilet is to be extended. Vent valve to be removed, extension
pipe to be fabricated: ND125 x 2.0 meter, 3 bends, 2 flanges, 1 wall penetration,
schedule 40 & hot dipped galvanized.
The shore connection cable pipe to be extended. A straight pipe ND200 x 700 length,
2 flanges, schedule 40 & hot dipped galvanized.
3 Hydraulic pipes to be disconnected and removed. Hydraulic oil from the system to
be collected and disposed off. 2 pipes ND25 & 1 pipe ND32 with lengths of 3.0
meter. 3 Bulkhead sleeves to be supplied, fitted and welded at the wall of the gantry.
The removed pipes to be cut and modified to connect on the bulkhead sleeves and
existing pipe work.
The following pipe systems are to be modified in way of the Portside forward barge
loading foundation:
Vent pipe tank 38 to be extended to the outside of the foundation: pipe ND65 x 3.0
meter, 2 bends, 2 flanges, 1 wall penetration, schedule 40.
Vent pipe tank 41 to be extended to the outside of the foundation: pipe ND150 x 3.0
meter, 2 bends, 2 flanges, 1 wall foundation, schedule 40.
3 Hydraulic pipes to be disconnected and removed. Hydraulic oil from the system to
be collected and disposed off. 2 pipes ND25 & 1 pipe ND32 with lengths of 3.0
meter. 3 Bulkhead sleeves to be supplied, fitted and welded at the wall of the gantry.
The removed pipes to be cut and modified to connect on the bulkhead sleeves and
existing pipe work.
The following electrical systems are to be modified in way of each forward barge
loading foundation:
1 emergency stop switch to be relocated one 1meter – to the outside of the foundation
3 cables running through the wall of the foundation to be removed, cable glands with
pipe pieces to be welded inside the wall plating and cables to be refitted and re-
connected.
2 Ship’s supplied explosion proof lighting armatures with switch to be installed.
Brackets to be fabricated and welded for the lighting armatures and switch. A cable to
be supplied and installed from the store space below upper deck. Assume length of 25
meter and existing deck penetration to be opened & modified to run the cable up.
The ladder in way of the portside gantry foundation is to be removed from the upper
deck to the crane deck. The railing in way of the upper deck to be modified.
A gooseneck type venting pipe with manual closing flap to be fabricated and installed
on top of the each new locker, 2190 above the upper deck. Pipe of ND300, 1.0 meter,
1 90 degrees bend, schedule 40 & hot dipped galvanized.
New steelwork and damaged paint system to be repaired by ST3 and applying 3 layers of paint. The inside of the new locker to be fully painted with 2 layers of ship’s supplied white paint.
Price including erection of staging.

Lump sum price for two lockers:

**G.115. Change location of ship and port name on aft ship**

- **01175-1015-030** Name and home port
- **G115** New ship name and home port aft ship

The ship name and home port at aft ship is to be overpainted on the cutter ladder gantry.
The yard is to fabricate welding letters, cut from 6 mm plate. Height of letters ship name is 300mm. The height of the port name is 250mm. The shape of the letters to be copies from the old name and reduced for the port name. The height of the IMO numbers is 200mm.
The letters and numbers of the ship’s name, the home port and the IMO number are to be fitted and welded as per enclosed drawing G115.
A staging to be erected, letters and numbers to be positioned, fitted and welded.
After welding works, the new letters and numbers and damaged paint system in way to be de-rusted to ST3 and painted with 3 layers of ship’s supplied paint. The names and numbers to be painted in black colour.

Lump sum price:

**G.116. Repair tank top in way of void space 46 & 51.**

- **01175-0323-020** construction mid ship

The tank top in way of the overflow cooling water pipe, portside frame 58-62 / 4000mm from centre is corroded and need to be replaced.
Assume the void space 51 is opened and ready for hot work under item G106.
Open up void space 46, install ventilation, lighting. Gas free the tank.
Renew the corroded tank top plating: grade A – 11.0mm thickness. Assume 3.0 x 3.0 m surface / 800 kg
New tank top plating on top and bottom and surroundings to be de-rusted to ST3 and painted with 3 ship’s supplied layers paint.

Lump sum price for 800 kgs steel renewal:
Price per kg for more or less kg steelwork:
**G.117. Shifting of anchor gantries one frame distance to forward**

LD-00-01-007 Dim. Drawing anchor gantry
LD-11-00-132 A-frame for 15T anchor

The top part of the existing anchor gantries mounting on the upper deck at SB & PS as per drawing LD-00-01-007 are to be shifted one frame – 700mm – to forward.

Erect a staging.

Disconnect, remove the hydraulic cylinder. Blank off hydraulic lines at ship’s side and on the hydraulic cylinder.

Disconnect, remove the moveable part of the anchor gantry. Transport to the workshop.

Modify the moveable part of the anchor gantry: cut off the top part, move 700mm to forward and re-weld to the gantry legs. Supply, if and install additional supports, pipe dia 260mm x 2.0 meter.

Modify the platform dwg LD 11-00-135 and the railing in way to suit the new position of the gantry.

Relocate a ladder with safety cage from the aft part of the barge loading gantry to the forward part: ladder 300mm, 4.0 meter height.

Relocate the MOB signal to the forward part of the barge loading gantry.

Re-install the moveable part of the gantry, refit pins. Re-install the hydraulic cylinder.

Repair the paint system by ST3 and applying 3 layers ship’s supplied paint.

Lumpsum.price :

**G.118. Remove old foundations in pump room.**

G118  Pictures old foundations

Erect a staging

Assume the adjacent fuel tank gas been opened and cleaning

Arrange gas freeing inspection and certificate.

Cut off the foundations for spare pump casings on the tank top in the pump room.

Grind smooth all burrs. Repair the damages by the cutting: repair by welding and grind smooth.

Repair the paint system by ST3 and applying 3 layers ship’s supplied paint.

Lumpsum.price :

**G119rev1. Renew moveable part cutter platform**

Platform i.w.o. cutter

00-002   Modification hinged platform

The hinge able part of the platform in way of the cutter is to be renewed.
The yard is to pre-fabricate a complete hinge able platform as per drawing 01175-2813-010 pos 102+93+91+83+192+143+144+145+3+180+181+182+183+184+95+96+108+109+110+111+… Including all steel parts and details part of the hinge able part of the platform. Including side, top, bottom plating, railings, stair casings. Including supply, machining, fitting and aligning new hinge plates detail 1, new hinge pins and securing pins. The supports as indicated on the drawing 00-002 to be fitted as well.

The two stairs are to be hot dipped galvanized after fabrication. After completion, the hinge able part of the platform is to be grit blasted to SA 2 ½ and painted with three layers owner’s supplied paint.

The yard is to erect a staging. Hinge pins pos 6 & securing pins pos 5 are to be removed. Disconnect the hinge able platform, lift and transport to shore. Old hinge platform is to be scrapped.

Yard is to supply, machine, fit and align two new hinge eye plate at ship’s side pos 69 and securing eye plates detail 2.

Transport the new platform from the workshop to ship, fit, install and connect to the vessel. Yard is to supply, machine new hinge and securing pins.

Lumpsum.price : …/

**G.120. Repairs + modification fender frames (modify for barges / integrated step).**

Addendum will follow

G121. Renew stair casings deck to bridge.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01127-1025-003</td>
<td>Railing on crane deck, bridge deck and top of wheelhouse</td>
</tr>
<tr>
<td>01175-1025-010</td>
<td>Railing and stairs on crane deck</td>
</tr>
<tr>
<td>01234-1030-900</td>
<td>Stairs and railing aft side deckhouse</td>
</tr>
<tr>
<td>G121</td>
<td>Detail step</td>
</tr>
</tbody>
</table>

The outside stairs from upper deck to the bridge deck are to be replaced. In total 6 stairs are to be replaced: the SB & PS stair from upper deck to crane deck at frame 45, the SB & PS stair from crane deck to deckhouse deck at frame 45, the SB stair from deckhouse deck to bridge deck at frame 50 and the SB stair from upper deck to crane deck at frame 70. The latter is fitted on other location and not according to drawing. See pic. G121. The upper removable platform is to be relocated in such a way that the bottom of the stairs is connected to the raised deck plate in way of the dredge pipe deck penetration. The yard is to cut the supports, railing and remove the complete old stair casings. The yard is to fabricate 6 new stairs as per stair profile shown on the drawing 01234-1030-900. Note that the angle of the new stairs is increased from 50 to 55 degrees. The width is also increased to 700mm.

The yard is to prepare construction drawings for the replacement stairs suitable for each location and to send for approval by the owner. The type of anti-slip step is to be submitted to the owner for approval as well. Anti-slip steps must be minimum 2mm thickness, 205mm wide & 43 mm height similar to enclosed specification sheet. Steps are fully welded to the stair legs.
Stairs to be pre-fabricated including railing and mounting brackets.  
After construction, stairs to be hot-dipped galvanized after construction  
Transport the new stairs to the vessel, fit, install and weld. Modify the adjacent railing in way of the new stairs.  
Including the necessary access works, removal, refitting panelling, insulation in way of the hot works in the accommodation.  
After installation, stairs and damaged paintworks in way and under deck to be de-rusted to ST3 and painted with 3 layers ship’s supplied paint.  

Lumpsum.price : …/

**G.122. Installation of 3 capstans & 4 release hooks (rev1)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD 11-00-151</td>
<td>Arrangement mooring barge loading</td>
</tr>
<tr>
<td>LD 11-00-156</td>
<td>Details construction mooring barge loading</td>
</tr>
<tr>
<td>07305-TAB10-LK-EP8000</td>
<td>Electric diagram</td>
</tr>
<tr>
<td>LK-EPHP</td>
<td>Capstan mooring roller type LK-EP8000</td>
</tr>
<tr>
<td>H-0300-SN-STD-00</td>
<td>30t Mooring Hook</td>
</tr>
</tbody>
</table>

The yard is to install three owner’s supplied capstan mooring rollers and connect the electric motors and controllers to the drive cabinets.  
The deck construction in way of the position of the three mooring rollers is to be modified and re-enforced. An opening in the deck to be made and a box to be constructed for the electric motor. Yard is to supply, fabricate, fit and weld the necessary foundations and re-enforcements.  
The yard is to supply, machine, fit and weld flanges on the owner’s supplied mooring rollers and deck foundation. The mooring rollers are to be connected to the foundation. Fasteners and sealing to be supplied by the yard.  
Foundation for the 4 owner’s supplied quick release hooks as per drawing H-0300-SN-STD-00 to be fabricated and machined. Foundation with hook to be welded on the deck. Reinforcements below deck to be supplied, fitted and welded.  
The yard is to install and weld 3 owner’s supplied panama chocks. The existing chock on the PS forward to be removed and the coaming in way of the new panama chock to be modified as such.  
On existing double bollard on the PS fore castle deck to be cut off, moved, refitted and re-welded.  
Two square mounted manhole cover fitted on the forecastle deck to be cut and opening in the deck closed. In each tank a new flush round type manhole cover to be fabricated as per yard standard, fitted and installed on another location (shifting 1 meter). The ladder underneath of length 8 meter to be relocated.  
Existing stiffeners to be modified / trimmed in way of the fore starboard release hook.  
Assume that the drive cabinets are already installed in the ship’s thyristor room. The yard is to supply, install, terminate and connect the drive cabinet to the nearest power supply, to the capstan mooring roller and control pedal and box on deck. All as per enclosed electric diagram:  
For each drive cabinet (total 3) :  
Power supply cable 3 x 2.5sp mm x 30m from distribution to drive cabinet  
Power supply cable from drive cabinet to electric motor : 2x3x2.5 sq mm x 70m  
Supply cable from drive cabinet to brake electric motor : 2x2x2.5 sq mm x 70 m
Control cable from drive cabinet to control box on deck: 2x2x1.5 sq mm x 70 m.
Control cabinet to be supplied by the ship.
Assume that existing cable trays below and on deck can be used. Cable to run below
to the capstan mooring roller and just under the position of the control box.
Installation & connection of the cables, limit switches and alarm panel is to be carried
out according to enclosed specification ‘section M’.
Paint system in way (on, under deck and in the tanks) to be repaired to ST3 and to be
painted with 3 layers ship’s supplied paint
Heavy duty caps in tarpauline cover to be fabricated and installed over the 4 quick
release hooks and 3 capstans.

Lumpsum.price: ...

G.123. Installation of container dove tails on crane deck

0175-0323-020 Construction midship
FR-31 U-frame
B-45 U-frame twistlock
LE-1 D lashing ring

The yard is to supply and install U-frame type container twistlocks on the crane deck.
In total 2 x 4 pieces twistlocks to be installed on the maindeck.
4 twistlocks for one 20ft container to be installed between frame 96 & 105, from
center vessel to 2450mm to portside.
4 twistlocks for one 20ft container to be installed between frame 106 & 115, from
center vessel to 2450mm to portside.
The crane deck in way of the container fittings is protected by wood. Angle bars
holding the wood to be cut, the wooden beams in way of the container fittings to be
removed and modified. Angle bars to be supplied and fitted in a square of 500mm
around the container fittings to secure the wooden beams to the deck.
The ceiling panels & insulation in the accommodation space under the crane deck are
to be removed in way of the hotwork. After the works, the insulation in way of the
works to be renewed and ceiling panels to be refitted. the yard will cover the flooring
and wall panels in way of the works.
Erect stagings.
The yard is to fabricate a filling block of 50mm thickness to fit under the dove tail.
Yard is to supply and weld U-frames as per drawing FR-31 or similar. Container
twistlocks as per drawing B-45 or similar to be supplied and installed.
At each container fitting a 30 tons D-ring type lashing ring as per drawing LE-1 to be
supplied and installed. Deck to be re-inforced underneath by a 200x15x1200 stiffener
The yard will install and weld transversal re-inforcements of 300x15x1200 under the
shore deck in way of each container fitting.
After welding, paintsystem to be repaiered by wire brushing to ST3 and painting 3
layers ship’s supplied paint.
The yard will test the container fittings using an owner’s supplied 20ft container and
present to owner’s representative.

Lumpsum.price: ...
G.124. Sea fastenings SB propulsion motor.

G124.1 pictures of existing PS sea fastening  
G124.2 pictures of existing PS sea fastening  
G124.3 pictures of existing PS sea fastening

- Two sea fastening blocks to be supplied and installed on the foundation of the SB propulsion electric motor similar to PS propulsion motor.  
- Remove / refit a spare oil cooler in way, D400xL2000mm, fitted with 2 units clamps.  
- Supply, fit and weld two foundation plate extensions on both sides of the foundation: 2 plates 300x80x50, welded one side to the foundation plate.  
- 2 positioning supports 100x100x30mm to be relocated: cut, fit and weld. All 8 threaded holes of the positioning supports to be dressed up and new bolts M30x40 to be supplied and installed and greased.  
- Fabricate 2 sea fastening blocks: 2 x (200x100x80mm), with machined tapered slot 50x50x200 & 2 wedges 35/40x50x5=200mm  
- Fit, align and weld the two sea fastening blocks. Fit & lock the wedges.  
- De-rust the complete motor foundation, the new sea fastening blocks to ST3 + 3 layers paint.

Lumpsum.price : …/

G.125. Repairs dent in twee deck SB & reinforcement foundation water pressure unit

01175-0323-020_JG Location damage.
G125.1 Picture of dent in tweendeck  
G125.2 Picture of water mist unit  
01175-0323-020 Construction drawing midship  
01175-1023-040 Man hole

- The dent in the tween deck SB frame 98 – 102 as indicated on the sketch is to be repaired by insert  
- The tween deck is the tank top of fuel tank 25 and is located in the SB bosun store. Assume the deck is cleared for access.  
- Assume the tank 25 is cleaned under item H1. Arrange ventilation, lighting, gas free and hot work permit in the tank 24  
- Erect a staging in the tank: l*w*h=5x3x1.5m  
- Renew the deck plate by insert including the stiffeners: insert size 3000x1500x9mm & 3 bulb profiles 200x9mm x Length of 3400mm each.  
- Fabricate a new flush manhole cover as per drawing 01175-1023-040, fit and weld in the new insert plate as per original situation  
- Supply parts, blank off vent pipes (2x), pressure test fuel tank, soap test and present to class surveyor.  
- Fabricate, fit and weld two support plates of 300x100x10 under the existing foundation of the water pressure unit and weld to the tank top tank 24.
- De-rust all damaged paint system in way of the tank top and apply 3 layers of paint.

Lumpsum.price:

G.126. Cutting opening in bulkhead engine room

01175-0323-020 construction mid ship
G126 bulkhead in engine room

- An opening is to be cut in the longitudinal bulkhead 6660 from centre at portside
- A staging is to be erected in the engine room: l*w*h=2x3x4m
- The leak tray of the thermal oil pumps is to be cleaned and the pumps with power cables are to be covered during the works. The main engine near the pumps is to be covered as well.
- Electric power cables to the 2 thermal oil pump motors are to be disconnected and removed over a length of 3 meter. Cable tray of 200 x 2000mm is to be relocated, fitted and welded. After works cables to be re-installed and reconnected.
- Cut an opening in the bulkhead as per sketches and indications on the bulkhead: size 550x450mm. Corners with radius 50mm. Grind edges smooth.
- A removable type steel plate of 3 mm, sized 600 x 500m is to be fabricated and to be fitted with two hinges and bolts over the opening.
- The paint system is to be repaired in way to ST3 & 3 layers of paint.

Lumpsum.price:

G.127. Installation of satellite TV mast (SB aft).

LD-11-00-085 Mast for dredging signals.
LD-11-00-A00501 Foundation dome SAT-TV + NAV lights on gantry loading barge SB
LD-11-00-A00589 Cable trays on SATTV mast SB
122663 Radome Installation equipment.

- A staging is to be erected above the Starboard aft barge loading gantry for access. See drawing LD-11-00-085 for sizes. Note that the staging should not be in way of the ship’s travelling deck crane.
- Assume that the navigation lights and HF antenna are removed by the ship’s crew. Yard is to be pull back the cables of navigation light
- Cut off, remove the existing mast for dredging signals as per drawing Ld-11-00-085. Cut, remove the foundations and grind smooth on top of the barge loading gantry.
- Receive the owner’s pre-fabricate platform as per drawing Ld-11-00-A00501. Mast is supplied in several parts. Fit and connect the bolted type mast support pipes.
• Transport, lift, the mast with platform on top of the barge loading gantry. Including fit, weld, NDT and remove temporary lifting lugs. Fit, cut, adjust and weld the mast pipes to the top of the barge loading gantry as per drawing.
• De-rust the damaged paint system of the platform to ST3 and fully re-paint the top of the barge loading gantry with 3 layers of paint.
• Transport, lift, install and connect the owner’s supplied 60’ Satellite TV dome antenna on top of the new mast.
• Install, run and fasten the cables in the existing cable pipes and on strips to the navigation light supports, the MF/HF antenna and the new dome antenna. Assume that the new cables are already installed up to 4 meter below the top of the barge loading gantry. Additional staging to access these cables are required.
• Assume the ship’s electrician will terminate and connect the cables.

Lumpsum.price:

G.128. Replace manhole covers by flush type in propulsion rooms

01175-0353-010 Tank plan
01175-0323-010 Construction plan aft ship
  01175-1023-040 Man hole

• Two existing manhole covers of the void space 53 and two of void space 52 are to be replaced by flush type.
• Manholes are located in the SB & PS propulsion rooms and are ready accessible.
• Open up all 6 manholes of void spaces 52 & 53 as per specification D3. Arrange ventilation, lighting, gas free, access & hot work permits.
• Cut out the manholes at frame 24 & at frame 33, two SB in tank 53 and two PS in tank 52. Cut out tank top plate around the manhole to 1200x1000mm. Supply, fit and weld an insert plate of 10mm thickness in way of the old manhole locations.
• Fit, weld owner’s supplied manhole covers as per drawing 01175-1023-040 on the previous location of the manholes, just above the existing ladders.
• Supply parts, blank off vent pipes of void spaces 52 & 53, pressure test tanks, soap test and present to class surveyor.
• De-rust the damaged paint system on tank top and inside the void space to ST3. Apply 3 layers of paint.

Lump sum price for 4 manholes:

G.129. Repair tank top ballast tank 9, replace manhole by flush type & renew ladder

01175-0353-010 Tank plan
01175-0323-030 (4pages) Construction plan fore ship
  01175-1023-040 Man hole
G129 Sketch insert repairs tank 9
The tank top of ballast tank no. 9 is corroded around the manhole on main deck at frame 126-127. The manhole is situated in the harbour generator room and is free accessible. Note that the yard is to cover and protect the storage racks with spare parts in way of the repairs.

Assume the ballast tank is empty. Open / close the manholes and docking plugs of the ballast tank as per specification D3. Arrange ventilation, lighting, gas free, access & hot work permits.

Erect a staging in the ballast tank: lxbxh = 5x5x6m.

Cover the area under the works in the ballast tank to protect the existing coating from damaging. If the coating is damaged during the works, repairs of the paint system by the yard are included.

Cut out the manhole of the ballast tank at frame 126-127 and the tank top plate around the manhole to a size of 1200x1000mm. Cut out the lower part of the web frame 127, 427x500x8mm including the faceplate for access.

Supply, fit and weld a new insert plate in the tank top, 1200x1000x8mm. Re-fit and re-weld the removed part of the web frame. Renew the longitudinal stiffener in way of the insert underneath, HP180x9 x 1400mm long.

Fit and weld owner’s supplied manhole cover as per drawing 01175-1023-040 on the previous location of the manhole, just above the existing ladder.

Fit, cut, weld an owner’s supplied ladder. Ladder is delivered in oversize. Yard to cut if required for mounting purposes.

Supply, blank off vent pipes and close plug and manholes of the tank, pressure test tank and present to class surveyor. Re-open manholes and plug

Paint system in the ballast tank 9 is repaired as described in item F109. The paint system of the tank top and bulkhead in the store room are to be repaired to ST3 and 3 layers of ship’s supplied paint.

G.130. Repair tank top in pump room

01175-0353-010 Tank plan
01175-0323-020 Construction plan mid ship

The tank top of the void space nos. 46 & 51 in the pump room is to be renewed in way of the cooling water overflow pipe in the pump room. Between frame 58 & 64, from 3500mm to 6300mm from centre to portside.

Open up the manholes of the void spaces 46 & 51 (6 pcs). Arrange ventilation, lighting, gas free & hot work permits.

Remove / refit stair casing in way for access.

Cut, supply, fit and weld an insert plate in the tank. Size is approximately 4200 x 2800 x 11mm thickness (1050 kg). Note that the vertical cooling water overflow pipe is fitted in the middle of this insert plate. Plate is to be cut, fitted and welded around the cooling water overboard pipe.

A drip tray of 150x8 x 3500mm length in way to be cut and renewed.

Blank off vent pipes of void spaces 52 & 53, pressure test tanks, soap test and present to class surveyor.
- De-rust the damaged paint system on tank top and inside the void space to ST3. Apply 3 layers of paint.

Lump sum price for 1050kg steel work: ...

Price per kg less or more: .../kg

G.131. Repairs spud supports and foundation

Drawings:
- IHC 01175-1041-030  Foundation for supports of spuds with rails for spud transport
- IHC 5474738  Arrangement spud support
- IHC 5242844  Support for spud

G.131.1. Renewal foundations deck and the bottom of spud supports

- Assume the spud supports are removed, dismantled and transported to the workshop as per K4.4.2.
- The foundations plates 01175-1041-030 pos 2 & 3 together with the bottom part of the foundation plates of the spud supports 5242844 are to be renewed.
- The supports are installed on the crane deck above the mid ship accommodation. The yard is to open the ceiling panelling in the accommodation areas underneath and remove the insulation in way. Hot work watch in the accommodation during the works is included. After completion, the paint system is to be repaired under decks, insulation in way to be renewed and the ceiling panelling to be refitted.
- The foundation plates pos 2 & 3 are to be cropped off and the deck is to be ground smooth. Owner is supplying new deck foundation plates pos 2 & 3.
- The lower foundation plates and stiffeners of the spud supports, material ST52-3 as per dwg 5242844 pos 014, 015,016,024 are to be renewed. Including the fabrication and machining of the plates pos 014 & 016. The yard is to crop off, supply, fabricate, fit, align and weld new counter foundation plates on each support. Special attention to be paid that the 4 foundation plates pos 014 & 016 are in the same plane. The fit and weld is preferable done with the support standing on a flat bed with the foundation plates pos 2 or 3 connected to the spud support during the welding.
- The spud supports together with the connected owner supplied foundation plates are to be transport and lifted to it’s location on the crane deck. The support is to be aligned and shifted to its position as per drawing. Including supply, fitting, welding and removing of positioning blocks and bolts. The foundation plates are to be welded to the deck.
- The spud support is to be removed and returned to the workshop for final assembly as per item K4.4.2 and to complete the welding of the foundations blocks pos 2/3 where not accessible with mounted support.
- The paint system on the deck and under the deck is to be repaired to ST3 and painted with 3 layers of ship’s supplied paint.

Price per support and renewal of 4 deck foundation plates: .../
G.131.2. Additional price for steelwork renewal

(nett kg) in conjunction with above works: Price per kg:

…/kg

[repair painting work]

G.131.3. Renewal foundation of winch (only supports fore ship)

- Applicable for support type as per drawing 5242844 page 2
- The complete winch foundation fitted between the two vertical legs of the spud support is to be renewed.
- The existing foundation frame as per drawing 5242844 page 2, pos. 042+043+044+045+046+047+048+049+050 is to be cropped out.
- A new owner’s supplied pre-fabricated foundation is to be fitted, adjusted and welded as per section H-H of the drawing 5252844 page 2.

Price per spud support: …/

G.132. Repairs signal mast on funnel

Dwg 01175-1072-020 signal mast on funnel

- Assume a staging is erected as per item E15. Modify the staging for access as required.
- The top horizontal NUC/RIM light support pos 56+57+16 including stiffeners are to be renewed.
- Disconnect, remove the top NUC/RIM navigation light armature.
- Crop of the damaged support. Supply, fabricate, fit and weld a new support.
- De-rust the damaged paint system to ST3 and paint in way with 3 layers ship’s supplied paint.
- Re-install and re-connect the navigation light.

Lumpsum.price : …/

G.133. Repairs cutter ladder wall plate in way of underwater pump

Dwg 5242787 Cutter ladder – middle part

- The wall plate of the cutter ladder has been punctured in way of the underwater pump casing.
- Assume that the pump casing is removed by the crew for access
- The wall plate 2650 from center, between cutter ladder frame 13 & 14, approximately 1500mm above cutter ladder bottom is to be repaired by insert.
- Open / close two manhole covers for access to the cofferdam side cutter ladder and SB side. Arrange ventilation, lighting, gas free certificate. Wash out and clean the cofferdam and dispose 1 cbm of mud / sand.
- Crop off the temporary doubler plate of 400x400mm. Cut, supply, fit and weld an insert plate sized 500x600x16mm. Dye-check weld seams.
• Repair paint system at both sides, de-rust to ST3 & 3 layers of ship’s supplied paint.

Lumpsum.price : …/

G.134. Repairs foundation underwater pump by insert plate
Dwg 5242787 Cutter ladder - middle part

• A vertical section of the foundation of the underwater pump in the cutter ladder is cracked and is to be renewed.
• Crop out, fit and weld an insert plate in the longitudinal stiffener under the base plate pos 370 of the foundation underwater pump. See drawing 5242787 – section B-B, between cutter ladder frames 11 & 13. Size of the insert in plate pos 372: 800x500x14mm, to be confirmed by superintendent.
• Note the very difficult access to the work area, which is to be considered as a void tank. Cut, remove, refit and re-weld platforms in way of the foundation. Erect a small staging in way of 1x2m above the angled bottom plate.
• Special attention to be paid in the welding sequence to not to disturb the alignment of the underwater pump.
• Repair paint system at both sides, de-rust to ST3 & 3 layers of ship’s supplied paint.

Price per insert plate: …/pc
Price per kg additional stiffeners in way (assume 20kg / location): …/kg
Additional price to remove / refit foundation fitting bolt for access: …/pc

G.135. Renew wood suspension brackets for cutters on cutter ladder gantry
Dwg 01175-1041-220 Brackets for suspension for cutters on cutter ladder gantry

• Assume the cutter heads are removed by the crew
• Erect a hanging staging in way of the suspension brackets: l*w*h = 10 x 2 x 4 m. Suspension brackets are fitted on the cutter ladder gantry, frame -5, 23.56 m above base
• The wood beams pos 6 are to be renewed. Yard is to cut, remove the 36 pcs fasteners pos 4 +5. the damaged wood is to be removed and disposed off
• The paint system in way if to be repaired to ST 3 & painted with 3 layers ship’s supplied paint.
• Yard is to install new owner’s supplied wood beams pos 6, size 257x200mm on 4 locations, with total length of 15.5meter. Yard is to cut, trim and drill holes in situ as per drawing. Yard to cut owner’s supplied threaded rod to size, install and fastening.
• After works, suspension bracket to be freshly painted.

Lump sum price: …/
G.136. Repair floor plates and supports engine room

- 01175-1030-600 Floor and gratings in engine room
- G136.1 Overview renewal floor plates engine room
- G136.2 Overview renewal floor plate angle bar
  
  - Part of the floor plates and its supports are damaged due to too high loads.
  - Assume the bilges are cleaned as per item H4.
  - Remove the floor plates as indicated on the drawing G124.1
  - Fully clean, mop the area’s clean in way suitable for hot works. Cut, renew the vertical angle bars supporting the flooring plates in situ as detailed in drawing G124.2. Supports are made from angle bar 40x60mm, height 1040 above tank top.
  - Supply, fabricate, new floor plate 980x700mm, from 5/7 mm checker plate.
  - All parts are grit blasted and shop primed prior installed. Top of the floor plates to be painted with 2 layers ships supplied paint.

Price per floor plate including angle bar support: …/

G.137. Repairs bulkhead between tank 9 & tank 13

- 01175-0353-010 Tank plan
- 01175-0323-030 Construction plan fore ship
- 01175-1023-040 Man hole

  - Assume tank 9 is opened and staging is erected as per item G129.
  - Assume tank 13 is opened and cleaned as per item H1.
  - Erect staging in tank 13: l*w*h= 6x2x5m along the bulkhead with tank 9.
  - Assume a crack is in the longitudinal bulkhead 6650PS from centre and tank top 5350 above base and between frames 134 & 138. Repair the crack in the longitudinal bulkhead between the tanks by insert plate of 2500x500x8mm and in the deck by insert plate of 2600x500x8mm. Including partly remove / refit and re-weld bulkhead in the hydraulic room of 2 times 1000 x 350 x 8mm. A flush type manhole in way is to be cut and a new ring as per 01175-1023-040 is to be fabricated, fitted and welded.
  - The works of the renewal of the deck plate are in the hydraulic room. All equipment in way to be protected during the works.
  - Paint system in the ballast tank 9 is repaired as per item F109. The paint system of the tank top and bulkheads in the hydraulic room are to be repaired to ST3 and 3 layers of ship’s supplied paint.

Lump sum price: …/

G.138. Repairs platform and railing deck crane

- 7430-01.HMC Travelling electro hydraulic deck crane
- G138 Picture of deck crane platform

  - Assume part of the railing along the deck crane machine space is missing.
  - A hanging staging is to be erected in way: l*w = 4 x 2 m
• The yard is to supply and fabricate two removable type railing. Total length 4.0 meter as described in item G3. Railing stanchions are fixed by yard supplied bolts to existing fastening pads on the platform.

Lump sum price: ..../

G.139. Repairs tank top in way of seawater hydropore tanks

01175-0323-020 Construction plan mid ship
01175-0338-030 General arrangement
01175-0353-010 Tank arrangement
G139 Picture seawater hydropore tanks

• The tank top plating under the seawater hydropore tanks in the portside separator room is to be renewed. Access to the separator room is via a hatch cover 1400x1400mm from deck.
• Disconnect, remove the connecting piping to the seawater hydropore tanks: 6 x ND50mm, 3 x ND12mm & 3 x pressostats. Disconnect, remove the piping to the filters, 6 x ND25mm.
• Open void space no. 47, install ventilation, lighting and arrange the necessary gas free inspections.
• Cut the foundation legs, OD150, remove the 3 seawater hydropore tanks, the 2 filters units, lift and put aside.
• Cut, renew the corroded tank top plate of the double bottom of void space no. 47 by an insert, between frame 60 & 69, between 6700 and 8700mm from centre to Port side. Thickness tank top plate 11mm.
• Supply, fit and weld a new drip tray as original situation – 100x8mm x 5m.
• Re-install, fit, weld and re-connect the hydropore tanks and filters
• Repair the paint system of the tank top and inside the void space to ST3 and 3 layers of ship’s supplied paint.

Lump sum price: ..../

G.140. New platforms under dredge line in cutter ladder

LD-00-00-A000464. Arrangement railing and platform on cutter ladder
5242846 Stairs, gratings and platforms on cutter ladder
LD-11-00-A000418 Platform inside cutter ladder
G140-3D 3D snapshot of platform inside cutter ladder
LD-12-00-A000461 Grating cutter ladder

• Note that the drawing 5242846 of the existing platforms is not as build. Some platforms shown in this drawing are not installed.
• Assume the platform with ladders sections A & B of drawing 5242846 page 2 are installed.
• Assume the suction hose is already removed by the crew for access.
• Erect a staging and ladders to access the void spaces under the dredge line. L+w+h=8x4x2m. Access from the upper deck.
• Fabricate, fit, install and weld a new platform in situ as per drawing LD-11-00-A000418. Note that access is very restricted. Fit, adjust, install, fastening owner’s supplied fibre glass gratings and fasteners as per detail 3 in drawing LD-12-00-A000461.
• Fabricate ladder, fit, weld, fastening of ladder including modification of the existing lower platform and grating.
• All steel used is to be grit blasted and shop primed. After installation in situ, all damaged shop primer and welds to be de-rusted to ST3 and painted with 3 layers of ship’s supplied paint.
• Ladder is to be hot dipped galvanized after construction and fully painted.

Lump sum price:

G.141. New platforms and access to underwater pump and coupling

<table>
<thead>
<tr>
<th>Description</th>
<th>Drawing Details</th>
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<tbody>
<tr>
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<td>5242846</td>
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<tr>
<td>Arrangement railing and platform on cutter ladder</td>
<td>LD 00-00-A000464</td>
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<tr>
<td>Additional platforms near tooth coupling cutter ladder</td>
<td>LD-11-00-A000438</td>
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<tr>
<td>Stair</td>
<td>LD-12-00-A000420</td>
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<tr>
<td>3D snapshot of platform inside cutter ladder</td>
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<tr>
<td>Grating cutter ladder</td>
<td>LD-12-00-A000461</td>
</tr>
<tr>
<td>Cutter ladder middle part</td>
<td>5242787</td>
</tr>
</tbody>
</table>

• Additional platforms and a stair are to be added to the existing platforms to access the underwater pump inside the cutter ladder.
• A staging is to be erected inside the cutter ladder l*w*h= 6 x 6 x 5 m
• Existing platforms are already installed inside the cutter ladder as per drawing 5242846 page 1, frame 8-13.
• The existing access ladder with its supports installed inside the cutter ladder between frame 8 & 9 is to be removed. The opening in the top plate 600 x 450 is to be closed by an insert plate of 15mm thickness.
• The access opening in the plate pos 5, as per detail W, drawing 5242784 sh2 is to be enlarged with 460mm to starboard side. Including cutting and adjusting the stiffeners underneath. Two additional transversal stiffeners HP160x8x500 are to be added underneath in way of the new cut.
• Two additional platforms are to be fabricated in situ as per drawing LD-11-00-A000438 pos 19,20,21,22,23,24,25 including railing pos 9 & 10. Platforms or materials are to be transported inside the cutter ladder, fitted and connected to the existing platforms and new supports pos 16, 26 & 27. A third additional platform is to be constructed in situ: pos 15, 16, 17 & 18. All constructed in angle bar 130x65x8mm
• Additional railing pos 11 & 12 are to be fabricated, fitted and welded in situ.
• An existing opening in the transversal web frame 12 under the underwater dredge pump is to be enlarged from 750x500mm to 1150x500mm as shown in drawing LD-11-00-A000438 section C-C. A flat bar 100x10 pos 8 is to be fabricated, formed, fitted and welded inside the new opening to compensate. Stiffeners pos 7 is to be fitted and welded.
• The additional platforms pos 3,4,5,6 and access ladder pos 13 & 14 are to be fabricated, fitted and welded.
• An owner’s supplied stair casing as per drawing LD-12-00-A000420 is to be fitted, adjusted installed and weld welded to the platform and deck.
• Owners supplied fibre glass gratings with fasteners are to be installed as per details2 LD-12-00-A000461. Yard to supply, fabricate, fit and weld supports for this grating, flat bar 50x10x2500mm length.
• All material used is grit blasted and shop primed. All railing and step material used is hot dipped galvanized. The existing frames and railings as shown on the 3D snapshot are to be de-rusted to ST3 and painted with 3 layers ship’s supplied paint. The damaged paint system in way of new railings, new stair and platforms is to be de-rusted to ST3 and painted with 3 layers paint.

Lump sum price : …/

G.142. Modify deck in way of the ladder swell compensator.

Dwg 100-007 Sea fastening cutter ladder in high position
Dwg LD-11-00-A000724 Modified construction swell compensator cylinder
Dwg 01175-2852-010 Arrangement swell compensator ladder

• An existing steel construction to support the cutter ladder sea fastening is fitted around the hydraulic cylinder of the swell compensator as shown in the drawing Vuyck no. 100-007
• The opening around the hydraulic cylinder is to be cut larger in order to remove the hydraulic cylinder.
• Assume that the swell compensator cylinder has been removed as per item J111.
• Cut the existing steelwork, fit, align and weld an owner’s supplied pipe OD700x15xH1000 as per drawing LD-11-00-A000724. Supply, fit, weld closing plates 15mm on the top and bottom of the box construction up to the new pipe segment as shown on the drawing.
• Return and re-connect the hydraulic swell compensator cylinder.
• Fit, adjust and weld owner’s supplied top support details 1 as per drawing.
• Supply, fabricate, fit and install pipe support type UPN120x435 as indicated in the drawing.
• De-rust all damaged paint system to ST3 and paint with 3 layers of ship’s supplied paint.

Lump sum price for SB & PS ladder swell compensator : …/

G.143. Platforms spud hoisting cylinders

Dwg LD-11-00-A000675 Platform near spud hoist cylinders – fixed
Dwg LD-11-00-A000710 Platform on aux spud hoist cylinder PS 5474735
G143 Arrangement sensors for spud handling

Pictures existing situation
• Erect a staging around the spud hoisting cylinder. Lxwxh= 2x2x6m. Staging to be removed and re-erected after fitting the new platform.
• Assume the limit switches fitted in way of the spud hoisting cylinders are removed by ship’s crew
• Disconnect, remove and scrap the existing access platform and ladder connected to the spud hoisting cylinder as shown on drawing 5474735 section A-C
• The yard is to transport, fit, align, adjust new owner’s supplied access platforms as per drawing LD-11-00-A000675 & LD-11-00-A000710. Owner’s supplied davits are to be fitted in the existing bottom foundation and platform is to be aligned / modified to suit as shown on the drawings. After correct fit, the davit arms are to be removed and returned to owner. Platform foundation legs to be welded to the existing spud tower foundation.
• Existing railing pipes are to be modified in way of the legs of the new foundation as shown on the drawings.
• Yard is to install and fix new ship’s supplied cables from existing junction boxes to the positioning sensors. A ship’s supplied lighting armature is to be installed underneath the new platform. Ships supplied cable to be installed from existing light and connected. Assume length cable 10 meter for sensors and for lighting.
• Platform is delivered fully painted. Damaged paint to be repaired and the damaged paint system of the existing platform to be repaired to ST3 & 3 layers of paint.

Lump sum price for 4 platforms : …/

G.144. Renew ladder in dummy tank no. 58
Dwg : 1175-1618-010 : Intermediate piece Spud carrier well
LD-11-00-151 : Arrangement mooring barge loading

• Assume the dummy tank no. 58 is removed as per item F8.
• Erect a staging inside the tank and to access the tank entrance.
• Open / close the manhole.
• Note that the position of the manhole and ladder is not as per drawing. The manhole and the top part of the ladder has been shifted more to fore and to starboard side as indicated on the drawing LD-11-00-151. The ladder from the topdeck down to 8420 is fitted under the manhole at its present location. The ladder between 1050 and 8420 above base is installed as per drawing 1175-1618-010.
• Crop off the old ladders and fit, weld new owners supplied ladders inside the dummy tank. Ladders are supplied in over length and hot dipped galvanized.
• Yard is to adjust, trim ladder. Supply, fit and weld new supports pos 4 & 113, fit, weld ladders
• Grit blast the supports, stiffeners and fully paint ladder in conjunction with the grit blasting and painting as per item F110.

Lump sum price : …/
G.148. Modification of railing and additional platform on anchor boom

- Existing railing is already installed as per drawing 5242498. Note that platform and stair as per section E-E in this drawing is not installed
- Assume that the hanging sheave block has been removed by the ships crew
- A staging is to be erected under the anchor hoisting eye plate frame 5, l*w*h=3x3x15m
- The railing is to be modified on the anchor boom in way of frame 3 & 7. Length 1377mm as shown in the drawing LD-11-00-A000666
- An additional platform with railings is to be added, fabricated, fitted and welded on the anchor boom as shown on view X in drawing LD-11-00-A000666. Both sides railings length 3800mm.
- All materials used are grit blasted and primed. Railing pipes and stanchions are hot dipped galvanized. Damaged paint system and new steelworks is to be de-rusted to ST3 and painted with 32 layers of paint.

Price for SB & PS anchor boom mast …/
• Railing is to be supplied, installed and welded on top of the cutter ladder as shown on snapshot G151-3Dc. Railings to be pre-fabricated and hot dipped galvanized after construction. Including barricading and staging’s in way of the area during the works.

• All damaged paint system in way of hot works and the corroded area’s of the bulkhead are to be repaired by wire brushing to ST3. Assume a corrosion of 10% on the bulkhead. 1 T/U and 2 FC’s are to be applied on the aft bulkhead, the new steelwork and the top of the cutter ladder.

• The damaged paint system inside the cutter ladder is to be repaired by wire brushing to ST3 and 3 layers of paint.

Lump sum price :

**G152. Modification anchor boom masts : SB & PS**

- 5242499 Arrangement anchor boom mast
- 5242500 Anchor boom mast
- LD-15-00-002 Arrangement pawl on anchor boom mast (old type)
- LD-12-00-A000497 Arrangement pawl on anchor boom mast
- LD-12-00-A000496 Fixed support for pawl
- LD-12-00-A000592 Arrangement pawl
- LD-12-00-A000596 Plate for pawl anchor boom
- LD-12-00-A000594 Shaft for pawl in anchor boom mast

• Erect a staging around the anchor boom masts: lxwxh=4x4x10m
• Assume the anchor booms are stored in the top supports as shown in the drawing 5242599.
• Assume that the removable support for the pawl and cylinders as per drawing LD-15-00-002 pos 20 to 25 are already removed.
• The yard is to cut, remove the fixed support as per drawing LD-15-00-002 pos 15+16+17+18+19.
• A new owner's supplied pre-fabricated fixed support as per detailed drawing LD-12-00-A000496 is to be fitted, aligned, welded to the anchor boom mast as shown in drawing LD-12-00-A000497.
• An owner’s supplied pawl arrangement LD-12-00-A000497 pos 1-15 is to be installed, aligned and fastened to the fixed support. The anchor boom will be lifted out of the top support and presented in front of the pawl by the crew. The yard is to adjust, align the pawl to the hook fitted in the anchor booms and all fastened.
• Two ladders as per drawing 5242499 are fitted to access the top of each anchor boom mast. The yard is to fit and weld owner’s supplied safety guards on the two ladders. One with length of 3.5 meter, one with length of 1.5 meter. Safety guards are delivered hot dipped galvanized.
• Damaged paint system in way of the works to be repaired by wire brushing to ST 3 and painting with 2 layers of paint.
• The complete anchor boom mast is to be degreased. Corroded area’s on the anchor boom mast to be wire brushed to ST3 and painted 2 layers paint. Assume 5% corroded area. A full coat to be applied on the complete main mast from upper deck to top.
Lump sum price for SB & PS anchor boom masts: ...

**G153. Guide plates under hatch provision store**

**G154. Renew & modify wooden flooring in pumproom**

- 01175-2625-100 Wooden floor in pumproom
- LD-12-00-A000451 Profiles for wooden floor in pumproom
- LD-12-00-100 Arrangement area wooden floor in pumproom

The void spaces in the pump room are to be opened, lighting to be installed and vented for hot works.

Assume that the existing wooden flooring on the tank top in the pumproom as per drawing 01175-2625-100 is already removed.

The existing steel fixations and profiles as per drawing 01175-2625-100 are to be cut and modified as per new layout drawing LD-12-00-A000451. Additional steel profiles as per new drawing LD-12-00-A000451 is to be supplied, fitted and welded.

The yard is to install new owner’s supplied wooden floor as per drawing LD-12-00-100. Yard is to cut access openings in the steel profiles on the tank top insert the wooden beams. Wooden beams are supplied in over length. Yard is to cut, trim, adjust to fit the wooden beams in situ and as per drawing. Remove parts in the steel profiles to be repaired by yard’s supplied inserts.

Note that the vessel will arrive in the yard with freshly painted tank top. The yard is to repair the damaged paint system by wire brushing to ST3 and painting with 3 layers ship’s supplied paint. All damaged paint system of the tank top and steel profiles is to be repaired prior inserting the wooden beams. Special attention to be paid not to damage the paint system during this installation.

Lump sum price: ...

Additional price for the complete renewal of steel fixations and platforms:

The existing steel fixations and profiles as per drawing 01175-2625-100 are to be cut off and removed. Deck to be grind smooth. The yard is to supply, fit and weld new steel fixations profiles as per layout drawing LD-12-00-A000451. The paint system in way is to be repaired by water blasting and 3 layers of ship’s supplied paint. Including the collection and disposal of water and dirt.

Lump sum price: ...

**G155. Modify hatch cutter ladder above cutter gearbox**

- 5242792 Superstructure cutter ladder
- LD-11-00-A000603 Extra Hatch for torn device

Disconnect, remove the bolted hatch from the top of the superstructure cutter ladder. Hatch no2 as per drawing 5242792 – 4770x5900mm. Transport to workshop.
The bottom side of the hatch 2 is insulated. Cut, remove the insulation including the 1mm cladding in way of works and finish the ends with 1mm galvanized plate. Cut an opening in the hatch, 1500x2818mm as shown on drawing LD-11-00-A000603. Grind edges smooth. Fit, weld an owner’s supplied hatch with coaming as per drawing LD-11-00-A000603 in the existing hatch cover. Including the opening / closed of the new hatch cover to access for welding. Insulation is to be supplied and fitted at the underside of the new inset hatch cover and covered with 1mm galvanized cladding. Including steel supports. Damaged paint system in way is to be repaired by wire brushing to ST3 and painted with 3 layers ship’s supplied paint. After repairs, return the cover and re-install with ship’s supplied gaskets. Carry out hose test to captain’s satisfaction

Lump sum price: ..../

G156. Replace gratings and supports in pump wells by new heavy duty design

G158-3D Overview platforms in Pumproom
LD-12-00-A000449 Grating in pump well (PS)
LD-12-00-A000453 Grating in pump well (SB)

Cut, remove, dispose of the existing light duty grating with angle bar supports now fitted in the dredge pump well. Supply, fabricate, install new removable type gratings as per drawing LD-12-00-A000449. Middle part is constructed as per detail shown in the drawing. Side grating are heavy duty galvanized grating. The supports to be fitted, adjusted in situ. Supports, grating and damaged paint system in way is to be repaired by wire brushing to ST3 and painted with 3 layers ship’s supplied paint.

Lump sum price for 2 pump wells (SB & PS) : ...

G158. Platforms and stair casings in pump room

G158-3D Overview platforms in Pumproom
LD-12-00-A000416 Arrangement platform in pumproom over discharge pipes
LD-12-00-A000423 Arrangement pump room
LD-12-00-A000417 Platform type A in pumproom
LD-12-00-A000421 Platform type B in pumproom
LD-12-00-A000424 Stair type A on platform in pump room
LD-12-00-A000425 Stair type B on platform in pump room
LD-12-00-A000427 Stair type C on platform in pump room
LD-12-00-A000432 RX Grating type A1 for platform type A
LD-12-00-A000433 RX Grating type A2 for platform type A
LD-12-00-A000434 RX Grating type B for platform type B
LD-12-00-A000448 Platform on suction cover support
Works are to be done in conjunction with items U103 & G154
Assume wooden floor in the pumproom is removed. Fit, weld, align owner’s supplied bottom part of the pipe supports of new platforms on the tank top as shown on the drawing LD-12-00-A000416 & LD-12-00-A000448. Transport, fit, assemble, install, weld owner’s supplied platform supports, platforms, railings and stairs as indicated on the drawing LD-12-00-A000423. In total 3 platforms, 4 stairs and one ladder. Note that gratings in front of the dredge pumps are already installed. Renew part of the portside platform on main deck level from frame 65 up to 70. Platform made of checker plate 6/8, 800mm wide with 100mm kickboard both sides. Platforms & stairs will be delivered fully painted and gratings will be fitted.
Yard is to be repair the damaged paint system to ST 3 & 3 layers of paint.

Lump sum price: ....

**G159. Modify hatch above dredge pump 2**

Dwg LD-12-00-A000439

Disconnect, remove the existing hatch cover above the dredge pump portside and transport to the workshop. Hatch size 3 x 5.5m
Cut opening in the hatch and stiffeners as per view 1, size 4215x1930mm
Fit in an owner’s supplied hatch cover as per drawing and weld this hatch cover to the top plate and stiffeners of the existing hatch cover.
Grit blast the old and new hatch cover and fully paint with owner’s supplied paint. Fit, install owner’s supplied rubber and cleats.
Return to ship and re-install the hatch. Test hatch open, close. Test / adjust locking mechanism. carry out hose testing in presence of the class surveyor.

Lump sum price: ....

**G160. Relocation VSAT mast (to PS aft)**

LD-11-00-085 Mast for dredging signals.
LD-11-00-158 Platform + foundation dome V-SAT
LD-11-00-A000482 Foundation dome VSAT + NAV lights on gantry barge loading PS
LD-11+-00-A000588 Cable trays on VSAT mast PS

A staging is to be erected above the Portside aft and Portside forward barge loading gantries to access. See drawing Ld 11-00-085 for sizes. Note that the staging should not be in way of the ship’s travelling deck crane.
Assume that the navigation lights and antenna are removed by the ship’s crew. Yard is to be pull back the electrical cables.
Cut off and remove the existing mast for dredging signals as per drawing Ld-11-00-085, installed on the portside aft barge loading gantry. Grind top gantry smooth.
Remove the existing 40’ VSAT dome antenna from the mast at portside and store in a dry and secure space.
Cut off, remove and scrap the old mast for the VSAT antenna dome as per drawing LD-11-00-158, from the top of the portside forward barge loading gantry.
Receive the owner’s pre-fabricate platform as per drawing Ld-11-00-A000482 & LD-11-00-A000588.
Transport, lift, fit the mast with platform on top of the barge loading gantry. Including fit, weld, NDT and remove temporary lifting lugs. Fit, cut, adjust and weld the mast pipes to the top of the barge loading gantry.
De-rust the damaged paint system of the platform to ST3 and fully re-paint the top of the barge loading gantry with 3 layers of paint.
Return, lift, install and connect the 40’ VSAT dome antenna on top of the new mast.
Install, run and fasten the cables in the existing cable pipes and on strips to the navigation light supports, the MF/HF antenna and the new dome antenna. Assume the ship’s electrician will terminate and connect the cables.

Lump sum price: …/}

**G161. Partly renewal plate foundation lower bend pipe**

503575 Arrangement seating with swivelling bend  
503571 Seating for swivel bend  
503571_JG Seating for swivel bend

Assume the lower bend pipe no. LD161 including the vertical supports shaft are removed under item U5.6.  
Assume the ring dwg 503571 pos 163 is removed and renewed as per item U5.7.  
The original position of the ring pos 163 is to be marked by sufficient number of reference points.  
Crop out, remove two access openings in plate 503571 pos 160 as indicated on the drawing. Arrange ventilation, lighting during the works. Close the access openings with new yard’s supplied plates 450x300x16mm  
The top plate of the foundation drawing 503571 pos 160 is to be partly renewed as indicated on the drawing 503571_JG. All to be welded at outside and in side the void. Butt welds full penetration welds. All welds to be crack tested and void to be pressure tested after the works. Yard is to close the access openings temporary and re-open after the test.
The outside and inside of this lower void to be grit blasted to SA 2 ½ and painted with 4 layer’s ship’s supplied paint.

Lump sum price: …/}

Lump sum price to renew the complete plate dwg 503571 pos 160: …/}

**G163. Additional ventilation inlet separator room**

G163. Picture additional ventilation inlet separator room
The ventilation inlet to the separator room is integrated in the gantry foundation of the aft portside barge loading gantry.
Erect a staging under and in way of the barge loading gantry portside: l*w*h = 3x3x4 m.
Open bolted type inspection cover to the ventilation inlet: 1.0 x 1.0 m.
Remove the existing louver from the aft side of the barge loading barge. Fabricate a identical louver with holding frame. Grit blast and hot dip galvanize old and new louver.
Cut an additional opening in the foundation barge loading gantry as indicated in the picture. Size 800 x 700mm. Fit, weld the new holding frame.
Install the louvers with yard’s supplied stainless steel bolts.
Repair the paint system in way to ST3 and paint the louvers with 3 layers of ship’s supplied paint.

Lump sum price: ..../ 

**G165. Renew water compartment of bain-marie in the galley**
The water compartment of the bain-marie in the galley is to be renewed.
The water compartment is made of 2mm stainless steel, l*w*h= 1300x500x250mm.
Floor and cabinets in way of the galley are to be protected by tarpaulin cover.
Yard is to fabricate a new water compartment, including 1” drain connection.
Cut out old unit, fit, install, weld the new water compartment, weld to the top plate.

Lump sum price: ..../ 

**G166. Install support for suction cover in the pumproom**

<table>
<thead>
<tr>
<th>G158-3D</th>
<th>Overview platforms in Pumproom</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD-12-00-A000455</td>
<td>Support for suction cover</td>
</tr>
</tbody>
</table>

Transport owner’s supplied support suction cover as per drawing Ld-12-00-A000455 in to the pumproom.
Fit, weld to the tank top as per overview drawing.
Paint system to be repaired in conjunction with item F112.

Lump sum price: ..../ 

**G167. Change home port name from ‘LUXEMBOURG’ in to ‘PORT LOUIS’**

G167 Existing ship’s and port name aft side.

The welding letters of the old home port name ‘LUXEMBOURG’ as per drawing G115 are to be removed. The yard is to cut, grind, remove the welding letter. Existing letters are made from plate 6mm and height of 250mm. Including repair of New Port name is ‘PORT LOUIS’
Port name is fitted on the horizontal beam of the moveable cutter ladder maintenance platform. A staging to be erected for access.
The yard is to fabricate new welding letters, made from 6 mm plate. Height of letters home port name is 250mm. The shape of the letters is to be copied from the old port name.
The letters of the new home port name are to be fitted and welded. After welding works, the new letters and the damaged paint system in way to be de-rusted to ST3 and painted with 3 layers ship’s supplied paint. The port name is to be painted in black colour.

Lump sum price: ...


Dwg 01175-0323-020 Construction midship
01175-2615-010 Wooden floor on crane deck
01175-0338-030 General arrangment

Assume the crew will remove all spare parts stored on the crane deck.
The deck plating under the wooden floor on crane deck between frame 100 to 115 and between center and 3000mm from center line to portside. Totaal area 10500x3000mm.
The wooden flooring as per drawing 01175-2615-030 in way of this steel damage is to be removed and refitted after the repairs. The yard is to mark the wooden beams. Cut out portions of the steel fixation profiles pos 9,10,12,13, remove the wooden beams. After repairs the wooden beams are to be returned, refitted on the same location or new owner’s supplied wood to be installed.
Part of the central accommodation, the washplace, the bosun’s store and fanrooms are located under the works. The yard is to open up ceiling panelling, supply, fit install staging and construct a temporary platform above the accommodation area and bosun’s store to protect the area underneath. After works, all damages to be repaired and spaces to be re-instated as original situation. Including removals / returning of furniture, lockers,..Extraction fans for welding fumes, temporary lighting, welding permits, sufficient fire prevention below in included. Barrides, tarpauline cover on deck during the works included as well.
The yard is to cut the deckplating including stiffiners as per above sizes. A new deck panel including stiffeners as per construction drawing is to be pre-fabricated, fitted and welded.
All steel work to class surveyor’s satisfaction.
The new steel deck panel is gritblasted and primered after construction. Damaged paint system is to be repaired in way to ST3. New deck plate and below deck is to be painted with 2 layers ship’s supplied paint.

Lump sum price: ...

G.169. Fore peak tank no. 1 & 2 steel repair and dummy tank no. 58 installation.

Drawings:
- IHC 01175-0353-010 tank testing plan
- IHC 01175-0323-030 Construction Plan Fore ship sheet 1, 3, 4
Steel work in fore peak tank can be combined with job X.126., renewal of echo sounder.

Scope:
- This job is to suspend / sea fasten the dummy tank 58 on PS longitudinal shell only.
- Steel repairs are required on the upper castle deck, vertical sides, and inside the fore peak tanks 1 and 2. Job can be combined with steel repair specification K.7.3.
- Assume the vessel is on the dock blocks.
- Assume a new dummy tank 58 is delivered by the owners at your yard (pos 1 on LD 11-00-A005285). Include offloading the dummy tank 58, temporary storage at your yard and transport to the ship. Empty dummy tank 58 weighs 15 ton.
- Perform a hoisting test of dummy tank 58 with fresh 1.5 m water in the tank, witnessed by Captain or officer. Certificate to be provided by the Yard. Including pumping of water, crane, dye check of pad eyes, etc. The tank is equipped with two (2) pad eyes (pos 36 / LD 11-00-A005205 sheet 1).
- Open / close one (1) manhole covers each in all three (3) tanks.
- After completion of steel works, pressure test the tank no.1, no.2 and no. 58 to 0.12 bar witnessed by ships Captain or officer. Blind-off / refit all the ventilation caps, sounding pipe and manhole covers. Including supply / installing new packing. Inform owner 2 work days in advance. Issue a certificate.
- After all works perform a vacuum test on bottom plug of tank no.1, no.2 and no. 58, witnessed by ships captain or officer. Including cementing of bottom plug.
- After all hot works perform a coating repair of damaged area’s inside the fore peak tanks and the dummy tank.
  - Wash and clean out the area with fresh water.
  - Power wire brushing to ST3 according specs E.6. and coating repair according specs F.10.
Coating (2 x 35 μm) with owner supplied zinc paint (Hempel’s Zinc Primer 16490) of mating surfaces on fixation block and bolt plates 80 mm on fore castle deck (tank 1 and 58).

Coating with owner supplied antifouling of the dummy tank according specs F.1.2. (Dummy tank is supplied coated with only missing the anti fouling layer.)

Including all means like staging; ventilation for tank access and hot works, permits, temporary lighting, working air, transports between ship and workshops, etc.

Fore peak tank no. 1 PS steel repairs

- On fore castle deck in way of frames 149-154, crop-off existing & supply + install oversized plate 4085 x 800 x 25 mm (pos 57 on IHC 01175-1661-010 sheet 1, detailed drawing LD 11-00-A005872) and brackets (pos 199 / detail 1 / IHC 01175-1661-010 sheet 2). 750 Kg steel renewal. Rings (pos 2 / LD 11-00-A005872) and oversized bolt plates (pos 3 and 4 / LD 11-00-A005872) are owner supplied. The bolt plates are un-drilled and to be tack welded only.

- Guide for dummy tank on PS hull in way of frames 149-150, (LD 11-00-A005285, bulkhead view - PS) crop-off existing & supply + install profile (pos 9), brackets (pos 10), block (pos 12) and wedge (pos 13).

- From the side longitudinal on the centre line, cut-out the existing fixation block (pos 3 / LD 11-00-A005285) and brackets (pos 14 and 15 on LD 11-00-A005285).

- Hull repair (IHC 01175-1661-010 sheet 1).
  - Removal of concrete coffer dam 0.6 x 0.7 x 0.6 m in tank No. 1, frames 151-152, 2550-3250 above base.
  - Steel inserts in side longitudinal, forward shell and deck 3250 above base. 500 kg in total.

Fore peak tank no. 2 SB steel repairs

- On fore castle deck in way of frames 149-154, crop-off existing & supply + install plate 2940 x 800 x 25 mm (pos 53 on IHC 01175-1662-010) and bracket (pos 102). Ring (pos 103-104) is owner supplied. For access remove / refit tank ladder, length 2 m.

- Guide for dummy tank on SB hull in way of frames 149-150, (LD 11-00-A005285, bulkhead view - SB) crop-off existing & supply + install profile (pos 8), brackets (pos 10) and block (pos 11).

Dummy tank no. 58 steel repairs and installation

- Bolts / nuts yard supply (4-5-6-7 / LD 11-00-A005285).
- Supply and install bush (pos 16 / LD 11-00-A005285).
- Install the new dummy tank no. 58 on dock blocks on the dock floor in way of the sea fasten position and adjust with jacks, chain blocks, wedges etc until the unit is in correct position (with bush pos 16 / LD 11-00-A005285 installed). Relocate the tack welded guiding blocks (pos 6, 5 / LD 11-00-A005205 sheet 1) if required. To include all hoisting and lifting movements.
- Weld the 2 bolt plates (pos 3 and 4 / LD 11-00-A005872) as much as possible. Mating surfaces of the bolt plates on tank 1 and the dummy tank 58 are to be parallel and properly mating. Verify with feeler gauges.
• Drill the bolt head plates on the ship’s centre line (pos 3 and 4 / LD 11-00-A005872) in line with the bolt plates of the dummy tank which are already drilled to final size (pos 52 and 53 / LD 11-00-A005205). Including the required tools, power supply, transport, calibration report, etc.

• Pre-fitting the two (2) suspension brackets (pos 37, 38, 39, 40, 41 / LD 11-00-A005205 sheet 1). The brackets are owner supplied, already assembled (welded) and coated.

• Loosen foundation cover and bolts (detail 2 / LD 11-00-A005205 sheet 1), fit capstan (pos 4 / LD 11-00-151 sheet 2) with electrical cables and connection box and fit & close MCT (pos 99 / LD 11-00-A005205 sheet 1). All parts owner supplied except packing (pos 2 / LD 11-00-A005205 sheet 1) which is yard supply.

• Cut-out the longitudinal shell section in way of the fixation block inside dummy tank 58. Install by welding the adjusting block in fore peak tank no.1 and dummy tank no.58. Adjusting block is owner supplied and delivered assembled with hammer head bolts, o-ring, etc. Supply + install the brackets (pos 14, 15 / LD 11-00-A005285) in tank no 1. Fit owner supplied bracket (pos 4 / LD 11-00-A005205 sheet 1) in dummy tank.

• Loosen the hammer head bolts of the adjusting block, lower the dummy on the dock floor for further fitting and final welding in the dummy tank no 58 and the fore peak tank no 1. Include erecting and modification of staging for fore peak tanks and dummy tank works. Weld inspection 100% ultrasonic in way of fixation block (tank 1 and 58) and the bolt plates (fore castle deck centre line).

• Install the dummy tank back in the ship and sea fasten with the fore (4) hammer head bolts (fixation block in fore peak tank 1) on torque (M56 – 3300 Nm) and the seven (7) upper bolts PS fore castle deck (M42 – 4000 Nm). Hydraulic wrench for hammer head bolt is owner supplied (notes on LD 11-00-A005285). Bush (pos 16 / LD 11-00-A005285) has to be removed and handed over to the Captain.

Lump sum price: ..../

**G.170. Deck crane, install bilge well**

Drawings:
- HMC 7430-01 deck crane general view
- HMC 7430-53 floor machinery house
- Pics G.170. deck crane bilge well

Two (2) bilge wells have to be installed on the bottom side of the machinery house, aft side.

Scope:
- Assume the bilges have been cleaned according specs H.7. and the main switch boards have been removed.
- Assume staging has been erected for coating of the deck crane or the machinery house has been lowered on the dock floor.
- Cut hole dia 200 mm on two (2) locations in the floor of the machinery house and weld two (2) owner supplied wells (dia 200 mm x 300 mm) in place.
• Two (2) existing drain, 1” cut off and weld insert.
• Including mobilisation of the welding equipment.
• Coating touch-up of the effected areas, power grinding to E.5. and coating according specs F.14.

Lump sum price: …/ 

**G.171. pump room, double bottom tank 46, flat bottom steel repair.**

Drawings:
- IHC 01175-1302-010 double bottom fr 58 ~ 69.
- G.171. mark-up of bottom plate 14-april-2014

The tank is located in the pump room, frames 59 ~ 178. On the centre line is a not water tight bulkhead, dividing tank 46 in two (2) sections.

Scope:
• Open / close and renew packing on four (4) manhole covers of tank 46, and of tank 51.
• Renew flat bottom thickness 13 and 16 mm.
  - Frame 59 – 100 mm (tank 51)
  - Frame 63 + 100 mm (tank 46a)
  - 4850 mm from centre line on PS
  - 5050 mm from centre line on SB
• Include access cutting in tank top of tank 46 A, frame 63, 3900 from centre line.
• Include vacuum testing of the welding seams, witnessed by Captain or first officer.
• Including all means like ventilation, temporary lights, cleaning, reporting, etc.

Scope coating repair:

Job can be combined with coating renewal F.142.

• Assume steel works have been completed.
• Assume the new steel inserts are supplied shop primed by the yard.
• Power wire brushing of burned areas according specs E.6.
• Coating of the new steel inserts and burned areas according specs F.10. dry tanks and flat bottom specs F.1.1..
• Including all means like ventilation, lights, permits, coating thickness measurements, etc.

Lump sum price: …/ 

**G.172. drink water tank 10, steel repair**

Drawings:
- IHC 01175-1605-010 water ballast tank fr 124 ~ 131
Job to be combined with F.145.

Scope:
- The tank has been grit blasted to SA 2.5. according specs F.145.
- Open / close the three (3) manhole covers on main deck (engine parts store).
- Assume scaffolding is in place. Allow for 5 times modification.
- Assume steel renewal of 1 ton (combination of profiles and bulkhead plate).
- Perform pressure test (0.12 ~ 0.18 bar, 1 hour). Included closing / opening of ventilation covers, sounding pipe, manhole covers with new packing.
  Witnessed by ships captain or first officer.
- Including all means like ventilation, lights, permits, tools, consumables, etc.

Lump sum price.

**G.173. pump room tank top steel renewal in way of sewage plant.**

Drawings:
- IHC 01175-0323-020 Construction plan mid ship
- IHC 01175-0353-010 Tank plan
- G.173 Sketch steel insert 14 April 2014

Scope:
- Assume the old sewage plant and the steel bulkhead around the old sewage plant at frame 72 are completely removed.
- Open/close the manholes of tank 46: double bottom under pump room.
- Arrange and include ventilation, lighting, gas free, access & hot work permits:
  - In the pump room
  - Inside tank 46
- Place an insert 4200 x 2000 x 11mm in the double bottom in the pump room, between frame 71 and frame 78, between 4550 and 6550 from CL to SB.
- Paint system on double bottom tank top and inside double bottom tank 46 in way of the steel work to be be repaired to ST3 and 3 layers of ship’s supplied paint.

Lump sum price : 

**G.174. spud carrier steel repairs**

**G.174.1. spud carrier various steel repairs**

Drawing:
- IHC 5242772 spud carrier section 4 construction
- IHC 5242777 section plan spud carrier.
- IHC 5242782 spud carrier section 3
- IHC 5242785 spud carrier section 6
- IHC 5242786 spud carrier section 5
• IHC 5242794  Ladders in spud carrier
• IHC 49403  Steel ladders
• IHC 49404  climbing brackets
• Sketch G.174. spud carrier climbing brackets

Scope:
• Steel works to be done after sandblasting according specs F.115.
• Assume job will be combined with renewal of wearing plates 25 mm according specification K.7.2.
• Bilge pump arrangement running from section 1 till 6 A.
  o Section 4, remove existing pump support and junction support brackets, supply and install pump support frame and junction box frame made from angle bar 50 x 5 mm, L 2 m. Pump and junction box are owner supplied.
  o Section 1 till 6, renew pipe dia 1 ½” hot dip galvanised, length 15 m, 5 bends, 5 straight connections, 3 bulkhead penetrations and 10 pipe brackets.
• Section 5, ladder passage from section 4 to section 6.
  o Crop-off 3 ladders.
  o Supply and install 3 new ladders according IHC 49403, length 1150 mm each.
  o Ladders to be hot dip galvanised, minimum thickness 50 μm.
• Section 5, water tight section.
  o Crop off existing, e-cable pipe and brackets, assume 5 meter pipe. Inclusive disconnecting and connecting of e-cable. Close water tight bulkhead penetration for the e-cable by welding.
• Section 6 B, welding of crack
  o location to be identified after sandblasting
  o Assume total of 0.5 m length on 2 locations.
  o Welding according specs G.1.1.
• Section 6 A, lighting fixtures
  o Crop off existing, supply new and install three (3) foundation brackets for lights. Assume 100 x 100 x 5 mm. Install three (3) new water tight lights, owner supplied.
  o Crop off existing, supply new and install e-cable pipe and brackets, assume 10 meter pipe in 5 sections.
  o Pipes to be hot dip galvanised, minimum thickness 50 μm.
  o Disconnecting and removing of old e-cable and install owner supplied class approved submerged type cable, 1.5 mm 2, assume 20 m.
  o Connect lights, switch is located in spud carrier section 4.
• Section 4, outside area, PS and SB. Supply and weld twenty four (24) climbing brackets (IHC 49404).
• Including ventilation, gas free certification, temporary lightning, permits, temporary brackets, etc.

Lump sum price:  

G.174.2. spud carrier section 6, new insert pos 128

Drawings:
IHC 5242785 spud carrier section 6

Scope:
- Assume the spud carrier has been grit blasted.
- Supply new and cut / fit wear plate pos 130 (25 mm, rolled).
- Supply new and cut / fit bulkhead plate pos 128 (16 mm, rolled).

Lump sum price: ...

**G.175. Renewal hinges cutter platform gantry side**

**Drawings:**
- IHC 01175-2813-010 (2/2) Dj: Platform iwo cutter
- Vuyk 14053-12-121: Hinge pin construction
- Vuyk 14053-12-110_1_C: Lifting arrangement cutterplatform
- Pictures G.175: Current setup

Old hinge plates were worn out and have been temporary repaired by adding extra rings on each side of the old hinge plate (see “Pictures G.175”). All modifications of locking arrangement, sea fastening brackets, filling plates, ... have been made according the centre line of these extra rings. **Therefore the centreline of these extra added rings needs to be maintained!!**

**Prefabricate:**
- Hinge plates pos 5, 6 &7 as per drawing 14053-12-121
  (prefabricated hinge plates to be shop primed before installation)
- Hinge pins (pos 2) and locking plates (pos 3) as per drawing 14053-12-121

**Job description:**
- Assume all electrical cables have been disconnected by crew
- Assume all excessive materials have been removed by crew
- Remove hinge pins (4 pieces) after removing the welded locking plates
- Remove the cutter platform as per lifting arrangement (Vuyk 14053-12-110) and put on shore on wooden blocks
- Inspect and measure the hinges (4 pieces) of the cutter platform and report to owner’s representative.
- Determine centre line of existing hinges and take reference to the existing structure
  *Most important reference points:* (see “Pictures G.175”)
  - Sea fastening support
  - Locking eyes
- Install 2 x hanging staging, one on each arm
  Staging will have to be removed when testing the platform manipulation and reinstalled for touch up painting
- Cut / re-weld access hole in each arm for inspection of internal stiffeners
  (see “Picture G.175”)
- Remove old hinge plates

**Remark:** The outboard hinge plate is connected to beam pos 80 (dwg 01175-
Yard to check if it’s possible to remove the complete hinge plate or if a cut-out has to be made just above this beam.

- Position and tag weld the new fabricated hinge plates
- First alignment check
- Weld complete hinge plate + close access holes
- Position boring bar and adjust according the old centre line
- Machine the holes of the hinge plates to the correct dimensions as per drawing 14053-12-121)
- Second alignment check
- Reinstall the cutter platform using the new hinge pins
- Test manipulation of the platform and make sure locking pins and sea fastening position are aligned.
- Remove the platform again and do touch-up painting (paint is owner supplied)
- Reinstall the platform after job G.178 is finished

Lump sum price.../

**G.176. aux spud door steel repair.**

**Drawings:**
- IHC 01175-1607-010 Spud keeper for auxiliary spud.
- IHC 01175-1682-010 bulwarks on spud keeper on PS

The aux spud door weighs 36 ton. Job to be combined with exchange of wear plates (pos 124 and 125) according specification K.7.3. Job to be done after grit blasting, part of specification F.147.

Job may clash with K.113.

**Scope:**
- Assume the unit has been removed and is available at the yard’s workshop / repair area according specs K.6.3.
- Assume wear plates pos (124 and 125 / IHC 01175-1607-010) have been removed / refit according specs K.7.3
- Open / close manhole cover and provide new packing.
- Include access cutting, with welding and vacuum testing of the seals. Testing in presence of Captain of first officer.
- Mark the cutting line with stainless steel welds.
- After grit blasting perform thickness gauging of complete bulkhead plates (side, back, front, closing plates), top and bottom plates.
- Place new hull shaped bulkhead inserts thickness 16 mm, 128 kg each, on three (3) locations (pos 116, 117, 118 / IHC 01175-1607-010). With back weld.
- Welding up of cracks, assume 20 hrs, according specs G.1.
- Supply and cut / weld four (4) pipes (pos 6 / IHC 01175-1607-010).
- Supply and cut / weld two (2) bulb profiles 160.8 L 1555 mm (pos 65 / IHC 01175-1682-010).
• Open / close and provide with new packing the dock plug (pos 3) and manhole cover. Perform pressure test (0.12 ~ 0.18 bar, 1 hour), witnessed by captain of first officer.
• Including all means like ventilation, lights, staging, permits, reporting, etc.

Lump sum. …/

**G.177. bollards and deck plating to repair in frames 130-139-143-144.**

**Drawings:**
- IHC 01175-0323-030 Construction plan fore ship
- LD 11-00-28 Arrangement fenders
- G177-bollard details bollard
- G177-2 Box around bollard
- G.177-3 sketch of inserts upper deck 14 April 2014

**Scope:**
- The upper deck in way of 5 bollards at frame 130 and 140 PS and frame 130, 140, 144 SB is worn and needs an insert under the bollard
- Open/close the manhole to the dry space on SB upper deck, tank 2A on main deck, tank 2A on upper deck, void space next to chain locker PS and SB on upper deck
- Open/close the manholes, Arrange and include ventilation, lighting, gas free, access & hot work permits:
  - On upper deck:
    - Void space next to the chain lockers on PS and SB between frame 130 and 133
    - The dry space on PS upper deck between frame 130 and 141
    - The dry space on SB upper deck between frame 130 and 141
    - Tank 2A on SB upper deck between frame 141 and 145
  - On main deck:
    - Dry tank 2A on SB main deck between frame 141 and frame 145
- Arrange and include ventilation, lighting, gas free, access & hot work permits:
  - Inside harbour generator room next to PS chain locker
  - Inside KHD-store next to SB chain locker
  - Inside hydraulic room at frame 140
  - Inside SB ER store at frame 140
- Place 3 inserts 800mm x 450mm x 8mm on upper deck.
- Place 2 inserts 800mm x 450mm x 12mm on upper deck.
- Staging to include on main deck under upper deck.
- Frames in way of the inserts to remain in place.
- Remove/refit 5 pieces steel box around bollard: 700 x 400 x 340mm. thickness 9mm.
- Remove/refit 5 pieces steel bollard diameter 133 x 10mm in way of the inserts. New bollards are owner supplied. Half round bar dia 76mm x L = 800mm underneath the bollard Yard supply.
- Assume 8 x 500kg loose owner’s spares in way of the steel works to be removed/refit by Yard for 2m
- Paint system on upper deck and main deck in way of the inserts and renewed bollards to be repaired to ST3 and 3 layers of ship’s supplied paint.

Lump sum price: \( \ldots/ \)

**G.178. Reconditioning movable cutter platform**

**Drawings:**
- Vuyk 14053-12-110 Rev C: Lifting arrangement cutterplatform
- Vuyk 14053-12-130 Rev C: Movable platform arrangement
- Vuyk 14053-12-122 Rev C3: Main construction
- Vuyk 14053-12-128 Rev C2: Rails PickPoint hoist and Found
- G178_sketch: Stopper blocks
- G.178_side wheel: Side wheel

**Job description:**
- Assume complete platform is removed as per item G.175.1
- Remove movable part (dwg 14053-12-130) and put on wooden blocks (can simply be hoisted out)
- Measure allignment of the guiding rails and report to owner’s representative (Pos 20 dwg 14053-12-122 Rev C3 & dwg 14053-12-128 Rev C2)
- Check all wheel assemblies (8 pieces) together with owner’s representative
- Loosen all bolts (18 pieces) of the wheel assemblies (Pos 25/27 dwg 14053-12-130 Rev C)
- Re-align the wheel assemblies and re-tighten the bolts
- Measure the wheel distances in both longitudinal and transversal direction and report to owner’s representative
- Weld small stopper blocks (32 pieces) as per sketch G.178. to keep the wheel assembly in position (stopper blocks = yard supply)
- Fabricate 2 extra side wheels as per example (see also picture xxx)
- Enlarge 2 cut-outs on the guiding rails for the 2 new side wheels
- Adjust all 4 side wheels by means of filling plates 80x100 mm (thickness will be determined by owner’s representative based on the measurement report of the guiding rails & measurement report of the wheel assemblies)
- Place the movable part back on the guiding rails test the movability and show to owner for approval
- Take into account that some small grinding of the cross beam (pos 5 dwg 14053-12-122 Rev C3) will be needed as well after first movability test.
- Touch up painting with owner supplied paint

Lump sum price (without fabrication of the extra side wheels) \( \ldots/ \)
Price per side wheel \( \ldots/ \)
**G.179. upper deck and coaming repair in way of PS frame 125-130 steel repairs.**

**Drawings:**
- IHC 01175-0323-030 (4 pages) Construction plan fore ship
- IHC 01175-1680-010 (2 pages) Bulwark on forecastle deck
- IHC 01175-0338-030 (2 pages) General Arrangement
- G179 sketch (4 pages) Sketches steel repair

**Scope:**
- Open/close the manhole at frame 130 of the PS dry space between frame 130 and frame 141, between upper deck and forecastle deck. Arrange and include ventilation, lighting, gas free, access & hot work permits.
  - Place an insert 1200 x 400 x 12mm in the forecastle deck, between frame 130 and 133 at PS, between 9450 from CL to PS hull
  - Place an insert 5000 x 1000 x 9mm in the ships hull, between frame 130 and 138 at PS, between 8900 and 9900 above base.
  - Renew 1 x longitudinal bulb profile HP140 x 8mm x 5000mm long and 2 x transversal bulb profile HP140 x 8 x 1000mm long in way of above insert
  - Renew the PS bulwark, including railing from frame 129 to frame 134.
  - Renew 1 x longitudinal bulb profile HP160 x 8 x 2100mm long on PS bulwark from frame 126 to frame 129
  - Renew the welded letters in way of the insert: ‘ARDO DA VIN’
  - Letters are made from plate 6mm and height of 500mm
- Assume 1000kg of loose various spare parts in way of the area to be renewed are to be removed/refit by Yard (distance to move the parts: about 2m)
- Paint system on bulwark and inside dry space from frame 130 to frame 141 to be repaired to ST3 and 3 layers of ships supplied paint.

Lump sum price: …/.

**G.180. side wire anchors modification and assembly.**

**Drawings:**
- Bagg_Uitr 02-A002215 hoisting plan side wire anchor 15 T
- Bagg_Uitr 02-03910 arrangement side wire anchor 18.5 t
- Bagg_Uitr 02-004038 side wire anchor 18.5 T - fluke
- Bagg_Uitr 02-004084 anchor wing right side, casted
- Bagg_Uitr 02-005408 anchor wing left side, casted

Fluke weight: 8 ton
Shank weight: 10 ton

Assume the two (2) anchors are available at the yard, stored with owners containers. The flukes are loose from the shanks. Assume all spares owner supplied.

Scope modification:
• Transport from / to yard steel workshop, the fluke (Bagg_Uitr 02-004038) and the two (2) new fluke wings (Bagg_Uitr 02-004084 / 02-005408).

• Remove / refit by cutting / full penetration welding the anchor wings left and right (pos 45 and 46 / Bagg_Uitr 02-004038) from the fluke.

• Preheating to 120 °C, interpass not lower then 100 °C. Shield from the prevailing wind during the works and cover with rock wool when cooling down slowly. 100% testing of welds, ultrasonic.

• Lift the fluke, measure the weight and issue certificate. Weld with stainless steel electrode “fluke xx ton”.

• Including all means like transports, crane, forklift, covering, shielding, tools, consumables, reporting, inspections, etc.

Lump sum. …/2 anchors

Scope assembly:
• Transport from / to yard steel workshop, the shank with shackle (pos 1, 3 and 4 / Bagg_Uitr 02-003910).

• Lift the shank, measure the weight and issue certificate. Weld with stainless steel electrode “shank xx ton”.

• Assemble the shank with fluke. Use the two (2) owner supplied hinge pins. Weld the securing plates.

• Transport the anchor to the ship for testing on board (modification of anchor support).

• Including all means like transports, crane, forklift, covering, shielding, tools, consumables, reporting, inspections, etc.

Lump sum. …/2 anchors

G.181. Ventilation hatches and entrance doors propulsion rooms, raise 300 mm.

Drawings:
• IHC 01175-0344-010 plan of doors
• IHC 01175-1816-010 sheet 1 crane deck frame 5 ~ 40
• IHC 01175-2410-080 diagram gratings and flaps
• LD 00-00-011 freeboard plan.
• IHC 49230 gratings type A & B for ventilation hatches
• IHC 49231 ventilation hatches type A & B
• IHC 49303 sheet 1 WT & GT doors
• IHC 49411 anti slip step

Four (4) vertical ventilation hatches (pos 7 / IHC 01175-2410-080) have to be re-located 300 mm higher from 600 to 900 mm above upper deck.
The hatches are installed between upper deck and crane deck, PS and SB in way of frames 15 and 29, longitudinal bulkhead 5250 mm from centre line.

Two (2) doors (pos 61, 64 / IHC 01175-0344-010) have to be re-located 300 mm higher from 600 to 900 mm above upper deck.
The doors are installed between in a companion house on upper deck, PS and SB in way of frame 16.

Scope:
- On damaged paint area’s, perform power wire brushing according E.6. and coating repair according F.9.
- Hatches, grating and doors to sandblast to SA 2.5 and coating renewal according F.9.
- Renew moos rubber 20° shore on the hatches and doors.
- When doors and hatches installed, perform water hose test, witnessed by captain of first officer.
- Including ventilation, lights, permits, cleaning, etc.

Scope hatches:
- Assume the ships crew has locked out / tagged out and de-pressurised the hydraulic system running in the ventilation trunks.
- Degrease the inner side of the trunk, 5 m2 per location.
- Install / remove fire retardant canvas inside the trunk, assume 5 m2 per location.
- Cut / weld stainless steel identification plates.
- Remove / refit hatches 1040 x 540 (IHC 49231 type A3) and grating 495 x 980 (IHC 49230). Cut / weld hinges and toggles. Dress up the hinges and toggles. Renew the split hinges on the gratings.
- Cut out plates 16 mm, 300 x 550, R 100 mm above the hatch, weld plates in below. Renew hatch coaming, flat bar 90 x 8 mm, L 3000 mm, per hatch.

Scope doors:
- Per door, disconnect / connect fluorescent light. Install new MCT, owner supplied, 1”.
- Remove / refit insulation on ceiling of the companion house. Assume 2 m2 per location. The insulation is galvanised plating, riveted.
- Install / remove fire retardant canvas inside stair casing, assume 5 m2 per location.
- Remove / refit doors 1040 x 540 (IHC 49303). Dress up the hinges and toggles.
- Cut out plates 16 mm, 300 x 670, R 100 mm above the door, weld plates in below. Renew door frame, L profile 75 x 50 x 7 mm, L 5000 mm, per door.
- Provide and weld one step inside, one step outside, 300 m above the upper deck per door. Steps to be anti slip type, 150 x 630 mm (IHC 49411 or equivalent). Hot dip galvanised, minimum thickness 50 μ.

Lump sum. … / 4 hatches and 2 doors

**G.182. HFO tank 24, thermal oil lines, pipe brackets renewal.**

Drawings:
- IHC 01175-0353-010  Tank Testing Plan
- IHC 02808  pipe bracket

Repair location near the forward manhole.
Scope:
- Assume the tank has been cleaned and manholes are open according specification H.1.1.
- Assume the thermal oil line system is drained by the crew.
- Cut, supply new and weld bracket for thermal oil line. Include opening and closing of bolts / nuts. Assume 5 brackets, diameter 48 mm.
- Including all means like gas free certificate, permits, lights, ventilation, etc.

Lump sum price: ...

**G.183. dirty lub oil tank 34, sounding pipe striking plate renewal.**

Drawings:
- IHC 01175-0353-010 Tank Testing Plan

Scope:
- Assume the tank has been cleaned and manholes are open according specification H.1.2.
- Cut, supply new and weld striking plate below the sounding pipe. Assume diameter 50 mm, thickness 10 mm.
- Including all means like gas free certificate, permits, lights, ventilation, etc.

Lump sum price: ...

**G.184. water ballast tank 11, steel repair.**

Drawings:
- IHC 01175-0353-010 tank testing plan
- IHC 01175-1605-010 water ballast tank fr 124 ~ 131

Job to be combined with F.139.

Scope:
- Assume manholes are opened and the tank has been grit blasted to SA 2.5. according specs F.139.
- Assume scaffolding is in place. Allow for one modification
- Renew two (2) brackets (pos 86).
- Perform pressure test (0.12 ~ 0.18 bar, 1 hour). Included closing / opening of ventilation covers, sounding pipe, manhole covers with new packing.
  Witnessed by ships captain or first officer.
- Including all means like ventilation, lights, permits, tools, consumables, etc.

Lump sum price: ...
**G.185. drink water tank 19, steel repair**

**Drawings:**
- IHC 01175-0353-010 Tank Testing Plan
- IHC 02808 pipe brackets
- IHC 49154 flush manhole covers

**Scope:**
- Assume the tank has been emptied, cleaned and two (2) manhole covers have been opened according specs H.1.5.
- Cut, supply new and weld striking plate below the sounding pipe. Assume diameter 50 mm, thickness 10 mm.
- Erect / remove staging 3 m3.
- Cut, supply new and weld two (2) pipe brackets on the filling pipe and one (1) pipe bracket on the suction pipe (IHC 02808). Pipe OD 88.9 mm, hot dip galvanised, minimum thickness 50 μm.
- Build by welding / grinding worn O-ring groove for flush manhole cover seating diameter 620 mm, assume to build-up 5 x 5 mm on complete circumference.
- Including all means like gas free certificate, permits, lights, ventilation, etc.

Lump sum price: ..../

**G.186. Water ballast tank 9 steel repair + buckled main deck in hydraulic room above HFO tank 13 and tank 9.**

**Drawings:**
- IHC 01175-0353-010 Tank plan
- IHC 01175-0323-030 (4pages) Construction plan fore ship
- IHC 01175-1023-040 Man hole
- G.186-0 to G.186-7 Sketches steel repairs tank 9
- G.186-pic storage rack in steel above tank 9

Job in conjunction with job G.2. and F.109.

**Scope:**
- Assume the ballast tank is empty. Open / close the manholes and docking plugs of the ballast tank as per specification D3. Arrange and include ventilation, lighting, gas free, access & hot work permits.
- Assume the dry tank no. 1, gasoil tank no. 17, fuel oil tank no. 13 and 14 and PS chain locker are empty and gas free.
- Erect a staging to reach the tank top from inside the ballast tank: inside size of the ballast tank = 4 x 12 x 5m high
  - The tank top in main deck of ballast tank no. 9 and is to be renewed from frame 125 to frame 141 and from 6950 from CL to PS to PS ship’s hull. Thickness 8mm. See G186-1 Green marked area.
  - An insert 2800 x 900 x 8mm in the longitudinal bulkhead of tank no. 9, 6650 from CL to PS is to be placed.
- An insert 2450 x 1000 x 8mm in main deck above ballast tank no. 9 and Fuel oil tank no. 13, from 5950 to 6950 from CL to PS is to be placed
- Renew bulb profiles inside tank 9, indicated on sketches. Total 62m x HP180 x9
- Renew horizontal parts of 4 transversal web frames inside tank 9, indicated on sketches. Total 13m x 608mm x 8mm bended plate.

- Cover the area under the works in the ballast tank to protect the existing coating from damaging. If the coating is damaged during the works, repairs of the paint system by the yard are included.
- Temporary supports to be foreseen inside tank 9 to support the bulkheads of tank 17 and PS chain locker: assume 2 pieces 4” pipe schedule 40, length 5500mm
- Access cutting/welding for supply and remove of plates necessary in the ship’s hull.
- 1 steel storage rack 2m long x 1m wide x 2m high with spare parts on main deck to be removed/refit. If necessary, spare parts to be removed under supervision of JDN crew.
- 2 deck penetrations for ER drainpipes that are in way of the tank top to be renewed. Size pipe: 42.2 x 5mm
- 1 deck penetration for sounding pipe and 1 m pipe to be renewed. Size 48.3 x 5mm.
- 1 x striking plate below sounding pipe to be renewed: diameter 70mm x 10mm thickness
- Supply, blank off vent pipes and close plug and manholes of the tank, pressure test tank and present to class surveyor. Re-open manholes and plug.
- Paint system in Tank 9 will be repaired according F.109.
- Paint system in adjacent spaces to be repaired to ST3 and 3 layers of ships supplied paint.

Lump sum price for above described steel work inside ballast tank…/
Price/kg extra steelwork in tank 9…/

G.187. MDO tank 17, steel repair.

Drawings:
- IHC 01175-0353-010 Tank plan
- IHC 01175-0323-030 (4pages) Construction plan fore ship
- G187-1&2 Sketches steel repairs tank 17

Scope:
- Job to be done in conjunction with G186, repairs tank no.9.
- Assume ballast tank 9, fuel oil tank 13 and gasoil tank 17 are empty. Arrange and include ventilation, lighting, gas free, access & hot work permits.
- Remove/refit 2m2 insulation in the hydraulic room
- Place an insert 1000 x 500 x 8mm in the longitudinal bulkhead, 6650 from CL to PS between frame 129 and frame 131, 5350 to 5850 from base. Insert will be half inside gasoil tank 17 and half inside harbour generator room
• Place an insert 450 x 500 x 10mm in the transversal bulkhead at frame 130, between 6650 from CL to PS and 7100 from CL to PS, between 5350 and 5850 from base. The insert will be in gasoil tank 17.
• Supply, blank off vent pipes and close plug and manholes of the tank, pressure test tank no 17 and present to class surveyor. Re-open manholes and plug.
• Paint system in adjacent spaces to be repaired to ST3 and 3 layers of ship’s supplied paint

Lump sum price for above described steelwork inside gasoil tank …/
Price/kg extra steelwork in tank 17 …/

**G.188. V-sat radome pedestal modification**

**Drawings:**
- LD 11-00-158 Platform + foundation dome V-SAT
- LD 11-00-A000482 Foundation dome VSAT + NAV lights on gantry barge loading PS
- LD 11-00-A000588 Cable trays on VSAT mast PS

Job to be combined with modification of the pedestal according specifications S.122.

**Scope:**
- Assume the vessel is on the dock blocks.
- Assume the barge loading gantries are reachable via a ladder with cage installed on the side of the gantries.
- Assume the radome has been removed according specifications S.122.
- Modify staging on PS aft barge loading gantry (frames 55 ~ 60). Assume 5 m3.
- Cut / relocate / weld the navigation light support, one (1) meter towards the fore ship.
- Cut the foundation pipe one (1) m below the radome flange, provide and weld two (2) bends and one straight pipe piece, extending the pedestal one (1) m towards the ships side. Diameter 356.6 x 16 mm S275.
- Cut / weld the railing in way of the .
- Perform coating repair according specs F.9. after power brushing of the affected area’s and the new pipe assembly according specs E.6.
- Including all means like permits, crane, rigging foreman, etc.

Lump sum. …/

**G.189. LT expansion tank renewal**

**Drawings:**
- IHC 01175-0323-110 construction plan funnel
- IHC 01175-1040-500 sheet 2 arrangements and foundations of loose tanks
- IHC 01175-1040-640 cooling water expansion tank 750 L
- IHC 01175-2318-620 pipelines in funnel
• G.187. funnel cut-out long bulkhead PS

The tank is installed in the funnel, 4.5 m above crane deck level. Details of the foundation are on drawing IHC 01175-1040-500 (tank 1040/14 in schoorsteen). Tank weighs 330 kg, dimensions 1530 x 1370 x 550 mm.

Scope:
• Assume all spares owner supplied, the vessel is dry docked and the LT system has been drained by the crew.
• Un sea fasten from owners container stored at the yard, and transport to the ship, the new tank. Weld pad eyes on the tank for rigging.
• Disconnect / connect the pipe lines connecting the tank, one valve, inclusive the level indication glass. Supply new packing. During the hot works, blind off the connections.
• Disconnect / connect the low level sensor. Remove / refit the sensor.
• Erect / remove staging from the dock floor to 16 m above base. Assume 200 m3 and three modifications.
• Erect / remove staging in the funnel, assume 20 m3. Allow for three (3) modifications.
• Install / remove temporary shielding for the hot works inside the funnel.
• Supply and weld pad eyes on the longitudinal bulkhead, 10850 from the centre line. Cut / weld side plate (6 mm) of the funnel between frames 94 ~ 97, 16300 ~ 18360 above base. Including the flat bar stiffeners 100 x 10. Vacuum testing of all welding seams, to be witnessed by the Captain or first officer.
• With yard crane, rig out the plate with tank from the funnel.
• Loosen / tight the bolts M18 and install the new tank on the funnel side plate. Rig the assembly into the funnel with yard crane.
• On the damaged coating area’s, perform wire power brushing according specs E.6. and coating repair according specs F.10.
• Including all means like ventilation, lights, permits, tools, consumables, crane, forklift, riggers, fire watch, etc.

Lump sum price: …/  

G.190. MDO day tank 27, drip tray modification

Drawings:
• Sketch G.190. MDO day tank 27, drip tray modification
• Pictures G.190. drip tray area.

The area is in the engine room, just above the tank top, in way of frame 108 on PS. The idea is to create an opening in the existing drip tray in way of the level switch as indicated on the picture and the sketch.
Job may clash with gearbox overhaul N.3.2.

Scope:
• Remove / refit floor plates and clean the bilge area, assume 5 m2.
• Disconnect / connect and remove / refit the level switch.
- Cut out drip tray, 240 x 250 mm, weld new drip tray coaming \( H = 100 \), thickness 5 mm.
- Including permits, lights, etc.

Lump sum price: \( .../ \)

**G.191. funnel, install escape hatch on top deck**

**Drawings:**
- IHC 01175-2318-620 pipe lines in funnel
- IHC 01175-0323-110 construction plan funnel
- IHC 01175-1030-550 stairs and platforms in funnel
- IHC 49403 steel ladders
- WINEL 4H15.2 Watertight musketeer scuttle Ø600

**Scope:**
- Assume the vessel is dry docked.
- Assume no ships diesel engines are running.
- Assume the funnel top deck is accessible via two (2) ladders from the SB.
- Install / remove temporary shielding for the hot works inside the funnel.
- Inside the funnel, erect / remove staging, assume 4 m³. Allow for three (3) modifications.
- With yard crane, rig in / out the equipment, etc.
- On funnel top deck, cut out top plate (8 mm) between frames 106 and 107. Install by welding owner supplied escape hatch. Re-enforce with flat bar 120 x 12 L 1000 mm.
- Fabricate and install steel ladder with support plates (IHC 49403), length 1800 mm above the existing ladder (pos 5 / IHC 01175-1030-550).
- On the damaged coating area’s and ladder and hatch, perform wire power brushing according specs E.6. and coating repair according specs F.10.
- Perform water hose test of the hatch, witnessed by the captain or first officer. Issue a report / certificate.
- Including all means like ventilation, lights, permits, tools, consumables, crane, forklift, riggers, fire watch, etc.

Lump sum price: \( .../ \)

**G.192. ER, main sea water cooling pumps, renew foundation on tank top**

**Drawings:**
- IHC 01175-1030-600 floor and gratings in ER and GR
- IHC 01175-1041-500 sheet 1 aux foundations in engine room and pump room
- IHC 01175-1041-720 foundation seawater unit
- IHC 01175-2332-500 diagram raw cooling water lines
- IHC 01175-2332-520 seawater cooling unit no. 2332-520
IHC 01175-2332-550 electrical insulated flange CuNifer ~ steel
Pict G.192. picture file

The unit is installed in the engine room, frames 102 ~ 110 (pos 2235 / IHC 01175-1041-500), located between two (2) main diesel engines on top of dry tank no. 23.

Job to be performed after the cleaning job of tank no. 23 according specifications F.131. Also after cleaning and division of the bilges according specifications H.5. and H.101.

Scope fabrication of new foundation:
- Fabricate and supply a new foundation unit according with all components according drawing IHC 01175-1041-720.
- To facilitate rigging in the engine room, deliver loose and weld in place pos (54, 58, 59, 63, 64, 65).
- Deliver loose, extra four (4) pieces of UNP 100 x 2000 mm (pos 63).
- Bolt holes for the five (5) pumps to be drilled in situ when joined with the pipe lines.

Scope remove / refit of components:
- Assume all spares owner supplied, the vessel is in dry dock, the sea water system has been drained and tank 23 is cleaned.
- A considerable amount of pumps, pipes and control & monitoring equipment removal / refitting involved. Verify drawing IHC 01175-2332-520.
- When fitting the pumps, leave them loose until the pipe lines are joined stress-free. Drill the holes in the foundation accordingly.
- Stow and fasten all the fragile components on wooden pallets and cover with plastic: pumps, e-motors, valves, etc.
- Rig in / out all components to a safe and secure yard warehouse. Use yard crane, forklift, truck, etc.
- Via the “workshop II” hatch, frames 114 ~ 120, rig in the foundation frame into the engine room. ER overhead crane SWL is 3.2 ton.
- Weld the loose delivered foundation components (pipe brackets, brackets, UNP).
- After all hot works perform a coating repair by power wire brushing according specs E.6. and coating according F.10.

Final quotation after pre-inspection on board.

Lump sum price: …/
• Arrange ventilation, lighting, gas free, access & hot work permits.
• An insert in the PS hull, 1800 x 1500 x 18mm between frame 127 and 130, between 5350 to 6850 from base is to be placed in the harbour generator room
• Replace 2000 mm long HP140 x 8 in way of above insert.
• An insert in the SB hull, 700mm x 600mm x 18mm between frame 137 and 139, between 7450 and 8050 from base is to be placed in the dry space.
• An insert in the SB hull, 1000 x 1400 x 18 mm between frame 142 and 144, between 6050 and 7050 from base is to be placed in the dry space.
• Replace 2000mm long HP140 x 8 in way of above insert.
• An insert in the SB hull, 500 x 500 x 18mm between frame 145 and 146, between 6750 and 7050 from base is to be placed in dry tank 2A.
• Assume 3 x 200kg spare parts to remove/refit by Yard for about 2m.
• Necessary stagings from the dock floor should be included.
• Paint system on hull, in harbour generator room and SB void space and inside tank 2A to be repaired to ST3 and 3 layers of ship’s supplied paint
• Including all means like ventilation, lights, permits, tools, consumables, fire watch, etc.

Lump sum price: …/..1

**G.194. Double bottom tank 23, crack repair.**

**Scope:**
• Assume the vessel is dry docked.
• Assume the tank has been grit blasted according specifications F.131.
• Assume three (3) cracks of 0.5 m to be welded on three (3) different locations.
• Welding according specifications G.1.1.

Lump sum price: …/..

**G.195. available**

**G.196. Spud carrier traverse and boogies to mark**

**Scope:**
• Assume the vessel is dry docked.
• Assume the traverse and boogies are removed from the ship and are available at the yard’s workshop according specifications K.6.6.
• Weld with stainless steel electrodes ID marks according instruction of chief engineer. Assume 10 man hours.
• Including forklift, crane, tools, fire watch, etc.

Lump sum price: …/..
G.197. HFO Tank 47, hot work on bulkhead in pump room and tank top aux engine room

Scope:
- Assume HFO bunker tank no.47 is cleaned and gas free.
- In the pump room, remove obsolete brackets, pipe penetrations, etc around salt water sanitary pump. Assume one shift for one fabricator.
- In the aux engine room, weld foundation of sludge separator to tank top.
- Perform coating touch-up with power wire brushing according E.6. and coating repair according F.10. assume 20 locations in total 2 m2.
- Including all means like, permits, tools, consumables, crane, forklift, riggers, fire watch, ventilation, etc.

Lump sum price: ..../

G.198. ER, bilge- fire and general service pump, renew drip tray.

Drawings:
- IHC 01175-1030-600 floor and gratings in ER and GR
- IHC 01175-1041-500 sheet 1 aux foundations in engine room and pump room
- IHC 01175-1041-600 foundation bilge / gen service pump
- IHC 01175-2320-520 bilge-/fire- /general service pump unit.
- Pict G.198. picture file

The two (2) pump units are installed in the engine room, frames 114 ~ 115 (pos 22.55 and 22.56 / IHC 01175-1041-500), located between two (2) main gearboxes.

Part of the fire fighting water lines. Check with chief engineer prior disconnecting.

Job to be performed after cleaning and division of the bilges according specifications H.5. and H.101.

Scope fabrication of new foundation:
- Fabricate and supply a new drip tray unit with drain. Positions 51 and 59 only / IHC 01175-1041-600.
- Cut off existing and weld new drip tray unit.
- Supports (pos 52, 54, 55, 56, 58 / IHC 01175-1041-600) and brackets (pos 53).

Scope remove / refit of components:
- Assume all spares owner supplied, the vessel is in dry dock and the crew has locked out / tagged out the electrical system.
- Open / closed the central ER hatch by the yard crane.
- A considerable amount of pumps, pipes and control & monitoring equipment removal / refitting involved. Verify drawing IHC 01175-2320-520.
- When fitting the pumps, leave them loose until the pipe lines are joined stress-free. Drill the holes in the foundation accordingly.
• Stow and fasten all the fragile components on wooden pallets and cover with plastic: pumps, e-motors, valves, etc.
• Rig in / out all components to a safe and secure yard warehouse. Use yard crane, forklift, truck, etc.

Final quotation after pre-inspection on board.

Lump sum price:                 ..../

**G.199. Pump room, double bottom tank no. 51, remove echo sounder arrangement.**

**Drawings:**
- IHC  01175-0323-020 sheet 1 Construction plan mid ship
- IHC  01175-0319-510 sheet 1 Arrangement pump room view on tank top
- IHC  01175-1117-010 ladder well end part
- DDD  405322 Echo sounder housing

Between Fr.38 and 39 at 3200 mm from centreline PS an echo sounder arrangement is installed in double bottom tank 51. The area is accessible from the pump room.

Steel work in tank 58 can be combined with job X.126. Job to perform after grit blasting but prior coating works according specs F.134.

**Scope:**
- Assume the vessel is dry docked.
- Assume the manholes in tank 51 are opened according specs F.134.
- Assume the unit has been disconnected electrically.
- Disconnect the valve operating system, valve (gate DN200 / DDD 405322), pipe (8” sch 80). Cut and remove the inserts in the flat bottom (pos E1) and two (2) in the tank top (pos E4). Dispose off the items.
- Weld new insert in the flat bottom (thickness 16 mm. dia 380 mm and dia 100 mm) and tank top (thickness 16 mm, dia 400 mm).
- Perform vacuum testing of the welds, witnessed by the captain or first officer.
- Including all means like ventilation, lights, permits, tools, consumables, fire watch, etc.

Lump sum price:                 ..../

**G.200. Double bottom tank PS aft no 52, tank top repair.**

**Drawings:**
- IHC  01175-0323-010 Construction plan aft ship
- Sketch G.200.1 sketch insert in tank top

**Scope:**
- Assume the vessel is in dry dock
• Assume tank 52 is empty. Open / close the manholes and docking plugs of the tank as per specification D3. Arrange and include ventilation, lighting, gas free, access & hot work permits.
• Cut and weld insert in the tank top, 2400 x 2800 x 10mm, between frame 23 and frame 28, between 7150 and 9950 from centreline to SB.
• Cut and weld insert in the tank top, 1400 x 1400 x 10mm, between frame 26 and frame 29, between 4600 and 6000 from centreline to PS is to be placed.
• Coating repair / renewal in conjunction with job F.126.
• Including all means like ventilation, lights, permits, tools, consumables, fire watch, etc.

Lump sum price: £…/-

**G.201. Double bottom tank SB aft no 53, tank top repair.**

**Drawings:**

- IHC 01175-0323-010 Construction plan aft ship
- Sketch G.201.1 sketch insert in tank top

**Scope:**

- Assume the vessel is in dry dock
- Assume tank 52 is empty. Open / close the manholes and docking plugs of the tank as per specification D3. Arrange and include ventilation, lighting, gas free, access & hot work permits.
- Cut and weld insert in the tank top, 2400 x 2800 x 10mm, between frame 23 and frame 28, between 7150 and 9950 from centreline to SB.
- Coating repair / renewal in conjunction with job F.127.
- Including all means like ventilation, lights, permits, tools, consumables, fire watch, etc.

Lump sum price: £…/-

**G.202. Ladder, escape hatch to renew.**

**Drawings:**

- IHC 5242839 general arrangement cutter ladder
- IHC 5242787 sheet 2 cutter ladder middle part
- WINEL 4H15.2 Watertight musketeer scuttle Ø600

The existing hatch is located between ladder frames 7 and 8, and gives access to the ladder engine room.

Job to be performed with the ladder in place to avoid clashing with coating renewal of the ladder.

Job not allowed to be done during overhaul of the dredge pump gearbox (specs J.5.8.) or cutter gearbox (specs J.2.10.).

Scope:
• Assume the vessel is dry docked.
• Assume the ladder engine room bilges have been cleaned according specs H.6.
• Erect / remove staging. Assume 10 m3. Allow for three (3) modifications.
• Cut existing hatch and adjoining bulb profile 220 x 10, enlarge hole in plate. Weld new hatch flush with the ladder deck, fit and weld new bulb profile 220 x 10, L 1 m.
• Perform water hose test of the hatch, witnessed by the captain or first officer. Issue a report / certificate.
• Including all means like ventilation, lights, permits, tools, consumables, shielding and covering, fire watch, etc.

Lump sum price: .../


G.204. Installation of MCT for new alarm system.

Drawings:
• IHC 01175-2313-610 location deck and bulkhead pieces on main deck.
• IHC 01175-2312-550 pipe passages in cross bulkheads at frame 56-78-113-116.
• Sketch G.204. location of MCT for new alarm system

Scope:
• MCT element and bulkhead penetration are owner supplied.
• Cut out bulkhead and weld in bulkhead penetration, on main deck, PS alleyway,
  o Erect / remove staging, 4 m3 per location. Allow for two (2) modifications.
  o Hole in plate 142 x 240 mm, cross bulkhead frame 85, above doorway corridor to ER.
  o Hole in plate 142 x 480 mm, longitudinal, frame 79 ~ 80, corridor to aux ER.
  o Hole in plate 142 x 300 mm, longitudinal, frame 66 ~ 67, corridor to pump room.
• Cut out bulkhead and weld in bulkhead penetration, on main deck, PS alleyway, hole in plate 142 x 370 mm, cross bulkhead frame 116, engine room to generator room.

Lump sum. .../ 5 locations


Drawings:
• LD 01-02-A008677 Arrangement construction shore discharge connection.
• Sketch G.205. guide cage.

Scope:
• Assume the bow discharge installation has been renewed.
• Assume bolts and nuts owner supplied.
• Assume yard to supply:
  o Pipe EN 10025, dia 114.8 x 8 mm, S235, length 30 m.
  o Flanges EN 1092-1 PN 16 DN100, 24 units.
• Supply / fabricate pipe pieces with flanges. Fit on board, cut and weld the pipe sections to final dimensions. Keep the pipe sections containerised dimensions. Test with owner supplied mooring rope for smooth guiding. Assume three (3) trials will be required before final welding.
• Issue an as built drawing, iso metric.
• Grit blast the pipe structures to SA 2.5 according specs E.8. and coat according specs F.1.3.
• Also perform coating repair of the damaged area’s inside fore peak tank no.1 on PS. Opening / closing of manhole, power wire brushing according specs E.6. and coating repair according specs F.10. with owners supplied paint.
• Transport to and sea fasten in owners container stored at the yard.
• Including all means like ventilation, lights, permits, tools, consumables, shielding and covering, etc.

Lump sum price: …/}

G.206. Upper deck, AC5 room, installation of manhole to thyristor room.

Drawings:
• IHC 01175-1371-010 sheet 1 upper deck with walls on main deck fr 40 ~ 58.
• WINEL 110-001 manhole central closing
• Sketch G.206. manhole location AC5 room

AC5 room is located on the upper deck, frames 41 ~ 44, PS. Access is via a watertight door. The area is above the thyristor room.

Scope:
• Assume the vessel is dry docked.
• Assume owner will supply the new manhole cover.
• Remove / refit spare Freon bottles from the AC5 room.
• Cover the electrical wiring and control boxes with fire resistant cloth. Assume 5 m2 in the thyristor room and 5 m2 in the AC5 room.
• Cut out upper deck, dia 560 mm, weld in the manhole frame.
• Including coating repair of the damaged area’s, power wire brushing according specs E.6. and coating repair according specs F.10. with owners supplied paint.
• Including all means like ventilation, lights, permits, tools, consumables, shielding and covering, etc.
G.207. Available

G.208. Available

G.209. Available

G.210. upper deck, i.w.o. barge mooring tensioners, repair foundation.

Drawings:
- IHC 01175-0323-020 sheet 1 & 2 Construction plan mid ship
- IHC 5474852 Foundation for barge mooring system aft ship
- IHC 5474863 Foundation for barge mooring system fore ship
- IHC 5474854 sheet 2 Arrangement Barge mooring system
- Sketch G210 2 sheets Position steel inserts
- Sketch G210 Details steel bollard

Scope:
- The foundation plate of the barge mooring swell compensator cylinders of the 4 barge mooring systems is buckled and the underlying deck plate is corroded trough.
- Assume the 4 barge mooring wires are removed/reeled up on the winches
- New prefabricated foundation to be blasted to SA2.5 and coated with 3 layers of owner supplied paint prior to fitting on the deck.
- Damaged paintwork in way of new foundation and deck penetration on upper deck and under upper deck to be repaired by power tooling to ST3 and 3 layers of ship’s supplied paint.

G.210.1. upper deck, i.w.o. barge mooring tensioners, repair foundation at fore ship PS
- On Barge mooring system fore ship: (dwg 5474854 _2)
  - Remove, blind, store in a suitable place and refit hydraulic cylinder pos 114. Sheave on top of the cylinder can remain installed on the cylinder.
  - Remove/refit 2 x sheave D710 pos 105. Clean and dress up all parts. Provide measuring report of shafts and bores of sheaves.
  - Remove/refit cylinder position sensor arrangement
  - Remove/refit fairleader pos 111
- Open/close 2 manholes of Cofferdam Engine room on PS main deck between frame 85 and 113,
• Arrange ventilation, lighting, gas free, access & hot work permit in cofferdam Engine room and in Engine room
• Crop off 1 x foundation on fore ship according drawing 5474863 on the upper deck (PS execution)
• An insert is to be placed in the upper deck in way of the removed foundation:
  o 500 kg ship’s spares on main deck (engine room spares) to be removed/replaced for a distance of 2m by Yard
  o Erect/remove staging 2m x 3m x 2m
  o Insert sizes: 3200 x 1250 x 12mm between 8000 from CL to 11200 from CL to PS, between frame 109 and 112.
• Supply, fit and weld 1 x new foundation on fore ship according drawing 5474863 on the upper deck (PS execution)
• 1 deck penetration 1” + 1 m ¾”pipe to be fitted for electrical cable.

Lump sum price: 

G.210.2. upper deck, i.w.o. barge mooring tensioners, repair foundation at fore ship SB
• On Barge mooring system fore ship: (dwg 5474854_2)
  o Remove, blind, store in a suitable place and refit hydraulic cylinder pos 114. Sheave on top of the cylinder can remain installed on the cylinder.
  o Remove/refit 2 x sheave D710 pos 105. Clean and dress up all parts. Provide measuring report of shafts and bores of sheaves.
  o Remove/refit cylinder position sensor arrangement
  o Remove/refit fairleader pos 111
• Arrange ventilation, lighting, gas free, access & hot work permit in SB alleyway on main deck
• Crop off 1 x foundation on fore ship according drawing 5474863 on the upper deck (SB execution)
• An insert is to be placed in the upper deck in way of the removed foundation:
  o 1000 kg ship’s spares (steel profiles) to be removed/replaced for a distance of 2m by Yard.
  o Erect/remove staging 2m x 3m x 2m
  o Insert sizes: 3200 x 1250 x 12mm between 8000 from CL to 11200 from CL to SB, between frame 109 and 112
• Supply, fit and weld 1 x new foundation on fore ship according drawing 5474863 on the upper deck (SB execution)
• New prefabricated foundation to be blasted to SA2.5 and coated with 3 layers of owner supplied paint prior to fitting on the deck.
• 1 deck penetration 1” + 1 m ¾”pipe to be fitted for electrical cable.

Lump sum price: 

G.210.3. upper deck, i.w.o. barge mooring tensioners, repair foundation at aft ship PS
• On Barge mooring system aft ship: (dwg 5474854_1)
- Remove, blind, store in a suitable place and refit hydraulic cylinder pos 114. Sheave on top of the cylinder can remain installed on the cylinder.
- Remove/refit 2x sheave D710 pos 105. Clean and dress up all parts. Provide measuring report of shafts and bores of sheaves.
- Remove/refit 2x cylinder position sensor arrangement
- Remove/refit fairleader pos 111

- This hot work is located above the accommodation on main deck.
- The yard is to open up ceiling panelling, supply, fit install staging and construct a temporary platform above the accommodation area to protect the area underneath. After works, all damages to be repaired and spaces to be reinstated as original situation. Including removals/returning of furniture, lockers, extraction fans for welding fumes, temporary lighting, welding permits, sufficient fire prevention below in included
- Crop off 1x foundation on aft ship according drawing 5474852 on the upper deck (PS execution)
- An insert is to be placed in the upper deck in way of the removed foundation:
  - 2800 x 1210 x 12mm between 8400 from CL to 11200 from CL to PS, between frame 40 and 42
- Remove/refit 1 piece steel bollard diam 133 x 10mm in way of the insert. New bollards owner supplied. Half round bar dia 76mm x L = 800mm underneath the bollard Yard supply.
- Supply, fit and weld 1x new foundation on aft ship according drawing 5474852 on the upper deck (PS execution)
- 1 deck penetration 1” + 1 m ¾” pipe to be fitted for electrical cable.

Lump sum price: …/
• Remove/refit 1 piece steel bollard diam 133 x 10mm in way of the insert. New bollards owner supplied. Half round bar dia 76mm x L = 800mm underneath the bollard Yard supply.
• Damaged paintwork in way of new placed insert and bollard to be repaired by power tooling to ST3 and 3 layers of ship’s supplied paint
• Supply, fit and weld 1 x new foundation on aft ship according drawing 5474852 on the upper deck (SB execution)
• 2 deck penetrations 1” + 1 m ¾” pipe to be fitted for electrical cable.

Lump sum price: …./

G.211. spud no.1 repair

Drawings:

• LD 10-00-066 Spud OD2000
• LD 10-00-067 sheet 2 - rev Dj Spud OD2000 LDV1 as built
• BSTL 000808 Assembled pipe OD2000 with spud point L=11540
• BSTL 000807 Assembled pipe OD2000 x50/55/60/65 L=11485

Scope.

• Assume the spud no.1 is lifted off the vessel as per K4.2
• The yard is to provide the necessary transports, repair yard, pipe supports, cranage, tools, consumables, safety gear, staging and all others to repair the spud.
• Owner will supply:
  o a pre-fabricated pipe piece of OD2000 x 50-to-65mm wall thickness, 11485mm long as per drawing BSTL0000807
  o a pre-fabricated pipe piece with point of OD2000 x 50mm thickness, 11540mm long as per drawing BSTL000808
• The spud pole is to be cut, the 2 new pipe pieces are to be fitted and aligned according drawing LD-10-00-067 sh3, pos 1A and 7A on the assembly ‘to repair next docking’
• Total scrapped weight: Approx 64000kg
• After approval of the alignment by the owner representative, the new pipe segments are to be welded according to the welding instruction on the drawing.
• Yard will hand over a detailed repair procedure to the owner prior start of works.

Lump sum price: …./

Additional after repairs, spud outside to be sandblasted to SA2.5 for 5m from the top and to be painted with 3 layers of ship’s supplied paint according paint detail on the drawing LD10-00-067 (page 2)

Lump sum price: …./
Additional after repairs, spud inside to be sandblasted for 20m from the top to SA2.5 and to be completely painted with 3 layers of owner supplied paint.

Lump sum price: ..../

**G.212. spud no.2 repair**

**Drawings:**
- LD 10-00-066   Spud OD2000
- LD 10-00-067   (sheet 3 – Rev Bj)   Spud OD2000 LDV2 as built

**Scope:**
- Assume the spud no1 is lifted off the vessel as per K4.2
- The yard is to provide the necessary transports, repair yard, pipe supports, craneage, tools, consumables, safety gear, staging and all others to repair the spud.
- Yard will hand over a detailed repair procedure to the owner prior start of works.
- 2 steel rings, material S355, OD1890, ID1000, thickness 20mm are to be fitted inside the spud according drawing LD_10-00-066 ‘Detail ring’
- Assume the spud is partly coated on the inside with a bituminous coating.
- Each ring to be transported inside the spud in 2 parts.
- After approval of the positioning by the owner representative, the new rings segments are to be welded according to the welding instruction on the drawing.
- In any case the yard must follow all instructions as per drawing LD 10-00-066 with special attention to be paid to:
  - The pre-heating and temperature to be controlled during and after the welding as prescribed. Values to be registered.
  - The alignment of the spud pole to be checked prior, during and after the welding.
  - After welding, welds to be grind flush at the outside of the spud pole.
  - After welding NTD to be carried out on the butt welds: 100% UT and X-ray testing on the „T“ joints and if necessary to be repaired and retested.
- After repairs, spud outside to be sandblasted to SA2.5 for 5m from the top and to be painted with 3 layers of ship’s supplied paint according paint detail on the drawing LD 10-00-067 (page 2)

Lump sum price: ..../

Additional after repairs, spud inside to be sandblasted completely to SA2.5 and to be painted with 3 layers of owner supplied paint.

Lump sum price: ..../
**G.213. spud no.3 repair**

**Drawings:**
- LD 10-00-066 Spud OD2000
- LD 10-00-067 (sheet 1 – rev Dj) Spud OD2000 LDV3 as built
- BSTL 000804 Pipe, welded OD2000 x 40
  L=3600 for Spud LDV03 section 16
- BSTL 000806 Assembled pipe OD2000 x 55
  L=2700 for Spud LDV03 section 7

**Scope:**
- Assume the spud no 3. is lifted off the vessel as per K.4.2
- The yard is to provide the necessary transports, repair yard, pipe supports, cranage, tools, consumables, safety gear, staging and all others to repair the spud.
- Owner will supply:
  - a pre-fabricated pipe piece of OD 2000 x 55 mm wall thickness, 2700 mm long as per drawing BSTL 0000806.
  - a pipe, OD 2000 x 40 mm wall thickness, 3600 mm long as per drawing BSTL000804.
- The spud pole is to be cut, the 2 new pipe pieces are to be fitted and aligned according drawing LD-10-00-067 sh1, pos 7A and 16A on the assembly ‘to repair next docking’
- Assume the spud is partly coated on the inside with a bituminous coating.
- Total scrapped weight: Approx 11500kg
- After approval of the alignment by the owner representative, the new pipe segments are to be welded according to the welding instruction on the drawing.
- Yard will hand over a detailed repair procedure to the owner prior start of works.
- In any case the yard must follow all instructions as per drawing LD 10-00-066 with special attention to be paid to:
  - The pre-heating and temperature to be controlled during and after the welding as prescribed. Values to be registered.
  - the alignment of the spud pole to be checked prior, during and after the welding,
  - After welding, welds to be grind flush at the outside of the spud pole.
  - After welding NTD to be carried out on the butt welds: 100% UT and X-ray testing on the „T“ joints and if necessary to be repaired and retested.

**Lump sum price:** ..../

Additional after repairs, spud outside to be sandblasted to SA2.5 for 5m from the top and to be painted with 3 layers of ship’s supplied paint according paint detail on the drawing LD 10-00-067 (page 2)

**Lump sum price:** ..../
Additional after repairs, spud inside to be sandblasted completely to SA2.5 and to be painted with 3 layers of owner supplied paint.

Lump sum price: …./

G.214. Impressed current anti fouling, minor modification.

Drawings:
- IHC 01175-1244-010 sheet 1 buoyancy space fr 111 ~ 124.
- CWC T111_001 anti-fouling system
- Sketch G.214. guide modification

Scope:
- Assume the two (2) anode frame units are removed according specs I.4.4.
- Assume the two (2) strainers are removed according specs I.4.1.
- Erect / remove staging from dock floor to flat bottom. Assume 12 m3 on PS and SB. To be
- Crop – off, supply and weld new guide bottom plate (pos 292, section J-J / IHC 01175-1244-010 sheet 1). Plate to be longer, with dimensions 135 x 150 x 10 mm. Install two (2) brackets 75 x 75 x 10 mm. In total four (4) locations for PS and SB.
- Perform coating repair with power wire brushing according E.6. and coating according F.1.2.
- Including all means like ventilation, lights, permits, tools, consumables, shielding and covering, etc.

Lump sum price: …./

G.215. Available

G.216. Remove obsolete grease trap in way of dry provision store shaft, frame 45.

Drawings:
- 01175-2323-530 diagram sanitary wastepipes.

Staging in provision store trunk can be combined with job X.126.

Scope:
- Assume the vessel is in dry dock and the unit has been disconnected from the grey water system.
- Open / close the dry provision store hatch with the yard crane, reachable from the upper deck.
- Erect / remove staging in dry provision store trunk, from tank top level upwards. Assume 35 m3, frames 37 ~ 41. Allow for three (3) modifications.
- Place / remove fire retardant canvas, assume 5 m2.
• Cut loose, hoist out and scrap the grease trap unit. Assume 100 kg. The unit is installed on a frame on main deck level.
• Fabricate and install dummy pipe 76.1 x 3.6 mm, L 1 m, flat flanges PN 10 ND 65 mm, two bends 45 °. Hot dip galvanised minimum thickness 50 μm.
• Perform coating repair with power wire brushing according E.6. and coating according F.10.
• Including all means like ventilation, lights, permits, tools, consumables, shielding and covering, etc.

Lump sum price: …/

G.217. Available
G.218. Available
G.219. Available

G.220. Fore peak tank no. 1 & 2 steel repair
(for intermediate docking June 2014 only)

Drawings:
• IHC 01175-0353-010 tank testing plan
• IHC 01175-0323-030 Construction Plan Fore ship sheet 1, 3, 4
• IHC 01175-1661-010 Main deck with bulkheads and shell on tank top, frame 124 fore SB
• IHC 01175-1662-010 fore peak frame 147 fore
• LD 11-00-A005872 upper fixed part for Dummy - PS
• LD 11-00-A005895 Upper fixed part for dummy - SB

Scope:
• Steel repairs are required on the upper castle deck, vertical sides, and inside the fore peak tanks 1 and 2.
• Assume the vessel is on the dock blocks.
• Open / close one (1) manhole covers each in all two (2) fore peak tanks.
• After completion of steel works, pressure test the tank no.1 and no.2 to 0.12 bar witnessed by ships Captain or officer. Blind-off / refit all the ventilation caps, sounding pipe and manhole covers. Including supply / installing new packing. Inform owner 2 work days in advance. Issue a certificate.
• After all works perform a vacuum test on bottom plug of tank no.1 and no.2, witnessed by ships captain or officer. Including cementing of bottom plug.
• After all hot works perform a coating repair of damaged area’s inside the fore peak tanks.
  o Wash and clean out the area with fresh water.
  o Power wire brushing to ST3 according specs E.6. and coating repair according specs F.10.
• Including all means like staging; ventilation for tank access and hot works, permits, temporary lighting, working air, transports between ship and workshops, etc.

Fore peak tank no. 1 PS steel repairs
• On fore castle deck in way of frames 149-154, crop-off existing & supply + install oversized plate 4085 x 800 x 25 mm (pos 57 on IHC 01175-1661-010 sheet 1, detailed drawing LD 11-00-A005872). 700 Kg steel renewal. Will not be installed brackets (pos 199 / detail 1 / IHC 01175-1661-010 sheet 2), rings (pos 2 / LD 11-00-A005872) and bolt plates (pos 3 and 4 / LD 11-00-A005872).
• Guide for dummy tank on PS hull in way of frames 149-150, (LD 11-00-A005285, bulkhead view - PS) crop-off existing & supply + install profile (pos 9), brackets (pos 10), block (pos 12) and wedge (pos 13). 100 kg steel renewal.
• From the side longitudinal on the centre line, cut-out the existing fixation block (pos 3 / LD 11-00-A005285) and brackets (pos 14 and 15 on LD 11-00-A005285) and install hull insert, 150 kg steel renewal.
• Removal of concrete coffer dam 0.6 x 0.7 x 0.6 m in tank No. 1, frames 151-152, 2550-3250 above base. Steel inserts in side longitudinal, forward shell and deck 3250 above base. 500 kg steel renewal in total (IHC 01175-1661-010 sheet 1).

Fore peak tank no. 2 SB steel repairs
• On fore castle deck in way of frames 149-154, crop-off existing & supply + install plate 2940 x 800 x 25 mm (pos 53 on IHC 01175-1662-010). Total of 500 Kg steel renewal. Not to install are bracket (pos 102) and rings (pos 103-104).
• Guide for dummy tank on SB hull in way of frames 149-150, (LD 11-00-A005285, bulkhead view - SB) crop-off existing & supply + install profile (pos 8), brackets (pos 10) and block (pos 11).

Lump sum price: …/
General remarks to steelwork mentioned under G

- Applicable to all steelwork mentioned in this tender, unless otherwise specified.

- Prior to doubling the underlying surface will be thoroughly de-rusted by sandblasting SA 2 1/2, cleaned and prepared for welding. Assume adjacent tanks have gas free certificate.

- Material of new plates and stiffeners to be approved by Bureau Veritas or IACS member, grade A, unless otherwise specified.

- All plates, internals, stiffeners, profiles, etc. to be fully grit blasted SA 2 1/2 and painted with one coat shop primer before fitting. (Shop primer according to owners paint system).

- All steel (new and surrounding) will be properly bevelled, and prepared according to drawings and to the surveyor’s satisfaction.

- When replacing stiffened panels the new stiffeners are to be suitably connected to the surrounding, to the satisfaction of superintendent and class.

- It is clear that the ship is not new, and that the surfaces to be doubled might be slightly dented, the same applies to the surroundings of plates to be renewed.

- Assume ship's paint specification is known to the yard, eventual extra's for jobs in certain areas (tanks) are to be specified.

- After welding, the weld seams to be wire brushed and painted with one coat primer.

- Before painting, the weld seams will have to be inspected for water tightness as required by the classification.

- Internal and external spot weldings must be ground.

- Brackets, eye plates and all other auxiliary means must be removed (grinding), damages caused by this to be built up by welding and grinding.

- Where required by class, welds to be controlled by X-ray or US control.

- Defective welds to be repaired for the yards account.

- The steel weight calculation is based on the net surface of the renewed plates, stiffeners, beams, etc. and on a specific steel weight of 8 ton per m3.

- For grit/sandblasting or any other surface preparation the general conditions mentioned under E are applicable.

- For painting the general conditions under F.

- All remarks under general, “2.Quotations”, on page 7 and 8, are applicable.

- Coating repair of damaged areas by steel works.
H. TANKS

Drawings:
- IHC 01175-0353-010 Tank Testing Plan
- IHC 01175-0353-030 tank sounding board
- LD 12-00-049 Location of inlet and overboard valves

Abbreviations:
- PR = pump room
- ER = engine room
- CL = centre line
- SR = separator room or auxillary engine room

H.1. Cleaning

H.1.1. MGO / HFO Tank cleaning

Quote per tank to carry out the following on tanks listed below:
- Opening and closing of manhole cover(s) (repacking, cleaning and renewing of washers, bolts and nuts if necessary, is included).
- Pumping out and disposal of remaining Liquid if any (Allow for 5cm).
- Manual clean tank to reachable height without staging. All tanks have low heights.
- Ventilation to allow for inspection of tank, inclusive obtain and maintain a gas free certificate and the inspections required for this.
- HFO is 180 cst.

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<thead>
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<th>Type</th>
<th>Fr.</th>
<th>Volume (m³)</th>
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<td>HFO</td>
<td>133-141</td>
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<tr>
<td>14</td>
<td>HFO</td>
<td>124-133</td>
<td>157.7</td>
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<td>MGO</td>
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<td>HFO Settling</td>
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<td>MGO</td>
<td>41-59</td>
<td>139.1</td>
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H.1.2. Dirty oil and sludge tanks to be cleaned

Quote per tank to carry out the following on tanks listed below:
- Opening and closing of 2 manhole covers each tank (repacking, cleaning and renewing of washers, bolts and nuts if necessary, is included).
- Ventilation and temporary lighting to be installed
- Manual clean tank to reachable height without staging. All tanks have low heights.

<table>
<thead>
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<th>Description</th>
<th>Capacity</th>
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<td>ER, CL, fr 94 ~ 102</td>
<td>37.6 m³</td>
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<tr>
<td>No. 37 Sludge Oil</td>
<td>PS, Fr. 81-98</td>
<td>19.2 m³</td>
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<tr>
<td>No. 38 Dirty water</td>
<td>PS, Fr. 81-98</td>
<td>24.2 m³</td>
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</tbody>
</table>

**H.1.3. Lub oil sump tanks to be cleaned**

Quote per tank to carry out the following on tanks listed below:
- Opening and closing of 2 manhole covers each tank (repacking, cleaning and renewing of washers, bolts and nuts if necessary, is included).
- Ventilation and temporary lighting to be installed
- Manual clean tank to reachable height without staging. All tanks have low heights.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 30 generator engine 1</td>
<td>ER, PS, fr 102 ~ 112</td>
<td>8 m³</td>
</tr>
<tr>
<td>No. 31 generator engine 2</td>
<td>ER, CL, fr 102 ~ 112</td>
<td>8 m³</td>
</tr>
<tr>
<td>No. 32 generator engine 3</td>
<td>ER, SB, fr 102 ~ 112</td>
<td>8 m³</td>
</tr>
<tr>
<td>No. 41 dredge engine 1</td>
<td>PR, PS, fr 84 ~ 94</td>
<td>8 m³</td>
</tr>
<tr>
<td>No. 42 dredge engine 1</td>
<td>PR, SB, fr 84 ~ 94</td>
<td>8 m³</td>
</tr>
</tbody>
</table>

**H.1.4. HP washing of ballast tanks tanks.**

Quote per tank to carry out the following on tanks listed below:
- Opening and closing of 2 manhole covers each tank (repacking, cleaning and renewing of washers, bolts and nuts if necessary, is included).
- Ventilation and temporary lighting to be installed.
- 1 Dock plug to be opened / closed, vacuum tested and cemented. To be witnessed by the Captain or first officer.
- A staging is to be erected in the tanks. Assume l*w*h= 4 x 4 x 4m (2 levels).
- The walls, ceiling and bottom is to be HP washed to 3000psi.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 9 Water Ballast</td>
<td>PS, Fr 124-140</td>
<td>185.7 m³</td>
</tr>
<tr>
<td>No. 11 Water Ballast</td>
<td>SB, Fr 124-131</td>
<td>74.6 m³</td>
</tr>
</tbody>
</table>

**H.1.5. HP washing and disinfecting of fresh water tanks.**

Quote per tank to carry out the following on tanks listed below:
- Opening and closing of 2 manhole covers each tank (repacking, cleaning and renewing of washers, bolts and nuts if necessary, is included).
- Pump out any remaining water and dispose on the dock floor. Include supply of pump equipment.
- Ventilation and temporary lighting to be installed.
- A staging is to be erected in the tanks. Assume l*w*h= 4 x 4 x 4m (2 levels).
- The walls, ceiling and bottom is to be HP washed to 3000psi.
- The manholes giving acces to tanks 10 and 19 are located in the engine room spare parts store. Assume 40 m2 of shielding to be installed / removed to conserve the spare parts.
NO. 10 Freshwater SB, Fr 124-140 155.6 m³
NO. 19 Freshwater SB Fr. 124-140 96.5 m³

**H.1.6. Cleaning of hydraulic tanks.**

Quote per tank to carry out the following on tanks listed below:

- Opening and closing of 1 manhole covers each tank (repacking, cleaning and renewing of washers, bolts and nuts if necessary, is included).
- Ventilation and temporary lighting to be installed.
- 1 Dock plug to be opened / closed, vacuum tested and cemented. To be witnessed by the Chief engineer or first engineer.
- Pump out any remaining oil to clean cubitainers tanks, yard supply. Assume the tanks are full.
- The walls, ceiling and bottom is to be HP washed to 3000psi.

<table>
<thead>
<tr>
<th>No. 15, hydraulic oil storage tank</th>
<th>Upper deck PS, Fr 137 - 141</th>
<th>6.7 m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main hydraulic unit</td>
<td>Main deck PS, fr 137 - 141</td>
<td>2 m³</td>
</tr>
<tr>
<td>Spud carrier unit, hydraulic oil storage tank</td>
<td>Spud carrier, section 3</td>
<td>3.5 m³</td>
</tr>
<tr>
<td>Ladder hydraulic oil storage tank</td>
<td>Ladder engine room, stand alone unit</td>
<td>0.2 m³</td>
</tr>
</tbody>
</table>

**H.1.7. Cleaning of dry tanks, void spaces, double bottom tanks or cofferdams**

Quote per tank to carry out the following on tanks listed below:

<table>
<thead>
<tr>
<th>No. 1 Fore peak PS</th>
<th>Fr 141 - 154</th>
<th>323 m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 2 Fore peak SB</td>
<td>Fr 141 - 153</td>
<td>190 m³</td>
</tr>
<tr>
<td>No. 2A void space</td>
<td>Main deck, Fr 141 - 147</td>
<td>10 m³</td>
</tr>
<tr>
<td>No. 5 Cofferdam PS</td>
<td>Fr 141 - 147</td>
<td>19 m³</td>
</tr>
<tr>
<td>No. 6 Cofferdam PS</td>
<td>Fr 141 - 145</td>
<td>12 m³</td>
</tr>
<tr>
<td>No. 7 Cofferdam SB</td>
<td>Fr 124 - 141</td>
<td>50 m³</td>
</tr>
<tr>
<td>No. 8 Cofferdam</td>
<td>Fr 124 - 141</td>
<td>50 m³</td>
</tr>
<tr>
<td>No. 12 double bottom tank</td>
<td>Fr 124 - 141</td>
<td>54 m³</td>
</tr>
<tr>
<td>No. 21 Double bottom tank</td>
<td>ER PS, fr 78 - 85</td>
<td>4.5 m³</td>
</tr>
<tr>
<td>No. 22 Double bottom tank</td>
<td>ER SB, fr 78 - 85</td>
<td>4.5 m³</td>
</tr>
<tr>
<td>No. 23 Double bottom tank</td>
<td>ER, fr 98 - 124</td>
<td>195 m³</td>
</tr>
<tr>
<td>No. 39 Double bottom tank</td>
<td>ER PS, fr 78 - 98</td>
<td>30 m³</td>
</tr>
<tr>
<td>No. 40 Double bottom tank</td>
<td>ER SB, fr 78 - 98</td>
<td>30 m³</td>
</tr>
<tr>
<td>No. 46 Double bottom tank</td>
<td>Pump room, fr 59 - 78</td>
<td>182 m³</td>
</tr>
<tr>
<td>No. 46A Double bottom tank</td>
<td>Pump room, fr 63 - 75</td>
<td>10 m³</td>
</tr>
<tr>
<td>No.</td>
<td>Type</td>
<td>Location</td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>51</td>
<td>Double bottom tank</td>
<td>Pump room, fr 37 - 59</td>
</tr>
<tr>
<td>51A</td>
<td>Dry tank</td>
<td>Pump room – ladder well, fr 34 ~ 37</td>
</tr>
<tr>
<td>52</td>
<td>Double bottom tank</td>
<td>PS propulsion room, fr 18 – 41</td>
</tr>
<tr>
<td>53</td>
<td>Double bottom tank</td>
<td>SB propulsion room, fr 18 – 41</td>
</tr>
<tr>
<td>54</td>
<td>Aft peak tank PS</td>
<td>Fr -4 - 4</td>
</tr>
<tr>
<td>55</td>
<td>Aft peak tank SB</td>
<td>Fr -4 - 4</td>
</tr>
<tr>
<td>56</td>
<td>Dry tank PS</td>
<td>Fr 8 - 12</td>
</tr>
<tr>
<td>57</td>
<td>Dry tank SB</td>
<td>Fr 8 - 12</td>
</tr>
<tr>
<td>58</td>
<td>Dummy tank</td>
<td>Fr 150 – 154, removable</td>
</tr>
<tr>
<td></td>
<td>PS ER Dry tank</td>
<td>Main deck, Fr 85-113</td>
</tr>
<tr>
<td></td>
<td>Cutter ladder Dry tank PS</td>
<td>ladder frame -1 till 4</td>
</tr>
<tr>
<td></td>
<td>Cutter ladder Dry tank SB</td>
<td>ladder frame -1 till 4</td>
</tr>
</tbody>
</table>

**H.2. Pumping out of oils**

**H.2.1. Pumping out, storage and delivery of excessive amounts.**
- MDO .../m³
- Lub oil .../m³
- Hydraulic oil .../m³
- HFO .../m³
- Thermal oil .../m³

**H.2.2. Pumping out and disposal of excessive amounts of (inclusive dumping).**
- MDO .../m³
- Lub oil .../m³
- Hydraulic oil .../m³
- HFO .../m³
- Thermal oil .../m³

**H.3. Testing of tanks**
- with fresh water .../m³
- with air pressure (soap test or water column) .../m³

**H.4. Cleaning of pump well and bilge’s in pump room**
- Lump sum price for degreasing, high pressure washing & cleaning of the pump room tank top from side to side, including the dredge pump wells and pumping out the excessive amounts of water, removal of sand, oil... Incl. cleaning pump room walls, pipes up to 2.0 mtr above tank top and cleaning under the pump bearing blocks and gland water pump unit. Total area of pump room tank top pump room: 493 m² .../
- Removal and disposal of only sand and mud in the pump wells, on the pump room floor, also under platforms, pipes, gland water unit. .../m³
• Removal and disposal of sand and mud mixed with some oil and small amount of sludge on the pump room floor, also under platforms, pipes, ...

**H.5. Cleaning of engine room bilges**

**Drawings:**
- IHC 01175-1030-600 floor and gratings in ER and GR

**Scope:**
- Degreasing and cleaning the engine room bilge’s from side to side and pumping out the excessive amounts of water, oils and sludge. Including remove / refit floor plates in way of the cleaning area. Assume total area of the engine room bilge’s: 17 x 27 mtr = 459 m².

Lump sum. ...

- Price per m³ for removal and disposal of excessive amounts of water, oil and sludge out of the engine room bilges.

Unit price. ...

**H.6. cleaning of ladder engine room bilges.**

**Drawings:**
- IHC 01175-2812-140 stairs and floors in ER cutter ladder
- IHC 5242839 general arrangement cutter ladder

The engine room is two (2) levels. Due to the inclined position of the ladder, the bilges between ladder frames 4 and 7 are to be cleaned only.

**Scope:**
- Degreasing and cleaning the ladder engine room bilge’s from side to side and pumping out the excessive amounts of water, oils and sludge.
- Including remove / refit floor plates in way of the cleaning area.
- Assume total area of the ladder engine room bilges: 5.3 x 6 mtr = 32 m².

Lump sum. ...

- Price per m³ for removal and disposal of excessive amounts of water, oil and sludge out of the engine room bilges.

Unit price. ...

**H.7 cleaning of deck crane machinery house bilges.**

**Drawings:**
- HMC 7430-01 deck crane general view
- HMC 7430-53 floor machinery house

A hoisting beam SWL 3 ton and a bolted hatch (1100 x 1100 mm) in the floor are installed in the machinery house.
Scope:
- Open / close the hatch,
- Degreasing and cleaning the deck crane engine room bilge’s from side to side and pumping out the excessive amounts of water, oils and sludge.
- Including remove / refit floor plates in way of the cleaning area, mobilisation / rigging of the pump, rags, drums, etc.
- Assume total area of the deck crane engine room bilges: 3.7 x 6.3 mtr = 24 m2.

Lump sum. … /

Price per m³ for removal and disposal of excessive amounts of water, oil and sludge out of the machinery house bilges.

Unit price. … / m³

**H.100. temporary storage of engine lubrication oil, 5 m³.**

Drawings:
- IHC 01175-0353-010 Tank Testing Plan
- IHC 01175-1023-070 Hatch over engine room, hatch way no. 1
- IHC 01175-1030-600 floor and grating in engine and generator room.

Scope:
- Assume the vessel is alongside a repair berth or dry docked.
- Open / close engine room central hatch on crane deck, frames 89 ~ 93 with yard crane. Loosen / tight lugs. Assume two (2) times.
- Provide five (5) clean cubitainers. Hoist in / out from the engine room with yard crane. Label, secure and store safely the units. Pumping arrangement to be clean. Use a strainer / filter. Assume two (2) times.
- Open / close two (2) times manhole covers from the main generator engines sump tanks, six (6) covers in total. Pump the lubrication oil between the sump tanks (pos 30, 31, 32) and the cubitainers.
- Open / close floor plates in way of the manhole covers.
- Including pump, hoses, permits, lights etc.

Lump sum price: …/.

**H.101. temporary division of engine room bilges for cleaning of bilges.**

Drawings:
- IHC 01175-1023-070 Hatch over engine room, hatch way no. 1
- IHC 01175-1030-600 floor and grating in engine and generator room.

Scope:
- Assume the vessel is alongside a repair berth or dry docked.
- Assume the bilges have been cleaned according H.5.
• Assume total area of the engine room bilge’s to be 17 x 27 m = 459 m².
• Open / close engine room central hatch on crane deck, frames 89 ~ 93 with yard crane. Loosen / tight lugs. Assume two (2) times.
• Open / close floor plates in way of the manhole covers.
• Provide and remove / refit temporary coaming of 20 cm. Arrange such the engine room bilge is divided in four (4) sections.

Lump sum price: ........................................

**H.102. Cleaning of lube oil storage tank 20.**

Gear box lube oil tank (8.5 m³) was contaminated with sea water and has to be cleaned.

**Drawings:**
- IHC 01175-0353-010 Rev C : Tank testing plan
- IHC 01175-1201-010 Rev B : Double bottom Frame 80-91

**Scope:**
- Tank is accessible through a manhole located between Fr 83 & 84 and between 4150 mm and 4800 mm PS from C.L. (see dwg. 01175-1201-010)
- Drain the remaining content of the tank and dispose (docking plug: between Fr 78 & 79 at ± 4m PS from C.L)
- Clean the tank with fresh water and chemicals, dry with rags and place a hot air blower
- Close the dock plug and manhole (incl. new yard supplied gasket) immediately after approval from the owner’s representative

Lump sum price: ........................................
Unit Rate : ........................................

Unit Rate : ........................................
General remarks to H

All prices include:

- Staging, lighting, ventilation, transport, cranage, dumping, all required auxiliaries and tools.
- Creating and closing of access openings.
- Supply of air, water, chemicals.
- For bilge cleaning: remove/refit the floor plates in way.
I. SEAWATERSYSTEM - VALVES

I.1. Overboard valves

Drawings:
- LD 12-00-049 Location of inlet and overboard valves

Price per valve for globe and gate valves should include:
- Staging (all valves require staging of approx. l+w+h = 2x2x3m)
- Open up of valves, in situ, cleaning, inspection, re-packing, grinding the seats in place and refitting. Dressing up of spindles.
- Renewal of small seals, bolts, nuts, etc. (yard's supply).
- Assume valves are in engine room or pump room as indicated above

Price per valve, should include for butterfly valves:
- Staging (all valves require staging of approx. l+w+h = 2x2x3m)
- Dismantling and reinstalling connecting pipe work (incl. : renewal of packing, bolts and nuts).
- Transport to and from workshop.
- Remove and refit (new) valve. Clean, dismantle and renew liner, ship’s supply.
- Required bolts, nuts, washers, smaller than M20, securing blocks, etc. are yard's supply.
- Assume valves are in engine room or pump room as indicated above

Additional in % for:
- Removing and replacing of floor plates.
- Transport to/from workshop, overhaul in workshop
- Hydraulic / pneumatic operated valve
- Location of valve in tank, cofferdam
- Renewal of spindle

Separator Room

<table>
<thead>
<tr>
<th>Pos</th>
<th>Valve Description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos 6</td>
<td>Dirty water pump overboard</td>
<td>ND150 Globe v/v</td>
</tr>
<tr>
<td>Pos 7</td>
<td>Bilge Oil water separator overboard</td>
<td>ND32 Globe v/v</td>
</tr>
<tr>
<td>Pos 8</td>
<td>Overboard dirty water ejector pump</td>
<td>ND100 Globe v/v</td>
</tr>
<tr>
<td>Pos 9</td>
<td>Gen service pump overboard</td>
<td>ND125 Globe v/v</td>
</tr>
<tr>
<td>Pos 10</td>
<td>Raw water harbour eng overboard</td>
<td>ND80 Globe v/v</td>
</tr>
</tbody>
</table>

Pump room

<table>
<thead>
<tr>
<th>Pos</th>
<th>Valve Description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos 2</td>
<td>Fill seawater overboard</td>
<td>ND25 Globe v/v</td>
</tr>
<tr>
<td>Pos 3</td>
<td>Fill seawater overboard</td>
<td>ND25 Globe v/v</td>
</tr>
<tr>
<td>Pos 4</td>
<td>Cooling water overboard</td>
<td>ND450 Butterfly v/v</td>
</tr>
<tr>
<td>Pos 5</td>
<td>Emergency suction fire pump</td>
<td>ND100 Globe v/v</td>
</tr>
</tbody>
</table>

Engine room

<table>
<thead>
<tr>
<th>Pos 15</th>
<th>Valve Description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos 15</td>
<td>Emergency bilge water ER</td>
<td>ND300 Butterfly v/v</td>
</tr>
</tbody>
</table>
SB Store

| Pos 11 | Sewage overboard | ND50 Storm v/v |

SB Propulsion Room

| Pos 12 | Food waste to overboard | ND65 Storm v/v |

PS fore peak tank no.1

| Pos 20 | Draft sensor | Gate valve DN50 PN16 |
| Pos 23 | Speed Log | Gate valve DN65 PN10 |

I.2. Inlet valves - seawater system

Drawings:
- LD12-00-049  Location of inlet and overboard valves

Price per valve should include for butterfly valves:
- Dismantle and re-install the connection pipe work (incl. renewal of packing, bolts and nuts)
- Remove / refit the butterfly valve. Transport to / from the workshop
- Clean, dismantle the valve. Dress up all parts.
- Renew liner by ship’s spare
- Bolts, nuts, washers smaller than M20, securing blocks, etc are yard’s supply
- Assume valves are in the engine or pump room as indicated above.

| Pos 1 | Emerg. Suction raw water harbour engine | ND125 Butterfly v/v |
| Pos 13 | Suction main raw water inlet | ND800 Butterfly v/v |
| Pos 14 | Suction main raw water inlet | ND800 Butterfly v/v |

I.3. Overhaul valves – general purpose

Pls. quote for overhaul per valve as per specification I.2. for butterfly valves and I.1. for other valves.

<table>
<thead>
<tr>
<th>Bore</th>
<th>Globe</th>
<th>Gate</th>
<th>Butterfly</th>
<th>Storm</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
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<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I.4. Seawater inlet

Drawing:
- IHC 01175-1244-010 buoyancy space fr 111 ~ 124.
- IHC 01175-1291-010 Seawater inlet strainer arrangement
- IHC 01175-2239-010 fastening cathodic protection
- CWC T111_001 anti-fouling system

I.4.1 Cleaning seawater inlet chests and cross over pipe

- Remove/refit the top cover. Remove/refit the filter elements and transport to/from workshop. Build up worn & corroded parts of seawater filter seat pos 13 and grind smooth. Assume 24 man-hours. Dress up bolts, thread and studs. Bolts, nuts and washers smaller than M20 to be renewed and supplied by the yard.
- Clean the seawater inlet space and the grating from growth, scraping, HP washing with freshwater and dry.
- Clean the box behind the inlet pipe where the Van De Velde protection is fitted.
- Clean cross over pipe between PS and SB inlet from growth, scraping, HP washing with freshwater and dry.
- Apply 4 layers of paint as per underwater system.
- Supply and renew two pieces 5kg zinc anode.

Lump sum price for SB & PS seawater inlet + cross over pipe ..../

I.4.2. Removal of mud:

Unit price ..../ m3

I.4.3. Grit blasting and coating of sea chest and filter element.

- Grit blast to SA 1 ½ (assume in conjunction with grit blasting of the hull).
  - sea inlet space
  - complete filter element, seat and rod pos 12 to SA 2 ½.
- Apply 4 layers paint as per underwater system.
  - For filter element include covering the strainer-mesh in order to prevent it from being painted (will get clogged by paint).

Price per inlet space: .../
Price per filter element: .../

I.4.4. Impressed current anti fouling system Vandeven

The vessel is equipped with two (2) impressed current systems, PS and SB, frames 122 ~ 124. The units are accessible below main deck, via the aux engine room PS and SB store.

- Assume the crew has locked out / tagged ou the system electrically.
- Open / close the hatch with yard crane.
- Disconnect / reconnect the electric cable.
- Open / close top cover (IHC 01175-2239-010).
• Lift the frame with anodes (CWC T111_001)– transport to shore, and dispose off.
• Install a new ship’s supplied anode system, re-connect, and test.

Price per unit \( .../ \)

**I.4.5. Renew bottom part filter element**

• Assume the filter elements are removed under item I4.1 and in the workshop
• Crop off and renew the bottom ring 01175-1291-010 pos 13. Including the supply, cutting, machining, aligning, fitting and welding of the new ring. Note that an O-ring groove is to be machined as per drawing.

• Price per filter element: \( .../ \)

**I.5. Cleaning crossover pipe for gland pump set in the pump room.**

Drawing IHC 01175-2327-520 (2 sheets) Gland water flushing unit

• Open/close above pipe nr. 27.064 ( dia 406.4 mm x 8.8 mm x 10 m) and remove sand, mud, etc.
• Remove cover at 1 end fort access.
• Cleaning to be carried out with suitable HP sewage rat.

Lump sum price \( .../ \)
Price per m³ (or part thereof) mud to be removed. \( .../\text{m}^3 \)

**I.6. Overhaul of gland water pumps**

Centrifugal pump Nijhuis type NC1
65 MLC 24 kW 2945 rpm
Dwg 22782 Arrangement drawing NC1

• Disconnect / reconnect the suction and delivery pipes to the pump.
• Disconnect / reconnect the coupling to the electric motor
• Transport the pump to / from workshop
• Dismantle the pump completely. Note pump is fitted with liquidyne type shaft seal
• Clean, dress up all parts. Make a report.
• Box up with ship’s supplied spare parts and under supervision of ship’s engineer.
• Re-install, align and reconnect the pump

Price per pump shaft diameter 70mm / impeller diameter 340mm \( .../ \)
Price per pump shaft diameter 50mm / impeller diameter 230mm \( .../ \)
General remarks to I

All prices mentioned above include:

- Cranage, transport, staging, cherry pickers with operator, removal for access, lighting, ventilation, tools and all auxiliary means.
- For surface preparation and painting all general remarks under E and F are applicable.
- For steelworks all general remarks under G are applicable.
- Removal and dumping of all mud, mussels, dirt, grit, etc.
- Removing and replacing of floorplates.
- Removal and reinstalling connecting pipe work. (Inclusive renewal of packing, bolts and nuts, yard's supply).
- Transport, handling, to and from workshop.
- Renewal of common bolts, nuts, seals and packing yard's supply.
J. Cutter ladder

- IHC 5242839  general arrangement cutter ladder

J.1. Ladder turning points.

J.1.1 Renewal of bronze bush ladder turning point in situ

- IHC 5242776  Arrangement Cutter ladder Turning Point
- IHC 5826945  Bush Turning Point Ladder.

- Repair to be carried out afloat with ladder in tilted position. Required water depth 13 m. Assume ladder will be tilted, and both turning shafts pushed out hydraulically by ship’s crew. Both shafts can then be accessed from the Upper Deck. A staging is required for access.
- The purpose of this repair is to renew the bronze bush pos. 359 with owner supplied new bush.
- Remove/Reinstall Wearing bush pos. 392 with locking plates pos. 395.
- Remove/Reinstall 12 PCS Bolt. pos. 382 and locking arrangement pos. 394
- Remove/Reinstall Locking Ring pos. 360.
- Remove/Reinstall Bush pos. 359. O-rings pos. 374 and 375 to be renewed.
- pos. 359, 360, 374, 375, and pos. 382 owner supplied.
- Bush in supplied in lower / under size. Yard is to measure, make reports, machine the bush to size including fabrication of auxiliary plates.
- pos. 394, 395, Loctite Activator NF736 and Loctite 307 yard’s supply.
- Special care to be taken to the position of the bush on the shafts with regards to the grease grooves in the bush.

Lump sum for one bush: .... /bush

J.1.2. Removal / renewal of shaft ladder turning point.

- IHC 5242776  Arrangement Cutter ladder Turning Point

- Repair to be carried out afloat with ladder in tilted position. Required water depth 13 m. Assume ladder will be tilted, and both turning shafts pushed out by ship’s crew. Both shafts can then be accessed from the Upper Deck. The yard is to cut opening to access the inside of the cutter ladder in way of the pins while the ladder is fully tilted. As alternative the yard may erect staging to access the inside via the normal door. Note that the fitted steps and platforms will be too steep to use with the ladder in tilted position
- Disconnect, blank off the hydraulic connection to the cylinder pos 354. Remove the covers pos 363 & pin 361. Push the cylinder in. Remove the locking pins pos 365.
- Remove the pins pos 355/356.
- Disconnect, remove the gland pos 364.
- Push out & remove the shaft pos 353. Transport to / from the workshop. Dismantle the shaft, remove the cylinder. Clean, dress up and measure all parts of the shaft and the bushes in ship’s side. Check straightness of the shaft on lathe. Make a report.
• After measurement and repairs, box up and return the shaft to ship, re-install the shaft assembly with new owner’s supplied gland packing and seals or if required install a new owner’s shaft.

Price per shaft: 
Additional price for renewal of bush pos 359 in the workshop as per item J.1.1:

J.1.3. Renewal of bushes ladder turning point cutter ladder side.
• IHC 5242776 Arrangement Cutter ladder Turning Point
  Assume the shaft pos 353 is removed under item J1.2 and in the workshop.
  Assume the bushes (pos 357 SB / 400 PS or pos 358 SB / 401 PS) are worn and need to replace by owner’s spare.
  Bushes to be cropped out and removed from the housing. Special attention to be paid not to damage the housing. Dress up, clean the housing. New owner’s bushes are delivered in under / oversize. Measure the bore, machine the ID & OD of the bush to shrink fit and to suit the diameter of the shaft.
  Freeze the bush by yard’s supplied nitrogen and install the new bush.

Price for bush pos 357
Price for bush pos 358

J.1.4. Measurement / renewal of bush ladder low turning point ship’s side.
• IHC 5242776 Arrangement Cutter ladder Turning Point
  Renewal of bush lower turning point is only possible in dry-dock.
  Assume the ladder is in high position. The lower turning point is accessible from the dock floor.
  Erect a staging.
  Clean, degrease the housing with bush. Measure the bush and make a report.

Price for measurement one bush only:

• Disconnect, remove, push out the bush pos 368 including fabrication and supply of pulling rods and jacks. Clean out housing, measure bores and make report. Install, shrinkfit an owner’s supply new spare bush. Supply dry-ice or liquid nitrogen. Re-connect and securing the bolts pos 381 as per drawing.

Price of renewal of one bush pos 368:

J.1.5. Measurement / renewal of bush ladder upper turning point ship’s side.
• IHC 5242776 Arrangement Cutter ladder Turning Point
  Assume the ladder is in low turning point: the high turning point is accessible from the main deck with the ladder tilted to -8m
  Erect a hanging staging 1x2 m

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• Clean, degrease the housing with bush. Measure the bush and make a report.

Price for measurement one bush only.  

• Disconnect, remove, push out the bush pos 368 including fabrication and supply of pulling rods and jacks. Clean out housing, measure bores and make report. Install, shrinkfit an owner’s supply new spare bush. Supply dry-ice or liquid nitrogen. Re-connect and securing the bolts pos 381 as per drawing.

Price of renewal of one bush pos 368.  

**J.1.6. Overhaul of hydraulic cylinder turning point.**

• IHC 5242776 Arrangement Cutter ladder Turning Point

• Assume the shaft turning point and it’s hydraulic cylinder is removed under item J1.2
• Dismantle the cylinder (stroke 600mm). Clean dress up all parts.
• Re-assemble the cylinder with owner’s supplied new seals and parts.
• Pressure test the cylinder in the workshop to 250 bar.
• Clean, de-rust and paint the cylinder housing.

Price per cylinder:  

**J.1.7. Removal / renewal tilting shaft.**

• IHC 5474711 Tilting arrangement of cutter ladder

• The tilting shaft is accessible via the cutter ladder and only in dry-dock.
• Disconnect, remove the cylinder bracket pos 107.
• Disconnect & blank off the cylinder hydraulically
• Remove the gland pos 110.
• Pull out, remove the shaft pos 101. Transport to the workshop. Clean, dress up. Skim the OD of the shaft on lathe. Remove the hydraulic cylinder. Clean, dress up the housing.
• Remove the locking ring pos 105, renew the seal pos 104 by owner’s spare.
• Box up the shaft assembly, return to the ship and re-install with new owner’s supplied packing’s and seals. Renew the shaft by owner’s spare if required.
• Reconnect the hydraulic cylinder and cylinder bracket.

Price per tilting shaft  

**J.1.8. Overhaul of hydraulic cylinder tilting shaft.**

• IHC 5474711 Tilting arrangement of cutter ladder

• Assume the tilting shaft and it’s hydraulic cylinder is removed under item J1.7
• Dismantle the cylinder (stroke 290mm). Clean dress up all parts.
• Re-assemble the cylinder with owner’s supplied new seals and parts.
• Clean, de-rust and paint the cylinder housing.
J.1.9. Fitting pieces PS & SB high turning points

Drawings:
- IHC 01175-0323-010 Construction plan Aft ship
- IHC 01175-1111-010 Construction Aft Ship Fr. 29-39
- IHC 5242776 Arrangement Cutter ladder Turning Point
- IHC 5242765 Bearing casing Cutter ladder Turning Point
- IHC 5875983 Fitting piece

J.1.9.1 Crack testing fitting pieces – HIGH TP
- Crack testing of the weld seam of the fitting piece and ship’s hull inboard & outboard
- Assume the ladder is in the low turning point. The high turning point is accessible from the main deck with the ladder at -8m.
- Assume hanging staging iwo high turning point and degreasing of the location was was done as described under J1.5.
- Remove the existing paint / T/U the removed paint from the weld seams to allow for MPI-testing
- MPI-testing of inboard & outboard weld seam.

Lump sum: \(... / turning point\)

J.1.9.2 Renewal of fitting pieces – HIGH TP

Both (PS & SB) fitting pieces pos. 369 drw. 524 2776 of the high turning points have to be renewed because of cracked welds and water leakage to the accommodation via the fitting pieces. 2 new oversized fitting pieces will be delivered by owner.

Repair can be carried out afloat with the cutter ladder in low turning point and the ladder at -8 m.

- Erect a hanging staging
- Cut of and remove horizontal stiffener plate bet. Fr32 and Fr. 33 and 1700 above base.
- Cut, gauge or grind off the welding between the fitting piece and the turning point from the inside and from the outside, without damaging the bore of the fitting piece in the turning point. Remove the fitting piece.
- Clean, dress up, measure the hole for the fitting piece in the turning point.
- Assume the holes are still round and do not require in situ machining. Measure up the length L of the old fitting pieces on PS and SB side.
- Machine the newly supplied fitting pieces to a diameter to obtain a H7/p6 interference fit with the holes in the turning points. The length L to be same as the old fitting pieces.
- Insert the new fitting pieces and weld on both sides. Thickness of the welds to be increased to 12mm.
- Magnaflux test of the welds and vacuum test or equivalent water tightness test.
- Reinstall horizontal stiffener plate at center of fitting piece (1700 above base).
- Install 2 extra stiffener plates of size 700 x 200 x 16mm at 150mm above and below of the existing stiffener.
• Please note that the fitting piece 587 5983 Aj at PS trunion point is welded up to dia 400 instead of up to dia 440 over 25% of its circumference towards FWD; see below sketch and picture (done in Dubai 2011). Allow for deeper gauging in this area.
• General remarks to steelwork mentioned under G also apply here.

Lump sum ... / turning point

• If the holes in the turning points are out of tolerance, holes and the face of the hole will have to be build up by welding and in situ machined afterwards.
• Assume hole to be build up by 5mm on radius and face.

Additional: ... / turning point

J.1.10. Renewal fitting pieces PS & SB lower turning points

Drawings:
• IHC 01175-0323-010 Construction plan Aft ship
• IHC 01175-1111-010 Construction Aft Ship Fr. 29-39
• IHC 5242776 Arrangement Cutter ladder Turning Point
• IHC 5242765 Bearing casing Cutter ladder Turning Point
• IHC 5875983 Fitting piece

J.1.10.1 Crack testing fitting pieces – LOW TP
• Crack testing of the weld seam of the fitting piece and ship’s hull inboard & outboard
• Assume the ladder is in the low turning point. The high turning point is accessible from the main deck with the ladder at -8m.
• Assume hanging staging iwo high turning point and degreasing of the location was was done as described under J1.5.
• Remove the existing paint / T/U the removed paint from the weld seams to allow for MPI-testing.
• MPI-testing of inboard & outboard weld seam.

Lump sum. ... / turning point

J.1.10.2 Renewal of fitting pieces – LOW TP

Fitting piece pos. 369 drw. 524 2776 of the lower turning points has to be renewed because of cracked welds and water leakage to the propulsion room via the fitting pieces. 2 new oversized fitting pieces will be delivered by owner.

Repair to be carried out in dry-dock with ladder in upper turning points.

• Cut of and remove horizontal stiffener plate bet. Fr32 and Fr. 33 and 1700 above base.
• Cut, gauge or grind off the welding between the fitting piece and the turning point from the inside and from the outside, without damaging the bore of the fitting piece in the turning point. Remove the fitting piece.
• Clean, dress up, measure the hole for the fitting piece in the turning point.
• Assume the holes are still round and do not require in situ machining. Measure up the length L of the old fitting pieces on PS and SB side.
• Machine the newly supplied fitting pieces to a diameter to obtain a H7/p6 interference fit with the holes in the turning points. The length L to be same as the old fitting pieces.
• Insert the new fitting pieces and weld on both sides. Thickness of the welds to be increased to 12mm.
• Magnaflux test of the welds and vacuum test or equivalent water tightness test.
• Reinstall horizontal stiffener plate at center of fitting piece (1700 above base).
• Install 2 extra stiffener plates of size 700 x 200 x 16mm at 150mm above and below of the existing stiffener.
• General remarks to steelwork mentioned under G also apply here.

Lump sum. ... / turning point

• If the holes in the turning points are out of tolerance, holes and the face of the hole will have to be build up by welding and in situ machined afterwards.
• Assume hole to be build up by 5mm on radius and face.

Additional. ... / turning point

J.1.11. In situ machining of bushes ladder turning point cutter ladder side.

Drawing:
IHC  5242776     Arrangement Cutter ladder Turning Point

Scope:
• Assume the shaft pos 353 is removed under item J1.2 and in the workshop.
• Assume the ID of the fitted bushes pos 357 or 358 are undersized
• Machine the inner diameter of the bushes pos 357 & 358 in line to suit the diameter of the shaft.

Price per side: .../

J.1.12. Removal / renewal safety pin

Drawings:
• IHC  5474713     Arrangement safety pin

Scope:
• The safety pin is accessible via the cutter ladder.
• Erect a staging at the inside and the outside of the cutter ladder
• Disconnect & blank off the cylinder hydraulically
• Disconnect, remove the end plate pos 513. Supply and install, connect a hydraulic hand pump and push out the cylinder. Disconnect the hydraulic cylinder from the end plate
• Disconnect, remove the locking ring pos 505.
• Remove the safety pin pos 501 c/w hydraulic cylinder.
- Transport to the workshop. Dismantle, clean, dress up. Skim the OD of the shaft on lathe. Remove the hydraulic cylinder. Clean, dress up the housing.
- Box up the shaft assembly, return to the ship and re-install with new owner’s supplied seal. Renew the shaft by owner’s spare if required.
- Reconnect the hydraulic cylinder and end plate.

Price per safety pin: ..../

**J.1.13. Overhaul of hydraulic cylinder safety pin**

**Drawings:**
- IHC 5474713 Arrangement safety pin

**Scope:**
- Assume the safety pin and its hydraulic cylinder is removed under item J1.12.
- Dismantle the cylinder (dia. 140 / stroke 290mm). Clean dress up all parts.
- Re-assemble the cylinder with owner’s supplied new seals and parts.
- Pressure test the cylinder to 180 bar
- Clean, de-rust and paint the cylinder housing.

Price per cylinder: ..../

**J.2. cutter drive**

**General note:** the cutter shafts flanges have bushes (slight fit) for torque transfer and bolts (loose fit) to keep the flanges together. Each time a flange connection is opened, the bushes have to be renewed: diameter of the holes and flange thickness to be measured and oversized bushes (Owner’s supply) have to be machined. All to be included in the lumpsum prices.

**J.2.1 In situ crack check Cutter shafts**
- IHC 01175-2165-540 shafts for cutter drive

- Remove paint from shaft by power tooling near the radius at the flanges of the shaft. NOT BY chipping hammers.
- Check the cleaned flange neck area for cracks by penetrant fluids
- Clean and paint the inspected areas with 3 coats owner supplied paint.

- Price per shaft (2 flanges) : ... / shaft

**J.2.2. Renewal of cutter top shaft and rubber bearing**

**Drawings:**
- AVD 001041-01 Cutter shaft bearing D630
- IHC 01175-2164-530 Dismounting Tool
- IHC 01175-2164-540 Plate for dismounting tool
- IHC 01175-2165-500 Arrangement cutter drive
- LD-04-02-007 Water Flushing Chamber
- LD-04-02-021 Rubber bearing
- LD-04-02-025 Grease trap box cutter shaft
Scope:
- Assume cutter head has been removed by ship’s crew and the cutter ladder is in sea fast position High or Low turning point.
- Erect a hanging staging in way of the cutter shaft bearing: \( l \times w \times h = 4 \times 1 \times 1 \mathrm{m} \)
- Remove / reinstall top halve of intermediate cutter shaft bearing AVD. Disconnect / re-connect grease trap boxes dwg. LD-04-02-025. Disconnect / re-connect the grease pipes, blank off during the works. Remove / reinstall locking rings for V-seals. Loosen 4 pcs M36 connection bolts and lift the top halve of the bearing housing. Disconnect, remove the bearing shells and transport to / from the workshop. Clean, dress up all parts. Take measurements and make a report. If required to be replaced by owner’s new bearing shells.
- Remove / refit cross beam H250 x 5700mm in way of works. Remove / reinstall intermediate shaft Pos. 22 (Weight 16.5 ton) adjacent to the cutter top shaft pos 12 by removing 16pcs connecting bolts and fitting bushes from each flange. (Pos. 14,15,16 and 17) Bushes to be pulled out with hollow jack.
- Transport the intermediate shaft to / from the workshop. Clean and dress up all bushes and holes of intermediate shaft and adjacent flanges. Inspect the holes and flange on cracks by dye check & magnaflux. Put shaft on lathe. Measure trueness. Skim, polish bearing surface until smooth surface. Make a report.
- Measure up ID of all holes and OD of bushes. Bushes to be replaced with owner supplied undersized. Bushes to be machined by the yard and shrink fitted.
- De-rust the intermediate shaft and bearing housing to ST3. Paint with 3 layer’s ship’s supplied paint.
- Remove / refit the bolted hatch covers above the flushing chamber.
- Disconnect / re connect flushing chamber Pos. 13 from the cutter shaft bearing housing. (Detail drawing LDV 04-02-007). Rubber seals to be renewed with owner supplied new one.
- Cut / remove 2 push blocks 300x300x300 from the cutter ladder deck in way of the shaft flange. Afterwards, refit & re-weld the blocks.
- Remove / reinstall cutter top shaft pos. 12 (Weight 25.4 ton). Replace with owner supplied new shaft. New shaft is completely with stainless steel liners. Prior to installation of new shaft, natural soap (yard supplied) to be put into the rubber bearing.
- Remove / reinstall rubber bearing Pos. 2. Bearing to be replaced with owner supplied new one. Remove / reinstall protection hood Pos. 8, remove / install 24 pcs bolt M24 Pos. 6, install dismounting tools (owner supplied) and jack out the bearing with 2 hydraulic jacks 200 ton (yard supply). Reinstallation of bearing to be done without using dry ice or liquid nitrogen. Bearing to be pulled in by means of chain blocks and with the use of Plate Drwg 01175-2164-540. Offload, unpack, repack the owner supplied bearing in wooden box from/ to the ship. Old bush to be crated and returned to the owner.
- It is known that the bronze outer casing of the rubber bearing can be about 3 mm oval. This no problem to dismount and mount the bearing. The housing may be heated to facilitate the mounting of the bearing, but shrinking of the bearing by filling the inside of the bearing with dry ice is not allowed. The rubber bearing can be cooled by spraying the outside with liquid nitrogen.
• Clean dress up the housing for the rubber bearing on the cutter ladder. Measure up ID of housing and OD of newly supplied bearing
• Fit new owner supplied support ring Pos. 4 on new cutter top shaft.
• Incl. the matching of the flanges of both shafts as described under paragraph Q.1.

Lump sum:

J.2.3. Removal of intermediate shaft

Drawings:
• IHC 01175-2165-500 Arrangement cutter drive
• AVD 001041-01 Cutter shaft bearing D630

Scope:
• Assume the cutter ladder is in sea fast position High or Low turning point.
• Remove / reinstall top halve of intermediate cutter shaft bearing AVD. Disconnect / re-connect grease trap boxes and grease pipes. Remove / reinstall locking rings for V-seals. Loosen 4 pcs M36 connection bolts and lift the top halve of the bearing housing. Remove the bearing shells and transport to / from the workshop. Clean, dress up and measure. If required to be replaced by owner’s new bearing shells.
• In case intermediate shaft connecting to the gearbox is to be removed, assume that the bulkhead penetration is removed under item J2.4.
• Remove / refit cross beam H250 x 5700mm in way of works.
• Remove / reinstall intermediate shaft Pos. 22 (Weight 16.5 ton) by removing 16pcs connecting bolts and fitting bushes from each flange. (Pos. 14,15,16 and 17) Bushes to be pulled out with hollow jack.
• Transport the intermediate shaft to / from the workshop. Remove /refit the protection cover from the 2nd bearing surface. Clean and dress up all bushes and holes of intermediate shaft and adjacent flanges. Inspect the holes and flange on cracks by dye check & magnafux.
• Put shaft on lathe. Measure trueness. Skim, polish bearing surfaces until smooth surface. Make a report.
• De-rust the intermediate shaft and bearing housing to ST3. Paint with 3 layers ship’s supplied paint.
• Grit blast SA2.5 and paint with 3 layers of owner’s supplied paint. [ST3 cannot be quoted without prior inspection]
• Measure up ID of all holes and OD of bushes. Bushes to be replaced with owner supplied under / oversized. Bushes to be machined by the yard and shrink fitted.
• Make report of straightness, diameter shaft and flange bores.

Price for one intermediate shaft

J.2.4. Renewal of bearing shells.

Drawings:
• IHC 01175-2165-500 Arrangement cutter drive
• AVD 001041-01 Cutter shaft bearing D630
Scope:
- Assume the cutter ladder is in sea fast position High or Low turning point.
- Remove / reinstall top halve of intermediate cutter shaft bearing AVD. Disconnect / re-con-net grease trap boxes and grease pipes. Remove / reinstall locking rings for V-seals. Loosen 4 pcs M36 connection bolts and lift the top halve of the bearing housing. Remove the bearing shells and transport to / from the workshop. Clean, dress up and measure. De-rust the housing to ST3 and paint with 3 layers paint. If required to be replaced by owner’s new bearing shells.

Price per bearing …/ 

**J.2.5. Bulkhead Penetration Cutter shaft**

Drawings:
- IHC 01175-2165-500 Arrangement Cutter drive
- IHC 01175-2165-510 Bulkhead gland Cutter shaft
- IHC 5473806 Wearing Bush

Scope:
- Erect a staging l+w+h= 4x2x6m inside the cutter ladder engine room. Clean, degrease the sealing housing, the drip-tray and bulkhead in way.
- Protect the torque measurement device on the shaft by metal plating and cloth.
- Remove the gland pos 27. Dismantle the 2/2 part stuffing box pos 12. Remove / reinstall gland pos. 27.
- Dismantle the 2/2 liner pos 1.
- Transport all to the workshop. Dress up and measure all parts
- De-rust the drip-tray and all gland parts to ST3, paint with 3 layers ship’s supplied paint.
- Box up the gland with new owner’s supplied packing and other gland parts if required.

Lump sum. …/ 

**J.2.6. Dress up bearing shell cutter drive bearing.**

- IHC 01175-2165-500 Arrangement Cutter drive

Scope:
- Assume the grease trap boxes are already removed.
- Remove the top part of the bearing housing
- Jack up the shaft slightly. Remove the bearings shells. Dress up de bearing shells in way of running marks.
- Blue print and refit the bearing shells.
- Remove the bearing shell and dress up where required until the shaft had a contact of more then 80 % to the (bottom) bearing shell.

Price per bearing …/
J.2.7. Renewal of liner pos 5 of cutter top shaft in situ

Drawings:
- LD-04-02-005 Cutter top shaft
- LD-04-02-007 Water flushing chamber
- IHC 01175-2165-500 Arrangement cutter drive.

Scope:
- Remove / refit the bolted hatch cover above the flushing chamber
- Disconnect / reconnect flushing chamber 01175-2165-500 Pos. 13 from the cutter shaft bearing housing. Parts Detail drawing LDV 04-02-007 pos 1+6+2 – all 2/2 part to be removed / refitted. Rubber seal pos 3 to be renewed with owner supplied new.
- Crop of the liner dwg LD-04-02-005 pos 5 in situ. Special attention to be paid not to cut in the shaft. Shaft to be cleaned and dressed up in situ
- Install a new owner’s supplied liner pos 5. Liner is supplied in 2 parts and e welded to each other and tack welded to the shaft.
- After welding, grind the welds smooth.
- Flushing chamber to be re-assembled with the filling ring pos 6 mounted.

Price per liner:  ....../

J.2.8. Repairs of cutter shaft.

J.2.8.1. Remove / refit the cutter shaft from owner’s special casing.

Drawings:
- LD-12-00-029 Casing for cutter top shaft
- LD-04-02-005 Cutter top shaft

Scope:
- Assume the new cutter top shaft or intermediate shaft is delivered in an owner’s steel casing. (both shaft types are supplied in same type of casing)
- Transport the container from the ship to the workshop.
- Remove the top of the casing. The casing is filled with oil to protect the shaft. Pump out the oil and temporary store the oil in yard supplied containers.
- Remove the shaft, clean, dress up and transport the shaft to the ship for installation.
- Empty, clean the container.
- After repairs, return the removed shaft & fit in the owner’s casing. Secure the shaft, refill the container and close the cover with yard’s supplied new gaskets.
- Return the casing to the ship.

Price per shaft  ....../

J.2.8.2. Inspection of cutter top shaft.
- LD-04-02-005 Cutter top shaft

Scope:
- Assume the cutter top shaft is removed under item J2.2. Transport the shaft to / from the workshop
• Clean, dress up the shaft. Carry out crack inspection in way of the flange and thread by mangafux & dye-checking. If necessary grind out the crack to determine the depth.
• Put the shaft on the lathe. Check straightness of the shaft and roundness of the liners.
• Make a detailed measurement report of diameters shaft, diameter holes flange & straightness.

Price per shaft

**J.2.8.3. Renewal of liners of cutter top shaft.**

Drawings:
- LD-04-02-005  Cutter top shaft
- LD-04-02-007  Water flushing chamber
- LD-04-02-015  bearing bush pos 30 on cutter shaft
- LD-04-02-016  bearing bush pos 31 on cutter shaft
- LD-04-02-017  bearing bush pos 32 on cutter shaft
- IHC 01175-2165-500  Arrangement cutter drive.

Scope:
- Assume the shaft is in the workshop and has been inspected under item J2.3.2.
- Crop off the bearing bush dwg LD-04-02-005 pos 11 & liner pos 4. Special attention to be paid not to cut in the shaft. If any damaged on the shaft, this is to be repaired by building up by welding and grinding. Shaft to be cleaned and dressed up.
- Heat up and install a new owner’s supplied liner pos 4. Liner to be tack welded to the shaft.
- Heat up and install 3 owner’s supplied new bearing bushes drawing LD-04-02-015 to -016. After installation, the three bearing bushes to be welded to each other. Including the supply and fabrication of the required mounting flanges, spaces and other plates. Shaft to put on lathe again and excess welds to be machined out.
- Heat up, install new owner’s supplied support ring dwg 01175-2165-500 pos 4.

Lump sum

**J.2.8.4. Renewal of liner pos 5 only of cutter top shaft.**

Drawings:
- LD-04-02-005  Cutter top shaft
- LD-04-02-007  Water flushing chamber
- IHC 01175-2165-500  Arrangement cutter drive.

Scope:
- Assume the shaft is in the workshop and has been inspected under item J2.8.2.
- Crop of the liner dwg LD-04-02-005 pos 5. Special attention to be paid not to cut in the shaft. If any damages on the shaft, this is to be repaired by build up by welding and grinding. Shaft to be cleaned and dressed up.
• Install a new owner’s supplied liner pos 5. Liner is supplied in 2 parts and is to be fully welded to each other and tack welded to the shaft.
• Shaft to put on lathe again and excess welds to be machined out.

Price per liner

J.2.8.5. Renewal of forward liner pos 2 of cutter top shaft.

Drawings:
• LD-04-02-005 Cutter top shaft
• LD-04-02-015 bearing bush pos 30 on cutter shaft
• LD-04-02-007 Water flushing chamber
• IHC 01175-2165-500 Arrangement cutter drive.

Scope:
• Assume the shaft is in the workshop and has been inspected under item J2.3.2.
• Put shaft on a lathe. Machine out the forward liner dwg LD-04-02-005 pos 2. Shaft to be cleaned, skimmed and dressed up. Machine a weld preparation chamfer at the middle liner pos 3.
• Heat up and install an owner’s supplied liner LD-04-02-015 pos 2. Including the supply and fabrication of the required mounting flanges, spaces and other plates. After installation, weld the new liner to the existing middle liner pos3
• Shaft to put on lathe again and excess welds to be machined out.

Price per shaft

J.2.8.6. Skimming of flange top shaft

• LD-04-02-005 Cutter top shaft

• Assume the top shaft is removed and on the lathe as per item J2.2
• Skim the face of the flange (diameter 800mm)
• Dress up, hone all bores of the flange holes (16 holes dia 100mm, flange thickness 140mm)

Price per flange

J.2.8.7. Skimming of flange intermediate shaft

• IHC 01175-2165-500 Arrangement cutter drive

• Assume the intermediate shaft is removed and on the lathe as per item J2.3
• Skim the face of the flange (diameter 800mm)
• Hone all bores of the flange holes (16 holes dia 100mm, flange thickness 140mm)

Price per flange

J.2.8.8. Matching of flanges of cutter top shaft and first intermediate cutter shaft in situ

Drawing:
IHC 01175-2165-500 Arrangement Cutter drive

Scope:
- Remove the 16 bolts pos 16 and the 16 bushings pos. 17
- Rehone / machine the bores in situ (allow for max. 0.5 mm on radius).
- Measure the bore and machine the OD of the oversize bushings supplied the Owner.
- Refit the bushings (H7/k6; using liquid nitrogen)

Lump sum \[ .../flange pair \]

J.2.8.9. Machining of bearing surface intermediate shaft

Drawing:
- IHC 01175-2165-500 Arrangement cutter drive
- IHC 01175-2165-540 Intermediate Shaft

Scope:
- Assume the intermediate shaft is removed and on the lathe as per item J2.3
- Machine the bearing running surface down as per owners instructions with maximum 10mm radius. Grind / polish the surface. Length bearing running surface 1000mm.
- Make a final report.
- Works include all gear, tools, auxiliary plates, and services.

Price per bearing running surface / shaft: \[ .../pc \]

J.2.8.10. Machining of undersized cutter shaft bearings shells

Drawing:
- IHC 01175-2165-500 Arrangement cutter drive
- AVD 001041-01 Cutter shaft bearing D630

Scope:
- Transport ship’s spare bearing housing as per drawing 001041-01 and undersized spare 2/2 bearing shells from ship’s store to workshop.
- Open up the top part of the bearing housing. Fit spare bearing shell in the housing, close and tighten.
- Machine out the ID of the bearing to agree diameter as per report of the repaired intermediate shaft. Machine greasing grooves and bores
- Open bearing housing, remove bearing shells and return all to ship.
- Works include all gear, tools, auxiliary plates, and services.

Price per bearing: \[ .../pc \]

J.2.8.11. Cutter shaft bore holes to be reamed

Scope:
- Assume the cutter shaft is at the yard workshop.
- Clean and calibrate bore hole prior and after the machining. Issue a report.
- Ream the bore hole Ø 100 L 140 mm, with a fixed reamer.
• Yard to foresee several fixed reamers so the job can continue on several shafts at the same time.
• Including tools, equipment and machinery.

Unit price
Lump sum.

J.2.10. Cutter gearbox.

Drawings:
• JAHNEL 1.207 848 Gearbox 2 BS 1400 So
• IHC 5242839 general arrangement cutter ladder
• IHC 5242792 superstructure cutter ladder

The gearbox is situated between ladder frames 2 ~ 4 and is accessible for the yard crane via a hatch directly above the gearbox.

Owner will advise depending on the yard their facilities if the overhaul of the gearbox can be done in situ or the gearbox has to be removed completely form the ship and forwarded to a local workshop. Yard to advise details of the available machinery / workshop for this overhaul.

The overhaul of the gearbox will be carried out under supervision of a specialist gearbox engineer arranged by the Owner.

J.2.10.1. hydraulically tighten cutter gearbox housing bolts

Drawing:
• JAHNEL 1.207 848 sheet 2 Gearbox 2 BS 1400 So

Scope:
• Gearbox is located inside the ladder, with free access around the gearbox except for some of the bolts needs removing of 4 pipe clamps, 4 cooling pipes and 3 light fencing.
• Some oil piping is running close to the bolts, but piping can’t be removed
• Hydraulically tighten the bolts of the gearbox housing according below mentioned specifications.
• M42 size to be done with torque wrench.
• M48, M56 and M64 to be done with hydraulic tensioning tool.
• Hydraulic tools & torque wrenches to be supplied by yard
• M42 (Pos. 201, 202 & Pos 203) : 56 pcs : 2650 Nm
• M48 (Pos. 89,90) : 12 pcs : 919 kN
• M56 (Pos. 82, 83, 84, 85, 86, 87) : 42pcs : 1269kN
• M64 (Pos. 80, 81, 88) : 14pcs : 1675kN

Lump sum price

J.2.10.2. cutter gearbox, complete overhaul in situ.

Drawings:
• JAHNEL 1.207 848 Gearbox 2 BS 1400 So
• JAHNEL 210521 parts list cutter gearbox
• IHC 5242839 general arrangement cutter ladder
• IHC 5242792 superstructure cutter ladder
• LD 04-02-012 Arrangement shaft sealing pos 24
• LD 04-02-022 fitting bolt for gearbox cutter drive
• LD 04-02-037 oversized bush
• LD 04-02-038 oversized bush
• LD 04-02-039 oversized bush
• LD 04-02-040 oversized bush
• LD 04-02-041 oversized bush
• LD 04-02-042 oversized bush
• LD 04-02-A006129 oversized dowel pin M56
• LD 04-02-A006130 oversized dowel pin M56
• LD 12-00-51 Packing for ladder hatch 2

The empty casing parts have following weight:
• Under part + / - 10 ton
• Middle part + / - 6 ton
• Thrust bearing casing incl. bearing, excl. shaft + / - 33 ton

Scope cutter gearbox remove / refit and overhaul:
• Assume all spares are owner supplied.
• Assume the two (2) electric motors are removed according specs S.3. and the two (2) air driven friction couplings are removed according specs J.2.10.6.
• Drain the gearbox and temporarily store the oil in a clean mobile tank.
• Remove / refit the friction coupling halves on the ingoing gearbox shafts.
• Disconnect / reconnect the gearbox from the first intermediate cutter shaft (16 bolts and fitting bushings).
• Disconnect, remove the top and middle part of the gearbox housing.
  o Under part + / - 10 ton
  o Middle part + / - 6 ton
• Open / close, assume two (2) times the hatch cover (hatch 2 / IHC 5242792). Supply new packing.
• Disassemble / assemble the gearbox. All seals and bearings will be renewed.
• Lift out / in and transport the gearbox between yard’s workshop and ship.
• Remove all roller bearings.
• Clean and recondition all parts.
• Inspect the gearbox casing, the gears (magnaflux all gear teeth) and the plain bearings.
• Clean all lub oil pipes and nozzles.
• Recondition the faces of the foundations and filling blocks under gearbox.
• Fit the new roller bearings and bearing sleeves to the ingoing and intermediate shafts.
• Tighten the bolts of the casings as per item J.2.10.1
• Include machining of oversized fitting bolts and dowel pins M56.
• Including all means like tools, consumables, permits, transports, reporting, measurements, etc.
Lump sum. … /

Additional price for owner supplied bearing sleeves in under / oversize and is to be machined to final dimensions
Sleeve 470 mm. … /
sleeve
Sleeve 680 mm. … /
sleeve

Scope cutter gearbox bearing seat inline boring
- Remove glue and packing and dress-up the mating surfaces of the gearbox casing sections.
- Assemble the 3 gearbox casing parts with all bolts pre-stressed as per item J.2.10.1.
- Yard to provide the suitable and calibrated bolt tensioning device.
- Install and align an inline boring machine, yard supplied. Submit a report to the owner.
- Machine bearing bore from
  - Dia 440 to dia 470 mm, L 160 mm
  - dia 470 to dia 490 mm, L 160 mm
  - dia 650 to dia 680 mm, L 180 mm
  - dia 680 to dia 710 mm, L 180 mm
  - dia 670 to dia 700 mm, L 195 mm
- Drill the holes (dia 30 mm) for the locking pins i.w.o. mentioned bearing bores.

Lump sum. … / one (1) boring

**J.2.10.3. Cutter gearbox, complete overhaul**

**Drawings**
- JAHNEL 1.207 848 Gearbox 2 BS 1400 So
- JAHNEL 210521 parts list cutter gearbox
- IHC 5242839 general arrangement cutter ladder
- IHC 5242792 superstucture cutter ladder
- LD 04-02-012 Arrangement shaft sealing pos 24
- LD 04-02-022 fitting bolt for gearbox cutter drive
- LD 04-02-037 oversized bush
- LD 04-02-038 oversized bush
- LD 04-02-039 oversized bush
- LD 04-02-040 oversized bush
- LD 04-02-041 oversized bush
- LD 04-02-042 oversized bush
- LD 04-02-A006129 oversized dowel pin M56
- LD 04-02-A006130 oversized dowel pin M56
- LD 12-00-51 Packing for ladder hatch 2

Total gearbox weight is 120 ton. The empty casing parts have following weight:
- Under part + / - 10 ton
Middle part +/ - 6 ton
Upper part +/ - 6 ton
Thrust bearing casing incl. bearing, excl. shaft +/ - 33 ton

Scope cutter gearbox remove / refit and overhaul:

- Assume all spares are owner supplied.
- Assume the two (2) electric motors are removed according specs S.3. and the two (2) air driven friction couplings are removed according specs J.2.10.6.
- Drain the gearbox and temporarily store the oil in a clean mobile tank.
- Remove / refit the friction coupling halves on the ingoing gearbox shafts.
- Disconnect / reconnect the gearbox from the first intermediate cutter shaft (16 bolts and fitting bushings).
- Disconnect / reconnect the gearbox from the foundation. Yard to provide the suitable and calibrated bolt tensioning device.
- Open / close, assume two (2) times the hatch cover (hatch 2 / IHC 5242792). Supply new packing.
- Lift out / in and transport the complete gearbox between yard’s workshop and ship.
- Disassemble / assemble the gearbox. All seals and bearings will be renewed.
- Remove all roller bearings.
- Clean and recondition all parts.
- Inspect the gearbox casing, the gears (magnaflux all gear teeth) and the plain bearings.
- Clean all lubrication pipes and nozzles.
- Recondition the faces of the foundations and filling blocks under gearbox.
- Fit the new roller bearings and bearing sleeves to the ingoing and intermediate shafts.
- Realign the gearbox to the cutter shaft using a laser measurement tool.
- Include machining of oversized fitting bolts and dowel pins M56.
- Including all means like tools, consumables, permits, transports, reporting, measurements, etc.

Lump sum. …/

Additional price for owner supplied bearing sleeves in under / oversize and is to be machined to final dimensions
Sleeve 470 mm. … /
sleeve
Sleeve 680 mm. … /
sleeve

Scope cutter gearbox bearing seat inline boring

- Remove glue and packing and dress-up the mating surfaces of the gearbox casing sections.
- Assemble the 3 gearbox casing parts with all bolts pre-stressed. Yard to provide the suitable and calibrated bolt tensioning device.
- Install and align the gearbox using the existing bearing bores on a CNC boring machine. Submit a report to the owner.
- Machine bearing bore from
Dia 440 to dia 470 mm, L 160 mm
Dia 470 to dia 490 mm, L 160 mm
Dia 650 to dia 680 mm, L 180 mm
Dia 680 to dia 710 mm, L 180 mm
Dia 670 to dia 700 mm, L 195 mm

- Drill the holes (dia 30 mm) for the locking pins i.w.o. mentioned bearing bores.

Lump sum. ... / one (1) boring

J.2.10.4. Friction coupling between E-motor and gearbox, in situ renewal of rubber blocks and air flex element.

Drawings:
- AVD 815.1.8316 Holset PM180 Airflex 38VC1200
- AVD 066-4-8342 Holset PM180 Airflex 38VC1200 Parts List
- AVD 086.4.7525 Airflex instructions VC 5000.

The cutter drive is equipped with 2 friction couplings between the 2 e-motors and the gearbox.

Scope:
- Remove / refit the coupling guard
- Open up the coupling – remove the 2/2 part ring pos 3.
- Renew 32 pieces rubber blocks Pos. 32 according manufacturers specifications. Blocks and silicone oil are owner supplied.
- Disconnect the outer housing of the clutch coupling from the flange hub pos 13.
- Remove/refit the 2/2 part ring in way of the air flex element pos 9.
- Disconnect / reconnect the airline pos 10 +11. Renew the Airflex element pos 9, which is owner supplied.

Lump sum. .. /coupling

J.2.10.5. Shifting of 2740 kW DC cutter motors in cutter ladder

Drawings:
- IHC 1175-2165-500 Arrangement cutter drive
- IHC 5242792 Superstructure cutter ladder
- IHC 5242839 General arrangement cutter ladder
- IHC 1175-2165-650 Chocks on cutter ladder

Specs:
- Make JEUMONT SCHNEIDER
- Type CCP 138.38.8
- Power 2740 kW
- Voltage 720 V
- Current 3995 A
- Speed 565 / 625 rpm
- Prot. IP56
Weight 18 ton / 21 tons including cooler

Scope:
- Electric motor to be shifted for access to clutch coupling.
- Open/close bolted hatches above the motors.
- Remove/reinstall fan ducts above motors.
- Disconnect / connect electric supply to fan motors.
- Disconnect / connect cooling water supply and discharge lines (3” pipes) from cooler.
- Disconnect / connect sensors. Electrically disconnect/unconnect motor.
- Disconnect / connect flexible coupling from motor.
- Remove / reinstall floor plates (bolted) from around motor
- Remove / reinstall 8 foundation bolts. M42 (2 fitting bolts/motor)
- Remove / reinstall 4 pcs sea fast chocks on motor.
- Tack weld 4 pcs steel chocks under motor.
- Lift and shift the motor and cooler in cutter ladder 1.0 meter to fore ship. (Total weight 21000 kg)
- After repairs, re-assemble and return the motor to the ship. Align, re-install the motor by use laser equipment. Check the blue fitting and grind the existing steel chocks.

Price per motor: ...

**J.2.10.6. Complete overhaul clutch couplings cutter gearbox**

Drawings:
- AVD 815-1-8316 Holset PM180 Airflex 38VC1200
- AVD 066-4-8342 Holset PM180 Airflex 38VC1200 Parts List
- AVD 086-4-7525 Airflex instructions VC 5000.

The cutter drive is equipped with 2 friction couplings between the 2 e-motors and the gearbox.

Scope:
- Assume the electric cutter motor is removed under item S3, moved forward for access under item J2.10.5 or the gearbox is dismantled under item J2.10.
- Disconnect and remove the complete clutch coupling. All parts accept the hubs to be disconnected and removed. Transport all to workshop.
- Dismantle the clutch coupling. Clean, dress up all parts. Measure all parts and make a report.
- Re-assemble with new owner supplied parts, inner member if needed, new rubber blocks, new air flex element, new bearing and seals.
- Return to ship and re-install coupling parts on the hubs.

Lump sum. ...

**J.2.10.7 Overhaul of cutter turning device coupling**

Drawing:
- Jahnel 2.1.210 169 X Spare parts drawing turning gear cutter gearbox
Scope:
- This gearbox is mounted on top of the cutter gearbox and is used as a turning device for the cutter gearbox.
- Open up / close main hatch cover of cutter ladder.
- Disconnect / connect fan ducts
- Disconnect / connect electric motor 25 kW from gearbox.
- Disconnect engage able tooth coupling between gearbox and cutter gearbox. (see drawing 2)
- Remove the whole gearbox to the workshop and recondition hub of tooth coupling.
- Remove also the pinion shaft (pos. 25 drawing nr. 2) with the other half of the tooth coupling and take to workshop.
- Remove/reinstall coupling half.
- Reassemble everything with owner supplied new parts.

J.2.11. Alignment measurement cutter shaft bearings.

Scope:
- Assume the ladder is hanging in the hoisting wire with safety pins out, but 200m above the supports.
- Assume the bulkhead penetration is removed under item J2.4.
- Assume the cutter shafts, the bearing shells and cutter top shaft bearing are removed under item J2.2 & J2.3.
- Refit bearing shells and upper bearing housing during the measurement. Remove afterwards.
- Measure the alignment of the three bearing in reference to the cutter gearbox and cutter end bearing. Laser equipment to be used to ensure accuracy of 0.02mm.
- Install the laser in the centre of the outgoing shaft of the cutter gearbox and align the laser line to the centre of the cutter top shaft bearing housing. Measure the distances of the laser line to the top, bottom, two sides of the ID of the bearings at the forward and aft position.
- Make a report.
- After correction of the bearings if needed, final measurement to be carried out again.

Lump sum price for 2 measurements: .../
J.2.12. Correction alignment of cutter drive bearing.

Drawing:
- IHC 01175-2165-500 Arrangement Cutter drive
- AVD 001041-01 Cuttershaft bearing D630

Scope
- Assume the alignment of the cutter shaft bearings were checked and found not within owner’s tolerance.
- Correct the alignment of the bearing housing. Remove the fitting bolts. Supply and install jack-up bolts. Adjust the height and tilt of the bearing housing by removing or supplying / installing shim plates. Reconnect the bearing housing to the foundation and re-check the alignment.
- Re-install the bearing shells.

Price per cutter drive bearing: ...
Additional price to fabricate, blue fit, install a new steel chock: ...


Drawing:
- IHC 01175-2165-500 Arrangement Cutter drive
- AVD 001041-01 Cuttershaft bearing D630
- AVD 431-1-8293 Sh01/Sh02 Bearing assembly Ø630/Ø624
- LD 04-02-008 SH01/03 2/2 set of bearing shells Ø630/Ø624

Scope
- Assume all intermediate bearings have been opened, cutter shafts and bearing shells have been removed under previous spec-items.
- 3 types of measurement possible
  - Measuring of bearing housing without shells
    Install top part of the housing, tighten bolts M56 to the required torque, measure the supporting area’s (Ø710 – 2 x 6 measurements) and make a report. Open up the bearing again.
  - Measuring of new shells
    Install new shells (Owner’s supply) and top part of the housing, tighten bolts M56 to the required torque, measure the shell ID (Ø630 or Ø624 - 2 x 6 measurements) and make a report. Open up the bearing again and return the shells.
  - Measuring of used shells
    Same measurement as with new shells but measure thickness of the used shells on same locations as the ID measurements

All in situ on the cutter ladder together with Owner’s representative.

Price for measuring of bearing housing without shells ..../pc
Price for measuring of new shells ..../pc
Price for measuring of used shells ..../pc

Drawings:
- AVD 001010-01A: Revision D=630 bearing housing
- AVD 001010-02: Revision D=630 bearing housing procedure
- AVD 001041-01: Cutter shaft bearing D=630
- Template 4 – Measurement report intermediate bearing housing

Scope:
- Assume bearings measured as per J.2.13. and found out of tolerance
- Remove/refit fitting bolts
- Transport bearing housing to/from the workshop/vessel
- Remove / refit the top cover
- Clean + sand blast complete bearing housing
- Paint outer areas with shop primer *(Don’t paint the carrying surfaces for the bearing shells!!)*
- Follow machining procedure (AVD 001010-02 and drawing AVD 001010-01A; the numbering on this drawing corresponds to the numbering below)
  1. Dismantle upper and lower casing
  2. Skim the split mounting surface (remove as less material as possible!)
  3. Skim bottom mounting surface (remove as less material as possible!)
  4. Box up the bearing housing; bolts and nuts not tightened to pre-stressed tension
  5. Machine the boring to Ø 717 mm
     (Middle part not to be machined)
  6. Dismantle upper and lower casing
  7. Degrease the boring
  8. Mask the middle part and fitting surfaces
  9. Spray the boring with stainless steel + aluminium / bronze
 10. Box up the bearing housing
 11. Machining boring to Ø 710 H7
     with centre at 530 mm from the bottom mounting surface
 12. Dismantle upper and lower casing
 13. Clean up the holes for the grease nipples and the temperature probe
 14. Drill out the locking pens
 15. Grind smooth of excessive edges.
- Conserve the machined surfaces to protect against rust formation
- Touch-up painting of the damaged areas on the outer surface with shop primer
- Extra 2 layer paint on the outer surface as per paint specifications of the cutter ladder. (Paint is owner supply)

Lump sum per bearing house: …/
J.3. Cutter ladder hoisting blocks

J.3.1 Three sheaves tackle block on ladder (PS and SB)
Drawing:
- IHC 01175-0343-020 Scheme Hoisting wires of cutter ladder
- IHC 5474720 Arrangement 3 sheaves Tackle Block
- IHC 5826639 List Of Parts: Instruction Drawing and Arr. of Mounting Tools
- IHC 5826701 List of parts
- IHC 5474733 Instruction drawing and arr. of tools of ladder hoisting sheaves

Scope:
- Assume ladder is sea fastened by the vessel's crew, and that the hoisting wire is slackened.
- Disconnect / connect grease lines.
- Dismantle the complete tackle block using owner supplied mounting shaft as described in drwg. 5474733. Yard is to supply preheating, jacks and (dis) mounting tools, plates, pins as seems fit.
- Transport the sheaves, shafts and covers to the workshop.
- Clean, degrease and dress up all parts in the workshop.
- Build up with owner's supplied parts (bearings, seals and bolts).
- Grit blast SA 2 1/2 the sheaves and paint them with 3 coats owner's supplied paint.
- Reassemble sheave block on the ladder checking / adjusting all required clearances.

Lump sum: ...

J.3.2 Two - Sheave hoisting block in ladder gantry (PS and SB)
Drawing:
- IHC 01175-0343-020 Scheme Hoisting wires of cutter ladder
- IHC 5474721 Arrangement 2 sheaves Tackle Block
- IHC 5826640 List Of Parts: Instruction Drawing and Arr. of Mounting Tools
- IHC 5826701 List of parts
- IHC 5474733 Instruction drawing and arr of tools of ladder hoisting sheaves

Scope:
- Assume ladder is sea fastened by the vessel's crew, and that the hoisting wire is slackened, and should be temporarily suspended in ladder gantry.
- Disconnect / connect grease lines.
- Dismantle the complete tackle block using owner supplied mounting shaft as described in drwg. 5474733. Yard is to supply preheating, jacks and (dis) mounting tools, plates, pins as seems fit.
- Transport the sheaves, shafts and covers to the workshop.
- Clean, degrease and dress up all parts in the workshop.
- Build up with owner's supplied parts (bearings, seals and bolts).
- Grit blast SA 2 1/2 the sheaves and paint them with 3 coats owner's supplied paint.
- Reassemble sheave block in the ladder gantry checking / adjusting all required clearances.

Lump sum:

**J.3.3. One - Sheave hoisting block renewal (8 in total)**

**Drawing:**
- IHC 01175-0343-020 Scheme Hoisting wires of cutter ladder
- IHC 5474722 Arrangement 1 sheave Tackle Block
- IHC 5826641 List Of Parts : Instruction Drawing and Arr of Mounting Tools
- IHC 5474733 Instruction drawing and arr. of tools of ladder hoisting sheaves

**Scope:**
- The one sheave tackle blocks are fitted on four locations:
  - In the ladder gantry (2 pcs)
  - On the crane deck (2 pcs)
  - On the swell compensators (2pcs)
  - In the propulsion rooms (2 pcs)
- Assume ladder is sea fastened by the vessel's crew, and that the hoisting wire is slacked, and should be temporarily suspended in ladder gantry, ore in case of the swell compensator, lifted out of the sheave box on the swell compensator.
- Disconnect / connect grease lines.
- Dismantle the complete tackle block using owner supplied mounting shaft as described in drwg. 5474733. Yard is to supply preheating, jacks and (dis) mounting tools, plates, pins as seems fit.
- Transport the sheaves, shafts and covers to the workshop
- Clean, degrease and dress up all parts in the workshop.
- Build up with owner's supplied parts (bearings, seals and bolts).
- Grit blast SA 2 1/2 the sheaves and paint them with 3 coats owner's supplied paint.

Lump sum:

... / ladder gantry sheave
... / sheave on crane deck
... / sheave on swell compensator
... / sheave in propulsion room

**J.3.5. Renew rod seals of ladder swell compensator cylinders in situ.**

**Drawing**
- IHC 01175-0434-020 Scheme Hoisting wires of cutter ladder
- Bauer 82.6309 Decio cylinder ladder wire
- IHC 01175-2852-010 A Arrangement swell compensator cutter ladder
- IHC 5474885 Sheave box for Swell compensator

Scope:
- Erect staging around top of cylinder.
- Remove the ladder wire from the sheave box and put aside.
- Remove / reinstall sheave box from cylinder
- Dismantle the top of the cylinder. Clean dress up all parts.
- Reassemble using owner supplied parts according manufacturers instructions.

- Lump sum: ... / cylinder

J.3.6. Overhaul of ladder swell compensator in the workshop

Drawing:
- Bauer 82.6309 Decio cylinder ladder wire
- IHC 01175-2852-010 A Arrangement swell compensator cutter ladder
- IHC 5474885 Sheave box for Swell compensator

Scope:
- Erect staging around top of cylinder.
- Remove the ladder wire from the sheave box.
- Disconnect & blank off the hydraulic connections
- Remove / refit the platform in way for access.
- Disconnect the cylinder from the foundation, lift and transport to the workshop
- Remove / reinstall sheave box from cylinder
- Dismantle the cylinder complete. Clean dress up all parts.
- Make a report
- Reassemble the cylinder owner supplied new rod and parts according manufacturers instructions.
- Pressure test the cylinder to 250 bars in the workshop.
- Repair the damaged paint system; de-rust to ST3 + 3 layers ship’s supplied paint.
- Return, re-install & reconnect the cylinder.
- Refit the steel wire.

- Price per swell compensator: .../

J.3.7. Overhaul balance block in cutter ladder gantry

Drawing:
- IHC 01175-0343-020 Scheme Hoisting wires of cutter ladder
- IHC 5474953 Arrangement Balance block
- IHC 5474898 Balance block
- IHC 5474722 Arrangement 1 sheave Tackle Block
- IHC 5826641 List Of Parts : Instruction Drawing and Arr of Mounting Tools
- IHC 5474733 Instruction drawing and arr. of tools of ladder hoisting sheaves

Scope:
• The balance block dwg 01175-0343-020 pos 2, hanging in top of the ladder gantry is to be removed and overhauled.
• Erect a hanging staging under the ladder gantry: l*w*h= 6x4x4m
• Assume that the ladder hoisting wire has been removed by the crew
• Fit, weld, test sufficient eye plates under the ladder gantry to attach yard’s chain hoists
• Disconnect / connect grease lines.
• Remove the pins dwg 5474953 pos 205. Assume pins are to be removed by hydraulic jacking. Supplying, fitting, welding of temporary push brackets and other tools are to be included. If required, cropping of the pins is included.
• Disconnect and lower the balance block, transport to workshop.
• Dismantle the balance block, remove sheaves & bushes. Owner is supplying mounting shaft as described in drwg. 5474733. Yard is to supply preheating, jacks and (dis) mounting tools, plates, pins as seems fit.
• Clean, degrease and dress up all parts in the workshop.
• Measure all parts and make a report
• Re-assemble all with owner’s supplied parts (bearings, bushes, pins, sheaves, seals
• Return the balance block to ship and re-install.
• Repair the paint system by ST3 and 3 layers full coat paint. Sheave to be painted black / yellow.

• Lump sum price: ....
J.4. Side wire fairlead arrangement

J.4.1. Remove / re-install side wire fairlead on the ladder.

Drawing
- IHC 5474706: Arrangement adjusting fairlead
- IHC 5242761: Supports adjusting fairlead
- IHC 5474705: Sheave support for fairlead
- LD 09-00-A009319: collar bush for fairlead OD540 / 420 x ID 380
- IHC 5826579: collar bush OD410/320 x ID280 L=238

Scope:
- Assume the side wire is removed from the sheave block. (ship’s crew)
- Erect a hanging staging, l*w*h=5x3x3m
- Crop off protection plates in way of the grease lines : 2 x 400x500x15 mm
- Disconnect/uonnect all greasing lines and dress up the couplings.
- Supply, fit, weld and NDT temporary lifting lugs. Remove and grind afterwards.
- Remove the complete sheave block by removing the loose support Pos. 423 and then sliding the sheave block out of the fixed support dwg 5474706 Pos. 427 (Total weight of sheave Blok 9.4ton).
- Clean and degrease the bores in the loose and fixed bearing pedestals.
- Renew the bushes pos 425 and 428, owner's supply. Include the machining of the oversize and sub size on journal and oversize on flange to final dimensions (LD 09-00-A009319 – IHC 826579).
- Transport/handling the sheave block to/from the workshop.
- Re-install a spare or overhauled sheave block. Re-connect grease lines.
  Supply, fit and weld protection plates in way of the grease lines : 2 x 400x500x15 mm

Lump sum: .../block

J.4.2. Overhaul side wire fairlead in workshop

Drawing
- IHC 5474706: Arrangement adjusting fairlead
- IHC 5474705: Sheave support for fairlead
- IHC LD-09-00-018: Arrangement dimensions bearings

Scope:
- Assume sheave block is in your workshop under item J4.1.
- Dismantle the complete side wire sheave into basic parts, clean, dress up and inspect all parts accordingly. Incl. removal of welded sheave guard prior by gas cutting.
- Provide staging for access. Clean, measure up all parts and make a report.
- Machine, skim faces and bore, tapholes including mounting plates.
- Dye check the weld of the shafts to the housing.
- Machine owner’s supplied over/undersized bronze bearings sleeves to size.
- Reassemble with owner supplied parts; seals, pins, bearings and bushes.
• Renew the grease pipings, stainless steel 10mm x 5.0m, 20 bends and 10 heavy duty pipe supports
• Adjust clearances according drwg. LDV 9-00-18 by machining owner supplied support rings
• Grit blast SA2.5 and paint the sheave housing with 3 coats owner supplied paint.

Lump sum: ... / sheave

**J.4.3. Special repairs to side wire fairlead**

**Drawing**
- IHC 5474705 Sheave support for fairlead.

**J.4.3.1 Replace swivel shafts of side wire fairlead**

**Scope:**
- Assume sheave block has been completely stripped in your workshop under J.4.2. and sheave has been removed.
- Set up the complete sheave block on machine. (9.4 ton)
- Remove 1 no. solid pin (Pos. 426) and 1 no. hollow pin Pos. 429 from the sheave block by machining.
- Build up by welding and machine the bores in the sheave housing to size for the solid and hollow pin.
- Clean owners supplied new pins and shrink fit them in the machined bores of the side wire sheave housing.
- Weld the outside diameter of the pins to the housing. Carry out dye-check, final measurements and report.
- Remove excess welding around the pins, as per drawing by grinding.

Lump sum: ... / sheave block

**J.4.3.2 Repairs bore of sheave housing**

**Scope:**
- Assume that the sheave housing is dismantled under item J4.2.
- Assume the bore of the sheave pin is worn out 2 mm.
- Build up the two bore and machine to the nominal size of 355D10 mm.

Lump sum: ... / sheave housing

**J.4.3.3 Welding & machining of pins & faces**

**Drawing**
- IHC 5875926 Hollow shaft
- IHC 5875925 Massive shaft
- Pictures J4.3.3

**Scope:**
- Assume that the sheave housing is dismantled under item J4.2.
Assume the hollow & massive pin (pos 429 & 426) are worn (max 5 mm on diameter) : to be corrected by welding & machining the shafts.

Assume the total width of the sheave housing (2138 mm) is worn (max 12 mm) : to be corrected by welding and machining the pin holding plates (pos 456 & pos 457).

All welding & machining without the removal of pins and plates and alignment (pins concentric and plate surfaces perpendicular) ensured by machining in 1 setting (rotary table). See also pictures J4.3.3.

Lump sum : ... / sheave housing

J.4.4. available

J.4.5. available (shifted under J4.3.3)

J.4.6. Renewing of side walking sheave on ladder (dia 1250 mm)

Drawing
- IHC 5242763 Foundation for walking sheave
- IHC 5826589 Shaft for walking sheave

Scope:
- Lift off the wire from the sheave and put aside. Wire will be slacked by ships crew
- Disconnect/ connect locking plate from shaft.
- Slide shaft sideways, just enough to allow passage of the sheave.
- Suspend the sheave in a crane and slide it from the shaft. (Ships crane cannot be used)
- Install new owner supplied sheave fitted with new bush onto the shaft.

Lump sum : ... / sheave

J.4.7. Repair of walking sheave (dia 1400 mm / width 350 / 64 mm wire)

Drawing
- IHC 5826588 Sheave

Scope:
- Apart from bore diameter and the fact that this sheave is fitted with a bronze bushing in stead of ball bearings, the profile of this sheave is identical to the side wire sheave.
- Assume sheave is in your workshop.

J.4.7.1 Measurement walking sheave
- Take following measurements :
- ID of the bush (2 x 3 measurements)
- Radius of the running surface of the steel wire (6 measurements)
- Outside diameter of the sheave (2 x 3 measurements)
- Groove angle (6 locations)
- If necessary for the above, sheave to be installed on a lathe and included in the price.
- Price per sheave ……/ sheave

**J.4.7.2 Bush renewal walking sheave**
- Assume that the measurement has been carried out as per J4.7.1 and only the bush has to be renewed
- Remove the bronze bush: not by cold high pressure pushing but by heating, cooling, gauging or machining (as per preference of the Yard) and smooth removal afterwards.
- Measure the diameter of the bore
- Machine the oversized bush to size, shrink fit the bush in the bore of the housing
- Grit blast SA2.5 and paint the sheave with 3 layers ship’s supplied paint
- Price per sheave ……/ sheave

**J.4.7.3 Welding repair of walking sheave**
- Assume that the measurement has been carried out as per J4.7.1 and running surface of the wire has to be repaired by welding & machining.
- Undercut the profile of the sheave on a lathe.
- Remove the bronze bush: not by cold high pressure pushing but by heating, cooling, gauging or machining (as per preference of the Yard) and smooth removal afterwards.
- Rebuild the sheave profile using proper wire and performing the heat treatment to the required hardness and depth. Assume profile has worn out 15 mm at bottom and 5 mm on the sides.
- Machining of the full running surface after welding.
- Measure the diameter of the bore – normally the bore will shrink a few 0.1’s.
- Machine the bore within the tolerance mentioned on drawing.
- Machine the oversized bush to size, shrink fit the bush in the bore of the housing
- Grit blast SA2.5 and paint the sheave with 3 layers ship’s supplied paint
- Price per sheave ……/ sheave
**J.5. Underwater pump**

**J.5.1. underwater pump cover shaft side remove / refit.**

*Drawings:*
- IHC 5242839 General arrangement cutter ladder
- IHC 5242479 Arrangement submerged dredgepump drive
- IHC 01175-2120-600 Dredge pump drive
- LD 02-03-005 pump cover, shaft side

*Scope:*
- Assume all spares owner supplied.
- Assume the suction cover, impeller, pump housing and shaft seal arrangement (pos 114, 103, 101, 113, 132, 142 up to 150 / IHC 5242479) of the underwater pump have been removed by the crew or by the yard according specs J.5.13.
- Disconnect the cover shaft side (pos 128) from the steel construction cutter ladder (pos 112) and bearing foundation (pos 515). Bolts (pos 139, 159) and 4 fitting bolts (pos 158) to be removed.
- Install a new owner’s supplied suction cover. Align the centre of the cover to the pump shaft. Ream the 4 holes, machine & install new fitting bolts (pos 158). Install all bolts and tighten under prescribed torque.
- Including all means like, tools, permits, temporary lights and ventilations, consumables, transports between ladder and workshops, reporting, torque wrench, etc.

- Lump sum price for suction cover: …./

**J.5.2. Underwater pump bearing block remove / refit**

*Drawing:
- IHC 5242839 General arrangement cutter ladder
- IHC 5242479 Arrangement submerged (ladder) pump
- IHC 01175-2120-600 Dredge pump drive
- LD 03-04-003 arrangement pump shaft bearing – WA360 – left hand thread
- JDN LD 03-04-A005503 ½ adjusting ring, set

The bearing block is installed in the dredge pump drive recess of the ladder, between frames 11 and 13 (IHC 5242839). Bearing block weighs 4500 kg, length 2.6 m, diameter 0.785 m.

*Scope:*
- Assume all spares are owner supplied.
- Assume the suction cover, impeller, pump housing and shaft seal arrangement (pos 114, 103, 101, 113, 132, 142 up to 150 / IHC 5242479) of the underwater pump have been removed by the crew or by the yard according specs J.5.13.
- Assume the intermediate shaft and gear coupling (pos 4 / IHC 01175-2120-600) has been removed according specifications J.5.5.1.
- Remove all gratings above the underwater pump bearing block.
• Remove / refit the M42 bolts (pos 631 / IHC 5242479) and tighten to 2400 NM torque.
• Remove / refit the bearing block complete (= with shaft) and transport to the workshop for safe storage. Clean-up the shaft journals and conserve. Upon installation align the bearing block, including machining of adjusting ring (JDN LD 03-04-A005503) for axial locking of the bearing (pos 643 / IHC 5242479).
• Remove new / sea fasten old bearing block in / from owner’s container stored at the yard.
• Dress-up and the clean the bearing pedestal. Coating repair after power wire brushing according specs F. Ladder.
• Including all means like, tools, permits, temporary lights and ventilations, consumables, transports between ladder and workshops, reporting, torque wrench, crane, lifting gear, etc.

Lump sum price for bearing block.

J.5.3. Overhaul bearing block in the workshop.

Drawing:
• IHC 5242839 General arrangement cutter ladder
• IHC 5242479 Arrangement submerged dredge pump drive
• IHC 01175-2120-600 Dredge pump drive
• LD03-04-003 arrangement pump shaft bearing – WA360 – left hand thread

Scope:
• Assume the bearing block underwater pump is removed under item J5.2.
• Dismantle the bearing block, remove shaft and bearings.
• Clean, dress up and measure all parts. Make a report.
• Re-assemble the bearing block with owner’s supplied new bearings and seals.

Lump sum price for bearing block.

J.5.4. In situ renewal of shaft seals under water pump bearing block

Drawing:
• IHC 5242839 General arrangement cutter ladder
• IHC 5242479 Arrangement submerged ladder pump
• IHC 01175-2120-600 Dredge pump drive

Scope:
• Assume that pump cover suction side, the impeller and shaft seal arrangement of the underwater pump are removed by the crew: items pos 114, 103, 101, 113, 132 & 142 up to 150 of drawing 5242479.
• Assume that the gear coupling and inner hub are removed as per item J5.5.1 & J5.5.5.
• Erect a hanging staging inside the pump casing: l*w*h = 4x1x1m
• Remove the end covers of the bearing block at both sides and dismantle the seal assemblies in situ.
Clean, dress up and measure all parts. Make a report.
Remove the bushes in way of the shaft seals. Assume old bushes are cropped off or removed by hydraulic jacking.
Re-assemble and re-install both end covers with owner’s supplied new seals and bushes.

Lump sum price.

**J.5.5. Overhaul of gear coupling underwater pump**

**Drawing:**
- IHC 01175-2120-600 Arrangement Submerged Dredge pump Drive.
- IHC 01175-2120-660 Intermediate pipe
- IHC 01175-2120-670 Arrangement Tooth Coupling with Intermediate Pipe
- JAHNEL VS 32 / 4377 Arrangement tooth Coupling Type : JZVS32

**J.5.5.1. Removal of intermediate shaft and coupling hubs.**
- Job to be carried out in dry-docks or afloat with ladder raised in the sea fast position.
- Drain the oil in both coupling halves (25 ltr. Total)
- Remove / reinstall 36 pcs (oversized – M36) bolts dwg 01175-2120-670 pos. 1. Clean, dress up all bolts and bolt holes. Measure bores and make a report.
- Fit, weld, NDT temporary lifting lugs. Remove and grind afterwards.
- Lower down / lift up the intermediate shaft pos.5.
- Remove the gear hubs dwg VS32/4377 pos 3. Transport to / from workshop. Clean, dress up the gear teeth. Measure the gear teeth & -clearance. Put all parts on lathe and skim all surfaces in way of the O-ring seals.
- Re-assemble the gear coupling and intermediate shaft with ship’s supplied new seals and other parts. Apply liquefied packing material on the covers.

Lump sum price.

**J.5.5.2. Transport intermediate shaft to / from workshop.**
- Assume the intermediate shaft 01175-2120-670 pos 5 has been removed under item J5.5.1.
- Transport shaft to / from workshop.
- Put shaft on lathe, skim face of both flanges and in way of the seals. Measure straightness and make a report.
- Dye-check neck of the flanges.

Lump sum price.

**J.5.5.3. Renewal flange intermediate shaft**
- Assume the intermediate shaft 01175-2120-670 pos 5 is in the workshop
- Crop off and renew flange pos 1A or 1B. Including supplying, fabricating, boring, reaming holes, fitting, welding and final machining after welding.
J.5.5.4. Grit blasting intermediate shaft
- Assume the intermediate shaft pos 5 is in the workshop under J5.5.2
- Cover the faces of the flanges by cardboard.
- Grit blast the complete shaft to SA2 ½ and paint with three layers of ship’s supplied paint.

Lump sum price.

J.5.5.5. Removal of inner part gear coupling
- Assume the intermediate shaft 01175-2120-670 pos 5 & gear hubs dwg VS 32/4377 pos 3 are removed as per item J5.5.1.
- Heat up the inner part gear coupling dwg 01172-2120-670 pos 2 by electrical or induction heating. Fabricate special tools and pull off the inner part by jacks in situ.
- Transport inner part gear to / from workshop. Dress up bore and shaft. Measure diameters and shaft. Put inner part on lathe to skim the area’s in way of oil seals.
- Re-install the inner part gear coupling or install a ship’s new supplied part. Including transports, electrical heating, specials tools and jacks.

Price per inner part gear coupling:

J.5.5.6. Reaming holes gear coupling hub
- Assume the hub of coupling dwg VS 32/4377 pos 3 is removed under J5.5.1. and needs to be renewed by ship’s supplied spare.
- The new hub is supplied with nominal flange holes of 32H7. The 36 boltholes are to be enlarged and reamed matching the actual diameter of 36mm. Including supply of special tools and reamers.
- Machine the owner’s supplied bolts to size.

Price per coupling hub:

J.5.6. Overhaul bulkhead penetration

Drawing:
- IHC 1175-2120-690 Arrangement Bearing block dredgepump pump drive
- IHC 1175-2120-600 Arrangement Submerged Dredge pump Drive.
- IHC 1175-2120-620 Rope Guard Bulkhead penetration UWP Drive
- IHC 5473788 Supreme Type 355 Arrangement for shaft ladder
- IHC 1175-2120-670 Arrangement Tooth Coupling with Interm. pipe

Scope:
- Assume that the intermediate shaft of the gear coupling is removed under J5.5.
- Dismantle / Reinstall the Rope Guard (pos. 18, Drwg. 1175-2120-600) from over the sealing arrangement. Clean, Dress up all parts.
• Remove the coupling Sleeve pos. 4 and Hub pos. 2 (Drwg. VS 32/4377) from Intermediate shaft. Clean Dress up all parts. Measure the gear clearance. Make a report.
• Dismantle the sealing Device Supreme Type 355 from the intermediate shaft according to manufacturer’s instructions in situ. Remove all parts and transport to the workshop. Clean, dress up and measure all parts. Make a report.
• Re-assemble the shaft seal with ship’s supplied new seals and parts. Align the bulkhead seal casing and liner to the gear shaft
• Re-install the coupling sleeve and hub with ship’s supplied seals.
• De-rust the damaged paint in way to ST3 and paint with 3 layers ship’s supplied paint.

Lump sum price

J.5.7. Overhaul of intermediate shaft underwater pump drive.

Drawing:
• IHC 1175-2120-600 Arrangement Submerged Dredge pump Drive.
• IHC 1175-2120-630 Intermediate Shaft
• IHC 1175-2120-700 Bearing bush.
• IHC 5826554 Shaft Coupling Flange
• 1/7973/1017/0 : LRZ 320 Shaft bearing

Scope:
• Assume that the gear coupling and bulkhead penetration is removed under J5.5 & J5.6.
• Disconnect / reconnect oil pipes to / from the bearing. Disconnect / reconnect the temperature sensor. Dismantle the upper part of shaft bearing.
• Remove / refit the shaft protection plates
• Disconnect, remove the electrical turning device – put aside for access. Remove / refit the 2/2 gearwheel of the turning device.
• Dismantle Coupling Flange (pos. 12 , Drwg. 1175-2120-600)
• Carefully remove the intermediate shaft with both bearing bushes. Put protection over running surface of shaft in between the two bearing bushes. Transport / to from workshop.
• Remove the lower bearing shell, transport all bearings parts to the workshop. Clean, dress up and measure all parts.
• Clean, dress up and measure the shaft. Put the shaft on lathe – measure straightness. Skim the shaft in way of the seals gear couplings hubs.
• Make a report.
• Renew the sleeves dwg 1175-2120-600 pos 5 by ship’s spare
• Return, re-assemble and re-install the shaft and bearing. Re-install the turning device.

Lump sum

J.5.8. Overhaul Gearbox of Submerged Dredge pump

Drawing:
- AVD 816.1.8264.AVD Arrangement Drawing
- IHC 5242839 general arrangement cutter ladder
- IHC 5242792 superstructure cutter ladder
- JAHNEL 1.0.207 896a.JaKe Dimension Drawing Jahnel-Kestermann
- JAHNEL 1.1.208118 X.JaKE Parts Drawing
- JAHNEL 209465.JaKe Partslist
- IHC 1175-2120-600 Arrangement Submerged Dredge pump Drive.
- IHC 582.6554 Flange Coupling
- KRACHT 3105317-1 KF5 lub oil pump
- KRACHT P.005317-1 KF5 lub oil pump parts list
- LD 12-00-52 packing for ladder hatch 1

Scope:
- Assume intermediate shafts pos. 4 and 10. (Drwg. 1175-2120-600) have been removed as per item J.5.5. & J.5.7.
- Open close hatch cover on ladder (hatch 1 / IHC 5242792). Supll new packing.
- Drain / Refill the gearbox and temporarily store the oil in a clean mobile tank.
- Remove / Reinstall protective cover from over Flange pos. 12 (Drwg. 1175-2120-600) and intermediate shaft pos. 10
- Disconnect / connect all electric connections and lub oil and cooling water piping.
- Disconnect / connect Lub Oil cooler and filters.
- Disconnect / connect Shaft coupling flange pos. 12. Remove / Reinstall 10 pcs fitting bolts M37. Clean dress up bolts and bolt holes in both flanges. (Already disconnected in conjunction with job. Q7)
- Disconnect / connect all bearing covers pos. 6, 7, 8 and 9.
- Measure up the clearances of all bearings in the bearing housings.
- Remove / Reinstall upper casing pos. 3 of gearbox.
- Remove / Reinstall Outgoing shaft complete with bearings, gear and coupling halve. Take to / from Workshop from / to Ship.
- Remove / Reinstall middle part of casing pos. 2
- Disconnect / reconnect the flange pos. 3 from the pneumatic HOLSET AIRFLEX couplings by removing the 12pcs bolt M24 pos. 35 and the 6 pcs of dowel bushes pos. 11. Disconnect / Reconnect the air supply.
- Remove / Reinstall Ingoing shaft complete with bearings, gear and coupling flange. Take to / from Workshop from / to Ship.
- In the workshop, remove both coupling halves and all roller bearings from the shafts. Three (3) bearings have bushes installed (pos 652, 672, 682 / JAHNEL 1.1.208118).
- Remove and inspect the gear Pos 14 from the shaft pos. 15.
- Clean and measure up the shafts and the gear.
- Magnaflux test the gears and the shafts in way of keyways and teeth.
- Clean all lub oil pipes and nozzles.
- Clean the lub oil pump.
- Remove / refit, dismantle, clean and reassemble the oil cooler.
- Renew the oil pump KRACHT KF5. (Owner supplied.)
• Clean and dress up the flange faces of the gearbox casing parts.
• Assemble the 3 gearbox casing parts with all bolts pre-stressed according to manufacturers specifications.
• Align the gearbox parts using the existing bearing bores.
• Measure up all bearing bores and issue a report.
• Remove again the Top and Middle parts of the gearbox.
• Reassemble all shafts and gears with owner supplied new bearings, bearing bushes and seals. Shrink fit the bushes over the bearings, lock the bushes with dowel pins dia 20 mm in the bearing pockets.
• Reinstall the shafts in the gearbox, close the gearbox, and reconnect all couplings, piping, coolers and electric cabling.
• Touch up the epoxy coating of the gearbox (SIGMA CM coating), incl. scraping and degreasing - paint of Owner’s supply.
• Test run the gearbox with load and check the contact of the teeth. Use owner supplied lay-out liquid.

Lump sum ...

**J.5.9. Fabrication and fitting of foundation bolt of UWP gearbox**

**Drawing:**
- IHC 1175-2120-600 Arrangement Submerged Dredge pump Drive.

**Scope:**
- Reaming of one hole dia. 46 H7 and Fabricate + machine to size one fitting bolt M42 x 4 (Mat : 34CrNiMo6V)
- Fabricate a fitting bolt for the foundation bolt of the gearbox UWP.

**Price per bolt :** ...

**J.5.10. Renew inner member of Holset flexible coupling of UWP e-motor.**

**Drawing:**
- AVD 816.1.8264.AVD Arrangement Drawing
- AVD 062.4.8265.AVD Parts List
- IHC 01175-2120-600 Arr. submerged dredgepumpdrive.

**Scope:**
- Assume the electric motor is removed under item S or the ingoing shaft with flange pos 3 of the gearbox is removed under item J5.8.
- Dismantle the complete coupling.
- Remove the Inner member pos. 21 (Star piece) from the shaft of the e-motor by loosening the bolts of the clamping ring pos. 73, and heating the star piece.
- Clean and dress up the shaft. Make measurement report of the shaft.
- Reinstall new Inner Member pos.21 with new clamping ring on the shaft. (Owner Supplied)
- Reassemble the complete coupling with ship’s supplied new bearings and seals.
• Special care to be taken when reassembling the clamping ring that bolts are tightened evenly!! To be carried out under the guidance of Chief Engineer.
• When installing rubber blocks pos. 23, plenty Silicone Oil to be applied on the blocks. Install the rubber blocks according Manufacturers specifications.

Lump sum: ... /

Additional price for shifting electric motor
• Disconnect cooling water pipes from the electric motor
• Open/closed the hatch cover above the electric motor for lifting purposes
• E-motor 2740KW + air cooler (21 ton) to be disconnected from its foundation and pulled back. Motor is standing on steel chocks and fixed with four foundation bolts. Steel chocks to be tack welded to foundation. All sea fast wedges to be marked, removed and afterwards reinstalled. All electric cables to motor can remain attached to motor. (For lifting of motor, it is possible to remove cover above motor on cutter ladder engine room)
• After overhaul of compling, return and reconnect the Electric motor

Lump sum: ... /

J.5.11. Removal and cleaning of air/water cooler of electric motor

Drawing:
• JEUMONT- SCHNEIDER 1CA0564 CJ General Arrangement

Scope:
• Open/close the hatch directly above the motor allows access
• Disconnect/connect electric cable to the pressure sensor & and leak detector.
• Disconnect/connect suction side ducting from motor and cooler.
• Disconnect the cooler element from the fan housing. Transport to/from workshop
• Clean the cooler at air and water side in an ultrasonic cleaning bath.
• Re-install the cleaned or a ship’s supplied new cooler element with new ship’s supplied gaskets.

Price per cooler .... /

J.5.12. Reconditioning of suction cover underwater pump

LD-02-03-001 Suction side cover

• Assume that the pump cover dwg 5242479 pos 144 is removed by the ship’s crew. Transport the pump cover to/from the workshop
• The wear plates dwg 5242479 pos 113 & 129 are to be removed. Wear plates and pump cover to be cleaned and bolt holes to be dress up.
• Assume the pump cover is worn several location as indicated on the drawing LD-02-03-001:
  o at the machined diameter of 1930
  o at the machined diameter 2201 & 2229, including part of the O-ring groove.
  o The inner diameter 970
• All worn area’s to be building up by welding and the pump cover to be machined to nominal sizes.
• The flange OD1230 of the pump cover is worn in way of the O-ring seating. The worn part to be build up by welding and flange to be skimmed.
• The two pipe connections diameter 76.1 with flange ND40 to be renewed by new pipe pieces in schedule 80. A template to be fabricated to align the pipe connection towards the pump cover flange. Both pipes must be mirror mounted and same template to be used for the pump cover.
• The pump cover to be grit blasted to SA 2½ and painted with 3 layers ship’s supplied paint.
• The two wearing plate or new ship’s supplied ones to be re-installed with new ship’s supplied sealing rings.

Price per pump cover: .../

J.5.13. Under water dredge pump remove/refit

Drawings:
• IHC 5242479 arrangement submerged (ladder) pump
• IHC 5242837 general arrangement suction / discharge line on ladder
• IHC 5242839 general arrangement cutter ladder

The under water dredge pump is installed on the outside area of the ladder between ladder frames 13 and 14 (IHC 5242839). Heaviest part is the pump house, weight 13 ton and with lifting bracket 14 ton.

• Assume all parts, spares, special tools and special lifting tools are owner supplied.
• Assume this job will be carried out under the guidance of the ships 1’st officer / engineer.
• Assume all seals, bolts, nuts will be renewed.
• Assume heating torch will be required.
• Assume installation / removal and 5 times modifying temporary staging / support of 5 m3.
• Remove / refit the expansion piece (pos 211 / IHC 5242837) by loosening the bolts / nuts. Packing’s to renew.
• Remove / refit the conical pipe (pos 212/ IHC 5242837) and bend (pos 213) by loosening the bolts / nuts. Packing’s to renew.
• Remove / refit the two (2) water flushing lines (pos 117).
• Remove / refit the suction side cover (pos 114). Loosen / tight the bolts (pos 138), use push-off bolts (pos 125) and lifting eye (pos 116). Renew the lip seal (pos 121).
• Remove / refit impeller (pos 103), the impeller nose. The impeller will be screwed of by activating a turning gear, done by crew. Hoisting of the impeller will be done by the ships dedicated lifting bracket with the yard crane. Clean and conserve the pump shaft thread area sturdy.
• Remove / refit throttle plate (pos 143), shaft seal arrangement (pos 148 till 155) and the water lubrication conenctions. Remove / refit the pump shaft liner (pos 601) with the ships dedicated special tool.
• Remove / refit water chamber (pos 142) and bolts (pos 147). Use the ships dedicated lifting tool bracket with the yard crane.
• Remove / refit the shaft side wearing plate (pos 113), loosen / tight the bolts. Supply and weld / remove lifting eye on old and new wearing plate.
• Remove / refit pump house (pos 101 / IHC 5242479). Use push-off bolts (pos 141) and loosen / tight bolts (pos 139).
• Remove / refit pump cover shaft side (pos 128/ IHC 5242479). Loosen /tight fore (4) fitting bolts (pos 158) and eight (8) bolts (pos 159).
• Assume redrilling / reaming of four (4) fitting bolts holes in between in way of the bearing pedestal and the cover shaft side (pos 128, section C-C) and assume machining of four (4) oversized fitting bolts.
• All parts to be hoisted out with yard crane and transported to a suitable storage area.
• Dress up all thread holes plus thread ends, clean.
• Including all means like, tools, permits (hotwork, staging, lifting, etc), temporary lights and ventilations, consumables, transports between ladder and workshops, reporting, etc.

Lump sum :

J.5.14. Under water pump gearbox, bearing bushes machining

Drawings:
• LD 05-00-023 sheet 1 & 2 bush OD420 x ID400 L = 128.
• LD 05-00-024 sheet 1 & 2 bush OD500 x ID480 L = 160.
• LD 05-00-023 sheet 1 & 2 bush OD500 x ID480 L = 121.

Scope:
• Assume the gearbox is being overhauled as per specifications J.5.8.
• Assume owner supplied oversized bushes are available.
• Machine bushes to final size, including the fabrication of a dowel pin dia 20 mm. Issue a measurement protocol and conserve the bushes with Tectyl.
• Including all means like tools, machinery, reporting, transports, consumables, etc.

Lump sum price … / bush

J.6. Steelwork on cutter ladder

J.6.1. Renewal of cone plates on ladder top (cutter shield)

Drawings:
• IHC 547.4736 Cone plate on ladder top
• IHC 524.2768 Cutter ladder First Section
• LD-12-00-098 Cone plate on ladder top with domite wear blocks
• Docu J6.1 Domite Brochure

Scope:
• Repair to be carried out with ladder in High or Low Turning Point and raised in the sea fast position, in dry-dock or afloat.
• Erect a hanging staging in way of works: bxhxl=2x4x6m platform with several floors.
• Crop off all Domite wear blocks shown on drawing LD 12-00-098
• Crop off all wear plates pos. 2, 3, 4, 5 and 8.
• Crop off filling plugs pos plugs pos. 9. Replace Ring pos. 6 by owner supplied new one. (24 x bolts M24)
• Install 2 pcs reinforcement knees 300 x 600 x 25 and 3 pcs reinforcement knees 200 x 500 x 25 as mentioned on Extracts nr. 1 & 2 of drawing 5242768.
• Build up by welding to original size, all areas of the Front plate pos. 192 on the OD, which have worn. Assume building up will be necessary over a total length of 3m, by 4cm wide and 1cm height. Check that front plate is perpendicular to the wear plates pos.4.
• Fit, adjust and install owner supplied pre-shaped wear plates in the following order : pos. 3 - 2 – 5 – 4 and 8. Wear plates are in Hardox 400 material. Weld the wear plates to the base plate and to each other. Fill up the welds up to the thickness of the wear plates.
• Fit and weld the removed or new owner’s supplied domite wear blocks on top of the wear plates as shown on drawing LD-12-00-098.
  o 93 pieces domite wear bar DLP125 (230x50x50mm)
  o 30 pieces domite chocky bar 50x24mm

Lump sum : .../

J.6.2. Damage to bottom and side plates of front part of cutter ladder
IHC 5242768 Cutter ladder first section

Scope:
• The bottom or side of the cutter ladder is severely damaged between Frs. 17 and 20. This bottom consists of 2 plates, 1000 mm wide – 40 mm thick.
• The adjacent stiffeners (HP 160 x 8) and vertical plates (40 mm) are to be renewed as well.
• Assume the ladder is either in the locking position (approx. horizontal, but far from the dock floor) or resting on the keel blocks on the dock floor.
• Erect a staging
• Remove the bolted double walled suction line for access (assume the welded suction mouth does not have to be removed)
• Removal and disposal of silt and sea growth inside the ladder – assume 5 tons.
• Including Cutting and re-welding of temporary access holes
• Repair the paint system by de-rusting to ST3 and painting 3 layers of ship’s supplied paint.

Lump sum price for plate 1850x1000x40mm …/

Price per kg for more of less steelwork …/kg

Remarks concerning steelwork on the ladder:
- Any welding and cutting on the ladder shall be continuously monitored, to prevent misalignment of the cutter drive.
- The alignment of the cutter shaft bearings will be recorded prior to the works and after docking.
- The readings will be continuously recorded during the works. The readings will be kept in a record, and will be daily presented to the superintendent. The final readings shall not differ from the first.
- To prevent misalignment of the cutter drive, the yard will make a proper procedure prior to the works.
- The procedure comprises the welding and fitting sequences, weld seam openings, plug welds, fitting of temporary stiffeners etc.

**J.6.3. Repair of cracks in cutter ladder**

IHC 5242787 Cutter ladder middle section

- To be charged per hour per welder, inclusive his equipment, power supply, basic electrodes, and everything required to perform the job.
- Assume area is gas free.
- Exclusive: staging

Unit price ....../hour-welder

**J.6.4. Inserts in cutter ladder**

Straight plates of less than 1 m² and less than 20 mm thick, inserts in bulkheads, deck, stiffeners, … inside the ladder

Unit price …./kg

**J.100 Repair of hatchcovers on cutterladder**

Drwg.

524 2792 2SH : Superstructure Cutterladder
LDV 12-51 : Packing
LDV 12-52 : Packing

Hatch covers are lined with A60 insulation on the inside.

Remove and take to workshop hatch covers nrs. 1, 2, 3 and 3A.
Cut off all angle bar 150 x 75 x 10 from the ladder around the four hatch covers and grind smooth the deckplate.
Derusting by powertool the corroded area’s on the outside of the hatch covers, and the complete edge (100mm wide) of the covers on the inside. Paint with 3 coats owner supplied paint.
Fit new angle bar 150 x 75 x 10 to the hatch covers without the gasket and drill the holes in the angle bar.
Fit the hatch cover with the new angle bar on the ladder. Weld the new angle bar frame onto the deck plate of the ladder.
Remove the hatch cover, powertool and paint with 3 coats owner supplied paint. the new angle bar and affected area’s outside and inside the ladder. Install new rubber gasket. (Owner supplied) and close the hatch with owner supplied new Stainless Steel bolts.

Lumpsum for one Hatch Type 1, 3 or 3A : ...

Lumpsum for one Hatch Type 2 : ...

When the outside edge of the hatch covers would be too corroded or distorted to assure a watertight sealing of the hatch, the outside edge (80mm wide) of the hatch cover should be cut off and replaced with a flat bar of 80 x 12. The holes to be drilled together with the new angle bar.

Lumpsum for one Hatch Type 1, 3 or 3A : ...

Lumpsum for one Hatch Type 2 : ...

**J.101 Replace / reinforce aircooler cuttermotor**

Drwg.
Jeumont Schneider 1CA0564 : General arrangement
5242792 Fj : Superstructure cuttermotor
5242839 : General arrangement cuttermotor

Weight of cooler : 2700 kg

Open/close hatches 3 and 3A above cuttermotors. (Size 2.7m x 2.8m : 140 bolts/hatch, Stainless steel M16)
Remove / reinstall fan ducting on top of coolers.
Disconnect / connect electric supply to fanmotors.
Disconnect / connect cooling water supply and discharge lines (3” pipes) from cooler.
Disconnect / connect sensors.
Remove / reinstall complete cooler housing with fanmotors from cuttermotor and take to/from workshop. (Weight : 2700kg)
Dismantle / reassemble complete cooler, ducts, fanmotors and clean with compressed air.
Install 4 yard supplied ½” GI pipes welded with nuts at each end.
Mount the angle lines with the ½” GI pipes to the supporting frame of the plate cooler. (Reinforcing the cooler)
Degrease, scrape, wash and painting the aircooler with 3 coats owner supplied paint
Pressure test the air cooler.

Lumpsum : ...

.../cooler
**J.102. Renewal bearing casing upper turning points ladder in ship.**

01175-0323-010 FJ : Constructionplan Aftship  
01175-1111-010 6SH : Construction Aft Ship Fr. 29-39  
524 2776 2SH : Arrangement Cutterladder Turning Point  
5826 662 3SH : List of Parts Arr. Cutterladder T. Point  
524 765 4SH : Bearing casing Cutterladder Turning Point  
524 834 2SH : Machining Data and Position of Ladder Turning Point  
5875 983 : Fitting piece  
01175-0334-010 : Accommodation Main deck Fr. 4 - 41

Repair to be carried out afloat, with the ladder in lower Turning Point and lowered to a depth of 15m. (Angle of cutter shaft line with horizontal 27°)

A minimum water depth of 15m is required throughout the repair.

In order to increase the working area around the turning point 16m to 17m waterdepth is advisable.

Assume the ladder has been lowered to a depth of -15m by the ship’s crew

Erect / remove staging i.w.o. the SB and PS upper Turning points.

Access to the turning points from the inside will be through the accommodation on the main deck. In way of the repairs (Fr. 31 – 35) all panelling from walls and ceiling to be removed. Adequate protection to be put up so no other areas of accommodation will be contaminated by smoke and dust. One passageway from outside the accommodation to the respective repair zones in the accommodation to be put up and completely covered with plastic or any other protective material. All damages who might occur to floor covering, wall or ceiling panelling will have to be repaired and put back in its original condition by the yard

Remove PS/SB Inconel bushes (pos. 368) from bearing casings. (30 pcs M27 bolts). Assume bush hard fit and need to be pushed out by hydraulics or cropped out.

Recondition the flange and the outer diameter of the Inconel bushing as they have to refitted later on.

Measure the outer diameter of the Inconel bushings and check if they are within the tolerances mentioned on drawing.

Install a piano wire or optical alignment tool centered through the bearing casings, using the centre of the dia 930H7 bores as references. Incl. the welding of the bridges on the outside of the casings and marking of the centres on the bulkheads on both sides of the bearing casings.

Measure the current height of the front faces of the bearing casings to the bulkhead.

Lower the ladder and measure the gap between ladder and casings. Weld 4 small reference blocks, with a height calculated from above measurements, around each casing.

Crop both bearing casings without losing the reference line (e.g. piano wire).

Machine the bores dia 1900 and 1630 in resp. the 32mm and 20mm thick bulkheads, using the reference line.

Note that the new bearing casings have been pre-machined according to drwg. 5242776 sh 3/4. This means e.g. : the unfinished bore of the new bearing casings is 915 mm (not 900 as mentioned on drwg. 5242776 sh ¼. The new bearing casings
haven’t been provided yet with the 30 tapped M30 holes. The front face of the new bearing casings is 10mm oversize. The bore dia 1150 with the rounded edge still has to be machined.

Position the new bearing casings in the machined bores in the bulkheads. The v-shaped outer diameters should match with the centre of the bulkheads. Check if the distance between the front faces is less than 2 x 3788 mm and check if the front face is higher than the 4 reference blocks around each casing.

Prepare welding instructions approved by Bureau Veritas and Jan De Nul N.V. Install, maintain during the welding and remove continuous heat treatment i.w.o. the casings (incl. insulation, monitor and control, power supply).

Preheat and weld the casings, making sure the dia 915 mm bores remain aligned with the reference line (piano wire or optical alignment device). All welds to be ground smooth to facilitate the magnaflux testing and to prevent fatigue cracks in the future.

Full magnaflux testing of all new weld seams. X-ray photographs to be taken as required by the Bureau Veritas surveyor.

In situ machining of the bearing casing to the final dimensions on drawing 5242 765 BJ / SH 4 (i.e. bores and front face!). Diameter of bore in way of Inconel bushes to be according to the measurements taken from the old Inconel bushes which will be reused, height of front face according to reference blocks welded on the bulkhead.

Fit the Inconel bearing bushings using Owners supply bolts and Yard’s locking wire. Remove the staging i.w.o. the bearing casings to allow the hoisting of the ladder. Assume the crew hoists the ladder and fits the ladder turning shafts in the bearing casings. The shafts have to be extracted as far as possible. The Yard fits the locking wedges pos 355 and 356, using installed chain blocks and under the supervision of the crew. These wedges have to be lowered to the same position as before the repair.

The crew retracts the turning point shafts against the wedges. Determine the length of the fitting pieces pos. 369 by measuring the distance from the bearing casing side to the turning point shaft end. The measurement can be done through the dia 400mm hole.

Assume the crew lowers the ladder again.

Re-erect / remove staging again if necessary i.w.o. the ladder turning points.

Machine to size and weld Owner’s supplied new fitting pieces (pos. 369). The size of the weld seams should be 15mm i.o. the resp. 6 and 8 mm mentioned on drwg. 5875983!

Magnaflux test of the welds and vacuum test or equivalent watertightness test of the whole bearing casings.

All remarks mentioned under ‘General Remarks Steelwork’ under par. G of the tender should included in the lumpsum.

Prepare measuring report with drawings incl. all measurements taken during this job.

Optional: extra cost if the cropping, fitting and welding is only carried out during daytime to allow the crew to use the accomodation during the night. Of course the heating should continued during the night.

General remarks to steelwork mentioned under G also apply here.

All drawings are submitted to the yard. Any works not specifically described but directly related to the installation of the turning points should be included.

All alignment checks, requested by superintendent for the purpose of ascertaining the correctness of performed works to be included.
Lump sum price : ... / turning point

**J.103 ADJUSTING THE PS & SB TILTING POINTS OF CUTTERLADDER.**

5242 834 2SH : Machining Data and Position of Ladder Turning Point, Tilting Point

5474 711 : Tilting Arrangement

Cutterladder.

1175-1115-010 SH2 : Construction drawing Fr. 5 tot 17

Repair can be carried out afloat with the ladder in low turning point. The tilting points can be reached standing on the ladder with the ladder lowered to about 5m, or with a hanging staging when ladder is lowered to a greater depth.

Both tilting points have been modified already by welding a flat surface to the bottom of the hole. Thickness of weld approx. 3mm. On top of that a flat bar has been welded with thickness 7mm. Purpose of this repair is to replace the welding and the flat bar with one solid piece of steel Mat. C45.

Measure up both holes for the tilting shafts in the ship. Determine the exact height of the welded inserts and flat bar in the bottom part of the hole. Remove the flat bar and the welding by grinding, until original diameter of 620mm is reached.

Fabricate an insert piece out of C45 material and weld it to the bottom of the hole, perpendicular to the vertical centreline of the hole. The thickness of the insert to be determined by the owners representative after measurement of the existing inserts.

Lump sum price : .... / for both tilting points :

**J.104. RENEWAL OF LOCKING RINGS LADDER TURNING POINT**

Drwg. 524 2776 2SH : Arrangement Cutterladder Turning Point

5826 662 3SH : List of Parts Arr. Cutterladder T. Point

Repair to be carried out afloat with ladder in tilted position. Required waterdepth 13m. Assume ladder will be tilted, and both turning shafts pushed out by ship’s crew. Both shafts can then be accessed from the Upper Deck.

The purpose of this repair is to change the locking ring pos. 360 by a new model of locking ring. The supplied drawings are showing the modified ring.
Remove/Reinstall Wearing bush pos. 392 with locking plates pos. 395. (grind off, reweld)
Remove/Reinstall 12 PCS Bolt. pos. 382 and locking arrangement pos. 394
Remove/Reinstall Locking Ring pos. 360.

REMARKS:

pos. 360 and pos. 382 owner supplied.
pos. 394 and 395 yard’s supply

Lump sum price : .../ for one Locking Ring

**J.105. Repairs and alignment foundation fairlead side wires**

5474706 Arrangement adjusting fairlead
5242761 Supports adjusting fairlead

Assume the fairlead is removed under item J4.1.
Erect / modify a staging.
Crop of the aft support of the fairlead : dwg 5242761 pos 483+484+485+486. Grind, dress up the base plate of the cutter ladder.
Fabricate a new support pos 484+485+486.
Fabricate and machine a new support drawing 578755. Shrink fit a ship’s supplied bush and tack weld.
Top of the foundation plate of both parts of the foundation are to be machined plane.
8 Holes to be pre-drilled.
Fit, align and weld the new support to the cutter ladder.
Fit, align the removable part of the foundation. Align the centre of the holes to the bore of the housing pos 475. Fabricate and machine the plate pos 489 to suit the alignment. Ream the two fitting holes, fabricate and install fitting bolts in C35. Install 6 bolts in the remaining holes.

Lump sum price : .../Price per fairlead

**J.106. Renewal of hydraulic pawl on cutter ladder for dismounting cutter**

LD-11-00-037 Hydr. Pawl on cutter ladder for dismounting cutter
5242839 General arrangement cutter ladder

Assume that the cutter head is removed by ship’s crew and cutter ladder is secured horizontally.
The hydraulic pawl as per drawing LD-11-00-037 is fitted on the top of the cutter ladder aft ship side – cutter ladder frame 21 and is to be renewed.
Erect a staging
Remove / dispose the clay on top of the pawl housing.
Measure the position of the hydraulic pawl construction – record for future reference to align the new assembly.

Open up the two top plates. Disconnect the hydraulic cylinder, blank off the hydraulic lines. Transport the cylinder to/from the workshop. Dismantle the cylinder. Clean, dress up all parts. Re-assemble with ships supplied new seals and other parts if required. Pressure and function test the cylinder in the workshop.

Crop of, remove the complete pawl construction. Grind smooth the top plate of the cutter ladder. Repair cutting damages by welding and grinding.

Fit, align and weld an owner’s supplied new pawl construction. Open the top plates, complete the welds of the construction from inside to the top plate of the cutter ladder. Install, connect the overhauled hydraulic cylinder. Test the pawl with cutter head mounted.

Lump sum price: …/.

**J.107. Repair boltholes and face water chamber cutter shaft bearing**

LD-04-02-007 flushing room cutter shaft bearing

Assume the cutter shaft and water chamber are removed under item J2.2.
Assume that the thread of the boltholes in the cutter bearing housing for bolts pos 9 are worn.
Drill out these 24 holes, cut thread, supply and install suitable helicoil M24
The face of the bearing housing is damaged. Build up the damages by welding.
Assume works for one welder – 5 days normal hours. Machine the face of the bearing housing in situ to nominal size.

Lump sum price for 24 helicoil & repair face of bearing housing: …/.

Alternative price to drill new holes and cut thread of M24 just next to the existing holes & repair face of bearing housing Close the worn holes by plastic steel.: …/.

**J.108. Renew hatch engine room underwater pump drive**

5242787sh2 Cutter ladder middle part
J108 Hatch

The round hatch ID700mm fitted on top of the cutter ladder above the underwater pump drive is to be replaced.
The yard is to propose, supply and fabricate a similar round hatch ID700, with 4 dogs and central locking system and coaming of 300mm similar to the hatch drawing J108, but in round execution. The locking system must be securable and hatch suitable for use under water up to -5 meter.
The old hatch with coaming is to be cropped of and replaced by the yard’s unit.
After welding, hatch to be tested and submitted to class inspection
Paint system to be repaired to ST3 and painting 3 layers ship’s supplied paint

Lump sum price: …/

**J.110. Installation of limit switches safety pin cutter ladder**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5474713</td>
<td>Arrangement safety pin</td>
</tr>
<tr>
<td>5474746</td>
<td>Mounting plate bottom side</td>
</tr>
</tbody>
</table>

Two ship’s supplied limit switches are to be installed on the safety pin and safety pin assembly is to be overhauled.
Assume the ladder is hanging in the hoisting wire. The yard is allowed to overhaul one by one. Always one safety pin must remain operational.
Erect two staging’s to access the inspection plate 5474713 pos 522 and pos 509. (lxwxh=2x1x6m + 2x1x8m)
Open the inspection cover pos 522. Disconnect the hydraulic hoses, blank off open ends.
Disconnect, remove the hydraulic cylinder, remove both end plates pos 513, pos 509 and 505. Transport all to workshop.
Clean, dress up all parts. Measure all bores, pins and make a report.
Dismantle the hydraulic cylinder. Clean, dress up parts. Re-assemble with new ship’s supplied seals. Pressure the hydraulic cylinder test to 200 bar.
De-rust cylinder to ST3 and apply 3 layers of paint.
Machine 4 tap holes M10x20 in cover plate pos 513 as per details drawing 5474746 to fit the new holder for the limit switches. Machine 2 tap holes G1/2 in the cover plate to fit cable glands.
Return all parts, re-assemble all covers with ship’s supplied seals. Install the owner’s supplied new support drawing pos 525 with 2 limit switches pos 526. Fit ships supplied cable glands and run cables to outside.
Fit, install a ship’s supplied junction box next to the cover plate pos 513. Including supply and welding of foundation.
Supply, fit, weld and install a cable pipe running from this junction box to the cutter ladder engine room as per lay-out drawing. Cable pipe is galvanized pipe 3/4”, with both ends flat bar to tie up the cable and total length of ….. Including the removal / refitting of a protection cover plate 1 x 6 meter. Cable pipe is to be fitted behind this existing cover plate. Open/ close & modify the existing MCT cable bulkhead penetration.
Fit, install & fasten ship’s supplied cable from the new junction box to the junction box in the engine room of cutter ladder as indicated on the lay out drawing. Total length of cable = 70meter. Existing cable trays can be used in the cutter ladder engine room.
Terminate, connect & test the cables.
Works include all gear, tools, auxiliary plates, and services.

Lump sum price for one safety pin: …/

Additional price to renew the Safety pin pos 501 (d520x1125mm) by owner’s supply. Including transport to / from ship’s store: …/
J.111. Install Protection bush ladder swell compensator & renew rod seals

- IHC_5474889_1_Bj: Arrangement sheave box for swell compensator
- LD_09-00-032_1: Sheave box for swell compensator – wire sheave
- LD_07-00-033_1: Protection bush ID180
  Dwg 01175-2852-010: Arrangement swell compensator ladder

Position: Both sides of crane deck, frame 4.

Erect a staging around the ladder swell compensator: 3x2x4m
Remove/refit the ladder wire from the sheave box and put aside.
Remove sheave box from cylinder rod.
Remove / refit the platform in way for access.
Transport sheave box to/from workshop. Degrease, clean parts. Measure bore and rod diameter. Make a report. Repair the damaged paint system to ST3 and full re-paint with 3 layers ship’s supplied paint.
Drill/tap six M6 holes in foundation of sheave box according to drawing LD-09-00-032 and install the bush on the sheave box.
Remove the cylinder cover, dress up all parts. Renew the rod seals of the cylinders with ship’s spares.
Re-install sheave box.
Works include all gear, tools, auxiliary plates, and services.

Price per ladder swell compensator: …/

J.112. Repairs back plate cone wear plate on ladder top and partly renewal wear plate

- 5474736: Cone plate on ladder top
- 5242768: Cutter ladder First Section
- LD-12-00-098: Cone plate on ladder top with domite wear blocks
- J112: Back plate cone on ladder

Repair to be carried out with ladder in High or Low Turning Point and raised in the sea fast position, in dry-dock or afloat.
Erect a hanging staging in way of works: b×h×l=2×4×6m
Crop off the wear plates pos. 4, 5 & 8.
Fair up the front plate pos. 192 (Drwg. 524.2768, Thickness 60mm OD 1625) i.w.o. the areas as marked on extract drawing J112. The marked area’s are bended backwards up to 15mm and have to be fairied up by means of heating, jacks, cutting the plate and re-welding.
6 stiffeners 500x300x20mm to be fabricated, fitted and welded.
Supply, fit and weld 2 pcs stiffeners 300 x 600 x 25 and 3 pcs stiffeners 200 x 500 x 25
Fit, adjust and weld owner supplied pre-shaped wear plates pos. 4, 5 & 8. Wear plates are in Hardox 400 material. Weld the wear plates to the base plate and to each other.
Fill up the welds up to the thickness of the wear plates. Final layer of the weld seams to be hard faced.
After welding, the face of the Hardox wear plate pos 4 is to be hard faced in single runs with spacing’s of 30mm and cross layered.

Lump sum price: ..../

Price to renew ship’s supplied wear block 300x50x50mm on the cone plate: .../pc

Price to renew part of the back plate drawing 5242768 pos 252 as highlighted in the drawing J112. Back plate on cone ladder.
Plate 60mm Grade A: .../

**J.113. Alignment check between underwater pump and intermediate shaft.**

01175-2120-600 Arrangement Submerged Dredge pump Drive.

Assume that the tooth coupling and intermediate shaft pos 2 & 3 have been removed as per item J5.5
Measure the alignment between the shaft of underwater pump bearing block pos 1 and the outgoing shaft of the gearbox pos 4 flange intermediate shaft using laser equipment.
Works include all gear, tools, auxiliary plates, and services.
Make a report.

Lump sum price : .../

**J114. Thickness measurement longitudinal bulkhead in way of cutter ladder**

01175-0338-030 General arrangement
01175-2620-010-sh2 Ceiling main deck and upper deck
LD-00-01-014 Working plan coating CASCO
01175-0323-010 Construction plan aft ship frame -5 to 44

The wall thickness of the longitudinal bulkhead in way of the cutter ladder which is not accessible it to be measured.
UT measurement to be taken of the plate of bulkhead 3850 from centre at starboard & portside, between frame 9 & 35 and between main deck and upper deck Original thickness 12 & 32mm referring to the construction drawing 01175-0323-010
Cover the flooring and wall panels at the cabins sides by tarpaulin.
Remove / refit the wall panelling covering the bulkhead 3850mm from centre in the corridors of the accommodation on main deck from frame 9 up to frame 35. Remove / refit the ceiling panelling in the corridor for access.
Remove / refit the insulation from the bulkheads. Note insulation is also installed around the web frames, but do not need to be removed. Damaged insulation to be renewed as per insulation plan. Insulation is 50mm glass wool, aluminium sheet and fixed with welded pins and clipping rings.
Carry out UT measurement of the bulkhead plating as indicated on the drawing LD-00-01-014, every 20cm, vertically and horizontally.

Assume that access to top level is possible using a ladder. If not allowed or possible by the yard, erect staging in way.

Make a detailed reports.

Lump sum price for SB & PS:  ..../

**J.115. Repair hinges of protection cover plates cutter ladder.**

<table>
<thead>
<tr>
<th>J115</th>
<th>Picture of protection cover plate cutter ladder</th>
</tr>
</thead>
<tbody>
<tr>
<td>5242839</td>
<td>Arrangement cutter ladder</td>
</tr>
</tbody>
</table>

Two steel cover plates are fitted along the longitudinal bulkhead of the cutter ladder between frame 13 – 14 to protect the hydraulic pipes and cables in way.

Erect a staging under both sides: 2 staging’s l*w*h=3x1x3m.

Open / close manhole of the cofferdam. Arrange venting, lighting and hot work permits during the works.

Protection cover plates are fastened by bolts. Approximately size 3.5x1.2m.

Disconnect, remove and transport the cover plates to the workshop. Renew the eye plates on the protection covers and at the bulkhead. In total 10 sets eye plates of 150x150x20mm per protection cover plate to be fabricated, fitted, aligned and welded.

De-rust the damaged paint system in way by wire brushing to ST3 and painting 3 layers paint.

Re-install and fasten the protection cover plates with yard’s supplied stainless steel bolts M24x70 and nyloc nuts.

Lump sum price for two cover plates :  .../

**J.116. ladder, install e-cable protection pipe in DP1 pump well**

**Drawings:**

- Sketch J.116. pipe run signal cable tilting pins
- IHC 02808 pipe brackets
- IHC 5242839 general arrangement cutter ladder

The job is situated inside the dredge pump well of the ladder. Area can be reached with the yard crane directly.

**Scope:**

- Assume the vessel is dry docked and no water is in the dredge pump well.
- Erect / remove staging, 40 m³.
- Disconnect / connect signal cable, length 10 m. open / close two (2) water tight junction boxes. Pull cable through new protection pipe.
- On ladder bulkhead frame 15, provide and install pipe dia 33.7 x 3.25 mm, L 9 m, with four (4) bends 90°. Hot dip galvanised.
- Install / weld seven (7) pipe brackets (IHC 02808).
- Including all means like permits, etc.
J.117. Ladder, hinge pin boring in ladder to machine i.w.o. grease packing

Drawings:
- IHC 5242776 Arrangement ladder turning point
- IHC 5876158 collar flange

The ladder is equipped with two (2) hinge pins (turning points) in way of ladder frame 0. If the ladder remains in the ship, the repair can only be done afloat with 11 m of water depth. If the vessel is on the dock blocks, the ladder has to be removed from the vessel in order to gain access to the hinge pins in the ladder.

Scope:
- Assume the vessel is afloat alongside the repair berth of the yard or the ladder has been removed from the ship when in dry dock.
- Assume the shaft (pos 353 / IHC 5242776) has been removed according specs J.1.2.
- The bushes (pos 357 and 358 / IHC 5242776) are still in place or have been removed according specs J.1.3.
- Calibrate the bore hole seating in way of the bushes (or their seating) and establish the centre point.
- With a line boring machine, skim the ID of the bearing housing ladder (pos 352 / IHC 5242776).
- Machine the oversized collar flange (pos 364 / IHC 5242776) to a size matching the new bearing house dimensions. Assume the flange is owner supplied.
- Including all means like, hire of line boring equipment its manpower and power supply, reporting of all machined dimensions, temporary lightning and ventilation, cleaning, permits, covering of the area, tools, consumables, transports between ship / ladder and workshops, etc.
- Supply new and thicker grease packing (pos 371 / IHC 5242776).

Lump sum price: ...

Additional build-up by welding (AWS E7018-1) and machine to original diameter ID of the bearing housing ladder (pos 352 / IHC 5242776). Assume 10 mm radius.

J.118. UWP bearing block, install modified securing system

Drawings:
- IHC 01175-2120-600 arrangement submerged dredge pump drive
- IHC 5242479 arrangement submerged (ladder) pump
- IHC 5242839 general arrangement cutter ladder
- LD 03-04-003 pump shaft bearing with shaft D360 complete
- JDN LD 03-04-A005503 ½ adjusting ring, set
Scope

- Assume all spares are owner supplied.
- Assume the bearing block has been removed by the yard according specs J.5.2.
- Supply new and install eight (8) securing lugs (pos 17 / LD 03-04-A005506). For correct position of the lugs, mount the loose securing lugs on the owner supplied adjusting ring (pos 643 / IHC 5242479), secure the adjusting ring on the bearing pedestal with the bolts (pos 644 / IHC 5242479). Dress-up or re-drill / tap.
- Including all means like, tools, permits, temporary lights and ventilations, consumables, transports between ladder and workshops, reporting, torque wrench, etc.

Lump sum price:

\[ ... / \]

**J.119. UWP drive, bulkhead penetration, Renew 2/2 clamp ring**

Drawings:

- IHC 01175-2120-600 arrangement submerged dredge pump drive
- IHC 01175-2120-620 rope guard 2/2 bulkhead penetration ladder pump
- IHC 5473788 supreme 355 bulkhead passage

Definitions:

- UWP = Under Water dredge Pump installed in the ladder
- The bulkhead penetration is located on the outside of the cutter ladder (pos 11 / IHC 01175-2120-600).

Scope:

- Assume the ladder is installed in the ship or removed from the vessel.
- Assume all parts owner supplied.
- Assume the bulkhead penetration is not being overhauled.
- Remove / refit the rope guard (pos 18 / IHC 01175-2120-600) which is of split execution. Renew bolts / nuts, owner supplied.
- Install / remove mounting clip (pos 119 / IHC 5473788). Dress-up the thread holes for the bolts (pos 120).
- remove / renew the bolts between the clamping ring (pos 105) and the stainless steel liner (pos 106). Remove / install new seal ring (pos 108), bolts (pos 109) and sealing wire (pos 107).
- Remove old and install new clamping ring (pos 105 / IHC 5473788), which is of split execution. Assume the clamping ring to be tack welded to the shaft. Sufficient space is present between the stainless steel liner and gear coupling (pos 4 / IHC 01175-2120-600).
- Measure the radial run-out of the stainless steel liner (pos 106 / IHC 5473788) with a dial gauge and issue report. Assume the crew will rotate the shaft.
- Including all means like temporary lights, covering, tools, transports, measurements, reporting, permits, chain hoist, etc.

Lump sump \[ ... / \] clamping ring
Additional for supply of new rope guard IHC 01175-2120-620 …/ rope guard
Additional for supply of new clamping ring …/ clamping ring

**J.120. UWP drive, flexible air clutch coupling overhaul.**

Drawings:
- AVD 816-1-8264  Arrangement Drawing flexible coupling
- AVD 062-4-8265  Parts List flexible coupling
- IHC 01175-2120-600  arrangement submerged dredge pump drive

The flexible clutch coupling is installed in the engine room area of the ladder between the E-motor and the gearbox (pos 6 / IHC 01175-2120-600).

Scope:
- Job to be carried out under the guidance of the ships 1’st engineer.
- Assume all spares are owner supplied.
- Assume the gearbox (pos 5 / IHC 01175-2120-600) has been removed according specifications J.5.8.
- Dismantle / assemble the complete coupling.
- Air clutch coupling part (AIRFLEX).
  - Remove / refit the clutch assembly (pos 52 till 71).
  - Renew the inflatable seals (pos 58 and 65).
  - Renew the bearings (pos 24 and 25).
- Flexible coupling part (HOLSET).
  - Remove / refit the clamping ring (pos 13). At reassembling, tight the bolts evenly.
  - Remove / refit the inner member (pos 21) from the shaft of the e-motor by loosening the bolts of the clamping ring (pos 73) and heating the star piece. Clean and dress up the shaft. Issue measurement report of the shaft and the inner piece.
  - Renew rubber blocks (pos 23) by pressing in pairs and applying silicone oil.
  - Check alignment between face of inner member (pos 21) and
- Dress up all thread holes plus thread ends and clean.
- For heating of mechanical parts use a heating torch (not cutting torch).
- Including all means like, tools, permits, temporary lights and ventilations, consumables, transports between ladder and workshops, reporting, lifting gear, etc.

Lump sum price:

Additional for shifting 2740 kW DC electric motor (pos / IHC 01175-2120-600).

Weight: 18 ton / 21 tons including cooler

- Disconnect cooling water pipes from the electric motor
- Open / closed the hatch cover above the electric motor for lifting purposes
- E-motor + air cooler to be disconnected from its foundation and pulled back. Motor is standing on steel chocks and fixed with four foundation bolts. Steel
chocks to be tack welded to foundation. All sea fast wedges to be marked, removed and afterwards reinstalled. All electric cables to motor can remain attached to motor. (For lifting of motor, it is possible to remove cover above motor on cutter ladder engine room)

- After overhaul of coupling, return and reconnect the Electric motor
- Including all means like, tools, permits, temporary lights and ventilations, consumables, transports between ladder and workshops, reporting, lifting gear, etc.

Lump sum price : …/

**J.121. UWP drive, gear coupling hub modification.**
Job to be combined with job J.5.5.1 & J.5.5.5.

Drawings:
- JAHNEL VS 32 / 4377 Rev Aj: Arrangement tooth Coupling Type : JZVS32

Scope:
- Assume the inner part gear is in the workshop and cleaned, measured, skimmed, dressed up, ... as per item J.5.5.5.
- Drill the new bypass channels as indicated on dwg Jahnel VS 32/4377 Rev Aj
- Check for cracks after machining
- Re-install as per item J.5.5.5.

Lump sum price : …/coupling
Remarks to J

All prices mentioned above include:

- Cranage, transport, staging, removal for access, lighting, ventilation, tools and auxiliary means.
- For surface preparation and painting all general remarks under E and F are applicable.
- For steelworks all general remarks under G are applicable.
K. Spud carrier
The vessel is equipped with one (1) main spud arrangement on SB bow and one (1) aux spud arrangement on PS bow. The main spud arrangement is placed in a movable spud carrier, the auxillay spud arrangement in a fixed position.
The vessel will arrive at the yard with the main, auxilarry and the 3’th spare spud seafastened horizontally on the crane deck.

The spud carrier is travelling on a rail-bogie arrangement in the spud carrier well, frames 124 – 147.

K.1. Spud holding clamp.
The main and auxillary spud arrangements are both equipped with one spud holding clamp K.1. and one spud hoisting clamp K.2.. Verify positions 5 and 6 on drawing LD 10-00-072.

K.1.1. Dismantling of the spud holding clamp
Drawings:
- IHC 5242784 Arrangement Spud clamp
- IHC 5476228 Build Up Plan Spud clamp

Scope:
- Assume the spud pole is lowered to its horizontal sea fast position by the crew. Assume that the forward halve of the spud pole clamp is removed by ship’s crew and stored on the deck.
- Erect a staging around the spud clamp and in the spud pole well.
- Disconnect and blank off the remaining spud clamp hydraulic cylinder and grease piping
- Remove the pins 5242784 pos 331. Disconnect & remove aft part of the spud clamp
- Transport the 2 clamp parts with hydraulic cylinder to the workshop.
- Dismantle the clamp completely: disconnect, remove the hydraulic cylinder.
- Pressure test 2 nos hydraulic cylinders with yards’ supplied oil and report.
- Crack test of all weld seams by dye penetrant or MPI.
- Remove / refit the 4 sets of PE blocks pos 307 on top of the clamp.
- Degrease, clean all parts.
- Measure all pins and bores of the hinges. Make a report.
- Fabricate and renew the wear plate 5875979 pos 320.
- Crop off and renew the wearing plates pos 334 by ship’s spare.
- After repairs, re-assemble with ship’s new pins. Return to ship, re-install and re-connect the hydraulics & grease pipes.
- Grid blast the spud clamp to SA2.5 & paint with 3 coats of ships supplied paint.

Price per unit: /clamp

K.1.2. Renew the grip liners of holding spud holding clamp.
Drawings:
IHC 5242784  Arrangement Spud clamp
IHC 5476228  Build Up Plan Spud clamp

Scope:
- Assume the spud clamp is removed and in the workshop as per item K1.1
- Gauge off the 4 rows of grip liners dwg 5476228 pos. 384. Grind the base smooth.
- Grip liners to be renewed on the 4 pcs ¼ clamp parts.
- Crack test of all new weld seams by dye penetrant or MPI.

Lump sum: price  …/ clamp.

K.1.3. Renew the base ring of grip liners spud holding clamp.

Drawings:
- IHC 5242784  Arrangement Spud clamp
- IHC 5476228  Build Up Plan Spud clamp

Scope:
- Assume the grip liners pos 384 are cropped off as per item K1.2 and the base ring pos 348 is also damaged.
- Crop off the plate pos 348.
- Fabricate and fit new rolled flat bars pos 348. Mat. ST52-3. Pos 384 with section 50 x 20, OD 2060
- Base ring to be renewed on the 4 pcs ¼ clamp parts.
- Crack test of all new weld seams by dye penetrant or MPI.

Lump sum: price  …/ clamp.

K.1.4. Reconditioning bores of hinge pin spud holding clamp

Drawings:
- IHC 5242784  Arrangement Spud clamp
- IHC 5476228  Build Up Plan Spud clamp

Scope:
- Assume the spud clamp is removed and dismantled under item K1.1
- Assume the holes of the hinge pin drawing 5242784 pos 331 are worn max 5mm on the diameter.
- Premachine bores to 2mm undercut the diameter
- Build up the worn hole in the two bottom plates dwg 5476228 pos 370 and machine afterwards to nominal diameter of 132mm D10.
- Build up the worn holes in the two top plates pos 383 and machine afterwards to nominal diameter of 142mm d10.
- Align the 4 spud clamp parts to each other (the necessary attention to be taken).
• The top and bottom holes are to be machined in line. Special attention to be paid to the drawing tolerances: centre of hole must be perpendicular to the bottom of the spud clamp.

Lump sum price for one hinge side (4 plates pos 383): …. /hinge

Additional supply, fabrication, machining, aligning, and welding of hinge plate.
• renew hinge plate pos 370: …. /hinge plate
• renew hinge plate pos 371+371: …. /hinge plate
• renew hinge plate pos 383: …. /hinge plate
• renew hinge plate pos 383+371 …. /hinge plate

K.1.5. Overhaul hydraulic cylinder spud holding clamp.
BRAUER 82.6306 spud Clamping Cylinder + parts list

Scope:
• Assume the cylinder spud clamp is removed under item K1.1
• Dismantle the hydraulic cylinder.
• Clean, degrease and dress up all parts.
• Put cylinder rod on lathe – check straightness
• Measure all parts – make a report
• Box up the cylinder with owner’s supplied new seals and parts.
• Pressure test the cylinder on 250 bar
• De-rust, paint the exterior of the hydraulic cylinder with 3 layers ship’s supplied paint.

Price per cylinder. …. /

K.2. Spud hoisting clamp
The main and auxiliary spud arrangements are both equipped with one spud holding clamp K.1. and one spud hoisting clamp K.2. Verify positions 5 and 6 on drawing LD 10-00-072.

K.2.1. Dismantling of spud hoisting clamp
Drawings:
• IHC 5242798: Arrangement spud hoisting clamp
• LD-10-00-030: Spud hoisting clamp

Scope:
• Assume the spud hoisting clamp is dismantled into 2 halves (4750kg/each) by ship’s crew.
• Transport the 2 halve clamps to/from your workshop
• Degrease the complete clamp. Remove pins and links.
• Dismantle / reassemble levers Pos. 502 and 503 from the clamp.
• Clean degrease and dress up all parts.
• Measure all pins and bores.
• Inspect all levers, shafts and links on cracks by dye checking.
• Crack test of all new weld seams by dye penetrant or MPI
• After repairs, re-assemble with owner’s new parts.
• Grid blast the spud clamp to SA2.5 & paint with 3 coats of ships supplied paint.

Price per unit. /clamp

K.2.2. Renewal of grip liners on spud hoisting clamp

Drawings:
• IHC 5242798 Arrangement spud hoisting clamp
• LD-10-00-030 Spud hoisting clamp

One clamp consists of 2 half clamps.

Scope:
• Assume the spud hoisting clamp is dismantled under K2.1
• Crop off the 4 rows of grip liners. Pos. 570. Grind the base smooth.
• Fabricate, fit and weld new centred flat bars for Pos. 570.
• Pos 384 with section 30 x 11, ID 2000. Mat ST53-3.
• Crack test of all new weld seams by dye penetrant or MPI

Lump sum. …/ clamp

K.2.3. Renew the base plate of grip liners spud hoisting clamp.

Drawings:
• IHC 5242798 Arrangement spud hoisting clamp
• LD-10-00-030 Spud hoisting clamp

Scope:
• Assume the grip liners pos 570 are cropped off as per item K2.2 and the base plate pos 546 is also damaged.
• Crop off the plate pos 546.
• Fabricate, fit and weld new flat bars pos 546.
• Pos 546 with section 50 x 25, OD 2060. Mat. ST52-3.
• Grip liners to be renewed on the 4 pcs ¼ clamp parts.
• Crack test of all new weld seams by dye penetrant or MPI

Lump sum price. …/ clamp.

K.2.4. Reconditioning bores of hinge pin spud hoisting clamp

Drawings:
• IHC 5242798 Arrangement spud hoisting clamp
• LD-10-00-030 Spud hoisting clamp

Scope:
• Assume the spud clamp is removed and dismantled under item K2.1
• Assume the holes of the hinge pin drawing 5242798 pos 506 are worn up to max 5mm on the diameter.
• Pre-machine the bores up to 2 mm undercut on diameter.
• Build up the worn holes in the plates LD 10-00-030 pos 523+525+562+563 and machine in line to nominal diameter of 141mm D10.

Lump sum price for one hinge side ....../hinge

K.2.5. Reconditioning bores of hoisting bracket

Drawings:
• IHC 5242798 Arrangement spud hoisting clamp
• LD-10-00-030: Spud hoisting clamp

Scope:
• Assume the spud clamp is removed and dismantled under item K2.1
• Assume the holes of the hoisting bracket 5242798 pos 502 are worn 4 mm on the diameter
• Build up the worn holes in the plates LD10-00-030 pos 533 & 566. Machine the bores in line to the nominal diameter of respective 171mm D10 & 187mm D10.

Lump sum price for one side. ....../side

K.3. spud sailing Bracket Main Spud

K.3.1. Overhaul spud sailing Bracket Main Spud

Drawings:
• IHC 5477068 Spud sailing Bracket
• IHC 5877967 Pin dia 80 L=880
• LD-11-00-044 Arrangement Spud sailing bracket
• LD-11-00-091 Platform + stowage for Locking pin on Spud sailing bracket

Scope:
• Disconnect the hydraulic cylinder and the spud sailing bracket 5477068. Transport to / from workshop.
• Build up by welding the worn hole in the plate 5477068 pos 1 machine to nominal size of 81 mm diameter.
• Fabricate and install 2 new eye plates thickness 35mm pos. 9 Drw. LDV 11-00-044.
• Build up the worn hole in the plate pos 3 and machine to nominal size of 80mm
• Renew the foundation plate 400x400x35 at the bottom of the support and at ship’s side. Including machining 12 holes dia 36mm and surface machining of the two foundation plates.
• Grit blast to SA 2.5 and paint with 3 coats owner supplied paint complete unit.
• Reassemble the spud sailing bracket with ship’s supplied new bushes and pins.
• Return and re-install the bracket and the hydraulic cylinder

Lumpsum: ... /bracket
K.4. Spud

K.4.1. Spud inspection of butt welds for cracks, for wall thickness measurement & diameter measurement.

Drawings:
- LD10-00-066 Spud D2000
- LD10-00-067 Spud D2000 as built
- LD10-00-060 Detail drawing holes in spud

- Erect staging where required from the main deck to the spud pole (3.0 meter height above deck).
- Assume the spud pole as per dwg LD 10-00-066 is stored horizontally on the foundations on deck
- Erect a staging under both ends of the spud pole. The inside of the spud pole is accessible via open manholes at both ends.
- UT check the 18 pcs circumferential butt welds welds on the spud from the inside. Diameter 2m, thickness 55-95 mm.
- UT check the welds on 4 pcs tilting hole inserts
- Measure the position of the butt welds with the spud point as reference
- Measure wall thickness of each pipe segment on 8 locations. In total the 18 x 8 measurements.
- Measure the inside diameter of the spud pipe in way of each thickness measurement, total 18 x 4 measurements.
- UT the conical plates, mark the problematic locations on a sketch and present to the superintendent.
- Measure the straightness of the spud pole using a laser and record every 2.0m the deviation horizontally and vertically
- Make a detailed report.

Price per spud pole: …../
Price per spud pole assuming the spuds are lifted off the vessel as per K.4.2 …./

K.4.2. Lifting of spuds

Drawings:
- LD10-00-066 Spud D2000
- LD10-00-067 Spud D2000 as built
- LD10-00-060 Detail drawing holes in spud

Scope:
- Erect staging’s in way of the spud supports and for access to hook on & off
- Erect stagings in way of the spud supports, seafastenings and lifting points.
- Remove / refit the sea fastenings. Remove / refit the upper half of the spud supports (1500kg). Transport all to to / from yard’s storage area.
- Lift the spud from the supports and transport the spud the dock floor, berth or temporary storage location. Yard is to provide, supply, fabricate suitable spud supports. Return the spud pole back to the vessel after inspection. Including supply of special lifting gear, spreaders, cranes, transport equipment.
- Weight spud: 130 ton. Length: 43.8 m
• Distance of location spare and auxiliary spud from ship side SB : 7m & PS : 16m
• Distance of location main spud from ship side SB : 10m & PS : 13m

Lump sum price for spare or auxiliary spud

Lumpsum price for main spud

K.4.3. Available

K.4.4. Spud supports.

Drawings:

• IHC 01175-1041-030 Foundations for supports of spuds
• IHC 5474738 Arrangement spud supports

K.4.4.1 Remove / refit spud support

• Assume the spud pole is removed under item K4.2.
• Remove the 24 tap bolts M36, Disconnect the spud support from the foundations
• Lift, transport the spud support to / from workshop. Weight 12.0 ton.
• Clean, dress up the tap bolt holes M36 on the deck foundation, cover during the dry-docking.
• After repairs, return, refit and refasten the spud support.

Price per support:

K.4.4.2. Overhaul spud support in the workshop.

• Assume the spud support is in the workshop
• Dismantle all parts. Remove and dismantle roller units pos 400, spud support pos 605, wire guides and wire sheaves, all bolts.
• Clean, dress up all parts. Dress up threads of all bolts and tap holes, apply molycte. Dismantle the pin and sheave, measure bore and pin, make a report.
• After dressing up all parts, re-assemble all with new ship’s supplied parts if applicable.

Price per support:

K.4.4.3. Grit blasting and painting spud support.

• Assume the spud support is dismantled and in the workshop under K4.4.2.
• Grit blast the steel spud supports and all steel attachments to SA 2 ½
• Apply 3 layers ship’s supplied paint.

Price per support.

K.4.5. Repairs of spud

Drawings:

• LD10-00-066 Spud D2000
• LD10-00-067 Spud D2000 LDV as build
K.4.5.1 Repairs of bent part spud pipe by cutting and re-welding

- Provide 2 additional supports iwo bent area. Gas cut the pipe in one location. Trim, align and adjust the 2 pipe lengths so the spud is back to straight line. Re-weld back the spud pipe section with pre-heat and post heat treatment.
- Repairs to be carried out in conjunction with and as per item K.4.5.1
- Assume the spud pipe is bent in a 2nd location.
- The yard is to cut a relatively short length out of the spud pipe as indicated by the owner. The shorter length will be compensated by the length of the insert pipe as per item K.4.5.1.
- The spud pipe parts are to be welded to each other as described in item K.4.5.1.

<table>
<thead>
<tr>
<th>Wall Thickness</th>
<th>Price per Butt Weld</th>
</tr>
</thead>
<tbody>
<tr>
<td>50mm</td>
<td>.../weld</td>
</tr>
<tr>
<td>55mm</td>
<td>.../weld</td>
</tr>
<tr>
<td>60mm</td>
<td>.../weld</td>
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<tr>
<td>65mm</td>
<td>.../weld</td>
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<tr>
<td>75mm</td>
<td>.../weld</td>
</tr>
<tr>
<td>80mm</td>
<td>.../weld</td>
</tr>
<tr>
<td>95mm</td>
<td>.../weld</td>
</tr>
</tbody>
</table>

K.4.5.2. Repairs to conical plates of spud tip.

Drawings:
- LD 10-00-066 Spud OD2000
- LD 10-00-010 Conical spud tip
- LD 10-00-A002443 Order drawing Spud point

Scope:
- Assume the spud is lifted off the vessel as per K4.2
- The yard is to provide the necessary transports, repair yard, pipe supports, cranage, tools, consumables, safety gear, staging and all others to repair the spud.
- The conical closing plates, 50mm thickness, of the spud tips are to be renewed. See drawing LD 10-00-A002443 position 2
- Open/close the plug detail 2 on drawing LD 10-00-A002443.
- Crop off and remove the existing conical spud tip plates.
- Fit and align owner supplied conical spud tip plates as per drawing LD10-00-A002443 position 2
- After approval of the alignment by the owner representative, the new point segments are to be welded according to the welding instruction on the drawing LD 10-00-A002443.
- Yard will hand over a detailed repair procedure to the owner prior start of works.
- In any case the yard must follow all instructions as per drawing LD-10-00-066 with special attention to be paid to:
  - The pre-heating and temperature to be controlled during and after the welding as prescribed. Values to be registered.
- the alignment of the spud pole to be checked prior, during and after the welding,
- After welding, welds to be grind flush at the outside of the spud pole.
- After welding NDT to be carried out on the butt welds: 100% UT and X-ray testing on the „T“ joints and if necessary to be repaired and retested.
- Let it be clear that this is a job to be finished in 1 time in day-and-night shift with electrical heating to be done by electrical resistors with slow controlled cooling down after all the welding is finished.
- Temperature to be recorded.

Lump sum price for complete spud tip plates (complete cone made of 4 plates). …/
Lump sum price for one segment spud tip plate (1/4 cone made of 1 plate). …/

Additional price to supply conical segment according drawing LD-10-00-010
(material S355)

Lump sum / segment (1/4 cone). …/

K.4.5.3. Repairs of central shaft spud.

Drawings:
- LD 10-00-066 Spud OD2000
- LD 10-00-010 Conical spud tip
- LD 10-00-A002443 Order drawing Spud point
- Sketch G.175.2 Repair of central shaft spud

Scope:
- Assume the spud is lifted off the vessel as per K4.2
- The yard is to provide the necessary transports, repair yard, pipe supports, cranage, tools, consumables, safety gear, staging and all others to repair the spud.
- Assume the conical plates on the spud point are removed under G.175.1
- A part of the central shaft diam 300mm of the spud and a part of the 4 pc stiffener plates, 50mm thickness is to be renewed according sketch G175.2.
- Crop off and remove indicated part of central shaft and stiffener plates.
- Fit and align owner supplied shaft and plates, as per sketch G175.2
- After approval of the alignment by the owner representative, the new shaft piece and stiffener pieces are to be welded according to the welding instruction on the drawing LD-10-00-A002443
- Yard will hand over a detailed repair procedure to the owner prior start of works.
- In any case the yard must follow all instructions as per drawing LD-10-00-A002443 with special attention to be paid to:
  - The pre-heating and temperature to be controlled during and after the welding as prescribed. Values to be registered.
  - the alignment of the spud point to be checked prior, during and after the welding,
After welding, welds to be grind flush at the outside of the spud pole.
After welding NDT to be carried out on the butt welds: 100% UT and X-ray testing on the „T“ joints and if necessary to be repaired and retested.
Let it be clear that this is a job to be finished in 1 time in day-and night shift with electrical heating to be done by electrical resistors with slow controlled cooling down after all the welding is finished. Temperature to be recorded.

Lump sum.

Additional price to supply, fabricate central shaft dia 300mm x 890mm length and 4 stiffener plates, 1000 x 400 x 50mm thickness in S355, as per sketch G175.2

Lump sum.

**K.4.5.4. Renew tilting/transport hubs of spud**

**Drawings:**
- LD-10-00-066 Spud 2000
- LD-10-00-060 Boss for tilting spuds

**Scope:**
- Assume the spud is lifted off the vessel as per K4.2
- The yard is to provide the necessary transports, repair yard, pipe supports, cranage, tools, consumables, safety gear, staging and all others to repair the spud.
- Crop off and remove the existing Boss, pos 5 on drawing LD-10-00-066 in the spud segments.
- Fit and align owner supplied boss pieces as per drawing LD10-00-066 pos 5.
- After approval of the alignment by the owner representative, the new boss pieces are to be welded according to the welding instruction on the drawing LD-10-00-066 and LD-10-00-060
- Yard will hand over a detailed repair procedure to the owner prior start of works.
- In any case the yard must follow all instructions as per drawing with special attention to be paid to:
  - The pre-heating and temperature to be controlled during and after the welding as prescribed. Values to be registered.
  - The alignment of the spud pole to be checked prior, during and after the welding.
  - After welding, welds to be grind flush at the outside of the spud pole.
  - After welding NTD to be carried out on the butt welds: 100% UT and X-ray testing on the „T“ joints and if necessary to be repaired and retested.
- After welding the boss, fit and weld position 2 & 3 on drawing LD10-00-060 according the instructions on the drawing.
- In way of the repairs, spud inside to be sandblasted completely to SA2.5 and to be painted with 3 layers of owner supplied paint
K.5. Spud hoisting cylinder

K.5.1 Renewal of rod seals spud hoisting cylinder in situ

**Drawings:**
- IHC 5474715 Sheave Box for spud hoisting cylinder
- IHC 5474718 Arrangement Sheave box for spud hoisting.
- IHC 503573 Arrangement spud in working position.
- IHC 5474735 Arrangement sensors for spud handling
- Brauer 81.6305 Spud hoisting cylinder + parts list

**Scope:**
- Erect a staging in way: 3 x 3x 8 m
- Assume that the spud hoisting wires pos. 891 and pos. 897 drwg. 503.573 are removed by the crew.
- Disconnect / re-connect the grease line from / to sheave box. Lift off the complete sheave box pos. 800 drwg. 503.573 by removing 2 nr. Locking bolts pos. 822 drwg. 547.4718. Measure the cylinder rod diameter & bore in sheave box.
- Dismount/reinstall, clean up the pivot plate.
- Remove /reinstall pos. 155 (drwg.: 5474735) from spud hoisting cylinder shaft. Measure and record the distance before removing.
- Remove / reinstall the seal cover of hoisting cylinder (Pos. 5 drwg. 81.6305) by unbolting pos. 6. Transport pos. 5 and 6 to/from the workshop.
- Clean up, dress up and measure all parts. Make a report.
- Renew all seals and bushings pos : 20, 28, 42, 18, 29 with owner supplied parts.
- Tighten bolts nr 42 (20pcs) to correct torque: 3670Nm.

Lump sum: .../cylinder

K.5.2. Removal / renewal of spud hoisting cylinder.

**Drawings:**
- IHC 5474715 Sheave Box for spud hoisting cylinder
- IHC 5474718 Arrangement Sheave box for spud hoisting.
- IHC 503573 Arrangement spud in working position.
- IHC 5474735 Arrangement sensors for spud handling
- IHC 5242831 Sea fastening spud hoisting cylinder
- Brauer 81.6305 Spud hoisting cylinder + parts list

**Scope:**
- Erect a staging in way.
- Remove / reinstall the spud hoisting wires pos. 891 and pos. 897 drwg. 503.573.
- Disconnect / re-connect the grease line from / to sheave box. Disconnect / re-connect the hydraulic pipes to the cylinder.
- Remove / re-install the sea fastening bracket (IHC 5242831).
- Remove/reinstall pos. 155 (IHC 5474735) and the electrical cable from spud hoisting cylinder shaft. Measure and record the distance before removing.
- Disconnect, remove the complete hoisting cylinder. Transport to/from the workshop. (11 tons)
- Remove the complete sheave box (pos. 800 IHC 503.573) by removing 2 nr. Locking bolts (pos. 822 IHC 5474718). If this sheave block is removed while the cylinder is still mounted on the ship – this is included.
- Clean up, dress up and measure all parts. Make a report.
- Install the complete sheave box pos 800 on the cylinder. Return to the ship, reassemble, re-install and reconnect all.

Lump sum: .. / cylinder

**K.5.3. Overhaul of spud hoisting cylinder**

81.6305.Brauer : Spud hoisting cylinder + parts list

- Assume the cylinder is removed under item K4.2.
- Cylinder diameter 440 x 4000mm stroke.
- Disconnect the ball joint foundation from the cylinder. Clean, dress up flanges and ball joint.
- Dismantle the cylinder completely. Remove the rod and check the straightness on lathe.
- Clean, dress up and measure all parts. Make a report.
- Re-assemble the cylinder with ship’s supplied new seals and gaskets and other new parts if required.
- Pressure test the cylinder in the workshop – 250bar.
- Degrease the exterior of the cylinder, de-rust to ST3 and paint with 3 layers ship’s supplied paint.

Price: .. /Cylinder

**K.5.4 Overhaul of Sheave box spud hoisting cylinder**

Drawings:
- IHC 5474718 Arrangement Sheave box for spud hoisting.
- IHC 5826632 Parts list for sheave box for spud hoisting clamp.
- IHC 5474719 Greasing diagram sheave box spud hoisting.
- IHC 5826687 Parts list Spud hoisting.

Scope:
- Assume that the sheave box is mounted/dismounted as per item K.5.1 or K.5.2.
- Transport the sheave box to/from the workshop
- Degrease & clean the complete sheave box
- Remove/reinstall all sheaves pos. 825, and 2 sheaves pos. 810.
- Remove /reinstall thrust plate pos 820 from sheave block.
- Clean up, dress up all threaded holes, inspection and measuring of all parts (bushing, shafts). Make a report.
- Re-assemble the shave box with repaired or new ship’s supplied parts.
K.5.5. Reconditioning bore holes of sheave box.

Drawings:
- IHC 5474718 Arrangement Sheave box for spud hoisting.
- IHC 5826632 Parts list for sheave box for spud hoisting clamp.

Scope:
- Assume the sheave box is removed under item K4.1 or 4.2 and the bores holes of the sheave pins are worn 3mm on the diameter.
- The bores in the housing is to be repaired by building up by welding and machining to nominal diameter.

Price is for welding and line boring the two opposite plates
Price for bore hole of shaft main sheave - diameter 400mm D10
Price for bore hole of auxiliary sheave – diameter 140 mm C11

K.5.6. Repair paint system sheave box.

IHC 5474718 Arrangement Sheave box for spud hoisting.

- Assume the sheave box is removed under item K4.1 or 4.2
- Cover all machined area’s
- Transport from/to repair shop to/from blasting and painting area
- Grit blast the sheave box and the sheaves to Sa 2 ½
- Apply 3 layers of owner’s supplied paint

Lump sum price. …/unit

K.6. Dismantling and removal spud carrier and spud parts

K.6.1. Degreasing of spud carrier, rails & well

Drawings:
- LD-10-00-072 Arrangement spud carrier
- IHC 5242774 Arrangement spud keeper doors

Scope:
- Erect a hanging platform staging in the spud well, l*w = 6 x 5 m
- Scraping, degrease (incl. disposal of grease and rags), HP wash and Chemical wash, the complete spud carrier and spud carrier well from the forecastle deck level till flat bottom. Especially the areas i.w.o. the wheel tracks. Collect, dispose off all residue water and grease.
- Assume the spud carrier will have to be moved (by ship’s crew) to have better access to all area’s.

Lump sum price: …/unit

K.6.2. Spud carrier, removal and refitting of spud keepers

Drawings:
IHC 5242770 Spud keeper PS for spud carrier
IHC 5242773 Spud keeper SB for spud carrier
IHC 5242774 Arrangement spud keeper doors
LD 10-00-072 Arrangement spud carrier
LD 10-00-074 upper pin oversize
LD 10-00-075 sheet 6 repair hinges spud keepers
LD 10-00-A000316 dummy spud

Scope:
- Assume the working spud is either in horizontal position on the crane deck, or is removed by the yard under item K4.2.
- A double door is mounted on the forward side of the spud carrier. These two doors form part of the main spud trunk and are opened when tilting the spuds. Assume that the spud keeper doors are in closed position upon arrival in the yard.
- Erect a staging from the dock floor up to the top of the spud carrier: l*w*h= 1.4x1.4x14m
- Remove/ refit the 4 nos. hinge pins of the two doors. Remove / refit the 2 nos. spud keeper doors.
- Note weight of 16.5 ton per piece. Transport the spud keeper doors to / from the workshop.
- Clean, dress up the pins and hinge bores. Measure pins and bores, note measurements on drawing LD 10-00-075. Dye-check the hinges on cracks.
- Measure the thickness of the wear plates by UT device. Assume 40 points to be measured. Make a report.
- Erect a staging in way of the spud pole well. Measure the thickness of the wear plates at ship’s side. Assume 20 point to be measured. Issue a report.
- Sweep blast to SA1 ½ and paint the spud keepers and hinge pins with 3 layers Owner’s supply epoxy paint.
- When door is installed, test with the owner supplied dummy spud, include all hoisting manoeuvres and equipment.

Lump sump price for 2 spud keeper doors and 3 pins each:  

Additional for thermal lancing out one upper pin (LD 10-00-074) in situ.  

K.6.3. Auxiliary spud, removal and refitting of spud door

Drawings:
- IHC 01175-1607-010 Spud keeper for auxiliary spud.
- LD 10-00-074 upper pin oversize
- LD 10-00-075 sheet 7 Repair hinges aux spud keeper
- LD 10-00-A000316 dummy spud

Scope:
- Assume auxiliary spud is in the tilted (horizontal) position.
• The forward part of the auxiliary spud trunk is a single door. The door is opened / closed to tilt the spud. Assume that the spud keeper door is in closed position upon arrival in the yard.
• Lift out, remove the two fixing pins. Open up the spud keeper door.
• Lift out, remove the two turning pins. Note that the fixing and turning pins are connected with a link and can be pulled out from the upper deck.
• Lift, transport the spud keeper door to the workshop (36 tons).
• Clean, dress up the pins and hinge bores. Measure pins and bores. Measurements to be noted in drawing LD 10-00-075 sheet 7. Dye-check the hinges on cracks and issue a report.
• Measure the thickness of the wear plates (pos 124 and 125 / IHC 01175-1607-010). Assume 20 point to be measured per plate and issue a report.
• Sweep blast to SA1 ½ and coat the spud door and hinge pins with 3 layers Owner’s supply epoxy paint.
• When door is installed, test with the owner supplied dummy spud, include all hoisting manoeuvers and equipment.

Lump sum price for 1 spud keeper door and total 4 pins: .... /

Additional for thermal lancing out one upper pin (LD 10-00-074) in situ. ...

pin

K.6.5. Removal and refitting of travelling cylinder

LD-10-00-072 : Arrangement spud carrier

• Assume ship's crew moved the spud carrier to its most forward position, i.e. cylinder completely extended.
• Assume vessel's hydraulic system is not in use. Movement of the cylinder rod has to been done mechanically, or by connecting a temporary hydraulic set onto the cylinder (hydraulic power pack to be provided by the yard with all hoses and connections, to be included in the price).
• The connection of the cylinder onto the spud carrier inside the spud carrier is easily accessible via a door on upper deck level; the connection is one level down. No access works or staging is required inside the spud carrier. The necessary hoisting lugs are present.
• Disconnect / reconnect the dia 1250 mm endplate inside the spud carrier section 4 by removing 28 nos. M36 bolts
• After loosening the bolts extend the hydraulic cylinder slightly to gain access to the bolts of the cylinder.
• Disconnect / reconnect the cylinder from the spud carrier section no. 4 by removing 16 nos. M24 bolts. Temporary support the cylinder rod before disconnecting.
• Disconnect / reconnect hydraulic piping on the cylinder, i.e. inboard (h- room) and outboard (spud carrier well). Temporary plug the piping and cylinder. Clean up oil spills on the dock floor an on board the vessel. Dispose off the oil.
• Disconnect / connect the 24 nos. bolts M30 from the bulkhead penetration.
• Clean, dress up all fasteners and foundations.
• Rig out / in the spud carrier cylinder (weight 7.5 ton). Transport the cylinder to the workshop. Clean, remove and dispose off the oil.
• Transport a new owner’s supplied cylinder to the ship and install as per above.

Lump sum: ...

K.6.6. Removal and overhaul of forward and aft traverse assembly (traverse + bogies + wheels)

Drawings
• LD 10-00-072 Arrangement spud carrier
• IHC 5474702 Arrangement bogie
• IHC 5474712 arrangement traverse I
• IHC 5242799 spud carrier installing
• IHC 578779 Arrangement jack foundation section 3

Scope:
• Assume spud carrier is moved by the crew to a position allowing removal of the traverse. Disconnect the hydraulic cylinder from the spud carrier according specs K.6.5. Ship’s crew will retract the cylinder.
• Erect staging in the spud carrier well i.w.o. the central bore.
• Disconnect / reconnect the grease lines.
• Remove / reinstall cover (pos 537 / IHC 5474712) and the securing plate (pos 536 / IHC 5474712).
• Jack up the spud carrier with 2 nos. 100T hydraulic jacks. The spud carrier is provided with suitable brackets for the jacking up (position 86 on drawing LD-10-00-072).
• If both traverses are to be removed, yard to supply the four (4) foundation plates 250 x 250 x 40 and four (4) hydraulic jacks 100 ton, hoses, power pack (IHC 578779). For location of the jacks verify drawing IHC 5242799 “vijzel” in section B-B and C-C. Tack weld / cut loose the foundation plates to/from the ship.
• Lift the traverse assy with crane (total weight traverse including 2 bogies = about 26 ton).
• Gently travel the traverse horizontally towards the end of the hollow shaft. Bear in mind the play is only about 0.5 mm.
• Turn the bogie 90° in the spud carrier well to take out the wheels out of the recesses in the ship's hull.
• Lift out the traverse assy from the spud carrier well and land it ashore. Transport the traverse assy to the yard's workshop.
• Remove / refit both bogies from the traverse by removing / refitting the covers pos 531 and locking plates pos 530. Dismantle; remove the wheels and pins from the bogies.
• Measure all bores, bushes, shafts & wheels of the bogies and traverse assembly. Measure the hollow shaft of the spud carrier. Dye-check hollow shaft, all bores, pins, bushes and connecting parts of the traverse and bogies. Make a report.
• Re-assemble the bogies and traverse assembly with old or owner’s supplied new traverse, pins and wheels if required. Return to ship and refit the traverse assembly onto the spud carrier.
Frabication and supply of Teflon sliding shoes for spud carrier.

- Assume the spud carrier without one (1) or both (2) traverses has to be slided forward / aftward in the spud carrier well.
- Design and supply steel structure \( H = 200 \text{ mm}, L = 500 \text{ mm}, W = 200 \text{ mm} \) with Teflon layer of 50 mm thick, able to withstand load of 80 ton.
- Four (4) pieces to supply.

Lump sum: ... / 4 sliding shoes.

**K.6.7. Hose track spud carrier remove / refit**

<table>
<thead>
<tr>
<th>IHC</th>
<th>01175-2516-660</th>
<th>Hose track for spud carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHC</td>
<td>01175-2516-700</td>
<td>supporting hose track spud carrier</td>
</tr>
</tbody>
</table>

Scope:

- Disconnect / connect and blank of all hydraulic pipes on both sides of the track arrangement (5 hoses 2” with SAE split flanges and 6 hoses 1” with fittings)
- Remove / refit hydraulic hoses on power supply track.
- Clean and dispose off oil spills.
- Disconnect / connect all electric cables (15 cables of dia 10 to 25 mm) in junction box in spud carrier and open up 1 MCT bulkhead penetration on the ship and 1 on the spud carrier. Pull back all cables from the spud carrier dia 139.7 mm cable guide pipe and from power supply track and coil them up in the ship, emergency generator room.
- Renew the electric cable guide pipe (dia139.7 x 4, hot dip galvanised, total length 8m with 6 bends, (bended to long radius)
- Disconnect / connect power supply track from spud carrier and ship by removing 2 stainless steel pins on both ends. Lift and store the track in a safe and suitable place.
- Crop / renew the 5 nos. vertical H-beams supporting the hose track (HEB 200). Assume 6 m in total.
- Surface preparation according specs E.8. and coating repair according specs F.1. vertical sides below water line.
- Including all permits, transports, staging, etc.

Lump sum lifting in and out.

**K.6.8. Tilting arms arrangement spud carrier remove / refit.**

Drawings:

- LD 10-00-072 Arrangement spud carrier
- IHC 5242764 Arrangement tilting arms for spud
- IHC 5474707 Tilting arm for spud

In total two (2) tilting arms are installed on the spud carrier (drawing LD-10-00-072 position 16).
• Assume the tilting arms are in the horizontal position (LD-10-00-072 detail ‘end position spud tilting’).
• Erect staging’s to access the hinge of the tilting arms. 2 staging’s l*w*h= 6 x 3 x 7 m
• Disconnect, remove the hydraulic cylinder (IHC 5242764 position 570).
• Disconnect, remove the tilting arms and the connecting link (IHC 5242764 pos 501, 502 and 503). Supply, install, and weld brackets and hydraulic equipment to jack out the hinge pins. If the yard requires installing and welding hoisting eye plates, this is included.
• Transport all to workshop or store at a suitable place.
• Dress up bores, boltholes and pins.
• Grit blast the tilting arms to specs E.8. and coat to specs F.9.
• Return and re-install and connect on board in the horizontal position, including installation and modifying the staging.

Lump sum price for 2 tilting arms: …./


**K.7. Repairs of spud carrier parts**

**K.7.1. Overhaul hinge pins of main and auxiliary Spud**

**Drawings**
- IHC 5242774 Arrangement Spud keepers for Main Spud
- IHC 5826607 Upper Pin
- IHC 5826608 Lower Pin
- IHC 5826609 Connection Pipe for Aux Spud Doors
- IHC 5826610 Connection Pipe for Main Spud Doors
- IHC 5826684 Shaft dia. 70
- IHC 5826685 Connection Link
- LD 10-00-072 Arrangement Spud carrier
- LD 10-00-073 oversized lower pin OD280 L=1595
- LD 10-00-074 upper pin oversize

**Scope:**
- In total there are 3 pin assemblies from the main spud and 2 pin assemblies from the auxiliary spud. One pin assembly consists of the bottom and upper pin, connected to each other with a connection link.
- Total length pin assy spud carrier : 9350mm. Total length pin assy auxiliary spud : 8255mm
- Assume pins have been removed under item K6.2 & K6.3. Transport the pin assemblies to the workshop.
- Pins are locked by welded cover plates. Cut off plates, dismantle all & grit blast all connecting links to SA2.5 and paint with 3 layers of ship’s supplied paint. Dye-check all connection parts for cracks. Make a report.
- Re-assemble with new ship’s supplied parts. Supply, fit and weld cover plates at each side of the pins. Repair the paint system in way.

**Price per Spud carrier pin assy :** ... / pin assy
**Auxiliary spud pin assy :** ... / pin assy

Additional price to machine a ship’s supplied oversized pin (LD 10-00-073 ~ 074) to size. Including fitting and welding the hinge plates at both ends after machining:
.../pin

**K.7.2. Renew wear plates for main Spud**

**Drawings**
- LD 10-00-072. Arrangement Spud carrier
- IHC 5242752 Lay Out Spud carrier
- IHC 5242770 Spud keeper PS for Spud carrier
- IHC 5242773 Spud keeper SB for Spud carrier
- IHC 5242774 Arrangement Spud keepers for Main Spud
- IHC 5242774 Parts list Spud keeper for Main Spud
- IHC 5242785 Spud carrier Section 6
- IHC 5242782 Spud carrier Section 3
• LD 10-00-012 : Order drawing Wear plates Spud carrier Sect. 3 & 6
• LD 10-00-013 Order drawing Wear plates Spud keeper Spud carrier.

Scope:
• Assume that the two spud keeper doors are removed and in the workshop. Assume that the wear plates are measured and are found to be renewed. All as per K6.2.
• Staging is erected as per K6.2, including modification of staging to access the wear plates fitted on the spud carrier.
• Crop off, cut and remove the worn wear plates, either in workshop or in situ depending location. Clean, de-rust the underlying surface by grit blasting to SA1. Remove & grind the remaining weld seams.
• Fit, adjust and weld new owner's supplied wearing plates, on top and bottom; thickness 25mm according to drawing.
• All hot works to be performed prior any paint works in the spud carrier. In case no paint works are planning in the spud carrier, coating repair for all the burnt marks inside the spud carrier according specs F.10.

IHC 5242770  spud keeper PS  2 wearing plates
• section C-C & section A-A, R = 1010mm, H=1025, pos. 340 ... / unit
• section R-R & section V-V, R = 1010mm, H=1030. pos. 323 ... / unit

IHC 5242773  spud keeper SB  2 wearing plates
• section C-C & section A-A , R = 1010mm, H=1025, pos. 373 ... / unit
• section R-R & section V-V, R = 1010mm, H=1030, pos. 361 ... / unit

IHC 5242785  spud carrier section 6  1 wearing plate
• section LL R = 1010mm, H=750, pos. 119 ...../unit

IHC 5242782  spud carrier section 3  1 wearing plate
• Sections EE-FF & HH R = 1010mm, H=750, pos. 190 ... / unit

Additional quote to fabricate and supply wear plate as per drawing:
• LDV 10-00-12pos. 190 H=750 ... / pc
• LDV 10-00-12pos. 119 H=750 ... / pc
• LDV 10-00-13pos. 340 H=1025 ... / pc
• LDV 10-00-13pos. 323 H=1030 ... / pc
• LDV 10-00-13pos. 361 H=1030 ... / pc
• LDV 10-00-13pos. 373 H=1025 ... / pc

K.7.3. Renew wear plates for Auxiliary Spud

Drawings:
• IHC 01175-0323-030, SH1 Construction Plan Fore ship
• IHC 01175-1606-010, SH3 PS Spud section Fr. 141-148
• IHC 01175-1607-010 Spud keeper for Aux. Spud on PS
Scope:
- Assume that the spud keeper door portside is removed and in the workshop according specifications K.6.3. Assume that the wear plates are measured and are found to be renewed.
- Crop off, cut and remove the worn wear plates. Clean, de-rust the underlying surface by grit blasting to SA1. Remove & grind the remaining weld seams.
- Fit, adjust and weld new owner's supplied wearing plates, on top and bottom; thickness 25mm according to drawing.

Liner in ship 970 mm above ship’s base; H=2600 mm, pos. 291 / IHC 01175-1606-010 sheet 3 ... / unit

Liner in ship 7880 mm above ship’s base; H=1400 mm, pos. 290 / IHC 01175-1606-010 sheet 3 ... / unit

Liner in spud keeper 970 mm above base; H=2600 mm, pos. 124 / IHC 01175-1607-010 ... / unit

Liner in spud keeper 7880 mm above base; H=1400 mm, pos. 125 / IHC 01175-1607-010 ... / unit

Additional quote to fabricate and supply wear plate as per drawing:
LD 10-00-14 pos. 290 H=1400 ... / pc
LD 10-00-14 pos. 291 H=2600 ... / pc
LD 10-00-15 pos. 125 H=1400 ... / pc
LD 10-00-15 pos. 124 H=2600 ... / pc

K.7.4. spud carrier sliding block arrangement
The spud carrier is equipped with two (2) sliding block arrangements, one on PS and one on SB. Verify position 28 on drawing LD 10-00-072. Both are located in section 6 of the spud carrier, verify drawing IHC 524785.

Drawing:
- IHC 5242766 Arrangement Sliding Block for Spud carrier
- IHC 5242777 section plan spud carrier.
- IHC 5242785 spud carrier section 6
- LD10-00-072 Arrangement spud carrier

K.7.4.1. Sliding block overhaul with spud carrier in place
Drawing:
- IHC 5242766 Arrangement Sliding Block for Spud carrier
- IHC 5242785 spud carrier section 6
- IHC 5826649 adjusting pin
- IHC 5875988 fastening plate
Scope:
- The arrangement is accessible from inside the spud carrier.
- Assume the vessel is dry docked and the spud carrier is installed in the schip.
- Assume all spares owner supplied.
- Including ventilation, gas free certificate, temporary lightning, transports between ship and workshop, hot work permits, etc.
- Closing and opening of two (2) manhole covers for access between section 6A and 6B.
- Pump out remaining sea water from subsection 6A and 6B.
- Loosen and dress up the gland packing arrangement. Renew the bolts, nuts and thread ends. Clean-up the thread holes of bush detail 12 on drawing IHC 5242785.
- Disconnect, dress up the thread and verify the functioning of the grease supply pos 127. Crew will activate grease supply. Accessible from outside the spud carrier.
- Loosen and dress-up up the adjusting pins positions 130 and thread ends position 142. Renew the washers and nuts.
- Remove the filling plates pos 134 – 135 and clean-up the mating surface on the pressure piece and the spud carrier construction.
- Dress up the guiding piece pos 132 and the foundation 133.
- Retract the pressure piece pos 126 inside and clean up the mating surface with rail.
- Apply copper grease to all movable part, yard supply.
- Assemble the complete system and adjust the position of the pressure piece pos 126 to adjust / minimize the clearance at both sides by jacking out the sliding block pos 126.
- Test if the clearance is sufficient along the complete stroke of the spud carrier. Fix this clearance by adding or removing filling plates behind the sliding blocks. New filling plates to be fabricated by the Yard.
- Measure the distance between both rails and the distance of both rails to the center of the vessel every 0.5m. Rails are located 1050 mm above base. Issue a report and submit to owner.

Lump sum PS & SB units …/ set
Additional for supply of adjusting pin IHC 5826649 …/ unit
Additional for supply of fastening plate IHC 5875988 …/ unit

K.7.4.2. Sliding block overhaul with spud carrier removed

Drawing:
- IHC 5242766  Arrangement Sliding Block for Spud carrier
- IHC 5242785  spud carrier section 6
- IHC 578762  pressure piece
- IHC 5826649  adjusting pin
- IHC 5875988  fastening plate

Scope:
• The arrangement is accessible from inside the spud carrier.
• Assume the vessel is dry docked and the spud carrier is removed from the schip.
• Assume all spares owner supplied.
• Closing and opening of two (2) manhole covers for access between section 6A and 6B.
• Pump out remaining sea water from subsection 6.
• Loosen and dress up the gland packing arrangement. Renew the bolts, nuts and thread ends. Clean-up the thread holes of bush detail 12 on drawing IHC 5242785.
• Disconnect, dress up the thread and verify the functioning of the grease supply pos 127. Crew will activate grease supply. Accessible from outside the spud carrier.
• Loosen and dress-up up the adjusting pins positions 130 and thread ends position 142. Renew the washers and nuts.
• Remove the filling plates pos 134 – 135 and clean-up the mating surface on the pressure piece and the spud carrier construction.
• Dress up the guiding piece pos 132 and the foundation 133.
• Pull out the pressure piece pos 126 via the outside from the spud carrier and clean up the mating surface with rail and the journal. Measure the OD of the journal bearing surface. Submit report to owners’ representative.
• Clean-up and measure ID of bush details 12 and 13 on drawing IHC 5242785.
• Apply copper grease to all movable part, yard supply.
• Measure the distance between both rails and the distance of both rails to the center of the vessel every 0.5m. Rails are located 1050 mm above base. Issue a report and submit to owner.
• Once the spud carrier is placed back in the ship, assemble the complete system and adjust the position of the pressure piece pos 126 to adjust / minimize the clearance at both sides by jacking out the sliding block pos 126.
• Test if the clearance is sufficient along the complete stroke of the spud carrier. Fix this clearance by adding or removing filling plates behind the sliding blocks. New filling plates to be fabricated by the Yard.

Lump sum PS & SB units …/ set

Additional for removing and fitting new bush detail 13 on IHC 5242785 …/ unit

Additional for supply of adjusting pin IHC 5826649 …/ unit
Additional for supply of fastening plate IHC 5875988 …/ unit
Additional for supply of bush detail 13 on IHC 5242785 …/ unit
Additional for supply of new pressure piece IHC 578762 …/ unit

K.7.4.3. Renewal of sliding block with spud carrier in place

Drawings:
• LD-10-00-072 Arrangeement Spud carrier
• IHC 5242766 Arrangeement Sliding Block for Spud carrier
• IHC 5242785 Spud carrier Section No. 6
• IHC 5242786 Spud carrier Section No. 5
• IHC 0578762 Pressure Piece
The purpose of this repair is to replace the side sliding block of the spud carrier by a new one, because there is too much clearance between the sliding piece (pos.126 on drawing IHC 5242766) and the bush (pos.112 and pos 113 on drawing IHC 5242785). Therefore water has been leaking through the sliding piece into section no. 6 of the spud carrier.

The repair has to be done without removing the spud carrier from the spud carrier well.

Scope:
- Erect a staging
- Drain all water from the spud carrier section no. 6 by opening docking plug.
- Disconnect grease pipe pos. 127 and adjusting pins pos. 130.
- Cut out the complete sliding piece according to the cuts no.’s 1 to 5 as marked on the extracts of drwg. 5242785, and remove downwards.
- Grind and cut all welding remnants from the spud carrier. Prepare all bevels according to construction drawing and given welding details.
- Machine the bush drwg. 582.6646 (with undersize ID + oversize OD) acc. to drawing 5242785 “Detail Bush”, except for the hole dia 18.5mm for the grease connection.
- Fit the new sliding piece pos. 126 into the new bush drwg. 582.6646. Fit the Gland pos. 128 onto the sliding piece. (All Owner supplied)
- Fabricate a new insert for the inner plate thickness 40mm and fit and weld it onto the bush drwg. 582.6646 according welding detail 11.
- Fit the new bush + inner plate in the spud carrier and weld it to the top plate and the existing parts of the inner plate according to welding detail nr. 7.
- Fabricate and fit a new insert for the bottom plate. Weld it to the inner plate according welding detail nr. 7, weld it to existing parts of bottom plate according detail nr. 4.
- Drill and tap the connection for the grease pipe pos. 127. Fabricate and install the grease pipe pos. 127.
- Before closing the watertight compartment of the sliding piece with the closing plate, remove all dirt, clean and paint according surrounding paint system.
- Fabricate and fit a new insert for the Closing plate and weld it to the top and bottom plate according welding detail nr. 6, and to the existing closing plate according detail nr. 20.
- Insert gland packing pos. 150 (Owner’s supplied), install and tighten the gland pos. 128.
• Reinstall adjusting plate pos. 129 and adjusting pins pos. 130.
• Following parts are owner supplied: pos. 126, 128, 129, 130, 131, 134, 135, 136, 137, 147, 148, 149, Bush drwg. 5826646 (oversized)
• All other parts yard’s supply.
• Measure the distance between both rails and the distance of both rails to the center of the vessel every 0.5m. Rails are located 1050 mm above base. Issue a report and submit to owner.

Lump sum price.

K7.5. Overhaul of travelling cylinder
• Assume that the travelling cylinder is transported to the workshop as per item K.6.5 or delivered to the yard in owner’s container.
• Dismantle the cylinder. Clean dress up all parts
• Put the cylinder rod on the lathe – check straightness
• Measure all parts – make a report
• Re-assemble the cylinder with ship’s supplied new seals.
• Function test the cylinder in the workshop up to 250 bar.
• Repair the damaged paint system to ST3 and painting 3 layers paint.
• Return the cylinder in owner’s container and secure.

Price per cylinder: ...

K.7.6. Renew bushes traverse & hollow shaft
**Drawings:**
- LD-10-00-072: Arrangement Spud carrier
- IHC 5474712 + LD-10-00-055 Arrangement Traverse II

**Scope:**
- Assume the bogies are removed from the traverse and are in the workshop under item K6.6.
- Renew the bushes as per requirement. Fabricate a pulling plate and pull out the bushes by hydraulic jacks. Clean, dress up the bore or shaft. Measure the shaft or bore. Make a report.
- Owner will supply new bushes in under / oversize. The bushes are to be machined to suit the corresponding bore and shaft diameters
- Shrink fit the bushes in the bores or heat up the bushes and fit on the shaft. Afterwards make a final measurement report.

Price per bush 5474712 + LD-10-00-055 pos 543 (D495/445x415): ...
Price per bush 5474712 + LD-10-00-055 pos 540 (incl renewing blocks pos 549) ...
Price per bush 5474712 + LD-10-00-055 pos 533 ...
Price per bush 5474712 + LD-10-00-055 pos 101 ...
Price per bush 5474712 + LD-10-00-055 pos 102 ...

K.7.7. Auxiliary spud door arrangement, renew hinge bushes
**Drawings:**
- IHC 01175-1606-010 sheet 3 PS spud section FR 141 ~ 148

238/568
- IHC 01175-1607-010 Spud keeper for auxiliary spud.
- LD 10-00-075 sheet 7 repair hinges aux spud keeper
- LD 10-00-078 sheet 2 Bush OD300 x ID255 x L134

Bushes are to be renewed in
- The hinge plates of the aux spud door (pos 20 ~ 27 / IHC 01175-1607-010).
- The hinge plates of the ship (IHC 01175-1606-010 sheet 3)

Scope:
- Assume the auxiliary spud keeper is removed as per item K.6.3.
- Assume ID of the bushes are measured and out of limit. Cut, crop and push out the worn bush.
- Dress-up and measure the ID of the bore housing of all hinges, ship side and door side. Measurements to be noted in drawing LD 10-00-075 sheet 7.
- Machine the owner’s supplied over- and undersized bush (LD 10-00-078) to the actual measured size.
- Skrink-fit the bush with liquid nitrogen. Tack weld bush to the bore housing.

Price per bush in door. .../
Price per bush in ship. .../

K.7.8. Main spud keepers arrangement, install hinge bushes

Drawings:
- IHC 5242770 Spud keeper PS for spud carrier
- IHC 5242773 Spud keeper SB for spud carrier
- IHC 5242782 sheet 1 spud carrier section 3
- IHC 5242785 spud carrier section 6
- LD 10-00-075 sheet 6 repair hinges spud keepers
- LD 10-00-078 sheet 2 Bush OD300 x ID255 x L134

Bushes are to be renewed in the hinge plates of
- The PS and SB spud keeper (IHC 5242770 - 5242773).
- The spud carrier (IHC 5242782 – 5242785).

Scope:
- Assume the hinges have been re-bored according spec K.113 and staging in the spud well of the spud carrier is in place.
- Machine the owner’s supplied over- and undersized bush (LD 10-00-078) to the actual measured sizes. Measurements to be noted in drawing LD 10-00-075 sheet 6.
- Skrink-fit the bush with liquid nitrogen.
- Tack weld bush to the bore housing.

Price per bush in spud keeper. .../
Price per bush in spud carrier. .../
K.7.9. spud door and spud keepers, renew hinge shafts locking arrangements

K.7.9.1. aux spud door

Drawings:
- IHC 01175-1606-010 sheet 3 PS spud section FR 141 ~ 148

The aux spud door has two (2) hinge shafts and one dedicated locking arrangement for each shaft.

Scope:
- Assume the vessel is dry docked and the hinge pins / spud keepers have been removed according specs K.6.3.
- Cut and supply new locking plate (pos 332 “detail K” / IHC 01175-1606-010 sheet 3).
- Cut and supply new locking plate (pos 331 “detail H” / IHC 01175-1606-010 sheet 3).
- Drop / hoist in via yard crane support pipe (pos 11 + 330 “detail H” / IHC 01175-1606-010 sheet 3)
- Support pipe and locking plates, gritblast to SA 2.5 according specs E.8. and coat according specs F.1.2.

Lump sum. … / aux spud keeper

Additional for supply of support pipe (pos 11 + 330 “detail H” / IHC 01175-1606-010 sheet 3). … / pipe

Additional for renewal of pipe 323,9 x 20 L 1000 mm (pos 9 “detail H” / IHC 01175-1606-010 sheet 3). … / pipe

Additional for renewal of pipe 323,9 x 20 L 195 mm (pos 10 “detail K” / IHC 01175-1606-010 sheet 3). … / pipe

K.7.9.2. spud carrier spud keeper

Drawings:
- IHC 5242770 spud carrier, PS spud keeper
- IHC 5242773 spud carrier, SB spud keeper

The spud carrier spud keeper arrangement has three (3) hinge shafts, with one dedicated locking arrangement for each shaft.

Scope:
- Assume the vessel is dry docked and the hinge pins / spud keepers have been removed according specs K.6.3.
- Cut and supply new locking plate (pos 331 “section Z-Z” / IHC 5242770).
- Cut and supply two (2) new locking plates (pos 336 “section Z-Z” / IHC 5242770).
- After welding locking plates gritblast to SA 2.5 according specs E.8. and coat according specs F.1.2.
Lump sum. … / spud carrier spud keeper

K.7.11. Available

K.7.12. Available

K.7.13. Buffer wheel assemblies overhaul

- Brauer 816310  Cushioning cylinder spud carrier
- IHC 5242772  spud carrier section 4 - construction
- IHC 5242788  lever for buffer installation spud carrier
- IHC 5474725  arr. buffer installation spud carrier
- IHC 578764  arr. Mounting of shaft buffer installation
- IHC 5826652  parts list mounting of shaft buffer installation

The vessel is equipped with two (2) buffer wheel assemblies installed on the spud carrier on PS and SB. The units are accessible from the spud carrier well, frames 124 - 147.

Scope:

- Weight: 4000 kg.
- Install scaffolding in way of the hollow centre journal.
- Assume both traverses are removed and the spud carrier is placed on four (4) hydraulic jacks according specs K.6.6. Activate the jacks until the buffer wheels are loose from the lower rails.
- Arrange / remove temporary fixation of the spud carriage (wooden blocks) in the transverse direction in order to cover the forces from pulling the wheel sets free from the central journals, and from removing the pivot shaft (pos 106 IHC 5474725) from the cushioning lever (pos 105 IHC 5474725).
- Remove / refit the mounting device (IHC 578764) connecting the pivot shafts PS and SB (pos 106 IHC 5474725). The mounting device is accessible from inside the spud carrier section 4. Derust, clean, dress-up and coat the mounting device parts.
- Disconnect / connect the flexible grease lines and the flexible hydraulic lines to buffer cylinder (pos 101 IHC 5474725). System pressure will be released by the ship’s crew. Drain and plug the hydraulic cylinder.
- Remove / install the bolted flange (pos 118 IHC 5474725) of the pivot shaft (pos 106 IHC 5474725). Dress up the flanges and the thread ends of the cushioning lever (pos 105 IHC 5474725).
- Remove / weld the locking plates (pos 112 IHC 5474725) and fit back at end of overhaul. Yard to supply new locking plates.
- Remove / install the bolted locking flanges (pos 107 and 108 IHC 5474725) on the pivot shaft inside the spud carrier. Dress up the flanges and the threads inside the spud carrier construction.
- Place a 100 tons hydraulic jack between the wheel recess and the pivot shaft and if necessary, additionally a strong bridge with 2 nos. 50 ton jacks on the inside of the spud carrier. Price to include fabrication or supply of the strong
bridge. Remove / install the pivot shaft by jacking it into the spud carrier, while the cushioning lever (pos 105 IHC 5474725) is suspended in the crane. Manoeuvre the cushioning lever with wheel arrangement (section A-A IHC 5474725) towards the open spud carrier well with the crane. This requires the removal / refitting of the staging.

- Dismount / assemble all parts form the wheel bracket (section A-A) and the collar shaft arrangement (pos 102 IHC 5474725).
- Measure the diameters of all bores and shafts (pos 102, 106, 122, 126, 131, 132, 133, 106, 114 on IHC 5474725). Provide measuring report.
- Renew the bearing (pos 134 IHC 5474725) and the bronze bushings with Owner’s supply.
- Assume all owner supplied bushes are oversized and machining is to be included (pos 114, 122, 130, 131, 132, 133).
- Including skimming the collar shaft journal (IHC 5826651).
- Including skimming on ID the wheel (pos 12 IHC 5474725).
- Including skimming the pivot shaft journals (IHC 578763).
- Replace the hydraulic cylinder with Owner’s spare.
- Surface preparation according specs E.8. and coating repair according specs F.1. vertical sides below water line.
- Incl. transport and cranage to / from workshop supply of dry ice / liquid nitrogen, all tools required, permits, temporary lightning, shielding, etc.

Lump sum. ...

Additional for overhaul of the hydraulic cylinder (Brauer 816310).

Hydraulic cylinder:
- Piston rod dia 220 mm.
- Piston dia 245 mm.
- Stroke 50 mm only.
- Weight 480 kg.
- Pressure test 350 bar.

- Transport to / from yards workshop, dissemble the hydraulic cylinder, clean and dress up all the parts, assemble with new owner supplied seals and bearings (pos 17 Brauer 816310), pressure test at 375 bar for 10 minutes witnessed by chief engineer.
- Verify the straighness of the piston rod (pos 6 Brauer 816310) on a lathe machine and issue a report.

Lumpsum. ...

Additional for machining the cushioning lever (IHC 5242788 section B-B)
- Assume the lever disassembled.
- Assume material to be mild steel S355.
- Pre-machining +/- 5 mm, welding with electrode AWS E7018-1 and machining to new build dimension.
  - Bore hole dia 275 (pos 147 IHC 5242788) in way of bush (pos 131 IHC 5474725).
Flange (pos 147 IHC 5474725) in way of V-seal (pos 127 IHC 5474725).

- Issue a report with old and new dimensions.
- Including all tools, lifting gear, crane, permits, transports between ship and workshop, etc.

Lumpsum. … / machine job.

Additional for machining the cushioning lever (IHC 5242788 section E-E)

- Assume the lever disassembled.
- Assume material to be mild steel S355.
- Bore hole for the pivot shaft dia 390 (pos 106 IHC 5474725).
- Pre-machining +/- 5 mm, welding with electrode AWS E7018-1 and machining to new build dimension.
- Issue a report with old and new dimensions including alignment values.
- Including all tools, lifting gear, crane, permits, transports between ship and workshop, etc.

Lumpsum. … / machine job.

Additional for machining the bore hole in spud carrier section 4 (IHC 5242772 section H-H)

- Assume the buffer wheel lever assembly removed from the spud carrier.
- Assume material to be mild steel S355.
- Bore holes for the pivot shaft bushes dia 355 in way of positions 132 and 133 on IHC 5474725.
- Flange in way of V-seal position 113 on IHC 5474725.
- Pre-machining +/- 5 mm, welding with electrode AWS E7018-1 and machining to new build dimension. Welding area to preheat to 150 °C and interpass temperature to 200 °C.
- Issue a report with old and new dimensions including alignment values.
- Including hire of the line boring unit.
- Including all tools, lifting gear, crane, permits, transports between ship and workshop, temporary lightning, ventilation, etc.

Lumpsum. … / machine job.

**K.7.14 Spud carrier spud tilting sheaves overhaul**

**Drawings:**

- paint system 3
- LD10-00-072 Arrangement spud carrier
- LD09-00-023 wire sheave, tread D 1000, wire 60
- JDN LD 09-00-A008530 wire sheave D 1000
- IHC 503577 fastening tilting wire on tilting tower
- IHC 5242782 sheet 1+2 spud carrier section 3 – construction
- IHC 5826637 Shaft OD 180 L 420
- IHC 5875944 Bush OD 210 x ID 180
- IHC 46031 shaft locking plates
Scope:

- The spud carrier is equipped with two (2) sheaves, in section 3 of the spud carrier (pos 59, 10-00-072).
- Remove the steel wire from the sheaves (pos 83 and 84 on LD 10-00-072).
- If the spud carrier is removed, erect staging to access the sheaves, assume 80 m³ and 3 modifications.
- Remove locking plate, pull out shaft with hydraulic jack while securing the sheave (shafts accessible via permanent manhole transit, section R-R, IHC 5242782 sheet 2),
- Remove bush from sheave, clean and dress up the shafts, locking plates, thread and bore holes in the spud carrier, grease nipple.
- Grit blast the sheave according specs E.8. and coat according specs “protection: paint system 3” on drawing LD 09-00-A008530.
- Measure bore holes of sheave and spud carrier section 3 detail XVIII, measure the OD of the shafts.
- Install owner supplied new bush, install shaft, sheave, lock and secure. Verify lubrication.
- Including all tools (hydraulic jack, heating torch, etc), permits (hot work, staging, etc.), lifting gear.

Lump sum overhaul two sheaves

Additional for supply of new shaft IHC 5826637...
Additional for supply of new bush IHC 5875944...

K.7.15. Overhaul of aft horizontal guide wheel arrangement

Drawing:

- IHC 5474732 Arrangement guiding wheel spud carrier
- IHC 5242800 Foundation for guiding wheel horizontal
- IHC 5876040 Collar bush for guiding wheel
- IHC 578774 guide wheel
- IHC 578775 shaft for guiding wheel
- LD10-00-072 Arrangement spud carrier ASSY002

The spud carrier is equipped with two (2) aft horizontal guide wheels (pos 29 and 30 on drawing LD 10-00-072), one on PS and one on SB. These are a single wheel execution.

Scope:

- Assume the collar shafts (pos 594) for seafastening of spud carrier are removed by the crew.
- Assume the crew has driven out the spud carrier so the PS unit is free from the hose track.
- Remove / refit the grease connections, access piece in deck, the vertical shaft (pos. 589), and the horizontal wheel (pos 854). In case the spud carrier is not removed from the ship, slide it towards the center of the spud carrier.
• Clean and dress up all the parts, measure the ID of the wheel, the ID of the foundation bore holes, the OD of the shaft, and blow through the shaft grease channels.
• Measure axial distance between upper and lower housing plate. If required by owner’s representative, remove existing, yard supply and install the tow (2) oversized filling rings (pos 504 IHC 5242800, nominal thickness is 6 mm).
• Renew the bronze bushes (pos 585), owner supplied. Machine oversize (ID + OD) bushes, owner supplied, to sizes matching with new / recovered shaft and wheel. Including skimming the journal of the recovered shaft (pos 589) and the ID of the recovered wheel (pos 854).
• Yard supply: renew the locking ring (pos 510 IHC 5242800) and the shaft locking plate (pos 591).
• Degrease, gritblast according specs E.8. and paint the wheels and housings according F.1.2.
• Including all tools, lifting gear, crane, permits, transports between ship and workshop, etc.
• Including staging (in case spud carrier is removed from the ship).

Lump sum …/ guide wheel

Additional for overhauling bore holes.
• Remove and supply new locking ring (pos 510 IHC 5242800).
• Pre-machine the upper and lower bore in situ with portable line boring machine of the foundation.
• Build up the 2 bores by welding (+- 8 mm gross thickness) electrode AWS E7018-1. Welding area to preheat to 100 ~ 120 °C.
• Machine (final) the upper and lower bore in situ with portable line boring machine to sizes matching with owners spare shaft.
• Including hire of the line boring unit.
• Including all tools, lifting gear, crane, permits, transports between ship and workshop, etc.
• Including staging.

Lump sum …/ guide wheel

K.7.16. Overhaul of forward horizontal guide wheel arrangement

Drawing:
• LD10-00-072 Arrangement spud carrier ASSY002
• IHC 5242781 Arrangement horizontal guide wheels
• IHC 5242782 spud carrier section 3 – construction
• IHC 5474714 adjusting shaft
• IHC 578758 Bogie
• IHC 5875961 Collar bush OD370/340 x ID310 L=200
• IHC 5875961 Collar bush OD305/275 x ID245 L=124.5
• IHC 5875963 cover OD510 H=60
• IHC 5875968 Adjusting bolt M48x70
• IHC 5826616 bogie wheel dia 820
• IHC 5826617 shaft OD243 L375
The spud carrier is equipped with two (2) forward horizontal guide wheels (pos 31 and 32 on drawing LD 10-00-072), one on PS and one on SB. These are a double wheel execution.

Scope:
- Remove / refit the 2 manhole covers on spud section 3.
- Remove and refit the grease connections, secure the bogie assembly (pos 551, 554, 557, etc), jack out upwards the vertical adjusting shaft (pos 552), pull the bogie assembly horizontally forward till they pass the spudcarrier (=when spud carrier remains installed in the ship).
- Clean and dress-up the adjusting shaft and the bore holes, blow through the grease lines in the shaft.
- Measure the shaft radial bearing seatings (3 locations) and the three (3) bores for the vertical shaft (IHC 5242782, section B-B, D-D, E-E).
- Completely overhaul the bogie assembly using wheels, bushings, seals and shafts supplied by the Owner.
  - Disassemble, clean and dress up parts. Measure the shafts, shaft cover, bushes and wheels (pos 553, 554, 555, 556, 557). Present report to owner.
  - Degrease, gritblast according specs F.1.2 and paint the bogie assembly (pos 551) according F.1.2.
  - Skim the two (2) shafts (pos 557).
  - Machine owners supplied oversized (ID + OD) bronze bushes (pos 555 and 553) to the machined sizes corresponding with shafts (pos 557 and 552) and wheels (pos 554). Six (6) bushes per bogie.
  - Skim the recovered shaft covers (pos 556) i.w.o. the V-seal and flange (to suit the skimmed shaft and the increased height between the covers) or machine the oversized owner supplied shaft cover (IHC 5875963).
- Reassemble all the parts and install back on board, check greasing and operational functioning.
- Including all tools, lifting gear, crane, permits, transports between ship and workshop, etc.
- Including staging (in case spud carrier is removed from the ship).

Lumpsum: … / guide wheel arr.

Additional for machining the bores in spud carrier section 3 (IHC 5242782, section B-B, D-D, E-E).
- Skim the 3 bores for the vertical shaft in situ with portable line boring machine.
- Machine the 2 thrust faces below and above bogie i.w.o. central bore.
- Including hire of the line boring unit.
- Including all tools, lifting gear, crane, permits, transports between ship and workshop, etc.
- Including staging.

Lumpsum. … / line bore job.
Additional for supply of new oversized shaft IHC 5474714.

Lumpsum.

K.7.17. pull open cylinder overhaul

Drawings:
- IHC 5242831 Sea fastening spud hoisting cylinder section A-A
- BRAUER 826307 spud clamp pull open cylinder
- HYDRAUDYNE 3-035762 ombouwsamenstelling opentrekcilinder

The “pull open” cylinders are hydraulic cylinders. The vessel is equipped with two hydraulic cylinders installed on the main spud hoisting arrangement (=spud carrier) and two (2) hydraulic cylinders installed on the aux spud hoisting arrangement. The cylinders are accessible on a platform.

Hydraulic cylinder:
- Piston rod dia 70 mm.
- Piston dia 140 mm.
- Stroke 350 mm.
- Weight 94 kg.
- Pressure test 300 bar

Scope:
- Disconnect / connect the cable 32 mm from the connection rod (pos 853 on IHC 5242831).
- Loosen / tight the securing plates and bolts, the foundation bolts from the hydraulic cylinder. Dress-up all the tread in the foundation plate.
- Remove / install connection nut (pos 855 on IHC 5242831) from the connecting rod (pos 853 on IHC 5242831) and the piston rod (pos 857 on IHC 5242831), clean and dress-up all the thread.
- Verify the straightness of the connecting rod (pos 853) and the connection nut (pos 855 on IHC 5242831) on a lathe machine.
- Transport to yards workshop, dissemble the hydraulic cylinder, clean and dress up all the parts, assemble with new owner supplied seals, pressure test at 300 bar for 10 minutes witnessed by chief engineer.
- Verify the straightness of the piston rod (pos 15 BRAUER 826307) on a lathe machine.
- Degrease and clean the unit.
- Surface preparation according specs E.6.
- Coating repair with owner supplied paint according F.1.3.
- Including all tools, transport, crane, staging, permits, etc.

Lump sum price for 4 hydraulic cylinders.

K.7.18. renew horizontal wear plates for spud holding clamp on spud carrier and spud keeper PS-SB.

Drawings:
- LD 10-00-061 wearing plate 1050 x 500 x 15
- LD 10-00-160 plate, flattened 1000 x 600 x 20
- IHC 5242782 Spud carrier Section 3
- IHC 5242770 Spud keeper PS for spud carrier
- IHC 5242773 Spud keeper SB for spud carrier

Scope:
- Assume the spud hoisting clamp has been removed from the spud carrier.
- Assume the overhauled spud keepers PS and SB are installed on the spud carrier.
- Cropp off existing / weld new owner supplied wear plates:
  - IHC 5242782 position 300, 2 plates
  - IHC 5242770 position 500, 1 plate
  - IHC 5242773 position 500, 1 plate
- After cropping off the wear plates, clean-up the area and measure with a laser / total station / piano wire, the height offset of the wear plates seating on spud carrier section 3 / spud keepers PS / SB. Report to owner. Wear plates with matching thicknesses will be installed accordingly.
- Welding area on spud carrier and spud keepers PS & SB area to preheat to 100 ~ 120 °C.
- All hot works to be performed prior any paint works in the spud carrier. In case no paint works are planned in the spud carrier, coating repair for all the burnt marks inside the spud carrier according specs F.10.
- Including ventilation, gas free certification, temporary lightning, permits, staging, transport between ship and workshop, etc.

Lump sum

Additional for delivery of plate HB400 1000 x 600.
- Thickness 25 mm ... / plate
- Thickness 30 mm ... / plate
- Thickness 35 mm ... / plate

Additional for delivery of plate HB400 1050 x 500.
- Thickness 20 mm ... / plate
- Thickness 25 mm ... / plate
- Thickness 30 mm ... / plate

K.101. Construction of watertight compartment around sliding blocks
Drwg. 050.3576 : Arrangement Spudcarrier
524.2785 : Spudcarrier Section No. 6

- Modification of the double bottom of the spudcarrier i.w.o. the sliding blocks, in order to make it watertight.
- Fabricate and install bolted watertight manhole cover on manhole giving access to the shaft ends sliding blocks adjustment arrangement. Location
according extracts nrs 1,2,3 and 4 of drwg. 524.2785. Manhole size 650 x 375. Construction of manhole has to be similar to the existing ones in the spudcarrier.

- Close 2 holes dia. 400 by inserting plates thickness 16mm and 8 scallop holes by welding of doubler.(Extract no. 2 drwg. 524.2785)
- Paint all new steel and damaged area’s according surrounding paint system.
- Assume job is carried out together with K.12.

Lumpsum for 2 pcs : ...

**K.102. Cleaning, painting inside of spudcarrier section no. 5 and 6**

Drwg . 050.3576 : Arrangement Spudcarrier
524.2786 : Spudcarrier Section No. 5
524.2785 : Spudcarrier Section No. 6

Open/close manhole cover.
HP washing of the complete compartment
Hard scraping and hammering to remove fixed scale.
Scrub, HP wash and bail out the compartment upon completion.
Derusting by powertool to ST2.
Paint with 3 coats owner supplied epoxy paint. (1 T/U +2 F/C)
Including eventual cutting, rewelding of access openings, and vacuum testing of the welds.
All general remarks under E and F are applicable.

Lump sum price for section no. 5 :
Lump sum price for section no. 6 :

Instead of hard scraping and powertooling, quote for gritblasting the complete compartment to SA2 ½.
Paint with 3 F/C owner supplied epoxy paint.

Lumpsum for section no. 5 :
Lumpsum for section no. 6 :

**K.103. Repairs of Main spud.**

LD 10-00-066 Spud D2000
LD 10-00-067 (page 1) Spud D2000 LDV1 as build
LD 10-00-060 ` Detaildrawing holes in spud
BSTL000216 Pipe ID1840x80mm x 8200.
BSTL000217 Pipe ID1840x50mm x 3000.

Assume the mainspud is bend and stored horizontally on it’s foundations on deck of the vessel
Erect a staging, remove all seafastenings from the spudpole.
Lift and transport the spudpole from the ship to the wharf or workshop. (130 tons).
Distance of location spud from ship side SB : 10m

249/568
The pipe segment marked „ASSY001“ & segment pos 8 on the drawing LD 10-00-067 page 1 is to be renewed by a owner’s pre-fabricated pipe pieces. Owner will supply a pre-fabricated pipepiece of OD2000 x 60-to-80mm wall thickness, 8200mm long as per drawing BSTL0000216 and a pipe pieces of OD2000x50mm wall thickness, 3000mm long.

The spudpole is to be cut, the 2 new pipepiece are to be fitted and aligned. The new pipe segments are to be welded according to the welding instruction on the drawing.

Yard will hand over a detailed repair procedure to the owner prior start of works. In any case the yard must follow all instructions as per drawing with special attention to be paid to:
- the pre-heating and temperature to be controlled during and after the welding as prescribed
- the alignment of the spudpole to be checked prior, during and after the welding that after welding, welds to be grind flush at the outside of the spudpole that after welding NTD to be carried out on the buttwelds : 100% UT and RT on the „T“ joints and if necessary to be repaired and retested.
- The spud segment pos 8 contains 2 sets of holes. The yard is to machine holes in the repaired spudpole and to fit and weld owner’s supplied new hubs.

Mark the centres of the holes on the repaired spudpole. Line bore the holes to a diameter of 912mm. Prepare the bevels on the spud i.w.o. the new holes according drawing LD 10-00-066 Section BB. Align and fit one new owner supplied pair of oversize hubs dia 900 (drw.LD 10-00-060). Preheat the spud i.w.o. new holes to 150°C by means of ceramic elements. Carry out controlled welding of the new hubs in the spud. Monitor alignment of the holes during the welding. Carry out ultrasonic testing of all new welds according acceptance norms ASME V and VIII Div I.

Welds to be grind smooth until smooth with surroundings. Power tool and paint the top 3m of the spud with red/white stripes. Ship’s supplied paint. After repairs, return the spudpole to the ship, re-install in the supports on deck and refit the seafastenings.

Lumpsum price (3 buttwelds + 1 pair of hole hubs) :

...(1)

Additional price to also renew the pipe segment pos 7 as per above procedure :

...(2)

**K.104. Marking of spuds**

Assume a staging is erected under item K4.1 and assume the spudpoles are store horizontally on the deck. Mark the three spud poles on the top side by respective ,LDV 1, LDV 2, LDV3. Letter are 300mm height and welding in stainless steel electrode. Letters to be painted white.

Lump sum price for 3 spudpoles :

...(3)

**K.105. Hinges of Spud keeper for Auxiliary Spud**
Assume the spud keeper door is removed as per K6.3.
Assume the bores and pins of the hinges are worn and alignment of the hinges is of as well.
Renew all the wear plates on the spud door and the ship’s side as described in item K7.3. All wear plates to be supplied by the yard.
Fabricate a dummy replacing the spud pole with allowed clearances. Fabricate and install two circular steel plates dia. 2020 mm (+/- 1 mm), 8 mm. thickness and weld at the renewed upper and lower wearing plates of the spud opening – ship’s side.
Re-install the spud keeper door using the old pins. Close the spud keeper door by hydraulic jacks until its wear plates are touching the installed dummy plates. Jack up the spud keeper door to its original height. Fit spacers between the hinges to hold the door in this position. Tack welds the dummy plates to the spud keeper door.
Measure out the clearances of the hinges. Mark the centreline on the top and sides of the hinge plates. Verify that the two centrelines are parallel and at correct distance from each other. Measure the gap between the hinge plates, record and mark.
Remove the spud keeper door and transport to the workshop. Build up the worn bores and machine in line to original sizes. Assume 6 mm to on diameter to be build up.
Build up the worn inner diameter of the bores of the 4 hinges at ship’s side and machine to nominal size in situ.
Build up the worn bottom areas of the 4 hinge plates and machine plane to nominal size. Built up the worn areas’ on the top of the 4 hinge plates at ship’s side and machine plane in situ. Assume 15 mm to be built up and machined.

Lump sum price : ...

**K.106. Machine collar of hollow shaft in situ.**

n.a.

**K.107. Renew conical plates of spud tip**

LD-10-00-072 : Arrangement spud carrier  
5474712 : Arrangement traverse 1

LD-10-00-066 Spud 2000  
LD-10-00-010 Conical spud tip

Assume the spuds are stored horizontally on the supports on deck  
Erect a staging under and at the tip of the spud  
The conical closing plates of the spud tips are to be renewed. See drawing LD 10-00-066 section H-H.  
Crop off and remove the existing conical spud tip plates. Note that doublers are installed over the existing conical plates and need to be cropped off as well.  
Preheat the spud i.w.o. new holes to 150°C by means of ceramic elements.  
Carry out controlled welding of the new hubs in the spud. Monitor alignment of the holes during the welding.  
Install, fit and weld the owner’s supplied conical plates as per drawing LD 10-00-010 & LD 10-00-066
Lump sum price for complete spud tip plates (4 segments) : …/
Lump sum price for one segment spud tip plate (90 degrees) : …/

Additional price to supply, fabricate and renew central shaft dia 300mm x 2850mm :
Price …/pc

**K.108. Renew guide plates and bars hoisting clamping main and auxiliary spud system.**

LD-10-00-072 : Arrangement spud carrier
K107-1 : Picture guide plate
K107-2 : Picture guide bar hoisting clamping
K107-3 : Picture top of guide plate

Assume that the hoisting clamps are removed and in the workshop as per item K2.1.
Erect a staging in way of the auxiliary and main spud hoisting clamp guides
Renew the top part of the vertical guides in situ: 4 plates 240x1500x35mm. Including curved top part.
Renew the bottom part of the vertical guides in situ: 4 plates 350x1600x35mm.
Special attention to be paid that the guide plates are in straight vertical line and parallel to each other with a maximum of 10mm tolerance.
Renew the guiding bars on the aft part of the 2 spud hoisting clamps in the workshop:
2 round bars of 65mm x 700mm & 4 90degrees bend pipe in schedule 80 on each of the two spud hoisting clamps.
Steel to be renewed is indicated on the enclosed pictures
Paint system to be repaired in way to ST3 and 3 layers of ship’s supplied paint

Lump sum price :
…/

**K.109 Repairs of bent part of spud by insert pipe.**

LD 10-00-066 : Spud D2000
LD 10-00-067 : Spud D2000 LDV as build
LD 10-00-060 : Detail drawing holes in spud
K4.5. : Pipe welded OD2000 L=330

Assume the main spud is bent and is lifted off the vessel as per K4.2
The yard is to provide the necessary transports, repair yard, pipe supports, cranage, tools, consumables, safety gear, staging and all others to repair the spud.
A bent part of the pipe with length 3300mm in way of sections 6-7-8 as per drawing LD 10-00-067 is to be renewed by owner’s pre-fabricated pipe piece. Owner will supply a pre-fabricated pipepiece of OD2000, wall thickness 50/55 & length 3300mm
The spudpole is to be cut and the new pipepiece is to be inserted, fitted and aligned.
The new pipe segments are to be welded according to the welding instruction on the drawing.
The yard will hand over a detailed repair procedure to the owner prior start of works.
In any case the yard must follow all instructions as per drawing with special attention to be paid to:
the pre-heating and temperature to be controlled during and after the welding as prescribed. Electric heating equipment to be provided by the yard.

the alignment of the spudpole to be checked prior, during and after the welding that after welding, welds to be grind flush at the outside of the spudpole that after welding NTD to be carried out on the buttwelds: 100% UT and RT on the „T“ joints and if necessary to be repaired and retested.

Carry out 100% ultrasonic testing of all new welds according acceptance norms ASME V and VIII Div I.

Welds to be grinded smooth until same level with surroundings.

Lumpsum price (2 buttwelds): …/

**K.110. Modify tilting arms and install hydraulic cylinders.**

LD-10-00-072 Arrangement spud carrier
5242764 Arrangement tilting arms for spud
5474707 Tilting arm for spud
LD-12-00-099 Hinge for tilting arms

In total 4 tilting arms dwg LD-10-00-072 pos 16 are installed on the ship’s two tilting towers on the foreship. Assume the tilting arms are in the horizontal position as shown on the drawing LD-10-00-072 detail ‘end position spud tilting’.

Erect stagings to access the hinge of the tilting arms. 2 Stagings l*w*h= 6 x 3 x 7 m Disconnect, remove the tilting arms dwg 5242764 pos 501, 502 and the connecting link pos 503. Supply, install, weld brackets and hydraulic equipment to jack out the hinge pins. Transport all to workshop. If the yard requires installing and welding hoisting eye plates, this is included.

Dress up bores, bolt-holes and pins.
Supply, fabricate, fit, align and weld hinge plates dwg 5474707 pos 560+561+562 on the existing tilting arms. Gritblast the tilting arms to SA 2½ and paint with 3 layers ship’s supplied paint. Return and re-install and connect on board in the horizontal position.

Transport, install, connect owner’s supplied hydraulic cylinder 5242764 pos 570 between the new hinge plate of each tilting arm and existing eyeplates already fitted on the spud towers. Including modifying staging in way. Transport, connect ship’s supplied portable hydraulic unit and test the operation of the tilting arms.

Lump sum price for 4 tilting arms: …/

**K.112. auxiliary spud door arrangement, machine hinges to nominal size.**

Drawings:
- IHC 01175-1606-010 sheet 1 & 3 PS spud section FR 141 ~ 148
- IHC 01175-1607-010 Spud keeper for auxiliary spud.
- LD 10-00-075 sheet 7 repair hinges aux spud keeper

All sixteen (16) hinges are to be re-bored.
- The eight (8) hinge plates of the aux spud door (IHC 01175-1607-010).
- The eight (8) hinge plates of the ship (IHC 01175-1606-010 sheet 3).
- Hinges are of mild steel S355, thickness 135 mm and 9 m distance between lower and upper hinge.

The hinge plates on the ship can only be reached from 1 side because of the presence of fore peak tank no.1 in the middle. Machining of the top hinge plates has to be carried out from the top, machining of the lower hinge plates has to be carried out from the bottom.

The hinges on the aux spud door can’t be machined in situ (i.e. on board) together with the hinges on the ship (no room for rear support of in situ boring machining).

Job may clash with F.147. and coating repair of hull.

Scope spud door:
- Assume the spud door has been removed from the ship according specs K.6.3. and the spud wear plates (pos 124, 125 / IHC 01175-1607-010 sheet 1) have been renewed according specs K.7.3.
- Cut, crop and push out the worn bushes, eight (8) units dia 280 mm.
- Establish the two (2) original hinge centre lines. Use a laser alignment tool with reference from the spud centre line (R 1010 mm to new wear plates, R 1035 to bulkhead). Measure prior and after machining, report to owner for approval.
- With line boring equipment, bore out hinge, assume 5 mm on radius.
- Including access cutting / welding for the in-line boring machine.
- Including all means like tools, machines, cleaning, measurements, etc.

Lump sum. … / door hinge

Scope ship hinges:
- Assume the spud wear plates (pos 290, 291 / IHC 01175-1606-010 sheet 3) have been renewed according specs K.7.3.
- Erect / remove staging in aux spud well, frame 145. Assume 60 m3.
- Dye check the weld seams of all hinge plates of the spud door and the ship.
- Cut, crop and push out the worn bushes, eight (8) units dia 280 mm.
- Establish the two (2) original hinge centre lines. Use a laser alignment tool with reference from the spud centre line (R 1010 mm to new wear plates, R 1035 to bulkhead, IHC 01175-1606-010 sheet 1). Mark on the upper and lower hinge plates (4 markings per hinge plate). Measure prior and after machining, report to owner for approval.
- With line boring equipment, bore out hinge, assume 5 mm on radius.
- Including access cutting / welding for the in-line boring machine.
- Including all means like tools, machines, cleaning, measurements, etc.

Lump sum price : … / ship hinge.

**K.113. main spud keepers arrangement, machine hinges to nominal size.**

Drawings:
- IHC 5242770 spud carrier, PS spud keeper
IHC 5242773  spud carrier, SB spud keeper
IHC 5242782  spud carrier section 3 – construction
IHC 5242785  spud carrier section 6
LD 10-00-075  sheet 6 repair hinges spud keepers

All hinge plates twenty four (24), are to be re-bored.
- The sixteen (16) hinge plates of the PS and SB spud keeper (IHC 5242770 - 5242773).
- The eight (8) hinge plates of the spud carrier (IHC 5242782 - 5242785).
- Hinges are of mild steel S355, thickness 135 mm and 9 m distance between lower and upper hinge.

Job may clash with F.115. and G.174.

Scope
- Assume the spud keepers have been removed from the spud carrier according specs K.6.2. and the spud wear plates (pos 233, 340 / IHC 5242770 ~ pos 361, 373 / IHC 5242773) have been renewed according specs K.7.2.
- Erect / remove staging in spud well of spud carrier. Assume 60 m3, with three (3) times remove / refit.
- Dye check the weld seams of all hinge plates of the spud keepers and the spud carrier.
- Clean and dress up all hinge plates of spud carrier and spud keepers, measure ID and thickness and report to owner.
- Horizontal mating surfaces of hinges, assume four (4) locations on spud keepers and two (2) locations on the spud carrier. Grind and build-up by welding (AWS E-7018), assume 5 mm thickness, dia 350 mm.
- Establish the three (3) original hinge centre lines. Use a laser alignment tool or total station with reference from the spud centre line (R 1010 mm to new wear plates, R 1035 to bulkhead). Mark on the upper and lower hinge plates (4 markings per hinge plate). Measure prior and after machining, report to owner for approval.
- With line boring equipment, bore out all hinges in situ, assume 10 mm on radius.
- Including access cutting / welding for the in-line boring machine.
- Including all means like tools, machines, cleaning, measurements, hoisting and rigging equipment, crane, forklift, etc.

Lump sum price : … / all hinges

**K.114. traverse hollow shaft spud side, repair O-ring groove.**

Drawings:
- LD 10-00-051 Hollow shaft for traverse spud carrier section 4 – spud side
- IHC 5242772 spud carrier section 4 construction

The shaft is welded in spud carrier section no.4 (pos 105 / IHC 5242772). The o-ring groove (9.5 x 5.3) in way of the flange is to be repaired (detail A / LD 10-00-051).

Scope:
• Assume the traverse has been removed according specs K.6.6.
• Assume the spud carrier has been removed according specs K.118.
• Erect / remove scaffolding to access the hollow shaft from outside. Assume 25 m3.
• Clean and dress up the hollow shaft journal and ends.
• Pre-machine 5 mm deep, build-up by welding (AWS 7018-1) and machine the groove o-ring groove to the original size (9.5 x 5.3). Material is mild steel S355. assume 30% of circumference to machine.
• Including hire / mobilisation of machining tool.
• Including all means like, temporary lightning, reporting, cleaning, permits, covering & shielding, etc.

Lump sum price : .../

K.115. spud carrier, grease lines, brackets and bulkhead penetrations to renew.

Drawings:
• IHC 5242777 section plan spud carrier

Job can be combined with steel works G.174. after the grit blasting and prior the coating F.115.

Scope grease supply for traverse boogies.
• Assume the spud carrier has been removed from the vessel and is stored at the yard with a suitable scaffolding erected according specifications K.118.
• 16 grease lines (dia 10 mm) are running from spud carrier section 1 downwards, in way of section 2 and 4, towards the forward and the aft traverse. Assume the length of each grease line to be 10 m.
• Dismount / mount the grease lines, plug and store at a safe place. Label all the grease lines.
• Renew all grease lines /grease hoses. Assume 250m in total. Material Owner supplied
• Grease lines are installed according P.4.
• Crop-off existing, supply and weld the L-profile (40 x 40 x 4 mm) support for the pipe clamps. 20 locations, length 300 mm each.
• Renew owner supplied pipe clamps, 160 pieces, bolted.
• Including all means required like permits, temporary lightning, covering and shielding, consumables, etc.

Scope bottom sliding blocks, renew bulkhead penetrations for grease lines.
• Assume the spud carrier has been removed from the vessel and is stored at the yard with a suitable scaffolding erected according specifications K.118.
• Assume job will be combined with the overhaul of the sliding blocks according specifications K.7.4.
• 2 grease lines (dia 10 mm) are running from spud carrier section 6 b, towards the spud carrier sliding blocks. Assume the length of each grease line to be 2 m.
• Dismount / mount the grease lines, plug and store at a safe place. Label all the grease lines.
• Renew all grease lines /grease hoses. Assume 50m in total. Material Owner supplied
• Grease lines are installed according P.4.
• Crop-out existing, weld owner supplied bulkhead penetrations, 2 locations on PS and SB.
• Renew owner supplied pipe clamps, 8 pieces, bolted.
• Crop-off existing, supply and weld the L-profile (40 x 40 x 4 mm) support for the pipe clamps. 4 locations, length 80 mm each.
• Including all means required like permits, temporary lightning, covering and shielding, consumables, etc.

Lump sum price :

K.116. available.


K.118. spud carrier hoist out / in
• LD 10-00-072 Arrangement spud carrier ASSY002
• IHC 503577 fastening tilting wire on tilting tower
• IHC 5242777 section plan spud carrier.
• IHC 5242799 spud carrier installing
• IHC 5242831 Sea fastening spud hoisting cylinder
• IHC 5474708 tilting wheels for spud complete
• IHC 48031 Pad eyes

The following will be done by the ships crew upon dry-docked.
• The spud carrier will be un-sea fastened.
• The spud carrier will be moved forward to a position allowing removing the forward and aft traverse (position 35, 36, 38, 39 on LD 10-00-072). The forward of section 3 will be positioned at frame 142 (one frame less then IHC 5242799).
• Components removed prior arrival of the ship at the yard, positions: 5, 13, 12, 18, 19, 23, 43, 44, 58, 75, 76, 77, 78, 79, 80 and 95.

Scope stripping and re-assembly of spud carrier.
• The vessel to be dry docked with limited list and trim.
• Pump out any remaining water from spud carrier section 5 or 6.
• Degreasing of spud carrier rails and well according specs K.6.1.
• Disconnect / connect the travelling cylinder (position 41) from the spud carrier according. Cylinder can remain in ship and does not have to be overhauled.
- Assume the spud holding clamp (position 6, 69, 70, 71, 72, 73, 74) removed according specs K.1.1.
- Assume the two (2) pull open cylinders (position 3 and 4) removed according specs K.7.17.
- Assume the two (2) spud hoisting cylinders and the hoisting wire assemblies PS and SB removed according specs K.5.2. (position 1, 2, 3, 4, 7, 8, 9, 10, 11, 13, 46, 47, 48, 52)
- Remove / install the two (2) spud hoisting wire stem (position 14).
  - Transport and store to / from a suitable place.
  - Surface preparation according specs E.8, coating repair according specs F.9.
- Assume the spud keepers on spud carrier (position 40 and 93) removed according specs K.6.2.
- Assume the two (2) tilting arms (position 16) removed according specs K.6.8.
- Remove / install miscellaneous items (position 15, 17, 57, 83, 84)
- Assume the hose track (position 90) removed according specs K.6.7.
- Remove / install platforms and stairs (position 20, 21, 22, 24, 85, 91)
  - All platforms incl. supports on upper deck level and near spud hoisting cylinders. Platforms, stairs, railings and supports are mainly welded.
  - Transport and store to / from a suitable place.
  - Surface preparation of stairs and platforms according specs E.8.
  - Steel repair on platforms, assume 500 kg.
  - Coating renewal according specs F.9.
- Assume the traverse assembly forward and aft (position 35, 36, 38, 39) removed according specs K.6.6.
  - Bogies remain on the traverse.
  - Yard to supply the four (4) foundation plates 250 x 250 x 40 and four (4) hydraulic jacks 100 ton, hoses, power pack. For location of the jacks verify drawing IHC 5242799 “vijzel” in section B-B and C-C.
  - When removed from the shaft, the aft traverse is to be pulled aft wards in the well, the forward traverse is to be pulled forwards, each with 2 chain blocks. Include welding of pad eyes on the hull and traverses.
  - When the spud carrier has been lifted out, the traverses can be hoisted out by rotating them free from the rail recesses in the spud carrier well.
- Assume the two (2) buffer wheel assemblies PS & SB, (position 33, 34) removed according specs K.7.13.
- Assume the PS and SB lower sliding blocks (position 28) are retracted according specs K.7.4.1.

Scope Spud carrier lifting in and out from ship:
- Assume that all removable parts described under specification K.118. have been removed.
- Assume the weight of the stripped spud carrier is 190 ton. Forward load 110 ton, aft load 80 ton.
- Inspect by dye penetrant the existing hoisting eyes on the spud carrier, the two (2) aft lifting eyes (“front view” on IHC 5242772), the two (2) forward lifting eyes (section N-N, “detail VI” on IHC 5242782).
- Provide / fabricate all special hoisting equipment, spreaders, slings, shackles....
• Take a spreader beam and connect slings of equal length to the two (2) aft lifting eyes, take another spreader beam and connect slings of equal length to the two (2) forward lifting eyes.
• Carefully lift the unit from the well and move it to a suitable place for repair according specs K.118. Including crane movements for:
  o lifting out from the ship,
  o transport to and from temporary storage area,
  o Lifting at temporary storage area,
  o Lifting the unit in the ship.
• Provide a job hazard analysis and present all documents and certificates minimum 2 days in advance for review and discussion of the lifting sequence with Captain and owners representative.

Scope spud carrier storage at yard:
• Temporary storage of the spud carrier allowing mechanical, steel, grit blasting and coating jobs.
• Provide dock blocks to support the spud carrier in way of flat bottom spud carrier section 6 B and angled part of section 5. Provide a drawing to the owner, minimum 2 days in advance.
• Erect staging over complete length, width and height of the spud carrier. Allow for two (2) times complete removal and re-erecting.
• Including any means required for yard works like barriers, lights, power supply, permits, etc.

Lump sum price : ... /

(Price to be excluding the jobs K.1.1., K.5.2., K.6.1., K.6.2., K.6.6., K.6.7., K.6.8., K.7.4.1., K.7.13., K.116. since these are to be quoted individually.)
L. RUDDER – RUDDERSTOCK
The vessel is equipped with 2 spade rudders with rudder stock dia 320 mm.

L.1. Rudder
Drawings:
- IHC 01175-2145-010 Arrangement rudders, rudderstock with bearings and propeller shaft brackets
- IHC 01175-2145-901 Arrangement rudder with rudderstock
- IHC 01175-2145-902 Aj List of Parts Rudderstock

L.1.1. Rudder blade inspection in situ
Drawings:
- IHC 49130507 rudder type 32

Scope:
- Erect staging around the rudder blade on both sides. Assume 25 m3.
- Drain the rudder by opening / closing the plugs. Include vacuum test on the plugs and cementing.
- Clean the rudder; inspect for leaks and cracks; air pressure test (1.8 bar) and repair if required.
- Preform crack test with dye penetrant at the transition radius between between horizontal coupling plate and rudder blade (detail 5 / IHC 49130507).
- Disassembly, assembly and testing in presence of chief engineer or first engineer.
- After completion of the repairs, fill the rudder with fish oil.
- Fill-up all slot welds with steel putty or Belzona (detail 4 / IHC 49130507).
- Testing to be advised minimum one working day in advance.

Lump sum : ............./rudder

L.1.2. Rudder remove / refit
Drawings:
- IHC 49130507 rudder type 32

Rudder weight 2.7 ton.

Scope:
- Assume rudder blade inspection in progress or done according L.1.1.
- Assume seal arrangement overhaul in progress according L.1.3.
- Remove/ apply new yard’s supplied cement from palm bolts
- Supply, fit, NDT lifting lugs and remove / grind afterwards (pos 204, 205).
- Remove/refit the rudder (taking care of centring plate pos 232).
- Recondition the 8 fitting bolts M80x4, and the holes in the flanges of rudder and rudderstock. Dye check rudder and stock flanges including boltholes.
- Measure the thickness of the horizontal coupling plate (80 mm).
- Shrink fit rudderstock bolts with liquid nitrogen.
• Including all means like temporary lights, tools, consumables, measurement reports, etc.

Lump sum … / rudder

L.1.3. Rudderstock seal overhaul

Drawings:
• IHC 01175-2145-901 Arrangement rudder with rudderstock
• IHC 01175-2145-902 Aj List of Parts Rudderstock

The seal arrangement is a split execution unit.

Scope:
• Assume all parts ownder supplied
• Assume the rudderstock is mounted in the rudder trunk
• Erect / remove scaffolding 25 m3.
• Remove / refit buffer ring (pos 331 / IHC 01175-2145-901), dress-up, gritblast complete to SA 2.5 according specs and renew coating according F.1.2. renew bolts and nuts (pos 332-334).
• Renew the complete rudderstock seal arrangement (pos 306 – 320, 335 – 338). Seal support rings (pos 306, 312, 314, 319, 336) to dress-up and power wire brush to SA 2.5 and renew coating according F.1.2.
• Clean and dress up the flange face and the journal of the rudder stock bush (pos 230).
• Measure and issue report of the clearance between the lower neck bearing (pos 301) and the rudder stock bearing (pos 230).
• Preform crack test with dye penetrant at the transition radius between rudder stock and horizontal coupling plate, and the connection between horizontal coupling plate and rudder blade.
• Disassembly, assembly and testing in presence of chief engineer or first engineer.
• Including all means like temporary lights, tools, consumables, measurement reports,

Lump sum … / rudder

L.2. Rudderstock.

Drawings:
• IHC 01175-2145-901 Arrangement rudder with rudderstock
• IHC 01175-2145-902 Aj List of Parts Rudderstock

Weight 1.8 ton, dia 320 mm.

L.2.1. Remove/refit the rudderstock.
• Remove / refit the yoke steering gear
• Remove/ open/ close/ refit the rudder carrier (pos 150).
• Lower/refit the rudderstock.
• Clean the rudder trunk and dispose of the grease
• Transport rudderstock to and from the workshop

262/568
• Put rudderstock on lathe to check for trueness. Skim surface of the bearing bush smoothly.
• Magnaflux & dye-check the rudderstock transition radius and both key ways in presence of chief engineer or first engineer.
• Recondition the upper end of the rudderstock, the bore in the steering cam, the faces of the carrying ring (pos 236), the key slot and the key i.w.o. the rudder carrier.
• Clean and refill the helm port with owner's supplied grease.
• Measure the diameter of bearings and rudderstock, and make a report as required by BV surveyor.
• Apart from eventual big spare parts and the parts pos 251, 252, 253, 254, 255, 306, 310, 311, 312, 314, 331, 335, 336, 337, 338, all small items, as bolts, nuts, Washers, gaskets, spring rings, socket screws, O-rings, locking-strips, ... will be supplied by the yard.

Price per rudder stock : …/.

L.2.2. Renewal of bush rudder stock

Drawings:
• IHC 01175-2145-904 Rudder stock type 32
• IHC 01175-2145-906 Bush

Scope:
• Assume the rudder stock is removed under item L2.1
• Remove the lower bush of the rudder stock by machining. Measure rudderstock, bore rudder trunk and make a report.
• Transport owner’s spare bush from ship’s store to workshop. Bush is under and lower sized.
• Machine the inner and outer diameter as per instruction superintendent and details as per drawing 01175-2145-905.
• Shrink fit the bush on to the rudder stock. Nitrogen and suitable container to be supplied by yard. All to be witnessed by class surveyor and final report to be made.

Price per bush: …/.

L.2.3. Renewal of lower neck bearing

IHC 01175-2145-906 Bearing bush type 36

• Assume the rudder stock is removed under item L2.1.
• The lower neck bearing bush (pos 301 / IHC 01175-2145-901) is to be renewed.
• Remove bolts pos 304, cut/ gauge out or push out the bush.
• Measure bore of rudder trunk.
• Transport owner’s spare bush from ship’s store to workshop. Bush is under and lower sized.
• Machine the inner and outer diameter as per instruction superintendent and details as per drawing 01175-2145-906.
• Shrink fit the bush in the rudder trunk. Nitrogen and suitable container to be supplied by yard. Refit bolts pos 304 and secure. All to be witnessed by class surveyor and final report to be made.

Price per bush:  

**L.3. Rudder blade and rudder stock coupling plate overhaul**

**Drawings:**
- IHC 49130507 rudder type 32
- IHC 01175-2145-904 Rudder stock type 32

**L.3.1. Flange holes reaming**
- Assume rudder blade and rudder stock at the yard workshop.
- In case yard decides to position and secure the blade upright, scaffolding to be included.
- Clean face of the flanges rudder and rudderstock.
- Align rudder and rudderstock in the workshop as per drawing.
- Machine and ream the holes in the flanges, to obtain a correct alignment. 6 holes nominal size 90mm, flanges thickness 80mm.
- Machine owner's supplied oversize (max. 5mm on radius) bolts to the correct size.
- Make final measurements report.

Price per flange (6 bolt holes):  

**L.3.2. Rudder stock and rudder blade, flange skimming.**

**L.3.2.a. rudder blade flange skimming**
- Assume rudder blade is at the yards workshop.
- Machine flange with original thickness 80 mm, assume max 2 mm deep.
- Including all means like temporary lights, tools, consumables, measurement reports, machinery, etc.

Lump sum  

**L.3.2.b. rudder stock flange skimming**
- Assume rudder stock is at the yard workshop.
- Machine flange, assume max 2 mm deep.
- Including all means like temporary lights, tools, consumables, measurement reports, machinery, etc.

Lump sum  

**L.3.3. build-up by welding the horizontal coupling plate of rudder stock and rudder blade**
- Assume rudder blade is at the yard workshop.
- Pre-machine / final machine area with original thickness 80 mm, assume 5 mm.
• Position and secure the blade upright and erect scaffolding 25 m³.
• Build-up by welding (AWS E7018-1) area with original thickness 80 mm. assume 5 mm.
• Pre-heat to 150 C, interpass to max 200 C.
• Issue class report.
• Including all means like temporary lights, tools, consumables, measurement reports, crane, etc.

Lump sum … / rudder blade
Lump sum … / rudder stock

**L.4. rudder carrier**

**Drawings:**
- IHC 01175-2145-901 Arrangement rudder with rudderstock
- LD 05-00-009 arrangement of rudder carrier
- LD 05-00-011 ½ uppercone

**L.4.1 REMOVED - See L4.3, 4.4 and 4.5.**

**L.4.2. REMOVED - See L4.3, 4.4 and 4.5.**

**L.4.3. Carrier inspection with rudderstock in place.**

Note that the rudder carrier is of a complete split design (both fixed part, rotating part and filling ring pos 150 on top - also called Pallister bearing)

- Assume the rudderstock remains in place.
- Support the rudderstock from dry-dock or hanging in steering gear room
- Disassembly / assembly in situ of the rudder carrier top part and the filling ring (the fixed part can stay in place)
- Clean remainders of grease allowing to inspect the bearing area’s on the fixed part and the moving part

Lump sum: /bearing.

**L.4.4. Complete dismounting of carrier whit rudderstock in place.**

- Assume the carrier has been opened as per L4.3 and found not fit for further use.
- Dismount/mount the base parts
- Prepare all parts of the carrier for transport.

Lump sum: /bearing.

**L.4.5 Overhaul rudder carrier**

- Assume carrier and filling ring are removed under item L2.1 or K4.4
- Transport all parts to/from workshop.
- Clean, dress up and make measurement report.
- Both bearing surfaces of the rudder carrier to be CNC machined (spherical + grooves) and super finished.
- New lubricating grooves to be made and/or existing ones to be slightly increased in order to suit the grease supply channels. All sharp edges of the grooves to be smoothend as per details of drawing LD 05-00-011 (allowed to do by hand).
- Perform mating test with Prussian blue.
- Oversized filling ring (Owner’s supplied) to be machined in order to compensate the above machining of the carrier parts.

Lump sum: /bearing.

**L.4.6 Install a new carrier**
Assume a new Owner’s supplied carrier has to be installed.
- For 4 pc bolt holes (equally spread, approx D27) in the foundation and in the carrier: drill a new hole or select an old hole and ream up for fitting bolt.
- Machine 4 pc Owner supplied fitting bolts M24 x 100.
- Machine the filling ring
- Transport parts to/from workshop/ship

Lump sum: /bearing.

**L.100. Steering gear cylinder overhaul**
Drawings:
- Brusselle 17731 sheet 1&2  Hydraulic steering gear – type HS140-150 N

Hydraulic cylinder:
- Piston rod dia 140 mm.
- Stroke 500 mm.
- Test pressure 210 bar.

Each steering gear unit is equipped with two (2) hydraulic cylinders. The PS and SB steering gear rooms are accessible via an escape hatch on the upper deck and via a watertight door through the accommodation.

Scope:
- Assume sufficient pad eyes are available for handling the hydraulic cylinders in the steering gear room.
- Assume hydraulic system has been de-pressurised and locked-out / tagged-out by the crew. Close / open, remove / refit the stop cock (pos 2). Disconnect / connect the hydraulic pipe lines and blind them (dia 20 mm).
- Disconnect / connect the connecting rod for the rudder indicator.
- Mark the position of each hydraulic cylinder on the foundation and label each cylinder, and mark the yoke (pos 12). Remove / refit the spring arrangement (pos 6 ~ 10, 17). Loosen / tight the sea fasten wedges and foundation bolts.
• Hoist cylinder out / in from the steering gear room via the ladder gantry towers. Transport to yards workshop, disassemble the hydraulic cylinder, clean and dress up all the parts, assemble with new owner supplied seals and bushings, pressure test at 210 bar for 10 minutes witnessed by chief engineer of first engineer.
• Assume replacing the bush (pos 14) with owner supplied spare after measuring the ID of the bushing and the shaft journal pos (17). Report to Chief engineer and owner’s representative.
• Verify the straightness of the piston rod (pos 5) on a lathe machine and report to owner.
• Surface preparation according specs E.6. Coating repair with owner supplied paint according F.1.3.
• Including all tools, transport, crane, permits, cleaning, etc.

Lump sum price for 4 hydraulic cylinders.  

L.101. **rudder carrier, re-bore the fitted bolt holes**

**Drawings:**
- LD 05-00-009 arrangement of rudder carrier
- LD 05-00-013 fitting bolt M24 x 125 for rudder carrier
- LD 05-00-016 ½ base for rudder carrier

**Scope:**
- Assume the rudder blade and rudder stock have been removed.
- Assume the rudder carrier is disassembled / overhauled.
- Re-bore and ream four (4) bore holes in the rudder carrier base and the foundation in situ. Assume from dia 27 to dia 32 mm).
- Machine four (4) owner supplied oversized fitting bolts.
- Including all means like tools (fixed reamer and magnetic drill), temporary lights, ventilation, permits, cleaning of the area after the works, measurement reports, etc.

Lump sum price :  

**L.102. Rudder stock repair iwo Pallister (weld & machine)**

**Drawings:**
- IHC  01175-2145-904 Rudderstock type 32

**Scope:**
- Assume the rudderstock is removed and on the lathe in Yards workshop under item L2.1.
- Rudderstock is to be machined in way of the damaged surface, diameter 180mm. Area to be machined is located 550mm to 750mm measured from the top of the rudderstock.
- Assume 5mm machining depth.
- Material of the rudderstock is C22(N).
- Machined area is to be built up by welding and afterwards machined to original size.
- Care is to be taken not to create distortion in the rudderstock during the welding.
- Prior to commencement, welding procedure is to be provided by the Yard and to be approved by Owner and Owner arranged Class Surveyor.

Lump sum price: ...

rudder stock
M. PROPELLERS AND TAILSHAFTS

M.1. Staging & inspection

Drawings:
- IHC 01175-2145-010 Arrangement rudders, rudders tockw ith bearings and propeller shaft brackets
- IHC 01175-2145-901 Arrangement rudder with rudderstock
- IHC 5474901 Arrangement after sealing type 300

Scope:
- Erect tower staging under the propeller shaft seals and on both sides of the rudder up to top of the rudder.
- Remove / refit the rope guards. Clean the outside of the shaft seals for inspection. De-rust the complete seal housing and rope guard by grinding to ST3. Apply three layers of ship’s supplied paint.
- Take wear down measurement of the tail shaft bearings via the shaft seal arrangement (IHC 5474901) with the ship’s tools according to manufacturer's instructions and make a report as required by B.V. surveyor.
- Perform crack check with dye penetrant on welding seams of tailshaft struts (frame 4) in way of hull and stern tube. Including touch-up coating repair.

Lump sum price … / PS & SB

M.2. Tailshaft withdrawal and refit

IHC 01175-2116-500 Arrangement stern tube with propeller shaft

- Remove/refit the propeller - transport to/from the workshop.
- Remove/refit the rope guard.
- Drain both seals, collect and dump the oil coming out of the stern tube
- Remove/refit the tail shaft coupling.
- Withdraw the tail shaft, transport to/from the workshop, and refit the tail shaft.
- Remove/refit both the inward and the outward shaft seal; transport to/from the workshop.
- Refill the stern tube with owner's oil after completion of the repairs.
- Dismantle, refit, clean, dress up all parts of both shaft seals in the workshop.
- The propeller to be cleaned from sea growth, and polished.
- The bossing in way of blade roots to be dye checked for fractures.
- Clean the tail shaft and both bearings.
- Put the tail shaft on a lathe and check for trueness.
- Magnaflux test the tail shaft cone in way of the keyways.
- Smoothen the tail shaft, and take measurements of several diameters.
- Take measurements of both stern tube bearings.
- Dressing up and cleaning of all parts such as rope guard, propeller nuts, water cap, fitting bolts in the propeller shaft coupling, shaft coupling, stern tube inclusive dressing up the thread of bolts and nuts on a machine.

- Including grinding away the shaft seal running marks in the running sleeves (small grinding, max allowed wear down = 1 mm).
Prior to fitting the propeller on the tail shaft, check the fitting with blue; allow for light scraping of the propeller boss, and for several times propeller on/off the tail shaft cone, to check for a proper fit.

Same is to be done for the tail shaft coupling.

Remove/refit the necessary lube oil/grease pipelines.

Issue all measurement reports.

Lump sum price

**M.3. Propeller remove and refit**

IHC 01175-2116-500 Arrangement stern tube with propeller shaft

- Assume propeller shaft has not been removed.
- Remove/refit the water cap, nut and propeller.
- Recondition the thread of the tail shaft and the nut.
- Magnaflux the keyway on the shaft as required by B.V. surveyor. Fit, blue the propeller on the shaft cone. Allow for remove/refit three times in order to realise a correct fit.
- Remove/refit the grease in the water cap.
- Recondition the hub of the propeller.

Price: .../propeller

**M.4. Propeller polishing in situ.**

- Assume staging is erected as per M1.
- Polish the dia 2700mm, 4-blade propeller in situ.
- Perform crack check with dye penetrant on blade roots.

Price: .../propeller

**M.5. Outboard stern tube seal overhaul**

IHC 5474901 Arrangement after sealing type 300

- Remove/refit aft seal (Supreme 300, Owner’s supply) as per manufacturer's instructions.
- Including collection of drained oil.
- Measure stern tube bearing weardown prior removal and after mounting of shaft seal arrangement and issue report.
- After mounting on board, test the seal arrangement by filling the stern tube with owner supplied lub oil and turning the tail shaft with the ships turning gear. Fill the lantern section of the middle piece with lub oil.

Price: .../aft seal

- To transport the aft seal to the workshop, to open up completely, to overhaul, and to renew chrome liner and seals with owner’s supplied spare, to reassemble, to test and to return to the vessel.
M.6. Replacing stern tube bearings

Drawings
- IHC 01175-2116-500 Arrangement stern tube with propeller shaft Ø270/Ø275.
- IHC 01175-2116-510 Measured sizes stern tube bushes.
- IHC 46311-012 Forward bearing bush Ø270 for propeller shaft.
- IHC 46312-012 Aft bearing bush Ø275 for propeller shaft.
- IHC 46313-012 House for forward bearing bush Ø270.
- IHC 46314-012 House for after bearing bush Ø275.
- IHC 43316-00 Securing piece for bearing bush of propeller shaft.
- LD 12-00-A005374 Over-sized fwd bearing bush for propeller shaft.
- LD 12-00-A005381 Over-sized after bearing bush for propeller shaft.

M.6.1. Renewal of aft and forward stern tube bearings for one propeller shaft

- Assume all spare parts owner supplied.
- Assume shaft pos 102 has been withdrawn completely from the stern tube as specified under section M.2; including measurements of internal diameter of the forward and aft stern tube bearing bushes position 106 and 105 on drawing IHC 01175-2116-500.
- Remove securing piece pos 111 on drawing IHC 01175-2116-500, eight (8) pieces in total.
- Remove both bearing bushes by jacking, grinding, cutting or any other owner’s approved method. Damage on base material of bearing housing to be avoided as much as technically feasible.
- Dress-up the stern tube, measure the bearing bore and record readings from throughout the bearing length and around its bore for forward and aft bearing bush areas, check the stern tube boss area for cracks with a dye penetrant. Submit a report of the measurements and condition to owner’s representative and the chief engineer.
- Machine OD of bushes to final dimensions and submit a report to the owner’s representative and the chief engineer.
- Installing the bearing bushes:
  - The housing and bearing journal should be clean and dry.
  - A thin film of anti-seize lubricant should be applied on the bearing bush outer journal and/or the housing inner surface.
  - Drive the bearing bushes into to the stern tube.
  - Hydraulic jacking will be required. Expect a drive force of 8 - 10 tons for the forward bearing bush and 15 - 20 tons for the aft bearing bush.
  - Ensure all lubrication grooves entries are aligned either visually or with a piece of bar stock.
  - Driving force in ton of each bush to be noted on the report.
- Install new securing pieces pos 111 on drawing IHC 01175-2116-500, eight (8) pieces in total by welding. Electrode to use AWS E7018, throat thickness 8 mm.
• Yard to protect the white metal surfaces and the outside surface of the bearing bushes from any damage during handling and installation. Arrangements to be included in the price.

• Yard to provide the required tools, consumables, all means and services like 60 m3 staging, lightening, cleaning, transport, reporting, measurements, etc. Including the erection/removal of all these means, for the job described above and for all intermediate floodings. To be included in the price.

Lump sum \( \ldots \) / forward bearing 1 shaft
Lump sum \( \ldots \) / aft bearing 1 shaft

**M.6.2 Measurement by laser of fore and aft borings for one stern tube**

• Assume both bearing bushes have been removed from their bores, the stern tube is clean, 60 m3 staging, lights any other means are available; as specified under section M.6.1.

• Measure by laser detector system the alignment of the forward and aft bore centre lines and submit a report to the owner’s representative and the chief engineer.

Lump sum \( \ldots \) / for 1 measurement

**M.6.3 Correction of misalignment by reboring of bearing housings for one stern tube**

• Assume both bearing bushes have been removed as per specification M.6.1 and measurements done as per M.6.2.

• Line bore the bearing housing, with the centre lines of the fore and aft bores becoming collinear.

• Measure by laser the alignment at regular intervals verifying the accuracy of the machining operation as specified under section M.6.1.

• Submit a report of the final dimensions to the owner’s representative and the chief engineer.

• Yard’s sub-contractor for line boring and the equipment to be prior approved by owner’s representative.

• Alignment measurements prior and after the line bore machining operation have to be performed at the same time in the morning to compensate the impact of sunlight on the deflection of the ship’s hull. At both occasions ambient air temperature to be noted down.

• To avoid distortion of the ships’ hull during the alignment measurements and during the line boring:
  - No extensive structural work may be performed on the aft ship form the ladder well on.
  - No heavy loads (>10 t) should be brought ashore or aboard on the aft ship form the ladder well on.
  - Yard to provide the required tools, consumables, all means and services like 60 m3 staging, lightening, cleaning, transport, reporting, measurements, etc. Including the erection/removal of all these means, for the job described above and for all intermediate floodings. To be included in the price.
<table>
<thead>
<tr>
<th>Lump sum</th>
<th>……/ line boring aft bearing house</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump sum</td>
<td>……/ line boring fore bearing house</td>
</tr>
</tbody>
</table>
General remarks to M

All prices for jobs described in M include:

- Parts to be measured, report to be made.
- Nuts, bolts smaller than 20 mm, packing, securing wire, O-seals, washers to be supplied by the yard if necessary (unless specified otherwise).
- Cranage, transport, staging, lighting and all required auxiliary means, removal and refitting all connected pipelines, protecting covers, etc.
N. MAIN DRIVES & DREDGEPUMP DRIVES

N.1. Main Engines

N.1.1. Plateau honing of DEUTZ 540 liners

N.2. Main generator drive couplings

N.2.1. Renewal of rubbers flexible coupling generator side

Drawings:
- IHC 01175-2125-500 Arrangement generator drive.
- IHC 01175-2125-510 Bulkhead passage
- AVD 157-2-8380 Coupling and intermediate shaft generator

Scope:
- Open, remove the bolted bulkhead passage dwg 01175-2125-510 in way of the generator shaft at frame 116.
- Disconnect the intermediate shaft 157.2.8380 pos 4 from the flexible coupling and the gear coupling. Shift the sleeve of the gear coupling pos 3 to the gearbox.
- Lift out the intermediate shaft and shift aside.
- Disconnect, remove the coupling end plate 157.2.8380 pos 23. Transport to workshop.
- Dismantle, remove the sleeve pos 3 from the coupling.
- Clean, degrease, dress up all parts. Measure the hub of the coupling end plate. Measure the teeth of the hub and sleeve coupling. Make a report.
- Renew the rubber elements pos 21 by ship’s spares (24 pieces). Rubber elements can be pulled out and renewed in situ.
- Re-assemble the coupling with old or new ship’s supplied coupling end plate. Box up the intermediate shaft & gear coupling.
- Refit the bulkhead passage.

Price per coupling ...

N.2.2. Renewal of hub gear coupling

Drawings:
- IHC 01175-2125-500 Arrangement generator drive.
- AVD 157-2-8380 Coupling and intermediate shaft generator

Scope:
- Assume that the intermediate shaft 157.2.8380 pos 4 and sleeve pos 3 have been removed under item N2.1
- Renew the hub pos 1 and sleeve pos 2 of the gear coupling by ship’s spares. Including heating up the hub and use of hydraulic jacks, plates and other tools.

Price per coupling : ...

275/568
N.2.3. Renewal of hub flexible coupling

Drawings:
- IHC 01175-2125-500 Arrangement generator drive.
- AVD 157-2-8380 Coupling and intermediate shaft generator

Scope:
- Assume that the intermediate shaft 157.2.8380 pos 4 have been removed under item N2.1
- Renew the hub pos 19 of the flexible coupling by ship’s spare. Including heating up the hub and use of hydraulic jacks, plates and other tools.
- Note if the yard decides in conjunction with item N3.1 to lift out and transport the complete output shaft of the gearbox with the hub pos 19 to workshop to renew the hub, this is included in the price.

Price per coupling

N.2.4. Repairs of coupling end plate 157.2.8380 pos 23

LD-05-00-017 Intermediate ring flexible coupling D890x256x109

- Assume that the coupling end plate 157.2.8380 pos 23 is in the workshop as per item N2.1
- The hub on this coupling end plate with diameter 302 is worn 2 mm on the diameter
- Rebuild this worn hub by welding. Material plate C22. Machine to original size of 302mm.

Price per coupling end plate.

N.3. main generator drive gearboxes

Drawings:
- IHC 01175-2125-500 Arrangement generator drive.
- JAHNEL 1-0-207 742 Gearbox generator drive ASN500
- JAHNEL 1-1-208149 Gearbox generator drive ASN500
- AVD 157-2-8380 arr intermediate shaft HOLSET DCB 837,5
- AVD 051-4-6784 Flexible coupling DCB – SS

N.3.1 Inspection main engine gearbox

- Disconnect the oil cooler, oil filters and oil piping. Store aside. Blank off all piping.
- Disconnect, remove the pressostats & manometers.
- Disconnect and remove the upper part of the gearbox casing. Store aside.
- Clean, mop gears and removed gearbox casing dry. Allow for inspection of bearings and gears by ship’s crew.
- Refit the upper part gearbox casing. Tighten all bolts to the prescribed torque.
- Re-assemble and re-install all removed parts.

Price per gearbox
N.3.2. Complete overhaul main engine gearbox.

- Assume the intermediate shaft is removed at generator side as per item N2.1.
- Dismantle the flexible coupling at engine side: disconnect the coupling end plate, remove / refit the coupling rubbers, disconnect and move aside the coupling sleeve.
- Disconnect, remove the oil cooler. Transport the oil cooler to the workshop. Dismantle the cooler & clean the tubing. Pressure test & re-assemble with new seals.
- Disconnect the oil filters and oil piping. Store aside. Blank off all piping.
- Disconnect, remove the pressostats & manometers.
- Dismantle the shaft driven oil pump and its drive. Disconnect, remove the shaft end covers.
- Disconnect and remove the upper parts of the gearbox casing. Store aside.
- Lift out the two shaft assemblies and transport to the workshop.
- Clean the gearbox casing thoroughly.
- Dismantle the two shafts. Remove all bearings and shaft sleeves. Clean, dress up all parts. Measure all shafts, liners and bores. Make a report.
- Re-assemble the shafts with owner’s supplied new bearings, seals if required new sleeves.
- Return the shafts to the ship and re-assemble the gearbox completely.
- Tighten all bolts to the prescribed torque.

Lump sum price

N.5. Dredge pump couplings

N.5.1. Overhaul of dredge pump clutch coupling

Drawings:

- IHC 01175-2120-500 Arrangement inboard dredge pump drive
- AVD 816-1-8381 Elfric 542 HOLSET DCB 849,5 Airflex
- 42 VC 1200

Scope:

- Remove / refit the steel coupling and flywheel guard. Disconnect / reconnect the air lines to the coupling.
- Open up the combined flexible / clutch coupling 01175-2120-500 pos 5 in situ. Disconnect the outer housing 816 1 8381 pos 64 & side aside. Disconnect the coupling drum pos 2 from the flexible coupling pos 20. Remove / refit the air hoses.
- Disconnect the closing plate 816 1 8381 and shift aside. Remove all 32 pieces rubber blocks. Clean blocks and housing.
- Open up the intermediate bearing 01175-2120-500 pos 6. Remove the two bearings shells. Disconnect the intermediate shaft from the diesel engine. Lift the intermediate shaft complete with the clutch drum and transport to the workshop.
- Dismantle the clutch coupling in the workshop. Clean, dress up and calibrate all parts. Make a report. Skim off the clutch coupling.
- Renew the bearings 816 1 8381 pos 24 & 25 by ship’s spare and reassemble the clutch coupling with new seals and if required a new clutch drum. Tighten all bolts to a prescribed torque. All parts supplied by the owner.
- Return the intermediate shaft with clutch coupling, re-install and reconnect. Re-install if required new ship’s supplied rubber blocks.
- Renew the air flex element by ship’s spare and box up the outer housing.

Price per coupling: …/
Additional price to machine the outer diameter of the clutch drum pos 2 …./pc

**N.5.2. Overhaul gear coupling dredge pump**

To do

**N.6. Dredge pump gearbox overhaul**
N.7. Dredge pump inboard

N.7.1. Remove / renew inner pump casing

Drawings:
- IHC 5242486 Arrangement double walled pump
- LD 01-02-166 Arrangement discharge pipe system

- Assume that the ship’s crew has removed the suction cover pos 200, the impeller pos 104 and the shaft seal assembly pos 220.
- Erect / modify staging
- Disconnect / remove the delivery pipe connecting to the outlet of the dredge pump. For SB pump, the pipe pieces dwg LD 01-02-166 pos LD036, LD037, LD038 & LD123 are to be removed and stored ashore. For PS pump, the pipe pieces LD050, LD051, LD052, LD010, LD165 & LD053 are to be removed and stored ashore.
- Remove the filling piece dwg 5242486 pos 129 from the outlet of the dredge pump.
- Remove the large pump cover pos 135, transport to the workshop. Clean the cover, dress up the face, the bolt holes and thread in the pump cover and the outer pump casing.
- Disconnect, remove the inner pump casing pos 101 using the ship’s special lifting hook. Transport the pump casing to / from the workshop. Clean, dress up the bolt holes.
- Assume the open space between outer en inner pump casing was full of sand and mud. After removal pump casing, clean, remove and dispose off around 3 tons of mud and sand. Pump empty, clean and dispose of mud and sand from the dredge pump well.
- Re-install the old pump casing or install an owner’s supplied new one. Re-install the large pump cover pos 200. Install the old or an owner’s supplied new filling piece pos 129.
- Tighten the bolts pos 127 & 123 to the prescribed torque by yard’s supplied hydraulic tool.
- Afterwards final cleaning of the dredge pump and dredge pump well.
- All works to be done under supervision of ship’s crew.

Price per dredge pump.

N.7.2. Renewal of water chamber

IHC 5242486 Arrangement double walled pump

- Assume that the ship’s crew has removed the suction cover pos 200, the impeller pos 104 and the shaft seal assembly pos 220.
- Erect staging
- Cover the thread of the pump shaft by tarpaulin cover and metal sheeting during the works.
- Disconnect & remove the wear plates pos 206 & 170 aft shaft side using ship’s supplied special lifting hook.
• Disconnect, remove the flange pos 187 and water chamber pos 184. Assume a hard fit of the water chamber and will need to be jacked out by hydraulics or cut in 2 pieces. Clean, dress up the bore and bolt holes.
• Install a new water chamber pos 184 and flange pos 187 with new O-rings and bolts. All parts ship’s supplied.
• Install new ship’s supplied wear plates pos 206 & 170.
• All works to be done under supervision of ship’s crew.

Price per dredge pump. …/

**N.7.3. Reconditioning of suction cover dredge pump**

**Drawing:**
- IHC 5242486 Arrangement double walled pump
- IHC 5474782 Suction cover double walled pump (31 bar)
- IHC 5474779 Suction cover double walled pump (19 bar)

**Scope:**
- Assume the pump cover dwg 5242486 pos 200 is removed by the ship’s crew. Transport the pump cover to / from the workshop
- The wear plates dwg 5242486 pos 170, 177 & 196 are to be removed. Wear plates and pump cover to be cleaned and bolt holes to be dress up.
- Assume the pump cover is worn on several location as indicated on the drawing:
  - at the machined diameter of 2249
  - at the machined diameter 2621 & 2650, including part of the O-ring groove.
  - At the machine diameter 1230 and face of the bore with depth 171
  - The face of the cover is pitted: assume pitting of 3 mm deep every 10 cm.
- All worn area’s to be built up by welding and the pump cover to be machined to nominal sizes including full skim on the face.
- The flange OD1230 of the pump cover is worn in way of the O-ring seating. The worn part to be built up by welding and flange to be skimmed.
- The two pipe connections diameter 76.1 with flange ND40 are to be renewed by new pipe pieces in schedule 80. A template to be fabricated to align the pipe connection towards the pump cover flange. Both pipes must be mirror mounted and same template to be used for the other and spare pump covers.
- The pump cover to be grit blasted to SA 2 ½ and painted with 3 layers ship’s supplied paint.
- The wearing plate or new ship’s supplied ones to be re-installed with new ship’s supplied sealing rings.

Price per pump cover: …/

(note that pump cover 19 & 31 bar are similar, only different in thickness & weight)

**N.7.4. Replacement bearing block dredge pump**

IHC 5242486 Arrangement double walled pump
• Assume that the ship’s crew has removed the suction cover pos 200, the impeller pos 104 and the shaft seal assembly pos 220.
• Assume that the pump cover pos 135 and inner pump housing pos 101 is removed by ship’s crew or under item N3.1. Assume that the water chamber pos 184 and wear plates are removed by ship’s crew or under item N3.2.
• Cover the thread of the pump shaft by tarpaulin cover and metal sheeting during the works.
• Remove the holding down bolts 5242486 pos 631.
• Dismantle, remove the turning gear assembly. Clean, dress up all parts.
• Open up the gear coupling, shift the gear ring to free the coupling.
• Disconnect, reconnect the oil lines. Drain, collect, dispose the remaining oil.
• Lift out the complete bearing block pos 617 including the pump shaft. Transport to be workshop. Clean, dress up the seating in the pump pedestal.
• Remove the hub of the gear coupling & gearwheel of the turning gear from the pump shaft. Clean, dress up and prepare for overhaul or return to owner.
• Transport the spare bearing block from the ship’s store to the workshop. Clean, dress up the free pump shaft ends. Fit, install the gear coupling hub and gearwheel of turning gear on the new shaft. Return the new bearing block to the ship and install in the pump pedestal. Re-install the holding down bolts and tighten to the prescribed torque. Tool supplied by the yard.

Price per dredge pump. …/ N.7.5. Overhaul of bearing block.

IHC 5242486 Arrangement double walled pump

• Assume the bearing block pos 617 complete with pump shaft is removed by ship’s crew or under item N3.6
• Dismantle the bearing block, remove the shafts, bearings, seals and covers. Clean, dress up all parts.
• Measure the bores of the bearing housing. Measure pump shaft. Put shaft on lathe and check truthness. Make a report.
• Re-assemble the bearing block with owner’s new supplied bearings and shaft seals.
• Fill the bearing housing with ship’s supplied oil and return to the ship’s store.

Price per bearing block : …/ N.100. Reconditioning of sealing faces outer dredge pump housings rev1

• IHC 01175-2120-500 Arrangement dredge pump drive
• IHC 5242486 Arrangement double walled pump
• IHC 503566 Outer pump casing

N.100.1 Remove / refit / machine the outer housing dredge pump.
• Assume that the ship’s crew has removed the suction cover pos 200, the impeller pos 104 and the shaft seal assembly pos 220.

• Assume that the pump cover pos 135 and inner pump housing pos 101 is removed by ship’s crew or by the yard under item N7.1. Assume that the water chamber pos 184 and wear plates are removed by ship’s crew or under item N7.2.

• Cover the thread of the pump shaft by tarpaulin cover and metal sheeting during the works.

• Disconnect, remove the foundation & fitting bolts of the pump casing pos 116. Clean, dress up the foundation in way. Mark & secure the steel chocks. Remove sea fastening blocks from the foundations. Remove the positioning screw. Clean, dress up the thread. Supply, fabricate and install new positioning screws.

• Disconnect, remove the frame and fitting bolts dwg 5242486 pos 156+157.

• Remove, lift out the outer pump casing pos 116, transport to the workshop. Clean dress up the pump frame, the foundation, pump casing and all bolt holes.

• The outer casing as fitted is according to drawing 503566. The pump casing is to be machined to fit the owner’s supplied centring rings 5242486 pos 222 & 223. Therefore the pump casing is to be machined according to 503566revA.

• Fit, install the owner’s supplied rings pos 222 & 223.

• Dress up and rethread the jack up bolts in the pump’s supports. Clean, dress up the bottom of the pump supports.

• The in- and outside of the pump housing and large pump cover to be grit blasted to SA 2½ and painted with 3 layers ship’s supplied paint.

• Return the pump housing to the ship, align and re-connect to the pump pedestal. Check the alignment of the pump shaft to the bore of the pump housing. Check the blue print of the steel chock, fit & adjust to 90% contact. Re-install the foundation and fitting bolts. Tighten to a prescribed torque.

Price per dredge pump : …./

Additional price for reaming and fabrication of new fitting bolt : …./bolt
Additional price for fabrication & fitting new steel chock : …./chock.

**N.101. main generator ~ cutter ~ under water pump ~ gearboxes, lubrication oil pumps overhaul**

**Drawings:**

- KRACHT 3105319-0 KF6 lub oil pump
- KRACHT 3105319-0 KF6 lub oil pump part list
- KRACHT 3105317-1 KF5 lub oil pump
- KRACHT P.005317-1 KF5 lub oil pump parts list

These are gear pumps, flange mounted with a pressure stop valve.

**Scope:**

• Assume all spares owner supplied.

• Assume the pumps have been removed from the gearboxes according specs J.5.8., J.2.10. and N.3.2. and are available at the yard’s workshop.
• Disassemble / assemble the pump. Exchange all worn parts. Conserve the machined parts with Tectyl after assembly.
• Including all means like tools, consumables, transports, reporting, etc.

Lump sum price : … / gear pump

**N.102. Recondition bolt hole outer pump casing DP3**

**Drawings:**
- IHC 5242486 Mj : Arrangement double walled pump
- IHC 503566 Cj : Outer pump housing

**Remark:** All below described lifting operations to be done under supervision of owner’s representative because of the use of special lifting brackets

**Job description:**
- Remove inspection piece and bring ashore
- Remove suction cover and transfer to its designated chair using ship’s specific lifting bracket (weight 10 Ton)
- Remove impeller and transfer to its designated chair using ship’s specific lifting bracket (weight 7 Ton)

**Option I:**
- Erect staging (+/- 23 m³) for loosening bolts (pos 127) outer pump cover
- Remove staging
- Remove outer pump cover and bring ashore (Weight 16 Ton; Dimensions +/- 5x5x0.5m)
- Remove welded doubler plate on outer pump cover (100x100 mm)
- Inspect all threaded holes together with owner’s representative
- Erect staging (+/- 23 m³) to access the damaged threaded hole
- Machine the hole to a diameter of 86mm; depth 160 mm
- Tap new thread of M90x4
- Fabricate a bush with:
  - Outer thread M90x4
  - Inner thread M64x4
  - Length 160 mm
- Mount fabricated bush
- Secure the bush by drilling a hole of 8 mm on the cross line between bush and pump house and inserting a fitting pin
- Re-assemble complete pump

**Option II:**
- Erect staging (+/- 6 m³)
- Remove welded doubler plate outer pump cover (100x100 mm)
- Machine the hole to a diameter of 66mm, depth 160 mm
- Tap new thread of M70x4
- Provide a new bolt M70x4 with length 290 mm; quality 8.8 or higher
- Re-assemble complete pump
<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lump sum price option I, in situ machining arranged by Yard:</strong></td>
<td>...</td>
</tr>
<tr>
<td>Reduction in case of Owner’s arranged subcontractor:</td>
<td>...</td>
</tr>
<tr>
<td><strong>Price per additional bolt hole to be repaired with threaded bush M90</strong></td>
<td>...</td>
</tr>
<tr>
<td>Reduction per additional hole in case of Owner’s arranged subcontractor:</td>
<td>...</td>
</tr>
<tr>
<td><strong>Lump sum price option II, in situ machining arranged by Yard:</strong></td>
<td>...</td>
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<tr>
<td>Reduction in case of Owner’s arranged subcontractor:</td>
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<td>...</td>
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<tr>
<td>Reduction per additional hole in case of Owner’s arranged subcontractor:</td>
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</tbody>
</table>
P. Pipe lines

P.1. Black Steel Pipes
Prices to be quoted for renewing of black steel pipes, in straight lengths of min. 2m, including new flanges, bolts quality 8.8 metric sizes, and packing, removing and refitting; assume pipes are mounted on deck.
(inclusive eventual 1/2" or 3/4" sockets for manometer, thermometer, etc.).

- 25 x 2 mm ...../m
- 33,7 x 2,6 mm ...../m
- 60,3 x 3,2 mm ...../m
- 70 x 4 mm ...../m
- 88,9 x 3,2 mm ...../m
- 101 x 5 mm ...../m
- 114 x 5 mm ...../m
- 139,7 x 6 mm ...../m
- 168,3 x 6 mm ...../m
- 219 x 8 mm ...../m

Additional (if any) for:
- Hot galvanised pipes .....
- ASTM schedule 40 pipes .....
- ASTM schedule 80 pipes .....
- Pipes in engine room, pump room, propulsion room above floor plates .....
- Pipes in engine room, pump room, bowthruster room, propulsion room under floor plates .....
- Pipes in double bottom, tanks .....
- Bent pipes up to 6" .....
- Branches .....
- Bulkheads or deck penetration .....
- Constructed bends (90) .....
- New clamps .....
- Lengths smaller than 2m .....
- Completely new pipe .....

Prices includes : cranage, lighting, staging, removing floor plates for access, transport, clipping of pipes, reconditioning of flanges, ventilation, all auxiliary means.

P.2. Hydraulic oil pipelines

P.2.1. renewal of hydraulic oil pipelines
Prices to be quoted for renewal of seamless steel precision pipes (inside working pressure:
- 220kg/cm2), in straight lengths of min. 3m.
- Assume pipes are on deck.
- Pipes to be pickled prior to fitting, and flushed afterwards.
- 20 mm (DIN 2445)  .../m
- 25 mm (DIN 2445)  .../m
- 30 mm (DIN 2445)  .../m
- 38 mm (DIN 2445)  .../m
- 50 mm (DIN 2445)  .../m

Pipes with an outside diameter of 30mm and larger are joined by SAE flanges. Smaller pipes are joined by means of steel pipe couplings of the cutting ring type (EO).

Extras for:
- price per straight coupling (EO) 20/25mm   ....
- bent coupling (EO) 20/25mm    ....
- T-coupling (EO) 20/25mm    ....
- price per flange coupling 30/38/50mm (inclusive bolts quality 8.8 metric sizes and O-rings)    ....
- bent pipes    ....
- branch 30/38/50mm    ....
- pipes in engine-, pump, bowthruster, propulsion room    ....
- bulkhead penetration    ....

Pipes with a diameter up to 38mm are fixed by "Stauff" clips, larger pipes by means of steel clips. Price for the renewal of clips of different diam.    ....

Prices in P.2. include: removing and refitting, cranage, bolts quality 8.8 metric sizes, nuts, seals, lighting, staging, transport, eventual reconditioning of flanges, all auxiliary means.

**P.2.2. Flushing of hydraulic pipe lines**

Scope:
- Flushing with a dedicated flushing unit to be performed on the system divided into parts which can be independently cleaned and isolated. Temporary pipes, flushing blocks, tube or hoses to be used.
- Dead ends without circulation shall be avoided.
- Remove / refit from the circuit hydraulic pumps, motors, valves; and substituted in their place temporary pipes, flushing blocks or hoses.
- A special flushing fluid with low viscosity is preferred and heated up to 60°C.
- Flushing fluid should achieve turbulent flow for minimum 30 minutes. If possible revert the direction of the flow a few times.
- Minimum flushing speed 7 m/s (largest diameter on board is 60 mm).
- Clean filter elements installed as necessary to keep the pressure drop across the filter within limits.
- Flushing until contamination level according NAS 1638 class 8 is reached.
- The contamination level will be determined by a suitable system.
- When the piping is flushed properly, drain all piping and blow out the remaining flushing fluid with dry air and sections to be blinded and labelled.
- Renewal of the piping connections (O-rings & Bolts, owner supplied).
- Flushing in presence of chief engineer, first engineer or hydraulic specialist.
• Including mobilization, hire of the flushing unit.
• Including disposal of the flushing liquid.

To quote for systems with pipelines equivalent to:
• Diameter < 1 “, L 30 m … /
• Diameter < 2 “, L 30 m … /
• Diameter < 3 “, L 30 m … /

Alternative, quote for cleaning to contamination level class 6.
• Diameter < 1 “, L 30 m … /
• Diameter < 2 “, L 30 m … /
• Diameter < 3 “, L 30 m … /

**P.3. Renewal of lagging and tracing lines.**

**P.3.1 Insulation.**

**Fuel lines and thermal oil lines in engine room.**

Lagging of fuel and tracing lines in engine room to be renewed with:
• Prefabricated hard rock wool pipe segments; density min kg/cum.
• Rockwool segments fastened by galvanized or stainless steel wire.
• Bends, etc. covered with segments, cut to the required form.
• Rockwool segments covered with glass-fibre cloths with aluminium evaporated layer, with 20 to 50 mm. overlap. Seam is fastened with glass fibre thread.
• In way of flanges, the insulation stops in such a way that the flange connection can be loosened. Flanges are covered by mattresses overlapping the pipe insulation. The ends of the pipe insulation are to be covered to avoid contamination by fluids.
• Special fittings (valves etc.) are covered with mats allowing normal operation and control of the equipment.
• Flanges and fittings are only insulated after tests and trials and inspection of all connections. Insulation material soaked or contaminated by fluids will have to be replaced before delivery.
• Pipe clips will be insulated from the pipe, with the finishing fibre cloth tightly worked around the clip’s supporting strip.

Price includes:
• removal of existing lagging
• cleaning, degreasing of pipes and fittings
• apply new lagging
• transport, cranage, lighting, staging

Assume thickness of insulation 30 mm; the inside temperature of the pipelines up to 180 deg. Celsius;
Price per meter for following external pipe diameters:
(the same price applies to straight pipes, bends, T-pieces, flange covers, fittings, etc.)
- Dia. 60.3 x 2.9 .../m.
- Dia. 48.3 x 2.6 .../m.
- Dia. 76.1 x 3.6 .../m
- Dia. 60.3 x 2.9 .../m.
- Dia. 33.7 x 3.2 .../m.
- Dia. 20.0 x 2.0 .../m.
- Dia. 42.4 x 4.0 .../m.
- Dia. 42.4 x 2.6 .../m.
- Dia. 25.0 x 2.5 .../m.

Additional, if any, for:
- Pipes in engine room, pump room, propulsion room above floor plates ....
- Pipes in engine room, pump room, propulsion room, under floor plates ....
- Pipes in double bottom, tanks, cofferdam ....
- Bent pipes up to 6" ....
- Branches ....
- Constructed bends (30) ....
- New clamps ....
- Lengths smaller than 2m ....

**Exhausts.**

Lagging of exhausts to be renewed with:
- **Straight exhausts:**
  - Water-repellent rock wool with a density of 120 kg/cum, max. operating temp. 750 deg. C. in prefabricated shells (type 850)
  - In way of expansion pieces removable rock wool mattresses in glass fibre covering.
  - The rock wool is protected by an oil tight and fire resistant glass fibre cloth.
  - Covered with aluminium (1 mm) plates fastened by self-tapping screws or rivets.
- **Bends and elbows:**
  - Water-repellent rock wool with a density of 120 kg/cum, max. operating temp. 750 deg. C. in prefabricated shells (type 855).
  - Fastened by steel wire.
  - The rock wool is protected by an oil tight and fire resistant glass fibre cloth.
  - Covered with aluminium (1 mm) plates fastened by self-tapping screws or rivets.

Price includes:
- removal of existing lagging
- cleaning, degreasing of pipes and fittings
- apply new lagging
- transport, cranage, lighting, staging
- pipes are installed in engine- or pump room
Price per m2.

(assume insulation of more than 10 m. pipe length is to be renewed, same price applies to straight pipes, bends, T-pieces, flange covers, fittings etc...)

Thickness of insulation for exhaust and thermal oil piping.

Inside temperature of pipes

<table>
<thead>
<tr>
<th>Ext. Pipe Dia. [mm]</th>
<th>Inside temperature of pipes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 C</td>
</tr>
<tr>
<td>17.2</td>
<td>20</td>
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<tr>
<td>21.3</td>
<td>20</td>
</tr>
<tr>
<td>26.9</td>
<td>20</td>
</tr>
<tr>
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</tr>
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</tr>
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</tr>
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</tr>
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<td>355.4</td>
<td>25</td>
</tr>
<tr>
<td>406.4</td>
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<tr>
<td>457.2</td>
<td>25</td>
</tr>
<tr>
<td>508</td>
<td>25</td>
</tr>
</tbody>
</table>

Diameters as follows:

- 508 x 4.5  .../m
- 324 x 4   .../m
- 159 x 2.5 .../m
- 457 x 4   .../m
- 419 x 4   .../m
- 219 x 3   .../m
- 133 x 2.5 .../m
- 108 x 2.5 .../m
- 88.9 x 2.5 .../m

Prices should include everything mentioned under P1.

- For clamps: steel clamps with lead inlay
- For flanges: the pipes are joined by means of steel flanges (loose) with bronze inner ring, welded to the cunifer pipe.

Additional, if any, for:

- Pipes in engine room, pump room, propulsion room above floor plates ....
• Pipes in engine room, pump room, propulsion room, under floor plates ....
• Pipes in double bottom, tanks, cofferdam ....
• Bent pipes up to 6" ....
• Branches ....
• Constructed bends (30) ....
• New clamps ....
• Lengths smaller than 2m ....
• Complete new pipe ....

**P.3.2 Tracing lines.**
Removal of the existing tracing pipeline of the fuel lines in the engine room and replacement by new steel tracing lines dia. 12.0 x 1.5 mm.
Material of tracing lines to be seamless or ERW-welded pipes.
Tracing lines to be fastened with stainless steel strips.

Price per meter: .../m.

Insulation is included in P.3.1.

**P.4. Stainless steel hydraulic oil pipelines**
Price to include everything as mentioned under P.2., however:
- Material should be AISI 316 up to dia. 25mm, and AISI 316 for larger dia. up to 38mm inclusive.
- Pipes with an outside dia. up to 25mm including are fitted by means of st.st. couplings (type Keelaring)
- Pipes with an outer dia. larger than 25mm are joined by means of steel flanges.
- The bolts of the stauff clamps are stainless steel.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Price</th>
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<th>Price</th>
</tr>
</thead>
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<tr>
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<td>.../m</td>
<td></td>
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<tr>
<td>Nan</td>
<td>.../m</td>
<td>.../m</td>
<td></td>
</tr>
</tbody>
</table>

Extras for (if any):
- st.st. straight coupling : 16/20/25 mm ....
- st.st. bent coupling: 16/20/25 mm ....
- st.st. T-coupling: 16/20/25 mm ....
- bent pipes ....
- branch ....
- bulkhead penetration ....
- pipes in engine-, pump-, propulsion room above floor plates ....
- pipes in engine-, pump-, propulsion room under floor plates ....
- pipes in double bottom, cofferdams, other tanks ....
- completely new pipe ....

**P.5. Cunifer Pipes**
Diameters as follows:
• 508 X 4.5  
• 324 X 4  
• 159 x 2.5  
• 457 x 4  
• 419 x 4  
• 219 x 3  
• 108 x 2.5  
• 88.9 x 2.5  

Prices should include everything mentioned under P1.
• For clamps: steel clamps with lead inlay
• For flanges: the pipes are joined by means of steel flanges (loose) with bronze inner ring, welded to the cunifer pipe.

Additional, if any, for:
• pipes in engine room, pump room, propulsion room above floor plates ...
• pipes in engine room, pump room, propulsion room under floor plates ...
• pipes in double bottom, tanks, cofferdam ...
• branches ...

P.6. In situ cleaning of pipes by hydro jetting.

P.6.1. In situ hydro jetting of grey water line propulsion room

IHC 01175-2323-530 Diagram sanitary water pipes

• Disconnect, remove pipe inspection plug from the grey water line in the SB propulsion room. Drain, collect the line. Disconnect, remove and refit pipe pieces of the sewage line connecting to the sewage unit.
• Supply, provide an internal pipe hydro jetting unit.
• Clean the complete grey water line up to the sewage unit, ND100mmx52.0m. Cleaning from both sides: in propulsion room and in sewage unit room.
• Yard to supply the transport, the operator, the freshwater, the power, tools, hoses, nozzle gun,…

Lump sum price: ...

P.6.2. In situ hydro jetting of grey water line forward accommodation

IHC 01175-2323-530 Diagram sanitary water pipes

• Disconnect, remove pipe inspection plug from the grey water line in the SB store room. Drain, collect the line. Disconnect, remove and refit pipe pieces of the sewage line connecting to the sewage unit.
• Supply, provide an internal pipe hydro jetting unit.
• Clean the complete grey water line up to the sewage unit, ND100mmx20.0m. Cleaning from both sides: in the SB store room and in sewage unit room.
• Yard to supply the transport, the operator, the freshwater, the power, tools, hoses, nozzle gun,…
**P.101. Renewal of oxygen & acetylene outlet stations & testing pipes**

01175-2650-500  Diagram acetylene & oxygen pipelines
Unitor outlet station

In total 12 oxygen & acetylene outlet stations are to be renewed by owner’s supplied units
Assume the system is not in used. Disconnect all 12 existing outlet stations. Blow through, gas free the piping. Cut; remove the valve, pipes, cover, foundation of the existing outlet stations.
Fabricate, fit and install & weld supports in stainless steel for the new owner’s supplied outlet stations.
Install the outlet stations & connect to the existing pipe lines. Short pipe pieces and fittings in stainless steel to be supplied by the yard. Assume maximum 2 new pipes D12 x 1.5 mm & length 500, for each outlet station to be supplied and installed by the yard.
After installation, the complete pipe system to be pressure tested and inspected for leaks using soap test.
Including the supply of a moveable staging or other access means to the pipe. Note that the pipes are running 3.0 – 4.0 meter above the upper deck.

Lump sum price:

**P.102. New pipes in engine- and pump room**

**P.102.1 Install cooling water connections harbour generator to deck**

Cunifer pipe to be removed in two existing cooling water systems in the harbour generator room. Send the two pipes to workshop. Cut, supply, fit and weld a branch pipe. Return to ship and re-install
Two ship’s supplied butterfly valves to be installed on these new branches.
Two pipes to be supplied, fabricate, fitted from these butterfly valves to above deck. Including deck penetration, 90deg bends above deck and blind flanges. Pipes are each 4.0 meter long, steel, ND80mm, 4 bends 90 deg, schedule 40 & hot dipped galvanized.

Staging is required.
Outside of the new pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price:
…./

**P102.2. Install inlet cooling water connections LT cooling water system to deck.**

Cunifer pipe to be removed in the existing cooling water system in engine room. Send the pipe to workshop. Cut, supply, fit and weld a branch pipe. Return to ship and re-install.

A ship’s supplied butterfly valves to be installed on the new branch.

Pipe to be supplied, fabricate, fitted from this butterfly valves to above deck.

Including deck penetration, 90deg bend and blind flange. Pipe is 10.0 meter long, steel, ND80mm, 4 bends 90deg, 4 bends 45deg, schedule 40 & hot dipped galvanized. Staging is required.

Outside of the new pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price:
…./

**P102.4 Install new bilge system in the ladder turning points**

Staging is required.

A pipe has to be supplied, fabricate, fitted from each turning points. Including a side penetrations, 2x 90deg bends, 2x 45° bends. Pipes are each 10 meter long, steel, ND50 mm, schedule 80 & hot dipped galvanized with a flanges at each side.

The two pipes need to be connected with two branches to the bilge line on top of the ladder, which is renewed in P103.37

Outside of the new pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for the two pipes:
…./

**P.103. Renewal / modification of existing pipes**

**P.103.1 Renewal of hydraulic pipes from deck to hydraulic motors anchor boom hauling winches SB & PS.**

The supply and return hydraulic lines from the deck to the hydraulic motors of the anchor boom hauling winches SB & PS on the crane deck are to be renewed.

In total 4 hydraulic lines ND42x5mm, each 1.6 m long, 5 bends. Including fabricating and machining new custom made square flanges in AISI 316 with O-ring grooves.

Pipes are made as per specification P4 : mat, AISI 316, pickled and flushed.
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for SB & PS winch :

\[ \ldots/ \]

**P.103.2. Installation of valve in suction emergency fire fighting pump**

Disconnect, remove an existing pipe from the suction line emergency fire fighting pump in the pump room
Install a ship’s supplied valve on one end of the suction line
Fabricate, fit and install a new pipe to suit the new situation: pipe ND65 schedule 80, 3 bends, 1 branch, length 1.0 m, hot dipped galvanized.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price :

\[ \ldots/ \]

**P.103.3. Renewal of bilge line deck crane**

Erect a staging on deck up to the horizontal structure of the ship’s deck crane
Renew the bilge line running from the deck level to the top structure of the gantry crane
Pipe ND40, length 50m, sch. 40, 6 bends, hot dipped galvanized.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price :

\[ \ldots/ \]

**P.103.4 Renewal suction line freshwater tanks**

Assume that the freshwater tanks are emptied, opened and cleaned under item H1.
The suction lines running in the freshwater tanks nos. 10 & 19 are to be renewed from the 1st flange connection outside the tanks.
Each suction pipe is ND80 x 6.0m long, 4 bends, schedule 40 & hot dipped galvanized. Including bulkhead penetration and reducer pieces ND125 to ND80 at suction end side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint. Freshwater tanks to be cleaned again after pipe works in the tanks.

Lump sum :

\[ \ldots/ \]

**P.103.5 Renewal freshwater line in SB propulsion room**
Erect a staging.
Freshwater line in SB propulsion room to be renewed: pipe ND40, 7.1m long, sch. 40, 2 bends, 1 branch 1” & hot dipped galvanized. Including the renewal of 2 dresser couplings.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price:

P.103.6 Renewal of hydraulic pipes to hydraulic motors of barge loading hoisting winches

The supply and return hydraulic lines from the deck to the hydraulic motors of the barge loading hoisting winches SB & PS on the crane deck are to be renewed.
4 hydraulic lines ND42x5mm, each 1.0 m long & 4 bends. Including fabricating and machining new custom made square flanges in AISI 316 with O-ring grooves.
Pipes are made as per specification P4 : mat, AISI 316 & flushed.
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for SB & PS winch:

P.103.7 Replace temporary hydraulic hoses locking pin cylinder by pipe

Erect a staging in the ladder
Remove hydraulic hoses to the locking pin cylinder.
Fabricate, install, fit 2 hydraulic pipes ND16 x 2, each 550mm long, both sides cutting ring couplings in AISI 316.
Pipes are made as per specification P4 : mat, AISI 316 & flushed.
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price:

P.103.8 Renew scupper pipe engine room

Erect a staging
Disconnect, remove and refit a ventilation trunk in way for access
Renew scupper pipe running from tweendeck to the bilges: Pipe ND50mm x 5.5 m long, 2 bends, 1 branch, schedule 40 & hot dipped galvanized & including renewal of 2 suitable dresser couplings
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price:
P.103.9 Renew pipe between emergency fire fighting pump and hydrophore unit.

Renew pipe, fittings and ball valve between fire fighting system and hydrophore unit. Pipe ND20mm schedule 80, length 3.5m, 5 bends, both ends cutting ring couplings & hot dipped galvanized. Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price: \(.../\)

P.103.10 Re-align intake pair pipe turbocharger main engine no. 3

Erect a staging – Engine room
Disconnect, remove the pipe ND250 x 300mm between air inlet filter and turbocharger of main engine. Send to the workshop, cut pipe in two. Return to ship, refit, re-align the pipes both sides and tack weld. Send to workshop, weld pipe. Return & refit the pipe with ship’s supplied new gaskets.

Lump sum price: \(.../\)

P.103.11. Renew seawater pipe toilet flushing in PS propulsion room

Erect a staging
Renew seawater pipe of toilet flushing in PS propulsion room. Pipe ND40, length 5.2 m, 1 bend, schedule 80 & hot dipped galvanized. Including delivery and fitting of 2 dresser couplings. Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price: \(.../\)

P.103.12. Renew scupper line above expansion tanks in engine room

Erect a staging
Renew scupper pipe above the expansion tanks in the engine room. Pipe ND65, length 12 m, 5 bend, 3 deck penetrations and 3 branch pipes, schedule 40 & hot dipped galvanized. Including delivery and fitting of 2 new dresser couplings. Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price: \(.../\)
P.103.13. Renewal gland water pipes

Erect a staging
Renew 5 pipes pieces above the gland water pump unit in the pump room
One pipe ND125 with reducer ND100 length 200mm
One pipe ND125 with reducer ND100 length 850mm
One pipe ND125, length 140mm
One pipe ND150, length 2100mm
One pipe ND125, length 2500mm with one bend.
All pipes schedule 80 & hot dipped galvanized.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : ...

P.103.14. Renewal scupper pipe accommodation PS aft

Erect a staging from the crane deck to the bridge deck
Renew the scupper pipe from the bridge deck running alongside the deck house to the crane deck.
Pipe ND50, length 9.4m, schedule 40, hot dipped galvanized. Pipe to be welded on top and welded fastened to the existing pipe clamps.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : ...

P.103.15. Renewal bilge line on cutter ladder

Erect a staging
Remove an existing bilge line. Fabricate, install a new & modified bilge line with different routing as per chief’s engineers instruction
Pipe ND65, length 3500mm, schedule 80, 3 bends, hot-dipped galvanized.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : ...

P.103.16. Renewal of venting pipe cathodic protection unit SB

Renew venting pipe cathodic protection unit SB. Assume difficult access in corridor
Pipe ND50, length 6.0m, 8 bends, schedule 80 & hot dipped galvanized
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : ...
P.103.17. Renewal of grey water pipe in SB propulsion room – Drain sink cabin 130

Erect a staging
Remove temporary installed hoses. Remove existing pipe in the SB propulsion room
Fabricate, install new pipe ND40, length 4.0m, 2 bends, schedule 80 & hot dipped galvanized. Supply install 2 new dresser couplings.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.18. Renewal of grey water pipe in SB propulsion room – shower cabin 130

Erect a staging
Remove temporary installed hoses. Remove existing pipe in the SB propulsion room
Fabricate, install new pipe ND50, length 3.5m, 2 bends, schedule 80 & hot dipped galvanized. Supply & install 2 new dresser couplings.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.19. Renewal of seawater pipe sanitary system accommodation

Renew seawater pipe to accommodation in the pump room
Pipe ND40, length 3.6m, 5 bends, 1 bulkhead penetration, 1 branch, schedule 80 & hot dipped galvanized. Supply & install 1 new dresser coupling. Routing of the pipe is to be modified as per chief engineer’s instruction.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.20. Renewal of scupper pipe near entrance forward accommodation PS

Erect a staging from the crane deck to the upper deck
Renew the scupper pipe from the crane deck running alongside the superstructure to the upper deck. Including works in void space.
Pipe ND65, length 15m, schedule 40, 6 bends, 5 bulkhead penetrations, hot dipped galvanized. Pipe to be welded on top and welded fastened to the existing pipe clamps.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.21. Renewal of scupper pipe near boatswain store entrance SB

Erect a staging from the crane deck to the upper deck
Renew the scupper pipe from the crane deck running alongside the superstructure to the upper deck.
Pipe ND65, length 11m, schedule 40, 3 bends, 3 bulkhead penetrations, hot dipped galvanized. Pipe to be welded on top and welded fastened to the existing pipe clamps. Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.22. Renewal of scupper pipe near PS SOS station

Erect a staging from the crane deck to the upper deck
Renew the scupper pipe from the crane deck running alongside the superstructure to the upper deck. Including works in void space
Pipe ND65, length 13m, schedule 40, 8 bends, 4 bulkhead penetrations, hot dipped galvanized. Pipe to be welded on top and welded fastened to the existing pipe clamps. Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.23. Renewal of overboard bilge / ballast pipe PS

Renew overboard bilge pipe in the auxiliary engine room. Note difficult access in way of routing of pipe – above the MDO settling & day tank.
Pipe ND125, length 4.5m, 2 bulkhead penetration, 1 branch ND65, schedule 80 & hot dipped galvanized.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.24 Renewal of hydraulic pipes pump units

Remove the temporary installed hydraulic hoses and replace by hydraulic pipes as per specification P2.
2 hydraulic pipes ND32x4mm, each 1.3 m long & 3 bends, both ends SAE flanges
1 hydraulic pipes ND32x4mm, 0.75 m long & 2 bends, both ends SAE flanges
2 hydraulic pipes ND32x4mm, 0.8 m long & 3 bends, both ends SAE flanges
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for 4 pipes : .../

P.103.25 Cleaning / renewal of fuel oil drain lines engines.

The heavy fuel oil drain lines from the 5 diesel engines running under the floor plates in engine room to the fuel oil drain tank are all blocked.
Pipe line is ND50mm x total 70.0m. Allow for 50 bends, 3 penetrations & 15 branches.
Open up the floor plates in engine room
Remove, dispose all insulation of the fuel drain pipes
Disconnect, remove, the thermal oil tracing lines of the fuel drain pipes
Disconnect, remove all fuel oil drainpipes from the engines to the fuel oil drain tank.
Transport all pipes to be workshop. Clean, unblock all pipes. Pickle pipes, paint the outside with primer.
Assume pipes are difficult to access and assume 20 other pipes running in way need to be removed to access.
Return, re-install the pipes with new gaskets & bolts. Supply, install, connect new tracing lines ID12x1.5mm as per system P3.2. Supply, install new insulation as per system P3.1.

Lump sum price for 70m drain lines : .../
Alternative price to renew all drain lines : ..../
Price to renew drainpipe per running meter : .../
Additional price to cut, fit and weld flanges in case pipe can not be removed : ../set

P.103.26 Install owner’s supplied hull valve for trunnion sensor

Erect a staging from tank top to top in the PS propulsion room
Fabricate a hull penetration pipe piece, with PN10 flange and stiffeners as per class requirements : Pipe ND80x400mm, schedule 160. Install owner’s supplied valve and carry out pressure test in the workshop.
Cut opening in the shell at as per instruction, fit, weld the hull penetration pipe. Fit and weld stiffeners. Carry out NDT as per class requirement.
Install ship’s supplied valve and sensor device.

Lump sum price : ..../
**P.103.27 Partly renewal / repair of seawater pipes supply lines above floorplate level to the heatexchangers in engine room**

Assume that the 2 LT & 2 HT heatexchangers are removed under item Q1 & Q2
Disconnect and remove coolingwater pipes in way for access
Disconnect, remove main supply coolingwater line to the heatexchangers:
- 1 pipe ND 400 x 2200mm / 2 branches ND200, 1 branch ND400 x 1500mm
- 1 pipe ND 400 x 3500 / 1 bend 90 degrees
- 1 pipe ND 400 x 4000 / 5 branches of ND200.
Transport all pipes to workshop, clean and present for inspection.
All pipes are made from cunifer material with collar flanges as per specification P5.
After repairs, return, refit and re-connect with new packings

Lump sum price :

Price to renew branch ND200 including formed saddle pieces matching ND400 and new ND200 collar flange

Price to partly renew straight cunifer pipe ND400 x 1000 mm (2 buttwelds)

Price to renew cunifer collar flange ND400 (1 buttweld)

**P.103.28 Partly renewal / repair of seawater pipes return lines below floorplate level from the heatexchangers in engine room**

Assume that the 2 LT & 2 HT heatexchangers are removed under item Q1 & Q2
Assume that the supply lines and other coolingwater lines above the floorplate level are removed under item P103.27.
Cut opening in the deck of the heatexchanger module unit. After repairs, refit and re-weld the temporary access plate.
Disconnect, remove main return coolingwater line from the heatexchangers:
- 1 pipe ND 400 x 2200mm / 2 branches ND200, 1 branch ND400 x 1500mm
- 1 pipe ND 400 x 4000 / 5 branches of ND200.
Note very difficult access to the pipes.
Transport pipes to workshop, clean and present for inspection
All pipes are made from cunifer material with collar flanges as per specification P5.
After repairs, return, refit and re-connect with new packings

Lump sum price :

Price to renew branch ND200 including formed saddle pieces matching ND400 and new ND200 collar flange

Price to partly renew straight cunifer pipe ND400 x 1000 mm (2 buttwelds)

Price to renew cunifer collar flange ND400 (1 buttweld)
P.103.29 Installation of venting pipe from venting valve dredge pipe LD142 on crane deck to overboard

LD 1-2-166 SH1 : Arrangement Discharge Pipeline System II
LD 01-02-177 : Double walled inspection pipe Ld1250

An owner’s supplied venting valve is to be installed on the ship’s existing branch of dredge delivery pipe. A venting pipe to be installed from this valve to overboard. Disconnect, remove the blindflange presently installed on the branch on top of the dredge pipe pos LD142A (situated on PS crane deck at frame 122.5) Install, connect owner’s supplied venting unit as per drawing LD-01-02-196. Supply, fabricate, fit, weld and install a pipe from this venting unit and run up to overboard at portside, frame 129, just above upper deck.
Pipe ND200, sch 40, 20 meter, 12 bends. 1 penetration under the crane track support and 1 penetration through the bulwark at portside, 50mm protruding. Pipe to be hot dipped galvanized after fabrication. Outside of the new pipe to be painted with 3 layers of paint. Damaged paint system in way to be repaired to ST3 and painted with 3 layers of paint.

Lump sum price : ...

P.103.30 Renew flushing water connection dredge pump covers

Dwg 5474779 Dredge pump cover suction side

assume that the pump covers are removed by the ship’s crew
Transport the pump cover from ship to the workshop
Renew the two flushing water connections to the pump covers. Supply, fabricate a template to fit the flushing water cover in same position mirror wise and in same position with different pump covers
Crop out the two pipe pieces installed in the pump cover. Supply, fit and weld two pipe pieces dia 76mm x 350mm in each pump cover. Pipe piece schedule 80.
After renewal of pipe pieces, de-rust the outside of the pipe and damaged pain system on pump cover in way and paint with 3 layers ship’s supplied paint.

Price per pump cover : ...

P.103.31 Renewal of the insulation from the thermal oil lines in the hydraulic room.

The thermal oil lines are running in the hydraulic room and the insulation is damaged. Remove the old insulation.
Supply, install new insulation as per system P3.1, assume that the thermal oil system contains 4 pipes ND 40 mm with a length of 1400 mm and 4 bends of 90°C

Lump sum price for the 4 lines ...

302/568
P.103.32 Renewal of the insulation from the thermal oil lines in the engine room.

The thermal oil lines are running in the engine room and the insulation is damaged. Remove the old insulation. Supply, install new insulation as per system P3.1, assume that the thermal oil system contains 2 filters, a straight valve, a 90° valve, an elbow of 90°, a T-piece and a pipe ND 125 mm with a length of 6 m.

Lump sum price ...

P.103.33 Renewal of the insulation from the thermal oil lines in the funnel on the crane deck.

The thermal oil lines are running in the funnel on the crane deck level and the insulation is damaged. Remove the old insulation. Supply, install new insulation as per system P3.1, assume that the thermal oil system contains a T-piece, a 90° elbow, 3 flanges and a pipe ND 32 mm with a length of 7 m.

Lump sum price ...

P.103.34 Renewal of the insulation from the thermal oil lines in the funnel on the upper deck.

The thermal oil lines are running in the funnel on the upper deck level and the insulation is damaged. Remove the old insulation. Supply, install new insulation as per system P3.1, assume that the thermal oil system contains 3 pipes ND 80 mm and ND 100 mm with a total length of 13 m.

Lump sum price ...

P.103.35. Renewal bilge line in SB propulsion room

Remove an existing bilge line. Fabricate, install a new & modified bilge line with different routing as per chief’s engineers instruction
Pipe ND65, length 4400mm, schedule 40, 3 bends of 90°, 2 bends of 45°, dresser gaskets, hot-dipped galvanized.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : ...
P.103.36. Renewal gland water lines to the cutter ladder

Erect a staging from the dock floor to the top of the ladder.
Remove two existing gland water lines. Fabricate, install two new & modified gland water lines with different routing as per chief’s engineers instruction
Pipe ND 125 mm, length 2x 3400mm, schedule 80, 2 x 2 bends of 90°, 2 x 2 bends of 45°, hot-dipped galvanized steel with a flange coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price : …/

P.103.37. Renewal flush water line to the cutter ladder

Erect a staging from the dock floor to the top of the ladder.
Remove an existing flush water line. Fabricate, install a new & modified flush water line with different routing as per chief’s engineers instruction
Pipe ND 150 mm, length 3400mm, schedule 80, 4 bends of 90°, 4 bends of 45°, hot-dipped galvanized steel with a flange coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price : …/

P.103.38. Renewal bilge line on the top of the cutter ladder

Remove temporary installed hoses. Remove existing pipe on top of the ladder, on the roof of the machinery space, near SB side wire sheave.
Fabricate, install new pipe ND 65mm, length 3.0m, 2 bends of 90°, 2 bends of 45°, schedule 40 & hot dipped galvanized steel with a flange coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price : …/

P.103.39. Renewal bilge water line ejector in the pump room

Remove the old bilge line
Fabricate, install a new bilge water line in the pumproom. Pipe ND 80 mm, length 30 m, schedule 40, 7 bends of 90°, 2 bends of 45°, hot-dipped galvanized steel with a flange coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price : …/
P.103.40. Renewal LT cool water lines to the cutter ladder

Erect a staging from the dock floor to the top of the ladder.  
Remove two existing LT cool water lines. Fabricate, install two new & modified cool water lines with different routing as per chief’s engineers instruction  
Pipe ND 150 mm, length 2x 3400mm, schedule 80, 2 x 2 bends of 90°, 2 x 2 bends of 45°, steel with a flange coupling at each side.  
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.  

Lump sum price : …/

P.103.41. Renewal gland water line at the shaft side of the UWP

Remove an existing gland water line.  
Fabricate, install a new gland water line in the pump room. Pipe ND 125 mm, length 1250 mm, schedule 80, a bend of 45°, hot-dipped galvanized steel with a klingerit coupling at each side.  
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.  

Lump sum price : …/

P.103.42. Renewal sewage line above sewage plant

Erect a staging above the sewage plant to the ceiling.  
Remove the old sewage line  
Fabricate, install a new sewage water line above the sewage plant. Pipe ND 125 mm, length 2000 mm, schedule 80, a bend of 90°, a branch, hot-dipped galvanized steel with a rubber coupling at each side.  
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.  

Lump sum price : …/

P.103.43. Renewal gray water line on PS and SB side

Erect a staging where needed, this staging is the same as P103.43.  
Remove the old gray water line  
Fabricate, install a new gray water line through different locations. Pipe start at ND 80 mm and end with ND 100 mm, length 55 m, schedule 80, assume a total of 6 bends, 14 branches with ND 50 mm and 2 bulkhead penetrations, hot-dipped galvanized steel with a dresser coupling at each side.  
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price for each side : …/

**P.103.44. Renewal black water line on PS and SB side**

Erect a staging where needed, this staging is the same as P103.42.
Remove the old black water line
Fabricate, install a new black water line through different locations. Pipe start at ND 125 mm and end with ND 150 mm, length 55 m, schedule 80, assume a total of 6 bends, 12 branches with ND 100 mm, a branch with ND 125 mm, a branch with ND 150 mm and 2 bulkhead penetrations, hot-dipped galvanized steel with a dresser coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for each side : …/

**P.103.45. Renewal gray water cross over line**

Erect a staging in the pump room, this staging is the same as P103.45.
Remove the old gray water cross over line
Fabricate, install a new gray water line at the roof of the pump room. Pipe ND 100 mm, length 16 m, schedule 80, 1 bulkhead penetrations, hot-dipped galvanized steel with a dresser coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

**P.103.46. Renewal black water cross over line**

Erect a staging in the pump room, this staging is the same as P103.44.
Remove the old black water cross over line
Fabricate, install a new black water line at the roof of the pump room. Pipe ND 150 mm, length 16 m, schedule 80, 1 bulkhead penetrations, hot-dipped galvanized steel with a dresser coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

**P.103.47 Renewal of hydraulic pipes barge mooring winches**

Remove the installed hydraulic pipes at the 4 barge loading winches and replace by hydraulic pipes as per specification P2.
8 hydraulic pipes ND50x4mm, with a total length of 14 m, 8 bends, 8 branches & 8 deck penetrations, both ends SAE flanges
16 hydraulic pipes ND32x4mm, with a total length of 24 m, 36 bends, both ends SAE flanges
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for 24 pipes : …/

P.103.48. Renewal the overflow of the thermical oil expansion tank

Blank off the storage tank.
Remove an existing overflow line. Fabricate, install a new & modified overflow line with different routing as per chief’s engineer’s instruction.
Pipe ND65, length 700 mm, schedule 40, 1 bend of 90°, 1 bend of 45°, 1 branch, with flanges at both sides.
Reinstall the old sight glass.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.49. Renewal fire line in the fan room

Remove an existing fire line in the fan room at the PS upper deck.
Fabricate, install a new fire line in the fan room. Pipe ND 65 mm, length 5000 mm, schedule 40, a bend of 90°, a bend of 45°, hot-dipped galvanized steel with a dresser coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

P.103.50 Cleaning / renewal of sludge drain line in bilge water tk 38

The sludge drain line inside bilge water tank 38 is blocked.
Pipe line is ND 40mm, schedule 80 and a deck penetration.
Open up bilge water tank 38.
Disconnect, remove, the sludge drain line inside the tank.
Transport all pipes to the workshop. Clean, unblock all pipes.
Return, re-install the pipes with new gaskets & bolts.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/
**P.103.51. Renewal salt water to sanitair upperdeck**

Remove the old salt water line in the auxiliary engine room above the end of the perfecto HT5 storage tank.
Fabricate, install a new salt water line. Pipe ND 40 mm, length 1300 mm, schedule 40, a bend of 90°, a bend of 45°, a bulkhead penetration, hot-dipped galvanized steel with a dresser coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

**P.103.52. Renewal scupper line above main engine 1**

Erect a staging in the pump room, this staging has to be build around ME1 till the roof of the engine room. (difficult staging)
Remove the old scupper line at ceiling of the engine room.
Fabricate, install a new scupper line. Pipe ND 50 mm, length 900 mm, schedule 80, 4 bends of 90°, a branch, hot-dipped galvanized steel with a dresser coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/

**P.103.53. Renewal hydraulic collector of the vessel spud carrier track**

Remove the old collector at the spud carrier and ship side.
Blast, inspect and measure the two collectors.
Install two new owners supplied collectors.
The collector has 7 branches (5x ND 50 mm, 1x ND 80 mm, 1x 65 mm)
Install 4 new owners supplied hoses for each collector.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for each collector : …/

**P.103.54. Renewal scupper drain pipe in PS corridor**

Remove the old scupper drain pipe in the PS corridor.
Fabricate, install a new scupper line. Pipe ND 100 mm, length 9 m, schedule 40, 2 bends of 90°, 3 bends of 45°, hot-dipped galvanized steel with a dresser coupling at each side.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price :

P.103.55 Renewal of hydraulic pipes ladder safety pins

Erect a staging
Remove the installed hydraulic pipes from the ladder safety pins and replace by hydraulic pipes as per specification P2.
Fabricate, install a hydraulic pipe ND16x2mm in pickled stainless steel, with a total length of 38 m, 8 bends of 90°, 24 bends of 45°, schedule HP, both ends with ermeto couplings.
Renew also the stauffer clamps and brackets.
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price :

P.103.56 Renewal of hydraulic pipes vacuum relief valve

Erect a staging
Remove the installed hydraulic pipes from the vacuum relief valve and replace by hydraulic pipes as per specification P2.
Fabricate, install a hydraulic pipe ND20x2mm in pickled stainless steel, with a total length of 18 m, 6 bends of 45°, schedule HP, both ends with ermeto couplings.
Renew also the stauffer clamps and brackets.
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price :

P.103.57 Renewal of hydraulic pipes cutter loose pawl

Erect a staging
Remove the installed hydraulic pipes from the cutter loose pawl and replace by hydraulic pipes as per specification P2.
Fabricate, install a hydraulic pipe ND16x2mm in pickled stainless steel, with a total length of 18 m, 6 bends of 45°, schedule HP, both ends with ermeto couplings.
Renew also the stauffer clamps and brackets.
Outside of the pipes and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.
Lump sum price : ...

**P.103.58. Renewal bilge line in the pump room**

Remove an existing bilge line. Fabricate, install a new & modified bilge line with different routing as per chief’s engineers instruction. The old penetration has to be blanked.
Pipe ND40, length 3000mm, schedule 40, 4 bends of 90°, a bulkhead penetration, dresser gasket at one side and a flange at the other, hot-dipped galvanized.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : ...

**P.103.59. Renewal sludge discharge connection**

Remove an existing sludge discharge connection. Fabricate, install a new & modified connection with different routing as per chief’s engineers instruction
Pipe ND40, length 500mm, schedule 80, 4 bends of 90° and a deck penetration.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : ...

**P.103.61. Renewal drain line in AC2 room**

Remove the existing scupper lines. Fabricate, install a new scupper line in the AC2 room.
Assume a pipe ND65, length 1150mm, schedule 80, with 2 penetrations, hot-dipped galvanized and welded at both sides. The second pipe is ND80, length 4000mm, schedule 80, with 1 bend of 90°, 2 bends of 45°, 2 penetrations, hot-dipped galvanized and welded at both sides.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price for the two pipes : ...

**P.103.62. Renewal gray water line in SB propulsion room**

Erect a staging in the SB propulsion room.
Remove the gray water line.
Fabricate, install a new gray water line. Pipe ND 40 mm, length 200 mm, schedule 80, a branch and welded at both sides.
Outside of the pipe and damages in way are to be de-rusted to ST3 and painted with 3 layer’s ship’s supplied paint.

Lump sum price : …/
**P.104 Repairs & modification of existing pipelines**

Below specifications are describing in detail the repairs and modification of existing pipe lines. These specifications refer to pictures that have the specification number as file names. All pictures are filed under the directory ‘Drawings\P104 Pictures Pipe repairs’

**P.104.01 Replace existing hydraulic hoses to cylinder safety pins cutter ladder by stainless steel piping**

Refer to pictures file names P104.01a.pdf, P104.01b.pdf, P104.01c.pdf & P104.01d.pdf

Assume staging is erected in way of the safety pins as per item J110.
Assume the hydraulic hoses are removed as per item J110.
Supply, fabricate & install a hydraulic pipe to replace the hydraulic hose as shown on the pictures. Stainless steel precision hydraulic pipe ND16x2mm, 550mm length, two formed bends 90 degrees, both ends with ‘Voss’ Type flared pipe couplings to suit the connection pipes.
Hydraulic pipes are fabricated and installed as described in item P4.

Price per pipe piece: ...

**P.104.02 Repairs of pipe between turbocharger and air cooler**

Refer to pictures file names P104.02a.pdf, P104.02b.pdf

Erect a staging in the engine room under the turbocharger of main engine 3: l*w*h = 2 x 3 x3 m
Remove the insulation in way of the pipe. Disconnect and remove the pipe between turbocharger and air cooler ME3. Pipe ND250 x 1000mm, w/ bend.
Transport the pipe to the workshop, cut off the flange at turbocharger side and dress up the pipe end. Fabricate a new flange. Return pipe to ship with the loose new flange. Refit the pipe, fit and tack weld the flange in situ. Remove pipe, complete the welding of the flange. Install the pipe with new yard supplied suitable gaskets.
Supply and renew the insulation of the pipe as original situation.

Lump sum price :

**P.104.03 Install cooling water connection from pump room to upper deck**

Refer to pictures file names P104.03a.pdf, P104.03b.pdf, P104.03c.pdf, P104.03d.pdf, P104.03e.pdf & P104.03f.pdf

Erect a staging in the pump room as indicated in the picture 03b.pdf : l*w*h = 10 x 3 x 4 m
Supply and cover the electric cables, the panels and light armatures in way of the works.
Two new pipelines are to be installed from existing cooling water lines in the pump room up to the upper deck. Two vertical pipes ND200 are to be cut just above the bends and to be disconnected at the top. Pipes pieces of ND200 x 1000mm to be sent to the workshop. In total 4 flanges to be fitted and welded in way of the cut: one flange to be fitted and welded in situ on each welded bend pipe and a flange on the removed pipe pieces. Flanges to be fitted and adjusted in situ.

A formed T-pieces to be welded in each of the removed pipe pieces : ND200/200/125 with flange. A ship’s supplied butterfly valve is to be installed at this new connection. Two new pipe pieces to be supplied, fabricated and installed running from the new butterfly valves to the upper deck. Routing as shown in the pictures. Flanges to be proved every 4.0 meter, and after each bend. Two pieces each ND125 sch 40, length 14.0meter, each 4welded bends 90 deg, 2 bends 45 deg, 1 deck penetration and 1 bulkhead penetration. Deck penetration of the 3-flange type. Blind flanges to be provided at the deck flanges with stainless steel bolts. All other flange bolts in 8.8 material. Pipes are hot-dipped galvanized after construction and painted with 3 layers of paint. Sufficient pipe clamps to be supplied, installed and welded to the bulkhead with minimum every 3.0 meter and after each bend. Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price :

P.104.05 Unblock drain line sludge pump / bilge water separator in tank 38

Refer to pictures file names P104.05a.pdf, P104.05d.pdf, P104.05e.pdf & P104.05f.pdf

Assume the tank 38 is opened and cleaned as per item H1
Arrange lighting, venting and gas free inspections as required
A drain line from the sludge pump & BWS is running through the tank 38. The drain line is blocked with fuel carbon and needs to be replaced.
Cut out drainpipe. Special attention to be paid for safety during the removal of this pipe. A new pipe is to be welded in the tank, pipe ND40 schedule 40, 6.0 m long, 4 bends, 2 deck / wall penetration. Pipes is joined with welded sleeves inside the tank. Pipe is pickled inside and coated outside with 3 layers of paint. Paint system at the inside and outside of the tank in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint

Lump sum price :

P.104.08 Renewal hydraulic pipe in hydraulic room ND50 x 3000mm

Refer to pictures file names P104.08a.pdf, P104.08b.pdf, P104.08c.pdf, P104.08d.pdf
An existing hydraulic pipe running at the ceiling in the hydraulic room is to be renewed.
Erect staging l*w*h = 3 x 1 x 2 m
Drain, collect and dispose off remains of hydraulic oils from the pipes.
Disconnect, remove 4 hydraulic lines in way of the pipe to be renewed.
Disconnect, remove the hydraulic pipe as indicated in the pictures. Send to workshop, template and fabricate a new pipe, but in two pieces, with additional set of flanges in the middle as instructed by chief engineer. Pipe ND50mm, length 3000 mm, 2 formed bends 45 degrees & 4 SAE flanges.
Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.09. Install connection grease line at SB side wire winch**
Refer to pictures file names P104.09a.pdf, P104.09b.pdf, P104.09c.pdf, P104.09d.pdf

A new grease line is to be installed on the upper deck along the SB side wire winch. Grease line OD16 x 2 mm, stainless steel precision piping, 3 formed bends, 3 coupling bends, 1 coupling t-piece, ship’s supplied ball valve. Pipe is to be fastened as close as possible to the winch’ foundation. Routing refer to the pictures.
Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
Pipe to be fastened with yard’s supplied Stauff type pipe clips and supports
Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.10 Renewal hydraulic pipe in hydraulic room ND20 x 2200mm**
Refer to pictures file names P104.10c.pdf, P104.10x.pdf, P104.10y.pdf, P104.10z.pdf

An existing hydraulic line running at the ceiling in the hydraulic room is to be renewed.
Erect staging l*w*h = 3 x 1 x 2 m
Disconnect, remove two hydraulic pipes as indicated in the pictures. Drain, collect and dispose off remains of hydraulic oils from the pipes.
Send the pipe to workshop, template and fabricate a new pipe. Pipe ND20mm, length 2200 mm, 2 formed bends 90 degrees & 2 cutting ring couplings. Only one pipe to be fabricated, the installed short pipe piece is not required, this was a temporary repair.
Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards. Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.12 Renewal hydraulic pipe in auxiliary spud tower room ND20 x 3000mm**

Refer to pictures file names P104.12a.pdf, P104.12b.pdf, P104.12c.pdf,

A temporary existing hydraulic hose in the auxiliary spud tower room is to be replaced by hydraulic pipe. Disconnect, remove the temporary hydraulic hose as indicated in the pictures. Drain, collect and dispose off remains of hydraulic oils from the pipe and hose. Fabricate, install a pipe ND20mm, length 3000 mm, 2 formed bends 90 degrees & 2 cutting ring couplings. Supply, fit 3 Stauf pipe clips and supports. Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards. Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.13. Partly renewal of seawater pipe below ceiling in engine room**

Refer to pictures file names P104.13a.pdf, P104.13b.pdf,

Erect a staging in the engine room as indicated in the picture 13a.pdf : l*w*h = 4 x 3 x 7 m

Remove the corroded pipe, transport to workshop, template and fabricate a new pipe as indicated, ND40 schedule 80, 4000mm length, 2 bends 90 degrees, hot dipped galvanized after fabrication, including supply and renewal of dresser couplings at both sides.

Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.14. Modification of cooling water pipe AC9**

Refer to pictures file names P104.14a.pdf, P104.14b.pdf,
The cooling water pipes running from the AC9 room through the upper deck are to be provided with flanged external connections.
Cut open the bulkhead penetration, the bend pipe 100mm above the upper deck and remove the bend pipes at the two locations.
Supply, fit and weld a formed T-piece ND 65mm on top of each penetration pipe.
Supply, fit and weld pipe ND65x300 to connect one end of the T-piece to the existing pipes in the AC9 room. Supply, fit, weld pipe ND65x100mm and flange PN10 at the other end of the T-piece. Supply, fit a blind flange and connect with stainless steel bolts.
Supply, fit and weld a new bulkhead penetration plate in the bulkhead.
Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.15 Install cooling water connection from separator room to upper deck**

Refer to pictures file names P104.15a.pdf, P104.15b.pdf, P104.15c.pdf, P104.15d.pdf, P104.15e.pdf

Assume a staging is erected in way of the works as per item P103-03
A new pipeline is to be installed from the seawater supply line of toilets in the separator room, via the pump room up to the upper deck.
New pipe to be supplied, fabricated and installed running from an existing flanged connection in the separator room as indicated in the pictures. Routing as shown in the pictures. Flanges to be provided every 4.0 meter, and after each bend. Pipe ND40 sch 40, length 9.0 meter, 4 welded bends 45 deg, 1 deck penetration and 2 bulkhead penetration. Deck penetration of the 3-flange type. Blind flanges to be provided at the deck flanges with stainless steel bolts. All other flange bolts in 8.8 material. Pipes are hot-dipped galvanized after construction and painted with 3 layers of paint. Sufficient pipe clamps to be supplied, installed and welded to the bulkhead with minimum every 3.0 meter and after each bend.
Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.16. Renewal of drain lines running in ballast tank 9**

Refer to pictures file names P104.16a.pdf, P104.16b.pdf, P104.16d.pdf, P104.16e.pdf, P104.16f.pdf

Works are done in conjunction with the steelwork in ballast tank 9 as per item G129. Assume a staging is erected as per G129.
Renew the corroded pipes running just below the tank top of tank 9 as indicated in the pictures.
Cut, remove the pipes, transport to workshop, template and fabricate two pipes ND50, schedule 80, 4 bends 90 degrees, each 8 meter long, included. Pipes are hot dipped galvanized after fabrication. Including renewal of the 2 bulkhead penetrations and in situ cutting / welding to the drain well – assume adjacent tank has been cleaned and gas freed.
Including the fabrication and renewal of similar pipe clips, also hot dipped galvanized.
Paint system to be repaired in conjunction with item F109 (grit blasting and painting)

Lump sum price :

P.104.17. New suction filter and modified piping in pump room

Refer to pictures file names P104.17a.pdf, P104.17b.pdf & P104.17c.pdf.

Remove the suction filter and suction pipe. Transport to workshop
Install a new ship’s supplied filter housing. Filter housing is of different type.
Fabricate two new suction pipes to suit the new type filter housing. Pipes ND100 schedule 80, each 1000mm length, 2 bends 90 degrees and 1 bend 45 degrees, 4 flanges. Pipes are hot dipped galvanized after fabrication.
Paint system of the new pipes, filter and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price :

P.104.18. Install flushing line to the economisers

Refer to pictures file names P104.18a.pdf, P104.18d.pdf, P104.18e.pdf, P104.18f.pdf & P104.18h.pdf
Erect a staging in the engine room PS, l*w*h = 4 x 3 x 2m
A freshwater flushing line is to be installed from an existing freshwater system to top of the three economisers.
Disconnect / reconnect the freshwater pipe as indicated in the picture: ND50 x 4.0m. Cut pipe, fit, weld a formed T-piece, ND50/50/25mm. Install cutting ring coupling in new T-outlet.
Supply, fit, install one new pipe line from this connection to the top of the 3 middle economizers in the funnel: pipe ND25 x 24000mm, schedule 40, 6 bends 90 degrees, 12 straight couplings, 1 weld type deck penetration, 2 T-pieces. All cutting ring type couplings. Install one three ship’s supplied ball valves and connect the pipes to each of the 3 economizers to the bulkhead in way of the top of the middle economiser.
Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ships supplied paint.

Lump sum price :

P.104.19 Renewal hydraulic pipes spud carrier
Refer to pictures file names P104.17a.pdf, P104.17b.pdf, P104.17c.pdf & P104.17d.pdf
The corroded hydraulic pipelines are to be partly renewed on the spud carrier.
Erect a staging above the track with hoses to protect the hoses and access to the pipes.
Disconnect 10 pipes as indicated on the pictures, blank off. Drain, collect and dispose off the reaming hydraulic oils. Transport pipes to workshop, template and fabricate new pipes.

8 hydraulic pipes ND25, length 5000mm, each 4 formed bends 90 degrees, 2 bends 45 degrees, 4 straight couplings to be fabricated in stainless precision steel. All fittings are of cutting ring type and in stainless steel. Pipes are flushed afterwards.

2 high pressure hydraulic pipes ND85x10mm, length 4000mm, 3 bends 90 degrees, 2 bends 45 degrees and 4 SAE flanges 3000 psi to be fabricated in steel pipe. Pipes are fabricated and installed as described in item P2, are seamless precision hydraulic pipes and are to be pickled prior to fitting, and flushed afterwards. SAE flange for ND85x10 pipe only are supplied by ship.

All pipe clips are to be supplied and renewed including the steel supports. All pipe clips are of the heavy duty Stauff type with stainless steel cover plates.

Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ships supplied paint.

Lump sum price:

---

P.104.24 Relocate venting pipe and connections in to cooling water header tanks
Refer to pictures file names P104.24

The cooling water venting pipes running from the 5 diesel engines to the cooling water header tanks are to be relocated and connected to the top of the tanks in stead of bottom of the header tanks as present.
Assume the header tanks are drained by the ship’s crew.
Disconnect the venting pipes and valves. Supply, install a brass plugs ND16 in the existing tank connection.
Open / close the manholes of the expansion tanks (5 pcs)
Erect a staging to access the top plate of the expansion tanks. L*w*h=5x1x2m
Drill 12 hole in the top plate of the expansion tanks. Supply, fit weld a pipe connection on top of each drilled hole. Dye check the welds for cracks.
Supply, install and connect 12 new pipes ND16mm between the existing vent pipes and the new connections on top of the tank. Including installing the old valve in the lines and under laying the required bends and other fittings. Pipe is to run as close as possible to the header tanks. In total 12 pipes ND16 x 1500mm length. Pipes are to be fastened with one pipe clip for each pipe welded to the manhole cover.
Header tanks are to be thoroughly cleaned and the paint stem inside is to be repaired by wire brushing to ST3 and two layers of paint.
New pipe and damaged paint system outside the tank is to be repaired by wire brushing to ST3 and three layers of paint.

Lump sum price for 5 header tanks & 12 venting pipes / connections:
P.104.26 Install weld type hydraulic bulkhead penetration in way of chemical lockers

Refer to pictures file names P104.26a.pdf, P104.26b.pdf, P104.26c.pdf, P104.26d.pdf, P104.26e.pdf

The pipes welded in to the bulkheads are to be replaced by weld type bulkhead penetration pieces
Assume that the chemical lockers are emptied by ship’s crew. Arrange venting and gas free certificate of the chemical lockers.
4 Hydraulic pipe lines are welded directly in to the bulkhead of the barge loading foundation. These pipes are to be partly renewed with a proper type bulkhead penetration
Assume the hydraulic pipeline is isolated by means of existing valves.
Disconnect the hydraulic lines, collect and dispose oil. Cut the hydraulic lines out of the bulkhead. 2 pipes ND30mm x 3.0mtr / 5 bends each pipe. 2 pipes ND25mm x 2.2 mtr / 1 bend each. Bends are of formed type, not welded. Pipes are connected by cutting ring couplings.
Supply, fit and weld an insert plate of diameter 200x15mm thickness in way of the bulkhead – 4 locations.
Supply, fit, weld new welding type bulkhead penetrations with cutting ring couplings both ends.
Supply, fabricate new hydraulic pipes to suit the new layout with the bulkhead penetrations. 2 pipes 30mm x 2.2 meter / 3 bends each. 2 pipes 30mm x 1 m / 2 bends each. 2 pipes 25mm x 2m / 1 bend. 2 pipes 25mm 0.5m. All pipes both ends cutting ring couplings.
Pipes are fabricated and installed as per specification P2.
Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ships supplied paint.

Lump sum price for 2 sides (total 8 pipes / penetrations)  .../

P.104.29 New suction and discharge pipes hydraulic pump K

Refer to pictures file names P104.29a.pdf, P104.29b.pdf, P104.29c.pdf

Assume crew will remove existing hydraulic pump and the suction and delivery pipes. A different type hydraulic pump will be installed by the crew.
Hydraulic pump is installed in the hydraulic room, just above deck, under the work tank and very difficult to access
The yard is to be fabricate, fit new suction pipe and delivery pipe between the pump’s connection and existing hydraulic system
Suction pipe ND50 PN10, length 500mm, 2 bends 45 degrees, SAE flange one side and hose clips other side
Delivery pipe ND20x3, length 500m, SAE flange both sides.
Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards
Lump sum price
…/ 

P.104.30 Partly renewal lub oil line under floor plate
Refer to pictures file names P104.30a.pdf & P104.30b.pdf

Lub oil pipe under the floor plate is to be renewed
Bilges in way to be cleaned for hot works.
Floor plates and supports to be removed, cut, refit and re-welded.
Remove / refit the connecting pipes for access.
Pipe ND125, schedule x 4000 length to be renewed as indicated in the pictures.
Pipe is pickled, inside oiled. Outside of pipes and in way of works to be derusted to
ST 3 and painted with 3 layers paint.

Lump sum price : …/ 

P.104.31 Repairs lub oil line in cutter ladder
Refer to pictures file names P104.31a.pdf, P104.31b.pdf & P104.31c.pdf

Two bulkhead penetrations of the oil supply line to the underwater pump in the cutter
ladder are to be renewed.
The pipes are installed inside the cutter ladder. Access to the engine room part is via a
normal door and platforms. Access at the other side is via a manhole and existing
platforms.
Disconnect, remove the 2 connecting pipelines at both sides of the bulkhead, ND40 x
2500mm. Drain, collect, dispose off the remaining oil. Blank off the pipelines.
Cover all electrical and fragile equipment in the engine room space of the cutter
ladder.
Crop out the pipe penetrations. Fabricate, install and weld new pipe penetrations
including bulkhead plating in way. Two pipes with formed bend 90 degrees, ND40
schedule 40 x 500mm to be fabricated and renewed.
Pipes are pickled, inside oiled. Outside of pipes and in way of works to be derusted to
ST 3 and painted with 3 layers paint.

Lump sum price :
…/ 

P.104.34 Renewal hoses barge loading
Refer to pictures file names P104.34a.pdf, P104.34b.pdf, P104.34c.pdf, P104.34d.pdf,
P104.34e.pdf & P104.34f.pdf

Dwg LD-12-00-042 Arrangement gantry with support pipe
Dwg LD-07-00-017 Hydraulic pipelines on support pipe (lower part)
Dwg Ld-01-02-141 Arrangement barge loading system

320/568
Erect a staging around the barge loading gantry from the upper deck to top of barge loading pipes with sufficient work levels: $l \times w \times h = 4 \times 6 \times 15$ m per gantry
Disconnect the pipes in way of the isolation valves on deck, drain, collect and dispose of the oil. Assume that the barge loading pipe system is secured.
Renew all hydraulic hoses as indicated on the drawings and pictures. All hoses are supplied by the ship. The hoses are to be installed with ship’s supplied protective covers as indicated and all are fitted inside soft hoses.
Total 4 barge loading gantries.

Lump sum price per barge loading gantry: …/

**P.104.36. Repair cunifer cooling water pipe by insert**

Refer to pictures file name P104.36

A cunifer cooling water pipe ND400 installed in the engine room is to be repair by insert pipe.
Remove / refit floor plates in way
Disconnect, remove the pipe and transport to the workshop. Pipe ND600 x 4000mm, 1 bend, one end flange, other end dresser coupling.
The dent in the pipe is to be repaired by insert pipe length 500mm.
Pipe to be returned and re-installed.
Note that the pipe is to be protected by cardboard during all transport. If pipe is damaged during transport, the pipe is to be completely renewed.

Lump sum price : …/

**P.104.37 Pipe clips of already renewed pipe barge loading gantry SB aft**

Refer to pictures file names P104.37a.pdf, P104.37b.pdf
Assume a staging is erected in way of the works.
Fit, install, welded two heavy duty Stauff type hydraulic pipe clips. Including welding of base plate.
Repair paint system to ST 3 and painted with 3 layers paint.

Lump sum price : …/

**P.104.38 Renewal of deck penetration SB barge loading system**

Refer to pictures file names P104.38a.pdf, P104.38b.pdf, P104.38c.pdf, P104.38d.pdf, P104.38e.pdf, P104.38.pdf & P104.38g.pdf

The deck penetrations of the hydraulic barge loading system lines in the SB ventilation room are to be renewed.
Hydraulic pipes above the (upper) deck are installed ventilation room with limited access as shown in the pictures. Disconnect / reconnect / remove and refit the fan for access.

Hydraulic pipes below the deck are installed in accommodation area. Assume area will be cleared by crew. The yard is to protect the wall panelling and floor in the accommodation in way of the works. Erect a staging in way: l*w*h = 3 x 1 x 2 m

Drain, collect and dispose off the remaining hydraulic oil from the pipes

Remove the insulation and cladding below deck. After the works, insulation and cladding to be renewed.

Disconnect, remove, blank off and reconnect the 9 pieces connecting pipe above and 9 pieces below the deck. Pipes to be blanked off and put aside.

The deck plate together with the 9 pieces deck penetration pipes is to be cut out as indicated on picture 38a.pdf, removed and transported to the workshop. To be cut at existing but welds.

Deck plate with the pipe penetrations is to be templated. A new deck plate with 9 new hydraulic pipe deck penetrations is to be fabricated as per template. 5 pipes ND32x4mm, 2 pipes ND50x5mm & 2 pipes ND20x3. A sleeve schedule 80 is to be fitted and welded over the pipes with length 150mm above deck. All pipes above 30mm are fitted with SAE flange. Schedule 80 deck penetration with cutting rings are fitted for the ND20 pipes. Pipe ends to be blanked off and the new penetration assembly to be transported to ship.

Fit and weld the assembly in situ.

After reconnecting the hydraulics, fabricate and fit a steel cover over the ventilation inlet.

Water blast the deck, lower walls and pipes inside the ventilation space to SA 2 ½.

Remove, dispose off water & grit. Spray paint with 3 layers ship’s paint.

Lump sum price : …/

**P.104.39  Renewal of bulkhead penetration hydraulic lines to anchor hoisting winches**


The bulkhead hydraulic pipe penetrations of the anchor hoisting winches located in the way of the ventilation ducting to propulsion rooms are to be renewed.

Hydraulic pipes are running from the hoisting winches at crane deck to just above the upper deck in to the ventilation ducting of the propulsion rooms.

Remove / refit the ventilation flaps in way for access. Note the very limited access.

Erect staging above the openings in the upper deck.

Drain, collect and dispose off the remaining hydraulic oil from the pipes

Disconnect, remove, blank off and reconnect the 8 pieces connecting pipe lines from deck and 8 pieces from the inside of the ventilation duct. Pipes to be blanked off and put aside. Total 2 x 4 pipes ND50, 2 x 2 pipes ND32 & 2 x 2 pipes ND20mm.

Renew the bulkhead penetration and bulkhead plates in way. All pipes to be provided with thick-walled sleeves in way of the deck area up with length 150mm.
Bulkhead penetrations to be renewed: 4 x ND50 x 500mm length, both sides SAE flanges, 2 x ND32 x 500mm length, both sides SAE flanges and 2 x ND20 x 500mm length, both ends cutting ring couplings.
Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards. The pipe ND20 is fabricated in stainless steel with stainless steel fittings. Re-install the connecting pipelines with new yard supplied bolts 8.8
De-rust the new, the removed pipes and bulkhead in way to ST3. Paint with 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.40 Renewal hydraulic pipe gantry deck crane**
Refer to pictures file name P104.40

Erect a hanging staging in way of the gantry deck crane as indicated in the picture
Remove one hydraulic pipe as indicated. Drain, collect hydraulic oil.
Fabricate, install a new pipe: ND32mm x 10.0m, 4 bends, both ends cutting ring couplings.
Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards
Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

Additional price for renewal bulkhead penetration
Disconnect, remove connection pipe inside the crane pedestal
Clean, mop dry the area in way.
Cut out, supply, fit, weld a new bulkhead penetration ND32

Price per bulkhead penetration : …/pc

**P.104.43 Renewal Fuel pipe line in way of booster module**
Refer to pictures file names P104.43

Fuel pipe is partly to be renewed in the separator room i.w.o booster module
Erect a staging l*w*h= 2x2x2m.
The pipe ND40mm with the branch can not be removed in one piece. Disconnect the flange and cut the pipe cold 1000mm from the flange. Remove the pipe ND40 x 1000 with formed bend and both ends dresser couplings. Send all to the workshop.
Fabricate one new pipe, ND40x1000, one flange, one formed T-pieces, branch pipe with bend ND40 x 1000mm.
Install the new fabricated branch pipe with 2 yard supplied dresser couplings.
Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

P.104.46 Renewal hydraulic pipes in fan room 12A
Refer to pictures file name P104.46

Open / close access cover to the fan room 12A. Access is very restricted from the upper deck as shown in the picture.
Disconnect, remove, refit and reconnect the electric fan motor for access
Renew the hydraulic pipes that are installed inside the fan room: 4 pipes ND40 x 2000mm long, 4 pipes ND40 x 1000mm long, each 1 90deg bend and 1 45 deg. Bend. Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards
Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price : …/

P.104.49 Renewal gland water flushing line in pump room
Refer to pictures file name P104.49

Erect a staging under the pipe if required.
Renew the flushing water pipe – ND125mm x 3700mm straight pipe and 4 outgoing branches. Pipe is to be hot dipped galvanized after fabrication.

Lump sum price : …/

P.104.50. Replace dresser couplings working air line by flanges in provision room

Erect a staging in the provision room l*w*h=3x2x8m
Open / close the pipe clips. Remove the working air line ND50 x 3000 mm as indicated in the picture.
Remove the installed dresser couplings from both sides.
Supply, fit, weld flanges ND50 - PN10 on the ends of the removed pipes and on the ends of the two connection pipes. Including modifying, shorting the pipe ends and the additional removal of the pipe to complete the internal welds.
Connect the pipe with new klingerite gaskets. Soap test using ship’s air pressure system.
Repair the paint system by wire brushing to ST3 and painting 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.51. Replace dresser couplings working air line by flanges under floor plate in engine room.**

Remove / refit 5 floor plates 1.0x1.0m in the engine room i.w.o DE2
Open / close the pipe clips. Remove two working air lines; 1 x ND50 x 2000 mm and 1 x ND50 x 1000. These two pipes are joined to each other with a dresser coupling. Modify, adjust the pipes. Supply, slip on, fit, flanges ND40 - PN10 at one end of each removed pipe. Fit, tack weld the flanges in situ. Remove the two pipes again and complete the welds at in- and outside.
Install the two pipes with new klingerite type gaskets. Soap test using ship’s air pressure system.
Repair the paint system by wire brushing to ST3 and painting 3 layers ship’s supplied paint.

Lump sum price : …/

**P.104.52. Renew fuel pipe dredge engine 3 under floor plate in engine room**

Refer to picture file name P105.09
P109.09 Diagram FO Supply

Assume the floor plates are removed and the insulation of the fuel pipe is removed / renewed as per item P105.09
Renew one fuel pipe ND80 – PN10 x 2500mm length, 2 bends 90degrees. Pipe is pickled at inside and ship primed at the outside.

Lump sum price : …/

**P.104.53 Relocate flow meter lub oil bearing in cutter ladder**

Refer to picture file P104.53

The existing flow meter in the lub oil line to the bearing block underwater pump in the cutter ladder is to be relocated.
The current and new position of the flow meter is indicated with red arrows in the picture.
Erect a staging in way: l*w*h= 2x2x1m
Disconnect, remove the flow meter with both pipe ends up to the first flanges.
Fabricate a new pipe ND40 x 500mm, 2 bends 90 degrees and install instead of the flow meter assembly.
Modify the remove pipe end with bends that is connected to the flow meter to a straight pipe ND40x100mm, one end BSP coupling, other end flange.
Remove the pipe with new location of flow meter. Cut pipe in two, shorten, fit and weld 2 flanges. Re-install pipe with the flow meter.
All pipes are pickled and flushed at the inside. Outside to be painted with 3 layers of paint.

Lump sum price: ...

P.104.54. Drain line galley

The existing drain from the galley is now connected to the grey water drain lines running in the SB propulsion room, just under the main deck. This line is to be modified, an owner’s supplied grease catcher and a new pipe line is to be installed directly to the sewage unit.
Erect a staging in the SB propulsion room: l*w*h= 10x2x4m
Disconnect, remove existing drain line from the galley, ND65 x 6.0m. Supply, fit a blind flange on the branch of the existing grey water line.
An owner supplied grease catcher box (1000x1000x500mm) is to be installed near the existing penetration of the drain galley. The yard is to fabricate a suitable platform, attached to the wall and ceiling. Floor area of the platform with leak tray 2.0x2.0m. A ladder is to be supplied fabricate to access the platform from the tank top, length 3.0 meter.
Leak tray of the platform to be provide with drain pipe ND50 x 3.0 m to the tank top
Ship’s supplied flanges are installed on both ends of the grease catcher
A pipe to be fabricated, fitted and installed between the existing connection drain galley and the grease catcher, ND65x1000mm, one branch.
Remove a connecting pipe to the sewage unit of ND100 x 1000. Fit, weld a branch ND65 in this pipe.
A pipe to be fabricated, fitted and installed between the grease catcher and the sewage unit in the pump room. ND65x50m, 10 bends, 1 branch & 3 x 3-flange type bulkhead penetrations. Branch close to the grease catcher. Pipe supports are heavy duty and are welded to the frames and stiffeners of the ceiling in the propulsion room.
A bypass pipe is to be fabricated, fitted and installed between the two branches with one ship’s supplied valve. 2 x ND65 x 2.0m, total 2 bends.
Pipe is schedule 40, hot dipped galvanized after fabrication, connected with flanges.
The platform, the outside of the pipe, the supports are to be wire brushed to ST3 and painted with 3 layers ship’s supplied paint.

Lump sum: ...

P.104.55. Repair pipe general service pump

Refer to picture file P104.55

Renew the discharge pipe general service pump in the engine room
Open / closed pipe clamp. Disconnect, remove damaged pipe, transport pipe to workshop.
Fabricate new pipe DN125, length 750mm, schedule 80, two branch ND152, one ½” pressure gauge connection, hot dipped galvanized after fabrication.
Install new pipe, paint outside with 3 layers’ ship’s supplied paint.

Lump sum price : ...

P.104.56. Renew scupper pipe PS from crane deck to upperdeck
Refer to picture file P104.56
Renew the scupper pipe from the crane deck to the upperdeck. Pipe is welded in to the deck and bulkhead. Pipe is running in accommodation space, through entrance en toilet space. Supply, fit protective covers in way of the works.
Remove / refit ceiling panelling in way of the scupper pipe (6sqm). Remove the insulation in way of the deck penetration and supply, fit new insulation after the repairs.
Erect a moveable staging l*w*h= 2 x 1x 2m.
Cut, remove, fabricate, fit and weld a scupper pipe DN80, length 8000mm, schedule 80, 3 bends 90 degrees & 3 x 45 degrees, hot dipped galvanized after fabrication. Pipe is welded in the deck and the bulkhead as indicated in the pictures.
Paint outside of the pipe and damaged painsystem in way with 3 layers’ ship’s supplied paint.

Lump sum price : ...

P.104.57. Drainpipe from driptray MDO settling / day tanks to dirt oil tank.
Refer to picture file P104.57
Remove / refit floorplate in way of the works : 10sqm.
Clean bilges and mop dry, suitable for hot works in way. Issue hotwork permit.
Supply, fabricate, fit and weld a drainpipe from the drip tray of the drain valves MDO settling and day tanks to the dirty oil tank. Pipe is running below and along the floorplates structure as shown in the pictures.
Pipe ND40, schedule40, length 8000mm, 3 bends 90deg, 3 bends 45 deg. Pipe is pickled and outside painted with 2 layers of paint.

Lump sum price : ...

P.104.111 Renewal of hydraulic line for spud carrier @ stbd workshop2
Refer to pictures file name P104.111.
Erect the small staging inside WS2.
Close the valves on adjacent line.
Open the pipe from place, make blank flanges on both side continuity line.
Fabricate & installed new hyd. Line dia. 1x50NB x L750mm, 1x90° bend with SAE flanges.
   Pipes are seamless precision hyd. line and are to be pickled prior to fitting and flushed
   afterwards.
   Paint system of the new pipe iwo the works to be repaired to ST 3 & 3 layers ship supplied paint

Lump sum price : ...

**P.104.112 Renewal of Cable deck penetration tube @ stbd main deck (below store 209)**

Refer to pictures file name P104.112.

Erect the small staging in stbd store 209.
Electrical wire disconnection & removed by ship staff.
Iwo hot work location, ship spares & other electrical cable racks completely protected with fire blanket.
Fabricate new rectangular steel tube 160x 140 x10mmthk. L500mm.
Crop the existing & installed new tube in situ. (before that new tube should be w/jet blast & primed)
Paint system of the new pipe iwo the works to be repaired to ST 3 & 3 layers ship supplied paint.

Lump sum price : ...

**P.104.113 Renewal of overboard board sea water line in (P) separator room (from p/p room bilge)**

Refer to pictures file name P104.113

Erect the staging inside separator room iwo frm # 66-67.
Assume OB valve was removed & other side to open dresser coupling. Make sure electrical cables should be protected.
Assume adjacent OB pipe dia.4” x L500mm line to be removed & refitted for access / man hovering.
Assume erect the staging in pump room port side longi bhd. Iwo fr # 66-67, and longitudinal bulkhead to be cut opened min. size for access to remove pipeline under item GNew8
Fabricate new pipe 1x150NB sch80 pipe x L2500mm, 1x30’ bend, 1x flange & 1x dresser coupling. Pipes are hot dip galvanized after fabrication.
Re-installed the OB pipe as same way with new yard supply bolt 8.8 with asbestos free gasket.
Paint system of the new pipe iwo the works to be repaired to ST 3 & 3 layers ship supplied paint.

Lump sum price : …/

P.104.114 Renewal / repair of hydraulic line @ aft stbd. BLP gantry inside fanroom.
Refer to pictures file name P104.114 001, 002, 003, 004.

Erect the staging out side of BLP gantry (inboard structure)
Cut open the access on side wall as per the picture P104.004.
Remove the hyd. Pipe line nearest top flange, assume bottom flange was removed for job P104.38
Take out the pipe through from fan room, clean the leaking area for inspection call JDN rep. to be decided repair / renewal.
Assume, if the pipe is damage:
Fabricate & installed new hyd. pipe 1x NB50 HP xL2000mm with 2x SAE flanges. Pipes are seamless precision hyd. line and are to be pickled prior to fitting and flushed afterwards.
Paint system of the new pipe iwo the works to be repaired to ST 3 & 3 layers ship supplied paint.

Lump sum price : …/

P.104.116 available.

P.104.117. separator room, gland pump no.3 overboard, renew bulkhead penetration and hull penetration pipe.

Drawings:
- IHC 01175-2313-550 pipe passages in long section in PR
- IHC 01175-2312-560 sheet 48 bulkhead penetration Ø 100
- IHC 01955 welding flange ND 10.
- LD 12-00-049 Location of inlet and overboard valves

Bulkhead penetration between pump room and separator room to be renewed.
Hull penetration pipe in separator room to be renewed.

Scope:
- Assume the vessel is in dry dock and the system has been de-pressurised and drained.
- Assume the access in the separator room is limited.
• In the pump room in way of frame 66, disconnect / connect dresser coupling ND 100, remove / refit pipe line ND 100, L 8 m. Including opening / closing of pipe brackets.
• Supply and weld new pipe line Ø 114.3 x 3.6, L 5 m, with 2 bends of 90°. Pipe to be hot dip galvanised, minimum thickness 50 μm.
• In the separator room in way of frame 66, disconnect / connect dresser coupling ND 100.
• Cut out existing, supply and weld new bulkhead penetration pipe with bend (pos 69 / IHC 01175-2313-550, IHC 01175-2312-560 sheet 48). Pipe to be hot dip galvanised, minimum thickness 50 μm.
• In the separator room in way of frame 66, assume the overboard valve and non-return valve have been removed according specs I.1. (pos 7 / LD 12-00-049).
• Remove / refit dresser coupling Ø 100 mm.
• Supply and renew pipe Ø 114.3 x 3.6 L 1 m. Pipe to be hot dip galvanised, minimum thickness 50 μm. Flange to have bolt holes Ø 20 mm (IHC 01955).
• Coating repair / renewal in pump room and separator room according specs F.10.
• Including permits, lights, ventilation.

Lump sum.

P.104.118 SB propulsion room, install grease catcher arrangement.

Scope:
• The existing drain from the galley has its own dedicated pipe running in the SB propulsion room, just under the main deck, directly up to the sewage unit. This line is to be modified and an owner’s supplied grease catcher is to be installed.
• Erect a staging in the SB propulsion room: l*w*h= 10x2x4m
• Disconnect, remove existing drain line from the galley, ND65 x 6.0m. Supply, fit a blind flange on the branch of the existing grey water line.
• An owner supplied grease catcher box (1000x1000x500mm) is to be installed near the existing penetration of the drain galley. The yard is to fabricate a suitable platform, attached to the wall and ceiling. Floor area of the platform with leak tray 2.0x2.0m. A ladder is to be supplied fabricate to access the platform from the tank top, length 3.0 meter.
• Leak tray of the platform to be provide with drain pipe ND50 x 3.0 m to the tank top
• Ship’s supplied flanges are installed on both ends of the grease catcher
• A pipe to be fabricated, fitted and installed between the existing connection drain galley and the grease catcher, ND65x1000mm, one branch.
• A pipe to be fabricated, fitted and installed between the grease catcher and the already existing dedicated line from the galley to the sewage unit in the pump room. ND65x4m, 2 bends, 1 branch. Branch close to the grease catcher. Pipe supports are heavy duty and are welded to the frames and stiffeners of the ceiling in the propulsion room.
• A bypass pipe is to be fabricated, fitted and installed between the two branches with one ship’s supplied valve. 2 x ND65 x 2.0m, total 2 bends.
Pipe is schedule 40, hot dipped galvanized after fabrication, connected with flanges.

Pipes to be made and installed according P1.

The platform, the outside of the pipe, the supports are to be wire brushed to ST3 and painted with 3 layers ship’s supplied paint.

Lump sum.

**P.104.119 pump room, bilge overboard line modification.**

**Scope:**

- Fabricate and install 1 x DN125 x Sch80 x 1700mm pipe with 2 PN10 flanges
- Fabricate and install 1 x DN100 x Sch80 x 1700mm pipe with 2 PN10 flanges
- Existing DN125 bilge water pipe to be disconnected, drained, cut, 2 x PN10 flanges to be installed and 2 owner supplied DN125 valves to be installed.
- Existing DN100 bilge water pipe to be disconnected, drained, cut, 2 x PN10 flanges to be installed and 2 owner supplied DN100 valves to be installed.
- Pipes to be fabricated according P1.
- Paint system of the new pipe and in way of the works to be repaired to ST3 & 3 layers ship’s supplied paint.

Lump sum price:

**P.104.120. tank 27 MDO day tank, install magnetic level indicator.**

**Drawings:**

- P.104.120 photo
- IHC 01175-0353-010 Tank Testing Plan

**Scope:**

- Assume MDO tank 27 is empty, cleaned and gas free
- The old level indicator is to be removed and the old pressure gauge connections to be blanked.
- Install an owner supplied magnetic level indicator, length = 1505mm
- Connections are DN20 with PN40 flanges.
- Supply and weld 2 bulkhead penetrations DN20 PN40 between Engine Room and MDO tank 27. Each penetration with 1 DN20 PN40 flange.
- Including lighting, ventilation, gas free certificates,..
- Pipes to be fabricated according P1.
- Paint system of the new penetrations and in way of the works to be repaired to ST3 & 3 layers ship’s supplied paint.

Lump sum.

**P.104.121. tank 28 HFO day tank, install magnetic level indicator.**

**Drawings:**

- P.104.121 photo
IHC 01175-0353-010 Tank Testing Plan

Scope:
- Assume HFO tank 28 is empty, cleaned and gas free
- The old level indicator is to be removed and the old pressure gauge connections to be blanked.
- Remove/refit 2m2 of insulation on the ER bulkhead
- Install an owner supplied magnetic level indicator, length = 1505mm
- Connections are DN20 with PN40 flanges.
- Supply and weld 2 bulkhead penetrations DN20 PN40 between Engine Room and HFO tank 28. Each penetration with 1 DN20 PN40 flange.
- Including lighting, ventilation, gas free certificates,
- Pipes to be fabricated according P1.
- Paint system of the new penetrations and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum.

P.104.122 Available

P.104.123 barge loading pipes, relocate hydraulic junction boxes

Drawings:
- P104.123-1 sketch
- P104.123-2 sketch
- LD 07-00-016 Hydraulic pipelines on support-pipe upper part
- LD 07-00-015 Hydraulic pipelines on shoot (barge-loading)
- LD 01-02-141 Arrangement barge loading system

Description:
- Assume all spare hydraulic hoses/valves are owner supplied
- Job to be done in conjunction with job U.6.1. and U.6.4
- Assume the launder pipe and barge loading arm piece assembly are dismounted as per job U.6.1. and U.6.4.
- The 5-valve block for the dredge valves on the barge loading shoot is to be moved.
- Disconnect 12pc hydraulic connections on the 5-valve block and remove the 5-valve block, pos 6 on LD 07-00-016. Drain all hydraulic lines, dispose of oil and blind hydraulic connections on the P & T line and on the 5-valve block.
- Remove all obsolete pipes, elbows and bulkhead penetrations from the upper hinge part, indicated on sketch P104.123-1.
- Install the 5-valve block on the barge loading launder pipe at the location, indicated on sketch P104.123-2. Assume 2 x L-profile 50 x 50 x 1000 mm for the installation.
- Supply, install and connect P&T line from the old location to the new location: Seamless pipes in AISI 316, OD25x3mm, 6000mm length/pipe with cutting
ring couplings and 2 SAE flanges. Assume 4x90° bend, 8 clampings/pipe and 4 owner supplied hydraulic hoses to be connected.

- Assume 4 x hydraulic lines to be supplied in AISI316 OD20x2.5mm, 2000mm length/pipe with SAE flanges to connect 2 of the cylinders to the 5-valve block
- Connect the 6 x remaining hydraulic lines to the 5-valve block with SAE flanges.
- Stainless Hydraulic pipes are fabricated and installed as described in item P4. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges are Owner Supplied
- Install and connect owner supplied electrical cable from the old location of the 5-valve block to the new location of the 5-valve block. Assume 10m 2” pipe with 10 clamps to be installed for guidance/protection of the electrical cable.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price/junction box: .../

**P.104.124** pump room, dredge inlet valves, upper and lower, reroute hydraulic lines for flow indicators.

**Drawings:**
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**Scope:**
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Lump sum. ... /

**P.104.125** old trunnion sensor arrangement, remove obsolete conduit lines and bulkhead penetration.

**Drawings:**
- 

**Scope:**
- 

Lump sum. ... /

**P.104.126** anchor hoisting winches, renewal hydraulic lines.

**Drawings:**
- P.104.126-1 up to P.104.126-15 pictures Anchor Handling Winches on Upper Deck

**Scope:**
- Remove, pipelines, drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install following hydraulic pipelines on deck:
  - OD60x6.0, 2000mm length, 2 bends 90°, 2 SAE flanges
  - OD60x6.0, 2000mm length, 2 bends 90°, 2 SAE flanges
  - OD60x6.0, 1000mm length, 2 bends 90°, 1 branch, 3 SAE flanges
  - OD60x6.0, 1000mm length, 2 bends 90°, 1 branch, 3 SAE flanges
  - OD60x6.0, 1000mm length, 2 bends 90°, 1 branch, 3 SAE flanges
  - OD60x6.0, 1000mm length, 2 bends 90°, 1 branch, 3 SAE flanges
  - OD60x6.0, 1000mm length, 2 bends 90°, 1 branch, 3 SAE flanges
  - OD60x6.0, 500mm length, 1 bend 90°, 1 branch, 3 SAE flanges
  - OD60x6.0, 500mm length, 1 bend 90°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1300mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1300mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1300mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1300mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1000mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1000mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1000mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD42x5.0, 1000mm length, 2 bends 90°, 2 bends 45°, 1 branch, 3 SAE flanges
  - OD25x2.5, 3000mm length, 4 bends 90°, 2 SAE flanges
  - OD25x2.5, 1000mm length, 1 bend 90°, 1 bend 45°, 2 SAE flanges
  - OD25x2.5, 1200mm length, 4 bends 90°, 1 bend 45°, 2 SAE flanges
  - OD25x2.5, 600mm length, 2 bends 90°, 1 bend 45°, 2 SAE flanges
  - OD25x2.5, 1000mm length, 2 bends 90°, 3 bends 45°, 2 SAE flanges
  - OD25x2.5, 1200mm length, 2 bends 90°, 1 bend 45°, 2 SAE flanges
  - OD25x2.5, 500mm length, 1 bend 90°, 1 bend 45°, 2 SAE flanges
  - OD25x2.5, 1000mm length, 3 bends 90°, 1 bend 45°, 2 SAE flanges
  - OD38x4.0, 1000mm length, 1 bend 90°, 1 bend 45°, 2 SAE flanges
- 1 of the hydraulic blocks will be renewed by an owner supplied new type with same dimensions but other type owner supplied connections. New pipes to be adapted to the new block.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges are owner supplied
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.
• Assume 2m3 staging on 1 location to reach the highest pipes on deck.

Lump sum price/winching: ...

**P.104.127 Available**

**P.104.128 Fire/deckwash lines renewal.**

**Drawings:**
• P.104.128-1 upto P.104.128-11 pictures of firelines

**Scope:**
• Several Sea water lines of the fire fighting/deckwash installation need to be renewed.
• For pipes in accomodation: Assume insulation in the accomodation will be removed under job MLR.D1.
• Following Sea water lines need to be renewed:
  o DN65, sch80, length 2200mm, 1 bend 90°, 2 bends 45°, 2 dresser couplings, 2m3 scaffolding required. (location: entrance steering gear room SB)
  o DN65, sch80, length 2200mm, 1 bend 90°, 1 penetration, 2 flanges PN10. (location: entrance Propulsion room SB)
  o DN65, sch80, length 3300mm, 1 bend 90°, 2 flanges PN10, 4m3 scaffolding required. (location: deck behind hatch DP2)
  o DN65, sch80, length 1500mm, 2 bends 90°, 1 branch, 3 dresser couplings, 2m3 scaffolding required (location: Entrance accomodation Fore)
  o DN65, sch80, length 3300mm, 1 branch, 3 dresser couplings. (location: Deck behind sidewinch right)
  o DN65, sch80, length 500mm, 1 penetration, 2 dresser couplings (location: deck next to bunker water meter)
  o DN50, sch80, length 100mm, 1 penetration, 2 dresser couplings (location: paintstore)
  o DN50, sch80, length 150, 2 dresser couplings, 8m3 scaffolding required. (location: pumproom)
  o DN65, sch80, length 3300mm, 2 bends 90°, 1 bend 45°, 1 flange PN10, 1 dresser coupling, 4m3 scaffolding required. (location: harbour engine room)
  o DN65, sch80, length 900mm, 1 bend 90°, 1 bend 45°, 2 dresser couplings (location: engine room next to sawing machine)

• All pipes are galvanised
• Dresser couplings are owner supplied
• Pipes to be made and installed according P1.
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

P.104.129 Install new automatic fuel filter

Drawings:
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Scope:
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Lump sum. … /

P.104.130.a Barge mooring tensioners, renewal of hydraulic line.

Scope:
• Remove 2 x DN48 x 6.0 x 2000mm pipes on upper deck.
• Remove 2 x DN48 x 6.0 x 1000mm pipes on upper deck.
• Pipes are connected with SAE flanges.
• Drain, collect and dispose of remains of hydraulic oil.
• Supply and install 2 x DN48 x 6.0 x 2000mm pipe.
• Per pipe: 4 x bend 90°, 1 x bend 45° and 2 SAE flanges.
• Supply and install 2 x DN48 x 6.0 x 1000mm pipe.
• Per pipe: 1 x bend 90° and 2 SAE flanges.
• No staging is needed for this job.
• Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
• SAE flanges are Owner supply
• Paint system of the new pipe and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

P.104.130.b. hydraulic lines Barge Mooring tensioners, bulkhead penetrations to renew.

Scope:
• Several hydraulic bulkhead penetrations need to be renewed.
• Disconnect pipes, Drain, collect and dispose of remains of hydraulic oil.
• Fabricate and install hydraulic pipelines with bulkhead penetration
  • OD60x6, 400mm length, 1 penetration, 2 SAE flanges, 2m3 staging required. (SB aft)
  • OD60x6, 400mm length, 1 penetration, 2 SAE flanges, 2m3 staging required. (SB aft)
- OD60x6, 700mm length, 1 bend 90°, 1 penetration, 2 SAE flanges, 2m3 staging required. (SB fore)
- OD60x6, 400mm length, 1 penetration, 2 SAE flanges, 2m3 staging required. (PS aft)
- OD60x6, 400mm length, 1 penetration, 2 SAE flanges, 2m3 staging required. (PS aft)
- OD60x6, 700mm length, 1 bend 90°, 1 penetration, 2 SAE flanges, 2m3 staging required. (PS fore)
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- Where penetrations run in accommodation, assume insulation and panels are removed under MLR.D.1.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.131 aux ER, exchange 2 valves and 2 spool pieces on thermal oil lines.**

Scope:
- 2 spoolpieces DN40 x 1000mm and 2 valves DN40 to be installed in Auxiliary Engine room, parts owner supply. No staging required.
- Assume the thermal oil system is not in operation.
- Drain, collect and dispose of remains of thermal oil.
- Spoolpieces and valves to be insulated according P3

Lump sum price: …/

**P.104.132. pump room, dredge bypass valve hull inlet, install hydraulic flow meter**

Drawings:
- P.104.132 Picture valve block bypass hull inlet valve

Scope:
- An Owner supplied hydraulic flow indicator is to be installed in the rod side of the hydraulic cylinder of the dredge by pass hull inlet valve in the pump room
- Disconnect pipe between hydraulic valve block and hydraulic cylinder rod side. Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 pipe, OD42x4.0, 300mm length, 1 SAE flange and 1 cutting ring coupling. Pipe runs from the hydraulic valve block to the hydraulic flow indicator.
Fabricate and install 1 pipe, OD42 x 4.0, 3000mm length, 5 bends 90°, 1 SAE flange and 1 cutting ring. Pipe runs from the hydraulic flow indicator to the rod side of the hydraulic cylinder.

Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.

SAE flanges owner supplied.

Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Assume 4m³ staging is required to reach the connection on the hydraulic cylinder.

Lump sum.

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**P.104.133. pump room, dredge bypass valve, install hydraulic flow meter**

Drawings:
- P.104.133 Picture valve block bypass valve

Scope:
- An Owner supplied hydraulic flow indicator is to be installed in the rod side of the hydraulic cylinder of the dredge by pass valve in the pump room.
- Disconnect pipe between hydraulic valve block and hydraulic cylinder rod side. Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 pipe, OD42x4.0, 300mm length, 1 SAE flange and 1 cutting ring coupling. Pipe runs from the hydraulic valve block to the hydraulic flow indicator.
- Fabricate and install 1 pipe, OD42 x 4.0, 4000mm length, 3 bends 90°, 1 SAE flange and 1 cutting ring. Pipe runs from the hydraulic flow indicator to the rod side of the hydraulic cylinder.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum.

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**P.104.134 pump room, i.w.o emergency fire pump, modification on gland water unit in Pump Room**

Drawings:
• P.104.134. Picture of socket on pipe

Scope:
• 1 socket, DN40, Length 300mm, to be removed from a 10” black steel pipe and pipe to be blanked off by means of a welded insert.
• No staging required

Lump sum price: ... /

P.104.135 Available

P.104.136 Thermal oil line, PT100 and dump valve modification.

Drawings:
•

Scope:
•

Lump sum. ... /

P.104.137 remove obsolete Halon lines ER

Scope:
• 2 obsolete lines from the old Halon System are still mounted in the Engine room
• Remove and dispose of the following pipes, including removing of the clamps, brackets.
  o DN32 x 4000mm length, 4 bends 90°, 2 bends 45°, 1 branch.
  o DN80 x 4000mm length, 4 bends 90°, 2 bends 45°, 1 branch.
• 20m3 staging required
• Paint system in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ... /

P.104.138 Remove dry dock sea water connection for toilet system.

Scope:
• The obsolete toilet flushing line from upper deck to auxiliary engine room is to be removed.
• 1 steel pipe DN40, sch40, 5000mm length, 3 bends 90°, 5 bends 45°, 2 penetrations is to be removed and disposed of, penetrations to be permanently closed by means of steel insert.
• Paint system in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.
• Staging required: 4m3 on 2 locations.

Lump sum price: ... /
P.104.139 Available

P.104.140. barge mooring tensioners install flow restriction valves.
Scope:
- Flow restrictions need to be installed in the hydraulic lines of the four(4) barge mooring tensioning cylinders.
- Flow restrictions and SAE flanges will be owner supplied.
- Remove/refit four(4) hydraulic pipes on main deck, OD60x6, length 4000mm, with two (2) SAE flanges each.
- Drain, collect and dispose of remains of hydraulic oil.
- Assume 2m3 staging needed at four (4) locations to facilitate remove/refit
- Assume insulation in accomodation will be removed under job MLR.D1. and hydraulic system will be de-pressurised and tagged out under P.110.
- Install the flow restriction pieces in the pipes by cutting the pipes in half and welding two (2) owner supplied SAE flanges per pipe. Flow restriction pieces are bolted in between the SAE flanges.
- Hydraulic pipes are modified, fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting and flushed afterwards.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...

P.104.141. Black steel pipes, bulkhead penetrations to renew.
Scope:
- Several black pipe bulkhead penetrations need to be renewed.
  - DN150, sch80, 2000mm length, 2 bends 30°, 2 flanges PN16, 1 penetration (Deaeration Tank 9 – assume tank is gas free)
  - DN150, sch80, 2000mm length, 2 flanges PN16, 1 penetration (Deaeration Tank 50 – assume tank is gas free)
  - DN150, sch80, 2000mm length, 2 flanges PN16, 1 penetration (Deaeration Tank 49 – assume tank is gas free)
  - DN75, sch80, 4000mm length, 1 bend 45°, 2 flanges PN16, 2 penetrations (Scupper pipe PS ER entrance)
- Pipes to be fabricated according P1.
- Where penetrations run in accommodation, assume insulation and panels are removed under MLR.D.1.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...
**P.104.143. Enlarge Drain Pot to Tank 37**

**Drawings:**
- P.104.143-1 Photo of existing drain pot
- P.104.143-2 Photo of existing drain pot
- IHC 01175-0353-010 Tank Testing Plan

**Scope:**
- The existing drain pot on the tank top of sludge oil tank 37 in the auxiliary engine room needs to be enlarged
- Note that the space around the drain is limited
- Assume tank 37 and tank 35 are cleaned and gas free.
- Clean the tank top of tank 37 around the drain. Issue gas free certificate
- The pipes running to the drain are to be plugged by the Yard.
- Cut existing drain OD141 x 6(5”), length 150mm
- Supply, fit and weld a new drain OD273 x 9 (10”), length 150mm.
- Renew the filling pipe to tank 35: 3000mm pipe ND65, PN10, Sch80, 2 penetrations
- Pipe/drains are to be fabricated/installed according P1
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.144. Hydraulic pipe penetration renewal in Hydraulic Room**

**Drawings:**
- P.104.144 picture of penetration

**Scope:**
- A hydraulic pipe penetration in the hydraulic room needs to be renewed.
- Disconnect pipes, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe OD25x2.5, 300mm length, 2 SAE flanges, 1 penetration.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.145. Hydraulic pipe renewal in Hydraulic Room**

**Drawings:**
- P.104.145 picture of pipe
Scope:
- A hydraulic pipe in the hydraulic room needs to be renewed.
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD20x2.5, 300mm length, 1 bend 90°, 1 SAE flanges and 1 cutting ring coupling
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...

P.104.146. Hydraulic pipe renewal in Hydraulic Room

Drawings:
- P.104.146-1 Picture of hydraulic pipe in hydraulic room

Scope:
- A hydraulic pipe in the hydraulic room needs to be renewed.
- The pipe is directly welded between 2 square steel manifolds
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD100x10, 1500mm length, existing steel manifolds on both ends of the pipe to be reused.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...

P.104.147. Hydraulic pipe renewal in Hydraulic Room

Drawings:
- P.104.147 Picture of pipe in hydraulic room

Scope:
- A hydraulic pipe in the hydraulic room needs to be renewed.
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD30x3.0, 1500mm length, 2 bends 90°, 2 SAE flanges
• Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
• SAE flanges owner supplied
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.
• Assume 2m³ staging/ a ladder to be erected to reach the coupling of the pipe

Lump sum price: …/

**P.104.148. Hydraulic pipe renewal in Hydraulic Room**

**Scope:**
• A hydraulic pipe in the hydraulic room needs to be renewed.
• Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
• Fabricate and install 1 hydraulic pipe: OD139.7x4.0, 6000mm length, 11 branches, 11 flanges PN250
• Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
• SAE flanges owner supplied
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.149. Deck penetrations aft Barge Mooring winches PS**

**Drawings:**
• P.104.149. Picture of the barge mooring winch on upper deck

**Scope:**
• Several hydraulic deck penetrations need to be renewed.
• Disconnect and remove old pipe with penetration, Drain, collect and dispose of remains of hydraulic oil.
• Fabricate and install the following pipes with penetrations:
  o OD60x6, 500mm length, 1 penetration, 2 SAE flanges, 2m³ staging required.
  o OD60x6, 500mm length, 1 penetration, 2 SAE flanges, 2m³ staging required.
  o OD20x2, 500mm length, 1 penetration, 2m³ staging required.
• Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
• SAE flanges owner supplied
• Assume the accommodation on main deck will be removed under MLR.D.1.
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.150. Deck penetrations aft Barge Mooring winches SB**

**Drawings:**
• P.104.150. Picture of the barge mooring winch on upper deck

**Scope:**
• Several hydraulic deck penetrations need to be renewed.
• Disconnect and remove old pipe with penetration, Drain, collect and dispose of remains of hydraulic oil.
• Fabricate and install the following pipes with penetrations
  o OD60x6, 500mm length, 1 penetration, 2 SAE flanges, 2m³ staging required.
  o OD60x6, 500mm length, 1 penetration, 2 SAE flanges, 2m³ staging required.
  o OD20x2, 500mm length, 1 penetration, 2m³ staging required.
• Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
• SAE flanges owner supplied
• Assume the accommodation on main deck will be removed under MLR.D.1.
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.151. Pipe to hydraulic motors on SB Barge Loading Pipe Winch**

**Drawings:**
• P.104.151. Picture of Barge loading Pipe winch

**Scope:**
• A hydraulic pipe on deck at the Barge Mooring Winch SB needs to be replaced
• Disconnect and remove old pipe. Drain, collect and dispose of remains of hydraulic oil.
• Fabricate and install 1 hydraulic pipe: OD60x6.0, 1500mm length, 1 branch OD42x5, 3 SAE flanges.
Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.

SAE flanges owner supplied

Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: .../

**P.104.152. Pipe to hydraulic motors on SB Barge Loading Pipe Winch**

**Drawings:**
- P.104.152. Picture of Barge loading Pipe winch

**Scope:**
- A hydraulic pipe on deck at the Barge Mooring Winch SB needs to be replaced
- Disconnect and remove old pipe. Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD60x6.0, 1500mm length, 1 branch OD42x5, 3 SAE flanges.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: .../

**P.104.153. up to P.104.157. Available**

**P.104.158. Suction Tank37 sludge separator**

**Scope:**
- A Stainless steel pipe for the sludge separator in the Auxiliary engine room is to be renewed.
- Remove/refit 10m2 floor plates in Auxiliary engine room
- Disconnect and remove old pipe, dispose of sludge/oily water
- Fabricate and install a new pipe, DN25, PN10, Sch40, 3500mm length, 6 bends 90°, 2 penetrations, 1 branch, galvanised, 3 flanges PN10.
- Pipes are fabricated and installed as per item P1.
- Pipes are in Stainless Steel
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.159. Suction Tank38 sludge separator**

**Scope:**
- A Stainless steel pipe for the sludge separator in the Auxiliary engine room is to be renewed.
- Remove/refit 10m2 floor plates in Auxiliary engine room
- Disconnect and remove old pipe, dispose of sludge/oily water
- Fabricate and install a new pipe, DN25, PN10, Sch40, 2500mm length, 2 bends 90°, 1 penetration, 1 branch, galvanised, 3 flanges PN10.
- Pipes are fabricated and installed as per item P1.
- Pipes are in stainless steel.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.160. Hydraulic pipe renewal in Auxiliary Engine Room**

**Drawings:**
- P.104.160. hydraulic pipe 4m

**Scope:**
- A hydraulic pipe in the auxiliary engine room needs to be renewed.
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD60x6, 4000mm length, 2 SAE flanges.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.161. Hydraulic pipe renewal in Auxiliary Engine Room**

**Drawings:**
- P.104.161. hydraulic pipe 1m

**Scope:**
- A hydraulic pipe in the auxiliary engine room needs to be renewed.
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD42x5, 1000mm length, 2 SAE flanges.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...

**P.104.162. Hydraulic pipe penetration renewal in luggage room/void behind freezer room**

Scope:
- A hydraulic pipe penetration between the luggage room on main deck and the void behind the freezer room under main deck needs to be renewed.
- Disconnect old pipe and remove penetration. Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe with penetration: OD42x5, 300mm length, 2 SAE flanges, 1 penetration. Assume 3m3 staging required.
- Job in conjunction with F.119, organise hot work permit in the luggage room and void behind freezer room.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...

**P.104.163. Sea Water CuNiFer pipe in Engine Room**

Drawings:
- P.104.163 MDO cooler SW pipe

Scope:
- A Sea Water CuNiFer pipe in the Engine Room is to be renewed
- Disconnect and remove old pipe, drain, dispose of water.
- Install a new CuNiFer elbow, ND 300
- Coupling flanges and CuNiFer pipes/elbows are owner supplied.
- Pipes are fabricated and installed as per item P1.
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...

P.104.164. Fresh Water Pipe in Engine Room
Drawings:
• P.104.164. Picture of pipe in engine room
Scope:
• A fresh water pipe in the Engine Room is to be renewed
• The pipe is on the tank top of the engine room, with limited working space.
• Disconnect and remove old pipe, drain, dispose of water.
• Fabricate and install a new pipe, DN75, Sch80, 1400mm length, 1 bend 90°, galvanised, 2 branches DN40, 4 PN10 flanges.
• Dresser couplings are owner supplied.
• Pipes are fabricated and installed as per item P1.
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: ...

P.104.165. Fresh Water Pipe in Pump Room
Drawings:
• P.104.165 picture of FW pipe in Pump Room
Scope:
• A fresh water pipe in the Pump Room is to be renewed
• Disconnect and remove old pipe, drain, dispose of water.
• Fabricate and install a new pipe, DN40, Sch80, 700mm length, galvanised, 1 branch DN30, 1 PN10 flange, 1 dresser coupling and 1 30S coupling
• Dresser couplings and 30S coupling are owner supplied.
• Pipes are fabricated and installed as per item P1.
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.
• Assume 3m3 staging is required to reach the pipe

Lump sum price: ...

P.104.166. Hydraulic pipe renewal in Pump Room
Drawings:
• P.104.166-167 picture of hyd pipe in Pump room
Scope:
• A hydraulic pipe in the Pump room needs to be renewed.
• Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
• Fabricate and install 1 hydraulic pipe: OD30x3, 3000mm length, 2 bends 45°, 2 SAE flanges.
• Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
• SAE flanges owner supplied
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price:  …/

**P.104.167. Hydraulic pipe renewal in Pump Room**

**Drawings:**
- P.104.166-167 picture of hydr pipe in Pump room

**Scope:**
- A hydraulic pipe in the Pump room needs to be renewed.
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD30x3, 3500mm length, 2 bends 45°, 2 SAE flanges.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price:  …/

**P.104.168. Hydraulic pipe renewal in Pump Room**

**Drawings:**
- P.104.168-169 Hydraulic pipe in Pump room

**Scope:**
- A hydraulic pipe in the Pump room needs to be renewed.
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD30x3, 2500mm length, 3 bends 90°, 2 SAE flanges.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.169. Hydraulic pipe renewal in Pump Room**

**Drawings:**
- P.104.168-169 Hydraulic pipe in Pump room

**Scope:**
- A hydraulic pipe in the Pump room needs to be renewed.
- Disconnect old pipe, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 hydraulic pipe: OD30x3, 2500mm length, 3 bends 90°, 1 bend 45°, 2 SAE flanges.
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- SAE flanges owner supplied
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.170. Fresh Water Pipe in Engine Room**

**Drawings:**
- P.104.170 FW pipe in Engine Room

**Scope:**
- A fresh water pipe in the Engine Room is to be renewed
- Disconnect and remove old pipe, drain, dispose of water.
- Fabricate and install a new pipe, DN40, Sch80, 2300mm length, 2 bends 90°, galvanised, 1 dresser couplings, 1 flange PN10
- Dresser couplings are owner supplied.
- Pipes are fabricated and installed as per item P1.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/

**P.104.171. Sewage line to tank 9 and tank 11 to remove**

**Scope:**
**P.104.172. Ballast line to tank 9 and tank 11 to remove**

Scope:

**P.104.173. Raw cooling Water Pipe in Engine Room/generator room**

Drawings:
- P.104.173-1 until P.104.173-3 Raw cooling water pipe in Engine Room/generator room
- P104.173-4 thickness measurements raw cooling water pipe
- IHC_01175-2332-500_1_Gj Diagram Raw Cooling Water lines
- IHC_01175-2332-540_1_Cj Salt cooling water lines in generator room
- P.104.173-sketch Sketch of new pipes in Generator Room/Engine Room

Scope:
- 2 OD508x15.1 x 1500mm length raw cooling water pipes between the engine room and generator room are to be renewed. Pos 42 and 43 on drawing IHC-01175-2332-500 – Indicated on sketch P.104.173
- Job in conjunction with G.198 and G.192
- Assume the vessel is in dry dock
- Cut the pipes pos. 3 on drawing IHC-01175-2332-540 about 1000m from frame 116 to fore.
- Disconnect/connect the 2 dresser couplings in ER.
- Disconnect and remove old pipes, drain, dispose of water.
- Pipes are under floor plates in engine room/generator room and with limited space. Assume 2 x 10m² floor plates to be removed/refitted
- Pipe pieces to remove/install via the Engine Room.
- Fabricate and install 2 new pipes, OD508x15.1, 1500mm length each, galvanised, 1 penetration/pipe, 1 dresser couplings/pipe.
- Pipes to be welded to pipes pos. 3 as per detail A on sketch P.104.173
- Dresser couplings are owner supplied.
- Pipes are fabricated and installed as per item P1.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price for renewal of 2 x 1500mm pipe: …/

**P.104.174. pump room, dredge pump well, bilge overboard.**

Drawings:
- IHC 01175-1302-010 sheets 1 & 2 double bottom fr 58 ~ 69
- IHC 02808 pipe brackets
- IHC 02360 dresser-couplings
- IHC 01955 welding flange NP 10 bar
- IHC 02450 welding pipe bends

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The area is above tank 46 A and is open to the pump room. Frames 63 till 75. Job can be combined with F.142.

Scope:
- Assume the area has been pumped out of any remaining sea water and the area has been grit blasted to SA 2.5. according specs F.142.
- Cut existing / install yard supplied pipe line 168.3 x 8.7 (pos 5), bend 90° (pos 6) and flange (pos 7). Also cut / renew the five (5) pipe brackets. Pipe assembly to be hot dip galvanised minimum thickness 50 μm.
- Dresser coupling (pos 8) is owner supplied.
- Pipes are fabricated and installed as per item P1
- Including ventilation, lights, permits, consumables.

Lump sum price: …/ P.104.175. Hydraulic pipe penetration renewal located in Ship’s Workshop

Drawings:
- P.104.175. picture of pipe penetration

Scope:
- A hydraulic pipe penetration in the Ship’s workshop needs to be renewed.
- Disconnect pipes, Drain, collect and dispose of remains of hydraulic oil.
- Fabricate and install 1 pipe: OD48x5, 300mm length, 1 penetration, 2 SAE flanges, 2m3 staging required. (hydraulic pipe spud carrier)
- Hydraulic pipes are fabricated and installed as described in item P2. Pipes are seamless precision hydraulic lines and are to be pickled prior to fitting, and flushed afterwards.
- Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/ P.104.176. Available

P.104.177. Repositioning fire line and remove obsolete penetrations on crane deck

Drawings:
- P.104.177-1 up to P.104.177-4 sketches

Scope:
• 8 pc obsolete deck penetrations need to be removed between upper deck in the bosun store and crane deck
• Provide hot work permit in bosun store and on crane deck (working deck)
• Remove penetrations and place 2 steel inserts in way of the old penetrations in the crane deck: 1000 x 300 x 9mm each. See sketch P.104.177-1
• Assume 4m³ staging required on bosun store
• Remove/refit 1 Fire Fighting pipeline DN80, PN10, Sch80 x 2000mm with dresser couplings
• Cut off 1 branch in above fire line and replace with blind insert.
• Fabricate and install 1 pipe penetration between the bosun store and the crane deck: DN65, PN10, 300mm length, 1 penetration, 1 dresser coupling, 1 PN10 flange. Note the limited space above the paint store in the bosun store
• Remove/refit 1 Fire Fighting pipeline DN65, PN10, Sch80, 1000mm length.
• Above pipe to be modified and foreseen with 1 branch DN65, PN10, Sch80, 200mm length in way of the new pipe penetration.
• Pipes are fabricated and installed as per item P1.
• Pipes are galvanised
• Paint system of the new pipes and in way of the works to be repaired to ST 3 & 3 layers ship’s supplied paint.

Lump sum price: …/
**P.105. Renewal of damaged pipe insulation**

**P.105.01 Renewal insulation of thermal oil lines in electric store**
Refer to pictures file name P105.01

The insulation of the thermal oil lines in the starboard electric store as indicated in the pictures is to be renewed.
Staging to be erected under the pipes, \(l \times w \times h = 20 \times 1 \times 1\)m
Insulation of the two pipes ND32, each 6 bends and each length 15.0m is to be renewed as per item P3.1, system for fuel and thermal oil. Note 30mm thickness rock wool with glass-fibre cloths with aluminium evaporated layer is to be installed.

Lump sum price: ..../

**P.105.02 Renewal insulation of hot water lines in electric store**
Refer to pictures file name P105.01

The insulation of the hot water lines in the starboard electric store as indicated in the pictures is to be renewed.
Assume a staging is erected as per item P105.1
The insulation of the two straight pipes ND65, each length 8.0m is to be renewed using pre-fabricated rock wool prefabricated shells (type 810) and covered with reinforced self-adhesive aluminium layer.

Lump sum price: ..../

**P.105.03 Renewal insulation of thermal oil lines to/from separator units A, B & C**
Refer to pictures file name P105.03

The insulation of the thermal oil lines running to the separator units A, B & C is to be renewed
Remove / refit the floor plates in way of works.
Insulation of all pipes & fittings as indicated in the pictures is to be renewed as per item P3.1, system for fuel and thermal oil, rock wool min. 30mm thickness but finished with 1mm aluminium plating, fastened by means of screws. This includes thermal oil lines running under the units and floor plates.
Pipes ND25, ND32 & ND40, with total length of approximately 60m, including numerous bends and valve fittings as shown on the pictures.

Lump sum price: ..../

**P.105.04 Renewal insulation of bunker transfer oil lines tank 13 & 14 in generator room**
Refer to pictures file name P105.04

The insulation of the thermal oil lines in the generator room as indicated in the pictures is to be renewed only above the floor plates.
Remove / refit 4 floor plates in way
Insulation of the two pipes ND125, each 8 bends and each length 9.0m is to be renewed as per item P3.1, system for fuel and thermal oil. Note 30mm thickness rock wool with glass-fibre cloths with aluminium evaporated layer is to be installed. Including mattresses around the bunker valves. Note limited and difficult access.

Lump sum price: 

**P.105.05 Renewal insulation of exhaust lines above turbocharger main engine no. 3**
Refer to picture file name P105.05

The insulation of the exhaust pipe just above the turbocharger ME3 as indicated in the picture is to be renewed
Erect a staging l*w*h= 4x4x3 m
Insulation of exhaust line ND1000 x 1400 length as per item P3.1, system exhaust lagging to be installed. Rockwool to be covered by 1mm aluminium plate fastened with screws. Note that the insulation in way of the bellow must be removable without remove top and bottom of the exhaust line.

Lump sum price: 

**P.105.06 Renewal glass fibre cloth**
Refer to pictures file name P105.06

The fibre cloth of the thermal oil lines running in the engine room in way of the control air compressor is to be renewed as indicated in the pictures
Staging to be erected under the pipes, l*w*h=18x2x2m
Remove and dispose off the torn fibre cloth.
Install new glass-fibre cloths with aluminium evaporated layer. Three pipes ND50 x 10.0 m length each.

Lump sum price: 

**P.105.07 Renewal insulation of thermal oil lines in engine room**
Refer to pictures file name P105.07

The insulation of the thermal oil lines in the engine room as indicated in the pictures is to be renewed.
Staging to be erected under the pipes, l*w*h=16x1x1m
Insulation of the two pipes ND40, each 6 bends and each length 16.0m is to be renewed as per item P3.1, system for fuel and thermal oil. Note 30mm thickness rock wool with glass-fibre cloths with aluminium evaporated layer is to be installed.

Lump sum price: 

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P.105.08 Renewal insulation of fuel lines to the 5 diesel engines in the engine room

Refer to pictures file name P105.08

The insulation of the fuel lines to the 5 diesel engines as indicated in the pictures is to be renewed. The pictures show the piping to one engine only. Assume the fuel lines to all 5 engines are similar to the one shown in the pictures.

Insulation of all fuel pipes ND40 to each engine length approximately 4.0m, valves, bends and fittings shown in the picture to be renewed as per item 3.1, system for fuel and thermal oil. Note 30mm thickness rock wool with glass-fibre cloths with aluminium evaporated layer is to be installed.

Lump sum price: for 5 engines ..../

P.105.09. Renewal of insulation of fuel lines under floor plates engine room

Refer to picture file name P105.09
P109.09 Diagram FO Supply

Remove / refit floor plates in way of the works: assume in total 30 floor plates of 1.0x1.0m
Cut / remove/refit / re-weld the angle bar supports of the floor plates. Including cleaning and gas freeing in way of the hot works.
Disconnect, remove the non-insulated fuel pipes as indicated with the arrows in the picture. Two lines ND65 x 20m. Clean, blank off the pipes and put aside. After works, re-install & re-connect. Note that all pipe supports are broken off of these lines en are to be repaired or renewed by ship’s supplied new units. Including fitting and welding.
Renew the insulation of the two bunker transfer lines running next to the removed fuel lines: ND100 x 20m & ND125 x 20m.
Renew the insulation of the two fuel supply lines running under the removed fuel pipes. 2 main lines ND65 x 25m, including the branch lines running to the 3 main engines, 6 x ND40 x 2 m each and the branch lines running to the 2 dredge engines, 4 x ND40 x 6 m. See diagram FO supply
Renew the insulation of two fuel flushing lines running under these two bunker transfer lines: 2 lines of ND32 x 30m, including the branch lines running to the 3 main engines, 6 x 2 m each and the branch lines running to the 2 dredge engines, 4 x 6 m. See diagram fuel supply lines.

Lump sum price:

P.105.10. funnel, thermal oil lines, repair insulation.

To do
**P.105.11.a. Hydraulic room, thermal oil lines for tank 13 and tank 14, repair insulation.**

**Scope:**
- The insulation of several thermal oil lines in the hydraulic room is to be renewed:
  - Thermal oil into tank 13: DN40, 1 valve, 1 temperature regulator, 3 bends 90°, 1 bend 45°, 2600mm length.
  - Thermal oil out of tank 13: DN40, 1 valve, 3 bends 90°, 1 bend 45°, 2600mm length.
  - Thermal oil into tank 14: DN40, 1 valve, 1 temperature regulator, 3 bends 90°, 1 bend 45°, 2600mm length.
  - Thermal oil out of tank 14: DN40, 1 valve, 3 bends 90°, 1 bend 45°, 2600mm length.
  - Thermal oil out, common pipe for tank 13 and tank 14: 1 bend 90°, 1 bend 45°, 1 T-branch, 3000mm length
  - Heater thermal oil in: 1 valve, 4 bends 90°, 4 bends 45°, 2 T-branch, 8000mm length.
  - Heater thermal oil out: 1 valve, 3 bends 90°, 6 bends 45°, 8000mm length
- Insulation is to be supplied and installed as per P.3.1.

Lump sum price: ...

**P.105.11.b. Generator room, fuel oil lines for tank 13 and tank 14, repair insulation.**

**Scope:**
- The insulation of several fuel oil lines in the generator room is to be renewed:
  - Fuel oil to tank 13: DN125, 2 bends 90°, 2 bends 45°, 4000mm length
  - Fuel oil to tank 14: DN125, 2 bends 90°, 2 bends 45°, 4000mm length
- Assume 4m² floor plates to be opened/closed in the generator room.
- Insulation is to be supplied and installed as per P.3.1.

Lump sum price: ...

**P.105.12. engines in ER, insulation material to renew.**

To do
P.106. Hydraulic system for new sluice valves in pump room

Ld-01-01-163 Arrangement dredge lines pump room
1175-2330-500 Hydraulic diagram
01175-0319-510_1 revF Arrangement pumproom – existing
01175-0319-510_1 revG Arrangement pumproom – new situation
01175-0319-510_2 revB Arrangement pumproom – existing
01175-0319-510_2 revC Arrangement pumproom – new situation
01175-0319-510_3 revB Arrangement pumproom – existing
01175-0319-510_3 revC Arrangement pumproom – new situation

4 new additional hydraulic operated sluice valves are installed as per item U103. 2 existing sluice valves are renewed.

Assume new hydraulic valve blocks 01175-2330-50 pos 50, 51, 52 & 53 are already installed on the portside longitudinal bulkhead in the pump room between frame 70 & 72 just above maindeck.

A supply and return line is to be installed from the ship’s existing P & T lines running in the separator room. Yard is to drain, disconnect and remove two lines ND50mm in the separator room. Pipes are to be shortened. A T-block with outgoing connection of SAE 1 ¼” 3000psi is to be supplied and fitted in the P-line and a T-block with outgoing connection of SAE 2” to be supplied and fitted in the return line. Yard is to supply, fit, weld P-line of 1 ¼” and 2” return line from these T-blocks to the new valve block in the pump room: length 6meter, 2 bends, 1 bulkhead penetration each. Bulkhead penetration is of welded block type.

Two hydraulic lines are to be supplied, installed, fitted from the new valve block to each of the 4 new sluice valves drawing LD-01-01-163 pos529, 530, 526 & 531. To each sluice valve one hydraulic lines 38x4 to bottomside cylinder and one line 30x4mm

The sluice valves LD-01-01-163 pos 525 & 528 are to be connected by hydraulic pipe to existing valves. The old hydraulic hoses are to be removed and disposed off. Two hydraulic lines ND32 x 2000mm length, 4 bends 90degrees each are to be supplied, fitted and installed between the existing valve block and sluice valve pos 525. Two hydraulic lines ND32 x 8000mm length, 6 bends 90 degrees each are to be supplied, fitted and installed between the existing valve block and sluice valve pos 528.

All hydraulic pipes with flanges SA3000 psi.

All hydraulic pipes are fastened by heavy duty Stauff pipe supports. Ship’s supplied isolating valves to be installed in each line near the sluice valves as per instruction chief engineer. Pipe supports are as much as possible fixated to the new platforms in the pump room, the pipe supports and the sluice valves. Hydraulic pipes are fabricated and installed as per item P2.

Lump sum price: …/

P.107. Replace submerged cooling pump and piping to cutter bearing no. 3

5242839 General arrangement cutter ladder
01175-2812-520 Coolingwater system for cutter shaft bearings

An existing ND40mm submersible pump is installed in the bottom of the cutter ladder, between frame 8 & 9
A tower staging is to be erected to access the submersible pump, \( l \times w \times h = 2 \times 2 \times 6 \) m
The existing submersible pump is to be removed and transport to ship’s workshop. The yard is to install a new owner’s supplied submersible pump type ND100 mm. The yard is to fabricate, fit and weld a new foundation plate to suit the larger pump as per drawing 01175-2812-520 detail B
The existing delivery pipe of ND50 mm is to be replaced by a new delivery pipe running to the top of the no.1 cutter shaft bearing. Pipe ND100, schedule 80, 20.0 meter, 20 bends 90deg, 1 3-flange deck penetration, 1 T piece, 1 reducer 125-100 mm. Old pipe is to be removed and scrapped. Two spray pipes ND65 to be installed from the T-piece to each top side of the cutter shaft bearing: 2 x ND65 x 300 mm x 1 bend. Pipe to be fixated by heavy duty pipe clamps. Pipe is hot dipped galvanized after fabrication
Yard is to supply, install and weld a galvanized cable pipe running from the pump to the MCT entering the closed engine room space of the cutter ladder at frame 8. Pipe \( 3/4” \) x 20 meter. Yard is to install, terminate and connect a new ship’s supplied power cable from the distribution box to the submersible pump. Old cable and –pipe to be removed and scrapped. Cable length 40 m.

Lump sum price :

\( \ldots / \)

**P.108. Installation of submerging pump & flushing pipe to cutter head loosening pawl.**

- 5242839  General arrangement cutter ladder
- 01175-2812-520  Cooling water system for cutter shaft bearings

An additional ship’s supplied submersible pump type ND40 mm is to be installed in the cutter ladder compartment between frame 19 & 20
Transport submersible from ship’s store to cutter ladder. Fabricate a foundation, fit and install the pump as per dwg 01175-2812-520 detail A
Supply, fabricate, fit, weld a delivery pipe from this pump to the cutter head loosening pawl, installed on top of the cutter ladder frame 20-21. Pipe ND50 mm 8.0 meter length, 1 bend 45deg, 6 bends 90 degrees, 1x 3-flange type deck penetration. Connection to the cutter head loosening pawl is with a flange. Yard is to supply, install and weld a galvanized cable pipe running from the pump to the MCT entering the closed engine room space of the cutter ladder at frame 8. Pipe \( 3/4” \) x 80 meter. Yard is to install, terminate and connect a new ship’s supplied power cable from the starter box to the submersible pump.

Lump sum price :

\( \ldots / \)

**P.109. ladder, grease system upgrade.**

To do

**P.110. Hydraulic system, open / close all pipe line connections.**

This job is to open all hydraulic pipe line connections on the ship, exchange the o-rings and tight with new bolts and nuts. The connections are SAE 3000 PSI flanges.
Scope:

- Assume the hydraulic systems on board have been de-de-pressurised and locked out / tagged out by the crew. The system will be drained as much as possible.
- Assume the pipe lines are accessible, manholes are opened, and areas are clean and ventilated.
- Open / close bolted pipe brackets. Assume 5 pieces per connection.
- Open / close flange connections. Renew all the bolts, nuts and O-rings, which are owner supplied. Clean / dress-up the flanges where required, including removal of old o-ring.
- Drain, collect and dispose any remaining oil from the pipe lines.
- Including tools.
- Amount and size of connections as per list.

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<th>Bolt</th>
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<th>Amount of connections</th>
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<td></td>
<td>25</td>
</tr>
</tbody>
</table>

Lump sum.price ... /
**General remarks to P**

- All prices in P include: Transport, cranage, staging, lighting, all auxiliary means and tools, removal and refitting, all connected pipe lines, protecting covers, wedges, securing blocks and plates.
- When disconnecting hydraulic, yard is to supply and install high pressure blind flanges of SAE type or others whatever is fitted. Blind flanges on the ship’s pipes and on the removed equipment.
- All bolts are 8.8 qualities unless otherwise mentioned.
- On deck: pipes and fittings are made of bright cold drawn seamless stainless steel precision pipes (DIN 2462 Bl1&2 or EN ISO 1127). Material notation: X 5 Cr Ni Mo 1810 (AISI 316) or notation X 2 Cr Ni Mo 1810 (AISI 316 L).
- On deck: pipes are joined by means of stainless steel couplings: type: welded-on cones (24° cones), according to DIN 2354/DIN3865, material: X10 Cr Ni Mo Ti 1810.
- Pipes are fixed with “stauff” or ”Hyros” supports - heavy duty execution.
- After welding and after hot bending the pipes must be mechanically cleaned, pickled, and passivated. After manufacturing pipes are cleaned by means of cleaning plug. Pipes are blanked in the shop with plastic plugs or blind flanges. Pipes are pressure tests in the workshop (1.5 x nominal pressure).
- Pipe supports: Base plate for Hyros type supports are: on deck: fully welded stainless steel plates or angle bars, in covered spaces: galvanized steel plates or angle bars.
- Pipe supports: Cover plate for Hyros type pipe supports are: on deck: stainless steel ; with stainless steel bolts (X5Cr Ni Mo 1810 -AISI 316) in covered spaces: galv. steel
Q. Auxilaries

Q.1. Heat exchangers

Q.1.1. Overhaul plate coolers HT
Maker: PASILAC  
Type: K55 MGS - 1  
S/N:  15305  
No. of plates: 35 and 52  
Dwg 11506909-2.Pasilac ME1-ME2-ME3  
Dwg 11506895-2.Pasilac DE1-DE2

- Dismantle complete cooler on board. Disconnect / reconnection pipe connections  
- Transport complete cooler from/to workshop.  
- Disassemble/ assemble complete cooler.  
- Chemically clean and water blast all plates.  
- Remove all gaskets from plates by heating in water to 100°C  
- Glue new owner supplied gaskets to the plates according the manufacturers instruction. (Gaskets and glue owner supplied)  
- End plates of coolers to be sandblasted and pitted area’s to be repaired with Belzona. Polish the plates to smooth surface. Paint with 3 coats yard’s supply epoxy paint, back to original colour.  
- Carry out pressure test.

Lump sum:  …/cooler 35 plates  
Lump sum:  …/cooler 52 plates

Q.1.2. Overhaul plate coolers LT
Maker: Pasilac  
Type : M92 MGS  
S/N :  15301  
No. of plates : 130  
Dwg 18300729-2.Pasilac Type M92 MGS

- Dismantle complete cooler on board. Disconnect / reconnection pipe connections  
- Transport complete cooler from/to workshop.  
- Disassemble/ assemble complete cooler.  
- Chemically clean and water blast all plates.  
- Remove all gaskets from plates by heating in water to 100°C  
- Glue new owner supplied gaskets to the plates according the manufacturers instruction. (Gaskets and glue owner supplied)  
- End plate of coolers to be sandblasted and pitted area’s to be repaired with Belzona. Polish the plates to smooth surface. Paint with 3 coats yard’s supply epoxy paint, back to original colour.  
- Carry out pressure test.
Lump sum. …/cooler

**Q.1.3. Cleaning of lubricant oil heaters**

Make : NRF  
Type : AUS1500x30-2-HG-4  
Size : D108 x 3250  
Dwg : 4EC13  

- The lubricating oil heaters in the supply line to the separators is to be cleaned.  
- Heaters are pipe bundle type heat exchangers  
- Disconnect, remove the connecting piping of lubricating oil and cooling water. Note that some pipes in way need to be removed for access.  
- Disconnect, remove the heater. Transport to workshop  
- Dismantle the heater. Clean the bundle in an ultrasonic bath. Dismantled heater after cleaning to be submitted for inspection by chief engineer.  
- Re-assemble with ship’s supplied gaskets and pressure test under supervision chief engineer.  
- Repair the paint system and return to ship.  
- Re-install and reconnect.

Price per heater. …/…

**Q.1.4. Cleaning of fuel oil / lub oil heaters**

The heaters serve the separator units and are installed in the aux engine room PS on the tank top of the double bottom frames 80 – 100.

**Q.1.4.1. Cleaning of LO heater**

Make : NRF  
Type : AUS1500x30-2-HG-4  
Size : D133 x 4480 mm  
Drawing : 4EC14  

- In total five (5) heaters are installed (D-E-F-G-H).  
- Work scope as per item Q.1.3.

Price per heater. …/…

**Q.1.4.2. Cleaning of HFO / MDO heater**

Make : NRF  
Type : 139/2100_2_BEU  
Size : D139 x 2370 mm  
Drawing : NRF_3-06-2955  

- In total three (3) heaters are installed (HFO heater 1 – 2, MDO heater 3).  
- Work scope as per item Q.1.3.

Price per heater. …/…
Q.2. boilers

Q.2.1. Cleaning of exhaust boiler

Drawings:
- KONKES 21-01-1467-841 Arrangement Exhaust Gas Boiler type 62/3
- IHC 01175-2335-510 sh 1 Exhaust gas lines in funnel

Scope:
- Note that the 3 exhaust boilers are installed in the funnel with very limited access space, 01175-2335-510 pos 4.
- The inside of the exhaust boilers are to be cleaned
- Open/close top inspection covers. Open / close lower inspection covers
- Cover the exhaust inlet from the boiler side with metal 1 mm plate. Plate to be supplied by the yard. Remove after the cleaning.
- Open / close drain line at turbocharger. Supply, fit, connect a hose at the drain.
- Hose down the exhaust gas boilers with high pressure fresh water until the out-coming water at the bottom is clear. Collect, dispose of water and residue.
- Neutralize boiler with soda-ash.
- Clean up area after works.

Lump sum per exhaust gas boiler.

Q.2.2. Cleaning of auxiliary thermal oil boiler

KONKES 21-04-1495-843 Arrangement thermal oil boiler TKH1,25/50

- Unit is located in the engine room on the main deck, PS, frames 106-111.
- Disconnect/unionect oil fired burner (include. cables and pipes).
- Remove and swing cover open of the thermal oil boiler, incl. the burner. Replace the gasket, yard supply.
- Open/close the drains at the bottom side of the boiler. Connect hoses to collect and dispose off the cleaning water. Hose the inside of the boiler down with freshwater with an alkalic additive, steam clean with high pressure water jet, until all soot has been removed.
- All electric equipment in the vicinity to be well covered and protected before starting the cleaning.

Lump sum:

.../
Q.3. safety valves

The valves are located in the engine room or the auxiliary engine room.

Q.3.1. Pressure testing of thermal oil safety valve

- Assume the thermal oil system has been drained by the crew
- Erect a staging, 2x2x3m in engine room – tween deck PS
- Remove / refit insulation lagging
- Remove the safety valve ND25mm, collect and dispose off residue of thermal oil.
- Transport valve to workshop, pressure test safety valve to 10bar until safety device opens. Witnessed by chief engineer and / or Class Surveyor.
- Return and re-install the safety valve.
- Issue a test report / certificate.

Price per valve: ..../

Q.3.2. Pressure testing of starting air safety valve.

- Safety valve 1’st stage, 2 units, BSP ½”, 7 bar
- Safety valve 2’nd stage, 2 units, BSP ½”, 32 bar
- Safety valve vessel, 2 units, BSP ½”, 31 bar

- Assume the air system has been de-pressurised by the crew
- Remove the safety valve, transport valve to workshop, pressure test safety valve. Witnessed by chief engineer.
- Return and re-install the safety valve.
- Issue a test report / certificate.

Price per valve: ..../

Q.3.3. Pressure testing of control air safety valve.

- Safety valve LP side, 1 unit, BSP ¼”, 6.5 bar
- Safety valve HP side, 1 unit, BSP ¼”, 21 bar
- Safety valve vessel, 1 unit, BSP ½”, 31.5 bar

- Assume the air system has been de-pressurised by the crew
- Remove the safety valve, transport valve to workshop, pressure test safety valve. Witnessed by chief engineer.
- Return and re-install the safety valve.
- Issue a test report / certificate.

Price per valve: ..../

Q.3.4. Pressure testing of working air safety valve.

- Safety valve compressor, 1 unit, BSP ½”, 8.5 bar
- Safety valve vessel, 1 unit, BSP 1”, 10 bar

- Assume the air system has been de-pressurised by the crew
- Remove the safety valve, transport valve to workshop, pressure test safety valve. Witnessed by chief engineer.
- Return and re-install the safety valve.
- Issue a test report / certificate.

Price per valve: \[ \ldots/ \]

**Q.4. Overhaul thermal oil circulating pumps**

Make: Allweiler  
Type NTT50-250/234  
75cbm/hour – 7.5 bar – 2900rpm  
Series NTT: drawing & specification NTT pumps  
Drawing: IHC 01175-2326-520 Thermal oil pump unit

- Both units are located in the engine room on the main deck, PS, frames 103-105.
- Remove the insulation from the pump and connecting pipes
- Disconnect / reconnect the suction and delivery pipes to the pump.
- Disconnect / reconnect the coupling to the electric motor
- Transport the pump to / from workshop
- Dismantle the pump completely.
- Clean, dress up all parts.
- Box up with ships supplied spare parts.
- Re-install, align and reconnect the pump

Price per pc: \[ \ldots/ \]

**Q.100 Renewal of raw water hydrophore tanks**

Picture Q100-1, Q100-2 & Q1003

The 2 pieces raw water hydrophore tanks with capacity of 1000L are to be renewed by owner’s supplied new units.  
The vertical mounted tanks are installed in the portside auxiliary room  
Disconnect the pipes to / from the tanks: each tank 3 connections 1.5”, 1 connection 1” and one safety valve.  
Cut; remove the tanks from the foundation.  
Open / close the hatch covers to access the auxiliary engine room, remove the stair casing in way. Transport the old tanks and dispose off. Receive the owner’s new tanks and transport to the auxiliary engine room.  
Fit, install and weld the tanks on to the foundation. Connect the tanks with yard’s supplied new fittings. Install new safety valve and drain pipe to deck (1.5” x 0.5 m)  
Paint the outside of the tanks and the foundation with 3 layers ships supplied paint.

Lump sum price for 2 tanks: \[ \ldots/ \]
Q.101. Empty, flush, clean and refill thermal oil circulating system.

Diagram thermal oil

Assume that the thermal oil in the ship’s heating system is polluted by fuel contaminants and needs to be emptied, flushed, cleaned and refilled. Assume that the system is shut down and cooled by ship’s crew. The system is to be drained. Total of 9000 l of system oil is to be drained and disposed off. Assume that all fuel tanks are opened and cleaned. Drain & disposed off the thermal oil from the tank coils. In total 14 tank heating coils – assume each tank heating contains 100 ltrs of oil. Disconnect, remove the shut off valves to each tank heating coil. Open / close the drainplugs, drain and collect the oil. Remove / refit the supply and return valves fitted just outside the tank. Connect temporary hoses and blow through by dry air pressure. Collect and dispose off the sludge and residu from the system. Drain off the 3 exhaust boilers and one oil fired boiler. Disconnect, remove the shut off valves. Connect temporary hoses and blow through by dry air pressure. Collect and dispose off the sludge and residu from the system. Fill up the system by owner’s supplied new oil. Assist the crew in starting up the thermal oil system. Works to be carried out by authorized boiler & heating specialists.

Lump sum price :
Unit price to dispose of thermal oil : …/m3

Q.102. Overhaul bypass and actuation system flue gas boilers

1735100_Konus-Kessel  Closing valve exhaust boiler
8-12-96 layout exhaust boiler
21-01-1467-841_Konus-Kessel  Arrangement Exhaust Boiler type
62/3
01175-2335-510 sh 1 Exhaust gas lines in funnel
01175-2335-510 sh 2 Exhaust gas lines in engine room

The bottom closing valve and its actuation mechanism is jammed. Assume that the exhaust boiler is cleaned and the 4 inspection manholes are opened under item Q.6. The exhaust bend pipe dia 700mm dwg 01175-2335-510 sh 2 pos 21 at the inlet of the exhaust boilers is to disconnect. A staging is to be erected above the engines, under the coupling: lxbxh= 3x3x4m. The aluminium insulation sheeting and the insulation in way of the flanges is to be removed. Flanges to be disconnected and bend pipe to be lowered and shifted aside. Special attention to be paid not to damage the aluminium sheeting and insulation. Any supply and repairs of insulation and aluminium sheeting to be included. Erect a staging lxbxh = 1 x 1 x 2 m to access the inlet pipe of the exhaust boiler. Dismantle the actuation mechanism, clean, dress up all parts. Including cutting and re-welding of the actuation rod if required.
Drill, fit ship’s supplied grease nipples in the bearings actuation mechanism. 
Re-assemble all, supply and repair insulation, test system. 
All works to be done under supervision and instruction of chief engineer and B.V. 
surveyor.

Lump sum price per exhaust boiler: 

\[\text{Q.103. Repairs of refractory of auxiliary thermal oil boiler}\]

21-04-1495-843 Konus-Kessel 
Arrangement thermal oil boiler TKH1,25/50

Assume the boiler has been opened and cleaned as per item Q7.
Assume the refractor on the end cover is damaged. Break out, remove all refractory material from the end cover.
Supply, weld, renew steel anchors on the end cover.
Supply, install new refractory on the end cover: diameter 1500 and thickness as recommended by supplier refractory material.

Lump sum price: 

\[\text{Q.104. Available}\]

\[\text{Q.105. Renewal vibration dampers of exhaust lines, exhaust boilers and economisers.}\]

01175-2335-510 Exhaust gas lines
Q105 Pictures vibration dampers exhaust lines

Erect a staging under the exhaust lines in the engine room: l*w*h=12x8x6m
The vibration dampers of the exhaust lines of 2 dredge pump engines, 3 generator engines & 1 harbour generator engine are to be renewed by ship’s spares parts.
All vibration dampers dwg 01175-2335-510 pos 73 up to pos 105 are to be renewed.
Two types of vibration dampers are installed. Types as per detail 21, 13, 26, 30, 15, 4, 34, 36, 37 & 17 are to be replaced by complete new spares. Including jacking up and temporary supporting the relevant exhaust line component for access.
All other types are standard units. These rod types to be disconnected one by one, rubber elements to be replaced by ship’s spare and re-connected.

Price per standard type damper : 
Price per damper type 21 : 

\[\text{Q.106. Hydraulic system, valve blocks remove / refit}\]

Drawings:
\[\bullet\] IHC 01175-0338-30 General Arrangement drawing
Job will be done under supervision / instruction of the owner arranged hydraulic specialist, company Hydrosan.

**Scope:**
- All hydraulic distribution blocks all over the vessel to be removed/refitted and transported to/from vessel for overhaul
- Open/close pipes of the hydraulic system and temporary blinded with owner supplied flanges.
- The job involves lots of cargo handling, yard to foresee a dedicated rigging foreman to coordinate the crane, forklift and riggers.
- Assume no dedicated staging or access is required to reach the valve blocks.
- Job including rigging and tools, yard crane, forklift, permits, transport, administration, etc.

**Scope main valve blocks**
- These valve blocks will be overhauled at the hydraulic workshop of Hydrosan in the Netherlands.
- In total 20 pieces large valve blocks (80 ~ 200 kg are involved:
  - 13 pieces (M1 to M13) valve blocks in the main hydraulic unit in the hydraulic room, numbered 1 until 12 + nr 37 on drawing IHC_01175-2083-560.
    - Remove / refit insulation and weld pad eyes above the valve blocks on the main hydraulic unit in order to rig the valve blocks to the floor.
    - After hot work, paint system to be repaired by power tooling to ST3 and 3 layers of owner supplied paint.
    - Blocks can be moved out by pallet trolley. Yard crane access trough the hatch from SB alleyway to upper deck.
  - 1 pc block nr. M14 (spec. 29 / IHC 01175-2083-510) from the workshop II.
  - 2 pc blocks nr. M15 and M16 (spec. 15 & 16 / IHC 01175-2083-500) from the auxiliary spud superstructure on fore ship. Rig in/out with chain blocks trough the WT door that leads to upper deck.
  - 2 pieces valve blocks nr. M17 and M18 (spec.15 & 16 / IHC 01175-2083-500) from inside section 1A of the spud carrier. Rig in/out with chain blocks trough the door that leads to upper deck.
  - 1 pc block nr. M19 (spec 63 / IHC 01175-2083-500) on SB dredge anchor hoisting winch on upper deck
  - 1 pc block nr. M20 (spec 63 / IHC 01175-2083-500) on PS dredge anchor hoisting winch on upper deck
- All blocks to be stuffed/unstuffed into dedicated owner supplied wooden boxes and loaded on Owner’s arranged truck. Boxes will be numbered as per the valve blocks.
- Block M1 = 760 x 650 x 380 mm – 200 kg
- Block M2 = 390 x 270 x 360 mm – 100 kg
- Block M3 = 770 x 640 x 440 mm – 200 kg
- Block M4 = 1430 x 640 x 440 mm – 300 kg
- Block M5 = 370 x 240 x 270 mm – 100 kg
- Block M6 = 390 x 170 x 300 mm – 80 kg
- Block M7 = 390 x 170 x 300 mm – 80 kg
- Block M8 = 1310 x 670 x 440 mm – 300 kg
- Block M9 = 790 x 640 x 400 mm – 200 kg
- Block M10 = 410 x 250 x 350 mm – 150 kg
- Block M11 = 760 x 650 x 440 mm – 200 kg
- Block M12 = 260 x 160 x 300 mm – 80 kg
- Block M13 (Spec 37) = 560 x 280 x 390 mm – 150 kg
- Block M14 (Spec.29) = 600 x 470 x 380 mm – 200 kg
- Block M15 (Spec.15) = 1190 x 470 x 670 mm – 300 kg
- Block M16 (Spec.16) = 290 x 280 x 280 mm – 100 kg
- Block M17 (Spec.15) = 1190 x 470 x 670 mm – 300 kg
- Block M18 (Spec.16) = 290 x 280 x 280 mm – 100 kg
- Block M19 (Spec.63) = 490 x 550 x 250 mm – 100 kg
- Block M20 (Spec 63) = 490 x 550 x 250 mm – 100 kg

Scope auxiliary valve blocks
- These valves will be overhauled at the mobile workshop of Hydrosan at the yard’s premises.
- In total 25 pc smaller hydraulic valve blocks are involved on several locations on deck and in several machinery and storage spaces on the vessel. Assume blocks are each about 20 kg each, 400 x 400 x 400 mm. Blocks to be rigged in / out of the vessel and transported to / from owner’s subcontractor mobile workshop on the yard’s premises.

  - block 13 anchor hoisting winch right
  - block 14 barge mooring winch right fore & buffer installation
  - block 16 anchor hoisting winch left
  - block 17 barge mooring winch left fore & buffer installation
  - block 19 hull inlet low sluice valve
  - block 19A hull inlet high sluice valve
  - block 20 water inlet sluice valve in by-pass
  - block 20A by-pass line sluice valve
  - block 22 distribution sluice valve right fore
  - block 23 anchor boom hauling winch right
  - block 24 discharge sluice valve to shore
  - block 28 distribution sluice valve left fore
  - block 29 anchor boom hauling winch left
  - Spec. 7 spud carrier cylinder
  - Spec. 17 spud clamp cylinders (4 pc.)
  - Spec. 28 barge mooring winches & aft winch (3 pc.)
  - Spec. 37 anchor boom hauling winch right & left (1 pc.)
  - Spec. 62 anchor hoisting winch right & left (2 pc.)
  - Spec. 100 barge loading valves left
  - Spec. 101 barge loading valves right
- Spec. 102 gantry cylinders left
- Spec. 104 gantry cylinders left (2 pc.)
- Spec. 105 gantry cylinders right
- Spec. 107 gantry cylinders right (2 pc.)
- Spec. 108,109,111 & 112 loading barge winch left
- Spec. 110 loading barge winches
- Spec. 113,114,116 & 117 loading barge winch right
- Spec. 115 loading barge winches
- Spec. 131 spud carrier cylinder
- OMF 438 windlass port and starboard (2 pc.)
- 711170 hatch cylinder
- 721266 hatch cylinders starboard (2 pc.)

- Each block will be dismantled by HYDROSAN and completely blinded off for blasting and painting. Yard to transport the prepared blocks from/to mobile workshop and Yard’s area for blasting & painting. Blocks to be grit blasted to Sa 2 1/2 and painted with 1 layer of shop primer (Yard supply).

Lump sum price :. … /
R. WINCHES

R.1. Side wire winches
The vessel is equipped with two (2) side wire winch arrangements which are located on the crane deck level, frames 40 till 50 and can be reached with a yard crane directly. The winches are powered by an electro motor.

Drawings:
- VDGIES 84006-2-01 Fore Side winch
- VDGIES 84006-2-02 CROSS-SECTION OF SIDE WINCH

R.1.1 Change seals on ingoing shafts gearboxes of side wire winches PS and SB

Drawings:
- JAHNEL 1-0-208-539 side winch drive
- JAHNEL 1-1-208-540X Assembly
- JAHNEL 208565 Parts list side winch drive
- AVD 136-3-8554. HOLSET NR B275 WITH DRUM DIA 630X236
- AVD 061-4-8557 HOLSET NRB 2.75 WITH DRUM Ø630 X 236
- VDGIES 84006-2-02 CROSS-SECTION OF SIDE WINCH

Gearbox:
- Type : CSN 800
- P=485 KW
- I = 49,7
- Weight : 12000 kg

- Drain / Refill the gearbox and temporarily store the oil in a clean mobile tank. (660 ltr)
- Assume the electric motor is removed under item S7.
- Remove / reinstall shoe brake.
- Remove brake drum from ingoing shaft gearbox. Dismantle, brake assy.
- Clean all parts and dress up shaft
- Remove / refit seal housing and renew seal on ingoing shaft of gearbox.
- Reassemble everything with new ship’s supplied wear parts, fill up gearbox with oil.

Lumpsum for 1 gear box.

R.1.2. Side wire winch Renewal of Drum Bushes and Shaft

Drawings:
- VDGIES 84006.2-01A : Fore Side Winch
- VDGIES 84006.2-02C : Parts Drawing
- VDGIES 84006.2-09DJ : Shaft
- VDGIES 84006.2-09DJ : Drum
- VDGIES 84006.2-08EJ : Bushes and Ring
Scope:
- Remove / refit the bearing caps at both sides of the winch drum.
- Supply, fit, weld and NDT temporary lifting lugs. Remove and grind afterwards.
- Lift the drum a few cm and temporary support it, to free the main shaft from any load, and to able to remove the bronze bushings. In case Yard decides to land the drum ashore, transport to and from shore, and removal of the wire should be included.
- Degrease shaft and drum.
- Remove the main shaft.
- Remove the bronze bushings at both sides of the winch drum
- Machine the Owner’s supplied bushes to the correct diameter of the main shaft.
- Fit the bronze bushings using liquid nitrogen.
- Fit the shaft.
- Assume vessel’s deck crane cannot be used for the lifting operations.

Lump sum: .../total

R.1.3 Overhaul PS/SB gearbox of side wire winches

Drawings:
- 1.0.208 539C.JaKe  Dimension Drawing Side winch
- 1.1.208 540X JaKe  Parts Drawing
- 208 565X JaKe      Partslst
- 136.3.8554.AVD     Arrangement Drawing
- 84006.2-02C.       Parts Drawing

Scope:
- Drain / Refill the gearbox and temporarily store the oil in a clean mobile tank. (660 ltr)
- Disconnect / connect all grease pipes from automatic greasing unit.
- Remove / Reinstall protective cover from over the drive pinion.
- Remove / Reinstall protection cover above the gearbox and motor.
- Disconnect / connect Brake drum from flexible coupling by loosening 12 pcs bolt M16. Clean and dress up bolts and bolt holes in both flanges.
- Remove / Reinstall bearing support pos. 10 drw. 84006.2-02C from outgoing shaft. Measure up height of bearing support and reinstall with same filling blocks and shims. Clean and dress up fitting bolts, bearing support and foundation for bearing support.
- Disconnect / connect all bearing covers pos. 16, 17, 18, 19, 20 and 21.
- Measure up the clearances of all bearings in the bearing housings.
- Remove / Reinstall upper casing of gearbox.
- Remove / Reinstall Outgoing shaft pos. 11 complete with bearings, gear and pinion gear. Take to / from Workshop from / to Ship.
- Remove / Reinstall Intermediate shafts pos. 7 and pos. 9. Complete with bearings and gears. Take to / from Workshop from / to Ship.
- Remove / Reinstall ingoing shaft pos. 5 complete with bearing and brake drum. Take to / from Workshop from /to Ship.
- In the workshop, remove all bearings, gears, sleeves and brake drum from the shafts.
- Clean, dress up all parts, make measuring report.
- Magnaflux test the gears and the shafts in way of key ways and teeth.
- Skim and dynamically balance the brake drum.
- Clean the inside of the gearbox.
- Clean and dress up the flange faces of the gearbox casing parts.
- Assemble the Upper gearbox casing to the lower with all bolts pre-stressed according manufacturers specifications.
- Align the gearbox parts using the existing bearing bore.
- Measure up all bearing bores.
- Remove again the Upper gearbox casing.
- Reassemble all shafts and gears with owner supplied new bearings and seals.
- Reinstall the shafts in the gearbox, install support bearing using same filling blocks, and close the gearbox.
- Touch up the epoxy coating of the gearbox (SIGMA CM coating), incl. scraping and degreasing - paint of Owner’s supply.
- Test run the gearbox with load and check the contact of the teeth inside the gearbox.

Lumpsum for 1 gear box: ..../

R.1.4. Adjustment height of support bearing side winch
VDGIES 84006.2-02C : Parts Drawing

- After renewing the bearings of the winch drum, the gearbox, or the support bearing, the contact between the teeth of the drive pinion and the drum gear have to be checked and adjusted when necessary by lifting or lowering the support bearing. This to be checked when at least 50% of load is applied to the winch.
- Erect a staging (lxbxh = 4x1x3m)
- Remove / refit the gearwheel
- Loosen up the 2 holding down / fitting bolts of the support bearing.
- Degrease the gears of the winch drum & pinion drive. Blue fitting of the gears
- Adjust the height of the support bearing by adding or removing shims between the chocks and the support bearing pedestal, or if no shims can be removed by skimming the chocks first and then adding shims.
- When correct height is obtained, measure up the chocks + shims and fabricate new chocks to correct height.

Lump sum for 1 support bearing. ..../

Additional price for removal chocks, send to/from workshop and skim the bottom side
Price per piece: ..../
R.1.5. Renew the lining side winch brakes
VDGIES 84006 2 -02 Fore side winch
GALVI 0000-0000 Brake N630

- Dismantle the brake. Remove the brake clamps with arms and connection parts. Transport all to the workshop. Clean, dress up all parts
- Renew the brake linings by ship’s spare. Drill out the screws. Clean, dress up the brake housings. Fit the new brake linings.
- Return & re-assemble the brake. Adjust clearance and test.

Price per brake. ...

R.2. Ladder winches

The vessel is equipped with two (2) ladder hoist winch arrangements which are located in the PS and SB propulsion rooms, frames 24 till 40. The winches are powered by an electro motor.

Drawings:
- VDGIES 84006.1-01A : Ladder winch
- VDGIES 84006.1-02C : Cross section of ladder winch
- VDGIES 84006.1-09DJ : Shaft
- VDGIES 84006.1-09DJ : Drum
- VDGIES 84006.1-08EJ : Bushes and Ring

R.2.1. In situ renewal of drum bushes Ladder winch

- Ladder winches are fitted under deck in PS and SB propulsion rooms.
- Wire will remain on winch drum.
- Remove/refit protection cover over the open gears of the winch drum.
- Remove/refit grease connections to drum bearings
- Remove / refit the bearing caps at both sides of the winch drum.
- Some lifting lugs are already fitted above the winch drum. If the yard requires more lifting lugs, the supply, fit, weld and painting is to be included.
- Remove / refit black water pipe in way, including cutting and re-welding: pipe D125x3000mm
- Lift the drum approximately 30 cm (Weight approx. 25 ton inclusive of wire) up to access and to remove the bronze bushings from the drum. Cut / reweld 2 sections of 500x400 out of the web frames under deck to allow for extra lifting height.
- Clean, degrease, dress up the shaft and drum bushes.
- Remove the bronze bushings at both sides of the winch drum. Assume to be cut or pushed out with jacks. Size bushes OD460/ID350 x 335/290mm
- Shaft to be pushed alternately to the left and right side of the drum while changing resp. right and left bush.
- Machine the Owner’s supplied new oversize (ID & OD) bronze bushes to the correct diameter of the main shaft.
- Shrink fit the bronze bushings in the drum using liquid nitrogen.

Lump sum per winch: .../ winch
R.2.2. Removal / renewal of drum shaft Ladder winch

- Assume the drum is disconnect and lifted up as per item R2.1.
- Remove / reinstall the main shaft from the drum. (Length 3.5m, dia 400mm)
- Remove / reinstall hydraulic pipes i.w.o. access opening in hull. (1 x dia 70mm, 2 x dia 32mm, 2 x dia 38mm, 1 x dia 60mm, 1 x dia 70mm, All length approx 4m, pipe nr. 1 with dresser couplings, pipes nr. 2 with Ermeto, rest with flanges)
- Cut and re-weld access opening in ships outside hull. This can only be carried out in dry-dock as the location is below the waterline.
- Transport the shaft to/from workshop and put a lathe.
- Clean, dress up shaft
- Measure straightness and diameters. Make a report.
- Skim the shaft i.w.o. bronze bushes (assume 2 area’s of 500mm long, dia 500, skimming 1 mm on radius)

Price per shaft. .... / shaft

R.2.3. Skimming of drum shaft Ladder winch

- Assume the drum shaft is in the workshop
- Skim the shaft i.w.o. bronze bushes (assume 2 area’s of 500mm long, dia 500, skimming 1 mm on radius)

Price per shaft. .... / shaft

R.2.4. Adjustment height of support bearing ladder winch

- After renewing the bearings of the winch drum, the gearbox, or the support bearing, the contact between the teeth of the drive pinion and the drum gear have to be checked and adjusted when necessary by lifting or lowering the support bearing. This to be checked when at least 50% of load is applied to the winch.
- Erect a staging (lxbxh = 4x1x3m)
- Remove / refit the gearwheel
- Loosen up the 2 holding down / fitting bolts of the support bearing.
- Degrease the gears of the winch drum & pinion drive. Blue fitting of the gears
- Adjust the height of the support bearing by adding or removing shims between the chocks and the support bearing pedestal, or if no shims can be removed by skimming the chocks first and then adding shims.
- When correct height is obtained, measure up the chocks + shims and fabricate new chocks to correct height.

Lump sum for 1 support bearing. ..../

Additional price for removal chocks, send to/from workshop and skim the bottom side
Price per piece: ..../
R.3. Dredge anchor hoisting winches

The vessel is equipped with in total two (2) dredge anchor hoisting winches, located on the upper deck PS & SB, frames 12 till 17.

DMN 11-04-11 Anchor winch 60 ton
DMN 11-04-50 Arrangement brake 30 ton

R.3.1. Renew the brake lining dredge anchor hoisting winch

DMN 11-04-11 Anchor winch 60 ton
DMN 11-04-50 Arrangement brake 30 ton

- Disconnect, remove the brake clamps. Transport to the workshop.
- Renew the brake lining by ship’s spare. Including drilling out old screws and dressing up holes and hinges. Clean, dress up brake housings and parts.
- De-rust the brake clamps to ST3 and paint with 3 layers ship’s supplied paint
- Return & re-install the brake. Adjust the clearance and test the brake

Price per brake: …/ 

R.3.2. Renew the guard gearwheel dredge anchor hoisting winch

DMN 11-04-11 Anchor winch 60 ton

- Renew the gearwheel guard dwg 11.04.11 pos 47.
- Erect a staging.
- Remove the old guard, transport to workshop. Fabricate a new guard as per sample. Diameter 2800, width 230, height 100. Thickness 6 mm.
- Grit blast the new guard to SA 2 ½ and paint with 3 layers ship’s supplied paint.
- Install the new guard on the winch.

Price per winch. …./

R.3.3. Hydraulic motor dredge anchor hoisting winches

R.3.3.1 Renew hydraulic motor

DMN 11-04-11 Anchor winch 60 ton

- Erect a staging
- Disconnect, remove the two connecting hydraulic pipes to the motor. Blank off.
- Disconnect, remove the hydraulic motor and transport to the workshop.
- Re-install the reconditioned motor or ship’s supplied new unit. Reconnect the hydraulic piping.

Price per motor: …./
R.3.3.2. Renew shaft seals hydraulic motor

- Assume motor is in the workshop
- Clean, dress up the unit, the connections and shaft. Renew the output shaft seal by ship’s spare.
- De-rust the motor to ST3 and paint with 3 layers of ship’s supplied paint
- Return the motor to ship

Price per motor: ...

R.4. Dredge anchor boom hauling winches

The vessel is equipped with in total two (2) dredge anchor boom hauling winches, located on the crane deck PS & SB, frames 43 till 46.

<table>
<thead>
<tr>
<th>DMN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-03-81</td>
<td>Arrangement anchor hauling winches 10 ton</td>
</tr>
<tr>
<td>11-03-89-1</td>
<td>Arrangement pneumatic brake anchor hauling winch</td>
</tr>
</tbody>
</table>

R.4.1. Renew the brake lining anchor boom hauling winch

- Disconnect, remove the brake clamps. Transport to the workshop.
- Renew the brake lining by ship’s spare. Including drilling out old screws and dressing up holes and hinges. Clean, dress up brake housings and parts.
- De-rust the brake clamps to ST3 and paint with 3 layers ship’s supplied paint
- Return & re-install the brake. Adjust the clearance and test the brake

Price per brake. ...

R.4.2. Renew the guard gearwheel anchor boom hauling winch

<table>
<thead>
<tr>
<th>DMN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-03-81</td>
<td>Arrangement anchor hauling winches 10 ton</td>
</tr>
</tbody>
</table>

- Renew the gearwheel guard dwg 11.03 81
- Erect a staging.
- Remove the old guard, transport to workshop. Fabricate a new guard as per sample. Diameter 1000, width 140, height 50. Thickness 8 mm.
- Grit blast the new guard to SA 2 ½ and paint with 3 layers ship’s supplied paint.
- Install the new guard on the winch.

Price per winch. ...

R.5. Barge loading pipe hoisting winches

The vessel is equipped with in total two (2) barge loading pipe hoisting winches, located on the crane deck PS & SB, frames 48 till 52.

<table>
<thead>
<tr>
<th>DMN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>73116-1400</td>
<td>Arrangement 2 x 20 tons winch</td>
</tr>
</tbody>
</table>
R.5.1. Renew the guard gearwheel barge loading pipe hoisting winches
DMN 73116-1400 Arrangement 2 x 20 tons winch

- Renew the gearwheel guard dwg 73116-1400 pos 29
- Erect a staging.
- Remove the old guard, transport to workshop. Fabricate a new guard as per sample. Diameter 2300, width 170, height 95 & thickness 6 mm.
- Grit blast the new guard to SA 2 ½ and paint with 3 layers ship’s supplied paint.
- Install the new guard on the winch.

Price per winch. ...

R.6. Barge mooring winches and swell compensator
The vessel is equipped with in total four (4) barge mooring winches and four (4) swell compensator units, located on the upper deck PS & SB. The winches are in way of frames 25 – 28 and 118 – 121, the swell compensator units in way of frames 40 and 110.

IHC 5474854 arrangement barge mooring system
IHC 5474889 Arrangement sheave box for swell compensator

R.6.2. Overhaul Swell compensator barge mooring system,
IHC 5474854 arrangement barge mooring system
IHC 5474889 Arrangement sheave box for swell compensator
81.6308 Swell compensator plunger cylinder

Assume the wire is reeled on the winch by ship’s crew.
Remove / refit the support of the swell compensator.
Remove / refit the hydraulic pipe. Supply and install blank flanges. Remove / refit the limit switches and cables.
Disconnect, remove swell compensator completely. Transport to the workshop.
Remove, dismantle the sheave box. Measure sheaves bore and shaft
Dismantle the swell compensator cylinder.
Clean, dress up all parts. Measure the cylinder rod, check straightness on lathe
Make a report.
Re-assemble the cylinder with owner’s supplied new seals and if required new rod.
Pressure test and carry out a function test in the workshop.
Re-assemble the sheave box and reconnect on the rod.
Repair the paint system by grinding to ST3 and painting 3 layers ship’s supplied paint.
Return and re-install the swell compensator.

Price per swell compensator: ...

R.6.3. Reconditioning wire tensioning system barge loading winch SB & PS
LD 09-00-015 Wire tensioning system barge loading winches
LD 09-00-016 Support with shaft

- The wire tensioning systems fitted on the crane deck SB & PS at frame 60 are to be overhauled.
- Assume that the barge hoisting winch wires are removed.
- Crop off the stopper plates LD 09-00-016 pos 1. In total 4 x 2 pieces.
- Remove / refit the filling pieces pos 8.
- Remove the 4 shafts LD 09-00-016 pos 3.
- Lift out and remove the moveable part of the tensioning system LD 09-00-015 pos 7. Transport to the workshop.
- Clean, dress up all parts of the moveable part and the deck foundation. Grit blast the moveable part to SA 2 ½. Derust the foundation and deck plating in way of the tensioning device to ST3.
- Paint all with 3 layers ship’s supplied paint.
- Return and refit the tensioning device. Supply, fit and weld 8 stopper plates pos 1. Repair the paint system in way.

Lump sum price for the SB & PS tensioning system: …/.
Additional price to supply, fabricate and renew shaft LD 09-00-016 pos 3: …/.

R.7 Ships anchor windlasses
The vessel is equipped with in total two (2) windlasses, located on the forecastle deck PS & SB, frames 130 – 133.

19.926 Anchor windlass ALS54
19.971 Anchor windlass

R.7.1. Renew the brake lining anchor windlass
19.926 Anchor windlass ALS54
19.971 Anchor windlass

- Disconnect, remove the brake clamps. Transport to the workshop.
- Renew the brake lining by ship’s spare. Including drilling out old screws and dressing up holes and hinges. Clean, dress up brake housings and parts.
- De-rust the brake clamps to ST3 and paint with 3 layers ship’s supplied paint.
- Return & re-install the brake. Adjust the clearance and test the brake.

Price per brake: …/.

R.7.2. Skimming of brake wheel anchor windlass
19.926 Anchor windlass ALS54
19.971 Anchor windlass

- Assume the brake clamps are removed under item R6.1.
- Open up; remove the top part of the gearbox. Disconnect the bearing covers.
- Lift out the shaft with the fitted gear-, chain- and brake wheel. Transport to workshop.
- Clean, dress up shaft and parts.
• Skim the outer diameter of the brake wheel until smooth surface.
• Return and re-assemble.

Price per windlass: …/

R.101. Repairs shaft supports ladder winch shafts
84006.1-01A : Ladder winch
84006.1-02C : Cross section of ladder winch
84006.1-03 I : Foundation ladder winch
84006.1-03 III : Shaft supports ladder winch

Assume the winch drum has been hoisting up and winch shaft is removed as per items R2.1 & R2.2
Assume that the inside diameter of the bores of the 2/2 part shaft supports as per detail drawing 84006.1-03-III are damaged and worn 6 mm on diameter.
Yard is to locate and mark the existing centreline
Build up the worn bore to size. Bore diameter 250 mm x 100mm wide. Including electrical heating equipment to preheat, monitor and maintain temperature of 150 degrees during the welding.
In situ machining of the bore to nominal size of 250H7 as per drawing. Special attention to be paid to the alignment of the two bores to each other and the reference of the centre line.

Lump sum price per winch / 2 bores : …/

R.102. Overhaul and add greasing points to sheaves hoisting system cutter head maintenance platform.
100-001 Arrangement hoisting and sea fastening cutter platform
100-004 Suspension hoisting sheave

Assume the hoisting sheave is disconnected from the cutter platform
A hanging staging is to be erected under the fixed and suspended hoisting sheaves and SB & PS: 2 x l*w = 2x3m
The hoisting wire is to be disconnected and reeled on the winch using ship’s system.
The suspended hoisting sheaves are to be disconnected and transported to the workshop. The two hoisting sheaves to be dismantled. All parts to be cleaned and dressed up. A greasing hole and groove is to be machined in the shaft. Ship’s supplied grease nipple to be installed and the inner side. RE-assemble sheave, return and re-install.
The fixed sheave drawing 100-04 section A-A is to be dismantled and removed. All parts to be cleaned and dressed up. A greasing hole and groove is to be machined in the shaft. Sheave to be re-assembled. Yard is to supply, fit and install an 8mm stainless steel grease line from the grease connection to the deck of the cutter ladder gantry. Length grease line : 2.0m. A ship’s supplied grease nipple to be installed at the other end of the grease line.
Damage paint system to be repaired by wire brushing to ST3 and 3 layers of paint.

Lump sum price for 2 suspended and 2 fixed sheaves : …/
R.103. Drilling holes in shafts wire drums ladder winches
84006.1-01A : Ladder winch

Assume the winch drum has been hoisting up and winch shaft is removed as per items R2.1 & R2.2 and transport to the workshop
The yard is to machine a hole in the shaft, perpendicular to the shaft centre.
Size hole at NDE: d8mm, 275mm depth & M10x30mm
Size hole at DE: d245mm & M10x30mm
The crew will install a PT100

Price per shaft:

R.104. In situ drilling holes in shafts wire drums of side wire winches
84006.2-01A : Fore Side Winch

Erect a staging at both ends of the side wire winch shafts
The crew will remove the existing PT100 fitted in the shaft. Existing holes of the PT100 is 8mm x 45mm depth.
The yard is to machine the existing holes deeper in the shaft, perpendicular to the shaft centre. Works done in situ.
Size hole at NDE: d8mm, 275mm depth & M10x30mm
Size hole at DE: d245mm & M10x30mm

Price per winch:

R.105. hydraulic motors overhaul

The hydraulic motors are radial piston motors.
- Brand: Vickers
- Type: Staffa B200 S / HMC 200 S-188-130-SO 4x30
- Weight: 290 kg.
- Dimensions: 0.5 x 0.5 x 0.75 m.

Scope dismounting / mounting:
- Assume all spare parts are owner supplied.
- Assume the hydraulic system has been de-pressurised and locked / tagged –out by the crew.
- Assume the winches are locked and available for maintenance.
- Remove / refit the hydraulic motors from the winches.
- Blind-off and label properly the hydraulic pipe lines (supply, retour and leak line), the hydraulic motors and the motor seating on the winches. Connections are SAE 3000 PSI. Open / close pipe brackets. Conserve the motor seating on the winches with grease / grease tape.
- Assume the spare hydro motors are stored in the aux engine room, directly accessible for a yard crane via the hatch on upper deck, frame 78 ~ 82. Assume the PS life boat has been removed. Hoist in / out.
- Perform coating tough-up after mounting back the hydro motors and the hydraulic pipes.
• Including all means required, like permits, hoisting gear, tools, grease tape, etc.

Scope for overhaul at yard arranged local workshop:
• Transport between ship and workshop, back and forth. Fabricate sturdy transport cases if not available at the yard.
• Assume one owner arranged service engineer will supervise the overhauls at the workshop.
• Overhaul
  o Dismantle motor, clean all parts and inspect visually
  o Renewal of all seals and both bearings (Owner’s supply)
  o Polish crankshaft (contact surface of piston connecting rods and shaft seal)
  o Measure tolerance between pistons and housing and report to Owner.
  o Lapping of the shaft (running face area of pistons)
  o Assemble motor and check bearing clearance, adjust shims if required.
  o Blasting and painting of the housing
  o If noticed after dismantling or measurements that other parts need to be replaced, owner to be notified
• Testing
  o No static testing is allowed: only dynamic testing with load on the shaft and oil flow through the motor can be accepted.
  o Connect shafts HMB/HMC motor to bigger motor with adjustable flow
  o Install torque meter between motors to be able to measure the torque in function of flow and pressure.
  o Ballast the shafts of HMB/HMC by choking the bigger motor.
  o Determine the efficiency of the motor, record the necessary testing graphs and report to Owner.
  o Testing to be done in a Kawasaki authorised workshop
• Including all means required, like gate passes, reporting, etc.

Scope for owner arranged workshop abroad.
• If no local workshop is available, owners will arrange a workshop abroad. Yard to prepare the motors for overseas transport. Evidentially price to be excluding the workshop job.
• Fabricate sturdy transport cases in wood and sea fasten the hydraulic motors in the cases, splash water tight.
• Transport between ship and container, back and forth. Assume owner arranged sea-freight 20 feet container dry box model is delivered at the yard.
• Sea fasten / un sea fasten the cases in the container.
• Perform coating tough-up after mounting back the hydro motors and the hydraulic pipes.
• Including all means required, like sea fasten consumables, permits, hoisting gear, tools, grease tape, etc.

R.105.a hydraulic motors overhaul, barge mooring winches PS & SB (4 winches)

Drawings:
• DMN 11-03-91 barge mooring winches 28 ton
2 motors per winch on 4 winches, or 8 motors in total.

Lump sum for overhaul at yard arranged local workshop .../
Lump sum for overhaul at owners arranged overseas workshop .../

**R.105.b hydraulic motors overhaul, barge loading pipe hoisting winches PS & SB**

Drawings:
- DMN 73116 - 1400 arrangement barge loading winches 2 x 20 ton

2 motors per winch on 2 winches, or 4 motors in total.

Lump sum for overhaul at yard arranged local workshop .../
Lump sum for overhaul at owners arranged overseas workshop .../

Prior fitting back the pipes and hydro motors, job “R.107. Barge loading pipe hoisting winches remove / refit” to be completed.

**R.105.c hydraulic motors overhaul, dredge anchor hoisting winches PS & SB**

Drawings:
- DMN 11-04-11 arrangement anchor hoisting winch 60 ton

4 motors per winch on 2 winches, or 8 motors in total

Lump sum for overhaul at yard arranged local workshop .../
Lump sum for overhaul at owners arranged overseas workshop .../

**R.105.d hydraulic motors overhaul, dredge anchor boom hauling winches PS & SB**

Drawings:
- DMN 11-03-81 arrangement anchor boom hauling winches 10 ton

1 motor per winch on 2 winches, or 2 motors in total

Lump sum for overhaul at yard arranged local workshop .../
Lump sum for overhaul at owners arranged overseas workshop .../

**R.105.e hydraulic motors overhaul, anchor windlass PS & SB**

Drawings:
- BRUSELLE 19926 Anchor windlass ALS54

2 motor per winch on 2 winches, or 4 motors in total

Lump sum for overhaul at yard arranged local workshop .../
Lump sum for overhaul at owners arranged overseas workshop .../
R.106. barge mooring system fairleads overhaul

Drawings:
- ACTA 11166A  Fairlead for barge mooring system
- ACTA 56470 (5 pages)  part list of fairlead for barge mooring system
- 5474854 (2 pages)  Arrangement Barge mooring system

Scope:
- Assume that the fairlead has been removed from it’s foundation according specification G.210.
- Transport the fairlead to/from the workshop
- Dismantle fairlead, clean and dress up all parts, make a measurement report.
- Assemble the fairlead with owner supplied spares.
- Repair the paint system by power tooling to ST3 and paint with 3 layers of owner supplied paint.

Price per fairlead: .../

R.107. Barge loading pipe hoisting winch, remove / refit & foundation overhaul

Drawings:
- DMN 73116-1400  Arrangement 2 x 20 tons winch
- LD 11-00-081  foundation winch 2 x 20 ton

Job to be done in conjunction with U.108. “Barge loading arm piece, overhaul hinges”. Two (2) winches are to be done.

R.107.1. remove / refit winch
- Assume the steel cable has been removed according specs U.6.3.
- Assume the hydraulic motors and adjoining pipe lines are removed according specs R.105.b.
- Inclusive blinding of the hydraulic pipe lines.
- Cut all bolts, fit with new owner supplied bolts (M30) and nuts.
- Hoist off / on the winch (5.5 ton). Transport between ship and yard grit blast area / yard workshop.
- Supply / install reinforced packing 3 mm (KLINGERIT, or equivalent) for the foundation
- Renew the coating of the area according specs F.5.

Lump sum price: .../ winch

R.107.2. renewal of the foundation, ship side
- Cut existing, fabricate and weld a new oversized foundation:
  - Allow oversize (as per Yard’s standards)
  - Allow an oversize on height (30 mm as per LD 11-00-081).
- Transport to/from vessel/workshop, fit the deck-welding-bevel of the foundation to the deck-shape on board and presented welding preparation to the Owner.
- Final machining (in workshop)
  - Drill 14 pc bolt hole Ø30mm as indicated on the drawing and 12 pc extra in between.
  - Machining of the flange thickness: milling in 1 operation to eliminate all distortion from bevelling and welding – final thickness may not be less than 20mm.
- Grit blast the foundation on the ship and the foundation of the winches to SA 2.5 according specs E.8., assume 3 m³ per location.
- Transport to the vessel and welding (full penetration) to the deck.
- Burned area’s coating preparation by power tooling to ST3 and coating with 3 layers of Owner’s supplied paint (weather deck and spaces below).

Lump sum price: … / foundation

**R.107.3. renewal of the foundation, winch side**

- Cut existing, fabricate new and weld foundation plate and stiffeners (Grade A). Plate with sufficient oversize thickness.
- Drill 14 pc bolt hole Ø30mm as indicated on the drawing and 12 pc extra in between. Use same pattern as deck foundation of R.107.2.
- Machining of the flange thickness: milling in 1 operation to eliminate all distortion from bevelling and welding – final thickness may not be less than 20mm.

Lump sum price: … / foundation

**R.108. Barge loading pipe hoisting winch, overhaul**

**Drawings:**
- DMN 73116-1400 Arrangement 2 x 20 tons winch

**Scope:**
- Assume all spares owner supplied.
- Assume the winch is available at the yards workshop and the hydraulic motors and adjoining pipe lines are removed according specs R.105.b.
- Loosen, remove / refit pinion cover (pos 1), hydro motor cover (pos 13). Dive out / in pinion shaft (pos 11) with bearings (pos 5).
- Loosen, remove / refit drum bearing covers (pos 20, 27), hoist out / in the drum shaft with drum.
- Renew all bearings, simmer rings, bolts and nuts.
- Clean, dress up all the parts. Blow through lubrication channel (pos 8).
- Measure wear of wire groove on drum, pinion, issue a report.
- Sandblast to SA 2.5 according specs E.8. and coat according specs F.9.
- Including all tools and equipment, etc.

Lump sum price: … / winch
R.109. Overhaul ladder winch gear box

R.110. Renewal of ladder winch drum tooth rack
S. ELECTRIC INSTALLATION

S.1. Overhaul of E-motors, (pumps, hydraulics,…)

The E-motor is installed in engine room, hydraulic room or pump room
Disconnect power cables to the motor
Disconnect & remove the coupling
Remove the foundation bolts, remove the E-motor, transport to the workshop
Dismantle the motor, clean, steam wash rotor & stator with suitable electrical solvent.
Dry in temperature controlled oven. Afterwards dipped varnishing and curing in oven.
Tidy up excess varnish. Apply 1 coat of insulation paint.
Dynamic balancing of the rotor - make protocol
Re-assemble the motor with new bearings, ship’s supply
Carry out static tests : winding insulation, winding resistance, surge comparison
Set up and carry out a spinning test under load in the workshop – make protocol
Re-paint the motor exterior with one layer paint.
Return the motor to ship, re-install and reconnect. Carry out running test.

Price per motor for the following motor power ranges

- Below 10 kW
- Between 10 – 20 kW
- Between 21 – 30 kW
- Between 31 - 40 kW
- Between 41 – 50 kW
- Between 51 – 60 kW
- Between 71 – 80 kW
- Between 81 – 90 kW
- Between 91 – 100 kW

Additional price for machining a worn out bearing housing, supplying and installing a sleeve. Including detailed report

- Bore 60-100
- Bore 100-150
- Bore 150-200

S.2. Overhaul of E-motor ventilation fans

- Open-up access cover or door to the ventilation room
- Disconnect power cables to the fan
- Disconnect fan from the ventilation trunk, remove out of the ventilation room if possible.
- Remove the fan wheel, remove the E-motor
- De-rust the fan housing and connecting ventilation trunk by grinding ST3, paint 3 layers paint
- Transport the E-motor and fan wheel to the workshop.
- Dismantle the motor, clean, steam wash rotor & stator with suitable electrical solvent. Dry in temperature controlled oven. Afterwards dipped varnishing and curing in oven. Tidy up excess varnish. Apply 1 coat of insulation paint.
- Dynamic balancing of the rotor and fan wheel - make protocol
• Re-assemble the motor with new bearings, ship’s supply
• Carry out static tests: winding insulation, winding resistance, surge comparison
• Set up and carry out a spinning test under load in the workshop – make protocol
• Re-paint the motor exterior with one layer paint.
• Return the motor to ship, refit in the housing, refit the fan wheel, re-install ventilator, and reconnect. Running test with crew.

Price per motor for the following fan motor power ranges
• Below 10 kW .../  
• Between 10 – 20 kW .../  
• Between 21 – 30 kW .../

S.3. Remove/reinstall 2740 kW DC motors in cutter ladder

The vessel is equipped with two (2) cutter motors, installed in the ladder.

Drawings:
• IHC 1175-2165-500 Arrangement cutter drive  
• IHC 5242792 Superstructure cutter ladder  
• IHC 5242839 General arrangement cutter ladder  
• IHC 1175-2165-650 Chocks on cutter ladder

Specs. : Make : JEUMONT SCHNEIDER  
Type : CCP 138.38.8  
Power : 2740 kW  
Voltage : 720 V  
Current : 3995 A  
Speed : 565 / 625 rpm  
Prot. : IP56  
Weight : 18 ton / 21 tons including cooler

• Open/close bolted hatches above the motors (hatch 3 / IHC 5242792).  
• Remove/reinstall fan ducts above motors.  
• Disconnect / connect electric supply to fan motors.  
• Disconnect / connect cooling water supply and discharge lines (3” pipes) from cooler. Remove / refit aircoolers.  
• Disconnect / connect sensors. Electrically disconnect/unconnect motor.  
• Disconnect / connect flexible coupling from motor.  
• Remove / reinstall floor plates (bolted) from around motor  
• Remove / reinstall 8 foundation bolts. M42 (2 fitting bolts/motor). Remove / reinstall & reweld 4 pcs sea fast chocks on motor. Remove dress up, skim foundation chocks in workshop and return.  
• Lift out/in motor and cooler from cutter ladder and transport to/from electrical workshop. (Total weight 21000 kg). If lifted out in several parts the in situ dismantling, transports, the supply, fit plywood in way of all openings of the electric motor and the cooler are included.
After repairs, re-assemble and return the motor and cooler assembly to the ship. Align; re-install the motor by use laser equipment. Ream boltholes, fabricate, supply, fit two fitting bolts. Check the blue fitting and grind the existing steel chocks. Supply, provide shims as per requirement.

Lump sum price for one cutter motor. ...
Lump sum price for one underwater pump motor. ...

Additional:
Fabrication of new steel chock 250 x 250 x 45 mm .../chock

S.4. Remove/reinstall 2740 kW DC propulsion motor
The vessel is equipped with two (2) propulsion motors, PS & SB, installed in the propulsion rooms on the tanktop of the double bottom, frames 20 – 23.

Specs.:
Make: JEUMONT SCHNEIDER
Type: CCP 138.38.8
Power: 2740 kW
Voltage: 720 V
Current: 3995 A
Speed: 565 / 625 rpm
Prot.: IP56
Weight: 18 ton / 21 tons including cooler

- Open/close bolted hatch above the motor in the propulsion room. Remove / refit the stair casings & platforms in the trunk. Provide a temporary access.
- Remove/reinstall fan ducts above motors.
- Disconnect / connect electric supply to fan motors.
- Disconnect / connect cooling water supply and discharge lines (3” pipes) from cooler. Remove / refit aircoolers.
- Disconnect / connect sensors. Electrically disconnect/ connect motor.
- Disconnect / connect flexible coupling from motor.
- Remove / reinstall floor plates (bolted) from around motor
- Lift out/in motor and cooler from cutter ladder and transport to/from electrical workshop. (Total weight 21000 kg). If lifted out in several parts the in situ dismantling, transports, the supply, fit plywood in way of all openings of the electric motor and the cooler are included.
- After repairs, re-assemble and return the motor and cooler assembly to the ship. Align, re-install the motor by use laser equipment. Ream boltholes, fabricate, supply, fit two fitting bolts. Check the blue fitting and grind the existing steel chocks. Supply, provide shims as per requirement.

Lump sum price for one propulsion motor: ...

Additional 1
• Fabrication of new steel chock 250 x 250 x 45 mm …/chock

Additional 2
• Assume one motor is mounted on chock fast. The existing chock fast is to be removed and motor to be aligned and mounted on new chock fast. Chock fast Orange to be supplied and fitted by the yard. Including the necessary temporary moulding and supports.

Additional price: …/.

S.5. Overhaul of 2740 kW DC motor

Specs. : Make : JEUMONT SCHNEIDER
Type : CCP 138.38.8
Power : 2740 kW
Voltage : 720 V
Current : 3995 A
Speed : 565 / 625 rpm
Prot. : IP56
Weight : 18 ton / 21 tons including cooler

- Assume the electric motor and cooler is removed and in the workshop.
- Erect stagings for access during the repair works.
- Disconnect, remove complete cooler housing with fan motors from the motor housing. Supply, fit plywood in way of all openings of the electric motor and the cooler. Disconnect, remove the fan motors from the cooler. Dismantle, remove and clean the cooler internally and externally including all parts by steamwash, chemicals, brush or ultrasonic bath. Box up, pressure test cooler. Steamwash, degrease, clean the cooler housing, re-paint. Supply, renew all joints and gaskets. Clean, dress up, all boltsholes. Fit new owner’s supplied filter cloth. Overhaul the 2 fan motors as per item S2, re-install and re-connect. Re-assemble cooler.
- Remove, jack off coupling. Dismantle motor, remove end covers, remove rotor from the stator. Remove / refit and reconnect thermo sensor cables.
- Including supply of required jacking and aligning plates, bars, supports and other tools.
- Clean, steam wash main stator, main rotor, exciter stator and -rotor with suitable electrical solvent. Dry in temperature controlled oven. Afterwards dipped varnishing and curing in oven. Tidy up excess varnish. Apply 1 coat of insulation paint.
- Put rotor on lathe, check trueness, polish shaft, skim and polish commutator. Dynamic balancing of the rotor and make a report (including OD-measurement).
- Re-assemble the motor with ship’s new supplied parts as per requirement.
- Measure resistances armature windings, megger tests and make report.
- Carry out static tests : winding insulation, winding resistance, surge comparison
- Carry out spinning test.
- Clean and file all carbon brush holders
- Bed 128 pcs of owner supplied carbon brushes.
Lump sum price: 

Additional price to machine out bearing bore, fabricate and shrinkfit sleeve in way of the bearing: 

**S.6. Remove/reinstall 485 kW ladder winch motor**

Specs.:
- **Make**: JEUMONT SCHNEIDER
- **Type**: CIR450VL
- **Power**: 485 kW
- **Voltage**: 720 V
- **Speed**: 900/1800 rpm
- **Prot.**: IP56

- Open/close bolted hatch above the motor in the propulsion room. Remove / refit the stair casings & platforms in the trunk. Provide a temporary access.
- Remove/reinstall fan ducts above the motor.
- Disconnect / connect electric supply to fan motors.
- Disconnect / connect cooling water supply and discharge lines (3” pipes) from cooler. Remove / refit aircoolers.
- Disconnect / connect sensors. Electrically disconnect/uneconnect motor.
- Disconnect / connect flexible coupling from motor.
- Remove / reinstall 8 foundation bolts. M42 (2 fitting bolts/motor)
- Remove / reinstall / reweld 4 pcs sea fast chocks on motor. Remove dress up, skim foundation chocks in workshop and return.
- Tack weld 4 pcs steel chocks under motor.
- Lift out/in motor and cooler from cutter ladder and take to/from electrical workshop. If lifted out in several parts this is included. Supply, fit plywood in way of all openings of the electric motor and the cooler. Disconnect, remove the fan motors from the cooler.
- After repairs, re-assemble and return the motor and cooler assembly to the ship. Align; re-install the motor by use laser equipment. Ream bolt holes, fabricate, supply, and fit two fitting bolts. Check the blue fitting and grind the existing steel chocks. Supply, provide shims as per requirement.

Lump sum price for one ladder winch motor: 

Additional:
Fabrication of new steel chock 250 x 250 x 45 mm 

**S.7. Remove/reinstall 485 kW side winch motor**

Specs.:
- **Make**: JEUMONT SCHNEIDER
- **Type**: CIR450VL
- **Power**: 485 kW
- **Voltage**: 720 V
- **Speed**: 900/1800 rpm
- **Prot.**: IP56

- Disconnect / connect electric supply to fan motors.
• Disconnect / connect cooling water supply and discharge lines (3” pipes) from cooler.
• Disconnect / connect sensors. Electrically disconnect / connect motor.
• Disconnect / connect flexible coupling from motor.
• Remove / reinstall 8 foundation bolts. M42 (2 fitting bolts/motor)
• Remove / reinstall 4 pcs sea fast chocks on motor.
• Tack weld 4 pcs steel chocks under motor.
• Lift out/in motor and take to/from electrical workshop.
• Remove / reinstall complete cooler housing with fan motors from the motor.
  Remove / reinstall the fan motors. Clean the cooler in an ultrasonic bath. Clean
  the cooling housing, re-paint and re-assemble. Overhaul the 2 fan motors as
  per item S2.
• After repairs, re-assemble and return the motor to the ship. Align, re-install the
  motor by use laser equipment. Check the blue fitting and grind the existing
  steel chocks.

Lump sum price for one side winch motor : …/

Additional :
Fabrication of new steel chock 250 x 250 x 45 mm …/chock

**S.8. Overhaul 485 kW motor**

<table>
<thead>
<tr>
<th>Specs.</th>
<th>Make</th>
<th>JEUMONT SCHNEIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>CIR450VL</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>485 kW</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>720 V</td>
<td></td>
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<tr>
<td>Speed</td>
<td>900/1800 rpm</td>
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<tr>
<td>Prot.</td>
<td>IP56</td>
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</tr>
</tbody>
</table>

• Assume the electric motor and cooler is removed and in the workshop.
• Erect stagings for access during the repair works.
• Disconnect, remove complete cooler housing with fan motors from the motor
  housing. Supply, fit plywood in way of all openings of the electric motor and
  the cooler. Disconnect, remove the fan motors from the cooler. Dismantle,
  remove and clean the cooler internally and externally including all parts by
  steamwash, chemicals, brush or ultrasonic bath. Box up, pressure test cooler.
  Steamwash, degrease, clean the cooler housing, re-paint. Supply, renew all
  joints and gaskets. Clean, dress up, all boltsholes. Fit new owner’s supplied
  filter cloth. Overhaul the fan motors as per item S2, re-install and re-connect.
  Re-assemble cooler.
• Remove, jack off coupling. Dismantle motor, remove end covers, remove
  rotor from the stator.
• Including supply of required jacking and aligning plates, bars, supports and
  other tools.
• Clean, steam wash main stator, main rotor, exciter stator and -rotor with
  suitable electrical solvent. Dry in temperature controlled oven. Afterwards
  dipped varnishing and curing in oven. Tidy up excess varnish. Apply 1 coat of
  insulation paint.
- Put rotor on lathe, check trueness, polish shaft, skim and polish commutator. Dynamic balancing of the rotor and make a report (including OD measurement).
- Re-assemble the motor with ship’s new supplied parts as per requirement.
- Measure resistances armature windings, megger tests and make report.
- Carry out static tests: winding insulation, winding resistance, surge comparison
- Carry out spinning test.

Lump sum price: ...

S.9. Cable chain from ship to cutter ladder

S.9.1. Install staging and opening of MCT type cable wall penetrations

Drawings:

- IHC 01175-2516-620 Arrangement cable chain from ship to cutter ladder
- VDLEUN 4323-31-7-03 Construction cable chains ladder PS & SB
- VDLEUN 4323-31-7-04 Construction cable catch & cable chain ladder PS & SB

Scope:

- Erect stagings in way of the SB & PS cable track from ship to the ladder, in cutter ladder and in thyristor room.
- The power and control cables are running from the consumers in the ladder to the thyristor room below main deck.
- The left-hand side cable chain is supporting in total 32 power cables and 57 control / signal cables.
- The right-hand side cable chain is supporting in total 34 power cables and 38 control / signal cables.
- The MCT type cable wall / deck penetrations are to be opened at the cutter ladder side and ship’s side of the cable chain. 2 penetrations at left hand side and 3 penetrations at right-hand side. Each penetration is suited for 90 cables. After the works, the MCT blocks to be adjusted and reinstalled.
- Open up, remove all guiding blocks dwg 4323-31-2-07 pos 1-7 & 9-23 on the cable chains. Clean, dress up all parts. After repairs re-assemble with the old or new ship’s supplied parts.
- Open / close the connection boxes on the 2 cutter motors and underwater pump motors. Open / close the MTC type wall penetrations of the 3 motors.
- Open / close the MTC wall cable penetration on the 3 motor drives in the thyristor room and the auxiliary connection box.
- Mark, tag all cables and wires. Disconnect cables at both sides and re-connect with torque after measurements.
- Megger test all 161 pieces cables. Make a report

Lump sum price: ...
S.9.2. Renewal of cables between ship and the cutter ladder

Drawings:
- IHC 01175-2516-620 Arrangement cable chain from ship to cutter ladder
- VDLEUN 4323-31-2-03 Construction cable chains ladder PS & SB
- VDLEUN 4323-31-2-04 Construction cable catch & cable chain ladder PS & SB

Scope:
- Assume that all connection boxes and MCT type cable penetrations are opened under item S9.1. Assume that the cable clamps on the cable chain are all opened.
- Renew power cables running from the motors mounted in the cutter ladder and the drive cabinets installed in the thyristor room below upper deck. New cables are supplied by the owner.
- Renew control/signal cables between the consumer in the cutter ladder and the connection box in the thyristor room.
- Cables are mounted on cable trays in the cutter ladder and thyristor room and are running on the cable chains.
- Special attention to be paid to keep sufficient slack in the cables mounted on the cable chain. Cable on the cable chain to be protected by cloth and metal sheeting during the works.
- Cold and hot wire testing to be carried out. Report to be made.
- Cables to be installed, terminated & connected as per section M – specification electrical installation.

Price per power cable OD 28mm & length 47 meter : .../
Price per power cable OD28 mm & length 68 meter : .../
Price per signal / control cable & length between 40 & 60 meter : .../
Price per signal / control cable & length between 60 & 80 meter : .../
Price per signal / control cable & length between 80 & 100 meter : .../
Price to renew grease / air hose & length 50 meter : .../

S.9.3. partly renewal of cable chain

VDLEUN 4323-31-2-03 Construction cable chains ladder PS & SB

- Assume that the clamps on the cable chain are all opened.
- Move the cables in way of the repair aside. Protect and cover the cables with cloth and steel sheeting.
- Cut; remove the pin 4323-31-2-03 pos 7 & 8.
- Renew one set plates 4323-31-2-03 pos 1 or pos 2 by ship’s spare. Fit, align and weld a new ship’s supplied pin 7 & 8.

Price for 1 plate pos 1 : .../pc
Price for 1 plate pos 2 : .../pc

S.10. Main Generator

Jeumont Schneider
S.10.1. Cleaning cooler main generator
- Open up the hatch covers to access the generator room (2 hatch covers: 1 main deck in workshop & 1 on crane deck)
- Erect a staging
- Disconnect the cooling water supply and return lines (ND80)
- Disconnect; remove the cooler housing, mounted on top of the generator. Transport to the workshop
- Supply, install a plywood piece to cover the opening of the generator body.
- Dismantle the cooler. Clean the bundle in an ultrasonic bath.
- Re-assemble with ship’s supplied gaskets and pressure test.
- Repair the paint system and return to ship.
- Re-install and reconnect the cooling water lines

Price per generator: …/...

S.11. Installation of cables in engine room and ecr.
- Installing of owner’s supplied cables on existing cable trays and fastened with owner’s supplied tie raps
- Excluding connections: will be done by owner’s arranged contractor.
- Time sheet to be signed off daily by chief engineer.

Price per cable layers per day – 8 hours working: …man-day
Opening / adjusting / closing MCT type bulkhead penetration: …/pc

S.100. Renewal control units for separators.
S100  8105 2011 129   terminal diagram.
S100  List of cables
S100 List of cables
SECTION M  Specification electrical installation
S100 Pictures old cabinet

- The 7 control panel units for the vessel’s oil separators are to be renewed.
- Disconnect, remove the existing control box units from the separator room. Remove the old cables running to the separator unit and power supply: assume 6 boxes with 11 cables, 10 meter length and 1 box with 21 cables, 10 meter length.
- The owner’s supplied control boxes are fitted with cooling fan and outlet opening with filters on the sides. The cooling fans and outlet openings are to be removed. The openings in the control boxes are to be closed by steel plate.
- The cooling fan and outlet opening are to be relocated to the bottom of the control box.
- Install 7 new owner’s supplied and fully outfitted control boxes. Adjust the foundation to suit the new control boxes. Size box: 600x380x350mm (bxhxd).
• The yard is to supply, install and terminate new cables between the control boxes and respective it’s power supply and the separator unit as per terminal diagram and detailed list of cables.

• All cables are of an approved marine type (Draka : VUSK or VUSO ; Reinshagen : MGCG, MGG), with an outside insulation which will not be affected by oil, grease, which will not harden and which is UV resistant. On deck, no PVC coated cables are used. Cables will be halogen-free.

• Installation & connection of the cables & switchboards is to be carried out according to enclosed specification ‘section M’. 

Lump sum price :

S.101. Installation high level alarm switches bunker tanks.

011475-0353-010 Tank arrangement
SECTION M Specification electrical installation

• Assume that the diesel tanks 13, 14, 49 & 50 and the heavy fuel tanks nos 24, 25, 35, 36, 47, 48 are opened & cleaned.

• Arrange ventilation & lighting. Gas free and arrange hot work permit

• In the middle of each tank a high level switch is to be installed in the tank wall, 6650mm from centre of the ship.

• A staging to be erected in and outside the tank in way.

• An opening is to be cut in the tank wall, a ship’s supplied flange to be fitted and welded from both sides. Weld to be checked for cracks by dye-checking. Level switches are fitted 2170mm above base.

• A ship’s supplied limit switch to be installed and connected on the new flange. Arrange vacuum test of the installed limit switch.

• Supply, install two junction boxes in the engine room at frame 80, on the longitudinal wall 6650mm from centre below teen deck, one at starboard & one at portside.

• Supply, connect and install a cable 2x2x1.5mm from each new limit switch to the nearest new junction box. Supply, connect and install a multi-core cable 12x2x1.5mm from each junction box to the alarm panel fitted in the engine control room on tweendeck.

• Assume that the cables can run on existing cable tray. Only from each limit switch, a flat bar 20x5 to be welded running to the nearest cable tray. Average length of each strip : 3.0 meter.

• Install a ship’s supplied alarm panel, connect & terminate the cables. Connect the outgoing common alarm to the ship’s central alarm system.

• Installation & connection of the cables, limit switches and alarm panel is to be carried out according to enclosed specification ‘section M’.

• The paint system on the outside of the bunker tanks to be repaired by grinding to ST3 and painting 3 layers ship’s supplied paint.

Lump sum price for 10 limit switches :

S.102. Installation of limit switch cutter platform.
A staging is to be erected to the top of the cutter ladder gantry at frame -5 – portside, 15 meter above crane deck. A ship’s supplied limit switch is to be installed in the top of the slide of the moveable cutter platform. The limit switch is to stop the cutter platform winches at the top position of the cutter platform. The yard to the fabricate, fit and weld a suitable support for the limit switch. A cable strip of flat bar 30x6 mm to be supplied and welded from the limit switch to the top deck of the cutter gantry: assume 5.0m in length. A ship’s supplied junction box to be installed on this top deck. A cable of 4x2x1.5mm to be supplied and installed from the new limit switch to the junction box and from the junction box to the winch control panels mounted in the thyristor room on main deck at frame 45. Assume cables can run on existing cable trays. Including opening, closing and adjusting MCT type deck and wall cable penetrations in way. Cables to be connected and terminated as per diagram.

Installation & connection of the cables, limit switches and alarm panel is to be carried out according to enclosed specification ‘section M’.

The paint system in way of the limit switch and new cable strip is to be repaired by grinding to ST3 and painting 3 layers ship’s supplied paint.

Lump sum price: ...

S.103. Install cables between radio installation on bridge and antenna’s mounted on the barge loading gantries

- At present the transmitter and receiver unit of the short wave radio are mounted on the bridge top deck. The antennas are mounted on a pedestal on the portside and starboard side barge loading gantries next to the bridge at frame 58. A flying wire is presently connecting the antennas and the connection boxes on the top deck. This wire is always in way of the passing deck crane. The intention of this works is to relocate the transmitter and receiver units near the antennas and run new cables below deck.
- Disconnect, remove the transmitter and transceiver boxes from the top deck (both around 50x30x20cm). Remove the cables running from the top deck to the radio installation in the bridge (3 x 10 meter). Cut off the old foundations.
- Remove/ refit the ceiling, floor and wall panelling in way of the cable trays on the bridge and the three decks below: assume around 40sqm panelling to be removed for access to existing cable trays in the accommodation.
- Erect a staging to the top of the barge loading gantries.
- Fabricate, fit and weld foundations for the transmitter box on top of the portside barge loading gantry and for the receiver box on top of the starboard barge loading gantry.
- Supply, install, and connect two cables from the radio installation on the bridge to the new location of the transmitter box: 80meter x 10x1.5mm shielded signal cable & 80meter x RG214U double shielded coax cable.
• Supply, install and connect 50meter x RG214U double shielded coax cable from the radio installation to the receiver box.
• Assume the existing cable trays inside the accommodation can be used. The yard is to supply and install pipe of 1 x 12 meter on each barge loading gantry to run the cables in from crane deck to the top. Pipes are galvanized and welded with flat bar every 1.0m meter to the gantry. Works including wall penetrations from the deckhouse to the barge loading gantry foundations
• Repair the paint system in way of the works to ST 3 and paint with 3 layers of ships supplied paint.

Lump sum price for two antennas :

S.104. Re-position wind meter to the main mast and install cable to bridge

A wind speed and direction meter is presently installed on the top deck of the bridge. This wind meter is to be relocated to the top of the main mast at frame 109 – port side. Disconnect, remove the wind meter. Remove the existing cable running to the bridge: assume 20 meter. Close deck penetration.
Erect a staging around the main mast to the top. Fabricate, fit and weld a new pipe type foundation and install the removed wind meter.
Supply, install and connect one cable from the wind meter at the new location to the wind indicator in the navigation desk on the bridge: 150 meter 5x0.75mm shielded cable. Assume that the cable can run on existing cable trays, 10 existing MCT bulkhead and deck penetrations to be opened / modified where the cable is passing through. Assume that the wall and ceiling panelling in way of the cable trays in the accommodation are removed under item S103.
Supply, install a suitable brass junction box on the mast near the wind meter.
Repair the damaged paint system in way of the works to ST 3 & 3 layers ship’s supplied paint

Lump sum price :

S.105. Install limit switches on security & tilting pins.

Specification to follow

S106. New 220 V lighting transformer to be installed and modification of the 220V distribution system
S106 List of new panels
S106 List of cables
S106 list of panels cables to be connected
S106 List of new deck & bulkhead penetrations
S106 Drawing coaming MCT
S106 Picture platform for transformer
The existing 220V system is to be modified. An additional transformer is to be installed which will be supplying a part of the ship’s 220V consumers. A separate 220V distribution system to be installed and the existing system to be modified accordingly.

An owner supplied 380-220V / 100kVA transformer is to be installed in the generator room. Assume that the transformer unit already is in the generator room. Size 1050x600x700mm. Supply, fabricate, install a suitable foundation made from angle bar 100x100mm on an existing access platform 2 meter above the tank top in the generator room.

10 owners supplied additional distribution panels are to be installed in the vessel. 1 panel of 1000x1000mm and 9 pieces of 600x600mm size. The yard is to supply, fabricate, install & weld suitable foundations to fix the units to the wall. Foundations made from angle bar in various engine room spaces.

At each new distribution panel a cable tray of 100mm width, 2.0m long is to be supply, fitted and installed by the yard. A cable tray of 200mm width, 2.0 meter long is to be supplied and installed towards the new transformer.

The yard is to supply, install and connect cables between the new transformer, new and existing panels as per enclosed cable list and panel list.

The yard is to supply, cut, fit and weld MCT type cable penetrations in deck or wall as per enclosed list. Coaming as per enclosed drawing are to be fabricated, fitted and welded on 4 locations (indicated with * in the list)

The yard is to test all cables and connections in the presence of owner’s representative: i.e. cold wire check. Insulation resistance of all cables to be measured.

A detailed measurement / test report to be made and handed over.

All new and modified steelwork to be de-rusted to ST3 and painted with 3 layers supplied paint.

Lump sum price : ...

**S.107. Installation ship voyage data recorder**

**S107 cable list**

An owner’s supplied ship voyage data recorder is to be installed on the top deck.

Supply, fabricate and install a suitable foundation on the bridge top deck: 3.0 meter height with stiffeners and supports. A cable pipe to be fitted along the foundation from top deck to top of foundation.

The ceiling paneling in way of the foundation is to be removed / refitted. A deck penetration for 20 signal cables with 300mm coaming to be supplied, fitted and welded in the top deck. A 300 mm x 10 meter cable tray is to be supplied and fitted above the ceiling in the bridge running to existing cable trays.

15 cables to be supplied, installed and connected between the newly installed SVDR and various equipment installed in the bridge. All as per enclosed cable list.

The yard is to test all cables and connections in the presence of owner’s representative: i.e. cold wire check. Insulation resistance of all cables to be measured.

A details measurement / test report to be made and handed over.

All new and modified steelwork to be de-rusted to ST3 and painted with 3 layers supplied paint.

Lump sum price : ...
S.108. Installation of 4 welding rectifiers in the cutter ladder gantry foundation

S108 list of cables
ESAB 630 800 Welding rectifier

- The yard is to install 2 owner’s supplied welding rectifiers in the cutter ladder gantry foundation at Starboard side and 2 units at portside. They are both to be fitted next to the stair casing inside the cutter ladder foundation at frame -3 and 3.6 meter above the crane deck.
- A suitable foundation to be fabricate to install two welding rectifiers on top of each other at both sides. Size of one welding rectifier: 800x500x600mm – 250kg. Two HP stiffeners to be cut away and re-enforcement from flat bar 100x10 to be supplied and fitted in stead.
- Power cables to be supplied, installed and connected between de 4 welding rectifiers and the ship’s distribution panels as per enclosed list. 4 female / male ships supplied plugs near the welding rectifiers to be installed and connected. Assume existing cable trays can be used to run the cables to the distribution panels.
- All new and modified steelwork to be de-rusted to ST3 and painted with 3 layers supplied paint.

Lump sum price for 4 welding rectifiers .../

S.109. Primary injection test breakers main switchboard

Circuit breaker
Make : Merlin Gerin
Type DSA1 5000
660VAC, In 5000A

- Disconnect, remove circuit breaker from the main switchboard. Transport to workshop
- Clean unit. Dress up contact. Inspect unit
- Carry out a primary injection test witnessed by ship’s electrician
- After test, return and re-install on board the vessel.

Price per unit : .../

S.110. Replace tank transducers

- Assume that the fuel tanks are empty and cleaned.
- Tank transducer is fitted in the double bottom tanks adjacent to the fuel tank
- Remove, disconnect the existing tank transducer that is fitted on the tank wall mounted closing valve.
- Remove valve, send to workshop, clean & dress up seat. Refit valve.
- Install a new owner’s supplied tank transducer on the valve. Connect the electric signal cable to the existing connection box.
Price for in total 10 pcs tank transducers: 

**S.111. Install VSAT entertainment system in accommodation**

Specification to follow.

**S.112. Renewal of conical fitting pin motor side wire winches**

Picture S112

Assume the existing conical bore for fitting pin is not in line. Remove existing pin.
Re-machine and ream the conical bore.
Fabricate, machine a new conical fitting pin: approx. dia 18/14 x 100mm. Fit pin.

Price per conical pin: 

**S.113. Relocation of high level switch fuel tank 24**

Picture S113

Assume the fuel tank 24 is cleaned under item 24
Arrange ventilation and hot work permit for the tank
Disconnect and remove the existing Mobrey type tank level switch and store aside.
Fit a ship’s supplied blind plate on the existing level switch connection.
Cut opening in tank, fit and weld a ship’s supplied level switch flange on the tank wall @ new location, 170mm higher as indicated.
Repair the damaged paint system in way.
Install and connect the level switch.

Lump sum price: 

**S.114. Electrical systems indication and control hydraulics dredge sluice valves pump room**

LD-01-01-163 Arrangement dredge lines pump room
01175-0319-510_1 revF Arrangement pumproom – existing
01175-0319-510_1 revG Arrangement pumproom – new situation
01175-0319-510_2 revB Arrangement pumproom – existing
01175-0319-510_2 revC Arrangement pumproom – new situation
01175-0319-510_3 revB Arrangement pumproom – existing
01175-0319-510_3 revC Arrangement pumproom – new situation

Works to be done in conjunction with item P106.
Assume a new limit switches junction box is already installed in the pump room, on portside main deck, between frame 65 & 70.
The yard is to install, fit, terminate and connect cables between this junction box and the limit switch already installed on the hydraulic cylinders of the sluice valves dwg LD-01-01-163 pos 525,528,530,526,531 & valve dwg LD 01-02-166 pos 119.
One ship’s supplied cable is to run to each sluice valve. A ship’s supplied junction box to be installed on the top of the upper body of the sluice valve. The cables attached to the limit switch to be routed and connection in this suction box. Cables
run in galvanized cable pipes along with the hydraulic pipes. Cable pipes to be supplied, fitted and installed by the yard.
A ship’s supplied multi-core and power supply cable is to be installed from the new limit switches junction box to the PLC cabinet in the thyristor room. The cables to be installed on existing cable trays. Including opening /adjusting / closing 3 MCT cable penetrations.

Lump sum price: ..../

**S.115. available**

**S.116. available**

**S.117. Thyristor drives, renewal of relays**
The vessel is equipped with a thyristor drive, frames 41 ~ 54. Access is via the accommodation. In several cabinets we have to exchange relays.

Scope:
- Assume all spares owner supplied.
- Assume owners arranged service engineer from company Van Der Leun is supervising the job.
- Arrange two (2) electricians to perform the job, English speaking and with tools.
- Assume job will take two (2) weeks.

Lump sum price ..../man day

**S.118. Available.**

**S.119. Dummy tank no.58 electrical scope**

Drawings:
- LD 08-00-010 E-drawings dummy
- LD 11-00-151 arrangement mooring barge loading AE/EE/BD
- LD 11-00-A005205 intermediate piece spud carrier well

Scope:
- Assume job G.169 has been completed and the dummy tank has been installed in the ship.
- Remove cover (pos 47 / LD 11-00-A005205) and install one (1) owner supplied capstan (pos 4 / LD 11-00-151). Include un-sea fastening and transport from owner’s container at the yard.
- Install one (1) connection box on the bulwark of the dummy tank no. 58. Assume L-profiles to be supplied & welded by yard.
- Connect and pull owner supplied cables, assume 20 m cable, inside dummy tank (pos 100 ~ 102 / LD 11-00-A005205).
Open / close the MCT (pos 99 / LD 11-00-A5205).

Lump sum price: .../

**S.120. Harbour generator overhaul**

**Drawings:**
- IHC 01175-0319-560 arrangement fore ship view on main deck.
- IHC 01175-1244-010 sheet 3 buoyancy space fr 112 ~ 124 PS.
- IHC 01175-1280-010 bulwark on upper deck from fr 114 to 129.
- IHC 01175-1890-010 companion house on fr 118 ~ 122 PS.
- IHC 85-10023-11B connection diagram harbour generator.
- IHC 01175-2335-510 exhaust gas lines.
- JS 20D9672 alternator APM 66 D4 main dimensions.
- JS 1700EX685 alternator APM 66 D4 wiring diagram.
- JS 20A9656 alternator APM 66 D4 general arrangement.
- JS 20B0455 alternator APM 66 D4 rotor shaft.

The alternator has to be overhauled, the diesel engine will not receive service. Access cutting in upper deck is required for moving out the alternator from the room. Job to be combined with the ventilation modification of the separator room, according specs G.2. of the midlife refit.

**Alternator data:**
- Manufacturer / type: Jeumont-Schneider / APM 66 D4
- AC synchronous, air cooled.
- star 380 V, 50 Hz, 650 KVA, 1500 rpm
- insulation class F, protection class IP 44 / IP 23
- Weight: 2700 kg
- Dimensions L x W x H: 1738 x 1120 x 1070 mm
- Rotor weight: 800 kg.
- Rotor length / dia: 1570 / 800 mm.

**Scope:**
- Assume the vessel is dry docked and shore power is arranged by the yard.
- Clean and dress-up all parts, thread holes.
- Including supply / fabrication of required tools for jacking and aligning plates, bars, supports, etc.
- Including all means like permits, lights, ventilation, transports form / to the ship, shielding and covering for hot works, support wood and plastic covering for temporary storage of mechanical parts, etc.

**Scope access cutting**
- For hoisting out the alternator with the yard crane.
- Remove / refit bolted stair between main and upper deck. Assume two (2) times.
- Remove / refit ventilation cap, cut / weld ventilation pipe of HFO tank no.24. For gas free permit, combine with cleaning according specs H.1.1.
- Remove / refit sea water lines dia 80 mm, length 6 m, three (3) bolted flanges, 2 valves. One (1) hydraulic line, ¾”, cutting ring couplings, length 1 m. CO2 alarm light and two (2) electrical switches, disconnect power plug and light form companion house (IHC 01175-1890-010).
- Cut / weld partly the bulwark brackets on frames 119 and 121 (IHC 01175-1280-010).
- Weld pad eyes on the companion house structure, cut / weld from the upper deck, hoist in-out the superstructure from the ship (IHC 01175-1890-010).
- Cut out / weld the upper deck between web frames 118 and 122, 9580 ~ 9900 from the centreline. Including cutting / welding Holland profile 140.8 on three (3) locations (IHC 01175-1244-010 sheet 3 “upper deck”).
- Install / remove temporary coaming around the cut-out in the upper deck, assume 10 cm high and cover the area from precipitation. Yard supply.
- Coating damage of all area’s affected by hot works to be repaired via power brushing according specs E.6. and coating repair according specs F.10.

Scope alternator remove / refit
- Assume the system is electrically isolated and locked / tagged-out by the crew.
- Label the alternator cables and the connections. Open / close two (2) MCT units on the alternator. Disconnect / connect the electrical cabling, assume 15 cables (power, heating, RPM, PT100, earthing, etc).
- Diesel engine junction box, disconnect / connect from foundation and secure clear from alternator.
- Diesel engine air filters units + foundations, 2 pieces, remove / refit from top of alternator.
- Alternator air filter, remove / refit. Supply, fit plywood in way of all openings of the electric motor and the filter. Fit new owner’s supplied filter cloth.
- Lubrication oil lines, 2 pieces, ½”, remove / refit and plug.
- Exhaust gas lagging, remove / refit. Assume 5 m length. Inclusive isolation with aluminium plate renewal.
- Flexible coupling with diesel engine, loosen / tight.
- Loosen / refit the four (4) foundation bolts and fitting pins. Bolts to be marked. Calibrate the bore holes and the fitting bolts. Include machining of owner supplied oversized fitting bolts and reaming of the bore holes.
- Install / remove the rotor locking device, fit slings in the lifting holes of the alternator frame.
- Supply and weld pad eyes on web frames of upper deck for rigging the alternator. Erect / remove staging. Assume 8 locations.
- Hoist in / out the alternator from the bedplate.

Scope alternator overhaul
- Assume the electric motor is at the yards workshop.
- Issue a full report with pictures during disassembly and assembly.
- Install / remove the rotor locking device.
- Dismantle / assemble and clean the air filter unit internally and externally washing / scrubbing.
- Remove / refit by jacking the flexible coupling.
- Remove / refit and exitator assembly from the NDE (rectifiers wheel, drive flange, etc).
- Dismantle / assemble generator, end covers (pos 20, 21 / JS 20A9656), locking / sealing plates (pos 23~ 28), heating elements (3), winding protections (6), etc.
- Remove / refit rotor from the stator.
- Renew the bearings (pos 12 ~ 14 / JS 20A9656), flexible washer (pos 15), owner supplied. Take care of insulation of NDE bearing. Blow through the lubrication channels.
- Clean, steam wash stator, rotor, exciter assembly with suitable electrical solvent. Dry in temperature controlled oven. Afterwards dipped varnishing and curing in oven. Tidy up excess varnish. Apply 1 coat of insulation paint.
- Perform crack test via magnaflux of the two (2) key ways of the shaft.
- Put rotor on lathe, polish shaft and check trueness in way of bearings seating.
- Measurements prior and after the overhaul. Only in presence of ships electrician, chief engineer or owners’ representative. Owner will provide a sample report.
  - Perform “insulation resistance” measurement, at DC 500 V, 1 minute and 15 minutes
  - Perform “surge test” measurement, stator / rotor grounded, 1760 VAC.
  - Perform “cold resistance” measurement, stator phases, rotor, exitator
  - Note down temperature of windings, ambient and the humidity at each measurement.
  - Perform dynamic balance test of the rotor.

Lump sum price: ...

**S.121. Main generator, DE and NDE bearings, exchange labyrinth seals**

Drawings:
- RENK 36130 General arrangement bearing

The vessel is equipped with three (3) main generators, located in the generator room on tween deck, frames 116 ~ 125. The bearings and the floating labyrinth seals are split execution, two (2) bearings per generator and two (2) seal units per bearing.

Scope:
- Job to perform on generator 2 DE + NDE and NDE of generator 3.
- Assume all spares owner supplied.
- Assume the generator drive has been locked out / tagged out by the crew.
- Applicable for drive end and non-drive end side of the generator.
- Open / close oil plug and drain the oil in a pitcher. Do not drain into the bilges. Fill-up with owners supplied oil and renew the filters. Assume 25 L per bearing. Dispose the old oil.
- Remove / refit the two (2) lub oil connections and plug. Remove / refit the oil cooler element. Clean the oil sump in the lower bearing halve.
- Remove / refit the end cover by loosening / tightening bolts M8 and the upper bearing halve. Bolts M24 are on torque 700 Nm. Lifting bolts and pad eyes are
present. Renew the Teflon insulation of the housing and the insulating bush of the bolts.

- Remove / refit the seal housings, split execution.
- Remove / refit seals and locking pins. Position with the oil collecting duct towards bottom side. Measure the ID of old and new labyrinth seals.
- Polish the shaft journal in way of the seals.
- Including all means, like tools, permits, cleaning, reporting, etc.

Lump sum price … /

Additional for supply of filling ring, ID 340 – OD 400 mm, thickness 5 mm, mild steel. … / piece

Additional for supply of TEFLO (PTFE) sheet thickness 0.5 mm. … / m².

S.122. V-sat radome remove / refit and cable renew.

Drawings:
- LD 11-00-158 Platform + foundation dome V-SAT
- LD 11-00-A00482 Foundation dome VSAT + NAV lights on gantry barge loading PS
- LD 11-00-A00588 Cable trays on VSAT mast PS
- Seatel 123628 radome assembly, 60 inch, general arrangement.
- Seatel 1226663 radome installation arrangement.
- Seatel 126936 system, 4006RZ-23, 60 inch radome.

Job to be combined with modification of the pedestal according specifications G.188.

Scope:
- Assume the owner has arranged a technician (Elekrikom) to supervise the works.
- Assume the vessel is on the dock blocks.
- Assume the barge loading gantries are reachable via a ladder with cage installed on the side of the gantries.
- Erect / remove staging on PS aft barge loading gantry (frames 55 ~ 60). Assume 5 m³.
- Disconnect / connect the electrical connection of the radome unit and two (2) navigation lights.
- Remove / refit the V-sat dome and the antenna unit from the PS aft barge loading gantry. Bolts are on torque (M18 290 Nm, cross wise) and with Loctite 271. Store the unit at the yard secure and safe warehouse. Fabricate a sturdy wooden casing if no decent location is available (60” dome).
- Remove the navigation lights, remove / refit cable with owner supplied new cable.
- For hoisting manoeuvres, use the yard crane. Use proper slings.
- Assume the cable trunk in the accommodation stair casing is opened by the crew.
- Remove the electrical cabling, running from the antenna unit, below upper deck, down again via the cable trunk in the accommodation stair casing, until
the tween deck level. Assume cable length of 100 m. Include opening / closing of 5 MCT units. Re-install two (2) new cables, owner supplied.

- Including all means like permits, crane, rigging foreman, etc.

Lump sum price: .../

**S.123. INMARSAT Fleet 77 radome remove and dispose.**

**Drawings:**

- **LD 11-00-158** Platform + foundation dome V-SAT
- **LD 11-00-A000482** Foundation dome VSAT + NAV lights on gantry barge loading PS
- **LD 11-00-A000588** Cable trays on VSAT mast PS
- **Seatel 123628** radome assembly, 60 inch, general arrangement.
- **Seatel 1226663** radome installation arrangement.
- **Seatel 126936** system, 4006RZ-23, 60 inch radome.

**Scope:**

- Assume the vessel is on the dock blocks.
- Assume the barge loading gantries are reachable via a ladder with cage installed on the side of the gantries – **no staging is required**.
- Disconnect / connect the electrical connection.
- Remove the obsolete INMARSAT Fleet 77 radome and antenna dish unit from the SB fore barge loading gantry. Foundation bolts M12 can be cut. Dispose of the unit.
- For hoisting manoeuvres, use the yard crane.
- Assume the cable trunk in the accommodation stair casing is opened by the crew.
- Remove the electrical cabling, running from the antenna unit, below upper deck, up again via the cable trunk in the accommodation stair casing, until the lower bridge deck level. Assume cable length of 100 m. Include opening / closing of 5 MCT units.
- Including all means like permits, crane, rigging foreman, etc.

Lump sum price: .../

**S.124. Shift V-sat radome**

**Drawings:**

- **LD 11-00-158** Platform + foundation dome V-SAT
- **LD 11-00-A000482** Foundation dome VSAT + NAV lights on gantry barge loading PS
- **LD 11-00-A000588** Cable trays on VSAT mast PS
- **Seatel 123628** radome assembly, 60 inch, general arrangement.
- **Seatel 1226663** radome installation arrangement.
- **Seatel 126936** system, 4006RZ-23, 60 inch radome.

**Scope:**

- Assume the barge loading gantries are reachable via a ladder with cage installed on the side of the gantries – **no staging is required**.
- Assume Fleet 77 already removed acc to spec-item S123.
- Disconnect / dismount the VSAT radome unit on PS-aft barge loading gantry.
• Install the VSAT radome on the SB-fwd barge mooring gantry (same type of gantry and foundation of Fleet 77 can be used without modifications – bolts M18 to 290 Nm & Loctite)

• Assume the cable trunk in the accommodation stair casing is opened.

• Remove the old electrical cabling from PS-aft location to the Dry Store (3 cables of appr. 100m each), running from the antenna unit, below upper deck, down again via the cable trunk in the accommodation stair casing, until the tween deck level. Include opening / closing of 5 MCT units.

• Install a new set of cables (Owner’s supply) from SB-fwd location to measuring room below the wheelhouse. For cable run: same conditions as old cables but cables with a total length of approx. 150m.

• Including all means like permits, crane, rigging foreman, etc.

Lump sum price : …/
T. ANCHORS AND CHAINS

T.1. Anchors and anchor chains

Drawings:
- IHC 01175-0313-010 sheet 4 cross sections over spud carrier well
- Anchor weight: 2 x 2.7 ton
- Chain thickness: 2 x dia 48 mm grade Q3
- Chain length: PS 9 shackle, SB 10 shackle.

Lower the chain and anchor to the dock floor.
- Clean by h.p. washing.
- De-rusting by griblasting to SA 2.5 or water jetting (WJ2).
- Inspection-, measuring report to be made.
- Coating renewal of the chains, anchors with 2 layers of epoxy paint, owner supplied.
- Mark the shackles ends with stainless steel strips / wire and white and red paint, owner supplied.
- Inspection by B.V. surveyor

Price per chain (SA 2 ½) : …/pc
Price per chain (WJ2) : …/pc
Welding of loose studs, per stud : …/pc

Turning of the anchor chain
Disconnect anchor chain, in the chain locker and connect this end to the anchor.
Incl. eventual necessary staging, lighting, ventilation, open/close manhole covers.

Price per chain : …/pc

Free up swivel
Suppose anchor and chain laid out at dock bottom.
Disconnect anchor, lift out of dock bottom, transport to shop, heat and free up anchor swivel and on completion, transport to dock bottom and reconnect.

Price per swivel : …/pc

T.2. cleaning chain locker

Drawing:
- IHC 01175-0323-030 construction plan foreship
- IHC 48158 sheet 2 gratings for chainlockers

The chain lockers are located between frames 130 - 133 and between main and fore castle deck. PS chain locker is adjoining two (2) diesel oil tanks.

Scope:
- Assume both anchor chains are lowered on the dock floor by the crew.
• Open / close fore (4) manhole covers, two on upper deck, two on main deck and renew packings.
• For access to the bottom, hoist and secure sidewise the grating for the chain, 2 x 1.35 m 500 kg.
• PS and SB chain lockers remove mud and wash out with fresh water.
• Volume per chain locker is 13.5 m³.
• Inclusive, ventilation, temporary lights, permits, tools, etc.

Price : .../PS & SB locker
Price for removal and disposal of mud .../m³

T.3. Dredge anchor boom

Drawings:
• IHC 5242496 Arrangement Anchor boom Installation
• IHC 5242824 Arrangement Suspension Bracket
• IHC 5827002 Parts list Suspension Bracket
• IHC 01175-1072-100 Rigging List
• IHC 5242825 Arrangement anchorboom pivot

T.3.1. Removal / refitting of anchor boom

• Assume the anchor boom is in sea fast position as shown on drawing 5242496.
• Erect a staging.
• Lift, secure the sheave block. Remove the anchor hoisting wire - reel on the ship’s winch. Disconnect, remove sheave block – send to the workshop.
• Disconnect, remove the 3 hanger wires: one wire D109mm x 35.84m, one wire D32mm x 22.92m & one wire D32. Coil up, clean and grease the wires.
• Store in a safe place.
• Disconnect the electrical cables at lower side of the boom
• Disconnect, remove the horizontal wire sheave dwg 5242825 pos 201.
• Disconnect the locking pos 212.
• Lift up the anchor boom complete with pivot and transport to workshop / wharf side.
• Remove the pin 5242855 pos 217. Assume tight fit and hydraulic jacks are needed to push out the pin. Remove the pivot assemble.
• Disconnect, remove the sheave.
• Clean, dress up all parts. Measure all bores and bushes. Make a report. Reassemble with ship’s new bearings and seals.
• Measure the straightness of the boom – make a report.
• De-rust the damaged paint system to ST3 on the boom, the pivot assemble and deck plating under the pivot. Paint with 3 layers ship’s supplied paint.
• After repairs, return the boom & re-install.

Price per boom : .../
T.3.2. Overhaul of anchor boom and pivot.
Assume the anchor boom is removed and in the workshop as per item T3.1.

T.3.2.1. Overhaul of sheaves and rollers
- Disconnect, remove the vertical sheave mounted on the anchor boom.
- Clean, dress up bore and shaft.
- Re-install the sheave with ship’s new bearings and seals.
- Remove the guide rollers 5242825 pos 227. Dismantle completely. Clean, dress up all parts. Re-assemble with ship’s new parts

Price per boom :

T.3.2.2. Renewal of bush ship’s side.
- Assume the bush 5242825 pos 214 is worn and need to be replaced.
- Crop off the old bush. Remove the bush and dress up the vertical pivot shaft.
- Measure the pivot shaft, machine the ID and OD of a new ship’s supplied bush. Heat the bush and install as per instructions on the drawing.

Price per bush :

T.3.2.3. Renewal of bronze bush in pivot housing.
- Assume the bronze bush 5242825 pos 215 is worn and need to be replaced.
- Crop out the old bush. Remove the bush and dress up the vertical pivot bore.
- Measure the pivot bore, machine the ID and OD of a new ship’s supplied bush.
- Shrink fit the bush by use of nitrogen.

Price per bush :

T.3.2.4. Overhaul of suspension bracket retaining wires
IHC 5242824 Arr. Suspension bracket for anchor boom retaining wires
- Assume the wires are removed under item T3.1.
- Erect a staging – 16 m. above the upper deck
- Disconnect, blank off the grease lines
- Remove the pin 5242824 pos 102 and block pos 101. Transport to workshop.
- Clean dress up parts and bushes. Measure the pin and bushes. Make a report.
- Re-assemble with owner’s new parts and filled with grease.

Price per bracket :
Additional price to renew bush pos 103 by ship’s spare :

T.3.2.5. Repair internal welds of anchor boom
LD 15-00-001 Arrangement hook for pawl
- The internal welds of the hook dwg LD 15-00-001 are to be re-welded.
- Cut a temporary access opening in the side the boom : diameter 600mm
• Arrange gas freeing, ventilation, lighting...
• Gauge out the internal welds of the hook pos 1 to the boom plate.
• Re-weld the weld of the hook to the top plate until a full penetration is realized. Weld is shown on drawing LD 15-00-001 – welding detail X.
• Carry out 100 % UT.
• Close the access hole and weld full penetration – using backing strip.

Price for the SB boom only : ...

**T.3.2.6 Skimming pivot foundation anchorboom**

IHC 5242825 Arrangement anchorboom pivot

• Assume the anchorboom and bush on the ship’s side are removed under item T.3.2.2
• Assume that the vertical pin 5242825 pos 211 welded in the vessel’s deck is worn and/or damaged on the outside diameter
• The vertical pin is to be skimmed in situ until the damages on the shaft are removed
• The horizontal part of the pin just above the deck deck to be skimmed as well.
• Vertical pin diameter 510mm x 540mm height

Price per pivot: ...

**T.4. Anchor boom masts**

Drawings:
• IHC_5242499_1_G Arrangement anchorboom mast

Each anchor boom mast is equipped with one upper and lower sheave for guiding of the wires between the hauling winch and the anchor booms.

**T.4.1. Overhaul of lower/upper wire sheave (drwg IHC_5242499)**

Drawings:
• MP_10-00-A001809_1 Wire sheave 560x140 with collar bushes for wire dia26

Scope:
• Crop/Refit weld on locking plate pos406
• Remove/Refit shaft locking plate pos405
• Remove/Refit shaft pos 404 to take out sheave pos 403
• Clean, dress up all parts and make measurements of shaft, bushes and bores.
• Sandblast and paint sheave.
• Re-assemble sheave and for parts out of tolerance use new ships spares. Bushes are press fit.

Price per wire sheave. … / lumpsum
Price per shaft pos 404. …/pc
Price per collar bush pos 2. …/pc
T.4.2. Overhaul tumbling sheave block of upper wire sheave

Drawings:
- IHC_5826913_1_A Sheave block
- IHC_5876120_1 Shaft

Scope:
- Assume sheave is overhauled under section “T.4.1”
- Remove/Refit collar shaft pos409
- Clean, dress up all parts and make measurements of shaft, bushes and bores.
- Sandblast and paint sheave block.
- Re-assemble sheave block and for parts out of tolerance use new ships spares. Bushes are press fit.

Lumpsum. …/lumpsum

Price per collar shaft pos409. …/pc

T.100. Fabricate & install hoisting eyes on the anchor boom

LD 15-00-003 Arrangement and detail hoisting eye plates on anchor boom

Assume that the anchor boom is removed under item T3.1 and in the workshop
Fabricate 4 hoisting eye plates as per detail B in drawing LD 15-00-003
Fit, adjust, and weld the 4 eye plates as per drawing. Carry out NDT crack test.
Modify the railing pipes in way of the 4 eye plates in such a way that lifting slings and shackles can be connected.
De-rust the eye plates and damaged paint system in way to ST3 and apply 3 layers ship’s supplied paint

Price per anchor boom. …/
U. DREDGING PIPELINES

Drawings:
- LD 01-01-163 arrangement dredge lines pump room
- LD 01-02-166 Arrangement discharge pipeline

U.1. Suction line on ladder

All repair to be carried out with the ladder in the horizontal sea fasten position afloat or in dry-dock

Drawings:
- IHC 5242839 General arrangement cutter ladder
- IHC 5242837 Arrangement Suction and delivery pipes on cutter ladder

All LDxxx numbers refer to the position numbers on this drawing.
- LD 01-02-166 Arrangement discharge pipeline
- LD 01-01-026 Double walled straight pipe
- IHC 524.2838 Supports pipeline in ladder

U.1.1. Replace the suction mouth pos. 200 on the ladder.

Drawings:
- IHC 5242762 Suction Mouth Complete
- IHC 5474736 Cone plate on ladder top
- IHC 5242768 Cutter ladder First Section

- Repair to be carried out with ladder in High or Low Turning Point and raised in the sea fast position, in dry-dock or afloat.
- Erect a staging
- Crop a welded protection cap over the bottom section of 120° of the first flange pair (suction mouth + bend 201).
- Disconnect / connect bolts between Suction mouth and bend pos. 201. (28 x M36 Bolts)
- Crop the doubler (wear) plate pos. 3 (Drwg. 547.4736) of the cutter shield i.w.o. both sides of the suction mouth.
- Gouge the welding between suction mouth and cutter shield.
- Cut the 2 welded brackets between the side of the suction mouth and the inside of the ladder.
- Weld necessary hoisting lugs on the suction mouth.
- Lower the suction mouth onto the dock floor or on a yard’s supplied pontoon, using a crane (the hoisting sling on the back of the suction mouth can pass through the top of the ladder!)
- Transport the suction mouth to shore.
- Fit new Owner supplied suction mouth using 2 fixed references:
  - The segment (pos. 9 and 10 Drw. 5242762 SH2) welded onto the bottom of the suction mouth has to be aligned with the rest of the cutter shield.
  - The fixed flange of the suction mouth has to match the corresponding flange of bend pos. 201 (first pipe of the suction line).
• Weld 2 brackets between the suction mouth and the inside of the ladder.
• Weld suction mouth to the cutter shield and restore the wear doublers on the cutter shield (pos. 3 Drw. 547.4736) (Owner supplied)
• Weld a new protection cap over the bottom of the first pair of flanges behind the suction mouth.

Lump sum : ...

**U.1.2. Renewal of bend pipe LD201**
- Assume the suction mouth pos LD200 is removed under item U1.1.
- Renew the bend pipe ID900 x 9 deg by owner’s supplied new bend pipe.

Price per bend pipe : ...

**U.1.3. Renewal or turning of the suction line of underwater pump in the cutter ladder**
- Assume the suction mouth LD200 is removed under item U1.1
- Assume the pipe piece LD211 is removed by the ship’s crew.
- Erect a staging.
- Supply, fit and weld temporary hoisting eyes on ladder frame and/or pipe pieces.
- Dismantle / refit the pipe clamps dwg 5242838 detail C & D (3 pieces)
- Dismantle, remove the pipe pieces LD201, LD202, LD203, LD204, LD206, LD207, LD209, the filling flange LD208, the branch pipe LD205 and the bend pipe LD210. All these parts are to be removed via the open underside of the cutter ladder or via the opening in the bulkhead frame 15 direction to fore ship.
- Turn the old pipes 120 degrees and refit or install owner’s supplied new pipes.
- Clean, dress up the face of the flanges prior mounting.
- After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum price : ...

**U.1.4. Turning of horizontal delivery line underwater pump ladder**
- Erect a staging on top of the ladder deck
- Disconnect, remove the pressure transmitter. Refit and reconnect afterwards
- Open / close the pipe clamps dwg 5242838 detail F (3 pieces)
- The pipe pieces LD214, LD215, LD216, LD217, Ld218 and the filling flange LD219 are to be turned 120 degrees. The pipes to be disconnected, turned and re-connected. Yard can turn several pipe pieces still connected in one time.

Lump sum price : ...

**U.1.5. Renewal of horizontal delivery line underwater pump ladder**
- Erect a staging on top of the ladder deck
- Disconnect, remove the pressure transmitter. Refit and reconnect afterwards
- Open / close the pipe clamps dwg 5242838 detail F (3 pieces)
• Disconnect, remove the pipe pieces LD212, LD214, LD215, LD216, LD217, Ld218, the bend pipe LD213 and the filling flange LD219.
• Install new owner’s supplied pipe pieces and filling flange
• Clean, dress up the face of the flanges prior mounting.
• After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum price : 

U.1.6. Renewing or turning of inclined part delivery line underwater pump in the ladder
• Erect staging
• Open / close the most forward pipe clamp dwg 5242838 detail F.
• Support the pipe LD217. Remove the pipe pieces LD218, LD222 and bend pipe LD220.
• Weld temporary supports to pipe pieces LD228/1, before disconnecting flanges.
• Cut loose / reweld 2 pipe brackets welded from pipe pos. 223 to the deck plate of the ladder. Clean and grind all welding remnants before re-welding. Brackets are welded to approx. 1/3 of pipe circumference.
• Remove / refit the pipe clamp dwg 5242838 section KK
• Disconnect and remove the pipes LD223, LD224, LD225, 226 and bend pipe LD227 from the ladder and land ashore.
• Turn and refit or re-install owner’s new supplied pipe pieces as per owner’s instruction.
• Clean, dress up the face of the flanges prior mounting.
• After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum : 

U.1.7. Renew the suction hose while cutter ladder is in upper position
• Assume the cutter ladder is in the upper turning point
• Erect staging
• The suction hose LD228/1+2+3 is connected to the ladder and ship’s bulkhead penetration by means of flange connection. Disconnect the suction hose pos LD2218/1, LD228/2, LD228/3 from both sides and remove. Assume that the ship’s crew will lower the ladder a bit for better access.
• Note that the suction hose if fitted with steel inner liners and is not very flexible.
• Install a new owner’s fully prepared suction hose assembly.

Lump sum price : 

U.1.8. Renew the suction hose while cutter ladder is in the lower position
IHC 5242769 Connection delivery pipeline cutter ladder on ship
• Assume the cutter ladder is in the lower turning point
• Erect staging
• The suction hose LD228/1+2+3 is connected to the ladder penetration by means of a flange connection and to the ship’s side by means of a sliding pieces as per drawing 5242769.3. Disconnect the suction hose pos LD2218/1, LD228/2, LD228/3 from the ladder pipe. Assume that the ship’s crew will lower the ladder a bit for better access.
• Disconnect the sliding piece at the upper deck. Lift out the sliding piece complete with the suction hose. Disconnect the holding arm 5242769 pos 312 from the sliding piece, connect to an owner’s supplied new sliding piece and suction hose.
• Note that the suction hose if fitted with steel inner liners and is not very flexible.

Lump sum price : .../ 

**U.1.9. Replace Vacuum Relief Valve**

**Drawings:**
- IHC 5242837 Arrangement Suction and delivery pipes on cutter ladder.
- IHC 5242839 General arrangement cutter ladder
- LD-01-01-193 Assembly / arrangement vacuum relief valve ND700

**Scope:**
- Erect a hanging staging platform under the valve : l*w = 3 x 1 m
- The vacuum relief valve is to be replaced. The valve is a hydraulic operated butterfly valve ID700
- Disconnect / connect hydraulic hoses Remove / reinstall electric sensor and connections
- Renew the vacuum relief valve by ship’s spare. Note the very difficult access to the space.

Lump sum : .../ 

**U.2. Suction inlet liner pipes**

**U.2.1. Renewal of upper suction inlet pipe LD058**
LD 01-02-166 Arrangement Discharge Pipeline System

- Works can only done in Dry-dock
- Assume that the suction hose LD228/1-2-3 is removed by ship’s crew and a blind flange is fitted on pipe LD057
- Erect staging (7.0 m above base)
- Support the valve pos 059 and delivery pipeline in the pump room.
- Disconnect, remove the blind flange & pipe piece LD057
- Disconnect, remove the bulkhead penetration pipe LD508.
- Install a new bulkhead penetration pipe with yard’s supplied new gaskets
- Turn & refit the pipe LD057 or install a new owner’s supplied pipe.
- Refit the blind flange.
- Clean, dress up the face of the flanges prior mounting.
- After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum price:

**U.2.2. Renew liner of Bulkhead penetration pipe pos. 1**

Drawings:
- LD 01-01-A006651 hull inlet lower turning point – connection ladder - ship
- LD 01-01-163 arrangement dredge lines pump room

The job will be done in the pump room.

**Scope:**
- Assume all spares are owner supplied.
- Assume the adjacent pipe pieces (pos 2, 3 and 4 / LD 01-01-163) and dredge valve (pos 525) have been removed according specs U.3.1.a.
- Remove / refit locking flange (pos 8 / LD 01-01-A006651)
- Gauge out the liner (pos 6). Gap between liner and pipe has been filled with mortar (pos 5).
- Clean out all cement of pipe by slamming and chipping. Dispose of it.
- Rig in the new liner, and position by means of four (4) jacking bolts (pos 17-18). Include cutting / welding of new bolts and drilling holes. Transport new liner from owner’s container stored at the yard.
- Fit the locking flange (pos 8) and thight the bolts (pos 16).
- Open / close the two (2) filling flanges (pos 11). Mix the cement (owner supplied) according manufacturers instructions and poor the cement through the filling opening. Leave drying for 24 hrs.
- Release the tension on the jacking bolts by unscrewing 2 turns. Cut off the bolts and weld close.
- Including hoisting and riggin gear, permits, lights, ventilation, etc.

Lump sum.

**U.2.3. sliding piece pos 229, adjust mating with dredge line pos 001.**

Drawings:
- IHC 5242769 connection delivery pipeline (ladder on ship)
- IHC 5242796 sliding piece
- IHC 5826670 parst list connection delivery pipeline

Works will be done in the ladder well.
Scope:

- Remove / refit stretching rod (pos 312 / IHC 5242769) with sliding piece (pos 305).
- Erect / remove staging, assume 40 m3. Measure and report weardown of sliding path (section C-C/ IHC 5242769) over complete length (pos 301 and 302).
- Lower / hoist sliding piece (pos 305 / IHC 5242769) and verify mating with new pipe flange (pos 303). Assume four (4) trials.
- Cut off, supply new and weld filling plates (pos 3, 4) on sliding piece. Grind wedges to increase mating with pipe flange during trials.
- Including welding in situ of sliding path, assume two (2) welders for two (2) shifts.
- Including yard crane, permits, lights, etc.

Lump sum.

U.2.4. Reconditioning sliding piece pos 229
IHC 5242796 Delivery Pipe

- Assume the sliding piece pos 229 is removed by ship’s crew or other repair item
- Clean, dress up the flanges
- Remove the locking ring pos 2. Clean, dress up boltholes and face of the flange.
- Install a new owner’s supplied ring pos 2 and O-ring pos 306

Lump sum price : ..../ Sliding piece

U.2.5. Renewal liner sliding piece pos 229
IHC 5242796 Delivery Pipe

- Assume the sliding piece pos 229 is removed by ship’s crew or other repair item
- Clean, dress up the flanges
- Remove the locking ring pos 2. Dress up the face. Assume some slight wear. Build up the worn parts and grind smooth.
- Crop out the liner pos 1. Break out the Cement pos 5. De-rust the inside of the outer pipe, paint with one layer ship’s supplied paint.
- Install a new owner’s supplied liner pos 1, centre the liner by yard’ supplied centring bolts. Supply, fit two blanking plates at both sides of the pipe piece. Fill the gap between outer and liner pipe with yard’s supplied shrink free mortar.
- Install a new owner’ supplied flange pos 323. Secure by tack welding.
- Install a new owner’s supplied ring pos 2 and O-ring pos 306

Lump sum price : ..../ Sliding piece
U.3. Gate valves

U.3.1. Pump room, hull inlet dredge valve ID 900 mm, 15 bar, upper position 528 / lower position 525.

Drawings:
- IHC 01175-1117-010 sheet 1 ladder well end part

The vessel has two (2) valves installed, inside the pump room, in way of frames 38 ~ 40. Access for the valve to the pump room is via two (2) hatches.

Weight: 3.7 ton
Dimensions: 4.5 x 1.5 x 0.7 m
ID: 900 mm
Working pressure: 15 bar

U.3.1.a gate valve remove / refit & overhaul

Drawings:
- LD 01-01-163 arrangement dredge lines pump room
- LD 01-02-225 rubber ring gate valve, ID 900 mm, 15 bar
- LD 01-02-226 upper valve body, ID 900 mm, 15 bar
- JU 01-02-033 lower valve body, ID 900 mm, 15 bar

Scope:
- Assume the vessel is dry docked.
- Erect / remove staging, assume 10 m3. Include three (3) times modification.
- Disconnect / connect hydraulic and electric connection from the cylinder. Supply, install blind flanges on the hydraulics.
- Disconnect / connect the flushing connection on the dredge valve, DN 60 mm. Renew gaskets / bolts – yard supply.
- For access, remove / refit the adjacent pipe pieces (pos 2, 3 and 4 / LD 01-01-163). Weld / dye-check / remove pad eyes on pipes. Hoist pipes in / out pump room.
- Disconnect / connect the gate from the yoke. Open / close hatches (pos 107 / LD 01-02-225).
- Remove / refit the hydraulic cylinder (pos 173 / LD 01-02-225) in situ to facilitate lifting out upper and lower valve body.
- Disconnect / connect, remove the upper body of the sluice valve (pos 103 / LD 01-02-225).
- Disconnect, remove the lower body (pos 101 / LD 01-02-225).
- Hoist out from pump room and transport all valve components between ship and yard workshop.
- Dismantle / assemble all parts, including the two (2) liners (pos 106 / LD 01-02-225) and combi-rings (pos 117). Clean, dress up all parts, thread holes, etc. Remove sand from the housings. Box up the valve with new owner’s supplied gaskets, rubber rings, liners, bolts, etc.
- Carry out function test in the workshop with yard’s supplied hydraulic unit. Witnessed by the ships captain or fist officer. Issue overhaul report for class.
• Include transport and un-seafastening of spare valve housings from owners container stored at yard.
• Including all tools, transport, crane, staging, permits, reports, torch heating, etc.

Lump sum. …/valve

U.3.1.b. Gate valve, hydraulic cylinder overhaul

Drawings:
• LD 01-02-220 hydraulic cylinder for gate valve, ID 900 mm, 15 bar

Test pressure bottom side 280 bar.

Scope:
• Assume all spares owner supplied.
• Assume the cylinder is available at the yards workshop.
• Disassemble / assemble the hydraulic cylinder and renew all seals, guiding, O-rings, bushes, bearings, etc. Use Loctite where required.
• Verify the trueness of the cylinder rod on a lathe machine.
• Perform pressure test for 10 minutes in presence of chief engineer or first engineer.
• Degrease and power brush the unit to ST3 according specs E.6. and renew the coating, 3 layers of owner supplied paint.
• Conserve the hinge bore holes with grease.
• Including all tools, transport, crane, staging, permits, reports, torch heating, etc.

Lump sum. …/cylinder

U.3.1.c. Upper and lower valve housing, grit blasting & coating

Drawings:
• LD 01-02-226 upper valve body, ID 900 mm, 15 bar
• JU 01-02-033 lower valve body, ID 900 mm, 15 bar

Scope:
• Assume the valve is dismantled and available at the yards workshop.
• Grit blast the housings to SA 2.5 according specs E.8., grit blast also the inner side of the lower valve body, in way of the rubber seal seating.
• Coating renewal according specs F.10. with ship’s supplied paint. Coating only after welding repair.
• Inclusive all means like transports, etc.

Lump sum. … / upper and lower housing

U.3.1.d. lower valve body, recondition of backing ring seats

Drawings:
• JU 01-02-033 lower valve body, ID 900 mm, 15 bar
Scope:
- Assume the valve is dismantled, grit blasted and available at the yards workshop.
- Assume the rubber seal seating is worn 10 mm deep on complete circumference (pos 70, dia 1154 mm and dia 1162 mm, thickness 5 mm, section C-C). Build up the worn surface by welding with electrode AWS E7018-1. Machine to new-build dimensions. Issue dimensional report.
- Inclusive all means like, fabrication of calliper, etc.

Lump sum. … / lower valve housing

U.3.3. Discharge valve no. LD254, ND900m
LD- 1-2-166 SH1 Arrangement Discharge Pipeline System II
IHC 5243937 General Arrangement Gate Hydraulic operated

U.3.3.a Remove / refit valve no LD254, overhaul in the workshop
- Erect a staging
- Disconnect / connect hydraulics and electric connection from the cylinder. Supply, install blind flanges on the hydraulics.
- Disconnect, move aside the bend pipe LD053 and pipes LD129
- Remove the flushing connection. Afterwards re-install with new gaskets / bolts – yard supply.
- Disconnect, remove the sluice valve. Transport to the workshop.
- Dismantle the valve completely. Clean, dress up all parts. Remove sand from the housings.
- Dismantle the mechanical position indication system. Clean, dress up or renew parts by ship’s spares if required.
- Return and re-assemble the valve with new owner’s supplied gaskets, rubber rings, liners... Reconnect the pipes.
- Carry out function test in the workshop with yard’s supplied hydraulic unit.
- De-rust the damaged paint system to ST3 & full paint the valve with 3 layers ship’s supplied paint.

Price per valve ND900 : …./valve

U.3.3.b. Overhaul of hydraulic cylinder / renewal rod valve no. LD254
- Assume the valve is in the workshop as per spec a.
- Remove the hydraulic cylinder from the casing, dismantle the cylinder.
- Cylinder 280x140x1200mm
- Clean, dress up all parts
- Box-up with new ship’s supplied seals, cylinder rod. Pressure test in workshop up to 180 bar

Price per cylinder valve dia 900 : …./pc
U.3.3.c. Grit blasting & painting of housings valve no LD254
Same works as per item U3.1.c

Price for upper housing : …./pc
Price for lower housing : …./pc

U.3.3.d. Built up worn rubber ring seats valve no LD254
Same works as item U3.1.d.

Price per lower housing : …./

U.3.4. Valve no. LD252, ND800m
LD- 1-2-166 SH1 : Arrangement Discharge Pipeline System II
HU 01-01-044 : General Arrangement Gate valve type RR-080-03-08-08

U.3.4.a Remove / refit valve no LD252, overhaul in the workshop
- Erect a staging
- Disconnect / connect hydraulics and electric connection from the cylinder. Supply, install blind flanges on the hydraulics.
- Disconnect, move aside the bend pipe LD401 and pipes 118 & 400
- Remove the flushing connection. Afterwards re-install with new gaskets / bolts – yard supply.
- Disconnect, remove the sluice valve. Transport to the workshop.
- Dismantle the valve completely. Clean, dress up all parts. Remove sand from the housings.
- Dismantle the mechanical position indication system. Clean, dress up or renew parts by ship’s spares if required.
- Return and re-assemble the valve with new owner’s supplied gaskets, rubber rings, liners,… Refit and reconnect the pipes.
- Carry out function test in the workshop with yard’s supplied hydraulic unit.
- De-rust the damaged paint system to ST3 & full paint the valve with 3 layers ship’s supplied paint.

Price per valve ND800 : …./valve

U.3.4.b. Overhaul of hydraulic cylinder / renewal rod valve no. LD252
Assume the valve is in the workshop as per spec a.
- Remove the hydraulic cylinder from the casing, dismantle the cylinder.
- Cylinder 100x56x965mm
- Clean, dress up all parts
- Box-up with new ship’s supplied seals, cylinder rod. Pressure test in workshop up to 180 bar

Price per cylinder valve dia 800 : …./pc
U.3.4.c. Grit blasting & painting of housings valve no LD252
Same works as item U3.1.c

Price for upper housing : 
Price for lower housing : 

U.3.4.d. Built up worn rubber ring seats valve no LD252
Same works as item U3.1.d.

Price per lower housing : 

U.3.5. Inlet valve no. LD119, ND800m
LD- 1-2-166 SH1 : Arrangement Discharge Pipeline System II
HU 01-01-044 : General Arrangement Gate valve type RR-080-03-08-08

U.3.5.a. Remove / refit valve no LD119, overhaul in the workshop
- Erect a staging
- Disconnect / connect hydraulics and electric connection from the cylinder. Supply, install blind flanges on the hydraulics.
- Disconnect, move aside the bend pipe LD122 & pipe LD403
- Remove the flushing connection. Afterwards re-install with new gaskets / bolts – yard supply.
- Disconnect, remove the sluice valve. Transport to the workshop.
- Dismantle the valve completely. Clean, dress up all parts. Remove sand from the housings.
- Dismantle the mechanical position indication system. Clean, dress up or renew parts by ship’s spares if required.
- Return and re-assemble the valve with new owner’s supplied gaskets, rubber rings, liners,... Refit and reconnect the pipes.
- Carry out function test in the workshop with yard’s supplied hydraulic unit.
- De-rust the damaged paint system to ST3 & full paint the valve with 3 layers ship’s supplied paint.

Price per valve ND800 :

U.3.5.b. Overhaul of hydraulic cylinder / renewal rod valve no.
LD119
- Assume the valve is in the workshop as per spec a.
- Remove the hydraulic cylinder from the casing, dismantle the cylinder.
- Cylinder 100x56x965mm
- Clean, dress up all parts
- Box-up with new ship’s supplied seals, cylinder rod. Pressure test in workshop up to 180 bar

Price per cylinder valve dia 800 :
**U.3.5.c. Grit blasting & painting of housings valve no LD119**
Same works as per item U3.1.c

Price for upper housing : ..../pc
Price for lower housing : ..../pc

**U.3.5.d. Built up worn rubber ring seats valve no LD119**
Same works as item U3.1.d.

Price per lower housing : ..../

**U.3.6. Regulating valves barge loading on upper deck**
LD- 1-2-141 : Arrangement barge loading system
LD-01-02-097 : Arrangement regulating valve ND900

**U.3.6.a Remove / refit barge loading valve no LD070 (SB) or no LD063 (PS), overhaul in the workshop**
- Erect a staging
- Disconnect / connect hydraulics and electric connection from the cylinder. Supply, install blind flanges on the hydraulics.
- Disconnect, remove turnbuckles between pipe and gantry foundation
- Disconnect, move aside the connection bend pipe LD069 (SB) or LD031 (PS)
- Disconnect, remove the sluice valve. Transport to the workshop.
- Dismantle the valve completely. Clean, dress up all parts. Remove sand from the housings.
- Dismantle the mechanical position indication system. Clean, dress up or renew parts by ship’s spares if required.
- Return and re-assemble the valve with new owner’s supplied gaskets, rubber rings, liners,.. Refit and reconnect the pipes.
- Carry out function test in the workshop with yard’s supplied hydraulic unit.
- De-rust the damaged paint system to ST3 & full paint the valve with 3 layers ship’s supplied paint.

Price per valve ND900 : ...../valve

**U.3.6.b. Overhaul of hydraulic cylinder / renewal rod valve no. LD070 or LD063**
- Assume the valve is in the workshop as per spec a.
- Remove the hydraulic cylinder from the casing, dismantle the cylinder.
- Cylinder 100x56x965mm
- Clean, dress up all parts
- Box-up with new ship’s supplied seals, cylinder rod. Pressure test in workshop up to 180 bar

Price per cylinder valve dia 800 : ...../pc
U.3.6.c. Grit blasting & painting of housings valve no LD070 or LD063
Same works as per item U3.1.c

Price for upper housing (in- & outside) : \( \ldots \)/pc

**U.4. Pipelines in pump room**

Drawings:
- LD 01-01-163 arrangement dredge lines pump room

**U.4.1. Dredge line 1, renew complete pipe**

Drawings:
- IHC 01175-1117-010 sheet 1 ladder well end part
- IHC 5242769 connection delivery pipeline (ladder on ship)
- IHC 5242796 sliding piece
- IHC 5826670 parst list connection delivery pipeline
- LD 01-01-A006651 hull inlet lower turning point – connection ladder - ship
- LD 01-01-163 arrangement dredge lines pump room

This job involves complete renewal of double walled pipe line (pos 1 / LD 01-01-163). The pipe line is a bulkhead penetration in way of frame 37, with pipe centre line 1700 mm above base. Works will be done in the ladder well and the pump room.

Scope:
- Erect / remove staging in ladder well, assume 20 m3.
- Assume the adjacent pipe pieces (pos 2, 3 and 4 / LD 01-01-163) and dredge valve (pos 525) have been removed according specs U.3.1.a.
- Cut out ring (pos 3 / LD 01-01-A006651) from bulkhead frame 37. Ring is scrap.
- Cut six (6) brackets (pos 245 ~ 248 / IHC 5242769) between bulkhead frame 37 and pipe.
- Rig out existing pipe, rig in new owner supplied coated pipe and tag weld ring (Pos 3 / LD 01-01-A006651) to bulkhead frame 37.
- Assume the adjacent pipe pieces (pos 2, 3 and 4 / LD 01-01-163) and dredge valve (pos 525) have been installed according specs U.3.1.a.
- Tight bolts between pipe (pos 1 / LD 01-01-163) and dredge valve (pos 525).
- Supply new and tag weld six (6) brackets (pos 245 ~ 248 / IHC 5242769) between bulkhead frame 37 and new pipe.
- Lower / hoist sliding piece (pos 305 / IHC 5242769) and verify mating with new pipe flange.
- Full welding of ring (Pos 3 / LD 01-01-A006651) to bulkhead frame 37 (section D-D / IHC 5242769) and brackets (pos 245 ~ 248 / IHC 5242769) between bulkhead frame 37 and new pipe. Avoid deformation during welding.
Perform ultrasonic testing of complete circumference (dia 1.4 m), witnessed by ships crew.
- Perform power wire brushing to ST3 and coating according specs F.1.2. and F.10.
- Including yard crane, permits, lights, reporting, etc.

Lump sum. …/ pipe

**U.5. Piping on deck**

**LD 01-02-166 Arrangement pipe line system**

**U.5.1 Renewal of pipes between deck penetration and discharge valve**
- Erect a staging
- Renew the pipe pieces nos LD165, LD053 & LD129 by owner’s new pipes.
- Clean, dress up the face of the flanges prior mounting.
- After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum price : …. /

**U.5.2. Turning of delivery pipes above deck**
- Erect staging
- Open up / refit the pipe clamps
- Disconnect the pipes LD126, LD130, LD131, LD132, LD133, LD134, LD135, LD136, LD137, LD138, LD139, LD140, LD141 in several sections as per yard’s practice. Turn the pipes 120 degrees and reconnect.
- Clean, dress up the face of the disconnected flanges prior mounting

Lump sum price : …. /

**U.5.3. Renewal of delivery pipes above deck between frame 78 & 124**
- Erect staging
- Open up / refit the pipe clamps
- Renew the pipes LD126, LD130, LD131, LD132, LD133, LD134, LD135, LD136, LD137, LD138, LD139, LD140, LD141 and LD142 by owner’s new pipes.
- Clean, dress up the face of the disconnected flanges prior mounting
- After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum price : …. /

**U.5.4. Renewal of delivery pipes above deck between frame 124 & 157**
- Erect staging
- Open up / refit the pipe clamps
• Renew the pipes LD144, LD145, LD146, LD147, LD148, LD149, LD150, LD151, LD152, LD153, LD154, LD155, LD156, and LD157 by owner’s new pipes.
• Clean, dress up the face of the disconnected flanges prior mounting
• After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum price :

**U.5.5. Renewal of upper bend pipe LD158, pipe LD159 & turning gland LD160**

IHC 503575  Arrangement seating with swivelling bend

• Erect staging
• Renew the bend pipe LD158 & pipe pieces LD159 by new owner’s supplied pieces. Note that the pipe LD159 is connected with arm pieces to the gland platform.
• Clean, dress up the face of the disconnected flanges prior mounting
• After works, repair the damaged paint system by grinding to ST3 and painting 3 layer’s ship’s supplied paint.

Lump sum price :

**U.5.6. Renewal of the lower bend and turning gland**

IHC 503575  Arrangement seating with swivelling bend
IHC 503571  Seating for swivel bend

• Assume the pipe pieces LD158, LD159 are removed as per item U5.6.
• Erect a stagings in way including re-erection for access
• Support the lower bend pipe LD161 temporary.
• Disconnect, lift out the gland pipe LD160.
• Remove the securing of the axial pin pos 116 and crop off any additional stiffener. Lift out the bend pipe and transport to the workshop. Dismantle the bearings assemble and remove the shaft pos 121.
• Measure the bores of the pin in the foundation and make a report.
• Box up the owner’s new supplied bend pipe with the shaft pos 121 and ship’s supplied bearings and seals. Install the bend pipe and refit the gland pos LD160. Fill the bore in the foundation with grease. During lower of the bend assemble, install seals pos 114 & 117 and refit the securing plate pos 116.

Lump sum price.

**U.5.7. Repairs of bores vertical shaft lower bend**

IHC 503575  Arrangement seating with swivelling bend
IHC 503571  Seating for swivel bend

• Assume the lower bend pipe no. LD161 is removed under item U5.6. Assume the bores of the vertical shaft and need to be repaired : ring pos 165 & detail I.
Supply, fabricate a ring 503571 pos 165 and a bottom ring as per detail I in ST52-3.
Install temporary centring brackets at the outside of the rings and centring markings. Crop out the worn rings.
Fit, align, and weld the two new rings. The two rings to be aligned to the center of the hole in the upper platform. Prior welding of the rings at the outside, install the owner’s supplied new vertical shaft. Afterwards, remove the shaft and weld the inside.
Repair the paint system by grinding to ST3 and painting 4 layers ship’s supplied paint.

Lump sum price : …/ 

**U.6. Barge loading pipes**

Drawings:
- LD 01-02-141 Arrangement barge loading system
- LD 12-00-041 Arrangement gantry with barge loading pipe
- LD 12-00-042 Arrangement gantry with support pipe

Description
- The vessel is provided with two (2) barge loading pipes running alongside the ship, frames 54 ~ 95, one on PS and one on SB side. Each barge loading pipe is supported by two gantries and lowered / hoisted by means of wires and hydraulically powered winches and cylinders.
- PS and SB are mirror images, to simplify only SB is described. The barge loading pipe consists of (JDN LD 01-02-141):
  - A horizontal launder pipe assembly (pos 86, 97, 106 ~ 114 on SB),
  - A vertical dredge line assembly on aft side (pos 72 ~ 85 on SB),
  - A vertical support pipe assembly on forward side (pos 91 ~ 94 on SB).

**U.6.1. Launder pipe remove / refit and overhaul**

Drawing:
- LD 12-00-044 barge loading MAG/VER
- LD 01-02-141 Arrangement barge loading system
- LD 01-02-157 platform on shoot barge loading system
- LD 01-02-158 railing on shoot barge loading system
- LD 07-00-015 hydraulic pipe lines on launder
- LD 12-00-041 Arrangement gantry with barge loading pipe

Weight= 40 ton.  
Length = 30.2 m  
Height = 3.9 m  
Width = 1.9 m

**U.6.1.a. Launder pipe remove / refit**

- Assume all spares are owner supplied.
- The launder pipe has to be dismounted while lowered over the side with the vessel alongside the yard’s repair berth. To work on PS and SB at the same
time, the yard can arrange a repair pontoon, moored on the other side of the vessel. The launder pipe can be brought maximum 8 m from the vessel's side, same height level as the vessel's upperdeck (3 m above the WL at a draft of 5.2 m).

- Provide four (4) supports for the launder pipe assembly on the berth / pontoon. Assume crew operates the winches to lower / hoist the launder pipe on the yard supports.
- Remove / refit the bolts (pos 85A and 94A / LD 01-02-141).
- Disconnect / connect and plug ten (10) hydraulic pipe lines, dia 30 mm and four (4) electrical cables. Including opening and closing of pipe brackets.
- Weld / remove pad eyes, transport the launder pipe from / to vessel at a proper location.
- Cut / weld the twelve (12) flange brackets (pos 404, section F-F / LD 12-00-041).
- Including all means like, cranes, lifting gear, transports, etc.

Lump sum. …/ 

Additional for supply of twelve (12) brackets (pos 404, section F-F / LD 12-00-041). …/ set

**U.6.1.b. Barge loading launder pipe disassembly / assembly**

- Assume all spares are owner supplied.
- Assume job will be done under supervision of a ships officer.
- Assume the launder pipe has been brought in one piece to the yard’s workshop.
- Secure the pipe on the floor by welding support to the forward and aft lower valve body (pos 107, 114 / LD 01-02-141).
- Disconnect / connect and plug the hydraulic pipe lines and grease lines where the different pipe sections join. Remove the hydraulic lines and grease lines.
- Cut / weld the railing where the different pipe sections join. Remove the platform from the pipe sections (pos 8 / LD 01-02-157 SB).
- Cut / weld the twelve (12) flange brackets (pos 405, section G-G / LD 12-00-041).
- Cut / weld the twelve (6) flange brackets (pos 405, section H-H / LD 12-00-041).
- Cut / weld the twelve (7) flange brackets (pos 405, section I-I / LD 12-00-041).
- Cut / weld the twelve (7) flange brackets (pos 405, section J-J / LD 12-00-041).
- Loosen / tight the flange bolts and nuts.
- Upon completion of assembly of the launder pipe, perform a flushing of the hydraulic pipe lines and plug for transport to the ship according P.2.2.

Lump sum. …/

Additional for supply of thirty two (32) new flange brackets (pos 405 / LD 12-00-041). …/
U.6.1.c. Barge loading launder pipe, renew wear liners and general wear down

Drawings:
- JDN LD 01-02-123 bend Ø900 - 22°30’ nr.97 in launder
- JDN LD 01-02-125 flap in shoot pipe Ø900 by barge loading
- JDN LD 01-02-130 straight pipe Ø900x22 x lgth 1950
- JDN LD 01-02-131 straight pipe Ø900x22 x lgth 7530
- JDN LD 01-02-141 Arrangement barge loading system
- JDN LD 01-02-185 straight pipe Ø900x22 x lgth 7530.

Scope:
- Assume all spares owner supplied.
- Assume the launder pipe has been transported in one piece to the yards workshop according specs U.6.1. Place the pipe in one piece on supports enabling the opening of the three (3) flaps. Secure the pipe against rotating by stopper beams welding / cutting.
- Alternatively assume the launder pipe has been disassembled and the components are available at the yards workshop according specs U.6.6.
- Connect / disconnect a hydraulic unit to the two (2) dredge valves and lock the gate in open position and secure the gate by welding / cutting a flat bar in the valve. Assume 1” connection, 100 bar.
- Renew all the liner plates, inclusive cutting and welding. Ventilate the pipe during the repairs.
- Inclusive of welding on gaps between wear liners, pre-heat 100 C ~ welding with AWS E7018 ~ welding with hard facing 400 HB.
- Include one hundred (100) man hours for welding on various locations to build-up wear and tear according specs G.1.1. of which 50 hours with electrode HB400 hardness.
- Inclusive all means like tools, consumables, ventilation, lights, permits, hoisting and rigging gear, etc.

Additional for delivery of the liners:
- Pos 3 on LD 01-02-185, 3 pieces, 409 kg
- Pos 7 on LD 01-02-185, 6 pieces, 1227 kg
- Pos 3 on LD 01-02-130, 1 piece, 107 kg
- Pos 7 on LD 01-02-130, 2 pieces, 319 kg
- Pos 3 on LD 01-02-131, 3 pieces, 409 kg
- Pos 20 on LD 01-02-131, 6 pieces, 1227 kg
- Pos 81 on LD 01-02-125, 2 pieces, 294 kg
- Pos 82 on LD 01-02-125, 1 piece, 294 kg
- Pos 77 on LD 01-02-125, 1 piece, 290 kg
- Pos 78 on LD 01-02-125, 2 pieces, 290 kg
- Pos 79 on LD 01-02-125, 1 pieces, 271 kg
- Material HRC35-45 elongation 10%

Lump sum for all liners. .../ 5140 kg
Unit price .../ kg

Drawings:
- LD 01-02-125 flap in shoot pipe Ø900 by barge loading

Scope:
- Connect / disconnect a hydraulic unit for open / closing the flap. Assume 1” connection, 100 bar.
- Remove / refit the protective caps (pos 62, 63). Cut / renew the chains (pos 31), stems (pos 80), shackles (pos 48, 57), taps (pos 67-68), rings (pos 94).
- Remove / refit the sheaves (pos 32), shaft (pos 34), bushes (pos 33).
- Remove / refit the yoke (pos 92), hydraulic cylinder (pos 56), shafts (pos 40, 39), renew bushes (pos 50, 70).
- Remove / refit hinge pin (assy 91, cut & weld), bush (pos 6) and flap (assy 93).

Lump sum for one (1) launder pipe with three (3) flaps. …/

Additional for supply of parts …/ set
- Chain (pos 31), 4 m.
- Bush (pos 33), 2 pieces.
- Shaft (pos 34), 2 pieces.
- Shaft (pos 39), 1 piece.
- Shaft (pos 40), 2 pieces.
- Bush (pos 50), 2 pieces.
- Protective cap (pos 62 ~ 63), 2 pieces.
- Tab for yoke (pos 67 ~ 68), 2 pieces.
- Ring (pos 94), 2 pieces.

Additional for supply of new yoke (pos 41 ~ 47) and cut existing / supply & weld new guides (pos 4). …/ set

Additional for supply of new flap (assy 093), hinge pin (assy 091), bush (pos 6) and cut / weld and supply new plates (pos 5). …/ set

U.6.1.e. Barge loading launder pipe, overhaul launder flap hydraulic cylinder.

Drawing:
- Hendrickx 972872 cylinder D60-80-900 / 1223

Hydraulic cylinder:
- Piston dia 80 mm.
- Piston rod dia 60 mm.
- Stroke 900 mm.
- Weight 100 kg.
- Test pressure 200 bar.
- Double acting.
Scope:

- Assume all spares owner supplied.
- Assume the cylinder is available at the yards workshop.
- Disassemble / assemble the hydraulic cylinder and renew all seals, guiding, O-rings, bushes, bearings, etc. Use Loctite where required.
- Verify the trueness of the cylinder rod on a lathe machine.
- Perform pressure test for 10 minutes in presence of chief engineer or first engineer.
- Degrease and power brush the unit to ST3 according specs E.6. and renew the coating, 3 layers of owner supplied paint.
- Conserve the hinge bore holes with grease.
- Including all tools, transport, crane, staging, permits, reports, torch heating, etc.

Lump sum.

cylinder

U.6.1.f. Barge loading launder pipe coating renewal

- Applicable to valve, flaps and pipe sections of the launder pipe.
- Assume all the hot works have been completed.
- Degreasing according specs E.5. and hosing down with fresh water according specs E.3.
- Grit blasting to SA 2.5 according specs E.8.
- Coating renewal according specs F.9. superstructures
- All paint owner supplied.
- Railings, platform, all pipe sections, flaps and valves.

Lump sum.

U.6.2. Discharge hose ID900 remove / refit

Drawings:

- LD 01-01-116  Arrangement discharge sleeve dia 900 barge loading
- LD 12-00-041  Arrangement gantry with barge loading pipe
- LD 12-00-042  Arrangement gantry with support pipe
- LD 01-02-141  Arrangement barge loading system

One hose per side (pos 75, 82 / LD 01-02-141).

Weight = 4.6 ton.
Length = 2.6 m
Height = 1.3 m
Width = 1.3 m

Scope:

- Assume all spares are owner supplied.
- Install / remove 5 ton lifting brackets and chain blocks on the hose (situation mounting and dismantling pressure-sack / LD 12-00-041 ~ 042).
Loosen / thights 48 pcs bolts M36 and nuts between rubber hose and adjacent pipes.
Hoist out / in the discharge hose. Handle the 5 ton chain blocks to position the flanges.
Transport from / to the vessel and a safe storage place.
Include disposal of the old discharge hose.
Including all means like, cranes, lifting gear, transports, etc.


- Assume the vertical dredge line assembly and the vertical support pipe assembly are in upright position and secured to the gantries (situation of seafastening / LD 12-00-041 ~ 042).
- Erect / remove a staging in the gantries, assume 120 m³ per gantry. Include 3 times modification.

Lump sum. discharge hose

U.6.2.b. Exchange discharge hose in horizontal position.

- Assume barge loading pipe will be operated by ships crew and placed overboard in horizontal position above the repair berth or yard arranged pontoon.

Lump sum. discharge hose

U.6.3. Hoisting wires remove / refit

Drawings:
- LD 12-00-040 general arrangement hoisting mechanism barge loading pipe

Wire diameter: 30 mm.
Wire length: 112 + 125 m

Scope:
- Assume all spares are owner supplied.
- Assume job will be done under supervision of a first officer.
- Assume the vertical dredge line assembly and the vertical support pipe assembly are in upright position and secured to the gantries (situation of seafastening / LD 12-00-041 ~ 042).
- Assume a staging has been erected for the removal of the “discharge hose ID900”.
- Open / close wedge sockets.
- Remove / refit the two (2) hoisting wires from the sheave assemblies on forward and aft gantry. The crew will operate the winch. One winch services both fore and aft gantry.
- Dress-up, clean all the parts.
- Including all means like, cranes, lifting gear, transports, etc.
U.6.4. Arm piece assemblies remove / refit and overhaul

Drawings:
- JDN LD 01-02-105 Hinged arm piece for pressure pipe
- JDN LD 01-02-106 Hinged arm piece for support pipe
- JDN LD 01-02-121 Bend with arm piece for support pipe
- JDN LD 01-02-122 Bend with arm piece for pressure pipe
- LD 07-00-016 hydraulic pipe lines on arm piece.
- LD 07-00-017 hydraulic pipe lines on support pipe
- LD 07-00-022 hydraulic pipe lines on pressure pipe.
- LD 12-00-041 Arrangement gantry with barge loading pipe
- LD 12-00-042 Arrangement gantry with support pipe

The arm piece assemblies consist each of two (2) joined arm pieces, one (1) hydraulic cylinder. The ship has in total four (4) arm piece assemblies.

Weight = 11 ton (with discharge hose weight is 15 ton).
Length = 8 m
Height = 2.8 m
Width = 2.6 m

U.6.4.a. Arm piece assemblies remove / refit

- Assume all spares are owner supplied.
- Assume job will be done under supervision of a first officer.
- Assume the vertical dredge line assembly and the vertical support pipe assembly are in upright position and secured to the gantries (situation of seafastening / LD 12-00-041 ~ 042).
- Assume the launder pipe, discharge hose and hoisting wires are removed.
- Erect the staging 3 m higher then for the “discharge hose ID900”, assume 36 m3 per gantry. Include 3 times modification and 2 times erecting / removing.
- Disconnect / connect the two (2) locking chains (pos 10 / LD 12-00-141).
- Gritblast to SA 2.5 according specs E.8. and coat with owners supplied paint according specs F.9.
- Disconnect / connect and plug ten (10) hydraulic pipe lines dia 30 mm, four (4) grease lines dia 10 mm and two (2) electrical wires.
- Weld / remove pad eyes, and secure the arm piece assembly in the yard crane.
- Loosen / tight bolts and nuts between arm pieces (pos 81 and 92 / LD 01-02-141) and straight pipes (pos 80 and 91).
- Hoist in / out the arm piece assembly and transport between yard storage area or workshop.
- Dress-up, clean all the parts. Conserve the exposed part of the hydraulic cylinder rod.
- Including all means like, cranes, lifting gear, transports, etc.

Lump sum. …/arm piece assembly
U.6.4.b. Barge loading arm piece assemblies take apart / assemble.

- Assume the arm piece assemblies are lowered on the dock floor and transported to the yards workshop according specifications U.6.4.
- Each arm piece assembly consists of two (2) joined arm pieces, one (1) hydraulic cylinder, and one pipe (pos 85 or 94 / LD 01-02-141). Total weight is 15 ton.
- Remove / refit the hydraulic “tilt” cylinder (pos 7 / JDN LD 12-00-041-042). Transport between workshops for overhaul. Including connecting / disconnecting hydraulic pipe lines dia 30 mm.
- Cut / weld the four (4) flange brackets (pos 401, section E-E / LD 12-00-041), four (4) flange brackets (pos 402), four (4) flange brackets (pos 403) and four (4) flange brackets (pos 403).
- Remove / refit grease lines to hinge pins, lubricating bolts, bolts and shaft locking plates. Drive out / in the two (2) hinge pins (pos 201). Use hydraulic jacking or by using thermal lancing of the pins.
- Remove / refit the 2 bushes (pos 11 / LD 01-02-105/106) and the 4 bushes (pos 20 / LD 01-02-121/122). Tack weld the bushes to the boreholes. Conserve the bushes with grease after mounting.
- Overhaul the sheaves (pos 11 / LD 12-00-041/042). Remove / refit the lubricating bolts (pos 310), bolts (pos 300) and the shaft locking plates (pos 100).
- Drive out / in the two (2) pins (pos 202) by hydraulic jacking or by using thermal lancing of the pins.
- Dress up and submit a measurement report bushes, pins, rings and wire running face of the sheaves.
- Remove / refit bushes (pos 204) from the three (3) sheaves (pos 11). Inclusive machining of oversized bushes.
- Remove / refit the hydraulic lines and grease on the arm pieces. Including opening / closing of pipe brackets.
- Perform a flushing of the hydraulic pipe lines P.2.2. Plug after completion.

Lump sum price per arm piece assembly …/

Additional for supply of four (4) flange brackets (pos 401, section E-E / LD 12-00-041), four (4) flange brackets (pos 402), four (4) flange brackets (pos 403) and four (4) flange brackets (pos 403). …/ set

U.6.1.c. Barge loading pipe, hydraulic tilt cylinder overhaul

Drawings:
- Hydraudyne 3-028619 hydraulic cylinder barge loading system
- LD 07-00-018 hydraulic pipelines cylinders Ø360/125 x 1600

Hydraulic cylinder:
- Piston dia 360 mm.
- Piston rod dia 125 mm.
- Stroke 1600 mm.
- Weight 1635 kg.
- Test pressure 250 bar.
• Double acting.

Scope:
• Assume all spares owner supplied.
• Assume the cylinder is available at the yards workshop.
• Disassemble / assemble the hydraulic cylinder and renew all seals, guidings, O-rings, bushes, bearings, etc.
• Verify the trueness of the cylinder rod on a lathe machine.
• Renew pipelines, elbows and coupling on the cylinder, 30x3 mm, stainless steel AISI 316 (LD 07-00-018), yard supply. Load control valve (pos 7 / LD 07-00-018) is owner supplied.
• Perform pressure test for 10 minutes in presence of chief engineer or first engineer.
• Degrease and power brush the unit to ST3 according specs E.6. and renew the coating, 3 layers of owner supplied paint.
• Conserve the hinge bore holes with grease.
• Including all tools, transport, crane, staging, permits, reports, torch heating, etc.

Lump sum.

cylinder

U.6.4.d. Barge loading arm pieces coating renewal
• Assume all components have been disassembled.
• Degreasing according specs E.5. and hosing down with fresh water according specs E.3.
• Grit blasting to SA 2.5 according specs E.8.
• Coating renewal according specs F.9. superstructures
• All paint owner supplied.
• Two (2) arm pieces per assembly.

Lump sum price per arm piece assembly …/

U.6.5. Pressure pipe and hinge bend remove / refit

Drawings:
• LD 01-02-141 Arrangement barge loading system
• LD 12-00-041 Arrangement gantry with barge loading pipe
• LD 07-00-22 hydraulic pipe lines on pressure pipe

The two (2) hinge bends are installed between upper deck and crane deck level, frame 58, PS and SB. Thus in way of the aft barge loading gantries only.

Weight = 8 ton
Length = 5.2 m
Height = 3 m
Width = 1.4 m
U.6.5.a. Pressure pipe and hinge bend remove / refit

- Assume all spares are owner supplied.
- Assume job will be done under supervision of a first officer.
- Assume the launder pipe, discharge hose, hoisting wires, arm piece assemblies are removed U.6.1 ~ U.6.4.
- Assume the pressure pipe (pos 80) is in upright position and secured to the gantries.
- Remove all the grease from the turning gland (pos 64) and the hinge (pos 3 / LD 12-00-041).
- Erect the staging, assume 36 m3 per gantry. Include 3 times modification and 2 times erecting / removing.
- Disconnect / connect bolts / nuts of pipe flanges between hinge bend (pos 72 / LD 01-02-141) and turning gland (pos 64).
- Disconnect / connect foundation bolts of hinge support (pos 3 / LD 12-00-041). Cut / reweld six (6) seafastenings.
- Disconnect / connect and plug grease lines (10), and hydraulic lines, weld earthing cable (after all welding works!).
- Weld / remove padeyes on the pressure pipe, secure in yard crane. Hoist in / out and transport from / to ship and store at the yard.
- Disconnect / connect bolts and nuts joining them.

Lump sum. …/pressure pipe ~ hinge bend assembly

U.6.5.b. Pressure pipe and hinge bend disassemble / assemble

- Assume all spares owner supplied.
- Assume the assemblie is available at the yards workshop.
- Remove / refit and plug hydraulic pipe lines and grease lines.
- Remove / refit the guide for the hydraulic pipe lines (pos 5 / LD 07-00-22).
- Perform a flushing of the hydraulic pipe lines P.2.2. Plug after completion.
- Disconnect / connect bolts and nuts joining them, renew the packing.

Lump sum. …/pressure pipe ~ hinge bend assembly

U.6.5.c. Pressure pipe and hinge bend coating renewal

- Assume all components have been disassembled.
- Degreasing according specs E.5. and hosing down with fresh water according specs E.3.
- Grit blasting to SA 2.5 according specs E.8.
- Coating renewal according specs F.9. superstructures
- All paint owner supplied.
- Two (2) arm pieces per assembly.

Lump sum. …/pressure pipe ~ hinge bend assembly

Additional for delivery of new guide (LD 01-02-159).

…/
U.6.10. Replace turning gland barge loading pipes
- Assume the bendpipe LD069 + sluice valve LD070 at SB or bendpipe LD031 and sluice valve LD063 at PS are removed as per item U3.6.a
- Renew the turning gland assemble pos 64 (PS) or pos 71 (SB) by ship’s spare
- Note that the access space in way of the turning gland is very limited as it is fitted inside part of the barge loading gantry.
- Works include the supply, fit, weld and remove of temporary lifting lugs

Price per side: \(.../\)

U.100. Modification support platform lower bend pipe LD161.

Dwg 503571  Seating for swivel bend

Assume the swivel bend pipe and turning gland is removed as per item U5.6.
The platform dwg 503571, 7290mm above base is to be modified to 2 parts.
Staging to be erected
The platform to be cut in two pieces as per enclosed drawing. Flat bars with holes to be fabricated, fitted and welded. Special attention to be paid to align and centre the removable part of the platform. A round plate of diameter 1300 to be supplied and temporary fitted in the hole of the platform for alignment references. 5 ladders, platform and hand supports to be fabricated and installed as per drawing. Ladders are hot dipped galvanized after welding. After welding, platform to be grit blasted to SA 2 ½ and painted with 4 layers ship’s supplied paint. Platform to be assembled with yard’s supplied 8.8 bolts.

Lump sum price :
\(.../\)

U.101.rev1 Re-alignment of suction line in pump room to the dredge pumps II.

LD 01-02-166 Arrangement discharge pipe line system
01175-2724-110  Support suction & delivery pipeline in pump room

Assume that the suction line to the SB dredgepump is removed. Assume that the welded support (‘stoel B’) in front of the dredgepump is 25-30 mm too low and as such the suction line is not in line with the inlet of the dredgepump. Transport a new pipe LD035 from owner’s container to the pumproom. Fabricate, fit and weld 4 stiffeners to secure the loose flange in such a way that the total length of the pipe with flanges is 1060mm. Install this pipe piece on the inlet of the dredgepump. Renew the pipepieces LD008, LD009, LD010A & LD011 by owner’s new pieces. Transport, fit and install a new owner’s supplied bendpipe LD015 as indicated on the drawing. Align the two bendpipes to each other.
Install owner supplied pipepieces LD12, LD13, LD32 & LD34 to connect the bendpipes LD015 with LD011.
Install owner’s supplied filling flanges Ld033B & LD033A.
Crop out the inner part of the foundation type B as indicated on the drawing.
Fabricate, fit, align and weld a new insert plate in the foundation type B to suit and support the bendpipe Ld015 on its correct location. Original thickness to be changed from 25 to 30mm plate. Mark the position of the bolt holes on the insert plate.

Lump sum price : …/ 

If required machine down the existing or new owner’s supplied filling flanges to suit the correct alignment of the suction line. Note that the inner diameter of the filling rings are hard faced and must be machined using special machinery suitable for HRC60 material.

Additional price to machine down thickness of one filling flange : …/

**U.102. Renew pipe support dredge pipe delivery line on deck at frame 146.**

LD 01-02-166 Arrangement discharge line
01175-2734-110 Support delivery line to fore ship

Remove / refit the platforms on top of the delivery pipes.
Disconnect, remove & refit the discharge pipelines nos. LD152, LD153, Ld155 & LD156. Remove / refit the bend pipe LD149 for access.
Clean dress up the flanges. Measure the length of the pipes & wall thickness of the liners (12 spots per pipe). Make a report
Install and connect the old or owner’s supplied new pipes LD153 & LD152.
Crop off, remove the support 01175-2734-110 pos V. Repair the damaged, and grind flush the deck in way.
Fabricate a new support as per drawing. Including machining / cutting the slotted holes.
Fit, install, and adjust the support on deck. Install the pipe no. Ld155 can connect the flanges. Push the support close to the flanges until there is a gap of 2mm between the liners of pipes LD155 & LD153. Weld the foundation to the deck.
The foundation is to be grit blasted to SA2 ½ and painted with 3 layers paint after fabrication. The welds of the foundation to deck and the damaged paint system is to be repaired to ST3 and painted with 3 layers paint.

Lump sum price : …/

**U.103. Modification dredge line in the pump room**

LD 01-02-166 Arrangement pipe line system
01175-0319-510 Arrangement pumproom view on tanktop
LD-01-01-163 Arrangement dredge lines pump
LD-12-00-A000423 Arrangement pumproom

441/568
LD-01-02-141 Arrangement barge loading system
LD-01-02-267 Filling flange OD1265 x ID900 H=52mm
LD-01-02-268 Filling flange OD1265 x ID900 H=45mm
LD-01-02-269 Filling flange OD1265 x ID900 H=58mm
LD-01-02-260 Filling flange OD1265 x ID900 H=74mm
LD-01-02-270 Filling flange OD1265 x ID900 H=68mm
01175-2724-110 Supports suction and delivery pipelines pump room

The vessel will arrive in the yard with the dredge lines in the pump room installed and per drawing LD 01-02-166, view ‘Discharge pipeline with pump I. The pipes are all fitted to the lower suction inlet valve as shown on the ‘side view’ of page 1. The upper inlet valve en pipes pos 060, 004, 006, 061 are also installed in the upper inlet (‘Ladder in highest position)
Assume the inspection pipe pieces dwg Ld 01-02-166 pos LD035 & LD049 are fitted on the dredgepumps.
The yard is to remove all dredge pipes in the pumproom between the suction inlets and the deck penetration. Pipes and filling flanges drawing LD 01-02-166 pos 002, 003, 004, 005, 006, 007, 008, 009, 010A, 011, 012, 013, 014A, 015, 016, 017, 018, 060, 004 (upper) 004 (upper), 061 & 404 are to be disconnected, removed and transport to shore. The yard is to prepare and load this on owner’s arranged transport. Disconnect hydraulics and electrics to the sluice valves pos 251 (ID900), 059 (ID900) & 119 (ID800). Remove sluice valves and transport to workshop. Prepare the sluice valves 251 & 059 for transport and load this on owner’s arranged transport. Remove, Completely overhaul the sluice valve pos 119 (ID800) as described in item U3.5.a, Overhaul of its hydraulic cylinder as per item U3.5b & grit blasting of the upper and lower housing as per item U3.5.c. Remove, completely overhaul the sluice valve pos 252 as described in item U3.4.a, Overhaul of its hydraulic cylinder as per item U3.4b & grit blasting of the upper and lower housing as per item U3.4.c All included in this specification.
Assume the wooden flooring is removed upon arrival. Open up the two void double bottom tanks of the pump room (4 manhole covers) Install venting, lighting and arrange the required gas free inspections during the works.
Cut off, remove the upper and lower parts of the old dredge pipe supports dwg 01175-2724-110 sh1 pos Stoel D (4 pcs), Stoel E, Stoel F & Stoel G.
The supports dwg 01175-2724-110 sh1 pos ‘Stoel A’ & Stoel B’ are to be repaired with an insert. The top part of the plate pos 69 (Stoel A) and pos 52 (Stoel B) is to be renewed. In each support an insert plate sized 1250x600x25mm, including the cut outs of radius 535mm is to be renewed. After installing the pipes, the slots for the bolts are to be marked, pipe to be lifted up for access and the slots are to be cut with sufficient opening for bolt and tool sockets.
Owner will deliver new dredge pipes, sluice valves & pipe supports to the yard. The yard has to arrange offloading, receipt, storage and transportation to the vessel. All parts are delivered completely assembled and fully painted. The dredge pipes (straight, bends and branches) are all of the double walled type and are already fitted with a liner in Nihard. Pipes can not be cut or adjusted.
Install, position and fit the 8 pieces owner’s supplied pipe supports on the tank top in the pump room. Pipe supports dwg Ld-01-01-163 pos 851, 852, 853 & 854 (5pieces).
Assume that the discharge and deck penetration pipes to barge loading system dwg Ld-01-02-141 pos 19, 20, 10/253 & 21 are installed in the pump room. The discharge pipes of dredge pump III to deck are also installed.
The yard is to fit, install & connect the new owner’s supplied sluice valves and dredge pipes in the pump room between the inlet pipes 001, 058, the dredge pumps II & III and the outlet pipe dwg LD 01-02-166 pos 19 as shown in the drawing and parts list LD-01-01-163 & LD-12-00-A000423. Owner will supply reconditioned pieces for the pipes marked in the drawing as ‘existing’. The renewal of the inlet pipes pos 001 & 058 is not included in the specification.

The face of the flanges of all pipes are to be dressed up by the yard prior connecting. All bolts, nuts, gaskets, O-rings are supplied by the ship. The filling flanges pos 502, 505, 508, 512, 515, 522 (2pcs), 527 are delivered in oversize. The yard is to install the pipes in steps, measure the gaps in way of the filling flanges, to machine the flanges in the workshop to size, shift the pipes for access, fit the filling flanges and connect all. Note that inside of the flanges are hard faced to 45 HRC as shown on the drawings and are difficult to machine down. The supply of special machining tools is included.

The yard is to submit a procedure and detailed schedule for owner’s approval to install the pipes, to determine and measure the sizes of the filling flanges. As build drawings of the machined filling flanges and bolt holes slots of the pipes supports A & B are to be handed over to the owner upon completion. After completion the damaged paint system of the pipes, supports, flange bolts are to be derusted to ST 3 & painted with 3 layers ship’s supplied paint.

Note that these works are done in conjunction with other minor and major works in the pump room as described in this specification. It is of very importance that the yard prepares and coordinates all works well in the pump room. An overall and detailed planning is to be made prior arrival of the vessel.

List of specification items that should include in this planning: F112, F113, G130, G154, G157, G158, H4, P104, P106, S114 & U2.2

Lump sum price : …/

U.104. available

U.105. Move support in way of dredge pipe LD214 on ladder

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5242839</td>
<td>General arrangement cutter ladder</td>
</tr>
<tr>
<td>5242838</td>
<td>Supports pipeline in ladder</td>
</tr>
<tr>
<td>5242837</td>
<td>General arrangement suction and discharge pipe line on cutter ladder</td>
</tr>
<tr>
<td></td>
<td>LD-11-00-A000540 Movement of pipe seat</td>
</tr>
</tbody>
</table>

Assume the dredge pipes dwg 5242837 pos 212,213,215 will be removed by the crew. The pipe support for pipe dwg 5242838 in way of pipe pos 214, at frame 12 is to be shifted 400mm to fore ship. The pipe support is to be cut from the cutter ladder deck and wallplate, shifted 400mm and re-welded to the deck and wall plate. A staging is to be erected below the cutter ladder deck: l*w*h=4x4x6m

A stiffener plate is to be supplied, fabricated, fitted and welded under the support in its new location as per drawing LD-11-00-A000540 Paint system is to be repaired by wire brushing to ST3 and 3 layers of paint.

Lump sum price : …/
U.106. Repairs and modification of dredge pipe deck penetration.

Ld-01-02-141 Arrangement barge loading system
LD-01-02-100 Straight pipe penetration pipe D900 nr 21
01175-1370-010 Upper deck fr 58-75

Erect a staging in way: l*w*h= 4 x 1 x 1m
Open up / close pipe support.
Disconnect, remove the bend pipes LD030, pipe LD024, T-pieces LD023. All ID 900mm and double walled type pipes.
Disconnect the deck penetration LD021 from the deck coaming
Assume the bend pipe LD018 in the pump room is not installed.
Lift out the vertical pipe assembly Ld021 + LD010 + LD020 + LD019.
Transport all pipes to workshop, disconnect all, dress up the flanges and re-assemble with new seals.
The deck plate of the deck penetration pipe LD023 is to be modified. A flush type manhole type 500 as per drawing LD-01-02-100 – modification Ej is to be supplied, fabricated, installed in the deck penetration pipe. Yard to supply all including bolts, seal.
The holes and rectangular flange of the deck penetration are to be dressed up.
The coaming of the deck penetration pipe on deck is to be renewed.
Yard is to fabricate a new coaming size 1800x2370 and as per detail P as indicated in drawing 01175-1370-010. Including the machining of the holes. Special attention to be paid that the face of the coaming is 100% level. Note that the coaming is very close to the deck house and bottom of the coaming is not accessible. Stainless steel nuts are to be supplied and welded in way as shown on drawing LD-01-02-100.
Old coaming is to be cropped off, deck and wall plating in way of the corroded area near the deck house is to be dressed up and doubled with 2 strips, 1800x100x8 & 1800x150x8mm. New coaming to be fitted and welded.
All pipes to be returned and re-installed with ship’s supplied seals and fasteners.
Paint system to be repaired to ST3 & 3 layers of paint.

Lump sum price : …/

U.107. Locking flange for dredge valve 25 bar, holes to re-drill

Drawings:
- LD 01-02-232 sheet 1 flange for gate valve 25 bar

Scope:
- Assume the flanges are on board the vessel or in an owners container at stored at the yard. Included un-sea fastening / sea fastening.
- At yards workshop, machine twenty eight (28) holes dia 36 mm to dia 45 mm. Issue a dimensional report.
- Clean and conserve with tectyl machined surfaces, yard supply.
- Including all means, cranes, consumables, tools and special tools required for the job.

Lump sum price : …/4 flanges
**U.108. Barge loading arm piece, overhaul hinges**

**Drawings:**
- JDN LD 01-02-105 Hinged arm piece for pressure pipe
- JDN LD 01-02-106 Hinged arm piece for support pipe
- JDN LD 01-02-121 Bend with arm piece for support pipe
- JDN LD 01-02-122 Bend with arm piece for pressure pipe

Job to be done in conjunction with job R.107. Barge loading pipe hoisting winches remove / refit

**Scope bore hole repair**
- Assume all spares owner supplied.
- Assume the arm pieces are disconnected from each other and are available in your workshop.
- Remove the existing bushes Ø 142 by jacking / cutting.
- Pre-machine the worn bore holes to minimal depth. Assume 2~3 mm on radius.
- Build up by welding the machined bore holes, use electrode AWS E7018-1, preheating to 100~120 °C. Allow for gentle cooling down.
- Final machining to Ø 142 H7 on an inline boring machine. Submit a final measurement report (diameter and dimensional geometry of the bore holes).
- Install new bushes, including machining from oversize by shrink fitting with liquid nitrogen.
- Including all means, cranes, consumables, tools and special tools required for the job.

Lump sum price per hinged arm piece: …/
Lump sum price per bend with arm piece: …/

**Alternative scope eye plate renewal:**
- Assume all spares owner supplied.
- Assume the arm pieces are available in your workshop.
- Remove the existing eye plates and weld new units, yard supply:
  - hinged arm piece, 2 units thickness 110, 335 x 580, S355
  - bend with arm piece, 4 units thickness 60, 335 x 580, S355
- Final machining to Ø 142 H7 on an inline boring machine. Submit a final measurement report (diameter and dimensional geometry of the bore holes).
- Install new bushes, including machining from oversize by shrink fitting with liquid nitrogen.
- Including all means, cranes, consumables, tools and special tools required for the job.
- Provide certificate of the material.
- Perform coating repair of the service areas with 3 layers of owner supplied paint.

Lump sum price per hinged arm piece: …/
Lump sum price per bend with arm piece: …/
**U.109. Barge loading pipe, tilt cylinder, install and test load control valves, spec 104-107.**

**Drawings:**
- LD 07-00-018 hydraulic pipelines cylinders Ø360/125 x 1600

**Description**
- The hydraulic cylinder is equipped with a load control valve (pos 7). Barge loading pipe will be lowered / hoisted overboard and tested during several tries with new load control valves, one ship side only.

**Scope:**
- Assume all spares owner supplied.
- Assume staging has been installed on the fore and aft gantry of the barge loading system after overhaul of the arm pieces according specs U.6.4.b. Include as extra 5 modifications of the staging on both gantries.
- Assume the crew has de-pressurised / pressurised the hydraulic system.
- Remove / refit load control valve (pos 7) on the fore and aft cylinder.
- Assume crew will operate the barge loading pipe with the winch and hydraulic cylinder with the ships hydraulic system. Testing 5 times.
- Adjust the cartridge pressure of the load control valve according instructions of owners hydraulic specialist.
- Including all means like tools, permits, cleaning, etc.

Lump sum price : …/

**U.110. hull inlet dredge valves, pump room, installation of emergency closing system.**

**Drawings:**
- Van Hemert A-10491-001 Emergency closing sluice valves LDV
- Hydac Dimensions hydraulic accumulator
- Hytop T3-42925-010 Hydraulic power pack
- IHC 01175-1117-010 Ladder well end part
- Sketch U.110. sketch accumulators against ladder well bulkhead

Job to be combined with U.3.1, hull inlet dredge valves ID0900.

AC5 room (ex AC9-room) is located on the upper deck, frames 41 ~ 44, PS. Access is via a watertight door. The area is above the thyristor room.

**Scope:**
- Assume the existing hydraulic power pack from AC5 room has been rigged out for the Midlife Refit. Cut foundation from deck.
- Hydraulic lines running from the hydraulic power pack to the PS and SB anchor chairs to be removed (frames 50). Stainless steel pipe dia 20 mm, total length. Four (4) 20 mm pipe bulkhead penetrations to be removed, and insert placed.
• Assume upper hull inlet dredge valve ID0900 pos 528 is removed under U.3.1.
• Remove 500 kg loose owner supplied spare parts from the pump room on main deck between frame 38 and 41. Cut / weld and remove shelves for storage of parts. Three (3) shelves 3 x 3 x 0.5 m.
• Weld foundation of the power pack on main deck in the pump room between frame 39 and 41 at owner’s specified location.
• Open / close hatch between frame 39 and 40 on upper deck. Rig in with yard crane the hydraulic power pack. Assume 2 occasions.
• Fit an owners supplied MCT between pump room and thyristor room. Remove / refit 2 m2 insulation in thyristor room and in pump room. Insulation is galvanised riveted sheeting.
• Rig in three (3) owner supplied hydraulic accumulators via the hatch, frame 39 ~ 40 on upper deck.
• Fix the accumulators against the ladder well bulkhead by means of 6 pieces 50 x 50 x 8 mm angle bar, welded on the existing P140 x 8 profiles, according sketch U.110. angle bar yard supply.
• Connect the P-line of the hydraulic power pack to the P-line of the 3 accumulators. Pipe material: 16 x 2 mm seamless pipe, assume 3 m with 3 branches. Supply and weld 3 pipe brackets.
• Connect the T-line of the hydraulic power pack to the T-line in the pump room. Pipe material: 20 x 2.5mm, assume 6 m. supply and weld 3 pipe brackets.
• Connect the T-line of the accumulators to the leak oil line in the pump room. Pipe material: 20 x 2.5mm seamless pipe, assume 6 m with 3 branches. Weld 9 pipe brackets.
• Connect the P-line of the 3 accumulators to the 3 hydraulic blocks of the hull inlet dredge valves. Pipe material 25 x 3 mm seamless pipe, assume 3 x 6 m. Weld 9 pipe brackets.
• Install an owner supplied 3-way emergency closing valve (connections for 12 x 2mm pipe) in the pump room on main deck level in way of frame 66.
• Connect the leak oil line in the pump room to the emergency closing valve. Pipe material: 12 x 2 mm seamless pipe, assume 35 m. Weld 10 pipe brackets.
• Connect the emergency closing valve to the pilot oil inlet on the 3 hydraulic blocks for the hull inlet valves in the pump room. Pipe material 12x2mm seamless pipe, assume 35m with 3 branches
• Connect the P-line of 1 of the accumulators to the emergency closing valve. Pipe material: 12 x 2 mm seamless pipe, assume 35m.
• Hydraulic pipes to be flushed according specs P2.2.
• Pipe lines and pipe brackets are yard supplied. Seamless steel, cold drawn pipe.
• In way of hot work damaged areas, repair coating system by power tooling to ST3 and coating according specs F.10.
• Job including permits, lights, ventilation, staging, tools, cleaning, etc.

Lump sum price : … /
General remarks to U

- All the pipes to be renewed or turned are of the double walled type. The owner will supply complete pieces, existing of an outer pipe and a liner already fitted and secured in this outer pipe. Pipe is delivered with flanges welded.
- Filling rings are delivered by the owner already machined to size.
- O-rings, packing and bolts + nuts if needed will be supplied by the owner.
- The owner will deliver the new dredge pipe pieces in 20ft flat rack containers by truck or barge to the yard. The quoted prices must include the receipt, handling, storage of these containers and the removal / refitting of the sea fastenings of the pipes.
- All bolts of the flanges are to be tightened to maximum torque with shipyard supplied hydraulic torque wrench.
X. MISCELLANEOUS

X.1. Load testing of ship’s deck crane

- Yard is to arrange a load cell and the necessary test weights to load test the ship’s deck cranes as per requirement of the owner’s arranged Bureau Veritas Surveyor.
- A nominal weight of 30 & 33 tons is to be supplied and hung on the crane’s no. 1 hook to adjust and test the safety device of the crane with a reach of 28m.
- A nominal weight of 30 & 33 tons is to be supplied and hung on the crane’s no. 2 hook to adjust and test the safety device of the crane with a reach of 28m.
- A nominal weight of 6.5 & 7.2 tons is to be supplied and hung on the crane’s no. 3 hook to adjust and test the safety device of the crane with a reach of 32.5m.
- A calibrated load cell is to be supplied to verify the weights of the supplied test weights.

Price:

X.2. Load testing of overhead travelling cranes

- The ship is equipped with one (1) crane in the pump room and two (2) cranes in the engine room.
- Yard is to arrange a load cell and the necessary test weights to load test the ship’s deck cranes as per requirement of the owner’s arranged Bureau Veritas Surveyor.
- A weight equal as the nominal lifting capacity of the crane is to be supplied and hung on the crane’s hook. The safety devices is to be tested.
- A weight of 1.25x times the nominal lifting capacity of the crane is to be supplied and hung on the crane’s hook. The safety devices is to be overruled and the crane construction is to be tested.
- A calibrated load cell is to be supplied to verify the weights of the supplied test weights.

Price for the pump room crane – SWL 16.0 ton
Price per engine room crane – SWL 3.2 ton :

X.3. Life boat davits

The vessel is equipped with in total two (2) life boats on PS and SB.

009055-10000002 General arrangement of gravity pivot davits lifeboat
Fully enclosed lifeboat – 63 persons


- The lifeboat is to be loaded with suitable test weights to 1.1 times the nominal carrying capacity of 63 persons. The weights are to be calibrated and reported.
- The lifeboat is to be lowered. The release hooks are to be tested under this load. The life boat is to be released in the water and hooked up again.
• All as per requirement and satisfaction of the owner’s arranged Bureau Veritas Surveyor

Price per lifeboat: ..../

**X.3.2 Overhaul and test of release unit in workshop.**

• Disconnect and remove the lifeboat from the ship. Store lifeboat on proper cradles in the yard.
• Disconnect, remove the hook release units from the wires of the lifeboat davits and transport to/from workshop.
• Dismantle the release hooks. Clean, dress up and calibrate all parts. Examine parts with regard to manufacturer’s tolerances and design requirements.
• Re-assemble the release units, adjust the release gear system.
• Carry out load and brake test in the workshop according to solas regulations and as per requirement and satisfaction of the owner’s arranged Bureau Veritas Surveyor.

Price per lifeboat (2 release units): ..../

**X.100. Reconditioning of windows.**

• The seat of the fixed windows of accommodation are corroded.
• Erect a staging in way.
• Fabricate a temporary blind in 10mm plywood and fit at the inside of the window.
• Remove all screw, locking strip and glass of the window.
• De-rust & dress up the window seating. Assume the face of the bottom side of the window seat is slightly corroded. Build up the worn part by welding and grind flush. Dress up all threaded holes.
• De-rust and paint with 3 layers ships supplied paint.
• Re-install the window and locking strip. Supply and install new brass screws.

Price for window size 500x700mm (wxh), 1.5 meter above crane deck: ..../
Price for bridge deck window 1000x900 12 meter above deck (wxh): ..../

Additional price to supply and fabricate stainless steel glass locking strips:
• 500x700: ..../
• 1000x900: ..../

Additional price to supply double marine security glass:
• 500x700: ..../
• 1000x900: ..../

**X.101. Renew plywood fitted on top deck of the bridge.**
Picture X101-1, X101-2 & X101-3

- Plywood plates are fitted on timber on top of the steel bridge deck. The plywood and timber are to be renewed. Assume that the steel foundations are in good condition
- Remove; dispose of the old plywood and timber.
- Surface of around 8.0 x 10.0 meter plywood.
- Repair the paint system of the foundation and top deck to ST3 and apply 3 layers of ship’s supplied paint. Apply a full final coat on the top deck – white colour.
- Supply, install 13 transversal hardwood support timber of 60x60x800cm.
- Cut, fit and install one layer of 18.0mm thick owner’s supplied plywood. Cut the owner’s supplied plates to size, fit and install on top of the timber.
- Including cutting and adjusting the plates in way of foundation on bridge deck.
- Refit the steel locking strips as original.
- Supply and renew the wooden protection of the crane jib support: 1 x (105x120x1400mm) & 2 x (105x120x600mm). Hardwood to be supplied. Including staging.
- All fasteners to be supplied by the yard in stainless steel.
- Apply two layers ship’s supplied paint on top of the plywood plates – white colour.

Lump sum price : .../

**X.103. Modification of recreation room**

Prior to works all desks, flooring, interior to be adequately protected by plastic covers. The existing cabinets and loose furniture is to be removed from the recreation room. Two existing partition walls between the bar and the portside area are to be removed. The openings in the ceiling panels to be closed by metal sheeting and PVC film. A new partition wall is to be supplied and installed. The partition wall is made from non combustible insulation panels of sandwich construction, total thickness 50 mm, with PVC film. Or an equivalent product. A door with steel frame and covered with PVC similar to the existing doors is to be supplied and installed as per drawing : separate access to the recreation room. Finishing PVC layers should be similar as close as possible to the existing panelling. A cupboard 3500x800x400 (WxHxD) with drawers and doors to be fabricated and installed at the aft wall.

Lump sum price : .../

**X.104. Writing desks on the bridge**

Prior to works all desks, flooring, interior to be adequately protected by plastic covers. The two radars at the portside are to be relocated and moved 1.0 to the centre. The wall panelling is to be removed in way. Steel foundation to be removed, relocated and welded. The cables to the radars to be extended and reconnected. The SB & PS sofa’s to be removed.
Two writing desks to be fabricated and installed on the bridges: one at PS fore and one at SB fore. Size 1800x800x800 (WxHxD). Including two blocks with drawers and door.
A storage cabinet to be fabricated and installed suitable to fit under the two radars units. Storage cabinet with doors suitable for safety equipment.

Lump sum price: ...

X.105. Replace existing carpet by vinyl.

Assume the floor of some of the cabins are covered by carpet.
Remove the carpets.
Supply, install, glue new vinyl similar to the already installed new vinyl. (done by Seven Seas in ’12-2007)

Price per cabin (20 sqm): ...

X.107. Insulation of bottom engine control room

The complete bottom of the engine control room is to be insulated with fire resistant insulation as per SOLAS regulation.
Insulation if to be finished by galvanized metal sheeting and painted.

Lump sum price: ...

X.108. Replacement of glass with electric heating on windows wheelhouse

Dwg 01175-1024-010. Plan of windows

The glasses of the windows pos 10,11,12,13 & 18 are to be replaced by owner’s supplied spare.
Erect staging’s along the existing platform in front of the windows. Lxbxh=6x2x2.5 and 3 units of Lxbxh=2x1x2.5
Disconnect the electric heating supply
Fabricate a temporary blind in 10mm plywood and fit at the inside of the window. Fix and close off gaps with duct tape.
Remove all paint from locking strip and screws. Remove all screws, remove brass locking strip and glass from the window frame. Dress up boltholes, window seat and locking strip.
Transport owner’s supplied glass from ship’s store, fit and install with suitable yard supplied sealant. Re-install the window locking strip with new yard supplied brass screws. Note that the windows pos 12 & 13 are in total 5 separate glasses.
Re-connect and test the electric heating of the windows.
Repair the paint system in way and apply a full coat on the affected window frames.
X.109. Reconditioning inner wheelhouse doors

01175-2622-040  page 1 Door plan

Disconnect the two inner doors of the wheelhouse entrances and transport to workshop. Protect the glass during transport. Clean, polish the doors. Grit blast the steel door frames, paint with 32 layers gloss paint, supplied by yard. Supply, fit and glue a door rubber in the frame as per drawing. Return doors and re-install.

Price per 2 doors: ...

X.110. Reconditioning crane cabin.

X110 pictures cane cabin and seat.
7430-01.HMC Travelling electro hydraulic deck crane

A plexiglass is fitted in the front hinged window frame of the crane cabin. Remove the hinged window, transport to workshop. It is possible to remove the window from inside of the crane cabin. If the yard however requires a hanging staging at the outside of the crane cabin, this is included. Replace the plexiglass by tempered safety glass. Including renewal of the glass rubbers. Size glass to be supplied by the yard: 640x1040x5mm. Window frame to be derusted to ST2 ½ and painted with 2 layers of paint. Disconnect, remove the seat and armrests from the cabin, transport to workshop. Renew the cushions and the semi-leather upholstery. Return and re-install all.

Lump sum price: ...

X.112. Load test spreader bar SWL 60 ton

Transport a 60ton spreader bar with length 3.0 meter from the vessel to the workshop. Arrange a load test of the spreader bar. Pulling top hoisting eye 60 ton at one side and 2 x 30 ton at the other side. Fabricate and fit an identification plate with details of load test. Issue a certificate. Return spreader bar to ship.

Lump sum price: ...

X.113. Insulation of new lower engine room entrance.

X113.1Picture inside the lower engine room entrance
X113.2 Picture outside of the lower engine room entrance

The lower entrance from the Portside entrance ECR to floor plates engine room is to be insulated and provided with stiffeners. Stiffeners are to be supplied, fitted and welded at the outside of the side walls: 50x8mm, 2 stiffeners length 3.0m, 2 stiffeners length 1.5m. The 4 angle bars 40x40 (2 x 3.0m & 2 x 1.5m) are to be removed and surface to be grinded smooth. The yard is to supply, fit, install insulation, rock wool thickness 40mm at the outside walls of this entrance, sides, bottom, top. Total surface 9sqm. Installation to be finished with 1mm galvanized sheet. Including the necessary anchors for the insulation and supports for the cladding. After completion the outside and inside of the entrance to be fully painted with ship’s supplied paint.

Lump sum price: \( .../ \)

X.114. Davit sea fastening spud, load test and certification

**Drawings:**
- LD 11-00-127 Assembly clamp platform for sea fastening spud
- LD 11-00-128 Arrangement for sea fastening spud
- LD 11-00-129 Arrangement for sea fastening spud

**Scope:**
- Assume the four (4) davits are sea fastened in an owners 20 feet container and the container is stored at the yard. Un-sea fasten / sea fasten the units from the container and transport to / from the ship & blasting area.
- Install / remove the davits on a foundation plate at the yard’s workshop (pos 4 / LD 11-00-127).
- Install / remove test weight of 1 ton and load cell on the davits.
- Mark the davit booms by welding with stainless steel electrode “SWL 750 kg”.
- Grit blast the davits to SA 2.5 according specs E.8. coating renewal according specs F.14. lifting gear.
- Issue a certificate of the load test (including certificate of test weight and load cell).

Lump sum price : \( .../ \)

Additional for fabrication of davit support, consisting out of:
- Seamless steel pipe S275 dia 139.7 x 16, length 800, 1 piece.
- Bracket 500 x 270 x 8, S275, 2 pieces.

Lump sum price : \( .../ \)

X.115. Special hoisting gear, load test and certification

**Drawings:**
- HMC 7430-59 hoisting beam deck crane
Scope:
- Open / closed bolted hatch on the bottom side of the deck crane engine room.
- Arrange certified test weight and perform load test on hoisting beam. Use 3.75 ton in total (125 % load).
- Fabricate and weld stainless steel ID tag on the hoisting beam, mark and issue the corresponding certificate.

Scope:
- Assume the crew will operate the winches hydraulically to wind off / on the steel wires.
- Arrange a cable winding machine and properly cleaned reels for temporary storage of the steel wires.
- Assume the jib, the two (2) main hoisting blocks (SWL 30 ton) and the auxiliary block (SWL 6 ton) are lower on the crane deck of the vessel by the crew.
- Disconnect / connect from the fixed points on the jib, the main hoisting wires. The area is reachable from the deck. Erect / remove staging 10 m.
- Disconnect / connect from the fixed point on the drum in the machinery house, the auxiliary hoisting wire. The area is reachable from the deck.
- Pull out the steel cables by winding them on a winding machine.
- Assume the crew operated the crane, resting the jib on the ladder gantry (frame -5 ~ 0) or on the wheel house top deck (frame 63).
- In the tower frame disconnect / connect the steel wire fixed points of the two (2) luffing cables. Pull out the steel cables by winding them on a winding machine.
- Store the hoisting blocks and the steel wire drums in a suitable place on the yard. Cover the wires with grease and plastic canvas.
- When installing the cables, provide and connect / disconnect the messenger lines. People will have to walk on the boom. Yard to foresee the required safety equipment.
- Including transports, yard crane, forklift, permits.
Lump sum price: ...

**X.117. deck crane, bogies and travel gear, overhaul**

**Drawings:**
- HMC 7430-01 deck crane general view
- HMC 7430-22 substructure portal
- HMC 7430-24 automatic lubrication bogies
- HMC 7430-60 crane drive unit
- HMC 7430-61 main bogies
- HMC 7430-65 switches travelling
- HMC 7430-81 bogies
- LD 13-00-A008301 crane rail L=11467.4
- LD 13-00-005 oversized bush for bogie
- LD 13-00-006 shaft for bogie
- LD 13-00-008 shaft for bogie
- LD 13-00-009 wheel for bogie
- LD 13-00-010 cover flange for bogie
- LD 13-00-011 shaft for bogie
- LD 13-00-012 cover for shaft
- LD 13-00-013 side piece for bogie
- LD 13-00-014 side piece for bogie
- LD 13-00-015 cover for shaft for bogie
- LD 13-00-016 cover for safety shaft for bogie
- LD 13-00-018 shaft for bogie

The deck crane has two (2) double bogies assemblies (section A-A / HMC 7430-81) on PS which is the hinged leg of the portal. There are two (2) single bogie assemblies with separate guide wheels (section B-B) on SB, which is the fixed leg of the portal. There is are two (2) drive units with a hydro motor, one (1) on PS and one (1) on SB.

Crane weighs 135 ton with 75% weight on PS.

Job to be coordinated with renewal of the crane track, G.170.

The rational is to place the crane on blocks and overhaul the four bogies at the same time.

**Scope:**
- Assume the vessel is on the dock blocks.
- Assume all parts owner supplied. We will install lots of new bushes, new shafts and new wheels.
- Dress up, clean and measure all the parts.
- Including all means like transports between ship and workshop, permits, covering, lights, heating torch, tools, lifting and rigging gear, etc.
- Assume the crane is position with the aft bogies in way of frames 42 ~ 46 (most space available for the service).
- Secure the crane and remove and dispose the grease from the bogie assemblies.

Coating renewal
- All removed construction parts and assemblies of the bogie and drive train arrangements have to receive a coating renewal.
- Grit blast to SA 2.5 according specs E.8.
- Coating renewal of the parts according specs F.14.

Grease pump units (HMC 7430-24)
- On all four (4) bogie assemblies, label, disconnect / connect, plug and store the four (4) electrical end switches. Including removing / installing cabling. Assume cable lengths of 3 m each. Store the units in a clean and secure place. Junction box is located above the bogie assembly.
- On PS and SB, label, disconnect / connect, plug and store twelve (12) grease lines dia 10 mm and twelve (12) grease hoses dia 10 mm. Including opening / closing pipe brackets. Store the units in a clean and secure place. Cut / provide and weld new angle bar supports from the portal substructure.
- Disconnect electrically and hose wise, in total three (3) grease distributer units. Junction box is located above the bogie assembly. Label and store the units in a clean and secure place.

Crane lifting / lowering
- Remove six (6) m of crane track on the H-beam (pos 2 / LD 13-00-A008301) on PS and SB. Cut the bolts and supports (pos 5) from the H-beam.
- Drive-up / lower the crane with four (4) 50 ton jacks. Jacks to be installed between the H-beam of the crane track construction and the bogie assemblies.
- Fabricate four (4) steel supports SWL 50 ton (H = 1050 mm, L = 900 mm, W = 900 mm) and lift in / out between the H-beam crane track and the substructure of the portal. Place soft wood between the support and the crane construction. Weld / cut the support to / from the crane track. Secure with turn buckles the crane to the deck including welding of pad eyes and supply of rigging equipment.
- Overhaul the PS and SB bogies and drive units.

PS and SB drive unit
- Assume the hydraulic system of the crane has been locked-out / tagged-out by the crew and de-pressurised.
- Disconnect three (3) hydraulic lines, 2 x 1½” and 1 x ½”. Plug, label and store on a clean and secure place. Cut / provide and weld new angle bar supports from the portal substructure. Inclusive opening / closing of pipe brackets. Pipes are accessible 1.5 m above the crane deck.
- Disconnect / connect two (2) grease lines dia 10 mm, plug, label and store.
- On the guide wheel assembly remove / refit all parts for the guide wheel (detail V / HMC 7430-60) and for the eccentric shaft (Detail VI / HMC 7430-60). Use a heating torch (not cutting torch) if required for loosening the nut (pos 6022).
- Rotate the drive assembly away from the crane track via the shaft (detail IV / HMC 7430-60). With a lifting arrangement, on the hydro motor drive (section
A-A / HMC 7430-60), remove / refit all the parts including the hydro motor. Bolts (pos 6023) are on torque 295 Nm, cross-wise tightening. Replace the pinion (pos 6041) by owner supplied spare.

- Remove / refit all the parts from the drive assembly hinge (detail IV / HMC 7430-60). Cut / weld the shaft (pos 2230) on the locking plates (pos 6026, 6027).
- When assembling back the drive train on the new crane track (specifications G.170), adjust the backlash of the pinion (pos 6041) via the eccentric shaft (pos 2230) to max 1 mm.

Double bogie assembly

- Remove / mount bolts and four (4) covers (pos 8103 / HMC 7430-81). Bolts (pos 8126) are on torque 2000 Nm, cross-wise tightening.
- Install a lifting eye on the plates, secure via yard rigging frame or yard crane, and jack-off / on the two (2) main bogie plates (pos 8112) from the two (2) shafts (pos 8101). Use a 30 ton jack. Use a heating torch (not cutting torch) if required.
- At the yards workshop, dissemble / assemble the covers (pos 8108), covers (pos 8106), vertical bogie wheels (pos 8104), shafts (pos 8107), the locking plates (pos 8110), horizontal bogie wheels (pos 8104) and shafts (pos 8109). Assume all sixteen (16) bushes (pos 8105) to renew, including machining from oversize bushes. Renew all o-rings (pos 8138, 8139) and V-ring (pos 8137). Bolts (pos 8128) on torque 580 Nm, cross-wise tightening.
- Jack-out / in the two (2) shafts (pos 8101 / HMC 7430-81) and renew the four (4) bushes (pos 6113 / 7430-61) including machining of oversized bushes.
- Install pad eyes and secure via rigging frame or yard crane the tilting block (pos 6106~6112). Jack-out / in the shaft (pos 6104 / HMC 7430-61) measure shaft journal and the bore holes (section D-D / HMC 7430-61).

Single bogie assembly.

- Remove / mount bolts and two (2) covers (pos 8102 / HMC 7430-81). Bolts (pos 8126) are on torque 2000 Nm, cross-wise tightening.
- Install a lifting eye on the plates, secure via yard rigging frame or yard crane, and jack-off / on the two (2) main bogie plates (pos 8111) from the shaft (pos 8101). Use a 30 ton jack. Use a torch heater if required.
- At the yards workshop, dissemble / assemble the covers (pos 8108), covers (pos 8106), horizontal bogie wheels (pos 8104), shafts (pos 8109). Assume all eight (8) bushes (pos 8105) to renew, including machining from oversize bushes. Renew all o-rings (pos 8138, 8139) and V-ring (pos 8137). Bolts (pos 8128) on torque 580 Nm, cross-wise tightening.
- Loosen / tight the bolts and nuts, install a pad eye and remove / refit the four (4) horizontal wheel covers assemblies (pos 6124 ~ 6130 / HMC 7430-61).
- Disassemble / assemble the horizontal wheel assemblies (section F-F / HMC 7430-81). Assume all eight (8) bushes (pos 8105) to renew, including machining from oversize bushes. Renew all o-rings (pos 8138, 8139) and V-ring (pos 8137). Bolts (pos 8128) on torque 580 Nm, cross-wise tightening.
- Jack-out / in the shaft (pos 8101 / HMC 7430-81) and renew the two (2) bushes (pos 6123 / 7430-61) including machining of oversized bushes.
• Weld / remove a lifting eye, secure via yard rigging frame or yard crane, and remove / refit the two (2) boogie foundation assemblies (pos 6114~6121 / HMC 7430-61). Renew the bolts (pos 6141).

Lump sum price : …/ deck crane

Additional supply of new bush (pos 6122 / HMC 7430-61) …/ pc
Additional supply of new bush (pos 6018 / HMC 7430-60) …/ pc

Additional for machining of two (2) bore holes ID 270 (section C-C / HMC 7430-61).
• Assume the tilting block (pos 6106~6112) is at the workshop.
• Align and machine, assume 5 mm in diameter.
• Including cleaning, reporting, handling, etc.

Lump sum price : … / pc

**X.118. Deck crane, exchange of hydraulic rotator**

Drawings:
- HMC 7430-48 slip ring body
- HMC 7430-50 general view machinery house
- POCLAIN T5H15-3B15 - K15377-66 hydraulic rotator
- Pictures X.118. Deck crane hydraulic rotator

The unit is located in the ER of the deck crane. A hoisting beam is installed in the ER.

Scope:
• Assume the hydraulic system of the crane has been locked-out / tagged-out by the crew and de-pressurised.
• Remove / refit floor plates in ER.
• Disconnect / connect and blind hydraulic hoses ¾”, fifteen (15) pieces.
• Disconnect / connect support pipe and coupling of the rotator.
• Disconnect / connect hydraulic rotator and transport between ship and hydraulic workshop at the yard.
• Remove and dispose oil from swing gear well. Assume 1 m³. Including mobilisation of pump, hose and drums. Degreasing of the area, assume 15 m³.
• Including ventilation, lights, permits.

Lump sum price : … / pc

**X.119. deck crane, winch drums, foundation bolts to replace.**

Drawings:
- HMC 7430-50 general view machinery house
- HMC 7430-31 frame luffing – hoisting
- Pics X.119. deck crane, winch drums, foundation bolts

Two (2) frames need to receive new bolts. Bolts are driven in from the outside bottom of the machinery house.
Scope:
- Assume all spares are owner supplied, the bilges have been cleaned according specs H.7.
- Assume staging has been erected for coating of the deck crane or the machinery house has been lowered on the dock floor and placed on blocks.
- Remove / refit all twenty (20) bolts (M 27 x 110), nuts and washer and tight on toque, cross wise 1500 Nm.
- Including tools and permits.

Lump sum price...

**X.120. deck crane, planetary gear boxes overhaul**

Drawings:
- HMC 7430-01 deck crane general view
- Pics X.120. deck crane, planetary gearboxes

Each drive assembly is build up by a hydro motor, break assembly and gearbox assembly. The gearboxes are planetary types, brand REGGIANA RIDUTTORY. For the luffing and hoisting, the gearboxes are built in the rope drums. The brakes are brand DANFOSS. The following components are to receive service:
- Travelling gear drive assembly, two (2) units, 300 kg / unit.
- Slewng gear drive assembly, two (2) units, 1.1 ton / unit.
- Main hoist drive assembly, two (2) units, 300 kg / unit.
- Auxiliary hoist drive assembly, one (1) unit, 200 kg / unit.
- Luffing drive assembly, one (1) unit, 750 kg / unit.

**X.120.1. deck crane, planetary gear boxes, change out for spare.**

Drawings:
- HMC 7430-41 rope drum main hoist.
- HMC 7430-42 rope drum luffing.
- HMC 7430-49 general view slewing.
- HMC 7430-90 rope drum aux hoist.

Rope drums to be removed / refit completely from the machinery house for disassembly / assembly at the yard workshop.

A hoisting beam SWL 3 ton is installed in the machinery house.

Scope:
- Assume the hydraulic system of the crane has been locked-out / tagged-out by the crew and de-pressurised.
- Assume the ropes are removed from the drums and the tower frame on top of the machinery house has been removed.
- Cut / weld roof of machinery house, 3 x 1.5 m. Perform water hose test after welding, witnessed by the crew.
- Coating repair of the damaged coating, power wire brushing to ST 3 according specs E.5. and coating repair according specs F.14.
- Gearboxes and rope drum assemblies to rig and hoist out / in from the machinery house, via the access in the roof.
- Dismount / mount the hydro motor, break assembly. Blind off the hydraulic connections with owner supplied blinds.
- Drain old oil and dispose off. Fill with owner supplied new oil.
- Several bolt connections are on torque, range 30 ~ 1000 Nm. Mark all the bolts / nuts once on torque.
- Including tools, rigging, yard crane, forklift, lights and permits.

Scope slewing gear drive assembly.
- Remove / refit floor plates in way of the slewing gear.
- Loosen / tight bolts M24, remove / refit the gearbox.
- Clean the recess and the gear. Assume 2 m2.
- Dress-up the foundation flange.
- Remove / refit pinion from the gearbox shaft (spline). Use torch heater / oil bath.
- Check backlash of min 1 mm of the pinion with lay-out liquid (Prussian blue).
- Two (2) luffing gears to service.

Scope auxiliary hoist drive assembly.
- Remove / refit limit switch (pos 9045 / HMC 7430-90), chain, gear wheel, etc..
- Loosen / tight bolts and nuts on the rope drum foundation (pos 9021, 9026).
- Transport the complete rope drum (800 kg) between ship and yard’s workshop for overhaul. Position the drum vertical at the workshop.
- Remove / refit flange (pos 9007), spline axle (pos 9038), fixing flange (pos 9035) and output flange (9036).
- Loosen / tight bolts (9024, 9022) and hoist out / in drum flange (pos 9005) and gearbox (pos 9037).
- Exchange bearing by owner supplied spare (pos 9042). Check for grease.
- Dress-up all the parts, clean and assemble.

Scope main hoist drive assembly.
- Remove / refit limit switch (pos 4139 / HMC 7430-41), chain, gear wheel, etc.
- Loosen / tight bolts and nuts on the rope drums foundation (pos 4121, 4116).
- Transport the complete rope drum (1.8 ton) between ship and yard’s workshop for overhaul. Position the drum vertical at the workshop.
- Remove / refit flange (pos 4104), spline axle (pos 4135), fixing flange (pos 4135) and output flange (4133).
- Loosen / tight bolts (4118, 4117) and hoist out / in drum flange (pos 4101) and gearbox (pos 4134).
- Exchange bearing by owner supplied spare (pos 4141). Check for grease.
- Dress-up all the parts, clean and assemble.
- Two (2) main drums to service.

Scope luffing drive assembly.
- Remove / refit limit switch (pos 4241/ HMC 7430-42), chain, gear wheel, etc.
- Loosen / tight bolts and nuts on the rope drums foundation (pos 4220, 4216).
- Transport the complete rope drum (3 ton) between ship and yard’s workshop for overhaul. Position the drum vertical at the workshop.
- Remove / refit flange (pos 4204), spline axle (pos 4234), fixing flange (pos 4231) and output flange (4232).
- Loosen / tight bolts (4118, 4117) and hoist out / in drum flange (pos 4101) and gearbox (pos 4134).
- Exchange bearing by owner supplied spare (pos 4141). Check for grease.
- Dress-up all the parts, clean and assemble.

Lump sum for six (6) gearboxes: ... /

Alternatively quote for exchange of the gearboxes in situ.
- All components to be handled with the hoisting beam 3 ton.
- Dismantling / mounting the rope drums in the machinery house.
- Access via the hatch on the bottom of the machinery house for the spare components.

Lump sum for six (6) gearboxes: ... /

**X.120.2. deck crane, planetary gear boxes and breaks, overhaul**

**Drawings:**
- X.120.b. Deck crane Travelling gear assembly
- X.120.b. Deck crane Aux hoisting gear assembly
- X.120.b. Deck crane main hoisting gear assembly
- X.120.b. Deck crane luffing gear assembly
- X.120.b. Deck crane Slewing Gear assembly

Owner will advise depending on the yard their facilities if the overhaul of the gearbox can be done. Yard to advise details of the available machinery / workshop for this overhaul.

Owner will arrange a maker specialist to supervise the overhaul.

**Scope:**
- Assume the gearboxes and break assemblies are dismounted from the deck crane and are available at the yards workshop.
- Assume all spares are owner supplied.
- Complete overhaul at the yards workshop:
  - Exchanging all bearing, seals and spring break pads.
  - Cleaning and dress-up all parts
  - Measuring several components and drawing / reporting of the same.
  - Magnaflux all spline shafts.
  - Filling up with owner supplied oil.
- Dispose of old oil, assume 50 L per gearbox & break assembly.
- Where the coating is damaged, power wire brush to ST3 according specs E.5. and coating renewal according specs F.14.

Lump sum. ... / one (1) gearbox & one (1) break assembly
**X.121. cutter tilting device, overhaul hydraulic cylinder**

**Drawings:**
- JD 04-01-006 Assembly cutter tilting machine
- JD 04-01-008 Bush dia 145/120 L=60
- HYDRAVI 28040-B hydraulic cylinder cutter tilting machine

This device is installed on a removable frame, sea fastened on the crane deck.

**Hydraulic cylinder:**
- Piston rod dia 140 mm.
- Piston dia 250 mm.
- Stroke 1779 mm.
- Weight 1020 kg.
- Pressure test 290 bar

**Scope:**
- Remove sea fastening by cutting the brackets, assume 4 locations, plate 200 x 200 x 20 mm.
- Lift and transport the unit between the ship and the workshop.
- Remove / refit two (2) shafts (pos 9 / JD 04-01-006), loosen locking plates and bolts. Dress-up the parts, measure the journal of the shaft and the un-removed bushes (pos 10).
- Hoist out / in the hydraulic cylinder and overhaul the unit with owner supplied spares. Dress-up all the parts.
- Verify the trueness of the cylinder rod on a lathe machine.
- Perform pressure test for 10 minutes in presence of chief engineer or first engineer.
- Degrease the unit and renew the coating, 3 layers of owner supplied paint.
- Including all tools, transport, crane, staging, permits, reports, torch heating, etc.

Lump sum price :

Additional for removal of bush (pos 10 / JD 04-01-006) and fabrication of new bush (JD 04-01-008)

Additional for removal of bush (pos 43 / JD 04-01-006) and fabrication of new bush

**X.122. windows bridge, measure all.**

**Drawings:**
- IHC 01175-1024-010 plan of windows and port holes.

**Scope:**
- Assume the vessel is on the dock blocks.
- Dismount / mount all the windows on the bridge deck front side and PS + SB. Not the ones from the doors (pos 14) and aft side for the dredge operator (pos 11, 12, 13, 18). Renew the window seals and screws, yard supply.
• Provide the required covering in case of bad weather, grit and coating operations.
• For the window frames, power brushing to ST3 according specs E.6. and coating renewal according specs F.9.
• Measure the dimension of the windows and the windows frames in the bridge construction. Tolerance of maximum 1 mm.
• Issue the drawings (fit for ordering new windows with correct dimension, location of heating element, screws types and dimensions, sealing details, etc).

Lump sum price: …/

X.123. deck crane, overhaul cable reel drive.

Drawings:
- HMC 7430-01: deck crane general view
- HMC 7430-22: substructure portal
- LD 13-00-A008319: detail existing cable connection
- Pics X.123.: deck crane cable reel drive

Scope:
- Assume the electrical supply for the crane has been locked out / tagged out by the crew.
- Disconnect / connect the electrical cable between the ships terminal box and the cable reel. The terminal box on the ship side is easily accessible on upper deck, in way of frame 77 (LD 13-00-A008319). Open / close MCT and the cable guide.
- Wind off / on the cable from the spool and wind on / off a suitable drum. Drum the yard delivery. E-cable is Ø 63 mm, L 65 m. Store the e-cable in a secure location for the duration of the works.
- On the cable reel, open / close stuffing box and disconnect / connect the E-cable between the slip ring unit and the crane.
- Suspend in yard crane with sling / chain blocks the complete cable reel unit. Loosen / tight the foundation bolts 4 x M20 (pos 2241 / HMC 7430-22) and hoist off / on the complete cable reel unit.
- Remove / refit the drum, two (2) e-motors with magnetic coupling, the gear box and slip ring body from the pedestal.
- At yard’s workshop, disassemble / assemble the slip ring unit, the gearbox and the magnetic couplings. Clean and dress up all parts. Replace all worn parts by owner supplied spares.
  • Gearbox needs to go to Belgium for making of drawings. Prepare a transport box (approx 70 x 70 x 70 cm), and load/receive the gearbox afterwards. All included.
• Coating repair, assume 2 m2. Power wire brushing to ST3 according specs E.5. and coating according specs F.14.

Lump sum price: … / cable reel.

X.124. available
**X.125. deck crane, installation of “home coming” device**

**Drawings:**
- Van Hemert hydraulic unit with E-cabinet
- Van Hemert hydraulic unit without E-cabinet
- Van Hemert A-10385-001 hydraulic diagram deck crane
- HMC 7430-50 General view Machine House
- Pictures X.125.1-2 photos inside machine house

A new hydraulic unit is to be installed in the deck crane machine house.

**Scope:**
- Clean the bilges in way of the hot works. Assume 20 m².
- Disconnect / connect electrical cabling in three cabinets including labelling. Assume 1 day work for two (2) electricians.
- Supply and weld two (2) angle bars 50 x 50 x 1000 mm to the wall of the machine house.
- Supply and weld two (2) angle bars 50 x 50 x 1000 mm to the side wall of the machine house.
- Relocate one (1) electrical lighting cabinet (600 x 500 x 300 mm) 2 m from its previous location.
- Cabling to be rerouted to the new location – weld owner supplied cable tray.
- Rig in the owner supplied hydraulic unit into the deck crane machine house via the deck crane machine house door (548 x 2000 mm). Unit to be rigged in 2 parts: 1 x Unit on frame + 1 x electrical cabinet.
- Place the hydraulic unit on the machine house floor and weld the unit’s frame to the floor (intermittent fillet weld). Location of the unit: under the ventilator pos 5034 on drawing HMC_7430-50.
- Gratings installed above the machine house floor to be adjusted in way of the new hydraulic unit by cutting / welding.
- Mount and connect electrical cabinet onto hydraulic unit.
- Stand still heating 25W of the hydraulic unit to be connected in the lighting cabinet. Cable owner supplied.
- Hydraulic unit to be cut into to P-line of luffing/slewing, to P-line of the auxiliary hoist and to T-line. Assume 3 x 1m pipe work in 20 x 2.5mm seamless pipe, 3 T-joints and 6 bends. 6 x owner supplied non return valve to be installed according hydraulic diagram.
- Where hydraulic pipes have been modified, drain the oil and flush according spec P.2.2.
- Welded areas to be repaired by power tooling to ST3 and 3 layers of owner supplied paint.

Lump sum price: ...

**X.126. Echo sounder renewal**

**Drawings:**
- IHC 01175-0334-070 general arrangement bridge
- IHC 01175-1117-010 sheet 1 ladder well end part
The existing echo sounder unit, read-out panel and two (2) bottom elements have to be replaced. The read-out panel is floor standing 19" rack unit, located in way of frame 58 on the bridge. The bottom elements are located in double bottom tank no. 51, frame 38, and PS fore peak tank no. 1, frame 141.

Owner will supply new echo sounder unit (transducers, bottom elements, valves, display unit, power supply, cables, MCT, etc). And specialist for commissioning.

Staging in provision store trunk can be combined with job G.216. Steel work in tank no.1 can be combined with job G.169. Steel work in tank 58 can be combined with job G.199.

Scope bottom elements:
- Assume the vessel is dry docked.
- Assume lights, ventilation and manholes are opened in tank 01 for job G.169.

Forward
- Tank 01, cut-out existing bottom element and weld new unit, flush mounted with the flat bottom. Hole in plate 200 mm, thickness .
- Tank 01, open close junction box, frame 141. Remove / pull cable to transducer.
- Open / close the dry provision store hatch with the yard crane, reachable from the upper deck.
- Erect / remove staging in dry provision store trunk. Assume 35 m3, frames 37 ~ 41. Allow for three (3) modifications.
- Dry provision store trunk, open / close junction box, frame 38. Remove / pull cable to transducer.
- Erect / remove staging in pump room, MCT to thyristor room. Partly on top of dredge line. Assume 15 m3 (Sketch X.126.).

Aft
- Assume lights, ventilation and manholes are opened in tank 51 for job G.199. Cut-out existing bottom element and weld new unit, flush mounted with the flat bottom. Thickness 16 mm, hole in plate 200 mm.
- Dry provision store trunk, cut the pipe line complete from flat bottom till main deck (section B-B / IHC 01175-2431-010), including the brackets. Weld an insert in the tank top, thickness 16 mm, dia 100 mm. Cemented floor tiles are installed on the tank top, remove / refit the tiles, assume 0.5 m2. Including supply of cement by yard.
- In tank 51, cut / weld an owners supplied MCT unit, tank top 16 mm, hole in plate 2”, between frame 37 ~ 38 (Sketch X.126.) in the pump room.
• Including coating repair of the damaged area’s, power wire brushing according specs E.6. and coating repair according specs F.10. with owners supplied paint.
• Issue a report.
• Including all means like ventilation, lights, permits, tools, consumables, shielding and covering, etc.

Scope read-out panel in bridge / electrical cabling
• Assume the vessel is dry docked.
• Assume the crew has locked out / tagged out the system electrically.
• Remove the existing 19” rack unit on the bridge. Owner will provide a new 19” rack cabinet, part of the accommodation renewals scope.
• Assume the cable trunk in the accommodation stair casing has been opened by the crew.
• Remove / pull cables between 19” rack on bridge and the junction box frame 38 and frame 141.
• Install new display unit and power supply in the new 19” rack, frame 58 and repeater panel and power supply in the navigation desk.
• Including all means like ventilation, lights, permits, tools, consumables, shielding and covering, etc.

Lump sum price : .
Z. VENTILATION

Z.100. Renewal of air handling condenser unit AC2

The complete air handling condenser unit of AC2 is to be renewed by owner supplied new unit.
Unit is installed in AC room on upper deck frame 75-85 at SB side.
Cut / remove / refit the steel workbenches with lockers from the upper deck above the AC room. Cut securing strips, remove / refit the wooden beams from the work deck above the AC room, 4.0 x 3.0 m. Cut an access opening in the upper deck above the AC room. Size 1400x1600mm, including a transversal web frame and stiffeners underneath.
Disconnect, remove the connecting inlet and outlet ducts. 4 x ND200 x 3m & 3 bends, 1 x 250x400mm x 4.0m & 3 bends, 1 x 300x600mm x 2.0m & 1 bend. All ducts are of the insulated type.
Disconnect the electric connections from fan, thermostats, temperature sensors, control valve.
Cut, disconnect & remove the Freon supply and return lines, ND40 & ND80, each 3.0 m & 3 bends.
Disconnect the condensate drain pipes ND25mm.
Remove the hot water piping with fittings in way, 2 x ND42mm x 2.0m
Disconnect, cut loose the unit. Remove and dispose off old unit. Size unit 1000x1300x3000mm / 500 kg
Transport new owner’s supplied air handling unit to ship. Fabricate new foundation, fit, connect and install the unit in the AC room
Fabricate, fit and install new insulated type inlet and outlet AC ducting to the unit as per above removed units.
Connect the fan, thermostats, temperature sensors, control valve. Supply, fit, install Freon supply & return pipes to the condenser. Supply, fit and install and connect drainpipes & hot water pipes to the unit
Vacuum the Freon pipes, test the system. Fill unit with owner’s supplied Freon gas.
Commission the unit under supervision of chief engineer
Close, fit and weld the temporary access hole in the deck
Repair the damaged paint system in of the deck plating and in way of works to ST3 and 3 layers of ship’s supplied paint
Refit the wooden beams of the work deck. Fabricate, fit and weld securing strips.

Lump sum price : ..../

Z.101. Replacement of inlet & exhaust duct paint store

The paint store is ventilated with existing fan en inlet.
The yard is to provide temporary storage for the paint stored in the paint locker.
Remove all pales of 100 pcs 5 and 20 lt of owner’s paint. Store in suitable space and return to the paint store after repairs
Ventilate the paint locker, provide hot work cert.
Erect staging
Disconnect, remove the electric fan, ND350 x 400mm.
Cut, remove the existing ventilation pipe, including wall penetration and goose-neck on deck: pipe ND150 x 3000mm, 4 bends.
Cut, remove the existing intake pipe: ND150 x 200. Fit, weld and close the opening in the wall of the paint store.
Supply, fabricate, fit and install a new inlet pipe from the paint store to the outside wall of the workshop: square duct 400 x 400mm. Including the fabrication and installation of Louvre & class approved hatch cover. Length of duct: 2.5m. Duct is made from 3mm steel plate. A light steel duct is to run inside the paint store over length of 2.5 m to distribute the intake air.
Supply, fabricate, fit and install exhaust duct from the paint store to the outside wall of the workshop. Install, fit, connect the old electric fan in this exhaust duct. Duct is square 350 x 350. Including 2 adaptor pieces to the round fan unit & the fabrication and installation of Louvre & class approved hatch cover. Duct is made from 3 m steel plate.
Louvre’s and hatch cover to be of similar type as installed on board.
Commission the fan unit and present to class.
Repair the damaged paint system to ST3 and paint with 3 layers ship’s supplied paint.

Lump sum price: …/.

**Z.102. Cleaning of ventilation ducts accommodations.**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01175-2313-600</td>
<td>Pipelines accommodation main deck</td>
</tr>
<tr>
<td>01175-2318-500</td>
<td>Pipelines accommodation upper deck</td>
</tr>
<tr>
<td>01175-2318-520</td>
<td>pipelines in accommodation upper deck</td>
</tr>
<tr>
<td>01175-2318-540</td>
<td>pipelines in accommodation crane deck</td>
</tr>
<tr>
<td>01175-2318-560</td>
<td>pipelines in accommodation lower bridge deck</td>
</tr>
</tbody>
</table>

The inside of the air-conditioning ducting on the vessel’s main, upper, crane and lower bridge deck are to be cleaned.
The ducts are to be cleaned and decontaminated by an in-situ electrical or pneumatic powered ventilation duct cleaning machine with rotating brush and camera system.
Vacuum cleaners to be used to remove all debris and contamination from inside the ducts.
After cleaning the ducts are to be inspected by camera system and shown to owner’s representative. A report with still photographs to be made after the works.
Including removal and refitting of outlet blowers and ceiling panels to access the ventilation ducts.
During works, flooring and wall to be protected by tarpaulin. Cabins and alleyways to be cleaned after works.
A works procedure to be presented prior start of works.

Lump sum price: …/.

Additional price to recondition the flap mechanism of AC outlet: …/pc

**Z.103. main switch board 660 V, ventilation ducting renewal / re-insulation.**

Drawings:
Description:

- The MSB is located in the engine control room, frames 77 ~ 19. Access is from both sides of the switchboard. Dimensions of the MSB are 9 x 1.5 x 2.1 m.
- The AC system of the MSB has isolation on the inner side of the ducting.
- Total length of ducting estimated at 25.7 m.
  - 120 x 380 mm, total length 1400 mm
  - 120 x 350 mm, total length 1200 mm
  - 120 x 300 mm, total length 2400 mm
  - 120 x 150 mm, total length 3600 mm
  - 120 x 120 mm, total length 17100 mm
- Regulation valves, assume 15 pieces.

Scope:

- Assume the system has been de-energised, locked out / tagged out by the crew.
- The complete AC ducting in the 660 MSB:
  - Dismounting / mounting
  - Removal of worn internal isolation material and cleaning
  - Internal coating
  - Internal covering with new isolation material.
- Measuring all ducting and issue a general arrangement and dimensional drawing
- Disposal of old isolation and/or ducts.

Isolation material Kaiflex ST-SK, Amaflex or equivalent. Yard to provide sample (galvanized duct with internal isolation fixated on it) by mail to Belgian office and technical specifications of the new isolation.

Lump sum excluding delivery of new ducts. … /

Lump sum including delivery of new ducts. … /
PART 2:
MLR
SPECIFICATIONS
LIST OF DRAWINGS

ld_con - drawing list MLR
ld_jdn - drawing list MLR
ld_special - drawing list MLR
MLR.B. Steel work

MLR.B3. Installation of additional escape routes

Drawings:
LD_11-00-A009532_1 Position WT door in FR.41 PS
LD_11-00-A009049_1_A Modification for AP measures
MLR.B3_426.116.800x600 Watertight musketeer door LH 6cl
MLR.B3_D203_12-00-010 Manhole 600x400

MLR.B3.1. Installation of escape hatch in separator room

- Create cut out with HIP 675x875 in bulkhead fr41 between separator room and propulsion room, as per drwg A009532
- Fit/weld new supplied watertight door
- Prepare surface ST3 and paint 3 layers of paint, JDN supply.

Lumpsum price: ...

MLR.B3.2. Installation of manhole in CO2 room

- Create cut out with HIP 600x400 in bulkhead of CO2 room fr124, 6650 from CL, as per drwg A009049
- Supply, fit and weld new manhole cover, as per shipyard standards or per drawing D203_12-00-010
- Prepare surface ST3 and paint 3 layers of paint, JDN supply.

Lumpsum price: ...

MLR.B3.3. Installation WT door in SB alleyway

- Fit/weld new plate with approximate size of 975x2420 on frames of webfr.89. 2 holes to be provided for existing piping.
- Create cut out in new plate with HIP 875x1925 in bulkhead, as per drwg A009049
- Close small remaining opening at bottom with plate 120x45x8.
- Fit/weld new supplied watertight door, right hinged.
- Prepare surface ST3 and paint 3 layers of paint, JDN supply.

Lumpsum price: ...

MLR.B4. Deck plating renewal in accommodation area

Drawings:
IHC_01175-0338-030_1_G General Arrangement Leonardo Da Vinci
IHC_01175-0338-030_2_J General Arrangement Leonardo Da Vinci
IHC_01175-0323-020_1_E Construction plan midship
IHC_01175-2615-010_1_C Work deck on crane deck
IHC_01175-1041-030_1_E Foundation for supports of spuds with rails for spudtransport
IHC_01175-2410-030_1_A Arrangement and foundations in fanrooms on maindeck and upperdeck
IHC_01175-2410-030_2_A Arrangement and foundations in fanrooms on maindeck and upperdeck
HEIHOP_12000156-100_1 Filter frame
MLR.B4_Overview_drwg Marked pitted area + steel plate renewal + structures upperdeck rev01
MLR.B4_Mark_up_drwg Cut out plan rev01

**MLR.B4.1. Renewal of steel deckplating**

- Remove/Refit the complete work deck as per drwg 01175-2615-010.
  - Remove old azobe beams and refit new azobe beams, JDN supply
  - Renew angle bar profiles 60x40x5, JDN supply
  - Renew profiles HE100M, JDN supply
  - Removal without renewal at location of new ventilation deckhouse frs. 70 – 74, from 4200 – 6300 mm ex CL to SB as per job B7.
- Remove/Refit foundation for supports of spuds between fr 94 and 96 and between 4600mm from CL to SB and 4600mm from CL to PS.
- Remove/Refit rails for spud transport on fr94 and fr96. Between 5200mm from CL to SB and 5200mm from CL to PS.
- Sandblast SA 2 ½ complete work deck between fr72-124 and between longitudinal girder L10 to PS from CL and longitudinal girder L10 to SB from CL, approx 321m². Steel plates described below that will be renewed shall not be blasted.
- Assume access for cutting has been prepared till blank steel in cabins, corridors, washing place, pantry, drawing room and office. (Under scope of midlife refit of accommodation)
- Access for cutting in boatswain store to be prepared in the following way:
  - Assume all removable objects like spare parts are removed by JDN
  - Remove/refit existing light armatures
  - Cover all cable trays and other sensitive equipment with fire resistant blankets.
- Access for cutting in 4 fan rooms to be prepared in the following way:
  - PS between fr96-102: Remove/Refit 40 filter panels
  - PS between fr107-113: Remove/Refit 30 filter panels
  - PS between fr113-118: Remove/Refit 22 filter panels
  - SB between fr113-118: Remove/Refit 20 filter panels and cover filter unit S3 and S13 with fire blankets
  - Remark: For welding new deck plates it’s possible that there is not enough access available from the inside of the fan room. A penetrated welding has to be foreseen from the crane deck.
- Install required staging’s in accommodation areas. Height 3.4m between upper and crane deck.
- All reinforcing internals to be kept in place and only renew steel plates with below coordinates (plates divided as per existing welding lines):
  - Renewal of steel plate 9mm between fr82-93.5 and between long. 2900mm and 4000mm from CL to PS.
  - Renewal of steel plate 9mm between fr82-89.5 and between long. 730mm and 2900mm from CL to PS.
- Renewal of steel plate 9mm between fr89.5-fr93.5 and between long. 1730mm and 2900mm from CL to PS.
- Renewal of steel plate 9mm between fr82-89.5 and between long. 730mm PS and 730mm SB from CL.
- Renewal of steel plate 9mm between fr82-93.5 and between long. 730mm and 2900mm from CL to SB.
- Renewal of steel plate 9mm between fr93.5-116 and between long. 2900mm and 4000mm from CL to PS.
- Renewal of steel plate 9mm between fr93.5-110 and between long. 730mm and 2900mm from CL to SB.
- Renewal of steel plate 9mm between fr110-116 and between long. 730mm PS and 2900mm from CL to PS.
- Renewal of steel plate 9mm between fr93.5-116 and between long. 2900mm and 4000mm from CL to SB.
- Renewal of steel plate 9mm between fr110-110 and between long. 730mm and 2900mm from CL to SB.
- Renewal of steel plate 9mm between fr93.5-96 and between long. 1700mm and 2900mm from CL to SB.
- Renewal of steel plate 9mm between fr116-121 and between long. 3830mm and 5050mm from CL to SB.
- Renewal of steel plate 14mm between fr116-121 and between long. 5050mm and 5830mm from CL to SB.
- Renewal of steel plate 16mm between fr121-122 and between long. 3830mm and 5830mm from CL to SB.
- Total weight is approx. ±10T (for indication only and can’t be used as variations on the lumpsum quotation)
- Before fitting new plates, all internals; existing deck plates have to be prepared for welding
- All extra cuts are for yards account.
- Paint the complete deck area, approx 460m² as per the paint specifications (3coats) provided. Paint supply by JDN.

Lumpsum price: ...

**MLR.B4.2. Repair of pitting on deck**

- Resurface pitted deck area with a 2 parts composite for metal repair and resurfacing, corrosion resistant. (For example Belzona 1111), shipyard supply
- Assume pitting on surface area is 5% scattered and total area is approximate 321m².

Lumpsum for work ...
Metal composite material .../kg

**MLR.B4.3. Repair of welding seams**

- Check for washed welds after sand blasting with superintendent and mark welds for re-welding.

Price for welding 3 passes .../m
**MLR.B4.4. Additional steel renewals**

If any additional steel renewals are required, noticed after sandblasting in the same area. Please mention the price per kg that exceeds the existing scope of renewal under section MLR.B4.1.1.

Rate …/kg

**MLR.B6. Engine cooling water drain tank + technical water tank**

Drawings:
- MLR.B6_drwg_CW_new_tank: New CW draining tank
- IHC_01175-1203-010_1_C: Double bottom fr102-111
- IHC_01175-2320-500_1_L: Diagram bilge ballast lines
- IHC_01175-0353-030_1_Aj: Tank soundings board
- IHC_01175-0353-010_1_Dj: Tank testing plan
- MLR.B6 IHC 49103: IHC specification steel profiles

**Cooling water drain tank**

New tank to be made in double bottom between fr110-fr113 and CL – CL+1950mm to PS of 4.3m³. See “drwg_CW_new_tank” and “IHC_01175-1203-010_1_Cj”

- Fabricate and install on tanktop of double bottom manhole cover Ø500mm between fr111 – fr112, 540mm from CL to PS
- Cut out two manholes 600x500 in centre of webframe 111 & 112, 1200mm from CL to PS
- Welding of flat bar 120x12mm webframe 111 & 112 conform detail on drawing modification Cj, 1200mm from CL to PS
- Blank all mouse holes on fr110 and fr113
- On top of the tank weld a flange, DN40 for filling and fit blind plate inclusive rubber packing.
- Near the bottom of the tank weld a flange, DN40 for discharge and fit blind plate.
- Install vent pipe DN40 with winel head (yard’s supply), hot galvanized running up to upper deck ±850mm. Incl all clamps, penetrations…
- 1 small sounding pipe is to be installed DN50, hot galvanized just up to ER level
- Sandblast SA ½ complete tank (cut hole for access and cleaning at bottom if required). Paint 3 layers of paint as per specs for fresh water coating, paint JDN supply.
- Pressure test tank 0.2 bar

**Technical water tank**

**Ballast tank** #11, 74.5m³ will be converted to a technical water tank.

- Open/close manhole and drain tank
- Remove 2 x valve pos 1407, piping pos003 and blind pipe pos001 of drwg “IHC_01175-2320-500_1_L”
- Near the bottom of the tank weld a flange PN10, DN25 for installation of level sensor. (Vegabar 82), flange shipyard supply, valve JDN supply.
- Near the bottom of the tank weld a flange PN10, DN25 for suction line to technical water system.
- Near the top of the tank weld a flange DN50 for installation of high level alarm sensor.
- Near the top of the tank weld a flange, DN32 for filling of tank 11 from FW generator.
- Existing ventilation and sounding cap of tank can stay in position.
- Sandblast SA 2 ½ complete tank (cut hole for access and cleaning at bottom if required). Paint 3 layers of paint as per specs for fresh water coating, paint JDN supply.
- Pressure test tank 0.2 bar

Inclusive: staging, ventilation, access holes, renewal of manhole rubbers, etc…

Lumpsum

MLR.B7. **Structural modifications in accommodation area**

Old Drawings:
- IHC_01175-1024-010_1_B Windows & Port Holes
- IHC_01175-1312-010_1_Hj Cross sections, Fr41-72
- IHC_01175-1312-010_2_Gj Cross sections, Fr41-72
- IHC_01175-1340-010_1_Ij Buoyancy space, Fr58-75
- IHC_01175-1340-020_1_A Spud trunk in buoyancy compartment
- IHC_01175-1342-010_1_Pj Buoyancy space, Fr40-57
- IHC_01175-1370-010_1_Gj Upper deck, Fr58-75
- IHC_01175-1801-010_1_D Lower bridge deck
- IHC_01175-1803-010_1_Fj Bridge deck
- IHC_01175-1805-010_1_C Top deck
- IHC_01175-1811-010_1_Ij Crane deck, Fr41-58 with walls on upper deck
- IHC_01175-1811-010_2_Hj Crane deck, Fr41-58 with walls on upper deck
- IHC_01175-1811-010_3_D Crane deck, Fr41-58 with walls on upper deck
- IHC_01175-1811-010_4_Ij Crane deck, Fr41-58 with walls on upper deck
- IHC_01175-1812-010_1_Hj Crane deck, Fr58-78 with walls on upper deck
- IHC_01175-1812-010_2_Ij Crane deck, Fr58-78 with walls on upper deck
- IHC_01175-1812-010_3_Fj Crane deck, Fr58-78 with walls on upper deck
- IHC_01175-1813-010_1_Fj Crane deck, Fr78-93
- IHC_01175-1813-010_2_Fj Crane deck, Fr78-93
- IHC_01175-1814-010_1_C Crane deck, Fr94-111
- IHC_01175-1814-010_2_D Crane deck, Fr94-111
- IHC_01175-1814-010_3_B Crane deck, Fr94-111
- IHC_01175-2410-030_1_ Arrangement and foundations in fanrooms on main deck and uper deck
- IHC_01175-2620-080_1_ Porthole frames

New Drawings:
- LD_11-00-_A008315_Bj_1 Crane deck Fr58-78 Midlife Upgrade
- LD_11-00-_A008551_1_1 Upper deck Fr58-78 Midlife Upgrade
- LD_11-00-_A008589_Aj_1 Buoyancy space Fr72-76
- LD_11-00-_A008657_Bj_1 Crane deck Fr41-58 with walls on upper deck
- LD_11-00-_A008662_Aj_1 Ventilation cabinet for air filters
- LD_11-00-_A008675_Aj_1 Crane deck Fr94-111 Midlife Upgrade
- LD_11-00-_A008692_1_1 Crane deck Fr78-93 Midlife Upgrade
Description:
The aim of this job is to execute the modifications to the steel structure in the accommodation area related to its refit. Mainly the structural modifications consist of:
1) Installation of an internal corridor between the forward accommodation and the main (aft) accommodation, located on upper deck between both pump room hatches.
2) Both pump room hatches will be raised from upper to crane deck.
3) Removal of the 3rd spud hole (fr. 72, SB) from the vessel’s construction.
4) Relocation of windows and doors in accordance with the new accommodation arrangement.
5) Structural modifications to internal steel bulkheads due to a relocation of some spaces: e.g. laundry, change rooms, gym, bar.

Note:
6) Steel weights, where indicated, are for indication and guidance only and shall not be used for variations on the lumpsum quotations.
7) For accommodation construction drawings, decks are named after the deck above, as fabrication during new-building was upside down.
8) All welds in bulkheads that will be visible in the new accommodation to be grinded perfectly smooth to owner’s satisfaction before painting.
9) Where required staging to be installed and included, also where not specifically mentioned.
10) For all below modification works grinding up to ST3, application of full paint system as well as repair and touch-up of areas with damaged paint as per specifications to be included.

- Assume accommodation area has been stripped, dredge and navigation control desk and measuring room 19” racks are thoroughly protected for and as described in job MLR.D1.
- Assume existing windows have been removed as per job MLR.D2.1.
- Assume steel plate renewal in accommodation area as per job MLR.B4.1. has been carried out or will be carried out together with below structural modifications.

Bridge deck (below Top deck):
Modify wheelhouse windows at dredge control desk as per drw. LD_11-00-_A008779:
- Install temporary supports between top deck and bridge deck.
- Crop off existing construction as indicated on mentioned drw.
- Grind smooth edges and bevel where required for welding.
- Fit/weld new part of structure as per mentioned drw.

Lower bridge deck (below bridge deck):
Close window and door openings and modify bulkheads as per drw. LD_11-00-__A00919;
- Crop off partly internal bulkheads for captain cabin as per mentioned drw.
- Grind smooth edges and bevel where required for welding.
- Remove existing windows (pos. 2: 6 pcs & pos. 3: 6 pcs) – drw. 01175-1024-010.
- Cut out existing window frames from accommodation bulkheads and cut opening to size for new windows where openings are not closed – 2 mm larger than clear frame size at each side. Grind smooth the edges.
- Fit/weld window and door closing plates where required as per mentioned drw.

Crane deck (below lower bridge deck):
Install support for dredge pipe clamp as per drw. IHC_01175-1801-010_1 (detail 3) and ventilation deckhouse as per drw. LD_11-00-__A008662:
- Fit/weld stiffener at fr. 63 bulkhead at 350 mm ex CL to PS as per drw. IHC_01175-1801-010_1.
- Remove existing windows (pos. 2: 5 pcs & pos. 3: 4 pcs) – drw. 01175-1024-010.
- Cut out existing window frames from accommodation bulkheads and cut opening to size for new windows – 2 mm larger than clear frame size at each side. Grind smooth the edges.
- Fabricate ventilation deckhouse as per drw. LD_11-00-__A008662 – WT door JDN delivery
- Assume work deck azobe beams and angle bars haven been removed as per job MLR.B4.1.1.
- Fit/weld ventilation deckhouse on upper deck between frs 70 – 246 mm and 74 on SB from 4020 mm to 5950 mm ex CL as per the same drw.

Upper deck (below crane deck) frs 94 – 111:
Relocate/remove window and door openings and modify bulkheads as per drw. LD_11-00-__A008675:
- Cut out new window and door openings as per mentioned drw.
- Crop off partly internal bulkheads for new corridor and hospital as per mentioned drw.
- Grind smooth edges and bevel where required for welding.
- Remove existing windows (pos. 2: 1 pcs & pos. 3: 4 pcs) – drw. 01175-1024-010.
- Cut out existing window frames from accommodation bulkheads and cut opening to size for new windows where openings are not closed – 2 mm larger than clear frame size at each side. Grind smooth the edges.
- Fit/weld window and door closing plates and additional stiffeners where required as per mentioned drw.
- Fit/weld new watertight doors for fan rooms as per mentioned drw.
- Fit/weld new internal bulkhead as per mentioned drw.

Upper deck (below crane deck) frs 78 – 93:
Relocate/remove window and door openings and modify bulkheads as per drw. LD_11-00-__A008692:
- Cut out new window openings as per mentioned drw.
- Crop off internal bulkheads for new corridor, stores and change room as per mentioned drw.
- Grind smooth edges and bevel where required for welding.
- Remove existing windows (pos. 2: 4 pcs & pos. 3: 2 pcs) – drw. 01175-1024-010.
- Cut out existing window frames from accommodation bulkheads and cut opening to size for new windows where openings are not closed – 2 mm larger than clear frame size at each side. Grind smooth the edges.
- Fit/weld window and door closing plates and additional stiffeners where required as per mentioned drw.

Upper deck (below crane deck) frs 58 – 78:
Install accommodation corridor, extend pump room hatches to crane deck, extend AC room, cut openings for ventilation deck house and install new store as per drw. LD_11-00-_A008315:
- Crop off bulkheads for new accommodation corridor, store and AC room as per mentioned drw.
- At AC room and ventilation room next to it, first disconnect electrically, dismount, travel out and temporary store ventilation fans for pump room and transformer room SB.
- Crop off both SB and PS pump room hatches at deck level. PS hatch will be reused in new position: cut coaming at correct height (600 mm)
- Grind smooth edges and bevel where required for welding.
- Remove existing windows (pos. 2: 5 pcs & pos. 3: 4 pcs) – drw. 01175-1024-010.
- Cut out existing window frames from accommodation bulkheads and cut opening to size for new windows where openings are not closed – 2 mm larger than clear frame size at each side. Grind smooth the edges.
- Extend pump room hatch trunks up to crane deck level as per mentioned drw. For PS hatch a 400 mm coaming is installed.
- Fit/weld PS hatch with 600 mm on the 400 mm new part of coaming: total coaming height will become 1000 mm.
- Fabricate and install new flush SB hatch per mentioned drw. – hatch clamps and closing rubber are JDN supply.
- Extend crane deck around PS raised pump room hatch to per mentioned drw.
- Fabricate and install new removable crane deck platforms as per drw. LD_11-00-_A009450
- Cut openings in crane deck and grind smooth edges for ventilation deckhouse as per mentioned drw.
- Fit/weld air duct plates and stiffeners below ventilation deckhouse and bulkhead between fan room and AC room as per mentioned drw.
- Fit/weld plates and stiffeners for new store next to SB pump room hatch as per mentioned drw.
- Fit/weld window and door closing plates and additional stiffeners where required as per mentioned drw.
- Assume that cross-over dredge line has been rerouted and installed, incl. modification and installation of dredge pipe support as per job MLR.J4.

Upper deck (below crane deck) frs 41 – 58:
Relocate/remove door openings, modify galley service openings and modify bulkhead as per drw. LD_11-00-_A008657:
- Crop off bulkheads for new change room as per mentioned drw.
- Cut out bulkheads in order to enlarge galley service counters per mentioned drw.
- Cut out new door openings as per mentioned drw.
- Grind smooth edges and bevel where required for welding.
- Remove existing windows (pos. 2: 3 pcs & pos. 3: 5 pcs) – drw. 01175-1024-010.
- Cut out existing window frames from accommodation bulkheads and cut opening to size for new windows where openings are not closed – 2 mm larger than clear frame size at each side. Grind smooth the edges.
- Fit/weld door closing plates and additional stiffeners where required as per mentioned drw.

Main deck (below upper deck) frs 58 – 78:
Relocate/close deck openings and add deck stiffeners as per drw. LD_11-00_-A008551:
- Cut out new deck opening as per mentioned drw.
- Remove existing portholes (pos. 1: 8 pcs) – drw. 01175-1024-010.
- Cut out existing porthole pipes from hull plating and cut opening to size for new portholes – 2 mm larger than clear pipe size per side. Grind smooth the edges.
- Grind smooth edges and bevel where required for welding.
- Fit/weld deck closing plates where required as per mentioned drw.
- Add new main deck stiffeners as per mentioned drw. – location is pump room ceiling: erect staging from pump room floor up or hanging from upper deck down through upper deck opening.

Main deck (below upper deck) frs 70 – 76 SB and from upper deck to bottom:
Remove 3rd spud hole pipe (from upper deck to bottom) and relocate bulkhead openings as per drw. LD_11-00_-A008589:
- Cut out new bulkhead opening as per mentioned drw.
- Tank 48: assume open/close and made gas-free and cleaned as per rep spec H. general.
- In SB store below main deck and above tank top:
- remove/refit:
- 3 racks with spare parts: 2m x 1m x 2m;
- 1 lista cabinet with spare parts: 2m x 1m x 2m;
- Provide thorough mechanical protection below main deck for cable trays next to 3rd spud hole pipe.
- Cut out 3rd spud hole pipe from upper deck to bottom as per mentioned drw.
- Cut out supporting pipe at fr.75 between upper deck and tank top as per mentioned drw.
- Crop off horizontal reinforcement plate in tank 48 between frs 70-75 as per mentioned drw.
- Crop off upper deck and bottom plate stiffeners around spud hole as per mentioned drw.
- Grind smooth edges and bevel where required for welding.
- Cut out new porthole openings (2 pcs) as per mentioned drw.
- Fit/weld deck closing plates in upper & main deck, tank top and bottom plate as per mentioned drw.
- Fit/weld door closing plate and closing plate of fr. 72 in tank 48 as per mentioned drw.
- Fit/weld new stiffeners where required as per mentioned drw.

Main deck (below upper deck) frs 40 – 57 PS + SB:
Relocate/remove door openings as per drw. LD_11-00_-A008762:
- Cut out new door openings as per mentioned drw.
- Grind smooth edges and bevel where required for welding.
- Remove existing portholes (pos. 1: 12 pcs) – drw. 01175-1024-010.
- Cut out existing porthole pipes from hull plating and cut opening to size for new portholes – 2 mm larger than clear pipe size per side. Grind smooth the edges.
- Fit/weld door closing plates and additional stiffeners where required as per mentioned drw.

Main deck (below upper deck) forward of fr.40:
- Remove existing portholes (pos. 1: 28 pcs) – drw. 01175-1024-010.
- Cut out existing porthole pipes from hull plating and cut opening to size for new portholes – 2 mm larger than clear pipe size per side. Grind smooth the edges.

Lumpsum price

**MLR.B11. Crane deck platform modifications**

Old Drawings:
- IHC_01175-1816-010_1_F Crane deck fr5-40
- IHC_01175-1025-030_1_F Railing on upperdeck and cranedock fr5-40

New drawings:
- LD_11-00-_A008792_1 Modification crandeck frame 5-40
- LD_11-00-_A008798_1 LD SPT-020-038 Railing on crandeck PS
- LD_11-00-_A009024_1 LD SPT-028-038-Railing on crandeck SB

Pictures:
- MLR B11 PIC1

**MLR.B11.1. SB platform reinforcements**

Fabricate and install new supports under platform as per drawing A008792.
- Assume that job section MLR.B12 has been completed.
- Fabricate and fit/weld new support at fr25 between platform and upperdeck, approx 130kg
- Fabricate and fit/weld 3 new reinforcing brackets 10150 from CL to SB, approx 25kg
- Fabricate and fit/weld 4 new reinforcing brackets 9450 from CL to SB, approx 35kg
- Fabricate and fit/weld 4 new reinforcing brackets 8750 from CL to SB, approx 64kg
- Fabricate and fit/weld railing on crane deck as per drawing A009024.

Prepare surface ST3 and paint 3 layers of paint as per specifications, paint JDN supply.
Weights are for indication only and can not be used on variations of the lumpsum quotation.

Lumpsum:

**MLR.B11.2. PS platform extension**

Fabricate and extend existing platform as per drawing A008792
- Assume that job section MLR.B12 has been completed.
- Pre-fabricate 3 supports to fit under platform fr 24, 29 & 35
- Pre-fabricate complete extension part of the platform, inclusive the transversal reinforcing brackets at fr31, 33 & 35. Approx 3753kg
- Crop out the required openings in the above mention transversal brackets for fitting the holland profiles 140x8 from existing part of the platform:
  - At fr31, 7350 from CL to PS
  - At fr33, 7350 and 8050 from CL to PS
  - At fr35, 7350, 8050 and 8750 from CL to PS
- Remove/Refit bracket and life raft and fit on the new part of the extended platform between fr31 and 35, see picture MLR B11 PIC1
- Fit/weld new extension of the platform on the existing platform and install all supports and brackets.
- Fabricate and fit/weld railing on crane deck as per drawing A008798.

Prepare surface ST3 and paint 3 layers of paint as per specifications, paint JDN supply
Weights are for indication only and can not be used on variations of the lumpsum quotation.

Lumpsum: …/

**MLR.B12. Relocation of UWP spares**

Drawings:
LD_12-00__A009070 Arrangement support for spare pump casing and impeller

Relocation of impeller
- Impeller and frame is currently located on SB side between fr23-27
- Open HEB-160 frame and remove impeller with ships special lifting tool
- Crop wall and deck support from current location and relocate/fit and weld in new location as per drawing A009070 between fr104-108 on SB. Flat grind remaining burs and edges
- Wall and deck support to be fitted and adjusted with impeller to guarantee equal support of the impeller
- Prepare surface ST3 and paint with 3 layers, paint JDN supply
- Refit impeller in it’s support

Relocation of UWP casing
- Casing and frame is currently located on PS side between fr23-33
- Open frame and remove UWP casing with ships special lifting tool
- Crop complete support from current location and relocate/fit and weld in new location as per drawing A009070 between fr23-29 on SB. Flat grind remaining burs and edges
- Wall and deck support to be fitted and adjusted with pump casing to guarantee equal support of the pump casing.
- Prepare surface ST3 and paint old and new location with 3 layers, paint JDN supply
- Refit UWP casing in its support.

Lumpsum price for relocating old support or remove/renew supports
(Choice as per yard preferences) …/

**MLR.B13. Position containers on crane deck Fr58-75**

Drawings:
LD_12-00_A009958 Position containers on deck
LD_11-00-A008315_Bj Crane deck Fr58-78 Midlife Upgrade

Align, fitting and welding of dove tail container foundation as per drawing A009958
- Assume that job section MLR.B7 has been completed Upper deck
- Align and fitting of dove tail container foundation for 2x20’ containers between frame 65 and frame 80 (dove tail foundations are owner supply)
- Alignment by means of a 20’ container (yard supply) as a template
- Welding after alignment check by Owners representative
- Prepare surface ST3 and paint 3 layers of paint as per specifications, paint JDN supply, incl on top of deck and damaged area lower deck

Lumpsum: ...

MLR.C. Deck crane

MLR.C1. Deck Crane Major Refit

Drawings:
HMC 7430-01 General arrangement deck crane
HMC 7430-10 Boom
HMC 7430-20 Gantry upperstructure
HMC 7430-22 Gantry substructure
HMC 7430-23 Hydr.& eletr. Lines
HMC 7430-24 Hydr.& eletr. Lines
HMC 7430-39 Sheave block main hoist - loose
HMC 7430-49 Slewing arrangement
HMC 7430-51 Upper carrier
HMC 7430-53 Machinery room floor
HMC 7430-55 Machinery room frame
HMC 7430-71 A-frame arrangement
IHC_01175-1050-020_B Support crane jib
LD 13-00-003 Boom bearing arrangement
LD 13-00-004 Main hoist sheave block – fixed
KRUEGR 22-029 Load measurement sheave

Pics & Docu
MLR.C1-1 Panel for type plate
MLR.C1-2 Overview hoisting & luffing sheaves
MLR.C1-3 Deck crane paint spec – GALVOSIL 15700
MLR.C1-4 SKF Flatness protocol
MLR.C1-5 Main e-cabinets
MLR.C1-6 Lighting under gantry
MLR.C1-7 Slewing bearing drawings

New Drawings
MLR.C1_Unknown Kone Cranes
10-003-105-000 KRAANCABINE

Intro: For this job, the deck crane has to be fully dismantled. All main structural components (and small parts as well) have to be blasted, inspected and re-painted. Some important components have to be renewed (slewing bearing, cabin, electrical cables & components, greasing system, etc.) . Owner has arranged most of the deliveries (including drawings, diagrams and technical documentation) by the Maker (Kone Cranes).  
In the meantime, some small modifications and main repairs can be realized.

For the main repairs to the deck crane, we refer to the jobs of chapter X:
X.116 Remove/refit hoisting & luffing cables
X.117 Overhaul boogies & travel gear
X.118 Hydraulic rotator overhaul
X.119 Winch drums foundation bolts renewal
X.120 Overhaul planetary gear boxes & brakes
X.123 Overhaul cable reel drive

Note that this job might interfere with the renewal of the complete crane track (item MLR.C2).

**Main scope**

- Assume that the crane is in a position with the jib supported either on the ladder gantry or on the wheel house (drwg IHC 01175-1050-020) and all wires removed as per X.116.
- Disconnect or cut (in case of renewal) auxiliary systems allowing to dismount the main parts (boom, A-frame, machinery room, slewing ring, gantry).
- Open the 2pc rotating points of the boom bearing arrangement, lift the boom and transport to/from workshop.
- Disconnect the A-frame from the machinery room (4 hinges), lift the A-frame and transport to/from workshop.
- Lift of the machinery house:
  - Assume electric slip ring has been removed by crew and the hydraulic rotator has been removed by the yard according specs X.118.
  - Dismount & lift 2pc motor/reductor of the slewing drive and temporary secure them inside the upper carriage (or already dismounted acc to X.120.1)
  - Remove / refit ladder in the slewing gear recess, and the support for the hydraulic rotator / slip ring. Cut / weld brackets.
  - Dismount the connection flange between the upper carriage and the slewing ring (72 pc bolt M30x265 – 2160 Nm).
  - Lift off the machinery house with upper carriage and transport to/from workshop.
  - Disconnect the slewing ring from the gantry ((72 pc bolt M30x265 – 2160 Nm), lift off and scrap.
- Gantry
  - Assume the bogies have been removed as per X117
  - Assume the cable reel has been removed as per X123
  - Remove the complete gantry (upper and substructure welded into 1 part) and transport to/from workshop.
  - Dismount the above mentioned main parts further into separate mechanical parts (i.e. mechanically disconnect beams, sheaves, shafts, swivelling shafts, bearings, sensors, railings, gratings, ladders, etc, etc...). Dress-up all parts, measure all machined area’s and report to Owner. Note that 26 hoisting & luffing sheaves (hoisting blocks included) and 1 measurement sheave (on the jib) are involved (all to be replaced by Owner’s new supplied sheaves). See also picture “MLR.C1-2” and drawings.
  - Remove all auxiliary systems where not already done for the main lifting items (electrical, greasing, hydraulics), including all their small fixtures. Fabricate and weld new steel fixtures and pipe clamps before blasting & painting.
  - Remove existing cabin including the 2 small support beams, position the new cabin with new supporting U-beams and brackets (all Owner’s supply). Weld the 2 new supporting U-beams and 4 brackets 729x280 on the main carrying support of 300x300. See drwg 10-003-105-000
  - Note that after dismantling, some small steel jobs (adaptations, renewals and/or repairs) can be expected (e.g. railings, doors, hatches, etc....) – same for mechanical work. Yard can quote seperately after dismounting & inspection (lumpsum or rate based) – not to be included in the quotation for this job.
  - An accurate flatness measurement (according to picture “MLR.C1-4”) of both connecting flanges for the slewing ring has to be executed and a report to be
submitted to the Owner. Optionally, Owner will decide to machine (skimming), in his option, either the flange of the Gantry and/or the bottom flange of the upper carriage.
- Prepare all parts for sandblasting and coating (machined surfaces to be suitably protected).
- Coating preparation & painting of all the above parts according to Hempel’s GALVOSIL 15700 system : 4 layers & 325 µm dft) – picture “MLR.C1-3”
- Note that Owner wants to inspect all structural parts (for cracks, deformations, etc..) after blasting and before painting (No major steel repairs are to be expected).
- Afterwards, crane to be completely reassembled in opposite sequence with existing or new parts (Owner’s delivery).

Note the following, related to this job and take in account while quoting :
- Special attention to be given for the installation of the slewing bearing : hardened spots have to be installed on the correct position and bolt torquing according to the correct torque and cross-wise sequence.
- The complete greasing lines have to be renewed (all parts Owner’s supply, clamps included).
- A new crane type plate has to be installed (see picture “MLR.C1-1”– Owner’s supply).
- All weather exposed cable trays on the crane have to be renewed by new stainless steel types (Owner’s supply).
- The new cabin is completely pre-wired and a connecting strip is provided in an e-cabinet
- 2 existing main electrical cabinets of the machinery room have to be removed and 2 new cabinets (fully pre-installed) will be delivered by the Owner. These have to be installed, shifted 400 mm as can be seen in picture “MLR.C1-5” (floor plates to and cable trays under the floor plates slightly to be adapted.. )
- All electrical cabling on the crane (including in the machinery room) has to be renewed and for some additional items (listed below) new cables have to be pulled (Owner will supply a complete package and all required drawings).
- A new transformer to be installed in the machinery room (Owner’s supply)
- On the upper carriage, the following to be (re)-installed (all Owner’s supply) :
  - A new type Krueger (load management system) load display
  - A reprogrammed Krueger CPU in the machinery room.
  - A new type Krueger inclinometer
  - An additional transmitting unit for the new remote control. system
  - An additional signal light & buzzer for engine room alarm
  - A new type limit switch for the luffing motion
  - A flashing light for man-riding mode
  - 2 additional lights (400W each) to be placed under the gantry as per picture “MLR.C1-6” (Owner’s supply)
- On top of the boom, 3 pc additional ultimate limit switches (type with small weight and switch to prevent collision of sheave block & boom) have to be installed (2 pc for main hoist & 1 pc for auxiliary hoist).
- On the boogies (or nearby) the following to be (re)-installed :
  - 2 pc new type limit switches for crane travelling
  - 4 pc new type emergency stops (red button boxes) on 4 corners of the travelling boogies.
  - 4 pc new type orange flashing lights on 4 corners of the travelling boogies
  - 2 pc new type buzzers/bells for crane travelling
  - 2 pc emergency switches connected with (steel) ropes

All studies of lifts, temporary supports, required cranage, special hoisting tools to be engineered and fabricated/ provided by the Yard and included in the quotation for this scope.
Including disposal of all old parts, rubish, etc related to this job.
Lump sum price (without options) ..../
Price for optional skimming of gantry flange for slewing bearing : ..../
Price for optional skimming of upper carriage flange for slewing bearing : ..../

**MLR.C2. Renewal crane track of deck crane**

Old Drawings:
IHC_01175-1050-030_1_E Crane track with details

New Drawings:
LD_13-00-_A008258_1 Crane track – General arrangement
LD_13-00-_A008261_1_A Crane track beams – Installation
LD_13-00-_A008312_1_A Cable tray
LD_13-00-_A008319_1_A Detail existing cable connection
LD_13-00-_A008289_1_B Crane rail L=11467.4 (beam and gear rack)
LD_13-00-_A008301_1_B Crane rail L=11467.4 (beam and gear rack)
LD_13-00-_A008306_1_B Crane rail L=6527.6 (beam and gear rack)
LD_13-00-_A008283_1_B Crane rail L=4911.2 (beam and gear rack)
MLR.C2_markup_drwg_paint Zones that require touch up painting

Description: The goal of this job is to remove the old crane track and gear racks by new supplied track and gear racks. The track will be removed/refit on the exact same location and in 2 steps from fr66 till 141 & from fr-6 till 66. New delivered track beam are delivered on oversize. The gear racks are delivered separate and machined.

- Make sure the crane is stationed on the aft side of the vessel in order to renew track between fr66-141. (crew)
- Prepare all new oversized track beams on the correct lengths and shape the outer ends with the correct welding and interconnection detail as per drawing specifications.
- Crop the old crane tracks and filling plates from the deck.
- Remove the remaining burs and prepare surface SA 2 ½ for painting and welding
- Layout new H-beams and add filling plates where required. Keep important alignment conditions in mind as per drwg A008261:
  - Distance between PS and SB centreline of track is 13300±10mm.
  - A max. allowable deviation of the tracks in top view of 2mm every running meter
  - A max. allowable deviation of the tracks from the side view of 0.5mm every running meter
  - A max. allowable deviation of the tracks in height compared between SB and PS is 9mm.
  - Beam with flattest flanged to be mounted on the bottom to assure good contact with the wheel
- Weld new H-beams on deck:
  - Preheat to 75°C before welding
  - Lower interconnecting flanges have to be flat grinded after welding for flat running surface
  - For welding H-beam to deck square bar profile has to be used over the complete length, yard supply.
- Make temporary connection between old and new beams near fr66.
- Fabricate and fit new bumper beams on the outer ends of the crane tracks.
- Fit/weld new gear racks on the H-beams. A 600mm counter mould of the gear rack is delivered by JDN to assist during fitting of 2 connecting gears. Between gear rails the gap of 2mm has to be filled with compriband elastic sealant (JDN supply)
- Remove/Refit new cable tray and supports pos 17, 18 & 19, yard supply. Provide cable tray with water holes Ø40mm.
- Transport the crane from aft side to fore side of the vessel. Remark between fr66 and fr82 no gear rail is installed and crane has to be pushed/pulled inside the new gear rail.
- Repeat above sequence for the track and cable tray between fr-6 and 66.
- Scrap value of old beams, gears and profiles are approx 85T.
- Machined teeth of gear have to be rubbed with tectyle.
- Yard to propose a coating plan to the satisfaction of Hempel inspector & Superintendent prior to start the job, paint JDN supply:
  - Surface preparation and painting of deck and H-beams
  - Signalisation coating yellow/black on beams
  - Stripe coating
- All remaining parts prepare surface SA 2 ½ and paint with primer and final striped coating (yellow/black).
- Below crane deck prepare damaged paint surface due welding of tracks to standard ST3 and touch up with 3 paint layers. See markup_drwg_paint.
- Test the movement of the crane over the complete length with supervision of JDN.

Remark: This job is interfering with renewal of accommodation. H-beams have to be welded on spot prior to painting and reinsulating of the ceilings in accommodation zones.

Lumpsum price: ....../
Lumpsum price if crane is removed and job can be done in 1 step: ....../

**MLR.D. Accommodation**

**MLR.D1. Stripping and re-insulating of accommodation area**

Old Drawings:
- IHC_01175-0334-010_1_. - Accommodation Main Deck Fr. 4-41
- IHC_01175-0334-020_1_A - Accommodation Main Deck Fr. 41-85
- IHC_01175-0334-030_1_. - Accommodation Upper Deck Fr. 41-63
- IHC_01175-0334-040_1_Dj - Accommodation Upper Deck Fr. 72-107
- IHC_01175-0334-050_1_. - Accommodation Crane Deck and Lower Bridge Deck
- IHC_01175-0334-070_1_C - Dredge Control Cabin/Wheelhouse
- IHC_01175-0344-010_1_Gj - Plan of Doors
- IHC_01175-0345-010_1_Bj - Plan of Floors
- IHC_01175-0345-010_2_. - Plan of Floors
- IHC_01175-0354-020_1_Dj - Plan Fire Resistant Bulkheads and Decks
- IHC_01175-0354-020_2_Dj - Plan Fire Resistant Bulkheads and Decks
- IHC_01175-1021-010_1_Gj - List of Steel Doors and Frames
- IHC_01175-1021-010_2_Dj - List of Steel Doors and Frames
- IHC_01175-2410-090_1_. - Arrangement Exhaust Ventilation Hood Galley
- With ‘accommodation area’ in this section D, there is being referred to– see old drawings:
  - On upper deck: cabins (incl. bathroom – previously dayrooms, office, drawing room – forward accommodation), pantry, wash place, gymnasium, change rooms, toilets, showers, mess rooms, galley, bar, recreation room, office, staircases, corridors between doors 54 – 40, 73/75/77 – 72/70/86.
  - On lower bridge deck: radio room, cabins and capt. cabin (incl. bathroom and dayroom, measuring room (excl. the 2 IMC 19” racks)), toilet, corridor between doors 6 – 12/18.
  - On bridge deck: wheelhouse excl. dredge and navigation desk.

- Provide boxes for temporary storage of all loose items inside the accommodation area.
- Transport to/from the vessel’s different locations inside the accommodation area to/from yard’s warehouse or other locations at the yard as indicated box per box by the owner, storage in warehouse during accommodation refit.
- All small loose items (a.o. loose chairs, safety equipment, galley pottery, cutlery, dishes, books, DVD’s, TV’s, folders, documentation, plans, etc.) and personal equipment from the accommodation area will be stored in the boxes by JDN crew, i.e. filling and emptying of the boxes by JDN crew as well as indication of storage destination at the yard.
- Assume in wheelhouse all electronic equipment to re-use, installed in/on furniture, walls and ceilings has been removed by JDN crew.
- Thorough sturdy heavy duty protection to be installed on equipment that remains installed during removal and renewal works: dredge and navigation desk on bridge deck, measuring room IMC 19” racks (2 pcs) and convertor room on lower bridge deck. Protection is mechanical (e.g. wooden casing around) and against dust (e.g. plastic).
- Remove all appendages and bigger loose equipment from accommodation area: a.o. curtains, mattresses, mats, sofa’s, settees, loose lamps, ...
- Remove all furniture from accommodation area: wooden furniture, metal furniture, fixed chairs, toilets, wash basins, mirrors, ...
- Remove all galley equipment (incl. galley hoods, rolling fire screen, excl. food elevator), mess room equipment (e.g. fridges), bar equipment (e.g. fridge, ice-maker), laundry equipment (e.g. washing machines, tumbler dryers). Where needed equipment to be dismounted inside in order to bring it outside in parts through the existing openings.
- Remove all doors in accommodation area, excluding the steel watertight and weathertight doors.
- Remove all ceiling panels in accommodation area, incl. appendages like lighting fixtures, AC supply units, ventilation grills, ...
- Remove all wall panels in accommodation area, incl. all plinths and appendages like power sockets, lighting switches, wall lighting, bolted handrails...
- Remove, crop off all welded handrails from steel bulkheads and stairways and grind smooth.
- Remove all floors in accommodation area, incl. wheelhouse wooden floor, up to the steel plate.
- Crop off all steel floor boundary strips and foundations of existing wet spaces: bathrooms, public washplace, laundry (drw. 01175-0345-010 details 17F, 19F, 4F, 3F, 5F, 8F, 9F) and grind smooth. Only boundary strips at hull and outside bulkheads remain in place.
- Crop off all existing galley, laundry and change room equipment foundations and grind smooth.
- Remove all thermal, noise and fire insulation of bulkheads and decks in accommodation area up to steel plate.
- Install/remove thorough protection for all cables and cable ways that remain in place, (mainly but not only cables below wheelhouse floor, cable ways in staircases and cables from ECR to accommodation staircase) against all cutting welding and piping works of jobs MLR.B7, MLR.G1 & 4, MLR.O, etc. Extra attention to be paid to the main cableways between the pump room hatches and from ECR around the pump room, further in the accommodation alleyways and to the thyristor room.
- After steelwork, painting, piping and ducting works as per jobs MLR.B7, MLR.G1 & 4, MLR.O, etc, re-insulate (thermal, noise and fire) accommodation area as per drw. LD_00-00-014_1: vertical bulkheads and insulation below decks, i.e. excl. insulation that has not been removed or touched, e.g. insulation below upper deck in ER and insulation below main deck. Floor insulation is excluded, it will be installed by the accommodation subcontractor.
- Disposal of dismounted and removed equipment, material and other garbage related to this job, incl. certificate of garbage disposal.

Lumpsum price

MLR.D2. Windows & portholes

MLR.D2.1. Dredging operator new windows

Old Drawings:
IHC_01175-0334-070_1_C Wheelhouse
IHC_01175-1805-010_1_C Topdeck
IHC_01175-1024-010_1_B Windows & Port Holes
IHC_01175-2323-500_1_D Diagram hot and cold freshwaterlines

New Drawings:
LD 11-00- A008779_j_1 Topdeck midlife update
MLR.D2.1_R5419-1 Fixed windows

- Assume panelling and insulation has been removed as per job MLR.D1.
- Assume dredge and navigation desk and cabling have been thoroughly protected as per job MLR.D1.
- Remove old windows pos 11, 12, 13 & 18 drwg 01175-1024-010, incl. steel window frames. Electrical heating of windows to be disconnected
- Remove old window wiper system on above windows.
- Disconnect electrically (Elec JDN)
- Remove flushing lines between wipers and valves pos 67, 68 & 69 drwg 01175-2323-500 (Don’t remove valves).
- Assume structural modifications for new windows have been done as per job MLR.B7.
- Fit/weld 5 new window frames. Welding frames and windows will be supplied by JDN. Please remark that the hole in the plate of the structure has to be 2mm larger on each side than the clear size of the welding frame, drwg R5419-1.
- Paint the renewed construction and window frames as per the specifications, paint JDN supply.
- Fit 5 new windows and seal the edges on the inside with a good quality silicone sealant, colourless/white as per drw. R5419-1.

Lumpsum price

MLR.D2.2. Renewal of window wipers

Drawings:
- IHC_01175-2323-500_1_D Diagram hot and cold freshwaterlines
- MLR.D2.2_Q17898_UNIV003-1 Trapeze side windows
- MLR.D2.2_Q17898_UNIV003-2 Front side windows
- MLR.D2.2_Q17898_UNIV003-3 Front central window
- MLR.D2.2_Q6000 6000 Controller Cut out and connections
- MLR.D2.2_Q80NM Installation manual
- MLR.D2.2_Q6000_control Wipers units connecting and controlling diagram
- MLR.D2.2_LD_Elec_Linediagram Electrical line diagram window heating
- Picture
- MLR D2.2 PIC1 3D sketch inside/outside wipers fitted

Mechanical fitting:
- Assume panelling and insulation has been removed as per job MLR.D1.
- Fit 5 new wiper motor units above the windows as per drawings Q17898-1/2/3. Drilling holes diagram can be found in manual Q80NM. Motors to be mounted on the inside. See picture “MLR D2.2 PIC1”
- Fit all arms and wiper blades on the unit’s and adjust the wiper angle if required.
- Remove valves pos 67, 68 & 69 drwg 01175-2323-500 and replace by new 24VDC solenoid valves ½” bore. Solenoid valves JDN supply
- Fit 2 supplied jet nozzles per window in a way that washing water is equally spread over the window.
- Fit 3 new flushing pipes ½” from inside solenoid valves pos 67, 68 & 69 to outside spraying nozzles with bulkhead connection. Divide the flow equally over the nozzles.
- Provide a cut out in the console of the dredging desk to mount the controller keypad, drwg “Q6000”. Fit the keypad with 4 bolts M4 (supply shipyard). Location of cut out to be agreed with JDN.
- Fit 2 supplied steering module boxes in the edges of the wheelhouse above the ceiling near to motors. (1PS / 1SB)

Electrical connection (see “Q6000_control” and “LD_Elec_linediagram”):
- Electrical installation will be done by ELEC jdn.
- Install supplied regulated 24Vdc power supply in dredge desk and connect:
- Between 24V supply – steering module 1 PS
- Between 24V supply – steering module 2 SB
- Connect “sync connection” and “device net connection” of steering module PS with SB, RS485 bus cable (2 x 8 mtr supplied)
- Connect Terminal resistor to keypad and device net connection of module 1/2
- Connect keypad to steering module 1 or 2 with RS485 bus cable (15mtr supplied)
- Connect window wiper motor 1, 2 and 3 with module 1 and motor 4 and 5 with module 2
- Connect 3 outputs of modules with solenoid valves pos 67, 68 & 69
- Connect aux output of module to contactors for heating. See LD_Elec_Linediagram. Connect the 5 heating elements of windows to contactor.
- Electrical cable 2x1.5mm² to connect 24V supply to modules, motors, solenoids and contactor are JDN supply
- Test all functions of the system

**Lumpsum price……../**

**MLR.D2.3. Installation of new windows and portholes in accommodation area**

Old Drawings:
- IHC_01175-1024-010_1_C Windows & Port Holes
- IHC_01175-2620-080_1_- Porthole frames

New Drawings:
- ACO1306409 Portholes, windows & boxes – general arrangement
- ACO1306409-01 Detail type of window/porthole

- Assume panelling and insulation has been removed as per job MLR.D1.
- Assume existing windows and window frames have been removed as per job MLR.B7.
- Assume existing portholes and porthole pipes have been removed as per job MLR.B7.
- Assume window and porthole openings have been closed/relocated/added as per job MLR.B7.
- Fit/weld new window frames (pos. W200 – 403: 30 pcs) and porthole pipes (pos. P100 – 125: 50 pcs) – drw. ACO1306409. New windows/portholes incl. frame and pipe will be supplied by JDN.
- X-ray inspection of welding in hull, other welds to be dye checked.
- Repair damaged painting of surrounding construction and hull: grind up to ST3, build up paint system as per the paint specifications, paint JDN supply.
- Paint the window frames, porthole pipes as per the paint specifications, paint JDN supply.
- Fit new windows and seals as per drw. ACO1306409-01.
- Include staging where needed from decks and/or dock floor.

**Lumpsum price……../**

**MLR.D3. Assistance to accommodation subcontractor**

New Drawings:
MLR.D3/1 Unknown – JDN drw. galley foundations and gutter way.
MLR D3 Doc1 – Order accommodation subcontractor Acopafi

- Reception and unloading of containers with materials for new accommodation and other general spare parts needed for the repair specification/MLR packed in wooden boxes – assume abt. 20/25 pcs 40ft containers; including loading/unloading of JDN arranged trucks/Unstuffing of containers – see also specification part 1 section C.100.2 Yard storage facilities.
- Storage of the materials from reception until installation on board.
- Prior to arrival of the vessel at the shipyard, together with JDN and its accommodation installation subcontractor:
  - Set-up of a detailed stripping and installation planning, indicating sequence of works, overlap of works, milestones, etc.
  - Set-up of a detailed logistical planning indicating sequence of materials to vessel and location of materials on vessel
- Transport of materials on the shipyard/to the vessel (forklift, trailer, crane,...) and transport on the vessel to locations nearby the accommodation entrances and all-over the accommodation spaces as per the logistical planning, its daily updates and JDN’s instructions.
- Removal and disposal of all remainders, leftovers, packaging, etc. from the installation works by the accommodation subcontractor.
- Where boundary strips at hull and outside bulkheads are missing, fit/weld new strips on deck – 120 x 8 mm at 100 to 150 mm from bulkhead, cfr existing strips.
- Prepare, fit/weld foundations for galley and laundry equipment and galley gutter way with connection scupper pipes as per drw. ‘MLR D3 Doc1’.
- Cut temporary opening of minimum abt. 1800 mm x 1200 mm around WT door to outside in aft galley bulkhead fr. 41 in order to move new galley equipment inside. Afterwards close opening again: fit/weld removed part, grind welding smooth, surface preparation grinding up to ST3 and repair of coating system both inside and outside.
- Provide sturdy protection for galley equipment whilst inside during renewal works.
- Welding of new stainless steel accommodation staircase guard rails, supplied and prepared by accommodation subcontractor, to the steel stairs.
- All visible stainless steel welding and grinding will be done by accommodation subcontractor.
- Yard to include all necessary permits and fire watches for subcontractor works, where applicable.
- Other assistance to accommodation subcontractor will be rate based as per sections C, E, F, etc.

  Lumpsum price ……/

MLR.D4. Installation of ducting and fire fighting equipment in galley

MLR.D4.1. Installation of ducting and CO2 protection system for galley exhaust hoods

Drawings:
MLR.D4.1_90-000-627 Principle diagram for galley exhaust duct
MLR.D4.1_layout_ducting_galley Line diagram ducting galley hoods
Assume that both exhaust hoods in the galley are fitted on location. See “layout_ducting_galley”
- Fabricate a stainless steel box on oversize for installing the ventilator and fit/weld on board:
  - Approximate size of the SS box 550x600x600mm, for price indication only
  - Type of the ventilator is TZA01-0280-4E to be mounted inside (spare o/b)
  - Fit/weld a frame inside the SS box for mounting/dismounting the ventilator
  - One side of the box has to be accessible for maintenance of the fan (opening to be air tight)
  - Fit a cable gland for electrical connection
  - Check on board the best location to fit this box above the ceiling and determine the correct size for easy connection of the ducting
- Install/fit and connect all ducting and fire flaps as per actual situation and routing on board, layout_ducting_galley is for indication only.
  - Small hood: round ducting Ø200mm
  - Island hood: square ducting 500x300mm
- Install complete CO2 protection system as per drwg “90-000-627”.
  - Install CO2 cylinder, protection box and instruction plate on location agreed with superintendent
  - Fit 2 nozzles on strategic positions in the SS box/ducting and connect with CO2 cylinder.
  - Connect safety switch to fan stop
- CO2 system, fire flaps and fan are JDN supply. Ducting, SS box, piping and couplings are shipyard supply.

More detailed information can be found in “Danfoss Semco – Manual CO2 galley”

Lumpsum price

MLD4.2. Installation of K-5 wet chemical fire suppression system for deep fat fryer

Drawings:
MLR.D4.2_03-9764-0200 Deep fat fryer fire ext. system type K5
MLR.D4.2_P/A3/797/CP3SWD NFS Control panel connections

- Install 2x cylinders, alarm siren, release push button and fire alarm and release panel on location agreed with superintendent
- Install the thermal detector at ceiling height above the fryer
- Fit piping between nozzles and cylinders. Install 2x K5 spray nozzles positioned centrally ±50mm over the cooking appliance at a height of 1 to 1.2 meter.
- Connect fire alarm and release panel as per drawing P/A3/797/CP3SWD
- Supply and install breaker for direct interrupting of fryer power supply
- Complete K5 system, piping and couplings are supplied by JDN

More detailed information can be found in “Instruction manual 5460-N”

Lumpsum price
MLR.E. Electrical

Cabling and wiring in panels, etc...

The following prescriptions apply to the internal wiring in panels and to the external cabling entering panels, or connected to electrical equipment (e.g. machines, transformers, ...).

Wiring in panels, switchboards, desks, etc... has to be numbered on the wire with closed colour and number coded markers, where the wire is connected to terminals and to components. Terminals and components are provided with numbering for all wire and cable connections.

Components have to be clearly marked. Marking to be of a permanent and clear type, i.e. no hand-written notes, but Resopal or another equivalent marking system is used.

On the electrical diagrams wire numbers as well as the terminal numbers of the components to which they are connected are to be clearly indicated. Wires are numbered in such a way that no equal wire numbers occur in a panel.

Wiring in panels have a section of at least 0,75 mm². Wiring in IMC panels, and in desks is thermopoint wiring (i.e. Teflon coated) with a section of at least 0,34 mm². All wiring in panels is halogen free.

All wiring runs in plastic cable tubes, with removable covers. Plastic cable tubes to be amply dimensioned: cable tubes are filled up to max. 70 % of capacity. Cable tubes and cable clamps are not of the self-glueing type but are fastened with screws. Where flexibility is required cable hoses are used, with hose clamps at both ends.

All metal parts must be grounded. All grounding cables to run to one earthing point. Mounting material may not be used as grounding.

Where cables enter panels, connection boxes, switchboards, junction boxes, sensors, starters, etc... watertight brass compression type cable glands are provided. Brass cable glands in accordance with DIN 46320, IP 55. On deck only brass cable glands with rounded head (type Hummel or Perfect), IP 68 are used. For non-metallic boxes sturdy Nylon (Polyamide) compression cable glands are used (with rounded head, type Hummel or Perfect), IP 68. Cable glands are installed at the underside of the panel or box.

All cabling entering panels, desks, etc...is connected to terminal strips, not directly to components in the panels except for components specifically designed for connecting exterior cabling. If possible, no dual terminals are used. For IMC and A&M systems, and for other control systems (if required) terminals are provided with disconnect terminal blocks, eventually with fuses with LED indication. Terminal blocks provided with test slots.

All unused glands in switchboards are closed.

All cable cores and all wiring will be connected to terminals or components with approved cable pins or cable shoes of the "crimp on" type (e.g. AMP). Only one cable core or wire is fitted in each cable pin or cable shoe.
All cables are properly marked on both ends. Cable cores are provided with markings provided by cable manufacturer, but are also marked with terminal strip number, at both ends (i.e. also at e.g. electrical motor). Cable numbers, and core numbers will be shown on the electrical diagrams.

**Electrical cables**

All cables are of an approved marine type. All cables are provided with a PVC or PO or equivalent tight outer sheet; this outside insulation will not be affected by oil, grease, will not harden and is UV resistant. On deck, no PVC coated cabling is used. Cables are halogen-free. For supply of portable electrical equipment or where flexibility is required, rubber insulated oil resistant flexible power cord is used (make Titanex or similar).

Where required, cables are provided with a metal braiding to avoid any interference. All cables are fire-retardant cables in accordance with IEC60092-3, and where required fire-resistant cables in accordance with IEC 60331-3.

Cables for serial communications (RS 422 and similar) are twisted shielded pair, STP 2*2*0.75 mm2. For other data cables: see the relevant sections in this specification.

All cables are placed and fixed on cable trays. For fixing the cables, cable trays of the ladder type are used; special attention will be paid to the running of the trays, concerning hoisting possibilities. Cable trays with a width exceeding 440 mm have rungs with angle bar section. The trays are secured to bulkheads, casing etc. by means of welded strips. Cables are fitted on the cable ways in a correct way, avoiding as much as possible cable crossings. Cables are only fitted on the upperside of the cable tray. Only a limited number of cables may be grouped in a bundle (i.e. fastened by the same ty wrap): maximum dimension of resulting bundle is about 100 * 50 mm for control and monitoring cables. Power cables grouped in such a way that cables are adequately cooled.

Where single cables or a very limited amount of cables run from a cable tray to any equipment (e.g. to an electromotor or to a solenoid), the cable is fixed to a steel strip or a steel (galvanized) pipe. The strip or pipe runs up to the connection box of the relevant equipment, in such a way that there are no unsupported cables. Alternatively these single cables may run inside steel (galvanized) pipes, as described below.

Cables are fastened by means of UV resistant black plastic ties (make Thomas Bett) with stainless steel clip. Where required by Class additional stainless steel ties are provided.

In general cables must run underdecks. Cables on deck, and cables needing mechanical protection are placed in galvanized, solid drawn steel pipes. The same applies for cables running in engineroom or other machinery space bilges or on floors. At the ends the steel pipe is provided with a sleeve in such a way that the cables cannot be damaged by the pipes' edge. Cables are fixed at the ends of the pipe by means of cableties. As much as possible, cables are led below deck.

Cable passages through outside decks are mounted on a coaming, or pipe extending above deck. Cable ways on deck (if any, and only after Owner's approval) are stainless steel.

Measuring, network and control cables are fitted separately from power cables. PLC network cables are laid in galvanised steel pipes, also inside the vessel, in order to protect the cable.

Cable passages through watertight decks or bulkheads are by means of watertight cable passages (MCT type). In these passages space is reserved for fitting extra cables. Intermediate
plates in MCT passages are in stainless steel or PVC execution. Epoxy casted penetrations are not allowed.
The same MCT type cable passages are used for deck and bulkhead passages that need to be airtight (e.g. boundaries of air conditioned spaces), or where subdivision for fire integrity is required. The MCT system has the required fire resistance rating. Where necessary, extra insulation is fitted.

Cable connections to electrical machines are provided with brass cable glands, and for larger machines MCT passages. Cable glands and MCT's selected for the installed cable size.

Cable trays or similar are also to be provided inside machines or electrical apparatuses (e.g. transformers). Cables running on equipment (e.g. gearboxes, motors, generators,...) are supported on steel strips, cable ways, or in pipes, and are provided with watertight cable glands at all connections.

Coax cables are provided with a plug connection when entering a panel, in such a way that coax cables in panels, etc.... are in flexible execution.

Spare measuring cable is fitted between wheelhouse and engine room (16 * 1.5 mm² cores).

**MLR.E1. Lighting distribution network accommodation**

Old Drawings:
IHC_85-10023-110_1_Ej  Main distribution one line diagram

New drawings:
LD_08-00-013_Aj  Power and Lighting Plan – Accommodation
ACO_1306408_Rev B  Electrical arrangement (light plan)
ACO_1306410-01_Rev B_1  Detail types of sanitary unit, type T-1, T-2, T-3
ACO_1306410-01_Rev B_2  Detail types of sanitary unit, type T-4 (hospital)
ACO_1306410-01_Rev B_3  Detail types of sanitary unit, type T-5, T-6
ACO_1306410-01_Rev B_4  Detail types of sanitary unit, type T-7
Midlife upgrade LDV cable list rev.10  Sheet New junction boxes lighting
Panel heating new switchboards.pdf
NR_K_409456-106-850_Bj.pdf
NR_K_409456-106-550_Bj.pdf
NR_K_409456-106-450_Bj.pdf
NR_K_409456-106-250-350_Bj.pdf
NR_K_409456-106-150_Bj.pdf
NR_K_409456-106-050_Bj.pdf
85-10023-132b.pdf
85-10023-111k1.pdf
84-10012-6110-001-sh41.pdf
84-10012-6110-001-sh40.pdf
84-10012-3200-022-sh11.pdf
84-10012-3200-022_sh10.pdf
85-10023-111K1 sht.1  Power supply new calorifiers
85-10023-132b sht.1  Main supplies lighting distribution
4323-26-3104  New airco installation: heating supply
4323-26-3105  Lighting distribution: heating supply
4323-26-3106  Power new search light SB
The scope of works for the shipyard consists out of:
- Assume accommodation area has been stripped as per job MLR.D1.
- Disconnection, dismounting, removal and disposal of existing 11 lighting and power distribution boards/boxes as listed below for renewal.
- All old cabling from the removed boards to the several users to be removed and disposed.
- Installation of 11 new lighting and power distribution boards/boxes (listed below and JDN supply) – incl. modifications of existing or installation of new mounting frame, where applicable.
- Connection of these 11 lighting distribution boards/boxes with the existing feeding cables for L, EL and 380V Main switchboards.
- Installation of new cables starting from distributions boards to junction boxes (where applicable) and further to users in cabins, galley, office, mess rooms, staircase, etc... with sufficient over length for later connection by the accommodation subcontractor.
- Distribution boards are supplied by JDN. Electrical cables and small junction boxes in cabins to be supplied by shipyard.
- Close co-op between ACOPAFI/JDN and shipyard is required.
- All necessary access works to be included: staging, lighting, ventilation, ...

Installation of new distributions boards:
The “approximate” locations of the distribution boards and electrical connection diagram can be found in drawing LD_08-00-013. Final installation locations to be agreed on board:
- 3 x 220V Lighting distribution board 2L: Lower bridge deck
- 3 x 220V Lighting distribution board 2EL: Crane deck
- 3 x 220V Lighting distribution board 8L: Galley
- 3 x 220V Lighting distribution board 3L: Upper deck
- 3 x 220V Lighting distribution board 3EL: Upper deck
- 3 x 220V Lighting distribution board 5L: Upper deck
- 3 x 220V Lighting distribution board 5EL: Upper deck
- 3 x 220V Lighting distribution board 4L: Main deck
- 3 x 220V Lighting distribution board 4EL: Main deck
- 3 x 380V Power distribution board 3P: Galley
- 3 x 380V Power distribution board 4P: Laundry

Installation of new cabling between distribution boards and lighting, interrupters, sockets…:
- For each separate circuit and per each separate space; lighting, emergency lighting, sockets a junction box to be provided, installed and connected by shipyard. As per below example approximate 26 junction boxes required on lower bridge deck.
- Cables from junction boxes to users to be provided with sufficient over length. Connection of cable ends to power sockets, lighting, etc will be done by ACOPAFI
- Referring to “Midlife upgrade LDV cable list rev.10.xls” => sheet New junction boxes lighting for the exact amount of junction boxes. Positions are clearly
marked on detail of drawing “LD_08-00-013_Aj Power and lighting Plan – accommodation”

Yard scope of works is to pull all network cables between 19” racks in measuring room on lower bridge deck and the correct cabin, desk, office, etc as per drawing LD_08-00-008_Cj. All pulled cables to be marked on outer ends for identification. Cables entering in the cabins, office, etc to be terminated by acopafi on the correct sockets. Cables entering in measuring room 19” racks to be terminated on the correct patch panel by shipyard (both 19” racks are executed with cable tracks). Cat6 cable supplied by JDN. Test all cables with network cable tester (approx 224 cables)

Special attention to be paid regarding fibre optic cable – rerouting of original fibre optic in measuring room and inside survey desk at the wheelhouse included. If damaged, renewal of fibre optic to be yard’s supply (see also drawing LD_08-00-008_Cj)

The JDN network exists out of the following networks:

- **Entertainment system**: 88 network cables to pull between 19” racks and:
  - Main deck: 26 cabins (52 cables)
  - Upper deck: 8 cabins, bar, gym, messroom officers, messroom crew, galley and hospital (28 cables)
  - Crane deck: 2 cabins (4 cables)
  - Lower bridge deck: captain and chief engineers cabin (4 cables)

- **Crew-DIA**: 97 network cables to pull between 19” racks and:
  - Main deck: 26 cabins (52 cables) + Elec workshop
  - Upper deck: 8 cabins, bar, messroom officers, messroom crew, hospital (24 cables)
  - Crane deck: 2 cabins and office (8 cables)
  - Lower bridge deck: captain and chief engineers cabin (6 cables)
  - Bridge deck: writing and survey desk (6 cables)

- **CREW-LAN**: 24 network cables to pull between 19” racks and:
  - Main deck: 6 locations
  - Crane deck: 2 cabins and office (6 cables)
  - Lower bridge deck: captain and chief engineers cabin (6 cables)
  - Bridge deck: writing and survey desk (6 cables)

- **Machine network**: 5 network cables to pull between 19” racks and:
  - Main deck: thyristor room and ECR (2 cables)
- V-SAT: 10 network cables to pull between 19” racks and:
  - Crane deck: office (1 cable)
  - Lower bridge deck: captain and chief engineers cabin (3 cables)
  - Bridge deck: navigation desk (2 cables)
  - Iridium telephone/ VSAT telephone

- Survey: 1 network cable to pull between 19” racks and
  - Bridge deck: survey patch panel (1 cable)

- Survey: 14 network cables to pull between patch panel on bridge deck and:
  - Crane deck: office (2 cables)
  - Lower bridge deck: captains cabin (2 cables)
  - Bridge deck: navigation desk, dredging desk and IHC computers (6 cables)
  - Main deck: Elec workshop

- Hydraulic network: 2 network cables to pull between hydraulic pc on bridge deck and:
  - Main deck: hydraulic pump room and elec store (2 cables)

- Fibre Optic original on wheelhouse and inside measuring room to be relocated to the new position inside the measuring room – according drawing LD_08-00-008_Cj

Lumpsum

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**MLR.E3. Renewal of telephone system**

**Drawings:**
MLR.E3_drwg_ACM_layout General plan stations layout

The old telephone system will be completely removed and replaced by modern ACM telephone/intercom/talkback system.

- Remove complete old telephone central on board under guidance of elec. (can be inspected on board for quotation of the lumpsum)
- Floor/Wall mount new telephone central ACM48 600x635x600 in stairways on main deck in new supplied central cabinet 600x1200x600. Position of new central to be agreed with Chief engineer and superintendent.
- Wall mount 3 supplied small junction boxes as per locations in “drwg_ACM_layout” (Laundry, engine room and pumproom). Final position to be agreed with Chief engineer and superintendent.

Cabling and installation of telephone units described per deck and as per “drwg_ACM_layout”:
- Bridge deck:
  - Install 1 DECT station and pull cable direct to ACM48
  - Install 3 Telephone stations and pull cables direct to ACM48
- Lower bridge deck:
  - Install 1 DECT station and pull cable direct to ACM48
  - Install 3 Telephone stations and pull cables direct to ACM48
- Crane deck:
- Install 3 DECT stations and pull cable direct to ACM48
- Install 4 Telephone stations and pull cables direct to ACM48
- **Upper deck:** split section marked with red line. Aft side direct connection to ACM and fore side via junction box in laundry
  - Install 5 DECT stations on fore ship and pull cables to junction box in laundry
  - Install 11 Telephone stations on fore ship and pull cables to junction box in laundry
  - Lay/Connect 2 x multicore cable between junction box laundry and ACM48.
  - Install 8 DECT stations on aft ship and pull cables direct to ACM48
  - Install 5 Telephone stations on aft ship and pull cables direct to ACM48
- **Main deck:** split section marked with red line. Aft side direct connection to ACM and fore side via junction box near engine room.
  - Install 7 DECT stations on for ship and pull cables to junction box in ER
  - Install 4 Telephone stations on for ship and pull cables to junction box in ER
  - Lay/Connect 1 x multicore cable between junction box ER and ACM48
  - Install 11 DECT stations on aft ship and pull cables direct to ACM48
  - Install 28 Telephone stations on aft ship and pull cables direct to ACM48
- **Section below main deck:** all units to connect to junction box in pumproom
  - Install 9 DECT stations and pull cables to junction box in pumproom
  - Install 5 Telephone stations and pull cables to junction box in pumproom
  - Lay/Connect 1 x multicore cable between junction box pumproom and ACM48
- On 11 locations an additional loudspeaker has to be mounted.
- Assume for mounting DECT stations a small mounting frame/bracket has to be fabricated by shipyard.
- Connection of cables to main central and commissioning will be done by subcontractor via owner.

**Supplied cables:**
- DECT stations: toughcat (2000m)
- Telephone units: LICY 2x2x0.5 (2500m)
- Junction box – ACM48: Multi core cable 20x2x0.5 (300m)

Lumpsum .../

**MLR.E4. Upgrade fire alarm system**

Drawings:
- MLR.E4_FDS_Central_Unit: Fire Alarm central unit
- MLR.E4_Fire_Alarm_System: Location and layout diagram of sensors and call points
- MLR.E4_SG-18319: Block diagram fire detection system
- 85-10023-134M: Power supply fire detection

Assume that the old fire alarm system (sensors, detectors, call points, etc) are all removed during renewal of accommodation. Complete new system will be supplied by JDN incl. cabling.

**Installation of main components:**
- Mount fire alarm central unit inside new ECR alarm outstation 2, see drwg “FDS_Central_Unit”
- Assume that the control panel M4.3 has been installed in new ECR alarm outstation 2 under job section “L1”
- Mount repeater panel M4.3 in 19 inch rack 2 on bridge, cut out already made.

**Installation of call points and detectors:**

Below mentioned equipment to be fixed on location as per drawing “Fire_Alarm_System”

- **Bridge deck:**
  - Manual call point – dry space: 2x
  - Smoke detector – wet space: 1x
- **Lower Bridge deck:**
  - Manual call point – wet space: 1x
  - Smoke detector – wet space: 3x
  - Smoke detector – dry space: 4x
- **Crane deck:**
  - Manual call point – wet space: 2x
  - Smoke detector – wet space: 1x
  - Smoke detector – dry space: 4x
- **Upper deck:**
  - Manual call point – dry space: 9x
  - Manual call point – wet space: 4x
  - Smoke detector – dry space: 24x
  - Smoke detector – wet space: 4x
  - Smoke/Heat detector – wet space: 1x
  - Heat detector 54° - wet space: 4x
- **Main deck:**
  - Manual call point – dry space: 9x
  - Manual call point – wet space: 7x
  - Smoke detector – dry space: 43x
  - Smoke detector – wet space: 5x

**Cabling and connection:**

The fire alarm system exist out of 128 addressed locals (smoke detectors, heat detectors, call points...) that will be connected in 3 loops (max 50 locals/loop)

The repeater and control panel will be connected to fire alarm central with backbone bus RS485.

- Install shielded cable 2x2x0.75 between repeater panel in rack2 on bridge and fire alarm central in ECR outstation 2, cable JDN supply
- Connect control panel with fire alarm central in outstation 2 with the same type of cable
- Pull cabling 2x0.75 for the 3 loops between 128 addressable locals and fire alarm central, for loops and electrical connection see drawing MLR.E4_SG-18319. Cable JDN supply.

**MLR.E5. Installation of new search lights**

Old Drawings:
Removal of old search lights (2 pieces)

- Disconnect search lights electrically
- Assume insulation has been removed below ceiling of wheelhouse.
- Remove/crop of manual searchlights and columns on wheelhouse top deck. Drawing SH_470_BH
- Close holes in plate

Modification of funnel platform

- Modify signal mast on funnel for installation of new searchlight. Drawing 01175-1072-020 rev E is the current situation and has to be modified as per details in rev G.
  - Currently installed signal lights to be moved downwards on additional platform
  - New platform to be made for new searchlight
  - Modification of mast for radar, for foundation plate of S-band radar check drawing “65830050sht2 S-band Masthead outline”
- Install small hang staging for access

Installation of new search lights (4 pieces), owner supply

- In drawing LD_00-00-017 you can find the locations of new searchlights
  - Fit/weld new searchlight on top of wheelhouse type EFN463XBO230450 supplied with 1000mm column.
  - Fit/weld new searchlight on funnel signal mast type EFN463XBO230450 supplied with 500mm column.
  - Fit/weld 2 new searchlights on PS/SB ladder gantry type EFN463XBO230450 supplied with 500mm column. Additional supports for mounting lights have to be fabricated as per drawing 01175-1072-020 see “searchlight foundation detail”
- Exact position of searchlights to be agreed with captain and superintendent

Electrical installation (Elec_diagram)

- Create 2 x cut outs for installation of “multi panel scheinwerfer” in dredging control desk and navigation desk. Location to be agreed with captain and superintendent.
- Mount modbus/interface box inside dredging control desk near multi panel and connect to local 230Vac supply.
- Connect 5 supplied SUBD 9 cables between 4 searchlights and modbus and between multi panel and modbus. Supplied lengths 3 x 100m, 1x75m & 1x15m.
- Connect 4 power supply cables 230Vac between searchlights and distribution box, cable JDN supply:
  - Light on SB ladder gantry to DB6LA, approx 15m
  - Light on PS ladder gantry to DB7LA, approx 15m
  - Light on wheelhouse to DB2L, approx 15m
- Ligont on signal mast to DB5LA, approx 60m

Prepare damaged paint surface ST3 and paint 3 layers, paint JDN supply.

Lumpsum

MLR.E6. Cabling for new air conditioning and ventilation system

New drawings:
- **LD_08-00-013_Aj** Power and Lighting Plan – Accommodation
- **NRK_409456-106-150_0** Switchboard AC1 Accommodation aft ship
- **NRK_409456-106-250/350_0** Switchboard AC2 Accommodation fore ship & AC3 ECR/MSB
- **NRK_409456-106-450_0** Switchboard AC4 Wheelhouse
- **NRK_409456-106-550_0** Switchboard AC5 Galley
- **NRK_409456-106-050_0** Switchboard Condensing Unit

Midlife upgrade LDV cable list rev.10
- Breaker location
- Location new breaker AC unit

MarineCom YOZc 250V.pdf
Marineflex YOZp 0.6_1kV.pdf
MarineLine YOZp 0.6_1kV.pdf
MarineLine YoZp 0.6_1kV.pdf
Panel heating new switchboards.pdf
NR_K_409456-106-850_Bj.pdf
NR_K_409456-106-550_Bj.pdf
NR_K_409456-106-450_Bj.pdf
NR_K_409456-106-250-350_Bj.pdf
NR_K_409456-106-150_Bj.pdf
NR_K_409456-106-050_Bj.pdf
85-10023-132b.pdf Main supplies lighting distribution
85-10023-111k1.pdf Power supply new calorifiers
84-10012-6110-001-sh41.pdf
84-10012-6110-001-sh40.pdf
84-10012/6110-001 sht. 38, 39, 40, 41, 43, 47, 48, 49, 51, 52, 53, 54 and 55
⇒ Lighting distribution. Power supplies for radars, search lights, 19” racks measuring room/wheelhouse, telephone system and ECDIS
85-10023/110 One line diagram
4323-26-3104 New airco installation: heating supply
4323-26-3105 Lighting distribution: heating supply
84-10012-3200-022-sh11.pdf
84-10012-3200-022_sh10.pdf

- Assume main components of new air conditioning system have been installed as per job MLR.G1.2.1.
- Assume accommodation fans have been relocated and renewed as per job MLR.G4.
- Connect electrically new distribution boxes, starter panels for new air conditioning system and install cables to newly installed air conditioning equipment and new or relocated ventilation fans.
- Connection at the newly installed equipment is done in job MLR.G1.2.1.
- Distribution boards and starter panels are owner’s supply. Cables are yard supply
- Assume new AC breaker is built in the section 31&32, see pdf file ‘Breaker location.pdf’ of the 380V MSB by owner’s subcontractor.
- In general following cables to be installed and connected – details as per attached JDN cable list, cable lists on switchboard drawings and file ‘Datasheets cables.rar’:
  - Feeding cables from MSB 380V section 31 to new AC distribution board P11
  - Cables between new panel P11, see drawing LD_08-00-013_Aj - Power and lighting plan, and new fan coil units – connection at fan coil units is job MLR.G1.2.1.
  - Cables between new panel P11 and new AC starter switchboards.
  - Cables from new AC switchboards to the new AC equipment as per the NRK drawings – connection at AC equipment units is job MLR.G1.2.1.
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price

MLR.E7. Renewal of cabling general alarm and general engineers alarm system

Drawings:
ACO_13/064/08_Rev. B   Electrical Arrangement
IHC_85-10023/44_1   Signalling Tableau’s lay-outs
IHC_85-10023/44E1_1   General alarm relay box pump room 44E1 wiring diagram / connection diagram
IHC_85-10023/44E2_1   General alarm relay box engine room 44E2 wiring diagram / connection diagram
IHC_85-10023/44E3_1   General alarm relay box aux engine room 44E3 wiring diagram / connection diagram
IHC_85-10023/44F_1   General alarm signalling tableau ECR panel 44F wiring diagram / connection diagram / lay-out
IHC_85-10023/144_1   General alarm installation cable diagram alarm bells
IHC_85-10023/144_2   General alarm installation cable diagram alarm bells
IHC_85-10023/144_3   General alarm installation cable diagram relay box 44 E1
IHC_85-10023/144_4   General alarm installation cable diagram relay box 44 E2
IHC_85-10023/144_5   General alarm installation cable diagram relay box 44 E3
IHC_85-10023/145-   General engineers alarm system cable diagram

Sketches locations items general alarm system
Sketches locations items general engineers alarm system

The scope of works for the shipyard consists out of:
- Assume accommodation area has been stripped as per job MLR.D1.
- Assume all horns, bells, junction boxes, alarm buttons, etc. in accommodation area have been removed during stripping of accommodation as per job MLR.D1.
- All existing cabling from the general alarm and general engineers alarm system inside the accommodation area to be disconnected, removed and disposed.
- Cabling and system equipment outside accommodation area remains installed.
- Install new cabling for general engineers alarm system inside accommodation area as per existing drawings and new locations of equipment as indicated on sketches and electrical arrangement drawing.

MLR
- All equipment of general engineers alarm system (buzzers, switches, junction boxes etc.) is renewed: owner’s supply and installation by accommodation subcontractor.
- Install new cabling for general alarm system inside accommodation area as per existing drawings and new locations of equipment as indicated on sketches and electrical arrangement drawing.
- All equipment of general alarm system (manual call points, alarm bells etc.) is renewed: owner’s supply and installation by accommodation subcontractor.
- Close co-op between ACOPAFI/JDN and shipyard is required.
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price ……./

**MLR.E8. Preparation works for installation of new radars**

Drawings:
- LDV 13228 Radars overview
- 65900058 Outline flushmount control panel

- Disconnect and remove old scanner, X-band radar on signalmast of funnel
- Assume that the foundation plate for the new mast has been prepared under job section “MLR.E5”
- Fit and fix new scanner unit of S-band radar on radar foundation.
- Remove old cabling of old X-band radars between signalmast and bridge (<130m)
- Pull new cables RA01 till RA08 between bridge and converter room/measuring room as per drawing LDV 13228, cables JDN supply (assume <150m for complete cable bundle)

Lumpsum price ……./

**MLR.E9. GSM/3G/4G Booster system**

Drawings:
- LD-Antenna_locations Detail location of antenna according cabin plan
- LD-drawing-principe-schema Detail locations of all elements and one-line diagram

Yard scope of works is to:
- Positioning and fixing of outside antenna according ‘LD-antenna_location’ on Monkey bridge
- Pull all coax cables between Monkey bridge and booster unit at measuring room according one-line diagram
- Pull all coax cables between 19” racks in measuring room on lower bridge deck and the line extenders on each deck. Some directly, some via splitter as on principle drawing.
- Pull all coax cables between line extenders to correct cabin, desk, office, etc conform drawing ‘LD-antenna_location’
- All active units; booster unit (1 piece), line extender (6 pieces) to be foreseen of power cable 1.5G 230V – maritime electrical cable Shipyard’s supply. See LD-drawing-principe-schema. Pulling of cable and connection onto active unit from switchboard Shipard’s scope.
- Fixing, installation and connection of all antenna’s inside the different cabines/offices/messroom/...

All pulled cables to be marked on outer ends for identification. Cables entering in the cabins, office, etc for final connection to the antenna’s to be terminated with correct connector by Shipyard, connector owner’s delivery.
Cables entering in measuring room 19” racks to be terminated on the booster unit by Shipyard, all coax cables are Owners delivery.
Test all cables with network cable tester (approx 80 cables)
Close co-op between ACOPAFI/JDN and shipyard is required in regards to final positioning of antenna and other equipment.

Complete system will be owners delivery (cables, antenna, booster unit, line extension splitter). Small tools, consumables etc...for installation of electronics to be included and delivered by Shipyard.

The full installation and connection of all parts till testing of network cables are in scope of the Shipyard. Owner will perform addition function test accordingly before final redelivery of the system by the Shipyard to the Owner.

Installation of antenna, booster unit, line extension splitter and antenna:
- Monkey Bridge:
  - Install and fit 2 outside antenna via outside splitter to booster unit
- Bridge deck:
  - Install 1 inside antenna
- Lower bridge deck:
  - Install total 2 inside antenna, 1 piece in each cabin
  - Install booster unit inside measuring room (see general-network-drawing and 19” rack lay-out)
  - Install line extender, exact location in close cooperation with Acopafi and Owner, keeping in mind maximum length of 50 meter between line extender and antenna and 150 meter between booster unit and line extender
- Crane deck:
  - Install total 3 inside antenna, cabin and office
- Upper deck:
  - Install total 8 inside antenna
  - Install line extender, exact location in close cooperation with Acopafi and Owner, keeping in mind maximum length of 50 meter between line extender and antenna and 150 meter between booster unit and line extender
- Main deck (A):
  - Install total 26 inside antenna
  - Install 2 line extender via splitter from booster unit, exact location in close cooperation with Acopafi and Owner, keeping in mind maximum length of 50 meter between line extender and antenna and 150 meter between booster unit and line extender
- Main deck (B):
  - Install total 2 inside antenna
  - Install 2 line extender via splitter from booster unit, exact location in close cooperation with Acopafi and Owner, keeping in mind maximum length of 50 meter between line extender and antenna and 150 meter between booster unit and line extender
All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum

**MLR.E10. Pull new cable for SAT-TV (dome to CPU)**

Drawings:
- LD_08-00-008_Cj Overview Network Connections
- 131030_LD_Accommodation Instructions for AERIAL PLAN LDV

Yard scope of works is to remove and pull all network cables between 19” racks in measuring room on lower bridge deck and the barge loading pipe gantry SAT TV Antenna as per drawing LD_08-00-008_Cj, position see picture ‘131030_LD_Accommodation’. All pulled cables to be marked on outer ends for identification. Cables entering in measuring room 19” racks to be terminated on the correct patch panel by shipyard (both 19” racks are executed with cable tracks). SAT TV Antenna cables are supplied by JDN. Test all cables with network cable tester (approx 6 cables)

**SAT TV Antenna:**
- Remove original cabling of SAT TV Antenna from the barge loading pipe gantry till dry store lower deck
- Pull new cables WA469.01 till WA469.06 between SAT tV antenna on barge loading pipe gantry till measuring room as per drawing LD_08-00-008_Cj/Instructions for AERIAL PLAN LDV, cables JDN supply (assume approx 150m per cable)
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum

**MLR.G. HVAC**

**MLR.G1. New air conditioning system**

**MLR.G1.1. Removal of existing system**

**MLR.G1.1.1. Removal of main components**

Old Drawings:
- IHC_01175-0319-510_1_Gj Arrangement pump room view on tank top
- IHC_01175-2410-010_1_B Arrangement and foundations in AC room on crane deck
- IHC_01175-2410-020_1_A Arrangement and foundations in AC room on upper deck
- IHC_01175-2331-500_2_Ej Diagram LT Fresh cooling water lines

Removal of compressors/condensers from auxiliary engine room:
- Following AC compressors/condensers units to be removed – see drws. IHC_01175-0319-510_1 and IHC_01175-2331-500_2:
  - 2x AC1 – pos 24.10/2;
- AC2 – pos 24.10/3;
- 2x AC3 – pos 24.10/4;
- AC4 – 24.10/13
- Disconnect above condensers from LT system;
- Disconnect above compressors from freon piping;
- Disconnect above compressors electrically;
- Tank 49 below: assume open/close and gas-free as per rep spec D general and C services.
- Crop off unit frames from tank top and grind smooth;
- Travel units, where possible by travelling beam in auxiliary engine room, to below hatch frs. 78-81;
- Lift out units from auxiliary engine room.
- Disposal of removed units and removed adjacent equipment.

Removal of equipment from AC room on crane deck:
- Remove all air ducting from AC room:
  - Fresh air duct from bulkhead penetration to AC1 air handling unit (AHU1);
  - Recirculation air duct from bulkhead penetration to AHU1;
  - Conditioned air ducts from AHU1 plenum to bulkhead and deck penetrations;
  - Suction and discharge ducting fan units E1 and E3;
- Crop off AHU1 frame from deck and grind smooth.
- Assume opening for installation of new AHU1 as described in job G.1.2.1. has been cut and travel out unit through this opening, complete or in parts.
- Alternatively dismount AHU1 in parts and move out AC room through existing bolted hatch (1450 mm wide x 1750 mm high with 2 hoisting eyes) of SB bulkhead.
- Disposal of removed equipment.

Removal of equipment from AC room on upper deck:
- Remove all air ducting from AC room:
  - Fresh air duct from bulkhead penetration to AHU2;
  - Fresh air duct from bulkhead penetration to AHU3;
  - Recirculation air duct from bulkhead penetration to AHU2;
  - Recirculation air duct from bulkhead penetration to AHU3;
  - Conditioned air ducts from AHU2 plenum to bulkhead and deck penetrations;
  - Conditioned air ducts from AHU3 plenum to bulkhead and deck penetrations;
  - Suction and discharge ducting fan unit E5;
- Crop off AHU2 and AHU3 frame from deck and grind smooth
- Assume opening for installation of new AHU2 and AHU3 as described in job G.1.2.1. has been cut and travel out unit through this opening, complete or in parts.
- Alternatively dismount AHU2 and AHU3 in parts and move out AC room through WT door in SB bulkhead.
- Disposal of removed equipment.

Removal of AHU’s in Elec workshop and ER workshop I:
- Disconnect from freon piping
- Disconnect from air ducting, where installed
- Disconnect electrically
- Dismount AHU from frame/support and travel to below hatch.
- Open/close hatch, lift out AHU.
- Crop off AHU frame and leak tray from deck and/or bulkhead and grind smoothly
- Repair damaged painting: grind up to ST3, build up paint system as per the paint specifications, paint JDN supply.
- Disposal of removed equipment.

Removal of thyristor room AC:
Inside AC9 room (frs 41-44 PS next to galley) – removal of compressor:
- Disconnect from freon piping;
- Disconnect from LT piping;
- Disconnect electrically;
- Crop off unit frame from deck and grind smooth;
- Travel unit outside;
- Disposal of removed equipment.

Inside thyristor room – removal of 2 existing AHU’s:
- Protect thoroughly surrounding electronic equipment, switchboards and drives against damage, humidity and dust of the following works.
- Disconnect from freon piping
- Disconnect from air ducting
- Disconnect electrically
- Dismount units completely into pieces of sizes to travel through the door to corridor and pump room.
- Crop off AHU frame and leak tray from deck and grind smoothly
- Travel pieces to pump room, to outside through pump room hatch or alternatively further through doors and staircase near ECR.
- Disposal of removed equipment.

Removal wheelhouse topdeck AC units:
- Assume inside wheelhouse fancoil unit has been removed as per job D1.
- Disconnect freon piping of units on topdeck and remove freon piping
- Disconnect electrically of units on topdeck
- Crop off unit frame from deck and grind smooth;
- Repair damaged painting: grind up to ST3, build up paint system as per the paint specifications, paint JDN supply
- Travel unit to quayside;
- Disposal of removed equipment

Removal old laundry room AC unit:
- Assume inside laundry fancoil unit has been removed as per job D1.
- Disconnect freon piping of compressor in pumproom
- Disconnect electrically compressor in pumproom
- Crop off unit frame from bulkhead and grind smooth;
- Repair damaged painting: grind up to ST3, build up paint system as per the paint specifications, paint JDN supply
- Travel unit to quayside;
- Disposal of removed equipment

Removal bosun store AC unit:
- Disconnect fancoil unit in bosun store from freon piping
- Disconnect fancoil unit in bosun store electrically
- Crop off unit frame from bulkhead and grind smooth
- Disconnect compressor next to PS fanroom near bosun store (fr.111 – 112) from LT piping
- Disconnect compressor electrically
- Crop off unit frame from bulkhead and grind smooth
- Repair damaged painting: grind up to ST3, build up paint system as per the paint specifications, paint JDN supply
- Travel units to quayside;
- Disposal of removed equipment
For the above listed jobs:
- Remove freon piping in the spaces where the equipment is removed until and including the bulkhead and/or deck penetrations.
- Cut out bulkhead and deck penetrations and fit/weld in new plate pieces, grind to ST3 and repair paint system.
- The same applies for cable penetrations that will not be needed anymore.

Lumpsum price ……./

**MLR.G1.1.2. Removal of Freon and hot water piping**

- Assume accommodation has been stripped as per job MLR.D1.
- Assume main components of new AC system have been installed as per job MLR.G1.1.1.
- Remove obsolete freon piping inside accommodation area (below description is for supply line, the same applies to the return line):
  - From bulkhead penetration between pumproom and bonded store inside bonded store (frs. 55 – 56);
  - From main deck penetration (frs. 55 – 56) up to upper deck penetration;
  - From upper deck penetration (frs. 55 – 56) up to crane deck penetration;
  - Above crane deck inside AC room.
- Cut out above mentioned deck and bulkhead penetrations and weld inserts: grind up to ST3 and repair paint system;
- Remove obsolete hot water piping inside accommodation area (below description is for supply line, the same applies to the return line), the part of the hot water piping that is being re-routed as per job MLR.G1.2.3. becomes obsolete and is removed (below description is for supply line, the same applies to the return line):
  - Along the same routing as described here above for the freon piping: from bulkhead penetration at bonded store upwards.
  - Deck penetration with crane deck for hot water piping is remaining and connected to the re-routed line (MLR.G1.2.3).
- Cut out the obsolete deck and bulkhead penetrations and weld inserts: grind up to ST3 and repair paint system.
- All necessary access works to be included: staging, lighting, ventilation, ...
- Disposal of removed all removed piping.

Lumpsum price ……./

**MLR.G1.1.3. Removal of air ducting**

Old Drawings:

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHC_01175-2311-500_1_Dj</td>
<td>Pipelines propulsion room and accommodation main deck aftship</td>
</tr>
<tr>
<td>IHC_01175-2311-500_2_Cj</td>
<td>Pipelines propulsion room and accommodation main deck aftship</td>
</tr>
<tr>
<td>IHC_01175-2313-600_1_B</td>
<td>Pipelines in accommodation on main deck – fr.41-85</td>
</tr>
<tr>
<td>IHC_01175-2318-500_1_Bj</td>
<td>Pipelines in accommodation on upper deck – fr.37-85</td>
</tr>
<tr>
<td>IHC_01175-2318-520_1_Dj</td>
<td>Pipelines in accommodation on upper deck – fr.85-130</td>
</tr>
<tr>
<td>IHC_01175-2318-540_1_Cj</td>
<td>Pipelines on crane deck</td>
</tr>
</tbody>
</table>
IHC_01175-2318-560_1_D Pipelines in accommodation lower bridge and bridge deck
IHC_01175-2410-010_1_B Arrangement and foundations in AC room on crane deck
IHC_01175-2410-020_1_A Arrangement and foundations in AC room on upper deck

New Drawings:
NRK_409465-101-111_D Air-flow Diagram AHU-1
NRK_409465-101-211_D Air-flow Diagram AHU-2
NRK_409465-101-311_C Air-flow Diagram AHU-3
NRK_409465-101-411_B Air-flow Diagram AHU-4 Wheelhouse
NRK_409465-101-511_B Air-flow Diagram AHU-5 Galley

- Assume accommodation has been stripped as per job MLR.D1.
- Remove all air piping and ducting inside accommodation area mentioned on above pipeline arrangement drawings for accommodation from deck and bulkhead penetrations to/from several users:
  - Conditioned air ducting from AHU1 and AHU2;
  - Recirculation ducting above fire and WT doors;
  - Exhaust air ducting from sanitary spaces, hospital, bar, gym, etc.
  - Overpressure ducting to outside.
- Remove all supporting frames and clamps where not needed anymore for new ducting as per job MLR.G1.2.4.
- Disposal of dismounted and removed piping and ducting, material and other garbage related to this job.
- During removal of existing air piping and ducting, based on air-flow diagrams of new system, routing of new ducting to be defined together with and subject to approval of JDN representative.
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price ……/

**MLR.G1.2. Installation of new system**

**MLR.G1.2.1. Installation of main components**

Old Drawings:
IHC_01175-0319-510_1_Gj Arrangement pump room view on tank top
IHC_01175-2410-010_1_B Arrangement and foundations in AC room on crane deck
IHC_01175-2410-020_1_A Arrangement and foundations in AC room on upper deck
IHC_01175-2331-500_2_Ej Diagram LT Fresh cooling water lines

New Drawings:
LD_12-00_-A009515_-j_ Lay-out air conditioning AHU-1 till AHU-5
LD_11-00_-A009579_-j_ Deckhouse for AHU4 onto top deck
LD_12-00_-A009847_-j_ Foundations AC equipment Aux. Engine Room
MLR.G1.2.1_Sketch1 JDN sketch arrangement chillers, open divider, circulation pumps
NRK_409456-101-110_C AHU Nr1 Accommodation Aft Ship
NRK_409456-101-210_B AHU Nr2 Accommodation Fore Ship
NRK_409456-101-310_B AHU Nr3 ECR  
NRK_409456-101-410_B AHU Nr4 Wheelhouse  
NRK_409456-101-510_B AHU Nr5 Galley  
NRK_409456-101-610_A AHU Nr6 AC thyristor room  
NRK_409456-101-710_A AHU Nr7 AC thyristor room  
NRK_409456-101-810_B AHU Nr8 AC Elec Workshop  
NRK_409456-101-910 AHU Nr9 AC Boatswain Store  
NRK_409456-101-1010 AHU Nr10 AC Cold Workshop  
NRK_409456-101-1110 AHU Nr11 AC Converter/Measuring Room  
NRK_409426-102-003-01_E CSH9583-210Y – K4803TB2 Condensing unit  
NRK_409426-102-003-02_E CSH9583-210Y – K4803TB2 Condensing unit  
NRK_409456-102-003-03_A Shell & Tube heat exchanger / open divider  
NRK_409456-102-003-04_B Chilled water unit HVAC  
NRK_409456-106-150_0 Switchboard AC1 Accommodation aft ship  
NRK_409456-106-250/350_0 Switchboard AC2 Accommodation fore ship & AC3 ECR/MSB  
NRK_409456-106-450_0 Switchboard AC4 Wheelhouse  
NRK_409456-106-550_0 Switchboard AC5 Galley  
NRK_409456-106-050_0 Switchboard Condensing Unit  
NRK_409456-101-352 Humidifier AT4 1534 AHU2  
NRK_409456-101-353 Humidifier AT4 1534 AHU4  
NRK_409456-101-354 Humidifier AT4 6464 AHU1  
NRK_409456-102-001_G R134A Refrigerating Diagram  
LD_08-00-013_1_- Power and Lighting Plan – Accommodation (P11)  
MLR.G1.2.4_NRK Spec.G

Installation of chillers, heat exchanger, open divider and chilled water pumps in auxiliary engine room:

- Assume AC compressor/condenser units have been removed from the auxiliary engine room as per job G.1.1.1.
- Tank 49 below: assume open/close and gas-free and cleaned as per rep spec H. general.
- Fabricate and fit/weld foundation frames for chiller units (condensing units) and heat exchanger/open divider unit as per LD_12-00-_A009847.
- Grind deck and new foundations below and around new equipment positions up to ST3 and apply full new paint system as per paint specs.
- Disassembly/assembly units in pieces
- Dismount/mount compressors from condensing units
- Dismount/mount pump set and upper piping from heat exchanger / open divider unit.
- in order to travel the parts through the hatch and by travelling beam through the auxiliary engine room to the new locations
- Travel inside condensing units, heat exchanger / open divider unit, chilled water unit HVAC and both electrical cabinets for auxiliary engine room (starter panel chillers and distribution board P11) – positions on drw MLR.G1.2.1_Sketch1 are indicative, definitive locations to be defined in situ.
- Open/close hatch and remove/re-install stairs from main deck to auxiliary engine room in hatch trunk.
- Where applicable move units and electrical cabinets on new foundation and frames, bolt them on foundations – bolts are yard supply.
- Move chilled water circulation pumps unit to new location and weld it on deck. Grind smooth welding, repair paint system as per specs.
- Adapt LT piping, disconnected from AC1 condensers as per job MLR.G1.1.1, and connect to both chiller condensers as per refrigerating diagram.
- Coolant lines from chiller unit condensers to heat exchanger and from heat exchanger to chiller unit compressors to be measured in situ. With these measurements owner’s supplier will provide piping (incl. flexibles).
- After delivery of piping, coolant lines to be fitted, welded according to the correct requirements and procedures provided by supplier and installed.

Installation of AHU1 for accommodation aft in AC room on crane deck:
- AHU1 will be delivered in 2 parts as per drw. NRK_409456-101-110_B: the humidifier section, to be mounted on the fan section will be delivered separated from the rest.
- Assume old AHU1 and all air ducting have been removed as per job MLR.G1.1.1.
- Assume fans E1 & E3 have been temporary removed as per job MLR.G4.
- Fabricate and fit/weld foundation frame as per drw. LD_12-00-_A009515_-_j_1
- Assume chilled water piping deck penetrations have been installed as per job MLR.G1.2.2.
- Cut opening in crane deck AC room SB side bulkhead (5250 mm ex CL), of big enough size to move inside the unit of 4000 mm x 1589 mm x 1054 mm (l x w x h) and the humidifier section of 1550 mm x 1589 mm x 1054 mm (l x w x h).
- Grind deck and new foundation frame up to ST3 and apply full new paint system as per paint specs.
- Clean bulkheads and touch-up paint system where needed, incl cut out part of bulkhead.
- Travel inside both parts of new AHU1, electrical starter cabinet and steam humidifier as well as the fans E1 & E3 for re-use. This travelling best to be done while old crane track is removed as per job MLR.C2 or alternatively the part of the old crane track next to the AC room to be cropped of.
- Install humidifier section on top of lower part (fan section)
- Re-install, fit/weld bulkhead cut-out, grind smooth welding, repair paint system as per specs – space between AHU and bulkhead is limited.
- Move AHU1 on foundation, bolt it on foundation – bolts are yard supply. If needed, open/closed bolted SB hatch for better access to foundation.
- After installation of new AC air ducting in this AC room, as per job MLR.G1.2.4. install steam humidifier, electrical starter cabinet and fans E1 & E3 – positions on drw LD_12-00-A009515 are indicative, definitive locations to be defined in situ.
- Frames for starter panel and steam humidifier to be included: fabricate, fit/weld. Grind smooth welding and painting.
- Relocation of E1/E3 supporting frames is included in MLR.G4.

Installation of AHU2 for accommodation forward and AHU3 for ECR + MSB in AC room on upper deck:
- AHU2 will be delivered in 3 parts as per drw. NRK_409456-101-210_-: the fan section and the air inlet section will be delivered separated from the rest.
- AHU3 will be delivered completely as 1 piece as per drw. NRK_409456-101-310_-.
- Assume old AHU2 & 3 and all air ducting have been removed as per job MLR.G1.1.1.
- Assume fan E5 has been temporary removed as per job MLR.G4.
- Assume AC room structural modifications as per job MLR.B7 are ongoing.
- Fabricate and fit/weld foundation frame as per drw. LD_12-00-_A009515_-_j_1
- Assume chilled water piping deck penetrations have been installed as per job MLR.G1.2.2.
- Cut opening in upper deck AC room aft bulkhead (fr.70) while doing the local structural modifications as per job B7, of big enough size to move inside the AHU2 in parts of 748 mm x 977 mm x 1064 mm, 1252 mm x 977 mm x 1064
mm and 2000 mm x 977 mm x 748 mm (l x w x h) and the AHU3 in one piece of 4050 mm x 977 mm x 1064 mm (l x w x h). Alternative solutions for temporary openings can be suggested by yard and approved by owner.
- Grind deck and new foundation frame up to ST3 and apply full new paint system as per paint specs.
- Clean bulkheads and touch-up paint system where needed, incl cut out part of bulkhead.
- Travel inside all parts of new AHU2, AHU3, electrical starter cabinet and steam humidifier as well as the fan E6 for re-use.
- Build together all parts of AHU2.
- Re-install, fit/weld bulkhead cut-out, grind smooth welding, repair paint system as per specs – space between AHU and bulkhead is limited.
- Move AHU2 & 3 on foundation, bolt them on foundation – bolts are yard supply.
- After installation of all new AC air ducting in this AC room, as per job MLR.G1.2.4. install steam humidifier, electrical starter cabinet and fan E6 – positions on drw LD_12-00-A009515 are indicative, definitive locations to be defined in situ.
- Frames for starter panel, steam humidifier and relocated fan E6 to be included: fabricate, fit/weld. Grind smooth welding and painting.

Installation of AHU4 for wheelhouse:
- AHU4 will be delivered completely as 1 piece as per drw. NRK_409456-101-410-__.
- Pre-fabricate new AC4 deckhouse for top deck as per LD_11-00-__A009579, but without installing CL facing bulkhead (with entrance door and bolted hatch). Keep this bulkhead separate for later installation. Incl. painting as per paint specs.
- Assume chilled water piping deck penetrations have been installed as per job MLR.G1.2.2.
- Fit/weld foundation frame as per drw. LD_12-00-__A009515__j_1
- Crop of top deck railing and overhanging part of wheelhouse canopy in way of new deckhouse as indicated in LD_11-00-__A009579.
- Fit/weld open deckhouse on top deck.
- Grind welding seams, deck and new foundation frame up to ST3 and apply full new paint system as per paint specs.
- Travel inside AHU4, move and bolt on foundation – bolts are yard supply.
- Install, fit/weld loose CL facing bulkhead, grind smooth welds, repair paint system as per specs.
- Travel inside electrical starter cabinet and steam humidifier.
- Install steam humidifier and electrical starter cabinet – positions on drw LD_12-00-A009515 are indicative, definitive locations to be defined in situ.
- Frames for starter panel and steam humidifier: fabricate, fit/weld. Grind smooth welding and painting.

Installation of AHU5 for galley:
- AHU5 will be delivered completely as 1 piece as per drw. NRK_409456-101-510__.
- Assume old thyristor room AC compressor has been removed from this ‘AC9 room’ (frs 41-44 PS next to galley) as per job MLR.G1.1.1.
- Assume chilled water piping deck penetrations have been installed as per job MLR.G1.2.2.
- Assume deck opening for installation of thyristor room AHU’s has been closed again – see below.
- Fabricate and fit/weld foundation frame as per drw. LD_12-00-__A009515__j_1
- Cut opening in AC9 room PS bulkhead (7350 mm ex CL to PS), of big enough size to move inside the AHU5 in one piece of 1698 mm x 671 mm x 1496 mm (l
Installation of AHU for ELEC workshop:
- AHU for ELEC workshop will be delivered completely as 1 piece as per NRK_409456-101-810.
- Assume old AHU has been removed as per job MLR.G1.1.1.
- Assume chilled water piping deck penetrations have been installed in thyristor room as per job MLR.G1.2.2.
- Clean bulkheads behind and around new AHU and touch-up paint system where needed.
- Travel inside AHU through workshop hatch. Open/close hatch.
- Move AHU on foundation, bolt it on foundation – bolts are yard supply.
- Foundation for AHU8 units to be included: fabricate, fit/weld. Grind smooth welding and painting.

Installation of AHU7 for thyristor room:
- Both AHU7 units will be delivered completely as 1 piece as per drw NRK_409456-101-710.
- Assume old thyristor room AC compressor has been removed from ‘AC9 room’ and old AHU’s have been removed from thyristor room as per job MLR.G1.1.1.
- Assume thorough protection of surrounding electronic equipment, switchboards and drives against damage, humidity and dust has been installed as per job MLR.G1.1.1.
- Assume chilled water piping deck penetrations have been installed in thyristor room as per job MLR.G1.2.2.
- Use opening for AHU5 in AC9 room PS bulkhead (7350 mm ex CL to PS) to move inside the AHU7 into AC9 room.
- Cut opening in upper deck between ‘AC9 room’ and thyristor room between frs 42 – 44 and 2450 mm to 3450 mm ex CL of big enough size to move inside thyristor room AHU7 in one piece of 1231,7 mm x 750 mm x 1200 mm (l x w x h)
- Grind deck below and around new AHU7 positions up to ST3 and apply full new paint system as per paint specs.
- Clean bulkheads and touch-up paint system where needed, incl cut out part of deck.
- Travel inside thyristor room both units for AHU7.
- Re-install, fit/weld upper deck cut-out, grind smooth welding, repair paint system as per specs.
- Move both AHU7 units on foundation, bolt them on foundation – bolts are yard supply.
- Foundation for AHU7 units to be included: draw, fabricate, fit/weld. Grind smooth welding and painting.
- Adapt existing ducting and connect it to AHU7 units air outlets.

**Installation of AHU8 for cold workshop:**
- AHU8 will be delivered completely as 1 piece as per drw NRK_409456-101-1010.
- Assume old AHU8 has been removed as per job MLR.G1.1.1.
- Assume chilled water piping deck penetrations have been installed as per job MLR.G1.2.2.
- Grind deck below and around new AHU8 position up to ST3 and apply full new paint system as per paint specs.
- Clean bulkheads behind and around new AHU8 and touch-up paint system where needed.
- Travel inside AHU8 through workshop hatch. Open/close hatch.
- Move AHU8 on foundation, bolt it on foundation – bolts are yard supply.
- Foundation for AHU8 units to be included: draw, fabricate, fit/weld. Grind smooth welding and painting.
- Adapt existing ducting and connect it to AHU7 units air outlets.

**Installation of AHU for bosun store:**
- New bosun store AC fancoil unit will be delivered completely as 1 piece as per drw NRK_409456-101-910.
- Assume old AHU8 has been removed as per job MLR.G1.1.1.
- Assume chilled water piping deck penetrations have been installed as per job MLR.G1.2.2.
- Adapt frame to new fancoil: adapt, fit/weld, grind smooth welding and painting
- Travel inside AHU8 through workshop and store door.
- Move AHU8 on foundation, bolt it on foundation – bolts are yard supply.

**Installation of AHU for convertor and measuring room:**
- Assume accommodation has been stripped as per job MLR.D1.
- Assume air ducting has been removed as per job MLR.G1.1.3.
- Fancoil unit to be installed above ceiling panels in accommodation on lower bridge deck, above corridor in front of the measuring room entrance door.
- Fabricate, fit/weld, grind smooth welding and painting a frame for installation of the fancoil unit (drw. NRK_409456-101-1110) for convertor and measuring room hanging on the deck above
- Travel inside AHU through lower bridge door.
- Move AHU8 on foundation, bolt it on foundation – bolts are yard supply.

For the above listed jobs:
- Include transport to/on vessel, cranage, hoisting, manipulating and staging where needed/required.
- After installation of AHU’s and fancoil units, connect drain connections with galvanized steel pipe to scuppers. Where needed, scuppers and grey water line below deck to be relocated and adapted.
- Connect electrically the chillers, circulation pumps and adjacent new equipment to the newly installed starter and distribution cabinets as per the E-diagrams and cable lists from NRK and JDN, see job MLR.E6.
- Connect electrically the AHU1, 2+3, 4, 5 and, where installed, the humidifiers to the newly installed starter cabinets as per the E-diagrams and cable lists of NRK, see job MLR.E6.
- Connect electrically the other AHU’s and fancoil units to the existing vessel’s distribution boards as per the JDN E-diagrams and cable lists, see job MLR.E6.
- Connect electrically the newly installed and/or re-installed exhaust fans E1, E2, E3, E4 and E6 as per the JDN E-diagrams and cable lists, see job MLR.E6.
- For new cables as much as possible existing cable ways to be used, alternatively new adequately sized galvanized steel cable way(s) or cable strips to be installed.
- Include as-built arrangement drawings (dwg or dxf format) of new equipment arrangement in AC rooms, auxiliary engine room and allocation of other above installed equipment.

Lumpsum price

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**MLR.G1.2.2. Installation of chilled water piping**

New Drawings:
NRK_409465-102-001_G    R134a Refrigerating Diagram
NRK_Sketch                Routing Chilled Water Piping

- Assume accommodation has been stripped as per job MLR.D1.
- Assume main components of new AC system have been installed as per job MLR.G1.1.1.
- Install and connect a completely new chilled water piping system in accordance with refrigerating diagram.
- Routing as per attached sketch referred to and following description for supply lines (same applies for return lines):
  - From chilled water circulation pumps in auxiliary engine room piping is split in 2 branches: one branch of DN100 to aft and one branch of DN150 to forward.
  - The branch of DN100 penetrates bulkhead with pump room at abt. frs. 42 – 44 and runs against bulkhead and ceiling and penetrates main deck with thyristor room just before fr 41.
    - In thyristor room there are 2 branches of DN50 to each AHU.
    - The pipe continues to run straight up as a DN50 pipe and penetrates upper deck to connect to AHU5.
  - The branch of DN150 contains branch of DN25 to ELEC workshop in auxiliary engine room. This DN25 pipe runs at ceiling of auxiliary engine room to penetrate main deck at abt. frs. 68 – 69 below ELEC workshop AHU.
  - The DN150 pipe penetrates bulkhead with pump room at abt. frs. 57 – 59 and runs against pump room ceiling to SB. It contains a branch of DN125 at pump room ceiling penetrating the main deck just behind fr. 63 running up between the fr. 63 deckhouse bulkhead and the gym wall panelling.
    - The DN125 pipe runs aft below the crane deck and above the main deck accommodation ceiling panelling to penetrate the crane deck at abt. frs. 55 – 57 to the AC room above, where a DN100 branch runs to the new AHU1.
    - The pipe runs further up as a DN40 pipe and penetrates the lower bridge deck to run further up behind the chief engineer’s sanitary unit. Below bridge deck there is a DN15 branch to the AHU for measuring and convertor room.
    - The DN40 pipe runs further up, penetrates the bridge deck and runs through the SB wheelhouse trunk to above to ceiling panels. The pipe runs horizontal below the top deck to penetrate the deck next to the new AHU 4.
  - After the DN125 branch the pipe continues at the pump room ceiling as a DN80 pipe running aft, penetrating the main deck forward of fr. 72. to the main deck AC room.
- In the AC room the pipe contains 2 branches of DN50 resp. to AHU3 and AHU2.
- The pipe runs further aft as a DN32 pipe. It penetrates the aft AC room bulkhead and runs above the main deck accommodation ceiling panels to the bosun store bulkhead (just forward of fr. 106) which it penetrates SB of the laundry room.
- In the bosun store the DN32 pipe runs at the ceiling to further forward and in PS direction. It contains a DN15 branch in the bosun store to the local AHU above the door.
- The remaining DN25 pipe penetrates the bosun store forward bulkhead below crane deck to the bosun workshop, where the pipe runs further downward to penetrate main deck to cold workshop I to the local AHU.
- The deaeration valves in the chilled water system are include in yard supply, as well as the regulating and isolation valves in front of the 3-way valves at the AHU’s. The same applies to the other valves mentioned on the refrigeration diagram as ‘yard’s supply’.
- The expansion tank is owner delivery and installed by yard in the chilled water system.
- Piping material is steel, fittings in general cast iron. The pipes are made of SA 2.5 shotblasted steel, treated with welding primer. The paint system is in accordance with the surroundings.
- In general pipe clipping is provided at least in such a way that the maximum distance between the supports is 2 m for piping of diameters of more than DN32 and 1.4 m for diameters of less than DN32.
- Pipe supports are to be sturdily connected to the vessel’s construction: pipes may not be supported by other pipes or any equipment. Double pipe supports may not be used.
- In way of a bend, the pipe is clipped at least on one side of the bend and if necessary and if necessary at both sides.
- Where a pipe is connected to machinery, or to a fitting, the pipe is clipped near the connection in such a way that no stresses are transmitted by the pipe to the equipment.
- For all watertight bulkhead and deck penetrations, welded three-flange pieces are applied for pipes with diameter larger than DN32 and pipe sleeves are applied for diameters smaller than or equal to DN32.
- As sufficient number of pipe connections, couplings or flanges is installed to allow easy removal and installation of pipes. Flanges are used for diameters larger than DN32 and pipe couplings for diameters smaller than or equal to DN32.
- All the chilled water and coolant pipes (installed as per job MLR.G1.2.1.) to be insulated as per following system: prefabricated rockwool shells (type 810) with reinforced self-adhesive aluminium layer.
- Pipes have to be individually insulated, i.e. not grouped. Therefore, these pipes are to be mounted with sufficient surrounding free space, enabling insulating as specified.
- As-built air pipe/ducting arrangement and routing drawings (dwg. or dxf. format) to be made, submitted to owner for review and approval, modified and adjusted in accordance with owner’s comments and supplied after approval.
- All necessary access works to be included: staging, lighting, ventilation, ...
- All related transport and craneage to be included.
- Where welding has been done for e.g. deck/bulkhead penetrations, clamp support installations, etc., all welds to be grinded up to ST3 and paint system to be applied as per specs.

Lumpsum price

MLR 519/568
MLR.G1.2.3. Adjustments of hot water piping

New Drawings:
NRK_409465-102-001_G R134a Refrigerating Diagram

- Assume accommodation has been stripped as per job MLR.D1.
- Assume main components of new AC system have been installed as per job MLR.G1.1.1.
- Hot water piping at pump room ceiling before penetration of longitudinal bulkhead with bonded store (abt. frs. 54 – 56): re-rout from here along pump room ceiling to area of main deck penetration of new chilled water piping to AC room on crane deck, see job MLR.G1.2.2. (just behind fr. 63 running up between the fr. 63 deckhouse bulkhead and the gym wall panelling.).
- After new deck penetration, pipe is running up between accommodation bulkhead and gym wall panelling to below crane deck. Pipe is running back aft where it is connected again to the existing crane deck penetration (frs. 55 – 56) to AC room.
- Above the upper deck accommodation ceiling panelling also a new branch (abt. DN50) is connected running to PS and aft to the AHU5 space: incl. bulkhead penetration and connection to the AHU5.
- In crane deck AC room hot water piping system is branched and connected to AHU1 (abt. DN50)
- In crane deck AC room hot water piping system is also extended to above, i.e. towards AHU4 (abt. DN50). Hot water piping is following the same routing to AHU4 as the new chilled water piping, see job MLR.G1.2.2, but without branch on lower bridge deck.
- Hot water piping to old change room radiator to be re-routed locally to location of new radiator (owner’s supply) in new aft change room.
- Hot water piping in old pantry tor be re-routed (up, above ceiling panels) to new forward change room for new radiator (owner’s supply) there.
- The above described modifications apply for both supply as return lines.
- All the connections to the AHU’s as per refrigeration diagram are included.
- Where needed additional deaeration valves are installed in the modified hot water system.
- For the connections to the new AHU’s, the new regulating and isolation valves in front of the 3-way valves to be included.
- Piping material is steel, fittings in general bronze. The pipes are made of SA 2.5 shotblasted steel, treated with welding primer. The paint system is in accordance with the surroundings.
- In general pipe clipping is provided at least in such a way that the maximum distance between the supports is 2 m for piping of diameters of more than DN32 and 1.4 m for diameters of less than DN32.
- Pipe supports are to be sturdily connected to the vessel’s construction: pipes may not be supported by other pipes or any equipment. Double pipe supports may not be used.
- In way of a bend, the pipe is clipped at least on one side of the bend and if necessary and if necessary at both sides.
- Where a pipe is connected to machinery, or to a fitting, the pipe is clipped near the connection in such a way that no stresses are transmitted by the pipe to the equipment.
- For all watertight bulkhead and deck penetrations, welded three-flange pieces are applied for pipes with diameter larger than DN32 and pipe sleeves are applied for diameters smaller than or equal to DN32.
- As sufficient number of pipe connections, couplings or flanges is installed to allow easy removal and installation of pipes. Flanges are used for diameters
larger than DN32 and pipe couplings for diameters smaller than or equal to DN32.

- The hot water pipes are only to be insulated where a risk of contact exists (only at certain locations near the AHU’s and in the AC rooms – rather limited) as per following system: prefabricated rockwool shells (type 810) with reinforced self-adhesive aluminium layer.
- Pipes have to be individually insulated, i.e. not grouped. Therefore, these pipes are to be mounted with sufficient surrounding free space, enabling insulating as specified.
- As-built air pipe arrangement and routing drawings (dwg. or dxf. format) to be made, submitted to owner for review and approval, modified and adjusted in accordance with owner’s comments and supplied after approval.
- All necessary access works to be included: staging, lighting, ventilation, ...
- All related transport and cranage to be included.
- Where welding has been done for e.g. deck/bulkhead penetrations, clamp support installations, etc., all welds to be grinded up to ST3 and paint system to be applied as per specs.

Lumpsum price ....../

**MLR.G1.2.4. Installation of new air ducting**

Old Drawings:
- IHC_01175-2311-500_1_Dj Pipelines propulsion room and accommodation main deck aftship
- IHC_01175-2311-500_2_Cj Pipelines propulsion room and accommodation main deck aftship
- IHC_01175-2313-600_1_B Pipelines in accommodation on main deck – fr.41-85
- IHC_01175-2318-500_1_Bj Pipelines in accommodation on upper deck – fr.37-85
- IHC_01175-2318-520_1_Dj Pipelines in accommodation on upper deck – fr.85-130
- IHC_01175-2318-540_1_Cj Pipelines on crane deck
- IHC_01175-2318-560_1_D Pipelines in accommodation lower bridge and bridge deck
- IHC_01175-2410-010_1_B Arrangement and foundations in AC room on crane deck
- IHC_01175-2410-020_1_A Arrangement and foundations in AC room on upper deck

New Drawings:
- NRK_409465-101-111_D Air-flow Diagram AHU-1
- NRK_409465-101-211_D Air-flow Diagram AHU-2
- NRK_409465-101-311_C Air-flow Diagram AHU-3
- NRK_409465-101-411_B Air-flow Diagram AHU-4 Wheelhouse
- NRK_409465-101-511_B Air-flow Diagram AHU-5 Galley
- MLR.G1.2.4_NRKG Spec.G
- ACO_13/064/21-07_Rev.B HVAC elements arrangement

- Assume accommodation has been stripped as per job MLR.D1.
- Assume existing air ducting has been removed as per job MLR.G1.1.3.
- New ducting to be installed in accommodation area, AC rooms and rooms with AHU4 and AHU5 in accordance with requirements of MLR.G1.2.4_NRK Spec.G relevant to shipyard’s scope.
- Install new air piping and ducting as per new air flow diagrams, HVAC elements arrangement and routing defined during removal of existing air piping and ducting. I.e. piping an ducting for new AHU1, AHU2, AHU4, AHU5, AHU for measuring and convertor room, new fans E1, E2, E3, E4, E6 and all related recirculation air piping and ducting.
- Fittings like regulating valves, temperature sensors, pressure sensors, etc. are owner’s supply.
- Where applicable, as per new air flow diagrams, replace existing deck and bulkhead penetrations by new ones with the correct size. Cut out unused deck/bulkhead penetrations and close deck/bulkhead by welding in insert: grind smooth welding and repair paint system as per specs.
- Install all fire dampers in air piping and ducting as per the new air flow diagrams. Small standard dampers in round air piping will be owner’s supply. Other fire flaps are yard’s supply.
- Clamping of new piping and ducting as per MLR.G1.2.4_NRK Spec.G, as much as possible re-use supports and angle bars from removed ducting.
- New air ducting and piping to be installed ready for connection of AC supply cabin units (owner’s supply) by accommodation subcontractor, i.e. with sufficient overlength if and where needed. To be defined in concert with accommodation subcontractor.
- Air ducting for recirculation air and overpressure (in line with grills in ceiling panels – owner’s supply) to be installed in close concert with accommodation subcontractor w.r.t. timing and exact location.
- As-built air pipe/ducting arrangement and routing drawings (dwg. or dxf. format) to be made, submitted to owner for review and approval, modified and adjusted in accordance with owner’s comments and supplied after approval.
- All necessary access works to be included: staging, lighting, ventilation, ...
- Where welding has been done for e.g. deck/bulkhead penetrations, clamp support installations, etc., all welds to be grinded up to ST3 and paint system to be applied as per specs.

Lumpsum price 

MLR.G3. Ventilation auxiliary engine room

Ventilation of auxiliary engine room is insufficient and will be upgraded as follows (see draaings mentioned in items below):

- Forward fan S12A
  - Is changed to a supply fan of triple capacity than the present supply fan. Therefore the ducting has to be increased in size.
  - Along present routing there in insufficient space to increase ducting is size, therefore a new ventilation house is installed on top of the companion house with access to harbour generator room and auxiliary engine room.
  - Ducting is installed along staircase downward to the auxiliary engine room.
- Middle fan E8
  - Exhaust fan capacity is tripled. Ducting to be enlarged accordingly.
  - Vertical duct in ER is enlarged with one frame length to foreship and with 250 mm to midship.
- Horizontal duct is enlarged 284 mm upwards and openings to auxiliary engine room are increase from 5 pcs of 400 mm x 400 mm to 8 pcs of 520 mm x 520 mm
- Aft fan S12A
  - Supply fan is changed to an axial supply fan of the same capacity.
  - No modifications to the air ducting.

**MLR.G3.1. Installation of new fan, ducting and deckhouse S12**

Old Drawings:
- IHC_01175-1244-010_1_K Buoyancy space, frame 111 – 124 SB
- IHC_01175-1244-010_2_F Buoyancy space, frame 111 – 124 SB
- IHC_01175-1244-010_3_H Buoyancy space, frame 111 – 124 SB
- IHC_01175-1890-010_1_B Companion house on frame 118 – 122 PS
- IHC_01175-2316-500_1_A Pipelines in fore ship main deck
- IHC_01175-2316-510_12_ Pipe passage
- IHC_01175-2316-510_28_ Pipe passage
- IHC_01175-2316-510_71_ Pipe passage
- H&H_12012170-302 Dimension drawing Axial Fan S-12

New Drawings:
- LD_11-00-_A009556_ Ventilation cabinet for air filters fan S12 – Midlife upgrade
- LD_11-00-_A009658_ Arrangement Filter Cabinet + Ducting Fan S12 fr. 116-122

Pictures:
- MLR.G3.1_Pictures from 3D model.

Job to be combined with access cutting/welding of job S.120. Harbour generator overhaul.

**New ventilation cabinet and air ducting:**

- Fabricate ventilation cabinet as per drw. LD_11-00-A009556.
- Cut out ventilation mushroom on top of ‘companion house’. Close opening by welding in plate.
- Cut opening for entrance hatch to ventilation cabinet. Grind smooth edges.
- Fit/weld hatch – JDN delivery.
- Fabricate, fit/weld ladder for access to ventilation cabinet.
- Assume piping and cabling in way of new ducting in harbour generator room and auxiliary separator room has been removed for re-routing as described below.
- Cut opening of 650 mm x 750 mm in upper deck. Grind smooth edges.
- Install, fit/weld support for ventilation cabinet in companion house above stairs.
- Install new fan S12 (JDN delivery) on its foundation flange before installation of ventilation cabinet on ‘companion house’; bolts, nuts and seals yard supply.
- Install, fit/weld ventilation cabinet on existing ‘companion house’ as indicated on drw. LD_11-00-A009556.
- Cut opening for DN700 ventilation duct pipe in main deck as per drawing i.e. with pipe centre 620 mm from side shell and 433 mm aft of fr. 118. Longitudinal stiffener below remains in place.
- Shift DN700 ventilation duct pipe into harbour generator room. Yard to decide how to bring pipe inside:
- By cutting pipe in 2, shifting it inside through staircase and weld it together again in situ, or
- By cutting upper deck opening temporary bigger, shifting pipe inside in one piece and fit/weld back excess cut part of deck plate and stiffener below.
- Shift DN700 duct pipe to location and lower partly in main deck opening and temporary fix in such a way that sufficient space is available above for the welding works below upper deck.
- Close area below opening in upper deck with ‘box’ forming a part of the duct:
  - Fit/weld horizontal plate between webframe T-beams at frs. 116 – 118, from side shell to 9450 mm from CL
  - Cut opening in horizontal plate for DN700 duct pipe in line with opening in main deck below.
  - Fit/weld vertical plate between same T-beams and stiffener above below upper deck.
  - Fit/weld bracket in this box as per drw. LD_11-00-A009556.
- Loosen temporary fixation of DN700 pipe and fit/weld pipe in horizontal plate above and main deck below.
- Close area below main deck with ‘box’ forming a part of the duct:
  - Fit/weld horizontal plates between fr. 118 and bulkhead with door to auxiliary engine room at 1000 mm aft of fr. 118 and from side shell to bulkhead at 9450 mm from CL at 675 mm below main deck.
  - Cut opening in bulkhead at 10500 mm ex CL between level of newly fitted horizontal plate and stiffener above.
  - Fit/weld vertical plates between newly installed horizontal plate, stiffeners and deck plate above, closing the ‘box’.
  - Cut opening above auxiliary engine room entrance door.
  - Fit/weld ‘air supply box’ above entrance door between bulkhead with door and webframe fr. 116.
- New cable (owner’s supply) to be pulled from new fan E12 to starter in ECR.
- New fan S12 to be electrically connected.
- Remove existing fan from PS forward fan room: disconnect, dismount, travel out and dispose of. Blank of existing fan foundation with blinding flange: bolts, nuts, seal and flange are yard supply.
- For all above welding jobs: after welding, grind welds and areas with damaged paint system to ST3, repair paint system.
- All necessary access works to be included: staging, lighting, ventilation, ...

Relocation and rerouting of adjacent piping, cabling and equipment:
- Assume the hydraulic system has been de-pressurised and the electric system locked out / tagged out by the crew.
- Disconnect / connect electrical cabling in junction box (60 x 60 x 40 cm), 4 cables. Remove / refit junction box, move side wise 10 cm. Cut / weld support, angle bar 50 x 50 x 4 mm.
- Disconnect / connect and remove / refit hydraulic pipe lines, SAE 3000 PSI, 1 “ ~ 1.5 “, assume 5 units. Blind-off, label and store temporarily. Cut-out deck penetration in main deck for hydraulic lines and relocate (pos 12 / IHC 01175-2316-500 ~ IHC 01175-2316-510 sheet 12).
- Disconnect / connect and remove / refit hydraulic pipe lines, SAE 3000 PSI, 1 “ ~ 1.5 “, assume 4 units. Blind-off, label and store temporarily. (pos 27 and 84 / IHC 01175-2316-500 ~ IHC 01175-2316-510 sheet 28 and 71).
- Supply and bend / cut / weld seamless steel pipe line, 1” and 1 ½”, assume 6 m. provide and weld pipe brackets, assume 5 pieces. Welded hydraulic lines to be pickled and neutralised.
- Flushing of new / modified pipe lines according specs P.2.2.
- Disconnect / connect.

Lumpsum price

**MLR.G3.2. Installation of new fan and ducting E8**

Old Drawings:
- IHC_01175-2410-030_2_Aj: Arrangement and foundations in fanrooms in on main deck and upper deck
- IHC_01175-1212-010_2_Kj: Cross sections buoyancy spaces 85 SB – 111 PS
- IHC_01175-1240-010_3_Ij: Buoyancy space fr. 76 – 93 PS

New Drawings:
- H&H_12012170-301: Dimension drawing Axial Fan E-8
- LD_11-00-_A009670-_j: Buoyancy space – fr. 76-93 PS

Pictures
MLR.G3.2_Pictures from 3D model.

- Disconnect electrically and dismount existing fan E8 in funnel from foundation pipe.
- Travel old fan E8 to outside funnel, if needed cut it in pieces. Disposal of dismounted fan.
- Fabricate intermediate reducing piece of abt. 750 mm long to install on top of existing foundation for installation of new fan E8 (JDN delivery), i.e. reducing piece from pipe diameter of 713 mm (new fan) to 608 mm (existing pipe), with flanges as indicated on above mentioned drawings. Before fabrication pipe to be measured in situ, if needed reducer will be eccentric in order to avoid interference with surrounding equipment, piping and construction.
- Install reducing pipe and new fan E8: bolts, nuts and seals yard supply.
- In engine room below crane deck remove existing structural ducting as follows:
  - Cut out plate at 10 m ex CL to PS between frs. 89 – 91 and inclined plate above.
  - Cut out horizontal plate at 400 mm above main deck between frs. 85 – 93 and from 9350 to 10400 mm ex CL to PS.
- Partly removed duct to be modified as follows:
  - Existing openings (5) from duct in main deck to auxiliary engine room to be enlarged from 400 mm x 400 mm to 520 mm x 520 mm.
  - 3 new openings of 520 mm x 520 mm to be added as per drawing. Total amount of openings will be 8, evenly distributed over the total length of the structural duct.
  - Cutting of new openings and enlarging of existing openings to be done from above when ducting is open, as access from below is limited. Piping below to be thoroughly protected.
  - Vertical plate at 9350 mm ex CL to PS: strip to be installed on top until a total height of 684 mm;
  - The same for the vertical plate at fr. 93
  - Horizontal top plate to be installed at this height between frs. 85 – 93 and between 9350 to 10400 mm ex CL to PS.
  - Openings to be cut for the connection to the vertical part of the ducting, as per drw.
  - Stiffener at fr. 89 to be extended from 10000 mm ex CL to PS to 9750 mm ex CL to PS.
- At fr. 92, vertical plate to be installed from 10400 mm to 9850 mm ex CL to PS and from 684 mm above main deck until upper deck web stiffener.
- Vertical plate to be installed between frs. 89 – 92 and from 684 mm above main deck until upper deck longitudinal stiffener.
- Plate reinforcements as per drawing.
- Empty store racks next to cofferdam in modification area, in concert with and under supervision of JDN representative. Suppose abt. 4 shelves and abt. 500 kg of spares.
- Other adjacent and surrounding equipment to be thoroughly protected during modification works.
- For the extension of the ducting to foreship and upwards, the shelves against cofferdam bulkhead to be cut where interfering with new routing of duct. Shelves to be adjusted and finished against modified duct.
- On exhaust openings (now 8) in auxiliary engine room grills to be installed – yard supply.
- New cable (owner’s supply) to be pulled from new fan E8 to starter box in ECR.
- New fan E8 and switch next to fan to be electrically connected.
- For all above welding jobs: after welding, grind welds and areas with damaged paint system to ST3, repair paint system.
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price

MLR.G3.3. Installation of new fan S12A

Old Drawings:
IHC_01175-2410-120_1_Dj Arrangement and foundations in fanrooms in on main deck and upper deck

New Drawings:
H&H_12012170-303 Dimension drawing Axial Fan S-12A

- Open/close bolted hatch of PS aft fan room with fan S12A.
- Disconnect electrically and dismount existing fan S12A from PS aft fan room.
- Travel old fan S12A out, if needed cut it in pieces and dispose of.
- Fabricate intermediate reducing piece of a length to be verified in situ and with the new fan S12A (JDN delivery), to install on top of existing foundation for installation of new fan S12A, i.e. reducing piece from pipe diameter of 719 mm (existing pipe) to abt. 632 mm (new fan), with flanges as indicated on above mentioned drawings. Before fabrication pipe to be measured in situ, if needed reducer will be eccentric in order to avoid interference with surrounding construction.
- Install reducing pipe and new fan S12A: bolts, nuts and seals yard supply.
- New fan S12A to be electrically connected at existing cabling.
- For all above welding jobs: after welding, grind welds and areas with damaged paint system to ST3, repair paint system.
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price

MLR 526/568
MLR.G4. Removal, relocation and renewal of Accommodation fans

Old Drawings:
IHC_01175-2311-500_1_Dj Pipelines propulsion room and accommodation main deck aftship
IHC_01175-2311-500_2_Cj Pipelines propulsion room and accommodation main deck aftship
IHC_01175-2313-600_1_B Pipelines in accommodation on main deck – fr.41-85
IHC_01175-2318-500_1_Bj Pipelines in accommodation on upper deck – fr.37-85
IHC_01175-2318-520_1_Dj Pipelines in accommodation on upper deck – fr.85-130
IHC_01175-2318-540_1_Cj Pipelines on crane deck
IHC_01175-2318-560_1_D Pipelines in accommodation lower bridge and bridge deck
IHC_01175-2410-010_1_B Arrangement and foundations in AC room on crane deck
IHC_01175-2410-020_1_A Arrangement and foundations in AC room on upper deck

E-1: sanitary spaces exhaust fan aft accommodation – located in AC room crane deck:
- Dismount E-1 during removal of equipment from AC room on crane deck per job MLR.G1.1.1., incl. disconnect electrically.
- Keep fan E-1 aside for re-use
- Install again in re-arranged AC room crane deck during job MLR.G1.2.4., incl. connect electrically.
- Assume supporting frame will need to be relocated in the room.
- Crop off E-1 supporting frame, grind smooth and touch-up painting.
- Fit/weld E-1 supporting frame at new location, grind smooth welds and touch-up painting.

E-2: hospital exhaust fan – located above ceiling panelling hospital:
- Dismount E-2 during job MLR.G1.1.3. removal of air ducting, incl. disconnect electrically.
- Crop off E-2 supporting frame, grind smooth and touch-up painting.
- Disposal of dismounted fan.
- New E-2 to be installed above ceiling panelling near new hospital during job MLR.G1.2.4., incl. connect electrically.
- Fabricate/fit/weld new E-2 supporting frame from angle bars, grind smooth welds and touch-up painting.

E-3: bar exhaust fan – located in AC room crane deck:
- Dismount E-3 during removal of equipment from AC room on crane deck per job MLR.G1.1.1. incl. disconnect electrically.
- Keep fan E-3 aside for re-use
- Install again in re-arranged AC room crane deck, incl. connect electrically.
- Assume supporting frame will need to be relocated in the room during job MLR.G1.2.4.
- Crop off E-3 supporting frame, grind smooth and touch-up painting.
- Fit/weld E-3 supporting frame at new location, grind smooth welds and touch-up painting.

E-4: galley exhaust fan – located in galley exhaust hood:
- Dismount E-4 during job MLR.G1.1.3. removal of air ducting, incl. disconnect electrically.
- Disposal of dismounted fan.
- New E-4 to be installed above ceiling panelling in galley during job MLR.G1.2.4, incl. connect electrically.
- Fabricate/fit/weld new E-4 supporting frame from angle bars, grind smooth welds and touch-up painting

E-5: gym exhaust fan – located in AC room upper deck (forward accommodation)
- Dismount E-5 during removal of equipment from AC room on upper deck per job MLR.G1.1.1., incl. disconnect electrically
- Crop off E-5 supporting frame, grind smooth and touch-up painting.
- Disposal of dismounted fan.

E-6: sanitary spaces exhaust fan forward accommodation – located above ceiling panelling of common sanitary spaces forward accommodation
- Dismount E-6 during job MLR.G1.1.3. removal of air ducting, incl. disconnect electrically
- Keep fan E-6 aside for re-use
- Install E-6 in re-arranged AC room upper deck during job MLR.G1.2.4. incl. connect electrically.
- Fabricate/fit/weld new E-6 supporting frame from angle bars, grind smooth welds and touch-up painting.

E-7: pantry exhaust fan – located above ceiling near pantry
- Dismount E-7 during job MLR.G1.1.3. removal of air ducting, incl. disconnect electrically
- Disposal of dismounted fan.

Lumpsum price

**MLR.G5. Relocation transformer room fan**

Old Drawings:
IHC_01175-2410-030_1_ - Arrangement and foundations in fanrooms on main deck and upper deck

New Drawings:
IHC_01175-2410-030_1_Aj - Arrangement and foundations in fanrooms on main deck and upper deck

- Assume the SB upper deck AC room and ventilation room next to it have been extended, modified and relocated as per job MLR.B7.
- Assume both pump room fan S15 and transformer room S14 fan have been temporary removed as per job MLR.B7.
- Re-install and reconnect electrically pumproom fan S15 on the same foundation. Bolts, nuts and seal are yard supply.
- For transformer room fan S14:
  - Cut out original foundation (located in new extended AC room) out of upper deck.
  - Fit/weld plate to close opening: grind weld and area with damaged paint to ST3 and repair/apply paint system.
  - Relocate S14 foundation/penetration in new ventilation room between pumproom fan S15 and CL, as indicated on revised drawing, however exact location to be finefined in situ to avoid interference with entrance door, passage and routing of adjusted ducting below deck.
  - Cut new opening in upper deck at new location.
- Fit/weld previously removed fan foundation/penetration at new location: grind weld and area with damaged paint to ST3 and repair/apply paint system.
- Re-install and reconnect electrically pumproom fan S14 at its new location. Bolts, nuts and seal are yard supply.
- In pumproom, remove the old ventilation ducting from S14 deck penetration to penetration of longitudinal bulkhead between pumproom and alleyway next to old laundry.
- Install new ventilation ducting in pumproom from new deck penetration to the same penetration in longitudinal bulkhead. Assume abt. 4m of ducting with 1 bend of 90°.
- For all above welding jobs: after welding, grind welds and areas with damaged paint system to ST3, repair paint system.
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price

**MLR.G6. Modification of ER fan filter walls**

**Drawings:**
- IHC_01175-2410-030_1_A  Arrangement and foundations in fanrooms on maindeck and upperdeck
- IHC_01175-0338-030_2_J  General arrangement LD
- IHC_01175-1814-010_1_C  Crane deck fr94-111
- IHC_01175-1814-010_2_D  Crane deck fr94-111
- MLR.G6_markup_drwg_hingeddoor  Hinged door in filter wall
- HEIHOP_12000156-100_1  Filter frame
- LD_11-00-_A009695-_j  Door in fanroom with filters (PS)

**Pictures:**
- MLR.G6 PIC1  Hinged door closed
- MLR.G6 PIC2  Hinged door open

Filter rooms are located on PS and SB side between fr96-102, 6650 from CL. Modify part of both engine room filter walls and install hinged door for access see “markup_drwg_hingeddoor”.

- Assume filter panels are removed/refit under job section “B4.1.1”
- Crop out and scrap existing frame marked in green see “markup_drwg_hingeddoor”, size approx W1240 x H3140
- Fabricate and install new hinged door/frame as per drawing LD_11-00-_A009695 and pictures “MLR G6 PIC1 & PIC2”
  - Install 3 welded hinges and handle for opening/closing
  - Frame constructed with angle bar L60x40x6 with mounting/dismounting fixtures for filter mats of drawing “HEIHOP_12000156-100_1”
  - Side of the handle to be foreseen with locking pin to prevent automatic opening.
- Prepare surface ST3 and paint with 3 layers of paint, JDN supply

Lumpsum
MLR.H. Dredging equipment

MLR.H2. Skidding out the ladder

Drawings:
- IHC_01175-0357-010_1_H Docking plan
- IHC_5242753_1 Formplan cutterladder
- IHC_5242836_1 Tilting positions of cutterladder
- IHC_5242839_1_B General arrangement cutterladder
- LD_00-00-010_1 Lock position ladder high and low turning point
- IHC_5242778_1_H Cutterladder after part
- IHC_5242778_2_G Cutterladder after part
- IHC_5242787_1_E Cutterladder middle part
- IHC_5242787_2_G Cutterladder middle part
- IHC_5242787_3_F Cutterladder middle part
- IHC_5242787_4_G Cutterladder middle part
- IHC_5242768_1_I Cutterladder first section
- IHC_5242837_1_L Gen. Arrang. suction and discharge line on cutterladder
- IHC_01175-2311-650_1 Pipes from ship to cutterladder
- IHC_01175-2327-500_1_I Diagram glandflushing water lines
- IHC_01175-1072-100_1_G Rigging Plan
- MLR.H2_S-14-DR0001 Sarens plan skidding ladder (dependent of supplier)
- MLR.H2_Skidshoe_drwg Skidshoe SWL 6x140T (dependent of supplier)
- MLR.H2_Skidtrack_drwg Sarskid 400 skidtrack 10m (dependent of supplier)

Picture:
- MLR H2 PIC Supporting of cutter ladder option 2

General description: Please grant permission in dock to an external company selected by the owner with its equipment for skidding the ladder. The ladder has to be skidded out of the ladder well over a length of approx 40m. Reason for skidding is complete external blasting and painting of the ladder, ladderwell and to do small steel repair. Space required in dock is length of vessel + length of skid, total of 170m. Allow a weight of 15T/m² for skidding. Please quote a lumpsum price for assisting with (de)assembly of skidding material and ladder. Following steps have to be followed:

Removal of all service and dredge pipe connection between ladder and ship:
- Assume E-track and all electrical cables are removed under job section MLR.M1.
- Assume cutterhead is removed by crew.
- Assume suction/pressure hose pos228/2, drwg 5242837 is removed under by crew.
- Assume flexible hoses for glandwater and coolingwater pos 2353, 2354, 2355 and 2x2558 on drwg 01175-2311-650 are removed by crew.
- Assume side wires PS pos36 and SB pos37, drwg 01175-1072-100 are disconnected by crew.
- Assume ladder hoisting wires pos 2 and 2a, drwg 01175-1072-100 are disconnected by crew.

Building up/Removing skidding track:
- Loading/unloading of equipment stored in containers that mainly exist out of:
  - 4 x Skidshoes
  - 8 x Skidtracks
  - Azobe beams for support
- Hydraulic powerpack
- Build up the skidding system in co-op with the contractor, assume 2 days
- Supervision during skidding of the ladder and approve risk and safety plan prepared by contractor.
- Cover all sensitive equipment (skidshoes, skidtracks) for approx 1 week during blasting and painting process of the ladder, means for covering supplied by shipyard.
- Assist in dismantling skidding system after works, store and sea fast in containers.

**OPTION1:**

**Supporting, balancing and skidding ladder:**

- Assume that the ladder is in high turning points. (double check with final skidding plan)
- Lower the ladder slowly to a vertical position parallel with the skidding track by paying out of the ladder hoisting wire. (by crew) see drwg S-14-DR0001
- Assist during positioning of the skidshoes below the correct frames of the ladder structure
- Fill up/Remove the required space between cutterladder and skidshoes with filling blocks, supplied by contractor. (Skidshoes have a stroke of 200mm)
- Contractor will support and balance weight of the ladder by pressurising skidshoes.
- After approval shafts of bearing points will be pulled in/out and ladder hoisting wire will be disconnected/connected by crew
- Skidding ladder in/out ladder well by contractor
- When ladder is skidded back inside the ladder well, contractor will position ladder centred with its high turning point. Locking shaft of high turning point will be manually activated by crew
- For period between skidding out and in of the ladder : Yard to provide a dock block arrangement for temporary support the other end of the ladder so that the pressure can be released from the skidshoes.
- Crew will reconnect the ladder hoisting wire and lift up the ladder until the safety pins can be locked.

**OPTION2:**

**Supporting, balancing and skidding ladder:**

- Assume that the ladder is in a fixed position, low turning point and locked with it’s safety pins
- Assist with building up supporting frame to support cutterladder as per picture “MLR H2 PIC1”. The supporting frame has to be built in a way that there is still a small gap <150mm between ladder and support. (Skidshoes have a stroke of 200mm)
- Assist during positioning of the skidshoes below the correct frames of the ladder structure
- Contractor will support and balance weight of the ladder by pressurising skidshoes
- After approval shafts of lower turning points and safety pins will be pulled in/out and ladder hoisting wire will be disconnected/connected by crew
- Skidding ladder in/out ladder well by contractor
- When ladder is skidded back inside the ladder well, contractor will position ladder in a way that the locking shaft of lower turning point and safety pins are centred and can be closed. This closing will be done manually by crew.
- Ladder hoisting wire can be reconnected at will, in a later stage.
Lumpsum price for assistance owner’s subcontractor option1: ...
Lumpsum price for assistance owner’s subcontractor option2: ...

Lumpsum price if yard is able to organise the complete operations with skidding.
All engineering and additional stiffeners for lifting have to be included ...

**MLR.H2.1 Blasting and painting of the ladder**

**Drawings:**
- IHC_5242839_1_B: General arrangement cutterladder
- IHC_5242768_1_Ij: Cutterladder first section
- IHC_5242787_1_Ej: Cutterladder middle part
- IHC_5242787_2_Gj: Cutterladder middle part
- IHC_5242787_3_Fj: Cutterladder middle part
- IHC_5242787_4_Gj: Cutterladder middle part
- IHC_5242778_1_Hj: Cutterladder after part
- IHC_5242778_2_G: Cutterladder after part
- IHC_5242753_1_C: Formplan cutterladder
- LD_00-00-_A000464_1_B: Arrangement railings and platforms on cutterladder
- LD_11-00-_A000450_1: Extra platforms cutterladder back
- IHC_01175-2636-010_1_D: Arrangement zinc anodes for cathodic protection
- LD_00-01-_015-1: Working plan OBO coating cutter ladder
- MLR.H2.1_drwg_nosil: LD ladder NO silicone anti fouling
- MLR.H2.1_drwg_paintareas: Marked paint areas
- LD_11-00-A000438_1: Extra platforms near tooth coupling cutterladder
- LD_11-00-A000418_1: Platform inside cutterladder
- LD_12-00-A000420_1: Stair 60° H2930

**Description:** The intention of this job is to clean, wash and blast the inside and outside of the ladder 100% (on water exposed areas only, not in dry space as voids, ER...) and apply a new silicone antifouling paint system (incl. railings and stairways, excl. dredgepipes). Few parts/walking areas that will require a regular anti slip coating will be described separate.
Make sure that the external sides are completely blasted and painted when ladder is skidded out of ladder well as per job section “H2.1”. Below you can find a detailed description of the job:

**We distinguish following areas on the cutterladder that need to be painted in silicone paint:**

1. Sides (external) : 460m²
2. Backside (external) : 100m²
3. Bottom (external) : 260m²
4. Side compartments (internal) : 1400m²
5. Internal spaces (internal) : 1220m²
6. Internal open area’s (DP1 area) : 70m²

**Pre TOTAL** : 3510m²

**We distinguish following areas on the cutterladder that need regular anti fouling and/or with anti-slip coat (quartz sand), see drwg_nosil:**

7. Ladder deck (external) + anti slip coat : 80m²
8. Deck cutter drive (external) + anti slip coat : 135m²
9. Deck roof of superstructure (external) : 85m²
10. Railings, supports and stairways (see drawings) : forfait

Pre TOTAL : 300m²

We distinguish following areas on the cutterladder that need extra thick layer of silicone paint, see drwg LD 00-01-015:

11. Sides (external) Pre TOTAL : 84m²

TOTAL LADDER : 3894m²

Assume below scope of works:

1. Sides (external) : 544m²
   - Scraping of barnacles (50%)
   - H.P washing 3000 PSI (100%)
   - Gritblasting SA 2.5 (100%)
   - 4 x F/C (100%)

2. Backside (external) : 100m²
   - Chemically clean (100%)
   - H.P washing 3000 PSI (100%)
   - Gritblasting SA 2.5 (100%)
   - 4 x F/C (100%)

3. Bottom (external) : 260m²
   - Scraping of barnacles (100%)
   - H.P washing 3000 PSI (100%)
   - Gritblasting SA 2.5 (100%)
   - 4x F/C (100%)

4. Side compartments (internal) : 1400m²
   - Scraping of barnacles (50%)
   - Removal of mud. Allow for 10m³
   - H.P washing 3000 PSI (100%)
   - Gritblasting SA 2.5 (30%)
   - 4 x F/C (100%)

5. Internal spaces (internal) : 1220m²
   - Scraping of barnacles (50%)
   - Removal of mud. Allow for 10m³
   - H.P washing 3000 PSI (100%)
   - Gritblasting SA 2.5 (100%)
   - 4 x F/C (100%)

6. Internal open area’s (DP1 area) : 70m²
- Scraping of barnacles (50 %)
- Removal of mud. Allow for 1m³
- H.P washing 3000 PSI (100%)
- Gritblasting SA 2.5 (100%)
- 4 x F/C (100%)

7. Ladder deck (external) : 80m²
- Scraping of barnacles (10%)
- Chemicaly clean (30%)
- H.P washing 3000 PSI (100%)
- Gritblasting SA 2.5 (100%)
- 1 x F/C + quarts sand (100%)
- 4x F/C (100%)

8. Deck cutter drive (external) : 135m²
- Scraping of barnacles (10%)
- Chemicaly clean (30%)
- H.P washing 3000 PSI (100%)
- Gritblasting SA 2.5 (100%)
- 1 x F/C + quarts sand (100%)
- 4x F/C (100%)

9. Deck (external) : 85m²
- Scraping of barnacles (10%)
- Chemicaly clean (30%)
- H.P washing 3000 PSI (100%)
- Gritblasting SA 2.5 (100%)
- 4x F/C (100%)

10. Railings and stairways (see drawings) : forfeit
- Remove/refit all gratings during blasting and painting
- For railings, supports and stairways do not use silicone paint

11. Sides (external) : 84m²
- Scraping of barnacles (50 %)
- H.P washing 3000 PSI (100%)
- Gritblasting SA 2.5 (100%)
- 3 x F/C (100%)
- 2 x F/C 150 µm (100%)

**Method of application:**
- Apply stripe coating on all sharp edges or areas that are difficult to paint prior to full coat
- F/C all areas Hempadur 15570, DFT 75µm
- F/C all areas Hempadur Quattro 17634, DFT 175µm
- First finish all non silicone coatings on area 8-9 and 10. Make sure that all nearby areas are covered with masking tape to guarantee no paint contamination
- F/C Hempadur 45182, DFT 50µm
- F/C Antifouling Olympic 72900 DFT, 125 µm
- F/C Antifouling Olympic 72900 DFT, 125 µm
- Finish silicone coatings on areas 1-7 and 11. Make sure that all nearby areas are covered with masking tape to guarantee no paint contamination
  - F/C Hempasil Nexus 27310, DFT 100 µm
  - F/C Hempaguard X7 89900, DFT 150 µm (except for zone 11 DFT 300 µm, to be applied in 2 coats)
- All paints to be applied in close cooperation with Hempels coating advisor and according to Hempels standards.
- Yard to arrange DFT measurements of each coating layer, to be taken in presence of Hempel inspector / ships crew

Lumpsum price  …/
Price per additional ton in case more then 20 tons sand: …/

Lumpsum price should include staging’s, temporary lighting, ventilation, cherry pickers with operators, covering materials, temporary access/drain holes, cleaning of dock floor and vessel, removing and dumping barnacles, mussels, dirt and grit, sand, etc... removal and disposal ashore, all required auxiliaries (e.g. air supply, water supply...), protecting/cleaning sacrificial anodes with/from soap and paint (after painting), painting done by airless spray

**MLR.H5. Cutter tilting device**

Drawings:
- LD_04-01_-A008809_1 Support on cranedeck for cutter tilting machine
- JD_04-01_-006_1_B Assembly cutter tilting machine
- JD_04-01_-005_1_E Cuttersupport with hinges for cutter tilting machine
- IB_11-00_-069 Support for cutter tilting machine
- JD_04-01_-004_1_B Cradle for cutter tilting machine
- JD_04-01_-004_2 Provisions for hydraulic control of cutter tilting machine
- IB_04-01_-001_1_B Assembly cutter tilting machine
- JD_04-01_-008_1 Bush dia145-120 L=60
- IHC_01175-0343-040_1_A Arrangement of winches
- MLR.H5_markup_dwg_crd1 Supports of platform sh1
- MLR.H5_markup_dwg_crd3 Fabrication new supports
- MLR.H5_HYD_DIAGRAM Hydraulic diagram cutter tilting device LDV

Assemble/Disassemble cutter tilting machine – drwg JD-04-01-006
- Assume that there is no cutter head mounted on the platform
- Disconnect/connect hydraulically and blind off cylinder
- Assume that the hydraulic cylinder has been removed/refit and overhauled under job section “X.121”
- Remove/Refit cuttersupport pos2, crop/refit (4) securing disk pos8 and remove/refit (2) shafts pos5. During refitting of cuttersupport

Recuperation of old supports from lower platform – drwg JD-04-01-004
- Crop of marked support and recuperate from platform, see markup_dwg_crd1
- Old hydraulic unit on platform will not be re-used. A new hydraulic unit in SS housing will be supplied by JDN.
- Cradle for tilting machine can be scrapped, approx weight 6.2T.

Fabrication and installation of new foundations – drwg IB-11-00-069

- Fabricate new foundations as per drawing, see markup_dwg_ct3
- Fit/weld recuparated supports on new foundations
- Fit/weld foundations on crane deck platform as per drawing A008809
- Fit/weld new hydraulic unit on crane deck platform as per drawing A008809. Hydraulic unit is mounted in SS box size 500x500x300mm delivered with angle bar frame for fitting.
- Prepare surface from platform and foundations ST3 and paint 3 layers, paint JDN supply

Hydraulic connection between hydraulic unit CTD and ship – HYD_DIAGRAM

- For installation and specifications of the hydraulic pipes please keep general remarks under section “P” in mind.
- Connect cutter tilting device between new hydraulics CTD and barge loading pipe winch left fore/anchor boom hauling winch. For arrangement of winches see drawing IHC_01175-0343-040
- Drain the oil from hydraulic lines at cut in locations
- Below description of routing:
  - Leakoil line: Cut in at anchor boom hauling winch near fr46 to aft ship until fr33. Approx 12m piping 16x2mm required.
  - P/T line: Cut in at piping from barge loading pipe winch left fore under crane deck near fr50 until fr33 of new CTD location. Approx 2 x 15m piping of 25x2.5 for P-line and 30x3 for T-line required.
- No penetrations required.

Lumpsum ...
Additional price for removal/refit and fabrication new bush pos 6 drwg LD04-01-006 .../bush
Additional price for removal/refit and fabrication new bush pos 7 drwg LD04-01-006 .../bush
Additional price for fabrication new shaft pos 5 drwg LD04-01-006 .../shaft

MLR.H6. Cooling IMCS bearing

Old Drawings:
IHC_5242787_2_Gj Cutterladder middle part
AVD_431-1-8293_1_Gj Arrangement cutter shaft bearing dia630
IHC_01175-2165-500_1 Arrangement cutterdrive

New drawings:
LD_04-02_-A008976_1_A Cooling box for shaft bearing complete
LD_04-02_-A008856_1_A Fixed wall for cooling box-aft
LD_04-02_-A008857_1_A Fixed wall for cooling box-front
LD_04-02_-A008967_1_A Removable piece for cooling box
LD_04-02_-A008972_1_A Fixed foundation for cooling box
LD_04-02_-A008858_1 Side closing plate
IHC_01175-2812-520_1_B Cooling water system for cuttershaft bearings
- Fabricate new cooling box as per drawing A008976. Parts pos 2, 3, 4, 7, 10, 11, 13 & 14 will be supplied by JDN.
- Crop of old cooling lines as per picture “MLR H6 PIC1”.
- Remove greasing lines + sensor PT100 temporary. See picture “MLR H6 PIC2”
- Fit new foundation as per drwg A008972. Cut foundation in 2 parts to be able to fit it around the bearing block.
- Create 2 small holes in the foundation of the cooling box so the greasing lines and sensor can be reconnected. Close the small gaps with silicone.
- Build up complete cooling box in situ and determine the final position of the box. Make sure that the centre line of the box sealing hole is aligned with centre line of cutter shaft.
- Adjust if required and weld the foundation in final position.
- Reroute the cooling water pipe and connect to the cooling box
- Prepare surface and paint complete structure, paint JDN supply

Lumpsum price: …/

**MLR.H7. Renewal of racks for SW anchors**

Old Drawings:
- LD_00-01-007_1_B DIM Sketch plant anchor gantry fr48-52 anchor 15T
- BAGG_UITR_02-A003910_1 Side wire anchor type-15 - Arrangement
- LD_11-00-132_1_A A-Frame for 15T anchor
- LD_11-00-121_1 Securing flange for hydraulic cylinder anchor gantry
- LD_11-00-122_1 Bush securing flange hydraulic cylinder anchor gantry
- LD_11-00-134_1 Shaft for connection hydr cyl on A-frame anchor gantry
- LD_11-00-124_1 Foundation anchor gantry
- LD_11-00-135_1_B Modification on platform OBO anchor gantry
- LD_15-00-001_1_B Arrangement hook for pawl
- LD_12-00-A000592_1 Shaft for pawl in anchor boom mast
- IHC_5242497_1_G Anchorboom
- IHC_5242498_1_G Railing and platform on anchorboom
- IHC_5242499_1_G Arrangement anchorboom mast
- IHC_5242500_1_G Anchorboom mast
- IHC_5826913_1_A Sheave block
- IHC_5760002_1_B Arrangement sheave for wire guiding on anchorboom
- HYDRWA 278662-M HYDRAULIC CYLINDER ANCHOR GANTRY
- IHC_5242749_1_G Mechanical depth indicator for cutterladder

New Drawings:
- 260.000B Anchor hoisting inquiry
- 260.001B Anchorboom - Arrangement.pdf
- 260.002B Anchorboom construction - Modifications arrangement.pdf
- 260.003B Sh1 Anchorboom construction - Modifications details.pdf
Description:
Old anchor racks of the side wire anchors will be replaced by newly designed racks. Due to this, the anchor boom masts and anchor booms have to be adjusted as well. The anchor boom winches pull the booms inside via the lower sheave and upper sheave on the mast until the fender is compressed against the support on the mast. The palhook on the anchorboom hooks in the pal of the mast when the fender is compressed with approximately 75kN pull force of the winches. (For parking of the anchor boom)
For seafastening, the boom has to be lifted with the crane for fitting the seafastening support between mast and boom. In the centre a turnbuckle jaw-jaw type is to be fitted for locking.
We have 2 types of anchors that can be mounted on the new racks; Dredge anchor and side wire anchors.
Below mentioned weights are for indication only and can’t be used for variations on the lumpsum quotation.

Removal of old anchor racks SB/PS (drwg LD_00-01-007)

- Remove SB/PS anchors from chair
- Remove hydraulic cylinders PS/SB
  - Disconnect and blind hydraulic cylinder, drwg 278662-M, make sure pin for sea fastening A-frame is still in position
  - Disassemble locking plate for removal of shafts LD11-00-134 between cylinder and A-frame
  - Disassemble securing flanges dwg LD11-00-121 and bushes dwg LD11-00-122 on mounting support of the hydraulic cylinder
- Crop of foundations LD-11-00-124 from deck and remove with complete A-frame’s (open sea fastening pins)
- Crop of mounting support LD-11-00-120 from bulkhead.
- Crop of modified support LD11-00-135 between fr48-50mm and fr52+600mm until 8750 from CL. To be able to fit new anchor racks
- Flat grind all remaining burrs and edges
- Scrap weight of both racks are approximate 2 x 3.2T = 6.4Ton

Fabrication and installation of new anchor racks and support for Dredge anchor SB/PS

- Fabricate new anchor racks as per drawing 270.001-01, 02 & 03, approximate total weight is 14.8Ton
- Fit/weld new racks by shipyards standards or proposed building sequence as per dwg 270.001-04
- Adjust existing railing work and platform on the new racks
- Assume Side wire anchors are assembled and available near the vessel according spec G180.
- Install the 2 x pendant wire Dia 56mm x length 365m on the pennant wire winch PS and SB under guidance of the ship’s crew. Assume hydraulic system of the winch is working.
- Connect/disconnect the side wire anchor PS and SB to the pendant wires by means of a ship’s supplied socket under guidance of the ship’s crew.
- Place/remove the side wire anchors on the anchor racks by means of the ship’s anchor booms
- Fabricate new supports for Dredge anchor as per drawing 270.002, approximate total weight is 1,8T
- Use above Dredge anchor support to determine position for fitting UNP200 supports on anchor racks and fit/weld in position.
- Install both Dredge anchor supports on the anchor racks
- Connect/disconnect the Dredge anchor PS and SB to the pendant wires by means of a ship’s supplied socket under guidance of the ship’s crew.
- Place/remove the Dredge anchor on the anchor racks by means of the ship’s anchor booms

Procedure for renewal and adjusting of main pendant wire and auxiliary pendant wires (unloaded)
- Remove old aux pendant wires and turnbuckles on PS/SB.
- Fit new supplied aux pendant wires I length 12704mm + aux pendant wires II length 21766mm + turnbuckles on PS/SB. Adjust the turnbuckles in a way that the sheave on boom end is centred above then new anchor racks minus the elastic elongation of 71mm. Keep in mind that the sheave will be straight and not under an angle due that no anchor is lifted.
- Remove main pendant wires of length 35.832m between boom and suspension bracket drwg IHC_5242824.
- Measure distance “X” to determine length of main pendant wire between centre suspension bracket and centre lifting eye on boom
- Remove sockets on 1 side of the main pendant wire, crop over length of wire and fit and mould old socket on cable end so that the final distance centre to centre sockets = measured distance “X”.
- Fit adjusted main pendant wires.
- Note down all final cable lengths and measurements to be done in co-op with owner.
- Final position of the booms with loaded 18.5T anchor should correspond with the centre of the new anchor racks.

Partial renewal of anchor boom masts SB/PS
- Disconnect pneumatic air connection from pawl
- Crop existing masts from 11760mm from BL to top. (some parts to be recuperated)
- Fabricate new masts as per drawing 265.002
  - Crop existing lower sheave support from mast section “B-B” drwg 5242499. Assume that the sheave is overhauled under section “T4.1”
  - Modify support and fit/weld on new position as per drawing 265.003
  - Crop existing upper support of sheave block from mast section “A-A” drwg 5242499. Assume that the sheave is dismantled and overhauled under section “T4.1”
  - Fabricate new counterweights for tumbling sheaves drwg 265.005.
o Modify existing sheave block drwg IHC_5826913 by drilling 4 holes in plate pos 420 for mounting counterweights. Assume that tumbling block has been overhauled under section “T4.2”.

o Modify existing support for tumbling sheave and fit/weld on new position as per drawing 265.004

o Fabricate new foundation for pawl as per drawing 265.006 and fit/weld in position

o Fabricate new support for pawl as per drawing 265.007 and assemble temporary on foundation. (later filling plate to be measured and installed)

o Re-use existing, pneumatic cylinder pos5/6, pawls pos15 and shafts pos14 of drwg LD-12-00-A000497 and assemble on new foundation of pawl

o Fabricate complete new support for sea fastening boom as per drawing 265.008 and fit/weld in position on mast.

o Crop existing mechanical depth indicator drwg IHC_5242749_1 from PS mast only. Blast and paint indicator and fit/weld on new PS mast.

- Fit/weld new masts on position as per drawing 265.002,003
- Winch boom inside with 75kN to compress fender against support. Determine thickness of filling plate that needs to be installed between foundation and support for pawl. Fabricate and install.
- Test activation of the pawls and sea fastening device of booms.

Scrap weight of both masts is approx. 10T

Modifications of anchor booms SB/PS

- Assume that the booms are removed under job section “T3.1” and transported to WS
- Requested jobs described under section “T3” to be combined with this overhaul
- Open/close temporary manhole for access on boom near pawl and fender
- Crop existing pawl hook LD15-00-001 and fabricate, fit and weld new pawl hook as per drawing 260.002, 003 on new location “section C-C”.
- Crop existing fender support LD15-00-001 and fabricate, fit and weld new fender support as per drawing 260.002, 003 on new location “section B-B”. Re-use existing D-fender
- Fabricate, fit and weld new cable guide for neuring wire “section A-A” drwg 260.003
- Close gap in railings drwg5242498 near fender and pawl hook
- (Reposition sheave for guiding wire on anchorboom drwg5760002 (due to the changed angle of boom from 20° to 24° else a different load on sheave occurs). New position of sheave can be found on drawing XXX)
- 3 New hanger wires of boom will be supplied by JDN

All new constructions and damaged areas to be prepared surface ST3, and paint 3 layers of paint, JDN supply.
Job includes stagings, transport to/from WS, temporary lighting, craning, temporary constructions, etc…

Lumpsum price …/

MLR.H8. Renewal cutter platform

Old Drawings:
IHC_01175-2813-010_1_Bj.tif Platform iwo cutter
IHC_01175-2813-010_2_Dj.tif Platform from iwo cutter
VUYK_05-029-100-001_1_C.tif Arrangement hoisting and seafastening cutterladder and platform
VUYK_05-029-100-002_1_C.tif Modification hinging platform
VUYK_05-029-100-003_1_B.tif Modification cutterladder and platform
LD_00-00-A009521_1 Part of the platform to remove
MLR.H8markup_drwg_platform Part of the platform to remove
MLR.H8_markup_drwg_platform2 New position of the new platform

New Drawings:
VUYK_14053-12-120_1_Dj.tif Arrangement Cutter Platform
VUYK_14053-12-121_1_Dj.tif Hinge Pin
VUYK_14053-12-122_1_C2.tif Main Construction
VUYK_14053-12-123_1_Dj.tif Construction Stair Section
VUYK_14053-12-124_1_C.tif Construction Intermediate Section
VUYK_14053-12-125_1_C.tif Construction Cross Over Section
VUYK_14053-12-126_1_B1.tif Construction Frame Extention
VUYK_14053-12-127_1_B1.tif Stairs and Railing
VUYK_14053-12-128_1_C1.tif Rails – Pick Point Hoist and Foundation
VUYK_14053-12-130_1_B.tif Movable Platform Arrangement
VUYK_14053-12-131_1_B1.tif Movable Platform Construction
VUYK_14053-12-132_1_B1.tif Movable Platform Frame

Removal of old cutter platform

In drawing “markup_drwg_platform” and is specified what part of the platform has to be removed and will be replaced by newly designed platform. Below fixtures to be removed before platform can be removed/lifted:

- Disconnect 2 x platform hoisting wire by removing D-shackles, drawing VUYK_05-029-100-001_1_C.tif
- Remove 4x securing pins pos4 and 2x shaft pos1 on drawing IHC_01175-2813-010_1_Bj.tif & IHC_01175-2813-010_2_Dj.tif
- Check all (8) hinge eyes diameters of platform on ships side. Make measurement report and replace if required. Original 80ØD10
- Connect/disconnect lighting and air supplies as per pre inspection.
- Old platform to be scrapped assume 13.6 Ton.
- Additional fixtures for lifting the platform will be provided by shipyard.

Fabrication of new cutter platform

Total construction weight: 15831 kg.
Dimensions L x W x H: 10319.5 mm x 8998 mm x 3152 mm

The new platform will be located approximate 500 mm below centre line of cutter shaft, see “markup_drwg_platform2”. The central part of the platform will be movable, see new drawings VUYK_14053-12-120_1_Dj.tif up to VUYK_14053-12-132_1_B1.tif

- (Pre)fabricate the complete new platform in workshop as per new drawings VUYK_14053-12-120_1_Dj.tif up to VUYK_14053-12-132_1_B1.tif. Assume approximate weight of new platform is 16T. The large dimensions will not allow fabricating the complete new cutter platform in the workshop. Different sections need to be assembled alongside berth.
- Use existing old platform as template for fitting new hinge eyes on new platform. Measurement to be taken on board. The old platform will not be removed until the new one is completely prepared.
- Prepare surface SA 2 ½ and paint 3 layers of paint, JDN supply.
- Fabricate, fit and weld 3 hoisting beams as per drawing VUYK_14053-12-128_1_C1.tif. Assume approximate 300 kg/piece.
- Transport to/from ship of different sections.

**Installation of new cutter platform**

- Connect hinges of platform with ships spare shaft pos1 and bushes pos3 for the hinges
- Re-connect above mentioned fixtures
- Test manipulation of the new platform and makes sure locking pins and sea fastening position is aligned.

Price

<table>
<thead>
<tr>
<th>Description</th>
<th>Price/Ton</th>
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<tbody>
<tr>
<td>Price</td>
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</tr>
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<td>Price for renewal of hinges of platform (fabrication + installation)</td>
<td>.../</td>
</tr>
<tr>
<td>Price for fabrication of shaft pos1</td>
<td>.../</td>
</tr>
<tr>
<td>Price for fabrication of bush pos3</td>
<td>.../</td>
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**MLR.H9. Modification of anchorbooms, anchormasts and anchor racks**

Old Drawings:

- IHC 5242496 Arrangement Anchor boom Installation
- IHC 5242824 Arrangement Suspension Bracket
- IHC 5827002 Parts list Suspension Bracket
- IHC 01175-1072-100 Rigging List
- IHC 5242825 Arrangement anchorboom pivot
- IHC_5242499_1_G Arrangement anchorboom mast
- IHC_5826913_1_A Sheave block
- IHC_5876120_1 Shaft
- MP_10-00-A001809_1 Wire sheave 560x140 with collar bushes for wire dia26
- LD 15-00-001 Arrangement hook for pawl

New Drawings

- 270.005B LD Wide Anchor Rack-Sheet4.pdf
- 270.006B LD Wide Anchor Rack - Wooden fender.pdf
- 270.007B LD Wide Anchor Rack - Removable wedge.pdf
- 260.000B1 LD Anchor hoisting inquiry-Sheet1.pdf
- 260.000B1 LD Anchor hoisting inquiry-Sheet2.pdf
- 260.001B1 LD Anchorboom - Arrangement.pdf
- 260.003B1 LD Anchorboom construction - Modifications details-Sheet1.pdf
- 260.003B1 LD Anchorboom construction - Modifications details-Sheet2.pdf
- 265.001B1 LD Anchorboom mast - Arrangement.pdf
- 265.002B1 LD Anchorboom mast - Construction.pdf
- 265.003B1 LD Anchorboom mast - Support lower sheave.pdf
- 265.004B1 LD Anchorboom mast - Support tumbling sheave.pdf
Basic description: For being able to keep on dredging while weather circumstances are getting worse, safe retracting of the side wire anchors needs to be improved. Therefore modification of the anchor boom, anchor boom mast, transition piece at the side fendering, anchor chair on deck and auxiliaries needs to be redesigned. For being able to outboard the anchor boom, in order to reach hatch, cutter, etc. below the anchor boom a pneumatic cylinder will be installed who can outboard the boom. A detailed principle removal/installation guide as described below. Steel weights are for indication only and can’t be used for variations on the lumpsum quotation.

**MLR.H9.1 Modification of PS&SB anchor boom**

Old Drawings:
LD 15-00-001 Arrangement hook for pawl
IHC 524296 Arrangement Anchor boom Installation
IHC 5242825 Arrangement anchorboom pivot
IHC_5876120_1 Shaft
IHC_5826913_1_A Sheave block

New Drawings
260.000B1 LD Anchor hoisting inquiry-Sheet1.pdf
260.000B1 LD Anchor hoisting inquiry-Sheet2.pdf
260.001B1 LD Anchorboom - Arrangement.pdf
260.002B1 LD Anchorboom construction - Modifications arrangement.pdf
260.003B1 LD Anchorboom construction - Modifications details-Sheet1.pdf
260.003B1 LD Anchorboom construction - Modifications details-Sheet2.pdf

- Erect required staging
- Remove/refitting of anchor boom PS&SB according to repair specification section T.3.1. ‘Removal/refitting of anchor boom
- Transport anchorboom to workshop, warehouse and store anchorboom on temporary support so modification job as described below can be performed
- Before refitting of the anchorboom, following modifications to be done – anchorboom according drawing 260.002;
  - Remove vertical wire sheave, measuring of bores and measurement report to be submitted. Due to changed inclining angle of the anchorboom, sheave will be repositioned. New position sheave according drawing 260.003 sheet.Cut original support from the anchor boom and clean up old burrs, sharp edges, filling up of gaps by welding,... Supply and fabricate steel plates and brackets as shown on drawing 265.003 to fit new sheave support. Determine new position, fit and weld support on boom. Wire guard protection can be reused.
All means to perform the job to be included – only sheave and wire guard foundation can be reused, all other parts are Shipyard’s supply.

- Modification hook for pawl/locking mechanism guy wire and existing fender according details on drawing 260.003 sheet 1/1:
  - Fabricate and mounting of locking mechanism guy wire according detail view A-A, delivery of pin position 5 and fixing needs Shipyards supply
  - Fabricate and mounting hook for pawl (position 3.01) according detail C-C, dimension, tolerance and welding procedure according drawing to be followed. Original hook for pawl to be removed, doubler plate to be cut and side plating to be made flush.
  - Modification of existing fender according view B-B; dismounting/removal of existing fender and support, fabricate and fitting new fender including internal reinforce brackets inside the anchorboom (temporary manhole to be foreseen and closed as marked on drawing)
  - Repair gap in railing as marked on drawing 260.002 side view
  - All above including surface preparation SA 2 ½ of anchorboom and painted as per the paint specifications, paint JDN supply.

Lumpsum price

MLR.H9.2 Modification of PS&SB anchor boommast

Old Drawing: IHC_5242499_1_G Arrangement anchorboom mast

New Drawings
265.001B1 LD Anchorboom mast - Arrangement.pdf
265.002B1 LD Anchorboom mast - Construction.pdf
265.003B1 LD Anchorboom mast - Support lower sheave.pdf
265.004B1 LD Anchorboom mast - Support tumbling sheave.pdf
265.005B1 LD Anchorboom mast - Counterweight tumbling sheave.pdf
265.006B1 LD Anchorboom mast - Foundation for pawl.pdf
265.007B1 LD Anchorboom mast - Support for pawl.pdf
265.008B1 LD Anchorboom mast - Support seafastening.pdf

- Assume job MLR.H9.1 – removal of anchor boom has been completed, before refitting of new modified anchor boom
- Original Anchor boom mast to be cropped off approx 100mm above deck keeping in mind positioning and minimum required space for welding and cutting tool, welding preparation to be foreseen according welding specification on drawing 265.002, grind remaining burs and edges, transport of anchor masts to the Shipyard’s workshop
- Fabricate new anchor boom mast according construction drawing; assume total weight of 7770kg. All stairs, gratings,...to be included. Extra attention to pay for;
  - Support tumbling sheave see drawing 265.004. Tumbling sheave detail A drawing IHC_5242499_1_G to be dismounted from original anchor boom mast and to be reused – all parts to be dressed up, measurements taken and reported to Owner.
  - Due to inclined tumbling sheave support, additional counterweight to be fitted onto the tumbling sheave – see drawing 265.005. Modification of support, providing of tapholes, tapbolts, counterweight,...all Shipyard’s supply
- Construction of foundation for pawl according drawing 265.007 – only tagwelding until final acceptance by Owner after installation and test of the newly installed anchor boom mast.
- Support sea fastening according drawing 265.008 – all small supplies, tapbolts, nuts, pen (position 17), etc... Shipyard's supply. Position 012 on drawing 265.001B1 – turnbuckle crosby HG228 jaw-jaw or equal to supply by Shipyard.
- Construction and installation of support for pawl according drawing 265.007. Attention during installation of the support for pawl in regards to the filling plate thickness between pawl foundation and pawl support – dimension ‘X’ to be adjusted to compression fender 37mm at winchpull 75kN (refer to drawing 265.001 detail ‘Pawl support to foundation’).
- Pneumatic cylinder position 315/316 drawing IHC_5242499_1_G to be reused from original anchorboom mast. New pneumatic lines to be foreseen to cylinder connection according general specification MLR.O. Auxiliaries – stainless steel pipe OD10mm – stauff clamps to be used and supplied by the shipyard.
- Fit newly fabricated anchorboom mast according drawing 265.001/002.
- Prepare surface ST3/spotblasting SA2.5 and paint 3 layers of paint as per specifications, paint JDN supply, incl on top of deck and damaged area lower deck.

Lumpsum: ...

**MLR.H9.3. New PS&SB rack for dredge anchor**

Old Drawings:
IHC 5242496 Arrangement Anchor boom Installation

New Drawings
270.006B LD Wide Anchor Rack - Wooden fender.pdf
270.007B LD Wide Anchor Rack - Removable wedge.pdf
270.005B LD Wide Anchor Rack-Sheet1.pdf
270.005B LD Wide Anchor Rack-Sheet2.pdf
270.005B LD Wide Anchor Rack-Sheet3.pdf
270.005B LD Wide Anchor Rack-Sheet4.pdf

- Fabricate wide anchor rack steel construction according drawing 270.005 sheet 1-2-3-4. Building sequence according sheet 4.
- Fitting of Owners supplied AZOBE hard wooden blocks as fendering inside the steel fabricated anchor rack according drawing 270.006 – assume fendering surface of approx 11.9m² per anchor rack. Locking of the wooden blocks according welding detail bracket position 1.08. Modification of AZOBE wood to fit inside the frame to be included.
- Fabrication and fitting of removable wedge, so called transition fendering piece according drawing 270.007. Fitting on-board the vessel can only be done after final completion of alignment of anchor rack on-board, see also drawing 270.005-01 sheet ¼. At final alignment, smooth transition between fender and anchor rack has to be obtained. Owner to present for acceptance.
- Fitting and welding after alignment inspection of wide anchor rack on-board the vessel on frame according drawing 260.001, alignment according side wire anchor position when anchorboom is in his anchor boom mast position – see top view, normal position anchor boom. Below described 'Procedure for renewal and adjusting of main pendant wire and auxiliary pendant wires’ to be followed.
- Area on deck to be made free; remove/refit of handrails, insulation under
deck, make gasfree of involved tanks/areas or void spaces,...
- Cut and remove original fitted anchor chair and all auxiliaries; foundation,
hinges from original anchor seats, profiles on deck,... area to be grind flush
and all burs and sharp edges to be removed
- Cropping of crane deck for fitting of sloped part between main and crane
deck according drawing 270.005 sheet 4

Procedure for renewal and adjusting of main pendant wire and auxiliary pendant
wires (unloaded)
- Remove old aux pendant wires and turnbuckles on PS/SB.
- Fit new supplied aux pendant wires I length 12704mm + aux pendant wires II
  length 21766mm + turnbuckles on PS/SB. Adjust the turnbuckles in a way
  that the sheave on boom end is centred above then new anchor racks minus
  the elastic elongation of 71mm. Keep in mind that the sheave will be straight
  and not under an angle due that no anchor is lifted.
- Remove main pendant wires of length 35.832m between boom and
  suspension bracket drwg IHC_5242824.
- Measure distance “X” to determine length of main pendant wire between
centre suspension bracket and centre lifting eye on boom
- Remove sockets on 1 side of the main pendant wire, crop over length of wire
  and mould old socket on cable end so that the final distance centre to
  centre sockets = measured distance “X”.
- Fit adjusted main pendant wires.
- Note down all final cable lengths and measurements to be done in co-op with
  owner.
- Final position of the booms with loaded 18.5T anchor should correspond with
  the centre of the new anchor racks.
- Fabrication and fitting of support for Dredge anchor according drawing 270.007 –
  all items to be shipyard supply
- All above including surface preparation SA 2 ½ and painted as per the paint
  specifications, paint JDN supply. Damaged paint areas nearby to be repaired
- All means to perform the job as staging, permits, services, cranage, transport
  means, all means of access etc... to be included

Lumpsum price ………

**MLR.H9.4. New PS&SB anchor boom pusher**

**Drawing:**
Picture 2015-06-27_182111 & 2015-06-27_181622
01175-2567-500_sheet17
01175-2567-500_Sheet5_Rev Cj Pneumatic working diagram
01175-2567-500_sheet4
01175-2567-500_Sheet2
265.011B LD Anchorboom mast - Pushing device-Sheet1.pdf
265.011B LD Anchorboom mast - Pushing device-Sheet2.pdf

At Crane deck level a cylinder has been added to temporary move outboard the
anchor booms in order to reach the cutters, hatches, etc. which become unreachable
or difficult to reach with the boom in the new position. The idea is to install a pushing
system on the mast to move the boom outboard.
- Fabricate and fitting of pneumatic cylinder support – according drawing 265.011B sheet 1&2. Complete system is new, no recuperation of original system can be taken into account.
- Alignment and functional test by pneumatic cylinder to the anchorboom to be witnessed by Owner.
- Pneumatic cylinder will be owners supply, position 4.01 and 4.05/9.03 and 9.04 – all other items are yards supply.
- Stainless steel piping of pneumatic control air system conform specification MLR.O., according 01175-2567-500 Pneumatic working diagram to be installed and connected.
- All above including surface preparation SA 2 ½ and painted as per the paint specifications, paint JDN supply of damaged paint areas nearby to be repaired
- All means to perform the job as staging, permits, services, cranage, transport means, all means of access etc... to be included

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MLR.J. Dredge lines

MLR.J2. Bow discharge upgrade

Old Drawings:
IHC_503575_1_Gj Arrangement seating with swivel bend dia900
IHC_503571_1_E Seating for swivelbend
LD_01-02_166_3_Dj Arrangement shore discharge line
LD_01-02_004_1_Cj Bend 90° LD158 (JDN supply)
LD_01-02_019_1_Dj Armpiece LD159 (JDN supply)
LD_01-02_133_1_Fj Turning gland LD160 (JDN supply)
IB_01-02_022_2_ Swivel bend LD161 (JDN supply)
LD_01-02_027_1_Ij Pipe with male ball joint LD170 (JDN supply)
LD_01-02_247_1_ New execution bordes shore discharge
IHC_01175-2336-500_2_H Diagram greasing lines

New Drawings:
LD_01-02_A008677_Bj_1 Arrangement construction shore connection
LD_01-02_A008285_Bj_2 Fixed piece of seating for swivel bend
LD_01-02_A008272_Aj_1 Removable piece of seating for swivel bend
LD_01-02_A008587_Aj_1 Arrangement support for turning gland (JDN supply)
LD_01-02_A008583_Aj_1 Support for turning gland – Upper part (JDN supply)
LD_01-02_A008586_Bj_1 Support for turning gland – Lower part (JDN supply)
LD_11-00_A008711_Aj_1 Railing on bow coupling platform
LD_11-00_A008715_Aj_1 Railing on bow coupling platform
LD_11-00_A008720_Aj_1 Railing on bow coupling platform
LD_01-02_A008707_j_1 Filling plate 540x250x20
LD_01-02_A008633_Aj_1 Filling plate 302x180x15
LD_01-02_A008706_j_1 Filling plate 2160x312x20
LD_01-02_A008578_Aj_1 Shaft OD75 L=178 (JDN supply)
LD_01-02_A009362_j_1 Ladder Br. 300

Basic description: The supporting frame of the shore connection drwg “503571” to be completely removed and replaced by complete new frame as per drawing “LD 01-02-A008677”. The new frame will be prefabricated in a workshop and installed on board.
A detailed removal/installation guide will be described below. Steel weights are for indication only and can’t be used for variations on the lumpsum quotation.

**MLR.J2.1. Removing the old supporting frame (drw [IHC_503571_1_E])**

- Erect required staging
- Mount safety rods in turning gland pos23 drwg LD-01-02-133 (crew)
- Disconnect and blind the greasing lines between ship and support rollers (10x), turning gland (4x) and pivot point of swivel bend (1x). (crew)
- Install temporary support around bend LD161 (LD-01-02-166)
- Remove separable platform of turning gland drwg LD-01-02-274
- Before removing bend LD158, 2 welded templates have to be fitted between the hull and bend. This to maintain the exact position of the bend during mounting/dismounting (see J2-PIC2)
- Remove bend LD158 (LD-01-02-166)
- Remove assembly with armpiece LD159, turning gland 160, swivel bend 161 (with bearings and shaft pos121 drwg 503575) and ball joint LD170. Transport assembly to workshop, disconnect all parts, clean all parts and present for inspection.
- Crop the old frame of the bow connection from the hull drwg 503571, weight approx 6.5Ton. Cut equally with hull surface and flat grind remaining burs and edges and prepare surface for welding

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**MLR.J2.2 Fabrication and installation of the new supporting frame**

- Fabricate the separable part of the frame as per drawing LD-01-02-A008272. Weight is approx 1020kg
- Construct and fit the railings of the platform as per drawing LD-11-00-A008711, LD-11-00-A008720 and LD-11-00-A008715
- Fabricate the new frame as per drawing LD-01-02-A008285. Weight of frame is approx 9218kg. During construction attention is needed for following points:
  - Connecting plates to the hull pos 1, 11, 24 and 37 have to be made with necessary oversize as per shipyard standard.
  - Reinforcing brackets pos 19, 20,25,26,27,28,34,40 have to be made with necessary oversize as per shipyard standard.
  - Bearing point to be installed with oversize as per shipyards standard and machined in situ to the correct diameter Ø420D10, Ø300D10, and Ø222D10. (Line boring).
  - Fit/weld brackets pos 16 and 17 with a bit oversize on top plate’s pos 18 before machining. Min thickness of plate after machining is 30mm.
  - Fit/weld brackets pos 35 and 36 with little oversize on plate pos 38 before machining. Min thickness of plate after machining is 40mm.
  - Support pos 18 and support pos 38 only to be fitted and welded on the constructed frame after alignment of the dredging pipes.
  - Centre line of turning gland and bearing points have to be aligned in longitudinal and transversal direction.
- Bearings have to be mounted free of stress between armpiece support and bearing point.
- Make a temporary support so the above frame can be assembled in a workshop in vertical position.
- Machining of the lower bearing point acc drwg A008285:
  - Set out a targetline: from the centre of the hole Ø1300 of top plate pos 37, perpendicular to plate pos 37.
  - In line machining (in situ) of ring pos 7 and 4 to the correct diameters Ø420D10, Ø300D10, and Ø222D10.
- Assemble swivel bend LD161 and turning gland LD160 with 4 alignment pins Ø38mm. Make sure safety rods in gland are mounted.
- Assume bearing point is assembled under section MLR J2.2.1.
- Mount bend LD161 and gland LD160 on bearing point and secure with temporary fix.
- Before installing flange ring pos27 drwg A008677, determine the height of the flange in such way that the bearing will be retained free of stress. The inner and outer ring of the bearing has to be aligned.
- Fit support pos 38 on lower roller support with 4 alignment pins Ø29mm and temporary filling blocks of 20mm. Assemble with upper roller support and filling plate of 10mm.
- Mount the complete roller support around the turning gland and adjust guide rolls free of clearance against the running surface of turning gland.
- Once all alignment conditions are ok support pos 38 can be fit/welded on the frame with a clearance of 20mm between roller support and roller. After welding the exact filling plate has to be measured, machined and installed.
- Mount armpiece LD159 on gland with 4 alignment pins of Ø38mm.
- Fit supports pos 18 on the arms with 4 alignment pins of Ø50mm and temporary filling blocks of 20mm. If alignment conditions are ok supports pos 18 can be fit/welded on the frame with a clearance of 20mm between armpiece and support. After welding the exact filling plate has to be measured, machined and installed.
  (REMARK: Bearings have to be mounted free of stress. Size of filling plate = Measured value + 1mm)
- After assembly remove/refit safety pins on turning gland and check manipulation of turning gland and swivel bend with supervision of JDN.
- Fabricate the seafastening block drwg A008285 sh2. Fit it on the constructed frame together with the swivelling bend on the sea fastening position to find the correct fit. Detail of the seafastening block see drwg LD_01-02-A008677 position 19,20,21,22,23.
- Fit/weld sea fastening blocks pos 42 and 43 on frame to lock roller support and armpiece.
- Transport complete structure to dock floor, total weight approx 21.5Ton.
- Refit bend LD158 on pipe LD157 and additional template (Position of bend LD158 during dismounting = position of bend after re-mounting.)
- Weld necessary appendages on hull and new frame for fitting it in preliminary position. During fitting make sure that the centre of bend LD158 is aligned with the centre of turning gland and bearing point in longitudinal and transversal direction.
- Once in position determine the oversize of the plates that needs to be cropped. After cropping prepare the plates for welding with the required bevel. (Allow more steps to find good fit).
- Once correct size and position of the frame is achieved mount 4 alignment pins Ø38mm between bend LD158 and armpiece LD159.
- Make sure a O-ring is mounted between all flanges.
- Weld the complete frame on the hull in a way that minimal deformation and stress occurs. For welds on the inside of the structure manhole’s have to be opened/closed at own discretion.
- Bolt and tight all remaining flanges.
- Install removable platform and fit/weld all railings and ladder.
- Install new greasing lines between ship and support rollers (10x), turning gland (4x) and pivot point of swivel bend (1x). (see J2-PIC1 and drwg 01175-2336-500)
- All above including surface preparation SA 2 ½ and painted as per the paint specifications, paint JDN supply.
- Bolts, nuts, O-rings are owner supply
- Alignment pins, templates, temporary fixes are yard supply

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**MLR.J2.2.1. Assembly of bearing point (LD-01-02-A008677)**

- Mount shaft and bush pos31 with O-rings pos37 and 38, inside the frame.
  Tolerance is a clearance fit, JDN supply
- Install shaft locking plates pos30, JDN supply
- Next parts to be mounted in following order: v-ring pos36, chamber flange pos28, shaft seal pos33, flange ring pos27, O-ring pos32. JDN supply
- Fit spherical roller bearing pos26, transition fit. JDN supply
- Fit spacer ring pos25, clearance fit. JDN supply
- Fit spherical roller thrust bearing pos24, transition fit. JDN supply

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**MLR.J4. Cross-over line modification**

Old Drawings:
LD_01-02-_141_1_F Arrangement barge loading system I
LD_01-02-_141_3_C Arrangement barge loading system I

New drawings:
LD_01-02-_A008032_1_B Modification barge loading system
LD_01-02-_A008029_1_A Oversized filling flange ID900x80
LD_11-00-_A008315_1_A Crane deck Fr58-78 Midlife Upgrade

Removal of old dredgepipes (drwg 141_1)

- Crop support from deck from pipe pos 27.
- Modify support from pipe pos27 as per mentioned drwg A008315, however with oversize at horizontal en vertical connection seams.
- Remove dredge pipes pos 66, 27, 28 and 29

Refit of new dredgepipes (drwg A008032)

- Pre-assemble pipes pos 261, 262, 263, 264, 265, 266,267 and 66.
- Connect assembly to pipe 26 and temporary support pipe pos 264
- Measure the gap between flanges of the branch pipe pos23 and bend pipe pos261 for machining the filling flange pos260 to the correct size.
- Remove/refit bend pos261 and fit together with machined filling flange, to prevent damage off the O-rings.
- Measure position of cross over line to crane deck and accommodation bulkhead fr.63 to cut oversized support to measured dimensions.
- Fit/weld support, an additional lift of the dredge pipes is required for fitting this support.
- O-rings, bolts, nuts, oversized filling flange and dredge pipes will be supplied by JDN.

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**MLR.L. IMC – AMCS**

**MLR.L1. Alarm system**

**Drawings:**
- IHC_01175-1036-030_1 Wooden floor in ECR room with marked locations
- MLR.L1_901.200.555_1 Outstation 2 Lay-out
- MLR.L1_901.200.533_1 Cable layout networks
- MLR.L1_901.200.558_1 Connection box cabinet for old norris cabinet

**Pictures:**
- MLR L1. PIC1 Old 19” alarm cabinet in ECR
- MLR L1. PIC2 Old alarm cabinet in ECR
- MLR L1. PIC3 Old 19” alarm cabinet in ECR
- MLR L1. PIC4 Door of drive thyristor room

**Documents:**
- LD alarm I-O list 19-06-2014

The old controls alarm system will be replaced by a new alarm & monitoring system. All alarms from A-Z in engine room will be connected to this system as for example: engine monitoring, drive monitoring, switch boards and breakers, cutter motors and dredgepumps, AC, tank monitoring, etc… A complete overview can be found in the “LD alarm I/O list” (approx 1050 hardwired I/O signals & approx 311 software alarms). The future alarm system will contain approx 1050 hardwired I/O signals, divided over 4 locations:

Location 1 in ECR: Old 19” alarm cabinet in ECR to be replaced by new cabinet with drawing 901.200.558. See “MLR L1 PIC1” and marked location in drwg IHC_01175-1036-030

Location 2 in ECR: Old alarm cabinet in ECR to be replaced by new “outstation 2” with drawing 901.200.555. See “MLR L1 PIC2” and marked location in drwg IHC_01175-1036-030

Location 3 in ECR: Old 2 x 19” alarm cabinets in ECR to be replaced by new outstation 1 (= same as 2 but without cut outs). See “MLR L1 PIC3” and marked location in drwg IHC_01175-1036-030

Location 4 in thyristor room: For each drive (total 7) the old panel doors will be replaced by new door panels. See “MLR L1 PIC4”

Below you can find a description of works to be carried out by shipyard for installing new alarm system:
- Reception of delivered parts and identify where to be installed
- Dismount 4 old thyristor doors from below described drives; new doors already fabricated, old doors can be disposed after completion of the job and final inspection of the owner. Make sure all cables are marked before disconnecting:
  - Door of thy. drive of cutter left or right (±45 alarms to be disconnected per door)
  - Door of thy. Drive of side winch left or right (±23 alarms to be disconnected per door)
  - Door of thy. Drive ladder winch left or right (±31 alarms to be disconnected per door)
  - Door of thy. Drive dredgepump 1 (±27 alarms to be disconnected)
- Above doors are sent as example to the supplier to fabricate 7 new doors for below described thyristor drives. Remove 7 old doors and install new supplied doors on location 4 and connect electrically and mount new/old modules in doors (additional din rails may be required); make sure all cables are marked before disconnecting.
  - Thy. drive of cutter left and right
  - Thy. drive of side winch left and right
  - Thy. drive ladder winch left and right
  - Thy. drive dredgepump 1
- Mark and disconnect all cables from all 5 diesel engine safety systems in ER. Old cabinets will be reused but all content will be renewed. Install new supplied terminals and controller panels inside the old cabinets and reconnect. (M2000 engine controller)
  - DE2 & DE3: ±66 alarms to be connected/disconnected per engine
  - GE1, GE2 & GE3: ±72 alarms to be connected/disconnected per engine
- Make new support for speed pick ups of 5 diesel engines. Mount new supports together with delivered speed pickups near the flywheels. Connect it to the new safety system M2000.
- Mark and disconnect all cables and wires inside old alarm and monitoring cabinets. Note more than 90% of cabinet is already marked.
  - Cabinet location 2: ±264 signals to be disconnected
  - Cabinets location 3: ±680 signals to be disconnected
- Remove old fire detection system and viscosity meter from cabinet location 3.
- Remove old alarm cabinet’s locations 2 & 3 and install new supplied alarm cabinets drwg 901.200.555_1.
- Install new fire detection unit and old viscosity meter inside new alarm cabinet location 3. Cut outs already provided.
- Mark and disconnect all cables from cabinet location 1 (mainly PT100 and NTC).
- Remove old cabinet and replace by new cabinet with drawing 901.200.558. Reconnect to new terminal strips.
- Some cables entering a certain cabinet have to be rerouted but quantity will be limited. Assume that approximate 200 cable extensions are required to supply cable to the correct terminal strip and cabin.
- Connect all wires to the new alarm and safety system terminal strips of new cabinet’s location 2&3.
- Create cut outs and install local alarm panel (DAP2200) in ECR and on bridge
- Create cut outs and install new monitor and keyboard in dredging control desk.
- Install monitors, keyboard, mouse and workstations of new alarm system on locations mentioned as per drawing 901.200.533. In ECR 2x2 additional power sockets have to be provided and installed.
- Pull all network wires to new alarm and monitoring system as per drawing 901.200.533
- Do cold wire check of each connected wire. Hot wire check to be done in co-op with JDN and can only be done after cold wire check of several signals. In this way hot
wire check can be done in a few consecutive days. Shipyard should inform JDN a week in advance to contact subcontractor.

Lumpsum …/.

**MLR.M. Constructions**

**MLR.M1. E-track renewal**

**Drawings:**
- VDLEUN_9014-421 Cable Chain Da Vinci
- IHC_01175-2516-620_1 Cables and pipes from ship to cutterladder
- IHC_01175-2516-620_2 Cables and pipes from ship to cutterladder
- IHC_01175-2516-620_3 Cables and pipes from ship to cutterladder
- LD_4323-31-2-03_1_D Construction cable chains ladder PS and ladder SB
- LD_4323-31-2-04_1_F Construction E-track cutterladder PS and SB clampblock
- MLR.M1_E-Track FINAL UPDATE
- MLR.M1_E-Track_part5 MCT E-track ladder
- MLR.M1_markup_drwg Cable tray, stopper plate and support E-track
- MLR.M1_markup_drwg 2 Location of rooms
- Cable list new cables ladder chain rev5
- Datasheet new flex cables.rar

**Pictures:**
- MLR M1.1 PIC1 General view on E-tracks
- MLR M1.1 PIC2 Stainless steel protection plate U-turn
- MLR M1.1 PIC3 Stopper plates

Description: E-tracks on PS and SB side have to be removed and renewed by a new type of E-track. Path of the cables are described below:

**PS cable track:** From junction box in ladder room cables are going over the PS cable track to AC9 room on upper deck and down to junction boxes in thyristor room on main deck. See markup_drwg2.

**SB cable track:** From junction box in ladder room cables are going over the SB cable track directly to the thyristor room on main deck. See markup_drwg2.

- Assume that the ladder is in vertical position and high turning point.
- Build stagings on PS and SB side of the E-track for access.
- Open and dispose/close on E-track all clamping blocks (24x) and cable guides (32x) as per drwg 4323-31-2-04. see “MLR M1.1 PIC1”
- Remove/Refit SS protection plate for cables in U-turns of cable tracks. See “MLR M1.1 PIC2”
- Open/close MCT block on left/right topside of the ladder as per drwg E-track_part5 (4 x 4xRGS-4)
- Open/close MCT block from E-track SB to thyristor room (2x4xRGS-4)
- Open/close MCT block from E-track PS to AC9 room (2x4xRGS4) and open/close MCT block from AC9 room to thyristor room (2x4xRGS4)
- Disconnect/connect all cables of E-track at the correct junctions boxes, with guidance of elec JDN
- Remove and dispose old cables
- Chipping and painting of MCT frames:
- 2 x frame 4xRGS-4 on cutterladder PS and SB
- 2 x frame 4xRGS-4 on SB side to thyristor room
- 2 x frame 4xRGS-4 on PS side to AC9 room
- Remove old E-tracks by cropping of the pad eyes pos4 between ship and track & ladder & track, drwg 4323-31-2-03.
- Remove/Refit new support for E-track, see drawing 01175-2516-620_2:
  - 14 x HEB100 profiles, length 1900mm to be exchanged by equivalent square bar profile 100x100x10mm, shipyard supply
  - 14 x small brackets thickness 10mm, see detail B, shipyard supply
  - 4 x Bend plate 120°, thickness 10mm, length 7000mm, shipyard supply
- Remove/Refit 2 pieces new stopper plates for connecting E-track on ladder. Size of plate is 1400x1350x20mm, incl. 3 brackets per plate, thickness 20mm. See “MLR M1.1 PIC3”
- Fabricate new SS cable tray on SB and PS between E-track and MCT cutterladder, approx size W1200xL850mm, 1 bend, min. material requirement AISI 316, incl supports. See markup_drwg
- Fit/weld new supplied SS pad eyes as per standard shipyard procedure. See new drawing VDLEUN_9014-421 (new drawing to check of E-track, possible that the location of the new pad eyes is not exactly the same as the old pad eyes). Remark: Pad eyes on cutter ladder and pad eyes of cable track on ships side have to be fitted in one line and parallel with the centre line.
- Connect and fit/weld new supplied E-tracks on pad eyes
- Install new cables delivered by JDN on oversize and connect to the correct junction boxes, see E-track.pdf. Fix all new cables in the cable trays

All prices should include surface preparation ST3 of the damaged paint and painting of new installed equipment total 3 layers.

Lumpsum price

Add. price if square bar profiles, small brackets and bended plates are made in SS AISI 316

Add price to fabricate and renew cable tray on PS and SB ships side, approx size W1200xL8000mm, 2 bends, incl supports (markup_drwg)

MLR.O. Auxiliaries

For below described new (part of) piping systems following conditions apply:

General:

All piping systems required for a satisfactory functioning of the installations are installed, together with all fittings, such as flow control valves, cocks, filters, pressure gauges, thermometers etc. according to good shipbuilding practice.

Fittings, armatures, … are in general in accordance with Yard’s standards.

Where required the pipelines are tested for leaks to the prescribed pressure. For systems with a working pressure of more than 3.5 bar, testing pressure is at least 1.5 * maximum or working pressure.
Overboard valves and inlet valves are fitted as close as possible to the hull. The connecting pipe between hull and valve is thickwalled and suitably supported. Overboard valves are located above the empty waterline.

As much as possible pipes will run underdecks.

The pipes are where necessary fitted with drain plugs and bleeding valves. Drain plugs are made in bronze and screwed in welded-on bushes. Sufficient drain plugs are provided in such a way that all systems can be completely emptied (e.g. for laying up in winter conditions).

The pipes and pipe-ends on machinery are blanked by means of plastic plugs prior to final installation.

Galvanized steel pipework will be hot dipped galvanized after completion of fabrication work. Welding or other hot work on galvanized pipes is not permitted. Stainless steel pipes and equipment damaged by welding or burning spots will be replaced.

**Clipping:**

Clipping of pipes is to be provided at least according to following prescriptions:

- pipes with a flexible connection are clipped near the flexible (if applicable at both sides),
- where a Dresser or Straub coupling is used, the pipe is clipped at both sides of the coupling,
- where a pipe is connected to machinery, or to a fitting, the pipe is clipped near the connection in such a way that no stresses are transmitted by the pipe to the equipment,
- in way of a bend, the pipe is clipped at least on one side of the bend and if necessary at both sides,
- in general clipping is provided at least in such a way that the maximum distance between supports is 2 m for piping with ND ≥ 32 mm, and 1.4 m for < 32 mm ND,
- pipe supports are to be sturdily connected to vessel's construction: pipes may not be supported by other pipes or by any equipment. Double pipe supports may not be used,
- pipe supports are to be aligned, fitted and welded while steel dummy pipes are fitted in way of flexible connections,
- small measuring pipes, or pipes for e.g. pneumatic remote control are not clipped by means of pipe supports but may be installed on steel strips, fastened by means of stainless steel ty-wraps,

**Bulkhead, deck passages:**

Where pipes pass through watertight bulkheads or through decks, welded three-flange pieces or pipe sleeves are applied.

Three flange pieces for:
- all pipes with ND > 32,
- all seawaterpipes (firefighting, deckwash, cooling water, ballast), irrespective of diameter.

Pipe sleeves for:
- all pipes with ND ≤ 32,
- sounding and venting pipes, irrespective of diameter.

For galvanized pipes double sleeves are used in such a way that the pipe's galvanization is not damaged. Passages through insulated bulkheads or decks have sufficient length so that pipe connections are free of the insulation.

**Couplings, flanges**

A sufficient number of pipe connections, couplings or flanges is provided in such a way that pipes are easily removed. Unless specified otherwise pipes with nominal bore larger than 32 mm are joined by means of welded flanges or by means of steel slip-on flanges & flared pipe ends (DIN 2642).

Pipes with a nominal bore of 32 mm and smaller sizes are joined by means of pipe couplings. Unless specified otherwise, pipe couplings are of the Walterscheid Walform shaped tube type (DIN 2353).

Venting and sounding pipes, scupper pipes, thermal oil pipes, tracing pipes may be joined by means of welded bushes, where there is no need of dismounting the pipe. Welded bushes for galvanized pipes in double execution, avoiding damage to the internal Zn layer.

Expansion joints or bends for small diameters, are provided in such a way that no excessive stresses occur due to thermal expansion or deflection.

**Materials for pipes and fittings**

The materials used for pipes, fittings, etc. are mentioned below

<table>
<thead>
<tr>
<th>System</th>
<th>Material of pipes</th>
<th>Material of fittings</th>
</tr>
</thead>
<tbody>
<tr>
<td>sanitary cold freshwater: sub lines</td>
<td>copper</td>
<td>chromium plated brass</td>
</tr>
<tr>
<td>sanitary cold freshwater: main lines</td>
<td>stainless steel or composite</td>
<td>cast iron</td>
</tr>
<tr>
<td>sanitary hot freshwater: sub lines</td>
<td>stainless steel or composite</td>
<td>chromium plated brass</td>
</tr>
<tr>
<td>sanitary hot freshwater: main lines</td>
<td>stainless steel or composite</td>
<td>cast iron</td>
</tr>
<tr>
<td>waste water system</td>
<td>galv.steel or composite or LOROX</td>
<td>bronze or composite</td>
</tr>
<tr>
<td>fresh cooling water</td>
<td>steel</td>
<td>cast iron</td>
</tr>
<tr>
<td>sewage lines (exhaust)</td>
<td>galv.steel</td>
<td>cast iron</td>
</tr>
<tr>
<td>scuppers</td>
<td>galv.steel</td>
<td>-</td>
</tr>
<tr>
<td>central heating</td>
<td>steel</td>
<td>bronze</td>
</tr>
<tr>
<td>System</td>
<td>Material of pipes</td>
<td>Material of fittings</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>central heating in accommodation</td>
<td>chromium plated steel</td>
<td>bronze</td>
</tr>
</tbody>
</table>

**Bends, reducers and branches (Tees)**

Up to nominal bore of about 150, pipes may be bended (mechanically) to the required bend. Bending is to be performed with an inner core where necessary to avoid ribs. Otherwise buttwelding elbows according to DIN 2605 (1962) are used: depending on the wall thickness of the straight pipe, bends according to Reihe 1 (Normalwand), Reihe 25, (Schwere Ausführung) or Reihe 3 (Extra schwere Ausführung) are selected in such a way that the wall thickness of the bend is always equal to or greater than the wall thickness of the straight pipe.

Reducers (concentric or excentric): butt-welding reducers according to DIN 2515 (Reihe 1, 2, 3 in accordance with wall thickness of the straight pipe).

Tees (equal or reducing): butt-welding tees according to DIN 2615 (Reihe 1, 2, 3 in accordance with wall thickness of the straight pipe), or branches are directly welded to the pipe.

**Flanges**

Flanges are selected according to pressure ratings according to DIN 2401. However, instead of flanges according to Nominal Pressure 6 bar (NP 6), flanges according to NP 10 are used. Further according to following standards:

- Tongue and Groove: DIN 2512
- Projection and Recess: DIN 2513, DIN 2514
- Contact faces: DIN 2526 and DIN 2501
- Blind flanges: DIN 2527
- Flat flanges: DIN 2573, DIN 2576
- Welding neck flanges: DIN 2632 to DIN 2638
- Slip-on flanges: DIN 2642

**Copper pipes**

Dimensions according to Yard’s standard.

Material: according to DIN EN 1057

Application: sanitary pipelines (sub-lines)

Copper pipes provided with cutting ring couplings.

**Stainless steel pipes**

Where stainless steel pipes are specified, no wall thickness reduction is permitted.

Stainless steel pipelines are made of bright, cold drawn, seamless stainless steel precision pipes according to specification EN ISO 1127. Material: notation X 5 Cr Ni Mo 1810 (AISI 316) or notation X 2 Cr Ni Mo 1810 (AISI 316 L).

For low pressure systems stainless steel AISI 304 may be used.

**Pipe supports general:**
- Up to 60,3 mm diameter glassfibre reinforced Nylon pipe supports (type Hyros or similar) or steel pipe clips (bended to pipe's diameter according to DIN 3567) or round bar bended to pipe’s diameter (according to DIN 3570) are used for all pipe types.

- For larger diameters then 60,3 mm steel supports made of flat strips bended to pipe diameter (according to DIN 3567) or round bar bended to pipe’s diameter (according to DIN 3570) are used.

Steel clips in galvanised execution.

Supports are fixed to surrounding structure by means of a welded steel strip or similar. For larger pipes, or for supports with unsupported lengths the strip is replaced by U-or angle bar.

- Base plate for Hyros type supports are:
  - on deck: fully welded stainless steel plates or angle bars,
  - in covered spaces: galvanized steel plates or angle bars.

- Cover plate for Hyros type pipe supports are:
  - on deck: stainless steel; with stainless steel bolts (X5CrNiMo1810-AISI 316)
  - in covered spaces: galvanized steel

Composite pipes and fittings

Composite pipes and fittings are made of polypropylene, such as Fusiofen-PPR or similar. Pipes are connected by glued or thermally welded bushes. Composite pipes are used for sanitary hot and cold water systems, and for sanitary discharge systems. Pipes and fittings must be UV resistant unless they are shielded from UV light.

Provided these pipes have an insulation characteristic that is comparable to the system prescribed in Q12 for sanitary hot and cold water pipes, this insulation may be omitted.

Pipes are clipped by means of adapted supports, provided with a rubber or similar inlay.

Composite piping may not be used for drainlines of AC air handling units.

Minimum distance between supports:
  - ND > 32 mm: 2 m
  - ND ≤ 32 mm 1,0 m.

SANITARY PIPELINES

General: taps, flushing valves for toilets, taps for sinks, taps for wash-hand basins, are individually provided with shut-off valves. In the fresh water system, a sufficient number of isolating valves are fitted (i.e. at least one branch in each system for each accommodation deck). Isolating valves are well accessible.

a) Cold sanitary water system

The freshwater system is arranged in a closed circuit, with an electrically driven circulating pump, in such a way that the water is circulated through the UV disinfecting unit.
All materials, pipework, tanks have to be certified for drinking purposes.

b) Hot sanitary water system

The hot freshwater system is a closed circuit fitted with an electrically driven circulating pump, the electric calorifier is kept under pressure by the freshwater hydrophore. The system is to comprise one ring mains with short branches to ensure ready discharge of warm water.

c) Waste water systems

Discharging pipes

Sewage and grey water pipe system to be of plastic or Loro-X above main deck in the accommodation, otherwise galvanized steel. Drain pipes of wash-hand basins, sinks, showers and scuppers are provided with siphons and are led down into common sloped collection pipes. The collecting pipes are led into a common discharge pipeline on the sewage installation. Where necessary, the collecting pipes are provided with vent pipes with goose necks, arranged in such a way that no smells occur near or in accommodation or under decks.

The drainpipes from the galley (from foodgrinder, …) are separated, and are led directly to the sewage unit, with a branch with valves enabling direct discharge overboard. This drainline is as direct and straight as possible, with diameter minimum ND80. In the drain line a grease trap is installed, in an accessible space.

For general maintenance of the grease trap, Shipyard will design construct and install platform around the grease trap for easy access by crew. Design to be approved by the owner. Also drip tray by welding of flat steel strip around grease trap foundation to be foreseen by Shipyard – minimum height of 85mm.

Grey water system

Water from the following spaces and systems to be passed to grey water system:
- hand-wash basins
- sinks
- showers
- galley
- washing machines in changeroom
- scuppers in accommodation spaces

Grey water to be discharged into the sewage treatment unit.

Black water system

Water from all WC-bowls, and black and grey water from the hospital sanitary space to be passed to black water system.

The black and grey water systems contain the required non return valves, cleaning plugs (stainless steel) enabling maintenance and declogging.

Collecting pipes are subdivided and led as main branches to the vacuum tank, enabling shutting off of main branches for finding leaks (at least one branch is provided for each deck level). Vacuum gauges are fitted on the vacuum collector pipe and on each of the main branches. An open air valve is fitted on the vacuum collector pipe.
Inspection openings are located in such a way as to ensure that the piping can be reached at all points. Maximum distance between inspection points is 15 to 25 m. Inspection openings may not leak in the case of a back flow.

Locations for inspection openings:
- at the end of horizontal pipelines
- at the upper end of vertical trunk pipelines
- at maximum intervals of 10 to 15 m
- at pockets
- at 90° bends made by the trunk line on the horizontal level.

A vacuum test of the piping system (without WC bowls) is to be performed at a vacuum of 0,60 bar. Vacuum will not drop below 0,58 bar after the hour.

**MLR.O1. Sanitary and technical water system**

Old Drawings:
- IHC_01175-2323-500_1_Dj Diagram hot and cold freshwater lines
- IHC_01175-2323-520_1_Dj Diagram sanitary saltwater lines
- IHC_01175-0344-010_1_Gj Plan of Doors

New drawings:
- LD_00-00-013_1_Bj Diagram sanitary hot and cold water
- HOR_ASP2a.140328 Connections galley
- LD_00-00-015_1_Aj General Arrangement Accommodation Midlife Upgrade

The sanitary water system is upgraded as follows:
- Water in both the cold and the hot water loops are circulated (circulation pumps are added), while now there’s only circulation in the hot water loop;
- The 4 different calorifiers are replaced by one centralized calorifier;
- A chilled water cooled cold water cooler is added in the cold water loop.
- All the sanitary water piping in the accommodation area is renewed.
- Prefabricated and pre-piped sanitary units are installed with only one cold and one hot water connection.

The sanitary salt water system is decommissioned and obsolete equipment is removed, see job MLR.O3. below.

A new technical water system is installed partly re-using a remaining part of the decommissioned sanitary salt water system (as per job MLR.O3) and old sanitary water piping in technical areas like ER and deck.

**MLR.O1.1. Removal of obsolete equipment and piping**

- Assume accommodation has been stripped as per job MLR.D1.
- Remove all sanitary hot and cold water piping and fittings inside accommodation area (defined as in job MLR.D1 and including crane deck AC room).
- Except rising pipe nr. 108 on drw. IHC_01175-2323-500 in forward accommodation common sanitary spaces against bosun store bulkhead: branch of this pipe to accommodation to be removed and plugged, branch going forward to technical spaces to be kept.
- In wheelhouse window flushing piping to be removed inside as well as outside wheelhouse.
- Remove calorifier sets (incl. calorifiers - 1 or 2 per set, hot water circulation pumps, valves, foundation frame, etc...) installed in accommodation area:
  - 2pcs in longitudinal main deck corridors (frs. 38 – 40, PS and SB);
  - 1pcs below stairs in staircase on main deck;
  - 1 pc in forward common sanitary spaces on upper deck (frs. 105 – 106).
- Outside accommodation area, remove sanitary hot and cold water piping and fittings as follows:
  - below main deck in PS and SB propulsion rooms;
  - below main deck in auxiliary engine room up to manifold at water treatment installation for cold water and up to and including rising pipe nr. 147 for hot water;
  - below main deck above provision store freezer and refrigerator – freezer and refrigerator ceilings to be dismounted/re-installed for access;
  - below main deck in and around SB electrical store below main deck, until and including ECR toilet, but excluding branch to high fog installation;
  - piping in pumproom against bulkhead at main deck level to provision store tap;
  - cross-over line between SB and PS (pipe nr. 038 on drw. IHC_01175-2323-500) in pumproom against forward bulkhead at main deck level;
  - below upper deck at PS corridor between door 221 and 215 up to ECR sink and connection to toilet and shower above, both hot and cold water piping;
  - in ER below upper deck branches 101, 110, 127, 128 to be removed and blanked off.
- For all removed piping, also pipe clamps and pipe supports that will not be used anymore for the new sanitary piping (jobs MLR.O1.3. and MLR.O1.4. below) to be removed: cut off supports from decks and bulkheads. Grind smooth and repair paint system. Where necessary insulation to be locally removed and repaired (if not renewed as per job MLR.D1.)
- For all removed piping bulkhead and deck penetrations to be cut out.
- Deck and bulkhead penetrations that will not be used anymore for the new sanitary piping (jobs MLR.O1.3. and MLR.O1.4. below), to be closed with insert: welding and areas with damaged paint to be grinded up to ST3 and new paint system to be applied.
- Disposal of dismounted and removed piping, fittings, penetration pieces and other garbage related to this job.
- During removal of existing sanitary water piping, based on diagrams of new hot and cold sanitary water system (including technical water part) – drw. LD_00-00-013 – and arrangement of accommodation after upgrade – drw. LD_00-00-015 –, routing of new piping to be determined together with and subject to approval of JDN representative.
- All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price

MLR.O1.2. Installation of new sanitary water and technical water equipment
New drawings:
WESCO_17-0366_02 Calorifier Serie 17RE_300
NRK_409456-102-XXX Heat Exchanger CB30-50H
AZCUE centrifugal pump CP 25-130
MLR.O1.2_Unknown Arrangement sanitary and technical water equipment

Installation of new sanitary water equipment in auxiliary engine room:
- Assume obsolete equipment and piping from sanitary hot and cold fresh water and sanitary salt water systems has been removed as per jobs MLR.O1.1. & O3.1.
- Tank 49 below: assume open/close and gas-free and cleaned as per rep spec H. general.
- Assume open/close hatch and remove/re-install stairs from main deck to auxiliary engine room in hatch trunk has been done for job MLR.G1.1.1.
- Travel inside both calorifiers (2 pcs of 17RE_300), hot & cold circulation pumps (2 pcs CP 25-130) and cold water cooler (CB30-50H) for auxiliary engine room – positions on drw Unknown_O1.2. are indicative, definitive locations to be defined in situ.
- After final decision on location, measure in situ, fabricate and fit/weld foundation frames for both calorifiers, hot & cold circulation pumps and cold water cooler.
- Where needed existing piping equipment to be locally slightly relocated, modified or re-routed in order to provide more space for the new equipment.
- Move calorifiers, pumps and cooler on new foundation, bolt them on foundations – bolts are yard supply.

Installation of new technical water hydrophore pump in engine room:
New technical water hydrophore pump (exact copy of existing sanitary FW hydrophore pumps) will be installed next to FW hydrophore pumps in ER between SB generator engine and longitudinal ER bulkhead with store, with foundation fitted against this longitudinal bulkhead.
- After final decision on location, measure in situ, fabricate and fit/weld foundation frames for new pumps.
- Grind bulkhead and new foundations up to ST3 and apply full new paint system as per paint specs. The same applies for the damage paint at the other side of the bulkhead.
- Move pump on new foundation, bolt it on foundation – bolts are yard supply.

Lumpsum price

MLR.O1.3. Installation of new piping sanitary water system

- Assume accommodation has been stripped as per job MLR.D1.
- Assume obsolete sanitary fresh water piping has been removed as per job MLR.O1.1.
- New cold fresh water sanitary water piping to be installed as per new flow diagram LD_00-00-013, arrangement of newly installed equipment per job MLR.O1.2 and detailed routing defined during removal of the obsolete piping per job MLR.O1.1.
- Note that the new piping materials will be in accordance with above table listed under MLR.O., this is not the same material as the existing galvanized piping.
- In general new piping will be routed as much as possible along the routing of the dismounted existing piping – see applicable drawings:
- In auxiliary engine room from water treatment installation (UV-sterilizer) to cold water cooler and then further in loops towards SB and PS main deck accommodation, and further up. The return line from accommodation towards the cold water circulation pump and further to the back to the UV-sterilizer.
- For main deck accommodation: below main deck in PS and SB propulsion rooms, in auxiliary engine room, above provision store freezer and refrigerator (assume freezer and refrigerator ceilings have been dismounted/re-installed for access as per job MLR.O1.1), in and around SB electrical store.
- In pumproom against bulkhead at main deck level to provision store tap.
- Cross-over line between SB and PS in pumproom against forward bulkhead at main deck level;
- Upwards as before, as per pipe nr. 038 or nr. 147 on drw. IHC_01175-2323-500 (to be decided in situ).
- For forward accommodation on upper deck: piping below upper deck in ER – for penetrations trough upper deck, remove/repair insulation (A60) below deck as well as galvanized protection sheeting. Alternatively piping can be routed above forward accommodation ceiling panels, routed upwards as per pipe nr. 148 on drw. IHC_01175-2323-500 (to be decided in situ).
- For aft accommodation on upper deck: piping routed above accommodation ceiling panels.
- For higher accommodation decks: piping routed above crane deck accommodation ceiling panels.
- For hot fresh water sanitary water piping the same applies as for the cold water piping above, except for the routing in the auxiliary engine room: in the cold water line from cooler to accommodation a branch is installed to the calorifiers, from where the hot water is routed to the accommodation cfr. the cold water. The return line from accommodation towards the hot water circulation pump and further back to the calorifiers.
- All new valves and fittings like manometers, pressure and/or temperature indicators and/or transmitters are owner’s supply. Installation by shipyard.
- The isolation valves for each deck or part of deck are located at easy reachable location (e.g. in staircases, alleyways or machinery spaces) at an easy reachable height.
- Clamping of new piping as much as possible re-use existing supports and angle bars from removed ducting. Where not possible, or if less expensive, new clamp supports and angle bars to be installed in accordance with guidelines listed under MLR.O. above.
- In accommodation area, new piping to be installed ready for connection at sanitary units and in galley by accommodation subcontractor, i.e. as close as possible to the location of the new units. To be defined in concert with accommodation subcontractor.
- Outside accommodation area (also in the the AC rooms), all connections of new piping to be done by yard.
- As-built sanitary fresh water pipe arrangement and routing drawings (dwg. or dxf. format) to be made, submitted to owner for review and approval, modified and adjusted in accordance with owner’s comments and supplied after approval.
- All necessary access works to be included: staging, lighting, ventilation, ...
- Where welding has been done for e.g. deck/bulkhead penetrations, clamp support installations, etc., all welds to be grinded up to ST3 and paint system to be applied as per specs.
**MLR.O1.4. Installation of piping for new technical water system**

- Assume accommodation has been stripped as per job MLR.D1.
- Assume obsolete sanitary fresh water piping has been removed as per job MLR.O1.1. and obsolete sanitary salt water piping has been removed as per job MLR.O3.1.
- Assume technical water tank has been installed as per job MLR.B6.
- New technical water piping to be installed as per new flow diagram LD_00-00-013, arrangement of newly installed equipment per job MLR.O1.2 and description here below. Detailed pipe routing to be defined in situ in close concert with owner representative.
- As much as possible remaining piping from sanitary salt water system and obsolete part of former sanitary fresh water piping will be re-used – see applicable drawings:
  - At discharge line of FW maker in ER aft between dredge engines, add new filling line to new technical water tank 11, i.e. a branch to SB ER longitudinal bulkhead, running forward along bulkhead to tank 11.
  - From tank 11 the new suction line follows the same routing back to ER, to the newly installed technical water hydrophore pump SB fore in ER next to longitudinal bulkhead. Pump discharge line penetrates the longitudinal bulkhead to SB store and runs further aft along the bulkhead.
  - At remaining salt water pipe at frs. 75 – 76 in SB store connect new technical water line.
  - In pumproom at PS fore, connect existing salt water pipe with the remaining former salt water hydrophore pump discharge line, routing the technical water to the remaining former salt water hydrophore tank.
  - At hydrophore tank discharge manifold, plug off unused connections. The remaining connection going up (nr. 450 on drw. IHC_01175-2323-520) will be used.
  - In PS corridor, before door 215, remaining former salt water pipe 473 is connected to former fresh water pipe 100.
- All new valves and fittings like manometers, pressure and/or temperature indicators and/or transmitters are owner’s supply. Installation by shipyard.
- Clamping of new piping as much as possible re-use existing supports and angle bars from removed ducting. Where not possible, new ones to be installed in accordance with guidelines listed under MLR.O. above.
- As-built technical water pipe arrangement and routing drawings (dwg. or dxf. format) to be made, submitted to owner for review and approval, modified and adjusted in accordance with owner’s comments and supplied after approval.
- All necessary access works to be included: staging, lighting, ventilation, ...
- Where welding has been done for e.g. deck/bulkhead penetrations, clamp support installations, etc., all welds to be grindwed up to ST3 and paint system to be applied as per specs.

**MLR.O2. Black and grey water system**

Old Drawings:
The old sewage treatment plant is located inside a separate room that has to be removed before installation of the new plant
- Crop additional box construction to open up storeroom of sewage plant, see drwg “markup_dwg_storeroomSTP”. Light armatures to be removed from walls
- Disconnect old STP electrically, remove attached piping for grey, black water and overboard line from plant drwg “D7936-14”.
- Remove old unit from vessel via pump room hatch SB on upperdeck between fr65-69 near old plant. All lifting equipment, pad eyes and transport to be supplied by shipyard. (Most pad eyes already in position).
- Dispose old sewage treatment plant
- Crop old foundations from deck and prepare surface ST3 and paint 3 layers before installation of new plant

The new sewage treatment plant will be delivered in 2 parts: separate sewage treatment plant drwg 1A114842 and separate inlet tank drwg 1A114832 with mounted vacuum system type jets, drwg 32993-029.
- Transport both units inside the vessel and install on new location as per drawing “01175-0319-510”. During installation best fit to be found in narrow space in co-op with CE and superintendent.
- Sea fasten both units sturdy on deck with angle bar
- Connect outlet flange of inlet tank with inlet flange of sewage treatment plant, piping DN50.
- Connect overflow of inlet tank with overflow of STP, piping DN50
- (Connect overflow of STP with ????)
- Blind 2 remaining inlets of inlet tank with flanges DN150.
- Foresee power supply and cable tray to new STP

Lumpsum price: …/
Water from the following spaces and system has to pass to grey water system: hand-wash basins, sinks, showers, galley, washing machine in change room and scuppers in accommodation spaces. Drain pipes of wash-hand basins, sinks, showers and scuppers to be provided with siphons and led down into common sloped collection pipes. Where necessary the collecting pipes are provided with vent pipes with goose necks, arranged in such a way that no smells occur near or in accommodation under decks. An overview of systems that need to be connected to inlet tank can be found below, as per drawing “LD-00-00-012_Dj”.

- Top deck: Install air vent pipe on top of main collecting pipe
- Bridge deck: Connect wheelhouse sink to main collecting pipe
- Lower bridge deck: Connect 3 sinks and 3 scuppers to main collecting pipe
- Crane deck: Connect 2 sinks and 4 scupper to main collecting pipe
- Upper deck:
  - Connect 4 sinks, 1 washing machine, 8 scuppers to main collecting pipe
  - Connect 10 sinks, 3 washing machines, 32 scuppers to main collecting pipe
  - Connect 3 sinks, 1 bain marie, 1 dish washer and 2 scuppers from galley to main collecting pipe via grease trap direct overboard or to common grey water inlet of tank.
- Main deck:
  - Connect 12 sinks, 16 scuppers to main collecting pipe.
  - Connect 15 sinks, 20 scuppers to main collecting pipe
  - Install 2 air vent pipes on end of main collecting lines
  - Connect dirty water pump from provision store to main collecting pipe of galley.
  - Install sufficient cleaning plugs (SS) for maintenance and declogging
  - All valves in drawing to be fitted on strategic locations, valves JDN supply.
- Pipes, fittings, clamps, reducers, plugs, siphons, ventilation heads, etc… are supplied by shipyard.

Lumpsum price: .../

**MLR.O2.4. Installation of black water vacuum piping**

Currently the toilets on board are flushed with seawater. New toilets will be installed and connected to the new vacuum system. Please find below overview of required vacuum piping to be installed between toilets and vacuum system. Size of the piping is DN50 and marked with full line in drawing “LD-00-00-012”

- Lower bridge deck: Connect 3 collecting pipes of toilets to main collecting pipe
- Crane deck: Connect 2 collecting pipes of toilets to main collecting pipe
- Upper deck: Connect resp. 9 and resp. 3 collecting pipes of toilets to 2 main collecting pipes
- Main deck: Connect resp. 1 toilet , 1 sink + bath, resp. 12 toilet and resp. 15 toilet collecting pipes to 3 main sloping collecting pipes. The gravity grey water of sink and bath to be connected via “greywater interface tank” to the black water system. Tank JDN supply.
- Install a valve in each of the 6 main collecting lines, for isolation.
- Join all 6 main collecting lines at a strategic point and connect to vacuum system (check with CE and superintendent)
- Install sufficient cleaning plugs (SS) for maintenance and declogging
- All valves in drawing to be fitted on strategic locations, valves JDN supply.
- Pipes, fittings, clamps, reducers, plugs, vacuum tank, etc… are supplied by shipyard.
- Perform a vacuum test of the piping system (without WC bowls) at a vacuum of 0.6bar. Vacuum will not drop below 0.58bar after the hour.

Lumpsum price: .../

**MLR.O2.5. Conversion of FO tank 48 to sewage holding tank**

Old Drawings:
IHC_01175-2334-510_G Diagram fuel oil transfer lines
IHC_01175-2322-500_F Diagram fire exting and deckwashing lines

- Assume HFO tank 48 -145m³ has been cleaned and made gasfree under section “H1.1” and manhole is opened
- Remove tank tracing/heating
- Remove valve 2701 and blind off pipe 011, drwg 01175-2334-510
- Remove filling/suction line, pipe011 DN125 between tank 48 and valve. Close hole in tank
- Remove and disconnect sounding sensor of tank. Close/blind holes in tank.
- Existing ventilation and sounding cap of tank can stay in position
- Install new flushing line inside tank 48, as per shipyards standards and spread over the tank length of 13.3m. Connect flushing line to existing ff lines below maindeck on pipe 059, drwg 01175-2322-500 and install extra supplied valve for flushing line. Pipes to be hot dip galvanized.
- Near the top of the tank weld a flange as per alarm type ITMLS-06AC-110-92 for filling of tank 48 from STP.
- Install galv. Steel piping DN50 between overboard line of STP and filling flange of tank 48.
- Near the bottom of the tank weld a flange PN10, DN25 for installation of level sensor. (Vegabar 82), flange shipyard supply, valve JDN supply.
- Near the top of the tank weld a flange DN50 for installation of high level alarm sensor.
- Near the bottom of the tank weld a flange PN10, DN50 for installation of discharge line towards overboard/shore connection.
- Install shore discharge/overboard pump (azcue CP50/130) on a support near tank 48 discharge line.
- Install galv. steel piping DN50 in between existing overboard/shore discharge line and tank 48.
- Change welded tank identification from tank “FO 48” to “SW 48”
- Complete tank to be sandblasted SA 2 ½ and apply new ballast tank coating, 3 coats. Paint JDN supply
- Temporary blind all access hole of tank and do pressure test 0.2 bar for 1 hour.

All valves and pumps are JDN supply
All pipes, fittings, flanges, brackets, supports … are shipyard supply

Lumpsum price: .../

**MLR.O3. Sea water system**

Old Drawings:
IHC_01175-2323-520_1_Dj Diagram sanitary saltwater lines
The sanitary salt water system to be decommissioned and obsolete equipment is removed.

**MLR.O3.1. Removal of obsolete salt water equipment and piping**

- Assume accommodation has been stripped as per job MLR.D1.
- Remove all sanitary salt water piping and fittings inside accommodation area (defined as in job MLR.D1 and including crane deck AC room).
- Outside accommodation area, remove all sanitary hot and cold water piping and fittings as follows:
  - below main deck in PS and SB propulsion rooms;
  - below main deck in auxiliary engine room up to manifold at salt water hydrophore tank;
  - below main deck above provision store freezer and refrigerator – freezer and refrigerator ceilings to be dismounted/re-installed for access;
  - below main deck in and around SB electrical store below main deck, until and including ECR toilet;
  - in pumproom pipe connected to emergency firefighting pump suction until salt water hydrophore pump;
  - below upper deck at PS corridor from door 221 up to valve 1002: valve to be removed and pipe to be blinded off.
  - In same corridor rising branch 478 to toilet above.
  - In same corridor, before door 215, pipe 473 to ER to be cropped of and to be removed from there up to and including the upper deck penetration in ER.
  - In pumproom salt water hydrophore pump to be removed: suction pipe has been removed, discharge pipe to be disconnected, pump foundation to be cut off deck. Grind smooth and repair paint system.
  - In auxiliary engine room most forward hydrophore tank to be removed: disconnect all pipe connections, cut off supports from deck. Grind smooth and repair paint system.
  - For all removed piping, also pipe clamps and pipe supports to be removed: cut off supports from decks and bulkheads. Grind smooth and repair paint system. Where necessary insulation to be locally removed and repaired (if not renewed as per job MLR.D1.).
  - For all removed piping bulkhead and deck penetrations to be cut out, closed with insert: welding and areas with damaged paint to be grinded up to ST3 and new paint system to be applied.
  - Disposal of dismounted and removed piping, fittings, equipment, penetration pieces, supports and other garbage related to this job.
  - All necessary access works to be included: staging, lighting, ventilation, ...

Lumpsum price

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