Tender No: Hooghly-CSL/OPS/SB/TEN/2025/022, Dated- 12.03.2025

## NOTICE INVITING TENDER

**Piping Spools Fabrication, Testing, Onboard Installation & Commissioning of Piping Systems & Hydraulic System Piping for 40T BP ASD TUGS being constructed at Hooghly Cochin Shipyard Ltd, Nazirgunge unit, Howrah**

E-Sealed competitive tenders are invited on behalf of Hooghly Cochin Shipyard Limited (Hooghly-CSL) from experienced vendors for the under mentioned work, so as to reach the undersigned on or before the date and time mentioned below. Please refer Scope of Work, General Terms and Conditions and Special Terms attached.

| | |
|---|---|
| **Tender No. & date** | Hooghly-CSL/OPS/SB/TEN/2025/022, Dt.- 12.03.2025 |
| **Scope of work** | Piping Spools Fabrication, Testing, Onboard Installation & Commissioning of Piping Systems & Hydraulic System Piping for 40T BP ASD Tugs being constructed at Hooghly Cochin Shipyard Ltd, Nazirgunge unit, Howrah (Detailed specification is enclosed separately) |
| **Type of Tender (LTE)** | Two Bid (E-mail mode) |
| **Cost of Tender** | Nil |
| **Earnest Money to be deposit** | Rs. 1,00,000/- (One Lac) |
| **Last date & time of receipt of tender** | 21.03.2025 at 1600 Hrs. |
| **Date & time of opening of tender (Part – I)** | 21.03.2025 at 1630 Hrs. |
| **Tenure of contract** | From the date of PO (or from the date of issuance of spool drawings / clearance from Project Manager).<br>For Each Contractor,<br>(i) Onboard pre-launch works, Onboard welding works; Onboard Piping spools Installation and commissioning to be completed within 30 days. (Yard Supplied Piping Spools) for one ship. |



**Registered Office:** Administrative Building, HCSL Premises, Satyen Bose Road, P.O. Danesh Shaikh Lane, Nazirgunge, Howrah, West Bengal - 711 109.
+91 (33)-2688 8282 contact@hooghlycsl.com www.hooghlycsl.com
**Shipyard:** Nazirgunge Unit, Satyen Bose Road, P.O. Danesh SK Lane, P.S. Sankrail, Howrah, West Bengal - 711109
+91 (33)-2955 8283
CIN : U35900WB2017GOI223197, GSTIN : 19AAECH3640L1ZD

| | |
|---|---|
| | (ii) Pipe Spools fabrication to be completed within 60 days (Yard supplied pipe and pipe fittings) for one ship. And Onboard pre-launch works, Onboard welding works; Onboard Piping spools Installation and commissioning to be completed within 90 days. (Using Pipe spools fabrication by contractor)<br>(iii) Hydraulic Piping Works for each ship to be completed within 30 days of site clearance from Project Manager.<br>(iv) Modification works (as / if required): For each ship to be completed within 30 days of site clearance from Project Manager.<br>**Method of awarding work is as per Annexure 3 Para 2.* |
| **Officer - in – Charge (tender)** | For Commercial:<br>Name : Vijay Singh<br>Designation : Manager (SC&C)<br>Email : vijay.singh@hooghlycsl.com<br>Phone No: : +918687069271<br><br>For Technical:<br>Name : Abhay Pratap Singh<br>Designation : Deputy Manager (Mechanical)<br>Email : abhay.pratap@cochinshipyard.in<br>Phone No: :+917994441148 |

Tender to be submitted by E-mail only. No hard copy quotation of the bid will be accepted. Tender reference should be clearly indicated on the subject of the Mail. Tenders should be submitted in two separate files as PART-I "TECHNO-COMMERCIAL" & PART-II "PRICE" (Password Protected) indicating the *tender number, due date of the tender and subject as in-line with the scope of supplies* in the Mail addressed to: vijay.singh@hooghlycsl.com / abhay.pratap@cochinshipyard.in

The tender documents can be downloaded from Hooghly-CSL/ CSL website **http://hooghlycsl.com/www.cochinshipyard.com**. The tender documents are available on above mentioned link. All corrigenda, addenda, amendments and clarifications to this tender will be hosted in the **website www.cochinshipyard.com or http://www.eprocure.gov.in** and not in the newspaper. Bidders shall keep themselves updated with all such developments till the last date and time of submission of tender.

**Tender administration:** Tender procedure/administration/evaluation including correspondences and awarding of contract will be done by M/s. Hooghly Cochin Shipyard Limited, Howrah, West Bengal.


**For Hooghly Cochin Shipyard Limited**

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**For Hooghly Cochin Shipyard Limited**

## IMPORTANT INSTRUCTION TO BIDDERS

### Minimum Qualification Criteria for Participating in The Tender Will Be as Follows:

1.1. The Bidder shall be a single firm having experience in various Piping works, piping spools fabrication, onboard installation & commissioning of piping system in Shipbuilding / Shipyard / Marine application.

1.2. Experience as contractor in the successful completion or under execution of similar nature of work in preceding 3 years. (Work-order / Purchase Order / Work completion certificate from the Client for work done should be submitted along with bid). Vendor should have completed and submit the details of work experience in preceding 03 FY years (2021-22, 2022-23, 2023-24) of similar nature of works as:

**01 (One) work order** of value at least Rs. **40 lakhs in past 3 FY's**

OR

**02 (Two) work orders** of value at least Rs. **25 lakhs each in past 3 FY's**

OR

**03 (Three) work orders** of value at least **Rs. 20 lakhs each in past 3 FY's**

Similar nature means **"**The experience of successfully completed or under execution of similar works for piping fabrication, installation & commissioning of piping system in Shipbuilding / Shipyard / Marine application.

1.3. The Bidder should furnish the required work-specific information and satisfactory documentary evidence such as copy of work order / agreement, certificate from the employer for satisfactory completion of work along with the GST Invoice shall be submitted to Hooghly-CSL in support of its claim of experience.

1.4. The work experience shall comprise of work having comparable nature to that of fabrication, installation & commissioning of piping system. If the experience claimed by the bidder is of no relevance with respect to fabrication, installation & commissioning of piping system, then such experience will not be considered for pre-qualification. Decision taken by Hooghly-CSL in this regard will be final.

### Common Requirements from the Bidders:

Following documents are required to be submitted by the bidders along with the Techno-commercial Bid (Part – I) submission:

1.5. The Bidder should enclose copy of statutory documents **PAN, GST registration certificate, Income tax returns for last three FY (2021-22, 2022-23, 2023-24)** or of **AY (2022-2023, 2023-2024, 2024-25).**

1.6. Audited Balance sheets showing turnover, Profit & Loss account of the firm for the preceding 03 years, FY (2020-21, 2021-22, 2022-23, 2023-24) should be submitted along with the

application for prequalification. **Net worth of the bidder must be positive as per the latest balance sheet. (MSE/NSIC may get exemptions as per prevailing Govt. norms).**

1.7. The average annual turnover of the bidder should be at least **Rs. 45 lakhs** during the last three preceding FY years (2021-22, 2022-23, 2023-24).

1.8. Bidder shall not be under a declaration of ineligibility issued by Govt. of India/ State govt./ Public Sector Undertakings etc. The bidder shall not have been debarred / black listed by CSL/Hooghly-CSL or by any of the Public Sector Undertaking or Government department etc.

1.9. Bidder performance on completed / ongoing works will be criteria for acceptance of offers submitted.


**For Hooghly Cochin Shipyard Limited**

## TECHNICAL SPECIFICATION / SCOPE OF WORK

This tender enquiry pertains to the awarding of contract for Piping Spools Fabrication, Testing, Onboard Installation & Commissioning of Piping Systems & Hydraulic System Piping for 40T BP ASD Tugs.

Following is details of total scope of work:

| Sl. No. | Description | No. of Ships |
|---|---|---|
| (i) | Pipe Spool Fabrication & galvanization etc from Yard supplied pipe and pipe fittings. (BOM at Enclosure 1) | 02 Ships |
| (ii) | Pre-launch works & Testing, Onboard Installation & Commissioning from contractor fabricated spools. | 02 Ships |
| (iii) | Pre-launch Works & Testing, Onboard Installation & Commissioning from Yard supplied spools. | 02 Ships |
| (iv) | Hydraulic System Onboard installation, trials & Commissioning (P&IDs, BOM at Enclosure 4) | 04 Ships |
| (v) | Modification works for Four Ships. (as, if required). | 04 Ships |
| **Method of awarding work is as per Annexure 3 Para 2.* | | |

## 1. DESCRIPTION OF WORK

1.1 The work includes Fabrication, Installation & Commissioning of piping system of the vessel(s) in accordance with the indicative specifications and drawings enclosed, delivery schedule, Hooghly-CSL - General Terms and Conditions in all respects.

1.2 Complete fabrication, testing, installation & commissioning of piping system, as per specifications and drawing.

1.3 Enclosures to Annexure 2 (Scope of Work) are as follows:

Enclosure 1: Material as per BOM of Pipe and fittings to be provided by yard for spool fabrication. (Qty. given is per ship). (Preliminary list)

Enclosure 2: BOM of Valves, fittings, to be installed onboard. (Qty. given is per ship). (Preliminary list)

Enclosure 3: Penetration List for onboard welding / Hot works (Preliminary)

Enclosure 4: BOM and P&IDs of Hydraulic tubes and Fittings. (Material supplied by yard)

1.3 Production drawings will be provided on commencement of work. The work is to be carried out at Hooghly Cochin Shipyard Ltd facility at Nazirgunge, Howrah.

1.4 Bidder are requested to obtain clarifications, if any, and carefully study the documents and the scope of work of Contractor and Hooghly-CSL, before submitting your offer.

1.5 The contractors are advised to familiarize themselves with the site conditions before quoting.

## 2. ABOUT THE VESSELS

Main Particulars of the Vessels

| | | |
|---|---|---|
| Length Overall (Hull) | : | 28.4 m approx. |
| Breadth (mld.) | : | 11.8 m approx. |
| Mean Draught (mld.) | : | 4.2 m approx. |
| Propulsion | : | Azimuth Stern Drive (ASD) (Twin) |
| Hull, Main Deck& Superstructure | : | Mild Steel IRS Gr. A |

Flag: India

Classification: Indian Register of Shipping.

Class Notation: 卐 SUL 卐 IY TUG, INWATER SURVEY, AGNI1 (2400 m3/hour), ICV

## 1. MODEL OF CONTRACTING

1.1. Hooghly Cochin Shipyard Ltd (Hooghly-CSL) proposes to offload fabrication, testing, installation & commissioning of piping system onboard for 40T BP ASD Tugs.

1.2. The work shall be carried out based on the contract specification, Piping drawing, Hooghly-CSL mentioned standards and Design drawings, up to the entire satisfaction of Hooghly-CSL / Owner / Class Surveyor, and up to the completion of satisfactory sea trials of the vessel.

1.3. Fabrication of spools is to be done inside Hooghly-CSL premises. If contractor intends to undertake spool fabrication in its shop / outside yard. The piping material will be issued to the contractor. The contractor need to submit Indemnity bond and the Insurance details, for the value of goods that will be lying at contractor premises.

## 3. SCOPE OF CONTRACTOR:

### (A) COMMON REQUIREMENTS

3.1 Fasteners, Gaskets, and U Bolts shall be supplied and installed by the piping contractor only, as per piping system and marine standards. Basic specifications to be conveyed to yard for confirmation / acceptance and approval.

3.2 Welding machines, grinding machines, cutting machines and other equipment and tools required for the successful execution of work shall be positioned by the piping contractor only. All items / equipment's as required to be arranged by Piping contractor.

3.3 The Contractor shall arrange all, tools & tackles, surface treatment (galvanizing, pickling, painting, passivation) and all related consumables, items and equipment's required at his own responsibility and expenses.

3.4 Welding consumables (electrodes / CO2 Mig coils), Argon gas, Helium gas, grinding wheel, gaskets all required consumables and machines & tools are under the scope of the contractor.

3.5 Successful bidder shall procure/use Quality standard welding consumables for (TIG/Arc/Brazing/MIG) and certificates shall be submitted to Hooghly-CSL for verification. Welding of pipes is to be done by qualified welders by classification societies. (Welders with WPS certificates)

3.6 ICS (International Classification society) approved Welding electrodes will be in the piping work contractor scope.

3.7 Industrial LPG, CO2 gas any other required gases, Tig welding consumables, grinding wheel, gaskets all required consumables portable oven other machines & tools are under the scope of the contractor.

3.8 Flushing machine, Pressure testing pumps, pressure gauges for pressure testing, cutting tools, all consumables, production aids required for the work are under the scope of the subcontractor.

3.9 The work shall be undertaken by only qualified welders of the contractor. Towards this, Hooghly-CSL will provide the WPS and PQR. Welders will have to be qualified by Class IRS at Contractor's cost. The welder qualification will be carried out at Hooghly-CSL and the contractor would have to pay for the testing and certification charges.

3.10 Work will be undertaken and inspected as per the quality standards provided by Hooghly-CSL, and approved by Class and Owner of the vessels. The same may be seen prior bidding, if required. Copy of the standards will be provided while awarding contract.

3.11 All welding machines are to be calibrated.

3.12 The Bidder shall have sufficient TIG welding machine with pressure regulators for Argon gas, Helium Gas with flow meter.

3.13 Lifting tackles like Chain Pulley (up to 10 Ton), Lifting Belt, Wire rope and D Shackles / Bow Shackles is in contractor scope.

3.14 Housekeeping work at respective work areas.

3.15 Pressure Testing arrangement is in contractor scope as well as need to show the pressure test in front of Hooghly-CSL QC and Class surveyor.

## (B) FABRICATION OF PIPE SPOOLS

3.16 The Contractor shall execute the work as per the specifications / drawings issued and to the satisfaction of Hooghly-CSL.

3.17 Pipe spool fabrication – as per BOM and spool drawings provided per vessel. The BOM provided is for preliminary estimation/quantum of work. Actual works to be as per spool drawings to be issued by yard with PO.

3.18 Detailed piping and fittings Bill of Material (BOM) is as per Annexure 2 Enclosures. Complete pipe spools fabrication for two ships.

3.19 Under subject scope, following are for 04 ships, (included in BOM), Below 32DN (i.e. 25 and below) and above 300DN (300DN and above) and IRS Class pipes (for sea-chest and OBDs).

3.20 The contractor shall be responsible to Hooghly-CSL for the following: -

(a) Fabrication of the pipe spools as per drawing and piping standard as indicated by Hooghly-CSL. Sample spool drawings attached for references.

(b) Fabrication scope includes Cutting, Bending, Edge preparation of the pipe spools, Fit up survey, Full Welding, Dry survey, galvanizing (for CS items) and shop floor testing.

(c) Pipe will be fabricated as per specification and the drawing provided by Hooghly-CSL. The reference sample drawing is enclosed at Annexure 16.

(d) Collection of material, material movement & accounting of the items.

(e) All pipes root should be in TIG welding and balance (cover/ filling runs) Arc / Mig ($CO_2$) welding for carbon steel pipes. Proper root penetration to be ensured (will be thoroughly checked during Quality Checks).

(f) All Stainless Steel (SS) pipes to be only TIG welded.

(g) The spools should be pressure tested for any leakages and, if found any defect, same should be rectified by contractor. Making good of any defects due to workmanship of contractor has to be undertaken by contractor at no extra cost.

(h) Pipes which require Hot-Dip Galvanizing shall be done with sand/grit blasting/special cleaning/ pickling with approved chemicals etc. to remove oil, grease, paints, varnish, rust etc. to make the surface ready for Hot-Dip galvanizing and then galvanizing (85-120 microns).

(i) All welding works shall be carried out by approved and qualified welders only.

(j) Welding spatters and slags on the flange face shall be removed.

(k) No holes other than those existing in the units are to be drilled to ease slinging while galvanizing. However, suitable hooks may be welded for slinging while galvanizing and removed later after galvanizing, at no extra cost. Any damage to the material while welding hooks or otherwise while in the premises of galvanizer should be rectified/replaced compensated by the bidder.

(l) Cleaning of materials after galvanizing and removing lump of zinc sticking to the surface (both inside and outside), if any. Galvanization of 85-120 microns need to be ensured and will be thoroughly inspected. Also, no zinc spray should be used.

(m) Galvanization including pickling of spools: Taking from yard, pickling & galvanization of spools and return of material to yard is in contractor scope. Including insurance.

(n) Pipes in which pickling is required, shall require blasting prior going to pickling and coat of Primer(spray)/paint(spray) coating of marine grade primer (50micron) to be done.

(o) Stainless steel pipe to be passivized.

(p) Pickling/ galvanizing/Passivation to be done as per the details given in fabrication drawing/yard standard.

(q) Punching of pipes with MLF, paint code, Pipe spool numbers and Ship number as indicated by Hooghly-CSL in the drawings.

(r) As per Hooghly-CSL piping practice all pipes will having inspection by Hooghly-CSL QC/OWNER, any imperfection/rejection/deficiency to be rectified by the contractor without any additional charges.

3.21 Contractor shall maintain quality as per Hooghly-CSL quality standards and yard quality procedures. Hooghly-CSL will conduct inspection during fabrication.

3.22 Entire work as per Work order must be completed within the time line as per Hooghly-CSL load conditions.

3.23 Bidder should be ready to work round the clock and multiple shifts as per requirement.

3.24 All works shall be as per strict compliance to approved Hooghly-CSL drawings/material type/ QAP.

3.25 All works to be as per standard industrial practices, marine applications and piping fabrication works standards.

## (C) ONBOARD FITMENT AND TESTING OF PIPE SPOOLS & TUBES WITH SUPPORT

Preliminary Technical details (for each ship):

- Number of pipes - Approx. 1500 nos.
- Total Length of pipes – 2500 m approx.
- Number of valves – 326 nos. approx.
- Various systems in vessel are as follows:-

(i) Exhaust System
(ii) FO System
(iii) LO System
(iv) Machinery cooling System
(v) Compressed air System
(vi) External Fire Fighting System
(vii) Bilge and fire System
(viii) Filling, Air vent, Sounding & Overflow System
(ix) Sludge & Oily water System
(x) Technical water System
(xi) Black & Grey System

(xii) Potable water System

(xiii) Scupper & Drain System

(xiv) Oil Dispersant System

(xv) Hydraulic System

(xvi) CO2 System

3.26 Installation scope includes pipe & support installation onboard and presenting dry survey. Including fitment of valves.

3.27 Commissioning scope involves testing of pipe lines, commissioning assistance till completion of the vessel.

3.28 **Flushing of the fuel & hydraulic pipe lines. Flushing machine to be arranged by contractor. For systems like, FO / LO / Hydraulics & Compressed air etc. Any consumable required for flushing including oil and sample testing of oil is in vendor scope.**

3.29 Testing scope includes blanking of pipes and pressuring with required medium and offering surveys to the Hooghly-CSL QC, Owner and Class.

3.30 The job includes collection of pipes from Stores/contractors skid, transportation to the ship/blocks and fitment onboard the ship as per the MLF, Yard plan and Revision drawings if applicable, and procurement of material for pipe supports as well as the pipe spools with Nominal Bore less than 32 mm as per key plan, schematic drawings and Hooghly-CSL quality standards etc.

3.31 Pipe spools with Nominal Bore less than 32 mm has to be routed and fitted as per the site condition, no spool drawings for the same will be provided by the yard.

3.32 Bidder should have sufficient experience in fitment of hydraulic precision tubes and same to be submitted along with the offer.

3.33 All fitment and welding job are under the scope of Outfitting contractors.

3.34 Jobs including outfitting of all the bulkhead penetrations, brackets, supports, doubler pads, erosion pads, striking pads, coupling, scuppers, gauges, strainers, flow-meters, level gauges/ sigh glasses, bellows, etc.

3.35 Also, all the foundations and seats if any for the above will be done by the respective contractors, which includes alignment, marking, fitment and welding.

3.36 The job includes leak / hose testing of overboard valves/pipes, fixing of valves and supports, blanking of valves, scupper, removing and refitting of pipes, if required for other works etc.

3.37 All the accessories like bolts & nuts, clamps, gaskets, U clamps and any components required for completion of pipe/ structural outfitting will be scope of

contractor as per MLF. Fasteners, Gaskets, U bolts etc. for onboard installation are included in the contractor scope of supply.

3.38 Fitment and welding of accessories like bosses/ square flange for fixing the instruments/gauges will be under the scope of the contractor.

3.39 Precision tubes laying, fitment and bending as per yard plan and Hooghly-CSL BOM are under the scope of contractor.

3.40 **The layout of piping system including making pipe system withstand 1.5 times system working pressure and then offering to QC and subsequently to OWNER & CLASS to their best satisfaction**. Any comments arising during the layout to be liquidated immediately. If there is delay in mitigation of comments, the pressure testing will be done by Hooghly-CSL and rectification delay will be accounted against the particular contractor.

3.41 Work has to be executed as per the instructions from executing officer and detailed plan of execution to be shared within a week of purchase order received by vendor.

3.42 Contractor shall ensure all pipe supports fabricated are painted before fitment onboard the ship otherwise it has to be handed over to Hooghly-CSL for painting.

3.43 The outfit survey of tanks to be presented to the QC and subsequently to OWNER & CLASS after completing all piping related jobs including mopping the debris and dewatering if any. The tank needs to be presented for box up survey after completing all the works and same needs to be closed. The gasket, bolt and nut will be scope of contractor.

3.44 Installation and fitment of all closing pieces to machineries including flexible hoses and bellows are within the scope of the contract.

3.45 All template pipes will be supplied by Hooghly-CSL in tack welded condition which needs to be welded onboard as per site condition. Pipes with flanges/ sleeves in tack-weld condition needs to be welded onboard as per site condition.

3.46 Total pipe includes the template pipes, precision tubes, MS pipes, SS and PVC pipes etc.

3.47 Fixing name plates by riveting on valves and equipment as per the schematic plan (P & I drawing).

3.48 The scope includes assistance for flushing of hydraulic systems, lube oil system and fuel oil system. The necessary looping for flushing and pressure testing to be

performed by the executing contractors.

3.49 Removal and refit of pipes for hull works, equipment erection, commissioning activities etc. to be done without extra cost.

3.50 There may expected 5% modification in the pipe fitment due to pipe fouling with hull, incorrect fabrication in the shop, Additional revisions in the drawing (other than the attached revisions), fouling with the other machineries, and additional pipes by revision etc. Same has to be envisaged and included in current offer.

3.51 Material movement & accounting of the items are in the scope of work of contractor.

3.52 All tools and tackles required for the work are under the scope of the sub-contractor and needs to comply with the safety rules and regulation of Hooghly-CSL. Minor staging up to 3m height shall be erected by the contractor for the work using Hooghly-CSL material without any separate payment. Any requirement over and above this shall be arranged by Hooghly-CSL separately.

3.53 Each contractor should have a good coordination with his counterpart in the same vessel during the collection of materials from shops/ stores /contractor skids.

3.54 Survey presentation to Yard I&QC, Client and Class authorities as per yard practices and standards. Documents for the same may be accessed at Hooghly-CSL. Copies of the same will be provided at the time of awarding contract.

3.55 Rectification of defects as per the comments from Yard I&QC, Client & Class authorities.

3.56 Arranging supporting blocks, jigs fixtures etc. for fabrication shall be to subcontractor scope.

3.57 Mobilization of entire labor / Workmanship (Skilled/ Semiskilled / Unskilled) required for the subject scope of work,

3.58 The job includes drilling of holes with reference to all piping works and pipe clamps fixing,

3.59 Provision of required PPE and safety appliances to workmen,

3.60 Fabrication, fitment and testing of all piping systems as per the General Arrangement plan and piping drawings.

3.61 Equipment end connection under the scope of the contractor.

3.62 Testing of piping systems as per Class requirement.

3.63 Supply & fixing of all "U" clamp for pipe support with necessary nut, washers, gaskets, rubber sheet are in contractor scope as per required sizes

3.64 The entire Deck/ BHD Penetrations and Over-board pipe fit-up and welding on hull will be done by the respective piping contractor.

3.65 For pipe installation all gaskets under contractor scope.

3.66 Removal and refit of pipes if required.

3.67 Hot dipped galvanization of CS pipes is in contractor scope.

3.68 The last spool shall be kept loose to adjust at site to prevent mismatch and onsite fouling issues. Drawings to be matched with onboard measurements.

3.69 Bilge Eductor, all end connections, installation of flexible hoses / bellows etc piping connection to equipment's is in contractor's scope.

3.70 **Leak rectification during onboard testing is in contractor's scope at no additional cost.**

3.71 $CO_2$ system copper / SS tubing work is in contractor scope.

## 4. OTHER CONDITIONS:

4.1 The contractor shall depute qualified piping engineer and welders and fitters with experience in pipe fabrication / ship pipe repairs or piping on floating marine structures.

4.2 The contractor shall have sufficient TIG welding machine with pressure regulators for Argon gas, Helium Gas with flow meter.

4.3 The contractor shall have sufficient mechanical cutting tools for cutting MS / stainless steel pipes. List of portable tools used for piping works to be submitted after placement of work order.

## 5. INSPECTION / TESTING/ QA AND QC

5.1 Vendor to submit Quality assurance plan (QAP) and welding procedure specification (WPS) for vetting by QC Hooghly-CSL. Qualified welders to be engaged.

5.2 The complete work has to be carried out under the survey of Hooghly-CSL Quality Control Dept. Pressure testing at 1.5 times of system pressure.

5.3 Contractor to maintain the required dimensional accuracy and surface finish as per quality standards.

5.4 Contractor to maintain the required dimensional accuracy and surface finish as per quality standards provided by Hooghly-CSL

5.5 All test and Inspections shall be carried out as per approved QAP.

5.6 All works shall be as per strict compliance to weight control and approved Hooghly-CSL drawings.

5.7 Contractor to maintain the required dimensional accuracy and surface finish as per quality standards provided by Hooghly-CSL.

## (D) HYDRAULIC SYSTEM:

Complete onboard installation, trials and commissioning. BOM placed at Enclosure 4 to Annexure 2. Pressure testing at 1.5 Times of system pressure.

### 1. CLASS COMPLIANCE, TESTING AND INSPECTION

- After installation and commissioning, on board tests/trials shall be carried out as per Hooghly-CSL/OEM standard practice and to the satisfaction of Classification societies / other statutory requirements.
- Any faults found at this stage, shall be corrected to the satisfaction of all related parties before the delivery of the ship without additional cost.
- Sea trials shall be undertaken as per the class and manufactures standard.
- All certificates required by the Class; Rules & Regulation shall be provided

### 2. TECHNICAL SPECIFICATION

**Scope of work:**

**A. Contractor Scope**

1. Fabrication and installation of pipe line as per respective P&ID & BOM (Yard Supply).
2. Inter connection line between hydraulic power pack. Fitment of flexible hydraulic hoses with fittings is in vendor scope. Supply of flexible hoses is in yard scope.
3. Pressure test of the hydraulic tubing shall be in contractor scope. Necessary arrangement for pressure testing including consumable and necessary calibration certificate is in contractor scope. All hydraulic tubing shall be hydrostatic tested to 1.5 times the relief pressure.
4. All hydraulic tubing shall be flushed properly before installation and commissioning of the system.
5. Fitment and welding of BHD fittings or deck fittings is in vendor scope
6. Manpower assistance during basin trial and sea trial
7. Contractor shall carry out the complete work in accordance with drawings provided by shipyard. Any minor modifications from drawing or any other work or supply of material, which is not specified hereunder, but is considered incidental and essential for the successful completion of the job shall be carried out by the contractor without any additional charge.

LIST OF DRAWINGS

a. General Arrangement

b. Schematic
c. Diagram of Electro Hydraulic Steering Gear System

## 6. INSPECTION

**6.1.** Work will be undertaken and inspected as per the quality standards provided by Hooghly-CSL, and approved by CLASS and Owner of the vessels.

**6.2.** The complete work has to be carried out under the survey of Hooghly-CSL, CLASS and Owners. The works are to be inspected and approved by Hooghly-CSL initially and thereafter presented to CLASS and the Ship Owner for their survey and approval.

**6.3.** After installation the system piping has to be tested as per IRS Class rules.

## 7. SCOPE OF HOOGHLY-CSL:

**7.1.** Preliminary BOM and spool drawings for respective systems. Supply of drawings & materials, equipment in the list of piping's for Piping works for the mentioned scope of work. Supply of drawings, for the mentioned scope of work.

**7.2.** Pipe and Pipe fittings material for two ships for spool fabrication will be provided by yard and Fabricated Pipe spools for two ships will be provided by yard for onboard installation.

**7.3.** Valves and fittings for onboard installation.

**7.4.** Required angle / Flat bar for clamp support will be provided by yard.

**7.5.** Assistance from yard will be limited to Entry pass for personnel /Crane assistance/Fork Lift assistance for loading and unloading of items within Hooghly-CSL premises, subject to availability at free of cost.

**7.6.** Hooghly-CSL shall not be responsible for any compensation to personnel for injuries etc. damage to vehicles involved in accidents under any circumstance, whatsoever.

**7.7.** Quality Assurance Plan (QAP) and applicable Welding Procedure Specification (WPS) will be provided.

**7.8.** Providing Electricity, Water, compressed air (at available pressure).

**7.9.** Services of Hooghly-CSL cranes and forklifts, subject to availability.

**7.10.** Required space for storage of materials inside the Yard (if required)

**7.11.** Staging / scaffolding above 3M height (as per requirement)

**7.12.** Place for work, Power Supply, Drinking Water, Crane & MHE Support

**7.13.** Space for positioning of contractor's office container if any. Power and water supply will be provided to the container, within the yard premises.

**Annexure - 3**

## TERMS & CONDITIONS

1. Piping Spools Fabrication, Testing, Onboard Installation & Commissioning of Piping Systems & Hydraulic System Piping for 40T BP ASD Tugs being constructed at Hooghly Cochin Shipyard Limited, Nazirgunge Unit, Howrah.

## 2. METHOD OF AWARDING CONTRACT

2.1. Contract will be concluded with bidder qualifying technically (including eligibility criteria), agreeing to commercial conditions and emerging as L1 as per Annexure- 7 (Price Bid) of this tender document.

2.2. 'For One ship pipe spool fabrication and for two ships onboard installation works, and modifications and Hydraulic piping' will be awarded to L1 bidder, and 'for one ship spool fabrication and for two ships onboard installation works, and modifications and Hydraulic piping', will be awarded to the next inline bidder who matches the prices quoted by L1 bidder.

2.3. Out of Piping works as required to be completed under current scope of work. Order will be placed on maximum 2 bidders, when they will match L1 bidder rate. Details given below:

| Sl. No. | Description | Work Scope for No. of Ships | **Qualified L1 bidder** | Next inline qualified bidder upon matching of L1 price |
|---|---|---|---|---|
| (i) | Spool Fabrication & Galvanization etc. from Yard supplied pipe and pipe fittings. | Two Ships | One Ship | One Ship |
| (ii) | Onboard pre-launch works, welding works; and Onboard Piping spools Installation and commissioning from contractor fabricated spools. | Two Ships | One Ship | One Ship |
| (iii) | Onboard pre-launch works, welding works; and Onboard Piping spools Installation and commissioning from Yard supplied spools. | Two Ships | One Ship | One Ship |
| (iv) | Modification works for Four Ships. (as, if required). | Four Ships | 02 Ships | 02 Ships |
| (v) | Hydraulic System installation and commissioning (Yard supplied Material) | Four Ships | 02 Ships | 02 hips |

2.3 If none of the alternate bidders matches the L1 price, **then 100% of the tendered Quantity will be awarded to L1 bidder.**

2.4. If none of the alternate bidders matches the L1 price, Hooghly-CSL reserves the right to split the work / percentage of work to any number of bidders upon matching of L1 price or to cancel the tender if required.

2.5. If any contactor, to whom the work is awarded, is not performing as per Hooghly-CSL work plan, Hooghly-CSL officer in charge has the right to modify / cancel the scope of work or volume of work in WO/PO and allocate to another contractor/bidder as required. Hooghly-CSL reserves the right to split the work / percentage of work to any number of bidders (up to H1) upon matching of L1 price.

## 3. PLACE OF WORK

Hooghly Cochin Shipyard Limited
131/1, Satyen Bose Rd, Nazirganj,
Guabaria, Mourigram, Howrah- 711109, India.

## 4. WORK PLAN / WORK COMPLETION SCHEDULE

4.1. From the date of PO (or from the date of issuance of spool drawings / clearance from Project Manager). For Each Contractor,

- For First ship, Spool fabrication to be completed within 60 days of PO (Yard supplied pipe and pipe fittings). And, Onboard Pre-launch works & Testing, flushing, Onboard welding works, Onboard Piping spools Installation and commissioning to be completed within 90 days of PO. Using Pipe spools done by contractor.
- For First Ship, Onboard Pre-launch works & Testing, flushing, Onboard welding works, Onboard Piping spools Installation and commissioning to be completed within 30 days of PO. (Yard Supplied Piping Spools).
- Hydraulics System Piping: For each ship within 30 days, upon site clearance by Project Manager.
- Modification Works: For each ship within 30 days, upon site clearance by Project Manager.

4.2. If required, work on each vessel is to progress simultaneously.

4.3. Associated Material positioning in scope of contractor, has to ensure that it should not withhold production.

4.4. The contractor shall submit their detailed scheduled of completion of the work, in consultation with the officer in-charge. The progress of work shall be made in tandem with the progress of completion of the vessel allowing sufficient time for other interface activities / works.

4.5. Yard has the right to change the schedules of the project in the interests of the company and the firm should be capable of adjusting the resources according to the instructions from the yard contact person.

4.6. Progress of work to be updated to officer in charge in requested format (MS Project /MS Excel/ MS Word) every Monday/ as and when a review meeting is called for.

## 5. VALIDITY OF OFFER

The offer shall be valid for acceptance for a period of 90 days from the date of opening of the Part-I Techno-Commercial Bid.

## 6. VALIDITY OF CONTRACT

Once the contract is awarded, the price offered and mutually agreed shall remain firm till **completion of work** and no escalation in labour, transportation cost etc. shall be allowed by Hooghly-CSL on whatsoever reason thereafter.

## 7. PAYMENT TERMS

7.1. Payment will be made for respective / each line item and for each vessel separately. Payment will be made as per below details. Payment will be as per actual measurement basis. Proper documents to be submitted for billing and certification.

| Sl. No. | Description (Work Scope) | Payment milestones (Payment will be made against each line item separately as per Contract value of respective line item in PO). "And Stage wise payment against each line item will be based on %age of Contract value against respective line item in PO" |
|---|---|---|
| (i) | Spool Fabrication from Yard supplied pipe and pipe fittings. | ➢ Payment will be per ship value of respective works (of Contract value of respective line item in PO)<br>➢ For ship for which complete piping work fabrication & installation is in contractor scope:<br>• 60 % on completion of spools fabrication.<br>• 20 % on Completion of onboard installation, testing and commissioning works & liquidation of observed defects.<br>• 20% on completion of final commissioning and trials and liquidation of observed defects. |
| (ii) | Pre-launch works & Testing, Onboard Installation & Commissioning from contractor fabricated | ➢ Of per ship value of Contract value of respective line item in PO<br>(For ship for which only onboard installation related works are in contractor scope):<br>• 20% on completion of pre-launch works.<br>• 60 % on completion of erection of piping |

| | | |
|---|---|---|
| | spools. | systems.<br>• 20 % on completion of final installation, testing, commissioning works and trials and liquidation of observed defects. |
| (iii) | Pre-launch Works & Testing, Onboard Installation & Commissioning from Yard supplied spools. | ➢ Of per ship value of Contract value of respective line item in PO<br>(For ship for which complete only installation works are in contractor scope):<br>• 20% on completion of pre-launch works.<br>• 60 % on completion of erection of piping systems.<br>• 20 % on completion of final installation, testing, commissioning works and trials and liquidation of observed defects. |
| (iv) | Hydraulic System Installation and commissioning | ➢ Of per ship value of Contract value of respective line item in PO.<br>➢ For each ship.<br>• 50% on completion of Fabrication of spools and Pressure testing and flushing, to the satisfaction of Hooghly-CSL representative, Classification society and the owner's representative as applicable.<br>• 30% on completion of Erection, installation, commissioning and completion of scope of work, to the satisfaction of Hooghly-CSL representative, Classification society and the owner's representative as applicable.<br>• 20 % on completion of final installation, testing, commissioning works and trials and liquidation of observed defects. |
| (v) | Modification works for Four Ships. (as, if required). | ➢ Of per ship value for each line item (Limited to max. 20% of per ship value). Payment will be as per actual measurement for respective works / at actuals. (Of Contract value of respective line item in PO)<br>➢ For each ship.<br>▪ 80 % on work completion certification<br>▪ 20 % on completion of final installation, testing, commissioning works and trials and liquidation of observed defects. |

7.1.1. Payment shall be made on the basis of certification by Hooghly-CSL officer in-charge. Contractor shall submit work completion certificate issued by Hooghly-CSL authority. Upon certification of work to the satisfaction of Hooghly-CSL representative, Classification society and the owner's representative as applicable.

7.1.2. The payment will be made within 30 days from submission of invoice along with the work completion certificate.

7.1.3. All claims for payment for the work/ additional work (if any as per special instruction from OIC) shall be submitted by the contractor within one month of completion of work.

7.1.4. Payment will be made by RTGS / NEFT to the account of agency. The name of the bank, branch, A/C No., IFSC code & other particulars shall be furnished by the agency in the proforma of Hooghly-CSL.

7.1.5. Above % payment of order value with applicable taxes will be released against original invoice subject to the full satisfaction and acceptance of work / items by Officer - In-Charge. Original tax invoice should contain GST number of both parties and submit in triplicate.

7.1.6. Contractor shall indicate details such as PAN, GST required for processing payment. Hooghly-CSL reserves the right for the deduction of taxes and duties as applicable from the bill or invoice.

7.1.7. In case milestone for stage payment is not achieved, for reasons not attributable to contractor / site clearance not issued by Hooghly-CSL, payment can be considered on case to case basis, at Hooghly-CSL discretion, based on actual measurement basis (for completed work, certified by execution department of Hooghly-CSL).

## 8. **ADDITIONAL WORKS**

8.1. Any additional works up to 05% growth of work on the material and spool fabrication in terms of total quantity of material and spools is to be envisaged and is to be undertaken without any additional price impact.

8.2. In case of additional work (minor rework/modification), written consent is to be obtained from the Officer-in-charge before commencement of the work.

8.3. Contractor shall carry out the complete work in accordance with Shipyard's approved drawings. Any minor modifications from drawing or any other work or supply of material, which is not specified hereunder, but is considered incidental and essential for the successful completion of the job shall be carried out by the Contractor without any additional charge.

8.4. The contractor shall be responsible for any damage caused to the spools supplied to Hooghly-CSL. Compensation with penalty for damage or loss of the item will be recovered from the Contractor, in the event of loss or damage.

9. **GROWTH OF WORK**

Hooghly-CSL shall be at liberty to place additional work to the extent of contract value at the same rate, terms and conditions of the contract within contractual period and bidder shall have to honor it. Such additional work shall be entrusted to the contractor through a separate Order to that effect or through an amendment to the Order. In any case, the contractor should not undertake any (additional) work beyond the Contractual period without prior intimation by the Officer in charge. This additional work is considered beyond the total order quantity.

10. **GUARANTEE FOR THE MATERIAL TAKEN OUT FROM Hooghly-CSL**

The successful bidder should furnish Indemnity Bond i.e **15% of total material cost for material taken out from Hooghly-CSL (for galvanization etc) in the approved format of Hooghly-CSL** (Annexure-15)

"All risk Insurance cover for "Material lying down at contractor premises during the work/till dispatch shall be covered under the scope of the piping Contractor only. The approximate cost of material to be insured will be intimated at the time of dispatch for outward." However, Transit insurance to and fro shall be borne by Hooghly-CSL.

11. **TAXES & DUTIES**

GST shall be applicable extra on the prescribed work. Bidders are requested to furnish the following details in the invoice/Bill.

- Applicable rate of GST/SAC Code
- Firms GST Reg. NO.
- Service accounting code (SAC) as prescribed by statutory authorities
- GST Registration Number of Hooghly Cochin Shipyard Limited is **19AAECH3640L1ZD**

12. **MSE/ NSIC BENEFITS (If and only if the certificate issued is in the relevant field)**

**A.** The following benefits are extended for all the firms who are registered with district industries center and come under the category of **Micro and Small Enterprises** holding a valid Entrepreneurs Memorandum (EM) Part ii certificate or Udyog Aadhaar Certificate. However, in order to avail the benefits as per public procurement policy for MSE's orders, 2012, all MSE bidders are required to declare their Udyog Aadhaar Memorandum (UAM) number in Central Public Procurement Portal (CPPP) compulsorily.

- Tender Forms Shall Be Issued Free of Cost.
- Payment of earnest money deposit (EMD) is exempted.

**B.** For all firms who are registered with National Small Industries Corporation (NSIC) and come under Micro and Small Enterprises holding a valid NSIC certificate, the below benefit also extended in addition to above.

Waiver of security deposit (SD) for the performance of the contract (5% of the order value by the way of bank guarantee till the supplies are completed), up to financial limit as mentioned in NSIC certificate.

**C.** This tender shall be based on MSE order dated 23rd march 2012, pertaining to public procurement policy.

D. MSE's quoting price band L1 + 15% (in the ascending order) may be awarded complete work, considering spirit of policy for enhancing the government procurement from MSE's.

**E.** Traders are exempted from the benefits from Public Procurement Policy, for MSEs Order, 2012. As mentioned in O.M. No. 5/2(2)/2021-E/P & G/Policy dated 02.07.2021, Retail and Wholesale traders can register on Udyam Registration Portal for the purpose of Priority Sector Lending (PSL) only.

## 13. COST OF TENDER AND EMD (EARNEST MONEY DEPOSIT)

a) Cost of Tender: Nil

b) Tenderers shall deposit an amount of **Rs. 1,00,000 (Rupees One Lac)** as Earnest Money Deposit (EMD) along with the tender.

c)The EMD can be remitted in the form of Demand Draft (DD) / Banker's Cheque / Fixed Deposit Receipt (FDR)/ Bank Guarantee drawn in favor of 'Hooghly Cochin Shipyard Ltd. payable at Kolkata and shall be valid for a period of 6 (Six) months from the due date of opening of Techno-commercial Bids from any Nationalized/ Scheduled Bank or paid online through e-gateway of -

**HOOGHLY COCHIN SHIPYARD LIMITED**
**STATE BANK OF INDIA**
**COCHIN SHIPYARD BRANCH**
**ACCOUNT NO: 37354232301**
**IFSC CODE: SBIN0003229**

d) EMD of bidders (unsuccessful during first stage i.e. technical evaluation etc.) shall be returned after declaration of result of first stage i.e. technical evaluation.

e) EMD of bidders (unsuccessful after price bid opening) will be released after issuance of work order and its acceptance by the contractor to whom the work is awarded.

f) EMD of the successful bidder will be refunded after remittance of the security deposit.

g) EMD deposited with the Client will be forfeited,

(i) if a bidder withdraws or modifies his bid during the period of validity specified or

(ii) if the successful bidder fails within the time limit to sign the agreement document or fails to furnish the required security deposit.

(iii) Request for enhancement in the quoted rates or bringing in new conditions after tender opening or unnecessary delayed acceptance of the order / commencement of work / submission of Security Deposit.

h) The relevant documents pertaining to the EMD should be enclosed with Techno-commercial Bid. Tenders Received Without EMD Will Not Be Considered For Further Evaluation.

## 14. SECURITY DEPOSIT/WARRANTY BANK GUARANTEE

The successful tenderer shall remit 5% of the value of the contract as security deposit within 07 days of receipt of the work order. This amount may be remitted by way of

demand draft or bank guarantee (in approved proforma of Hooghly-CSL) from any of the scheduled banks, valid till the satisfactory completion of the entire work i.e. receipt of material / spools at yard. The Security Deposit will be released after satisfactory completion of the contract i.e. receipt of material / spools at yard and on certification of nil liability to Hooghly-CSL by Officer-in charge. Submission of Performance Security is not necessary for a contract value up to Rupees 20 (twenty) lakh.

## 15. LIQUIDATED DAMAGES

In case of delay in supply of ordered materials or execution of work beyond the stipulated completion period, which is not attributable to Hooghly-CSL, supplier is to pay Liquidated Damages (and not by way of penalty) a sum equivalent to ½% (half percent) per week or part of the week of the total basic price of the contract value subject to a maximum of 10% of the total basic price of the contract value / undelivered value (Total basic price is the order value excluding freight, taxes, other charges etc.). Further GST will be applicable upon LD and the same also will be deducted along with LD. However, LD applicability is without prejudice to Hooghly-CSL right to terminate contract for delayed delivery or other actions as per Risk Purchase clause.

## 16. RISK PURCHASE

If the contractor fails to commence the work in time, as per the terms in work order or violate any other terms & conditions of work order OR If the firm's performance is found not satisfactory with regard to the progress of work, quality, and time factor, labour dispute with their workers, poor safety record, contract shall be terminated with 7 day notice and Hooghly-CSL shall have the following rights.

a) To terminate the contract within 7 days of notice forfeiting the Security Deposit
b) To initiate alternative arrangements at the risk and cost of the contractor.
c) No claim whatsoever will be entertained in this regard from the firm.

## 17. DEFECT LIABILITY PERIOD

The contractor has to guarantee the workmanship for a minimum period of 06 months from the date of successful completion of work, against defective workmanship. Any trouble or defect originating with the workmanship of any works undertaken by contractor arises at any time up to 06 months from the date when the work is successfully completed, and the CONTRACTOR is notified thereof, the CONTRACTOR shall at his own expense and as quickly as possible make such alteration / repairs and replacements as may be necessary to comply with the above guarantees and shall reimburse any costs and expenses incurred by Hooghly-CSL in connection with such trouble or defect. If the contractor fails to take action as above as Hooghly-CSL shall direct, Hooghly-CSL shall be free to take corrective/alternative action at the contractor's cost and risk within a reasonable time.

## 18. FORCE MAJEURE

18.1. Should failure in performance of the contract or part thereof arise from war insurrection, restrain imposed by government, act of legislature or other statutory authority or illegal strike, riot, legal lock-out, flood, fire, explosion, act of God or any inevitable or unforeseen event beyond human control which may be construed as reasonable ground for an extension of time, Hooghly-CSL may allow such additional time as is mutually agreed to be justified by the circumstances of the case. The occurrence/cessation of force majeure situation is to be informed with documentary evidence within 15 days from the date of occurrence/cessation.

## 19. TERMINATION & LIMITATION OF LIABILITY

19.1. This contract may be terminated upon the occurrence of any of the following events.

19.1.1. By agreement in writing of the parties hereto;

19.1.2. By the non-defaulting party, upon default by the other party, of any clauses of this contract, if not remedied within fifteen (15) days, or such longer time as may be agreed upon by the parties, after receipt of notice thereof in writing from the non-defaulting in party.

19.1.3. By the other party, upon either parties:

(i) Making the assignment for the benefit of creditors, being adjudged a bankrupt or becoming insolvent; or

(ii) Having a reasonable petition filed seeking its' dissolution or liquidation, not stayed or dismissed within sixty (60) days; or

(iii) Ceasing to do business for any reason.

19.1.4. In cases where maximum limit of LD is reached and still the items are not delivered.

19.1.5. For fraud and corruption or other unacceptable practices.

19.1.6. Upon expiry or termination of this Contract, neither party shall be discharged from any antecedent obligations or liabilities to the other party under this Contract unless otherwise agreed in writing.

19.2. Hooghly-CSL may by notice in writing to supplier terminate the order after issuing due notice i.e. '7 days' notice period. Hooghly-CSL shall be entitled to compensation for the loss limited to the order value.

19.3. Liability maximum that can be claimed by the supplier shall be limited to what is due to be and has been paid by Hooghly-CSL for the material delivered /work done as per the payment milestones.

## 20. POWER OF ATTORNEY

The tenderer(s) shall have to sign in each page of the tender documents with official stamp as a token of his acceptance of the conditions stated therein. The person signing the tender form on behalf of another or on behalf of a firm, shall enclose to the tender, a

Power of Attorney or the said deed duty executed in his favor or the partnership deed giving him such power showing that, he has the authority to bind such other persons or the firm, as the case may be, in all matters pertaining to the contracts. If the Person so signing the tender, fails to enclose the said Power of Attorney, his tender shall be liable for being summarily rejected. The Power of Attorney shall be signed by all partners in the case of partnership concern, by the proprietor in the case of a proprietary concern, and by the person who by his signature can bind the company in the case of a Limited Company.

## 21. ARBITRATIONS

21.1. Any disputes arising during the execution of the contract shall, in the first instance be settled by mutual discussions and negotiations. The results of such resolution of dispute shall be incorporated as an amendment to the contract, failing which the parties can resort to arbitration.

21.2. If any dispute, disagreement or question arising out of or relating to or in consequence of the contract, or to its fulfillment, or the validity of enforcement thereof, cannot be settled mutually or the settlement of which is not herein specifically provided for, then the dispute shall within thirty days from the date either party informs the other in writing that such disputes, disagreement exists, be referred to arbitration. The arbitrators shall be appointed and the arbitration proceedings shall be conducted in accordance with and subject to the Arbitration and Conciliation Act, 1996 (No. 26 of 1996) as amended from time to time and the decision of the Arbitrators shall be final and binding on the parties here to. The arbitration will be done by a Board comprising one officer nominated by each party, and a mutually agreed Umpire. Each party shall bear its own cost of preparing and presenting its case. The cost of arbitration shall be shared equally by the parties unless the award provides otherwise. The enforcement of the award shall be governed by the rules and procedures in force in the State in which it is to be executed. Performance under this Contract shall however, continue during arbitration proceedings and no payment due or payable by the parties hereto shall be withheld unless any such payment is or forms a part of the subject matter of arbitration proceedings.

## 22. SAFETY OF PERSONNEL AND FIRST AID

22.1. The contractor shall be entirely responsible for the safety of all the personnel employed by him on the work. In this regard, he may adopt all the required safety measures and strictly comply with the safety regulations in force. Detailed information and references available with HSE department of Hooghly-CSL.

22.2. The Contractor may arrange to suitably insure all his workmen/ other personnel in this regard. Hooghly-CSL will not be responsible for any injury or illness to the Contractor's workmen/other personnel during execution of the works due to whatsoever reasons.

22.3. In this regard, the Contractor will have to fully indemnify Hooghly-CSL against any claims made by his workmen/other personnel.

22.4. The Contractor shall provide and maintain so as to be readily accessible during all working hours, a first aid box with prescribed contents at every place where he employs contract labour for executing the works.

22.5. Occupational Health, Safety & Environmental Requirements: Contractor is deemed to comply with the occupational health, safety and environmental policy of the company.

## 23. SUB CONTRACTING AND ASSIGNMENT

23.1. Contractor shall neither assign nor transfer the Purchase Order/ Work Order nor shall any share or interest therein in any manner or degree be transferred or assigned by Contractor to a third party without prior consent in writing of Hooghly-CSL.

23.2. Contractor shall not contract with any subcontractor and/or vendor without the prior written consent of Hooghly-CSL. Such consent shalt not relieve the Contractor from any of his responsibilities and liabilities under the Purchase Order/ Work Order. In addition, Contractor shall ensure that the terms and conditions of any such contract shall comply with and correspond to the terms and conditions of the Purchase Order/ Work Order.

## 24. INDEMNITY

24.1. The firm shall indemnify Hooghly-CSL and keep harmless against any or all claims, liabilities, damages, losses, costs, charges, expenses, proceedings and actions of any nature whatsoever made or instituted against Hooghly-CSL directly or indirectly by reason of:

a. Any wrongful, incorrect, dishonest, criminal, fraudulent or negligent work, misfeasance, disregard of duties by personnel of the firm; and/or
b. Any theft, robbery, fraud or wrongful act or omission by personnel of the firm.

24.2. The service provider shall indemnify Hooghly-CSL or its officers against any claims arising out of accidents or injuries to workmen or other persons or damage to other property which may arise during the execution of the contract or from breach of any Law or Regulation prior to delivery and acceptance of the items at Hooghly-CSL.

24.3. Under no circumstances Hooghly-CSL will be responsible for any statutory compliance related to Labor, Central/State Government if any.

## 25. OVERWRITING & CORRECTIONS

Tenders shall be free from overwriting or erasures. Corrections and additions, if any, shall be duly attested and a separate list of such corrections shall be attached with the offer.

## 26. SECRECY CLAUSE

26.1. The CONTRACTOR shall be responsible to ensure that all persons employed by them in the execution of any work in connection with this contract are aware of the provisions of the official secrets act 1923 and to comply with the same. The CONTRACTOR shall also ensure secrecy of design, construction, equipment and completion of the vessel. Any information provided to you under this contract is to be treated as strictly confidential and is not to be disclosed to any person or persons not concerned therewith.

26.2. All documents under this Contract transferred between the parties shall be treated as UNCLASSIFIED unless explicitly marked.

26.3. The CONTRACTOR shall ensure that their organization, suppliers/ installation agency/test and trials teams etc. shall not communicate for use in advertising, publicity, sales release or in any other medium, system details, photographs and reproduction of equipment and their fitment on board Navy/coast guard/private owner vessels except without written approval from the competent authority of Hooghly-CSL.

## 27. DAMAGE OF MATERIALS / EQUIPMENTS

The contractor will ensure that no damage is caused to the materials, due to negligence and / or any reason whatsoever by the contractor's man. The cost of damage will be suitably recovered from vendor's bills.

## 28. INDIVIDUALITY OF CONTRACT

This Contract should be treated as an individual contract and should not be related with other orders with Hooghly-CSL in respect of progress of work or payment.

29. Acknowledgement of the Purchase order/Work order by signing and returning a copy of same within 3 days is required once the order is placed to vendor. If acknowledgement is not received, it will be presumed as accepted.


For **Hooghly Cochin Shipyard Limited**

**Annexure -4**

## GENERAL TERMS & CONDITIONS

1. Specific resources required/employed for the job: The contractor shall deploy and submit details of resources (equipment and manpower) of adequate capacity and quantity to be specifically provided for subject works. Details to be submitted after award of order, prior start of work.

2. The contractor/bidder must have a site-in charge/ supervisor to execute work, with a minimum experience of 3 yrs. In similar works;

3. The Contractor shall provide the minimum wage rate as prescribed by the Central Govt. to their workmen/s.

4. The Contractor shall have to engage men on round the clock basis and also on Sundays and holidays, if required. Work has to be completed to the satisfaction of Hooghly Cochin Shipyard Engineers deputed for the job. The job should be completed at the time specified by the supervising Engineer for each stage of work.

5. The upper age limit of all workers and supervisors employed by the contractor and those contractors who do or supervise the job themselves shall be as per the prevailing rules of Hooghly-CSL.

6. **For fabrication purpose all consumable like Welding Electrode, cutting wheel, grinding wheel, portable pipe bending machine, welding machine, grinding machine, etc is in vendor scope.**

7. The work will be undertaken by only qualified welders of the contractor. Towards this, Hooghly-CSL will provide the WPS and PQR. Welders will have to be qualified by Class by Hooghly-CSL. **The subcontractor must pay for the welder qualification, testing and certification charges to Hooghly-CSL on actuals. The contractor must retain the qualified welders till the completion of the project**.

8. Work will be undertaken and inspected as per the quality standards provided by Hooghly-CSL, and approved by CLASS and Owner of the vessels.

9. Area and steel skids will be provided by Hooghly-CSL, leveling of the skid will be undertaken by contractor to the satisfaction of Hooghly-CSL QC. Required production aids shall be arranged by Contractors.

10. The contractor shall arrange to collect and clean up every day all waste, scraps, debris, etc. generated by the work men while working onboard the vessel and other locations and dispose the same suitably at his cost to the full satisfaction of Hooghly-CSL. In case any failure on his part to comply with this requirement, Hooghly-CSL will arrange the required cleaning entirely at the contractor's cost.

11. Assistant General Manager (P&P) or his authorized representative will be the Officer-in-charge of this Contract.

12. Material supplied by Hooghly-CSL may not be in the required size and shape. These may be cut and prepared after proper nesting by the Contractor. Special care to be taken to reduce wastages. Shortage of any material (supplied by Hooghly-CSL) arising out of excess wastages due to improper planning shall have to be made up by Contractor free of cost.

13. The contractor shall be responsible for any damage caused to the material supplied by Hooghly-CSL. Compensation with penalty for damage or loss of the item wilt be recovered from the Contractor, in the event of loss or damage.

14. Any particulars/literature/information/certificates required by the Shipyard in connection with the work is to be forwarded free of cost.

15. All correspondence with the Shipyard to be in English language. All documents and plans to be in English language and in metric units.

16. Contractor to provide all personnel protective items like safety helmets, gloves, welding shields, goggles, leg guards, safety belts, boiler suit, safety shoes etc. to their employees.

17. The firm shall be solely responsible for the payment of wages, salaries and other legal dues of its personnel who are employed or deployed by it from time to time. The firm shall promptly pay all due salaries and wages to its personnel providing service. Hooghly-CSL reserves the rights to ask the firm to submit satisfactory evidence of payment due, salaries etc. In any event, Hooghly-CSL shall not be liable for any payments, dues, wages and salaries of the personnel deployed by the firm.

18. Necessary Insurance Coverage for the contractor's materials / equipment / vehicle including Third Party liability and for the workmen (covering Workmen's Compensation Act) engaged by the Contractor are to be taken at his cost. If any accident/injury occurs to any other persons/public due to proven negligence/non-adherence to relevant safety and other precautions on the part of Contractor/it's employees, the contractor shall remain liable to pay necessary compensation and other expense, as decided by appropriate authorities.

**For Hooghly Cochin Shipyard**

**Annexure-5**

## SPECIAL TERMS & CONDITIONS (TWO-BID SYSTEM)

### 1. Common Requirements from the Bidders:

Following documents are required to be submitted by the bidders along with the Techno-commercial Bid (Part – I) submission:

a. The Bidder should enclose copy of statutory documents **PAN, GST registration certificate, Income tax returns for last three FY (2021-22, 2022-23, 2023-24)** or of **AY (2022-2023,2023-2024, 2024-25).**

b. Audited Balance sheets showing turnover, Profit & Loss account of the firm for the preceding 03 years, FY (2021-22, 2022-23, 2023-24) should be submitted along with the application for prequalification.

### 2. MODE OF SUBMISSION OF TENDERS:

- Tenders should be submitted in two separate files as **PART-I "TECHNO-COMMERCIAL"** & **PART-II "PRICE"** indicating the tender number, due date of the tender in the Mail and addressed to The Assistant General Manager (Materials), Hooghly Cochin Shipyard Limited, Nazirgunge Unit, Howrah. Tender to be submitted by Email only.
- Bidders are requested to submit the bid by e-mail (**Price part password protected**) to the following email addresses clearly mention the tender reference in the subject line for easy identification:

| vijay.singh@hooghlycsl.com / abhay.pratap@cochinshipyard.in |
|---|

- While submitting the bid, bidders are requested to note that the e-mail ID starting with following words may probable **be treated as spam, not always necessary**-

*info, support, admin, sales, customer support, helpdesk, mail, mail admin, billing, hello, careers.*

### 3. TECHNO-COMMERCIAL PART SHOULD CONTAIN FOLLOWING DETAILS:

a. Stamped and signed copy of all pages of **tender document and corrigenda (if any)** with all supporting documents (as applicable);
b. Financial documents as mentioned in "**Common Requirements" of Annexure-1;**
c. ***Signed Copy of un-priced Price bid (Annexure-6) (Price bid without price & with percentage of taxes & duties and details like "quoted/Nil/included" need to be mentioned for each line item.)***
d. Signed and stamped copy of Technical Specification / Scope of Work as per **Annexure** with supporting documents if required
e. Signed and stamped copy of tender terms and conditions
f. Checklist duly undersigned with remarks if any.
g. Vendor Details, NEFT mandate Form

h. List of Deviation (if Any) ,
i. Security Deposit formats
j. Power of Attorney document, Self-Declaration
k. Details of Legal Case(s) pending

**All documents provided along with techno-commercial part should be stamped and undersigned. Hooghly-CSL reserves the right the reject the bid in case of any discrepancies on the mentioned aspect.**

4. **PRICE PART:**

The price part should contain the following details:

- The price correspondent to each item;
- Taxes as applicable

**The price bid to be offered in the given format (Annexure – 6). Deviations to the format as given would be liable to decline of the bid so submitted.**

5. **Validity:** The offer should be valid for a minimum period of **3 (Three) months** of date of tender opening.

6. Hooghly-CSL reserves the right to alter, modify the scope of supply, at their discretion.

7. Un-priced bid to be submitted along with techno-commercial part (Part – I – Techno-commercial Bid) with details like percentage of taxes & duties applicable & details like "quoted/nil/included" to be mentioned for each line item as per Annexure-6.

8. Tenders should be submitted through E-mail only. No hard copy of the tender documents will not be accepted and may subject to rejection of the bid as a whole by the Hooghly-CSL authority.

9. **Price part should be submitted exactly in the Price Format as provided (Annexure 7)**. Price should be quoted separately for each item shown in the format. Combining of figures against more than one item and ambiguous clauses will lead to rejection of the bid.

10. Unprotected Price Bids/ Price Bids which are not password protected will be subject to rejection/disqualification of bid and Hooghly-CSL as a whole reserves the right to cancel out such bids.

11. Check lists, technical & commercial, duly filled & signed should be submitted along with Part-I "Techno-Commercial" bid. Non-receipt of this document may lead to rejection of the offer.

12. The Techno-commercial part alone will be opened initially on the due date of tender. The price part will be opened only after evaluation of the Techno commercial part. Firms will be intimated the date of opening of the price part, whose Techno-commercial bid is acceptable, in due course. *Tenderers shall not be allowed to attend the Techno commercial bid opening.*

13. After submission of quotation / price opening, no unsolicited correspondence will be entertained.
14. Bidders can contact Officer-in-charge of the work which is indicated in the Tender Notice for any clarification before submitting the offer. If clarifications/details are not obtained before the offer is submitted, no claim on this account will be admitted.
15. The bidder shall be deemed to have carefully examined the scope of work, technical specifications, general & special terms and conditions, and other necessities mentioned in the tender and have to satisfied himself as to the nature and character of the works to be carried out, the site conditions and all relevant matters & details.
16. All pages of offers including price bids, supporting documents etc. are to be signed by authorized signatory in each page and company seal should be affixed on each page. In case of non-compliance, offer is liable for rejection.
17. Bidder should make sure that they comply with all the techno-commercial details in additional to adhere to all technical specifications during the whole process (i.e. Starting from bid submission to carry out scope of work as per work agreements and as applicable) and provide necessary MSE/NSIC Certificates to avail exemptions, if applicable.
18. Participants/Vendors are requested to obtain clarifications, if any, and carefully study the documents and the scope of services and Hooghly-CSL, before submitting your offer.
19. If any case of the above conditions is not acceptable to the tenderer, it should be specifically indicated in the tender, failing which it will be presumed that all the terms and conditions are acceptable.
20. Hooghly-CSL have full right upon deviations, if any, including rejecting the partial scope/ complied offers.
21. Offers should be clear and unambiguous. Incomplete/ambiguous offers are likely to be rejected.
22. Bid Submission shall include Amendment / corrigendum / response to pre bid query duly signed and accept (if any).
23. After scrutinization of documents (Part – I) provided by the bidders, and after successful techno-commercial qualification, bidders will be contacted prior to opening of price bid. Passwords will be asked before opening of price bid. Authorized representor is required during the opening of price bid**.**
24. The bidders are advised to familiarize themselves with the site conditions before quoting.
25. Supplier should depute only persons who are entitled for exemption for income tax in India or any site work. In case the supplier does not depute such persons, the tax liability will be to supplier's account.
26. After submission of tender, no unsolicited correspondence will be entertained.

27. Hooghly Cochin Shipyard Limited does not bind itself to accept the lowest or any tender but reserves to itself the right to reject any or all or a part of any tender at its discretion.

28. During the evaluation of tender, officer-in-charge may seek clarifications from the bidders. Clarification if any shall be given in writing/e-mail. Officer-in-charge's decision will be final and binding on the bidder.

29. All applicable taxes, duties, transportation, delivery, etc at Hooghly-CSL Nazirgunge, should be included in the rate quoted, unless specified otherwise. Hooghly-CSL reserves the right for the deduction of taxes and duties as applicable from the bill or invoice.

30. Bidders to note that no advance payment will be made by Hooghly-CSL against purchase order issued.

**For Hooghly Cochin Shipyard Limited**

| **Techno-Commercial Checklist for Tender for Piping Spools Fabrication, Testing, Onboard Installation & Commissioning of Piping Systems& Hydraulic System for 40T BP ASD Tugs being constructed at Hooghly-CSL, Howrah** | | | | |
|---|---|---|---|---|
| **Sl. No.** | **DESCRIPTION** | **COMPLIANCE** | | **REMARKS** |
| | | **YES** | **NO** | |
| 1 | Submission of Tender in two (2) parts – Techno-commercial bid & Price Bid (Password protected) | | | |
| 2 | Work Completion Period as per Tender | | | |
| 3 | EMD | | | |
| 4 | Validity of offer – 90 Days | | | |
| 5 | Payment Terms acceptance | | | |
| 6 | The Prices offered should remain firm till the completion of work, in case the work order is placed with you. | | | |
| 7 | Have you specified Taxes, duties, levies etc., if any, in the offer? | | | |
| 8 | Signed and stamped copy of unpriced bid (mentioning taxes and duties) and “quoted/nil/included” against each line item as per Annexure 6 to be included in the techno- commercial offer. Please confirm | | | |
| 9 | Compliance with Pre-qualification criterion with supporting documents | | | |
| 10 | Self-attested copy of PAN Card, GST, ESI, EPF and MSME/NSIC registration certificate. | | | |
| 11 | Disputes in connection with contract subject to jurisdiction of courts at Kolkata, India. | | | |
| 12 | Defect Liability Period as per relevant clause in the terms of enquiry. | | | |
| 13 | L.D. payable as per relevant Clause in the General terms of enquiry. | | | |
| 14 | Termination of contract/Risk purchase as per relevant clause in the General terms of enquiry. | | | |
| 15 | ITR, Balance Sheets, Profit & loss statement for FY 2021-22, 2022-23 &2023-24 submitted with the Bid. | | | |
| 16 | List of Deviations to be submitted as per Annexure 8 | | | |
| 17 | Supplier should have minimum average annual turnover of **Rs. 45 Lakhs** as on 31$^{st}$March (FY 2020-21, 2021-22 and 2022-23) Supporting document to be submitted along with technical bid | | | |
| 18 | Contractor to provide minimum wage structure as prescribed by **Central Govt.** | | | |
| 19 | Modification works if envisaged later, to be done and calculated at unit rates agreed / established under this contract. | | | |

## PRICE BID FORMAT

**PART A**: PIPE SPOOL FABRICATION RATE FOR CARBON STEEL & SS PIPES

| Sl. No. | Category | Approx. Inch Diameter / Ship **(IND) (A)** | Unit rate **(B)** | Total Rate For One Ship **(C=A*B)** | Req. for No. of Ships **(D)** | TOTAL **(E=C*D)** |
|---|---|---|---|---|---|---|
| 1 | Non-Class Carbon Steel Pipes total | 18,715.5 | | | | |
| 1.1 | 32NB to 50NB | 8271.5 | | | 02 | |
| 1.2 | 65NB to 80NB | 6857 | | | 02 | |
| 1.3 | 100NB to 150NB | 2334 | | | 02 | |
| 1.4 | Above 150NB, 200NB & | 1208 | | | 02 | |
| 1.5 | Pipe bending | 45 | | | 02 | |
| 2 | Stainless Steel Pipe total | 714 | | | | |
| 2.1 | 25NB to 50NB | 347 | | | 02 | |
| 2.2 | 65NB to 80NB | 359 | | | 02 | |
| 2.3 | 100NB | 8 | | | 02 | |
| | | TOTAL VALUE FOR ONE SHIP | | | GRAND TOTAL VALUE | |
| | | | GST@..... | | GST@..... | |
| | TOTAL VALUE INCLUDING GST | | | | | |

**Note:**

1. Quantum of work indicated is for estimation purpose only as per preliminary design progress, actual quantum of work executed at site shall be considered for the payment as per spool drawings issued.
2. Per Inch Dia. quoted rates will also be applicable for modification works, if required.

## PRICE BID FORMAT

**PART B**: PIPE SPOOL FABRICATION RATE FOR CARBON STEEL & SS PIPES

| Sl. No. | Category | Approx. Inch Diameter / Ship **(IND) (A)** | Unit rate **(B)** | Total Rate For One Ship **(C=A*B)** | Req. for No. of Ships **(D)** | TOTAL **(E=C*D)** |
|---|---|---|---|---|---|---|
| 3 | Non-Class Carbon Steel Pipes total | 1665 | | | | |
| 3.1 | Less than 32 NB | 335 | | | 04 | |
| 3.2 | 300NB to 550NB | 1330 | | | 04 | |
| 4 | Class Carbon Steel Pipes total | 245 | | | | |
| 4.1 | 32NB to 50NB | 97 | | | 04 | |
| 4.2 | 65NB to 80NB | 46 | | | 04 | |
| 4.3 | Above 150NB | 102 | | | 04 | |
| | | TOTAL VALUE FOR ONE SHIP | | | GRAND TOTAL VALUE | |
| | | | GST@..... | | GST@..... | |
| | GRAND TOTAL VALUE INCLUDING GST | | | | | |

**Note:**

3. Quantum of work indicated is for estimation purpose only as per preliminary design progress, actual quantum of work executed at site shall be considered for the payment as per spool drawings issued.
4. Per Inch Dia. quoted rates will also be applicable for modification works, if required.

**Annexure 7**

**PRICE BID FORMAT**

**PART C:** RATE FOR GALVANISATION/PICKLING/PASSIVATION

| SL. No | Description | Total Weight in Ton (A) | Unit Rate/Ton (B) | Total Rate for One Ship (C=A*B) |
|---|---|---|---|---|
| 1 | Hot Dip Galvanizing | **20** | | Rs…… |
| 2 | Pickling and primer | **6** | | Rs…… |
| 3 | Passivation | **0.7** | | Rs…… |
| | **PART C - TOTAL PRICE** | | | |
| | **GST@….** | | | |
| | **PART C - TOTAL PRICE INCLUDING GST** | | | |

**Note:**

1. Non-GI pipes inside and outside of pipes to be ballasted upon completion .
2. After GI process pipes to be cleaned thoroughly to avoid any scales or zinc ash marks.
3. After pickling Outside of pipes to be primer coated approx. 50 micron to avoid corrosion after completion.
4. All ends to be properly closed with plastic end cap to avoid outside particles.

**Annexure 7**

## PRICE BID FORMAT
## PART D: ONBOARD INSTALLATION, TESTING & COMMISSIONING

**Per Meter cost is inclusive of:**

- Onboard Fabrication and Installation of Pipe Supports (Yard will provide MS flat-bars and MS angles only),
- Onboard Installation of Valves and Related Fittings, Gauges and Piping Instrumentations.
- Flushing, Testing & Commissioning of Piping Systems.
- Related fasteners gaskets and U bolts etc (as per Marine / Shipbuilding Standards).

| I. CARBON STEEL PIPING - CONSOLIDATED MATERIAL SUMMARY | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Description** | **Size / Dimensions** | **Material** | **Total Req. Per Ship (A)** | **UOM** | **Installation Price / Meter (B)** | **TOTAL PRICE (For One Ship) (C = A*B)** |
| 1 | PIPE SMLS | DN80 | ASTM A53 Gr B | 264 | Mtr | | |
| 2 | PIPE SMLS | DN65 | ASTM A53 Gr B | 247 | Mtr | | |
| 3 | PIPE SMLS | DN50 | ASTM A53 Gr B | 480 | Mtr | | |
| 4 | PIPE SMLS | DN40 | ASTM A53 Gr B | 317 | Mtr | | |
| 5 | PIPE SMLS | DN32 | ASTM A53 Gr B | 108 | Mtr | | |
| 6 | PIPE SMLS | DN200 | ASTM A53 Gr B | 49 | Mtr | | |
| 7 | PIPE SMLS | DN150 | ASTM A53 Gr B | 25 | Mtr | | |
| 8 | PIPE SMLS | DN125 | ASTM A53 Gr B | 27 | Mtr | | |
| 9 | PIPE SMLS | DN100 | ASTM A53 Gr B | 49 | Mtr | | |
| 10 | TUBE 1.5THK | Ø8 | ASTM A192 Gr B | 45 | Mtr | | |
| 11 | PIPE SMLS | DN25 | ASTM A53 Gr B | 211 | Mtr | | |
| 12 | PIPE SMLS | DN20 | ASTM A53 Gr B | 108 | Mtr | | |
| 13 | PIPE SMLS | DN15 | ASTM A53 Gr B | 101 | Mtr | | |
| 14 | PIPE SMLS | DN550 | ASTM A53 Gr B | 3 | Mtr | | |
| 15 | PIPE SMLS | DN450 | ASTM A53 Gr B | 8 | Mtr | | |
| 16 | PIPE SMLS | DN400 | ASTM A53 Gr B | 22 | Mtr | | |
| 17 | PIPE SMLS | DN350 | ASTM A53 Gr B | 20 | Mtr | | |
| 18 | PIPE SMLS | DN300 | ASTM A53 Gr B | 2 | Mtr | | |

| II. STAINLESS STEEL PIPING - CONSOLIDATED MATERIAL SUMMARY | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Description** | **Size / Dimensions** | **Material** | **Total Req. Per Ship** | **UOM** | **Installation Price / Meter (B)** | **TOTAL PRICE (For One Ship) (C = A*B)** |
| 1 | PIPE SMLS | DN25 | A312, SS316L | 10 | Mtr | | |
| 2 | PIPE SMLS | DN40 | A312, SS316L | 10 | Mtr | | |
| 3 | PIPE SMLS | DN50 | A312, SS316L | 27 | Mtr | | |
| 4 | PIPE SMLS | DN65 | A312, SS316L | 27 | Mtr | | |
| **III. CLASS APPROVED PIPING - CONSOLIDATED MATERIAL SUMMARY** | | | | | | | |
| **Sl. No.** | **Description** | **Size / Dimensions** | **Material** | **Total Req. Per Ship** | **UOM** | **Installation Price / Meter (B)** | **TOTAL PRICE (For One Ship) (C = A*B)** |
| 1 | PIPE SMLS | DN80 | ASTM A106 Gr B | 4.5 | Mtr | | |
| 2 | PIPE SMLS | DN400 | ASTM A106 Gr B | 1.5 | Mtr | | |
| 3 | PIPE SMLS | DN550 | ASTM A106 Gr B | 1.5 | Mtr | | |
| 4 | PIPE SMLS | DN15 | ASTM A53 Gr B | 1.5 | Mtr | | |
| 5 | PIPE SMLS | DN40 | ASTM A53 Gr B | 1.5 | Mtr | | |
| 6 | PIPE SMLS | DN50 | ASTM A53 Gr B | 6 | Mtr | | |
| 7 | PIPE SMLS | DN65 | ASTM A53 Gr B | 1.5 | Mtr | | |
| 8 | PIPE SMLS | DN200 | ASTM A53 Gr B | 4.5 | Mtr | | |
| | | **GRAND TOTAL (FOR ONE SHIP):** | | | | | |
| | | **GST @....** | | | | | |
| | | **TOTAL VALUE FOR ONE SHIP INCLUDING GST** | | | | | |

**Note:**

1. Quantum of work indicated is for estimation purpose only as per preliminary design progress, actual quantum of work executed at site shall be considered for the payment as per spool drawings issued.
2. Per Meter quoted rates will also be applicable for modification works.

**Annexure 7**

## PRICE BID FOR PIPING WORKS OF 40 TON ASD TUG PRICE BID FORMAT

| SI. NO. | WORK DESCRIPTION | | Qty. | UoM | TOTAL VALUE FOR ONE SHIP (A) (UOM – LS) | GST APPLICABLE @..... (B) | REQUIRED FOR NO. OF SHIPS (C) | TOTAL VALUE D=(A+B)*(C) |
|---|---|---|---|---|---|---|---|---|
| 1 | PART A | Pipe Spools Fabrication for Carbon Steel & Stainless-Steel Pipes | 1 | LS | | | 02 | |
| 2 | PART B | Pipe Spools Fabrication for Carbon Steel & Stainless-Steel Pipes Less than 32 NB and more than 300NB | 1 | LS | | | 04 | |
| 3 | PART C | Galvanization / Pickling / Passivation | 1 | LS | | | 02 | |
| 4 | PART D | Onboard Installation & Commissioning of Piping Works | 1 | LS | | | 04 | |
| 5 | PART E | Onboard Hot-Works / Welding, (OBDs, Penetration Sleeves, Deck & BHD Penetrations, Tank Penetrations Etc., Pre-Launch Works Onboard) | 1 | LS | | | 04 | |
| 6 | PART F | Hydraulic Piping Works (Turnkey onboard installation & commissioning as per Yard supplied BOM / Material) | 1 | LS | | | 04 | |
| | | TOTAL VALUE FOR ONE SHIP | | | | | | |
| | | GST @... | | | | | | |
| | | GRAND TOTAL VALUE INCLUDING GST | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | PART G | Piping Modification Works (Limited to 20% of each line item PART A to PART F) (Modification works if envisaged later, to be done and calculated at unit rates agreed / established under this contract.) | | | | | 04 | |
| | *PART G – Modifications Work cost is not to be considered for L1 determination. | | | | | | | |

Signature:
Address of the contractor:
Date:
Seal:

**Note:**

1.1. Prices are to be quoted in the Pricing Format. The quotations to be submitted in the company letter head.
1.2. Quotations shall be submitted as Password Protected File. The bidders are advised to share the password through only SMS while opening the quotations.
1.3. L1 will be determined based on the total amount basis without taxes
1.4. Cost of Pipe spool fabrication will be = Size of pipe in inch x No. of joints (of that size) X Inch Dia. Rate in the respective category.
- Each Butt joint is considered as one joint.
- Each Flange fitment, inside and outside welding (Fillet) is considered as two joints.
- Sleeve welding both ends considered as one joint.
- Brach connection butt joint is considered as one joint
- Pipe bending by cold bending process is considered as 0.5 joints for charges.
- For joints which are only tack welded is considered as 0.5 joints for charges.

1.5. Rate quoted for Inch Diameter (IND) includes all activities involved in that joint such as edge preparation, fitment, welding of flanges, sleeves, elbows, tees, reducers, bends, branch pipes, butt welding, fillet welding etc.
1.6. Root welding should be TIG welding.
1.7. Fabrication also includes marking, cutting, edge preparation, cold bending, branch connections, profile cutting,

preparation, testing, inspection etc. as per drawings, specifications/ instructions of Officer- in - Charge.

1.8. Cost for electrodes/filler wire, consumables, galvanizing, pickling and passivation, pressure testing, inspection etc. shall be inclusive in the quoted rate.

1.9. All costs for the satisfactory completion of pipe spool fabrication and Primer coating or Hot -dip galvanizing shall be included in PART A/B.

**Note:**

**1.** The quoted price will be valid for a period of 3 (three) months.

**2.** Quoting for all serials is mandatory. Partially quoting for few serials shall result in rejection of the bid.

**3.** L1 Bidder will be decided on total amount basis **(Modification works is not considered for L1 determination),** without considering Taxes.

**4.** Rate agreed upon as per quotation shall remain firm and fixed till conclusion of contract.

**5.** Bidders shall quote total amount in figures and in words. Corrections and additions if any must be attested / duly signed by the bidder. In the case of error in multiplication / addition in amount calculated, unit rate quoted will be considered as correct and the amount will be calculated accordingly. Conditional rebates & discounts, incomplete/ambiguous offers are likely to be rejected.

**6.** Bidder has to submit the price bid as mentioned in the format only, otherwise bid will be rejected

**7.** Un-priced bid to be submitted along with techno-commercial part (**Part – I – Techno-commercial Bid**) with details like "**quoted/nil/included**" to be mentioned for each line item

*Any modifications or alterations or additional notes added to the above format will straight away leads to rejection of the offer.

Signature:
Address of the contractor:
Seal:

| COMPLIANCE STATEMENT- LIST OF DEVIATIONS | **PAGE 1 OF 1** |
|---|---|

**Tender Name**: Piping Spools Fabrication, Testing, Onboard Installation & Commissioning of Piping Systems, Hydraulic System Piping for 40T BP ASD Tugs being constructed at Hooghly-CSL, Nazirgunge unit, Howrah**.**

TENDER NO: Hooghly-CSL/OPS/SB/TEN/2025/022 , Dated- 12.03.2025
**DATE:**

We hereby confirm and truly declare that our Offer / Bid No. ……dated …….is in full compliance with the documents issued against the Tender No. …….dated ……, except for the deviations listed below:

**LIST OF DEVIATIONS**

| **Sl. No.** | **Description / Tender Reference** | **Reasons for Deviation** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Name of tenderer:
Date: Name & Designation Seal & Signature

(Company Seal)

**Annexure -8**

**Vendor details (to be submitted along with TECHNICAL BID)**

| | | |
|---|---|---|
| **1** | Name of Bidder/Firm | |
| **2** | Registered office Address of Company/firm in Kolkata/Howrah:<br>Local office address at Kolkata/Howrah (if held): | |
| **3** | Telephone No./Fax No./Mobile No | |
| **4** | E-mail address: | |
| **5** | Names of the contact person & Designation: (of person in connection with this tender) : | 1)<br>2)<br>3) |
| **6** | Type of Entity-Pro praetorship/Partnership firm/company/NSIC/MSE Category etc. (Please attach registration certificate of Firm/Partnership agreement/proprietorship documents) | |
| **7** | Cost of Tender Details (DD No. Name of Bank) | |
| **8** | EMD Details (DD No. Name of Bank) | |
| **9** | PAN Card Number<br>(Self-attested copy of PAN card has to be Submitted) | |
| | GST Registration No.<br>(Self-attested copy has to be Submitted) | |
| **10** | Whether the agency has been blacklisted/de barred or given tender holiday or contract terminated before expiry of the contract period by any govt. autonomous bodies/organizations where bidder has provided services earlier due to deficiencies in service or misconduct etc. | Yes/No<br>(Please tick as applicable)<br>If yes, please furnish details on a separate sheet |

**Certified that the above information is true to the best of our belief and information.**

**Place:**

**Date:**

**Signature of Supplier/Authorized signature of firm/agency:**

**Name of Supplier or authorized signatory of firm/agency:**

**Designation:**

**Annexure -9**

NEFT mandate form

(ON THE LETTER HEAD OF THE BIDDER)

**Electronic Payment Mandate Form**

(Mandate for receiving payments through RTGS/NEFT Hooghly Cochin Shipyard Ltd)

1) Vendor Name

2) Vendor Address with Phone No

3) Vendor Code

4) Permanent Account No. (PAN)

5) Particulars of Bank Account

a. Name of the Bank

b. Name of the Branch

c. Branch Code

d. NEFT Code of the Bank

e. City Name

f. Branch Location

g. Branch Telephone No.

h. Bank IFSC Code

i. 9-Digit MICR Code

**(Where MICR is starting with "0". Please take the correct code from your bank for proper identification of city, bank, branch)**

i. Type of the Account (S.B Current or

Cash Credit) with code (010/011/013)

j. Account Number (as appearing on the cheque book)

6) Email Address of Vendor

7) Date of Effect of RTGS/NEFT in

your Bank

We hereby declare that the particulars given above are correct and complete. If the transaction is delayed or lost because of incomplete or incorrect information, we would not hold the company responsible.

(……)
Signature of Employee

Bank Certificate

We certify that_____ has an Account No._____ with us and we confirm that the details given above are correct as per our records.

Date:

Place:

(……)
Authorized official of Bank

**Note: Please enclose a cancelled un-signed cheque leaf to enable us to verify the details mentioned above.**

**Annexure 10**

**Form of bank Guarantee towards EMD**

(On stamp paper of value Rs. 200/-)

This deed of GURANTEE made on …….. day of ……Two thousand Eighteen between Hooghly-CSL on the one part and …… (Name and address of the bank) of the other part is as follows: -

In consideration of the Hooghly-CSL having allowed M/s……..…….…… (Hereinafter referred to as 'the Supplier') to submit Tender No…….. to them without Earnest Money according to the conditions of such Tender Notification.

We……..…… (here enter the name of 'the Bank') a Company incorporated under the …….Act and having its registered office at ……(hereinafter referred to as 'the bank') undertake to pay to Hooghly-CSL on demand at Kolkata the sum of money payable as Earnest Money in respect of the Tender No…….made by the Supplier, in case the Supplier withdraws the tender before the date of firmness stipulated or when the tender is accepted by or on behalf of the Hooghly-CSL the Supplier makes default in furnishing the Security Deposit or in entering into an agreement as required by the Hooghly-CSL or otherwise commits any breach of the terms and conditions of the tender.

We, ……Bank Guarantee to pay the amount due and payable under this guarantee without any demur merely on demand from the Hooghly-CSL. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. The liability of the surety shall be restricted to Rs ……..……(Rs…… ……only)

This guarantee shall not be avoided, released or affected by any variation in the terms of the tender, acceptance or the contract between the Contractor and the Hooghly-CSL or any neglect indulgence or forbearance by the Hooghly-CSL.

This guarantee shall remain in full force and effect during the period that would be taken for the finalization of the tender and till the Hooghly-CSL certifies that the terms and conditions of the said tender have been fully and properly carried out by the Supplier and accordingly discharges this guarantee or for Six Months from the date of issue of this guarantee whichever is earlier. A

notice of the claim under this guarantee may be served on the Bank within Six Months after the said period in which case the same shall be enforceable against the Bank notwithstanding the fact that the same is enforced after the expiry of the said period.
The decision of the CEO, Hooghly-CSL as to whether the occasion or the ground has arisen for the demand of the surety form Bank shall be final. The Hooghly-CSL shall be at liberty to act as though the Bank were the principal debtor.

We, the said Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Hooghly-CSL in writing and agree that any change in the constitution of the said contractor or the said Bank shall not discharge our liability hereunder.

In witness whereof we have hereunto set our hand and seal this. …… day ……of……...……Two thousand and ……...

Place:
Date:

**Bank guarantee in lieu of security deposit/**
**Warranty guarantee**

To
HOOGHLY COCHIN SHIPYARD LTD
(Govt. of India Enterprise)
Satyen Bose Road,
Danesh SK Lane (PO),
Nazirgunge, Howrah,
West Bengal - 711109.

WHEREAS .....(Name & Address of Supplier) (hereinafter called" **the Supplier**") has undertaken, in pursuance of Contract……No.……Dated:……to execute .....(Name of Contract and brief description of works) (hereinafter called "**the Contract**").
AND WHEREAS it has been stipulated by **HOOGHLY COCHIN SHIPYARD LTD** (The Buyer – hereinafter called "**Hooghly-CSL**") in the said contract that the Supplier shall furnish **Hooghly-CSL** with a Bank Guarantee for the sum specified therein as security for compliance with the Supplier's obligations in accordance with the Contract.
AND WHEREAS we have agreed to give the Supplier such a Bank Guarantee.
NOWTHEREFORE we……(Name of the Bank) having its Head Office at……(Address of Head Office) and acting through its branch office at……(Address of the executing branch)(hereinafter called "the Bank") hereby affirm that we are the Guarantor and responsible to **Hooghly-CSL**, on behalf of the Supplier upto a total of……(amount of Guarantee) in words).
We, the bank, hereby irrevocably undertake to pay you any amount not exceeding in total the Guarantee Amount upon receipt by us of your demand in writing accompanied by the following documents:

1. Your signed statement certifying that the Supplier is in breach of his obligation(s) under the Contract and the respect in which the Supplier is in breach.
2. Your signed statement certifying that the Supplier has been given a prior written notice by email from you to make good the aforesaid breach and that the Supplier still failed to fulfill the Contract within 30 days of such notice. A copy of such notice given by email to the Supplier shall be attached to the demand for payment.

Any demand for payment should contain your authorized signatures which must be authorized by your bankers or by a notary public.
We, the Bank, further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between **Hooghly-CSL** and the Supplier shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification. We, the Bank, further agree that any change in the constitution of the said contractor or the said bank shall not discharge our liability hereunder.

**Notwithstanding** anything contained herein:
1. Our liability under this Bank Guarantee shall not exceed ……..(only).

2. This Bank Guarantee shall be valid upto (date) and

3. We are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if **Hooghly-CSL** serve upon us a written claim or demand on or before……..(validity date).

Any demand for payment under this guarantee must be received by us at this office during working hours on or before the validity date. Should we receive no claim from you by the validity date, our liability to you will cease and the guarantee will definitely become null and void whether returned to us or not.

Yours truly,
Signature and seal of the guarantor:…….....

Name of Bank:…….....

Address:……..Date:……

[1]An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract and denominated in respective Dollars / Indian Rupees/Other Currency.

**Annexure - 12**

## POWER OF ATTORNEY

*(On Applicant's* Letter *head)*

(Date and Reference)

To
The Assistant General Manager
Hooghly Cochin Shipyard
Limited
Nazirgunge, Howrah-711109,
West Bengal.

**Subject: Power of Attorney**

Mr. / Mrs. / Ms..... (Name of the Person(s), domiciled at .....(Address ),
acting as..... (Designation and name of the company), and whose signature is attested below, is hereby appointed as the Authorized Representative and authorized on behalf of ..... (Name of the company) to provide information and respond to **enquiries etc.** as may be required by the Employer for the project of ..... (Project title) and is hereby further authorized to sign and file relevant documents in respect of the above.

(Attested signature of Mr._____).

For.....

(Name & designation)

(Company Seal)

**Annexure - 13**

## Self-Declaration to be given by the bidder in Letter head

Bid's Reference No. & Date:

Bidder's Name & Address:

Person to be contacted:

Designation:

Telephone No.: Fax No.: Email:

1. We do hereby declare that we have not been debarred/black listed by Hooghly-CSL or by any of the Public Sector Undertaking or Government department etc.

2. If Hooghly-CSL finds that, we have been blacklisted/ debarred by any of the Public Sector Undertaking or Government department, and then Hooghly-CSL can reject the offer or terminate the contract at any point of time. In such case, we are aware that, EMD, security deposit, performance guarantee etc will be forfeited by Hooghly-CSL. Further we are confirming herewith that, any loss that has happened to Hooghly-CSL due to this will be compensated by us.

For and on behalf of the firm
(Firms Name & Address)

(Signature of Authorized Signatory)
Name:
Designation
Phone No.:
Seal:
Date: ……....
Place: …….

**Annexure - 14**

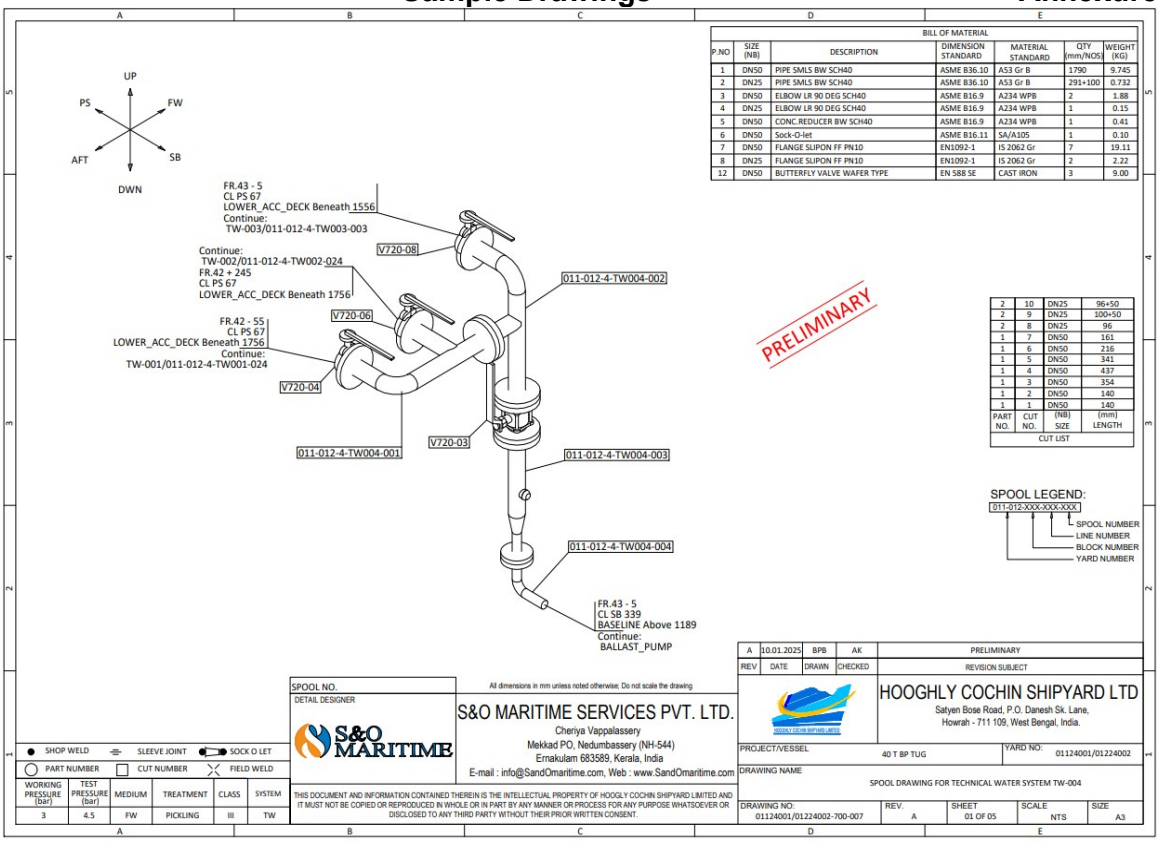
**Form of Legal Case** *(Sample Format)*

Details of legal cases pending against the firm for the last five years

| SL. NO. | ORGANISATION AGAINST WHOM THE LITIGATION IS INVOLVED | BRIEF DETAILS OF DISPUTE | AMOUNTS INVOLVED (Rs. …..) | PRESENT STATUS | Remarks |
|---|---|---|---|---|---|
| | | | | | |

- If no Cases pending please mention as “NIL” and submit the above form.

**SIGNATURE OF BIDDER**


BILL OF MATERIAL
P.NO | SIZE (NB) | DESCRIPTION | DIMENSION STANDARD | MATERIAL STANDARD | QTY (mm/NOS) | WEIGHT (KG)
1 | DN50 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 1790 | 9.745
2 | DN25 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 291+100 | 0.732
3 | DN50 | ELBOW LR 90 DEG SCH40 | ASME B16.9 | A234 WPB | 2 | 1.88
4 | DN25 | ELBOW LR 90 DEG SCH40 | ASME B16.9 | A234 WPB | 1 | 0.15
5 | DN50 | CONC.REDUCER BW SCH40 | ASME B16.9 | A234 WPB | 1 | 0.41
6 | DN50 | Sock-O-let | ASME B16.11 | SA/A105 | 1 | 0.10
7 | DN50 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 7 | 19.11
8 | DN25 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 2 | 2.22
12 | DN50 | BUTTERFLY VALVE WAFER TYPE | EN 588 SE | CAST IRON | 3 | 9.00
UP
PS
FW
AFT
SB
DWN
FR.43 - 5
CL PS 67
LOWER_ACC_DECK Beneath 1556
Continue:
TW-003/011-012-4-TW003-003
Continue:
TW-002/011-012-4-TW002-024
FR.42 + 245
CL PS 67
LOWER_ACC_DECK Beneath 1756
FR.42 - 55
CL PS 67
LOWER_ACC_DECK Beneath 1756
Continue:
TW-001/011-012-4-TW001-024
V720-08
V720-06
V720-04
V720-03
011-012-4-TW004-001
011-012-4-TW004-002
011-012-4-TW004-003
011-012-4-TW004-004
FR.43 - 5
CL SB 339
BASELINE Above 1189
Continue:
BALLAST_PUMP
PRELIMINARY
2 | 10 | DN25 | 96+50
2 | 9 | DN25 | 100+50
2 | 8 | DN25 | 96
1 | 7 | DN50 | 161
1 | 6 | DN50 | 216
1 | 5 | DN50 | 341
1 | 4 | DN50 | 437
1 | 3 | DN50 | 354
1 | 2 | DN50 | 140
1 | 1 | DN50 | 140
PART NO. | CUT NO. | (NB) SIZE | (mm) LENGTH
CUT LIST
SPOOL LEGEND:
011-012-XXX-XXX-XXX
SPOOL NUMBER
LINE NUMBER
BLOCK NUMBER
YARD NUMBER
SHOP WELD
SLEEVE JOINT
SOCK O LET
PART NUMBER
CUT NUMBER
FIELD WELD
WORKING PRESSURE (bar) | TEST PRESSURE (bar) | MEDIUM | TREATMENT | CLASS | SYSTEM
3 | 4.5 | FW | PICKLING | III | TW
SPOOL NO.
DETAIL DESIGNER
All dimensions in mm unless noted otherwise; Do not scale the drawing
S&O MARITIME
S&O MARITIME SERVICES PVT. LTD.
Cheriya Vappalassery
Mekkad PO, Nedumbassery (NH-544)
Ernakulam 683589, Kerala, India
E-mail : info@SandOmaritime.com, Web : www.SandOmaritime.com
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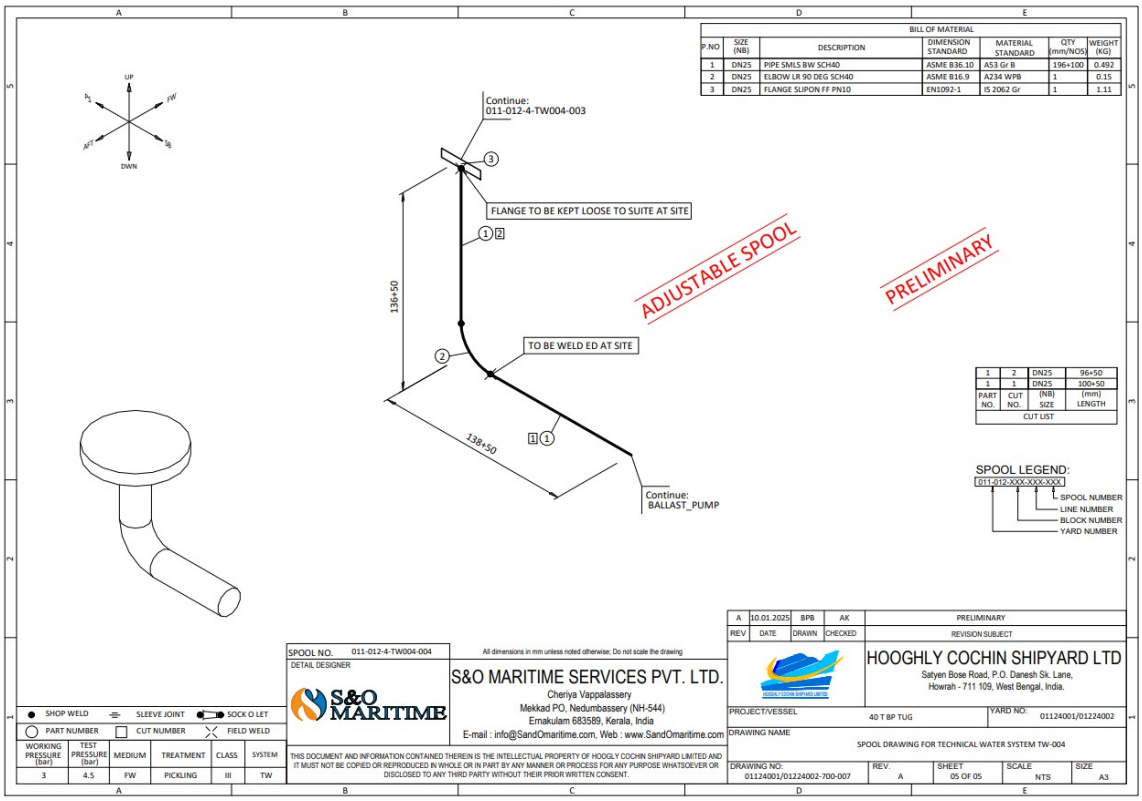
A | 10.01.2025 | BPB | AK | PRELIMINARY
REV | DATE | DRAWN | CHECKED | REVISION SUBJECT
HOOGHLY COCHIN SHIPYARD LTD
Satyen Bose Road, P.O. Danesh Sk. Lane,
Howrah - 711 109, West Bengal, India.
PROJECT/VESSEL: 40 T BP TUG
YARD NO: 01124001/01224002
DRAWING NAME: SPOOL DRAWING FOR TECHNICAL WATER SYSTEM TW-004
DRAWING NO: 01124001/01224002-700-007
REV.: A
SHEET: 01 OF 05
SCALE: NTS
SIZE: A3


BILL OF MATERIAL
P.NO | SIZE (NB) | DESCRIPTION | DIMENSION STANDARD | MATERIAL STANDARD | QTY (mm/NOS) | WEIGHT (KG)
1 | DN25 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 196+100 | 0.492
2 | DN25 | ELBOW LR 90 DEG SCH40 | ASME B16.9 | A234 WPB | 1 | 0.15
3 | DN25 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 1 | 1.11
UP
PS
FW
AFT
SB
DWN
Continue:
011-012-4-TW004-003
FLANGE TO BE KEPT LOOSE TO SUITE AT SITE
136+50
TO BE WELD ED AT SITE
138+50
Continue:
BALLAST_PUMP
ADJUSTABLE SPOOL
PRELIMINARY
1 | 2 | DN25 | 96+50
1 | 1 | DN25 | 100+50
PART NO. | CUT NO. | (NB) SIZE | (mm) LENGTH
CUT LIST
SPOOL LEGEND:
011-012-XXX-XXX-XXX
SPOOL NUMBER
LINE NUMBER
BLOCK NUMBER
YARD NUMBER
SHOP WELD
SLEEVE JOINT
SOCK O LET
PART NUMBER
CUT NUMBER
FIELD WELD
WORKING PRESSURE (bar) | TEST PRESSURE (bar) | MEDIUM | TREATMENT | CLASS | SYSTEM
3 | 4.5 | FW | PICKLING | III | TW
SPOOL NO. 011-012-4-TW004-004
DETAIL DESIGNER
All dimensions in mm unless noted otherwise; Do not scale the drawing
S&O MARITIME
S&O MARITIME SERVICES PVT. LTD.
Cheriya Vappalassery
Mekkad PO, Nedumbassery (NH-544)
Ernakulam 683589, Kerala, India
E-mail : info@SandOmaritime.com, Web : www.SandOmaritime.com
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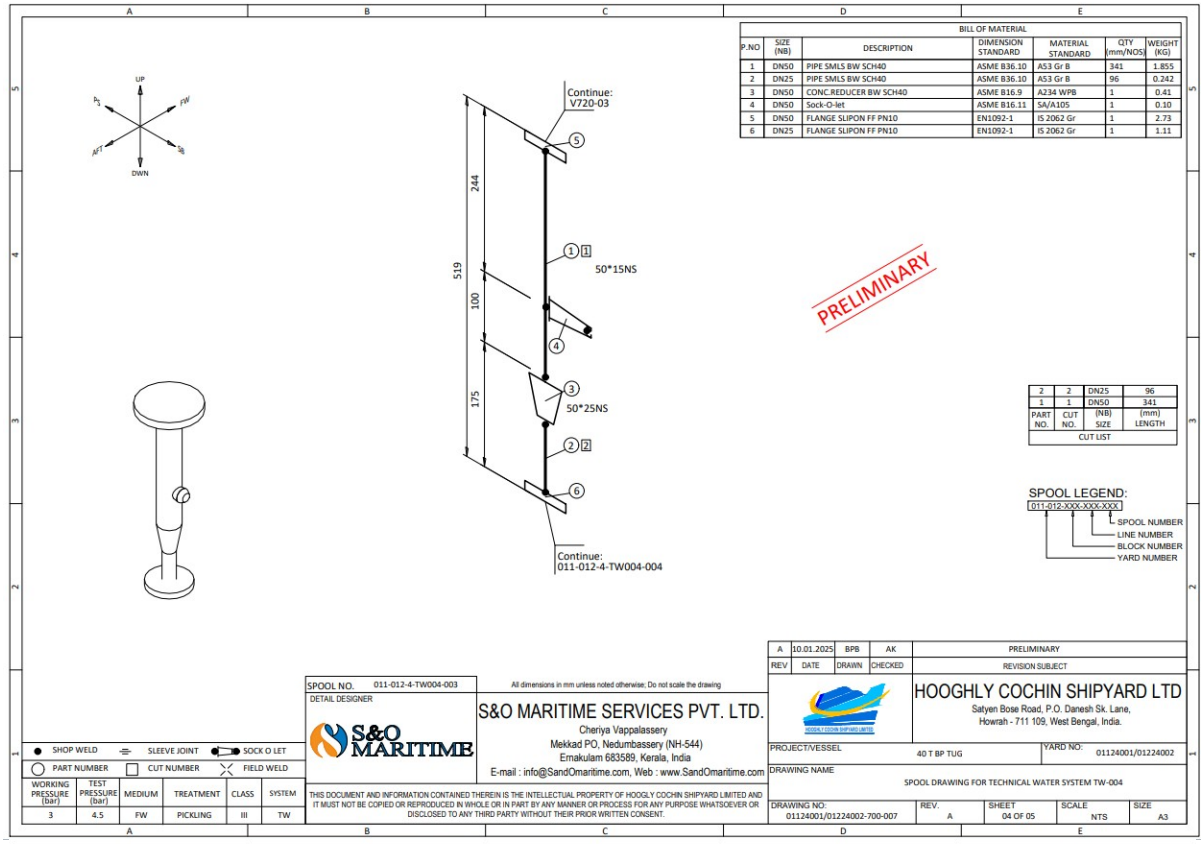
A | 10.01.2025 | BPB | AK | PRELIMINARY
REV | DATE | DRAWN | CHECKED | REVISION SUBJECT
HOOGHLY COCHIN SHIPYARD LTD
Satyen Bose Road, P.O. Danesh Sk. Lane,
Howrah - 711 109, West Bengal, India.
PROJECT/VESSEL: 40 T BP TUG
YARD NO: 01124001/01224002
DRAWING NAME: SPOOL DRAWING FOR TECHNICAL WATER SYSTEM TW-004
DRAWING NO: 01124001/01224002-700-007
REV.: A
SHEET: 05 OF 05
SCALE: NTS
SIZE: A3


BILL OF MATERIAL
P.NO | SIZE (NB) | DESCRIPTION | DIMENSION STANDARD | MATERIAL STANDARD | QTY (mm/NOS) | WEIGHT (KG)
1 | DN50 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 341 | 1.855
2 | DN25 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 96 | 0.242
3 | DN50 | CONC.REDUCER BW SCH40 | ASME B16.9 | A234 WPB | 1 | 0.41
4 | DN50 | Sock-O-let | ASME B16.11 | SA/A105 | 1 | 0.10
5 | DN50 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 1 | 2.73
6 | DN25 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 1 | 1.11
Continue: V720-03
244
519
100
175
50*15NS
50*25NS
Continue: 011-012-4-TW004-004
PRELIMINARY
2 | 2 | DN25 | 96
1 | 1 | DN50 | 341
PART NO. | CUT NO. | (NB) SIZE | (mm) LENGTH
CUT LIST
SPOOL LEGEND:
011-012-XXX-XXX-XXX
SPOOL NUMBER
LINE NUMBER
BLOCK NUMBER
YARD NUMBER
SHOP WELD | SLEEVE JOINT | SOCK O LET
PART NUMBER | CUT NUMBER | FIELD WELD
WORKING PRESSURE (bar) | TEST PRESSURE (bar) | MEDIUM | TREATMENT | CLASS | SYSTEM
3 | 4.5 | FW | PICKLING | III | TW
SPOOL NO. 011-012-4-TW004-003
DETAIL DESIGNER
All dimensions in mm unless noted otherwise; Do not scale the drawing
S&O MARITIME SERVICES PVT. LTD.
Cheriya Vappalassery
Mekkad PO, Nedumbassery (NH-544)
Ernakulam 683589, Kerala, India
E-mail : info@SandOmaritime.com, Web : www.SandOmaritime.com
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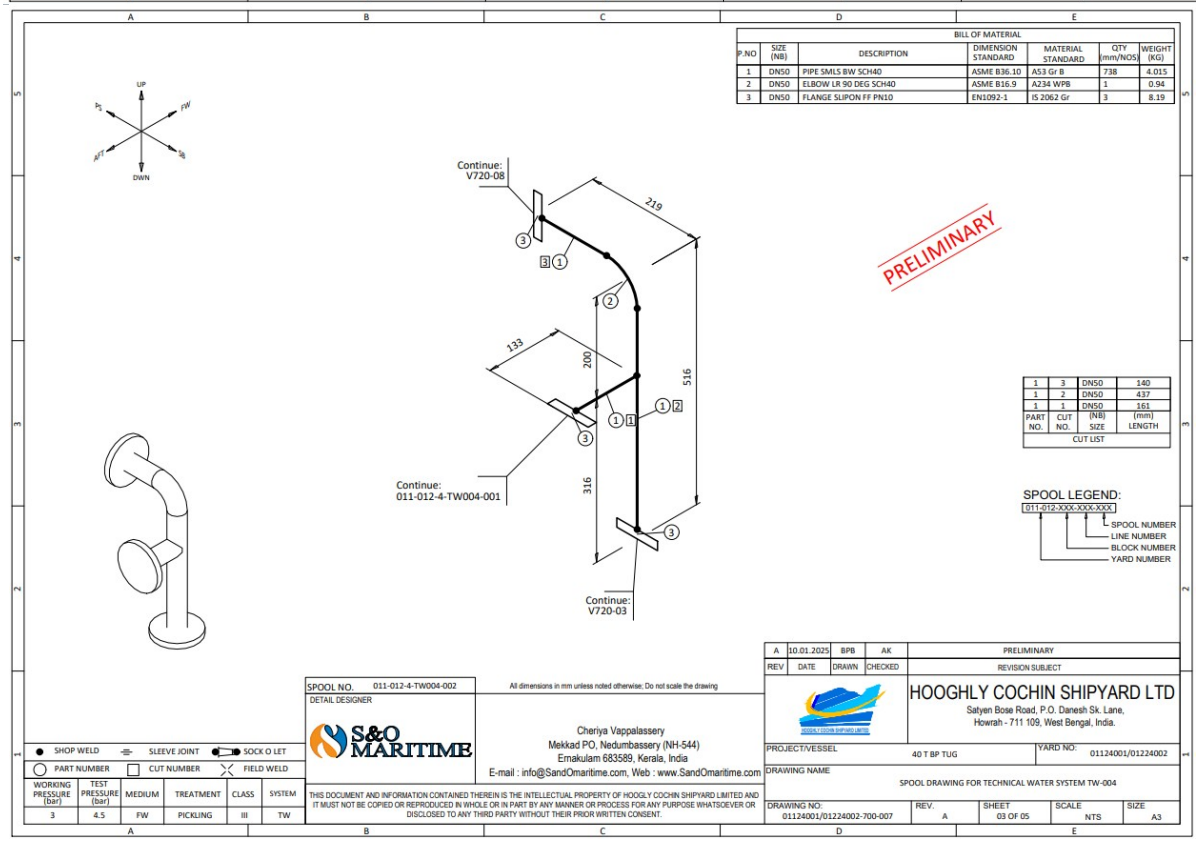
A | 10.01.2025 | BPB | AK | PRELIMINARY
REV | DATE | DRAWN | CHECKED | REVISION SUBJECT
HOOGHLY COCHIN SHIPYARD LTD
Satyen Bose Road, P.O. Danesh Sk. Lane,
Howrah - 711 109, West Bengal, India.
PROJECT/VESSEL 40 T BP TUG
YARD NO: 01124001/01224002
DRAWING NAME
SPOOL DRAWING FOR TECHNICAL WATER SYSTEM TW-004
DRAWING NO: 01124001/01224002-700-007
REV. A
SHEET 04 OF 05
SCALE NTS
SIZE A3


BILL OF MATERIAL
P.NO | SIZE (NB) | DESCRIPTION | DIMENSION STANDARD | MATERIAL STANDARD | QTY (mm/NOS) | WEIGHT (KG)
1 | DN50 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 738 | 4.015
2 | DN50 | ELBOW LR 90 DEG SCH40 | ASME B16.9 | A234 WPB | 1 | 0.94
3 | DN50 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 3 | 8.19
Continue: V720-08
219
133
200
516
316
Continue: 011-012-4-TW004-001
Continue: V720-03
PRELIMINARY
1 | 3 | DN50 | 140
1 | 2 | DN50 | 437
1 | 1 | DN50 | 161
PART NO. | CUT NO. | (NB) SIZE | (mm) LENGTH
CUT LIST
SPOOL LEGEND:
011-012-XXX-XXX-XXX
SPOOL NUMBER
LINE NUMBER
BLOCK NUMBER
YARD NUMBER
SHOP WELD | SLEEVE JOINT | SOCK O LET
PART NUMBER | CUT NUMBER | FIELD WELD
WORKING PRESSURE (bar) | TEST PRESSURE (bar) | MEDIUM | TREATMENT | CLASS | SYSTEM
3 | 4.5 | FW | PICKLING | III | TW
SPOOL NO. 011-012-4-TW004-002
DETAIL DESIGNER
All dimensions in mm unless noted otherwise; Do not scale the drawing
Cheriya Vappalassery
Mekkad PO, Nedumbassery (NH-544)
Ernakulam 683589, Kerala, India
E-mail : info@SandOmaritime.com, Web : www.SandOmaritime.com
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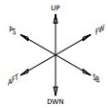
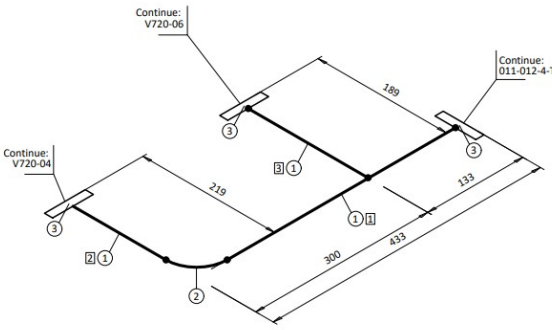
A | 10.01.2025 | BPB | AK | PRELIMINARY
REV | DATE | DRAWN | CHECKED | REVISION SUBJECT
HOOGHLY COCHIN SHIPYARD LTD
Satyen Bose Road, P.O. Danesh Sk. Lane,
Howrah - 711 109, West Bengal, India.
PROJECT/VESSEL 40 T BP TUG
YARD NO: 01124001/01224002
DRAWING NAME
SPOOL DRAWING FOR TECHNICAL WATER SYSTEM TW-004
DRAWING NO: 01124001/01224002-700-007
REV. A
SHEET 03 OF 05
SCALE NTS
SIZE A3

| BILL OF MATERIAL | | | | | | |
|---|---|---|---|---|---|---|
| P.NO | SIZE (NB) | DESCRIPTION | DIMENSION STANDARD | MATERIAL STANDARD | QTY (mm/NOS) | WEIGHT (KG) |
| 1 | DN50 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 711 | 3.875 |
| 2 | DN50 | ELBOW LR 90 DEG SCH40 | ASME B16.9 | A234 WPB | 1 | 0.94 |
| 3 | DN50 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 3 | 8.19 |

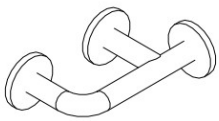



PRELIMINARY

| CUT LIST | | | | |
|---|---|---|---|---|
| PART NO. | CUT NO. | (NB) SIZE | (mm) LENGTH | |
| 1 | 3 | DN50 | 216 | |
| 1 | 2 | DN50 | 140 | |
| 1 | 1 | DN50 | 354 | |

SPOOL LEGEND:
011-012-XXX-XXX-XXX
SPOOL NUMBER
LINE NUMBER
BLOCK NUMBER
YARD NUMBER



| REV | DATE | DRAWN | CHECKED | REVISION SUBJECT |
|---|---|---|---|---|
| A | 10.01.2025 | BPB | AK | PRELIMINARY |

HOOGHLY COCHIN SHIPYARD LTD
Satyen Bose Road, P.O. Danesh Sk. Lane,
Howrah - 711 109, West Bengal, India.

SPOOL NO. 011-012-4-TW004-001
DETAIL DESIGNER
S&O MARITIME

S&O MARITIME SERVICES PVT. LTD.
Cheriya Vappalassery
Mekkad PO, Nedumbassery (NH-544)
Ernakulam 683589, Kerala, India
E-mail : info@SandOmaritime.com, Web : www.SandOmaritime.com

All dimensions in mm unless noted otherwise; Do not scale the drawing

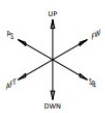


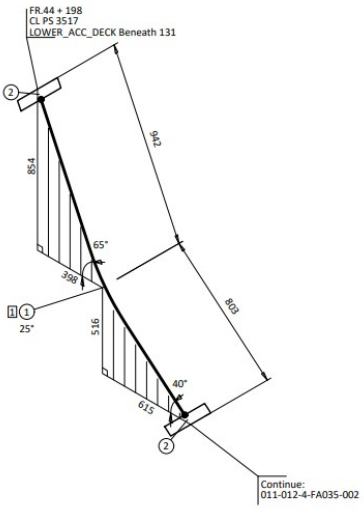
PROJECT/VESSEL: 40 T BP TUG
YARD NO: 01124001/01224002
DRAWING NAME: SPOOL DRAWING FOR TECHNICAL WATER SYSTEM TW-004
DRAWING NO: 01124001/01224002-700-007
REV.: A
SHEET: 02 OF 05
SCALE: NTS
SIZE: A3

● SHOP WELD ⏚ SLEEVE JOINT ⋈ SOCK O LET
○ PART NUMBER □ CUT NUMBER ✕ FIELD WELD

| WORKING PRESSURE (bar) | TEST PRESSURE (bar) | MEDIUM | TREATMENT | CLASS | SYSTEM |
|---|---|---|---|---|---|
| 3 | 4.5 | FW | PICKLING | III | TW |

| BILL OF MATERIAL | | | | | | |
|---|---|---|---|---|---|---|
| P.NO | SIZE (NB) | DESCRIPTION | DIMENSION STANDARD | MATERIAL STANDARD | QTY (mm/NOS) | WEIGHT (KG) |
| 1 | DN40 | PIPE SMLS BW SCH40 | ASME B36.10 | A53 Gr B | 1722 | 6.974 |
| 2 | DN40 | FLANGE SLIPON FF PN10 | EN1092-1 | IS 2062 Gr | 2 | 4.16 |




PRELIMINARY

| CUT LIST | | | | |
|---|---|---|---|---|
| PART NO. | CUT NO. | (NB) SIZE | (mm) LENGTH | |
| 1 | 1 | DN40 | 1722 | |

SPOOL LEGEND:
011-012-XXX-XXX-XXX
SPOOL NUMBER
LINE NUMBER
BLOCK NUMBER
YARD NUMBER

| REV | DATE | DRAWN | CHECKED | REVISION SUBJECT |
|---|---|---|---|---|
| A | 10.01.2025 | AVU | AK | PRELIMINARY |

HOOGHLY COCHIN SHIPYARD LTD
Satyen Bose Road, P.O. Danesh Sk. Lane,
Howrah - 711 109, West Bengal, India.

SPOOL NO. 011-012-4-FA035-003
DETAIL DESIGNER
S&O MARITIME

S&O MARITIME SERVICES PVT. LTD.
Cheriya Vappalassery
Mekkad PO, Nedumbassery (NH-544)
Ernakulam 683589, Kerala, India
E-mail : info@SandOmaritime.com, Web : www.SandOmaritime.com

All dimensions in mm unless noted otherwise; Do not scale the drawing



PROJECT/VESSEL: 40 T BP TUG
YARD NO: 01124001/01224002
DRAWING NAME: SPOOL DRAWING FOR FILL VENT SYSTEM FA-035
DRAWING NO: 01124001/01224002-700-002
REV.: A
SHEET: 01 OF 01
SCALE: NTS
SIZE: A3

● SHOP WELD ⏚ SLEEVE JOINT ⋈ SOCK O LET
○ PART NUMBER □ CUT NUMBER ✕ FIELD WELD

| WORKING PRESSURE (bar) | TEST PRESSURE (bar) | MEDIUM | TREATMENT | CLASS | SYSTEM |
|---|---|---|---|---|---|
| 1 | 1.5 | FW | PICKLING | III | FA |

# Encl 1 BOM of Pipe & Fittings per ship Ann. 2 Encl 1

**Annexure 2 Enclosure 1:**

**Material as per BOM of Pipe and fittings to be provided by yard for spool fabrication. (Qty. given is per ship).**

| CARBON STEEL PIPING - CONSOLIDATED MATERIAL SUMMARY | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Item Type** | **Description** | **Size / Dimensions** | **Material** | **Standard** | **Total Req. Per Ship** | **UOM** |
| 1 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN80X65 | ASTM A234 WPB | ASME B16.9 | 6 | nos. |
| 2 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN80X65 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 3 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN80X50 | ASTM A234 WPB | ASME B16.9 | 22 | nos. |
| 4 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN80X50 | ASTM A234 WPB | ASME B16.9 | 13 | nos. |
| 5 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN65X50 | ASTM A234 WPB | ASME B16.9 | 9 | nos. |
| 6 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN65X50 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 7 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN65X40 | ASTM A234 WPB | ASME B16.9 | 3 | nos. |
| 8 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN65X40 | ASTM A234 WPB | ASME B16.9 | 5 | nos. |
| 9 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN50X40 | ASTM A234 WPB | ASME B16.9 | 3 | nos. |
| 10 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN50X25 | ASTM A234 WPB | ASME B16.9 | 4 | nos. |
| 11 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN40X32 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 12 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN40X25 | ASTM A234 WPB | ASME B16.9 | 5 | nos. |
| 13 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN40X25 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 14 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN40X20 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 15 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN32X25 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 16 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN250X200 | ASTM A234 WPB | ASME B16.9 | 4 | nos. |
| 17 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN200X150 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 18 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN200X150 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 19 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN150X80 | ASTM A234 WPB | ASME B16.9 | 3 | nos. |
| 20 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN150X100 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 21 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN150X100 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 22 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN125X100 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 23 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN100X80 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 24 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN100X65 | ASTM A234 WPB | ASME B16.9 | 4 | nos. |
| 25 | ELBOW-45° | ELBOW LR 45 DEG SCH40 | DN80 | ASTM A234 WPB | ASME B16.9 | 17 | nos. |
| 26 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN80 | ASTM A234 WPB | ASME B16.9 | 24 | nos. |
| 27 | ELBOW-45° | ELBOW LR 45 DEG SCH40 | DN65 | ASTM A234 WPB | ASME B16.9 | 17 | nos. |
| 28 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN65 | ASTM A234 WPB | ASME B16.9 | 45 | nos. |
| 29 | ELBOW-45° | ELBOW LR 45 DEG SCH40 | DN50 | ASTM A234 WPB | ASME B16.9 | 75 | nos. |
| 30 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN50 | ASTM A234 WPB | ASME B16.9 | 60 | nos. |
| 31 | ELBOW-45° | ELBOW LR 45 DEG SCH40 | DN40 | ASTM A234 WPB | ASME B16.9 | 31 | nos. |
| 32 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN40 | ASTM A234 WPB | ASME B16.9 | 14 | nos. |
| 33 | ELBOW-45° | ELBOW LR 45 DEG SCH40 | DN32 | ASTM A234 WPB | ASME B16.9 | 10 | nos. |
| 34 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN32 | ASTM A234 WPB | ASME B16.9 | 8 | nos. |
| 35 | ELBOW-45° | ELBOW LR 45 DEG SCH40 | DN200 | ASTM A234 WPB | ASME B16.9 | 3 | nos. |
| 36 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN150 | ASTM A234 WPB | ASME B16.9 | 4 | nos. |
| 37 | ELBOW-45° | ELBOW LR 45 DEG SCH40 | DN100 | ASTM A234 WPB | ASME B16.9 | 4 | nos. |
| 38 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN100 | ASTM A234 WPB | ASME B16.9 | 12 | nos. |
| 39 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN80 | ASTM A234 WPB | ASME B16.9 | 127 | nos. |
| 40 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN80 | ASTM A234 WPB | ASME B16.9 | 85 | nos. |
| 41 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN65 | ASTM A234 WPB | ASME B16.9 | 50 | nos. |
| 42 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN65 | ASTM A234 WPB | ASME B16.9 | 115 | nos. |
| 43 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN50 | ASTM A234 WPB | ASME B16.9 | 195 | nos. |
| 44 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN50 | ASTM A234 WPB | ASME B16.9 | 185 | nos. |
| 45 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN40 | ASTM A234 WPB | ASME B16.9 | 60 | nos. |
| 46 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN40 | ASTM A234 WPB | ASME B16.9 | 138 | nos. |
| 47 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN32 | ASTM A234 WPB | ASME B16.9 | 40 | nos. |
| 48 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN32 | ASTM A234 WPB | ASME B16.9 | 35 | nos. |
| 49 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN200 | ASTM A234 WPB | ASME B16.9 | 10 | nos. |
| 50 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN200 | ASTM A234 WPB | ASME B16.9 | 3 | nos. |
| 51 | ELBOW-90° | ELBOW SR 90 DEG SCH80 | DN200 | ASTM A234 WPB | ASME B16.9 | 6 | nos. |
| 52 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN150 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 53 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN150 | ASTM A234 WPB | ASME B16.9 | 5 | nos. |
| 54 | ELBOW-90° | ELBOW SR 90 DEG SCH80 | DN150 | ASTM A234 WPB | ASME B16.9 | 8 | nos. |
| 55 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN125 | ASTM A234 WPB | ASME B16.9 | 14 | nos. |
| 56 | ELBOW-90° | ELBOW LR 90 DEG SCH40 | DN100 | ASTM A234 WPB | ASME B16.9 | 12 | nos. |
| 57 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN100 | ASTM A234 WPB | ASME B16.9 | 17 | nos. |
| 58 | PENETRATION SLEEVE | PIPE SMLS SCH160 | DN80 | ASTM A53 Gr B | ASME B36.10M | 10 | mtr |
| 59 | PENETRATION SLEEVE | PIPE SMLS SCH160 | DN65 | ASTM A53 Gr B | ASME B36.10M | 10 | mtr |
| 60 | PENETRATION SLEEVE | PIPE SMLS SCH160 | DN50 | ASTM A53 Gr B | ASME B36.10M | 5 | mtr |
| 61 | PENETRATION SLEEVE | PIPE SMLS SCH160 | DN40 | ASTM A53 Gr B | ASME B36.10M | 5 | mtr |
| 62 | PENETRATION SLEEVE | PIPE SMLS SCHXXS | DN40 | ASTM A53 Gr B | ASME B36.10M | 5 | mtr |
| 63 | PENETRATION SLEEVE | PIPE SMLS SCH160 | DN200 | ASTM A53 Gr B | ASME B36.10M | 5 | mtr |
| 64 | PENETRATION SLEEVE | PIPE SMLS SCH120 | DN125 | ASTM A53 Gr B | ASME B36.10M | 5 | mtr |
| 65 | PENETRATION SLEEVE | PIPE SMLS SCH120 | DN100 | ASTM A53 Gr B | ASME B36.10M | 10 | mtr |
| 66 | PENETRATION SLEEVE | PIPE SMLS SCHXXS | DN100 | ASTM A53 Gr B | ASME B36.10M | 10 | mtr |
| 67 | PIPE SMLS | PIPE SMLS SCH40 | DN80 | ASTM A53 Gr B | ASME B36.10M | 144 | mtr |
| 68 | PIPE SMLS | PIPE SMLS SCH80 | DN80 | ASTM A53 Gr B | ASME B36.10M | 120 | mtr |
| 69 | PIPE SMLS | PIPE SMLS SCH40 | DN65 | ASTM A53 Gr B | ASME B36.10M | 91 | mtr |
| 70 | PIPE SMLS | PIPE SMLS SCH80 | DN65 | ASTM A53 Gr B | ASME B36.10M | 156 | mtr |
| 71 | PIPE SMLS | PIPE SMLS SCH160 | DN50 | ASTM A53 Gr B | ASME B36.10M | 5 | mtr |

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|---|---|---|---|---|---|---|---|
| 72 | PIPE SMLS | PIPE SMLS SCH40 | DN50 | ASTM A53 Gr B | ASME B36.10M | 315 | mtr |
| 73 | PIPE SMLS | PIPE SMLS SCH80 | DN50 | ASTM A53 Gr B | ASME B36.10M | 160 | mtr |
| 74 | PIPE SMLS | PIPE SMLS SCH40 | DN40 | ASTM A53 Gr B | ASME B36.10M | 132 | mtr |
| 75 | PIPE SMLS | PIPE SMLS SCH80 | DN40 | ASTM A53 Gr B | ASME B36.10M | 185 | mtr |
| 76 | PIPE SMLS | PIPE SMLS SCH40 | DN32 | ASTM A53 Gr B | ASME B36.10M | 48 | mtr |
| 77 | PIPE SMLS | PIPE SMLS SCH80 | DN32 | ASTM A53 Gr B | ASME B36.10M | 60 | mtr |
| 78 | PIPE SMLS | PIPE SMLS SCH40 | DN200 | ASTM A53 Gr B | ASME B36.10M | 34 | mtr |
| 79 | PIPE SMLS | PIPE SMLS SCH80 | DN200 | ASTM A53 Gr B | ASME B36.10M | 15 | mtr |
| 80 | PIPE SMLS | PIPE SMLS SCH80 | DN150 | ASTM A53 Gr B | ASME B36.10M | 15 | mtr |
| 81 | PIPE SMLS | PIPE SMLS SCH40 | DN150 | ASTM A53 Gr B | ASME B36.10M | 10 | mtr |
| 82 | PIPE SMLS | PIPE SMLS SCH40 | DN125 | ASTM A53 Gr B | ASME B36.10M | 27 | mtr |
| 83 | PIPE SMLS | PIPE SMLS SCH40 | DN100 | ASTM A53 Gr B | ASME B36.10M | 15 | mtr |
| 84 | PIPE SMLS | PIPE SMLS SCH80 | DN100 | ASTM A53 Gr B | ASME B36.10M | 34 | mtr |
| 85 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN80 | IS 2062 Gr B | EN1092-1 | 210 | nos. |
| 86 | SLIP ON FLANGE | FLANGE SLIPON FF PN16 | DN80 | IS 2062 Gr B | EN1092-1 | 42 | nos. |
| 87 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN65 | IS 2062 Gr B | EN1092-1 | 360 | nos. |
| 88 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN50 | IS 2062 Gr B | EN1092-1 | 730 | nos. |
| 89 | SLIP ON FLANGE | FLANGE SLIPON FF PN16 | DN50 | IS 2062 Gr B | EN1092-1 | 46 | nos. |
| 90 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN40 | IS 2062 Gr B | EN1092-1 | 327 | nos. |
| 91 | SLIP ON FLANGE | FLANGE SLIPON FF PN16 | DN40 | IS 2062 Gr B | EN1092-1 | 16 | nos. |
| 92 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN32 | IS 2062 Gr B | EN1092-1 | 190 | nos. |
| 93 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN200 | IS 2062 Gr B | EN1092-1 | 44 | nos. |
| 94 | SLIP ON FLANGE | FLANGE SLIPON FF PN16 | DN200 | IS 2062 Gr B | EN1092-1 | 2 | nos. |
| 95 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN150 | IS 2062 Gr B | EN1092-1 | 6 | nos. |
| 96 | SLIP ON FLANGE | FLANGE SLIPON FF PN16 | DN150 | IS 2062 Gr B | EN1092-1 | 18 | nos. |
| 97 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN125 | IS 2062 Gr B | EN1092-1 | 38 | nos. |
| 98 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN100 | IS 2062 Gr B | EN1092-1 | 58 | nos. |
| 99 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40 | DN25X15 | ASTM A234 WPB | ASME B16.9 | 7 | nos. |
| 100 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN25X20 | ASTM A234 WPB | ASME B16.9 | 4 | nos. |
| 101 | ELBOW-45° | ELBOW LR 45 DEG SCH80 | DN25 | ASTM A234 WPB | ASME B16.9 | 11 | nos. |
| 103 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN 25 | ASTM A234 Gr. WP | ASME B16.9 | 4 | Nos. |
| 104 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN 20 | ASTM A234 Gr. WP | ASME B16.9 | 9 | Nos. |
| 105 | ELBOW-90° | ELBOW LR 45 DEG SCH80 | DN 20 | ASTM A234 Gr. WP | ASME B16.9 | 5 | Nos. |
| 106 | PIPE SMLS | TUBE 1.5THK | Ø8 | ASTM A192 Gr B | ASME B36.10M | 45 | mtr |
| 107 | PIPE SMLS | PIPE SMLS SCH40 | DN25 | ASTM A53 Gr B | ASME B36.10M | 123 | mtr |
| 108 | PIPE SMLS | PIPE SMLS SCH80 | DN25 | ASTM A53 Gr B | ASME B36.10M | 88 | mtr |
| 109 | PIPE SMLS | PIPE SMLS SCH40 | DN20 | ASTM A53 Gr B | ASME B36.10M | 57 | mtr |
| 110 | PIPE SMLS | PIPE SMLS SCH80 | DN20 | ASTM A53 Gr B | ASME B36.10M | 51 | mtr |
| 111 | PIPE SMLS | PIPE SMLS SCH40 | DN15 | ASTM A53 Gr B | ASME B36.10M | 87 | mtr |
| 112 | PIPE SMLS | PIPE SMLS SCH80 | DN15 | ASTM A53 Gr B | ASME B36.10M | 14 | mtr |
| 113 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN25 | IS 2062 Gr B | EN1092-1 | 100 | nos. |
| 114 | SLIP ON FLANGE | FLANGE SLIPON FF PN16 | DN25 | IS 2062 Gr B | EN1092-1 | 1 | nos. |
| 115 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN20 | IS 2062 Gr B | EN1092-1 | 40 | nos. |
| 116 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN15 | IS 2062 Gr B | EN1092-1 | 30 | nos. |
| 117 | SOCKET WELDED MALE NPT NIPPLE | SOCKET WELDED MALE NPT NIPPLE 3000# | DN25 | SA 105 | ASME B16.11 | 12 | nos. |
| 118 | SOCKET WELDED MALE NPT NIPPLE | SOCKET WELDED MALE NPT NIPPLE 3000# | DN20 | SA 105 | ASME B16.11 | 8 | nos. |
| 119 | SOCKET WELDED MALE NPT NIPPLE | SOCKET WELDED MALE NPT NIPPLE 3000# | DN15 | SA 105 | ASME B16.11 | 28 | nos. |
| 120 | SOCKETWELDED COUPLING | SOCKETWELDED COUPLING 3000# | DN25 | SA 105 | ASME B16.11 | 81 | nos. |
| 121 | SOCKETWELDED COUPLING | SOCKETWELDED COUPLING 3000# | DN20 | SA 105 | ASME B16.11 | 48 | nos. |
| 122 | SOCKETWELDED COUPLING | SOCKETWELDED COUPLING 3000# | DN15 | SA 105 | ASME B16.11 | 64 | nos. |
| 123 | SLIP ON FLANGE | FLANGE SLIPON FF PN10 | DN400 | IS 2062 Gr B | EN1092-1 | 9 | nos. |
| 124 | SLIP ON FLANGE | FLANGE SLIPON FF PN16 | DN300 | IS 2062 Gr B | EN1092-1 | 3 | nos. |
| 125 | PIPE SMLS | PIPE SMLS SCH80 | DN550 | ASTM A53 Gr B | ASME B36.10M | 3 | mtr |
| 126 | PIPE SMLS | PIPE SMLS SCH80 | DN450 | ASTM A53 Gr B | ASME B36.10M | 8 | mtr |
| 127 | PIPE SMLS | PIPE SMLS SCH80 | DN400 | ASTM A53 Gr B | ASME B36.10M | 2 | mtr |
| 128 | PIPE SMLS | PIPE SMLS SCH20 | DN400 | ASTM A53 Gr B | ASME B36.10M | 20 | mtr |
| 129 | PIPE SMLS | PIPE SMLS SCH80 | DN350 | ASTM A53 Gr B | ASME B36.10M | 20 | mtr |
| 130 | PIPE SMLS | PIPE SMLS SCH80 | DN300 | ASTM A53 Gr B | ASME B36.10M | 2 | mtr |
| 102 | ELBOW-45° | ELBOW LR 45 DEG SCH20 | DN400 | ASTM A234 WPB | ASME B16.9 | 4 | nos. |
| 131 | ELBOW-90° | ELBOW SR 90 DEG SCH80 | DN450 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 132 | ELBOW-90° | ELBOW LR 90 DEG SCH20 | DN400 | ASTM A234 WPB | ASME B16.9 | 3 | nos. |
| 133 | ELBOW-90° | ELBOW SR 90 DEG SCH80 | DN400 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 134 | ELBOW-90° | ELBOW LR 90 DEG SCH80 | DN350 | ASTM A234 WPB | ASME B16.9 | 5 | nos. |
| 135 | ELBOW-90° | ELBOW SR 90 DEG SCH80 | DN350 | ASTM A234 WPB | ASME B16.9 | 10 | nos. |
| 136 | ELBOW-90° | ELBOW SR 90 DEG SCH80 | DN300 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 137 | PENETRATION SLEEVE | PIPE SMLS SCH80 | DN400 | ASTM A53 Gr B | ASME B36.10M | 2 | mtr |
| 138 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN550X400 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 139 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN450X350 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |
| 140 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN450X300 | ASTM A234 WPB | ASME B16.9 | 1 | nos. |
| 141 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH80 | DN350X200 | ASTM A234 WPB | ASME B16.9 | 2 | nos. |

| STAINLESS STEEL PIPING - CONSOLIDATED MATERIAL SUMMARY | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Item Type** | **Description** | **Size / Dimensions** | **Material** | **Standard** | **Total Req. Per Ship** | **UOM** |
| 1 | PIPE SMLS | PIPE SMLS SCH40S | DN25 | A312, SS316L | A312, SS316L | 10 | mtr |
| 2 | PIPE SMLS | PIPE SMLS SCH40S | DN40 | A312, SS316L | A312, SS316L | 10 | mtr |
| 3 | PIPE SMLS | PIPE SMLS SCH40S | DN50 | A312, SS316L | A312, SS316L | 27 | mtr |
| 4 | PIPE SMLS | PIPE SMLS SCH40S | DN65 | A312, SS316L | A312, SS316L | 27 | mtr |
| 5 | PENETRATION SLEEVE | PIPE SMLS SCH160S | DN40 | A312, SS316L | A312, SS316L | 2.5 | mtr |
| 6 | PENETRATION SLEEVE | PIPE SMLS SCH160S | DN65 | A312, SS316L | A312, SS316L | 2.5 | mtr |
| 7 | PENETRATION SLEEVE | PIPE SMLS SCH160S | DN80 | A312, SS316L | A312, SS316L | 2.5 | mtr |
| 8 | PENETRATION SLEEVE | PIPE SMLS SCHXXS | DN100 | A312, SS316L | A312, SS316L | 2.5 | mtr |
| 9 | ELBOW-90° | ELBOW LR 90 DEG SCH40S | DN50 | A403, WP304 | A403, WP304 | 16 | nos. |
| 10 | ELBOW-90° | ELBOW LR 90 DEG SCH40S | DN65 | A403, WP304 | A403, WP304 | 15 | nos. |
| 11 | ELBOW-45° | ELBOW LR 45 DEG SCH40S | DN50 | A403, WP304 | A403, WP304 | 8 | nos. |
| 12 | ELBOW-45° | ELBOW LR 45 DEG SCH40S | DN65 | A403, WP304 | A403, WP304 | 5 | nos. |
| 13 | SOCKETWELDED COUPLING | SOCKETWELDED COUPLING 3000# | DN25 | A182, SS304L | A182, SS304L | 8 | nos. |
| 14 | CONCENTRIC REDUCER | CONC.REDUCER BW SCH40S | DN40X25 | A403, WP304 | A403, WP304 | 2 | nos. |
| 15 | FLANGE | FLANGE SLIPON FF PN10 | DN25 | A182, Gr F.304 | A182, Gr F.304 | 18 | nos. |
| 16 | FLANGE | FLANGE SLIPON FF PN10 | DN40 | A182, Gr F.304 | A182, Gr F.304 | 10 | nos. |
| 17 | FLANGE | FLANGE SLIPON FF PN10 | DN50 | A182, Gr F.304 | A182, Gr F.304 | 54 | nos. |
| 18 | FLANGE | FLANGE SLIPON FF PN10 | DN65 | A182, Gr F.304 | A182, Gr F.304 | 50 | nos. |

| CLASS APPROVED PIPING - CONSOLIDATED MATERIAL SUMMARY | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Item Type** | **Description** | **Size / Dimensions** | **Material** | **Standard** | **Total Req. Per Ship** | **UOM** |
| 1 | PIPE - ASTM A106 Gr B | PIPE SMLS SCH 160 | DN80 | ASTM A106 Gr B | ASME B36.10M | 1.5 | mtr |
| 2 | PIPE - ASTM A106 Gr B | PIPE SMLS SCH 80 | DN400 | ASTM A106 Gr B | ASME B36.10M | 1.5 | mtr |
| 3 | PIPE - ASTM A106 Gr B | PIPE SMLS SCH 80 | DN550 | ASTM A106 Gr B | ASME B36.10M | 1.5 | mtr |
| 4 | PIPE - ASTM A53 Gr B | PIPE SMLS SCH80 | DN15 | ASTM A53 Gr B | ASME B36.10M | 1.5 | mtr |
| 5 | PIPE - ASTM A53 Gr B | PIPE SMLS SCHXXS | DN40 | ASTM A53 Gr B | ASME B36.10M | 1.5 | mtr |
| 6 | PIPE - ASTM A53 Gr B | PIPE SMLS SCH80 | DN50 | ASTM A53 Gr B | ASME B36.10M | 1.5 | mtr |
| 7 | PIPE - ASTM A53 Gr B | PIPE SMLS SCHXXS | DN50 | ASTM A53 Gr B | ASME B36.10M | 4.5 | mtr |
| 8 | PIPE - ASTM A53 Gr B | PIPE SMLS SCHXXS | DN65 | ASTM A53 Gr B | ASME B36.10M | 1.5 | mtr |
| 9 | PIPE - ASTM A53 Gr B | PIPE SMLS SCH160 | DN80 | ASTM A53 Gr B | ASME B36.10M | 3 | mtr |
| 10 | PIPE - ASTM A53 Gr B | PIPE SMLS SCH100 | DN200 | ASTM A53 Gr B | ASME B36.10M | 4.5 | mtr |

Encl. 2 Valve and fittings

## List of Valves to be fitted during fitment of pipe spools.

**40 T BP TUG_VALVE DETAILS (IRS APPROVED) FOR 01 VESSEL**

| Sr. No | Type | Size (NB) | End Connection | Body Material | Class | Pr. Rating | IRS Approval | FTF | Qty/ Vessel (Nos.) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | GLOBE | 50 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 230 | 3 |
| 2 | SDNR | 15 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 130 | 3 |
| 3 | SDNR | 40 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 200 | 1 |
| 4 | SDNR | 50 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 230 | 4 |
| 5 | SDNR | 65 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 290 | 1 |
| 6 | SDNR | 80 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 310 | 4 |
| 7 | SDNR | 80 | Flange | Cast Steel | III | PN16 | IRS Unit Approval | 310 | 1 |
| 8 | ANGLE GLOBE | 200 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 275 | 2 |
| 9 | GATE | 50 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | 180 | 2 |
| 10 | HYDRANT | 65 | Flange | Bronze | III | PN10 | IRS/MMD Type Approval | - | 13 |
| 11 | STROM VALVE | 50 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | - | 2 |
| 12 | STROM VALVE | 80 | Flange | Cast Steel | III | PN10 | IRS Unit Approval | - | 1 |

**40 T BP TUG_VALVE DETAILS (NON-CLASS) FOR 01 VESSEL**

| Sr. No | Type | Size (NB) | Pr. Rating | Class | End Connection | Fluid | Body Material | FTF | Qty/ Vessel (Nos.) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | BALL VALVE | 40 | PN10 | III | Flange | Portable Water | Nodular Cast Iron | 140 | 2 |
| 2 | BALL VALVE | 50 | PN10 | III | Flange | Portable Water | Nodular Cast Iron | 150 | 2 |
| 3 | SDNR VALVE | 50 | PN10 | III | Flange | Bilge Water/Sea Water | Nodular Cast Iron | 230 | 2 |
| 4 | SDNR VALVE | 65 | PN10 | III | Flange | Bilge Water/Sea Water | Nodular Cast Iron | 290 | 5 |
| 5 | GATE VALVE | 65 | PN10 | III | Flange | Bilge Water/Sea Water | Cast Steel | 170 | 4 |
| 6 | GATE VALVE | 65 | PN10 | III | Flange | Bilge Water/Sea Water | Nodular Cast Iron | 170 | 1 |
| 7 | GATE VALVE | 32 | PN10 | III | Flange | Sea Water | Cast Steel | 130 | 3 |
| 8 | GATE VALVE | 25 | PN10 | III | Flange | Sea Water | Cast Steel | 125 | 2 |
| 9 | GATE VALVE | 50 | PN10 | III | Flange | Sea Water | Cast Steel | 150 | 4 |
| 10 | SDNR VALVE | 100 | PN10 | III | Flange | Bilge Water/Sea Water | Cast Steel | 350 | 1 |
| 11 | SDNR VALVE | 65 | PN10 | III | Flange | Bilge Water/Sea Water | Cast Steel | 290 | 2 |
| 12 | BALL VALVE | 25 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | 125 | 8 |
| 13 | GATE VALVE | 80 | PN10 | III | Flange | Fuel Oil | Cast Steel | 180 | 2 |
| 14 | PRESSURE RELIEF (2.8 BAR) | 80 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | - | 1 |
| 15 | GATE VALVE | 50 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | 150 | 20 |
| 16 | SDNR VALVE | 50 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | 230 | 2 |
| 17 | QUICK CLOSING VALVE | 50 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | - | 4 |
| 18 | GATE VALVE | 15 | PN10 | III | Socket weld | Fuel Oil | Nodular Cast Iron | | 1 |
| 19 | QUICK CLOSING VALVE | 40 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | - | 2 |
| 20 | BALL VALVE | 40 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | 140 | 1 |
| 21 | GLOBE VALVE (WITH SPRING OPERATOR) | 20 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | - | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 22 | BALL VALVE | 15 | PN10 | III | Socket weld | Fuel Oil | Nodular Cast Iron | | 1 |
| 23 | BALL VALVE | 15 | PN10 | III | Threaded | Fuel Oil | Nodular Cast Iron | | 1 |
| 24 | SWING CHECK VALVE (THREADED ENDS) | 15 | PN10 | III | Threaded | Fuel Oil | Nodular Cast Iron | 60 | 2 |
| 25 | SWING CHECK VALVE (THREADED ENDS) | 8mm | PN10 | III | Threaded | Fuel Oil | Nodular Cast Iron | 60 | 2 |
| 26 | BALL VALVE | 32 | PN10 | III | Flange | Fuel Oil | Nodular Cast Iron | 130 | 3 |
| 27 | GATE VALVE | 50 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | 150 | 4 |
| 28 | BALL VALVE | 50 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | 150 | 2 |
| 29 | BUTTERFLY VALVE | 50 | PN10 | III | Lug type | Fresh Water | Nodular Cast Iron | 43 | 6 |
| 30 | BALL VALVE | 50 | PN16 | III | Flange | Sea Water | Cast Steel | 150 | 1 |
| 31 | BUTTERFLY VALVE | 150 | PN16 | III | Lug type | Sea Water | Cast Steel | 56 | 3 |
| 32 | SWING CHECK VALVE (SHORT TYPE) | 150 | PN16 | III | Flange | Sea Water | Cast Steel | 200 | 1 |
| 33 | SWING CHECK VALVE (SHORT TYPE) | 80 | PN16 | III | Flange | Sea Water | Cast Steel | 125 | 1 |
| 34 | BUTTERFLY VALVE | 80 | PN16 | III | Lug type | Sea Water | Cast Steel | 46 | 3 |
| 35 | BALL VALVE | 25 | PN16 | III | Flange | Sea Water | Cast Steel | 125 | 1 |
| 36 | BUTTERFLY VALVE | 200 | PN10 | III | Lug type | Sea Water | Cast Steel | 60 | 3 |
| 37 | BUTTERFLY VALVE | 65 | PN10 | III | Lug type | Sea Water | Cast Steel | 46 | 5 |
| 38 | BUTTERFLY VALVE | 50 | PN10 | III | Lug type | Sea Water | Cast Steel | 43 | 7 |
| 39 | BUTTERFLY VALVE | 100 | PN10 | III | Lug type | Sea Water | Cast Steel | 52 | 2 |
| 40 | BUTTERFLY VALVE | 40 | PN10 | III | Lug type | Sea Water | Cast Steel | 33 | 1 |
| 41 | DUAL PLATE CHECK VALVE | 65 | PN10 | III | Flange | Sea Water | Cast Steel | 54 | 1 |
| 42 | BALL VALVE | 40 | PN10 | III | Flange | Sea Water | Cast Steel | 140 | 10 |
| 43 | GLOBE VALVE | 40 | PN10 | III | Flange | Sea Water | Cast Steel | 200 | 3 |
| 44 | BALL VALVE | 32 | PN10 | III | Flange | Sea Water | Cast Steel | 130 | 1 |
| 45 | GLOBE VALVE | 32 | PN10 | III | Flange | Sea Water | Cast Steel | 180 | 1 |
| 46 | BALL VALVE | 20 | PN10 | III | Flange | Sea Water | Cast Steel | 120 | 2 |
| 47 | GLOBE VALVE | 20 | PN10 | III | Flange | Sea Water | Cast Steel | 150 | 2 |
| 48 | BUTTERFLY VALVE | 80 | PN10 | III | Lug type | Sea Water | Cast Steel | 46 | 2 |
| 49 | BUTTERFLY VALVE | 65 | PN10 | III | Lug type | Fresh Water | Nodular Cast Iron | 46 | 6 |
| 50 | BALL VALVE | 20 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | 120 | 4 |
| 51 | BALL VALVE | 15 | PN10 | III | Threaded | Fresh Water | Nodular Cast Iron | 64.7 | 3 |
| 52 | BALL VALVE | 25 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | 125 | 2 |
| 53 | BALL VALVE | 40 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | 140 | 12 |
| 54 | GLOBE VALVE (WITH SPRING OPERATOR) | 25 | PN10 | III | Flange | Lube oil | Nodular Cast Iron | 160 | 1 |
| 55 | GLOBE VALVE | 25 | PN10 | III | Flange | Lube oil | Nodular Cast Iron | 160 | 2 |
| 56 | BALL VALVE | 25 | PN10 | III | Flange | Lube oil | Nodular Cast Iron | 125 | 9 |
| 57 | GLOBE VALVE | 40 | PN10 | III | Flange | Lube oil | Nodular Cast Iron | 200 | 2 |
| 58 | GLOBE VALVE | 80 | PN10 | III | Flange | Lube oil | Nodular Cast Iron | 310 | 2 |
| 59 | GLOBE VALVE | 15 | PN10 | III | Flange | Lube oil | Nodular Cast Iron | 130 | 2 |
| 60 | SDNR VALVE | 80 | PN10 | III | Flange | Lube oil | Nodular Cast Iron | 310 | 2 |
| 61 | BALL VALVE | 15 | PN10 | III | Threaded | Lube oil | Nodular Cast Iron | - | 8 |
| 62 | BALL VALVE | 65 | PN10 | III | Flange | Oily water | Nodular Cast Iron | 170 | 1 |
| 63 | BALL VALVE | 40 | PN10 | III | Flange | Oily water | Nodular Cast Iron | 140 | 6 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 64 | GLOBE VALVE-WEIGHTED CLOSE | 25 | PN10 | III | Flange | Oily water | Nodular Cast Iron | 160 | 1 |
| 65 | SWING CHECK VALVE (SHORT TYPE) | 25 | PN10 | III | Flange | Oily water | Nodular Cast Iron | 70 | 1 |
| 66 | BALL VALVE | 25 | PN10 | III | Threaded | Oily water | Nodular Cast Iron | - | 3 |
| 67 | BALL VALVE | 40 | PN10 | III | Flange | Sludge | Nodular Cast Iron | 140 | 5 |
| 68 | SWING CHECK VALVE (SHORT TYPE) | 40 | PN10 | III | Flange | Oily water | Nodular Cast Iron | 80 | 1 |
| 69 | SDNR VALVE | 40 | PN10 | III | Flange | Oily water | Nodular Cast Iron | 200 | 1 |
| 70 | SWING CHECK VALVE (SHORT TYPE) | 25 | PN10 | III | Threaded | Oily water | Nodular Cast Iron | 70 | 1 |
| 71 | SWING CHECK VALVE (SHORT TYPE) | 25 | PN10 | III | Flange | Sludge | Nodular Cast Iron | 70 | 2 |
| 72 | SWING CHECK VALVE (SHORT TYPE) | 20 | PN10 | III | Flange | Sludge | Nodular Cast Iron | 65 | 1 |
| 73 | GLOBE VALVE-WEIGHTED CLOSE | 25 | PN10 | III | Flange | Sludge | Nodular Cast Iron | 160 | 1 |
| 74 | GLOBE VALVE | 25 | PN10 | III | Flange | Sludge | Nodular Cast Iron | 160 | 1 |
| 75 | SWING CHECK VALVE (SHORT TYPE) | 40 | PN10 | III | Flange | Sludge | Nodular Cast Iron | 80 | 1 |
| 76 | SDNR VALVE | 25 | PN10 | III | Flange | Dispersant | Bronze | 160 | 2 |
| 77 | BALL VALVE | 25 | PN10 | III | Flange | Dispersant | Stainless steel | 125 | 3 |
| 78 | BALL VALVE | 25 | PN40 | III | Flange | Air | Nodular Cast Iron | 125 | 4 |
| 79 | SWING CHECK VALVE (SHORT TYPE) | 25 | PN40 | III | Flange | Air | Nodular Cast Iron | 70 | 2 |
| 80 | BALL VALVE | 10 | PN40 | III | Threaded | Air | Nodular Cast Iron | | 2 |
| 81 | SDNR VALVE | 40 | PN40 | III | Flange | Air | Nodular Cast Iron | 200 | 2 |
| 82 | BALL VALVE | 8mm | PN40 | III | Threaded | Air | Cast steel | | 12 |
| 83 | BALL VALVE | 25 | PN10 | III | Flange | Air | Nodular Cast Iron | 125 | 11 |
| 84 | BALL VALVE | 15 | PN10 | III | Flange | Air | Nodular Cast Iron | 115 | 8 |
| 85 | PRESSURE RELIEF (7.7 BAR) | 25 | PN10 | III | Flange | Air | Nodular Cast Iron | - | 1 |
| 86 | PRESSURE REDUCING, (7 BAR - 30 BAR) | 25 | PN10 | III | Flange | Air | Nodular Cast Iron | - | 2 |
| 87 | PRESSURE RELIEF (1.1 BAR) | 25 | PN10 | III | Flange | Air | Nodular Cast Iron | - | 1 |
| 88 | PRESSURE REDUCING, (1 BAR - 7 BAR) | 25 | PN10 | III | Flange | Air | Nodular Cast Iron | - | 2 |
| 89 | BALL VALVE | 25 | PN10 | III | Threaded | Fresh Water | Nodular Cast Iron | 84.8 | 2 |
| 90 | SWING CHECK VALVE (SHORT TYPE) | 40 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | 80 | 2 |
| 91 | GLOBE VALVE | 40 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | 200 | 2 |
| 92 | SDNR VALVE | 40 | PN10 | III | Flange | Sea Water | Cast Steel | 200 | 2 |
| 93 | PRESSURE RELIEF VALVE (3.9 BAR) | 40 | PN10 | III | Flange | Fresh Water | Nodular Cast Iron | - | 2 |
| 94 | GATE VALVE | 100 | PN10 | III | Flange | Black water | Cast Steel | 170 | 2 |
| 95 | DUAL PLATE CHECK VALVE | 100 | PN10 | III | Flange | Black water | Cast Steel | 64 | 1 |
| 96 | DUAL PLATE CHECK VALVE | 50 | PN10 | III | Flange | Black water | Cast Steel | 54 | 1 |
| 97 | BALL VALVE | 50 | PN10 | III | Flange | Black water | Cast Steel | 150 | 2 |
| 98 | GATE VALVE | 50 | PN10 | III | Flange | Black water | Cast Steel | 150 | 5 |
| 99 | SDNR VALVE | 50 | PN10 | III | Flange | Black water | Cast Steel | 230 | 1 |
| 100 | GATE VALVE | 80 | PN10 | III | Flange | Grey water | Cast Steel | 180 | 3 |
| 101 | DUAL PLATE CHECK VALVE | 80 | PN10 | III | Flange | Grey water | Cast Steel | 54 | 1 |
| 102 | GATE VALVE | 50 | PN10 | III | Flange | Grey water | Cast Steel | 150 | 1 |
| 103 | BALL VALVE | 20 | PN10 | III | Threaded | Drain water | Cast Steel | 73.4 | 4 |

## BOM of Pipe Supports to be fabricated and fitted during fitment of pipe spools.

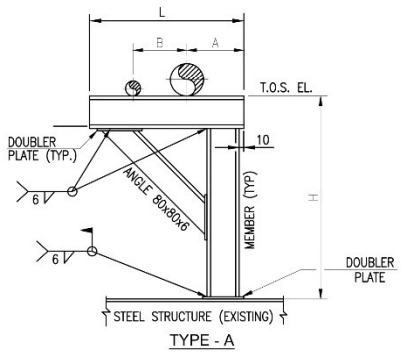
| SUPPORT MEMBER | | | | | |
|---|---|---|---|---|---|
| **SL.NO.** | **TYPE** | **SIZE** | **TOTAL LENGTH(m)** | **QTY.** | **WEIGHT(kg)** |
| 1 | L ANGLE | L 75x75x6 | 3383 | - | 23174 |
| 2 | L ANGLE | L 50x50x6 | 12 | - | 54 |
| 3 | FLAT BAR | 50x8 | 1173 | - | 2762 |
| 4 | FLAT BAR | 60x10 | 3 | - | 14 |
| 5 | FLAT BAR | 75x10 | 5 | - | 29 |
| 6 | FLAT BAR | 100x10 | 24 | - | 188 |
| 7 | DOUBLER PLATE | 100x100x10 | - | 272 | 214 |

| U BOLT | | | | | |
|---|---|---|---|---|---|
| **SL.NO.** | **PIPE SIZE** | **U BOLT SIZE** | **U BOLT QTY.** | **NUT QTY.** | **WASHER QTY.** |
| 1 | DN15 | M6 | 1 | 4 | 2 |
| 2 | DN25 | M6 | 20 | 80 | 40 |
| 3 | DN32 | M10 | 2 | 8 | 4 |
| 4 | DN40 | M10 | 28 | 112 | 56 |
| 5 | DN50 | M10 | 89 | 356 | 178 |
| 6 | DN65 | M12 | 40 | 164 | 80 |
| 7 | DN80 | M12 | 26 | 114 | 52 |
| 8 | DN100 | M12 | 3 | 12 | 6 |

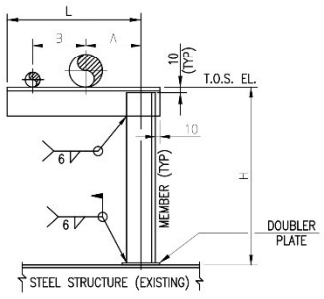
| U CLAMP | | | | | | |
|---|---|---|---|---|---|---|
| **SL.NO.** | **PIPE SIZE** | **U CLAMP QTY.** | **BOLT SIZE** | **BOLT QTY.** | **NUT QTY.** | **WASHER QTY.** |
| 1 | Ø10 | 8 | M6 | 8 | 8 | 8 |
| 2 | DN15 | 18 | M6 | 18 | 18 | 18 |
| 3 | DN20 | 10 | M6 | 10 | 10 | 10 |
| 4 | DN25 | 38 | M6 | 38 | 38 | 38 |
| 5 | DN32 | 16 | M10 | 16 | 16 | 16 |
| 6 | DN40 | 92 | M10 | 92 | 92 | 92 |
| 7 | DN50 | 78 | M10 | 78 | 78 | 78 |
| 8 | DN65 | 60 | M12 | 60 | 60 | 60 |
| 9 | DN80 | 56 | M12 | 56 | 56 | 56 |
| 10 | DN100 | 4 | M12 | 4 | 4 | 4 |
| 11 | DN200 | 2 | M16 | 2 | 2 | 2 |
| 12 | DN350 | 12 | M16 | 12 | 12 | 12 |

## Pipe Support Sample Drawings: -

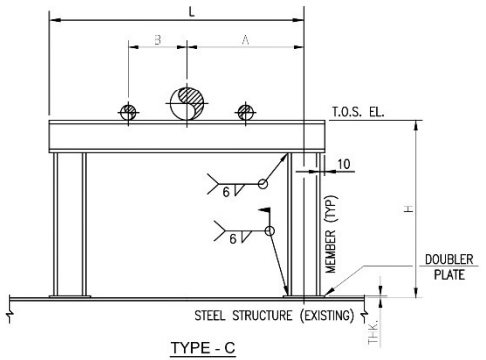
# GOAL POST SUPPORT (GP-01)




TYPE - A




TYPE - B




TYPE - C

| SUPPORT MEMBER | | H (MAX.) | L (MAX.) | MAX. LOAD |
|---|---|---|---|---|
| REF. | SIZE | NOTE 1 | NOTE 1 | IN KG. |
| 1 | ANGLE 100x100x10 | 750mm | 500mm | 610 |
| 2 | ANGLE 80x80x8 | 500mm | 300mm | 250 |
| 3 | ANGLE 80x80x6 | 500mm | 300mm | 230 |
| 4 | UPN-100x50x10.6 | 750mm | 500mm | 1525 |
| 5 | CHANNEL 152x76x18 | 1000mm | 600mm | 2030 |
| 6 | CHANNEL 203x76x24 | 2500mm | 1500mm | 1020 |

| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | STEEL/PROFILE | ASTM A36 |
| 2 | PLATE | ASTM A36 |

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. DIMENSIONS A, B TO BE FOLLOWED AS PER PIPNG GA



All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
| -- | - | - | - | - |

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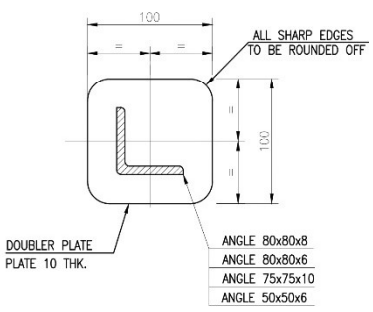
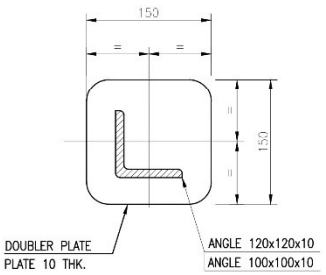
| | |
|---|---|
| Client | --- |
| Project / Vessel | --- |
| Drawing Name | STANDARD SUPPORT DRAWING |

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 10 OF 10 | 1:1 | A3 |

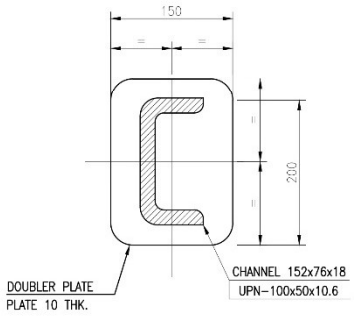
# DOUBLER PLATE (DP-01)

TYPE - A

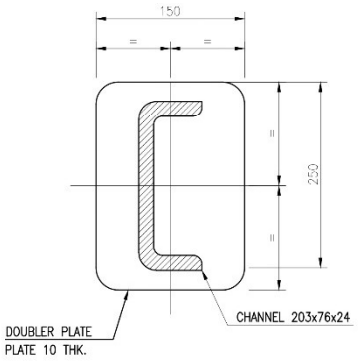


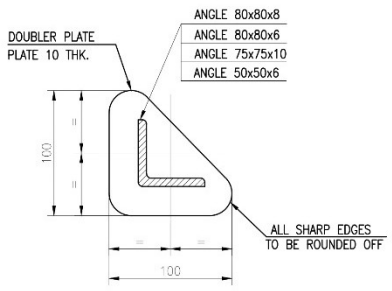

TYPE - A



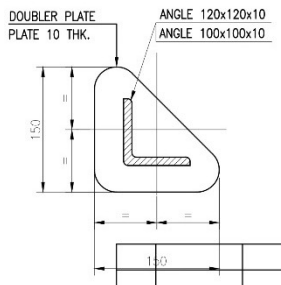

TYPE - B




TYPE - C




TYPE -D






All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
| -- | - | - | - | - |

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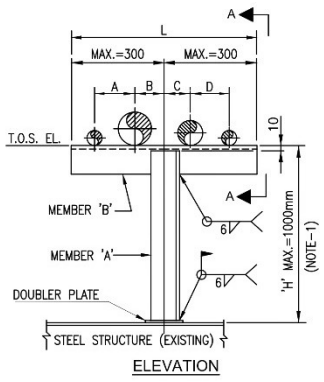
| | |
|---|---|
| Client | --- |
| Project / Vessel | --- |
| Drawing Name | STANDARD SUPPORT DRAWING |

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 9 OF 10 | 1:1 | A3 |

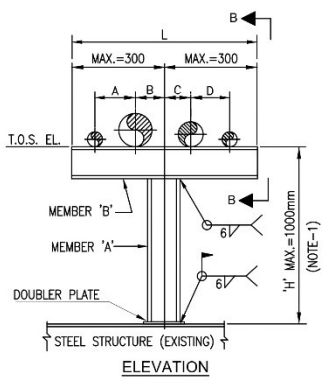
# T-POST SUPPORT-1 (TP-01)

TYPE - A




ELEVATION

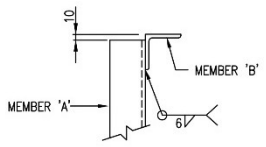
TYPE - B



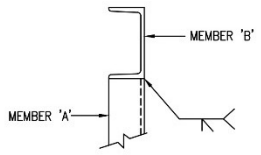

ELEVATION

| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | STEEL/PROFILE | ASTM A36 |
| 2 | PLATE | ASTM A36 |

| SUPPORT MEMBER | | | MAX. LOAD IN KG. |
|---|---|---|---|
| REF. | MEMBER 'A' | MEMBER 'B' | |
| 1 | ANGLE 80x80x8 | ANGLE 80x80x8 | 305 |
| 2 | ANGLE 120x120x10 | ANGLE 100x100x10 | 760 |
| 3 | CHANNEL 152x76x18 | CHANNEL 152x76x18 | 510 |




VIEW A-A




VIEW B-B

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. DIMENSIONS A, B, C, D TO BE FOLLOWED AS PER PIPNG GA



All dimensions in mm unless noted otherwise; Do not scale the drawing

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| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
| -- | - | - | - | - |

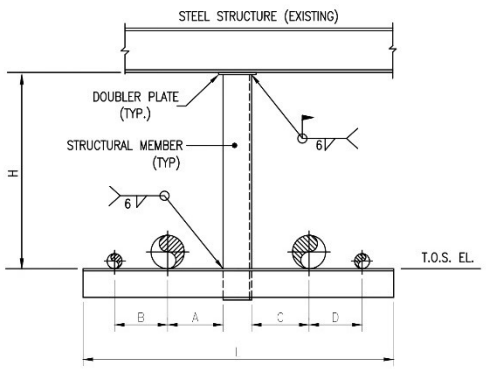
Client: ---

Project / Vessel: ---

Drawing Name: STANDARD SUPPORT DRAWING

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 8 OF 10 | 1:1 | A3 |

# HANGER REVERSE 'T' TYPE SUPPORT (HS-02)




ELEVATION

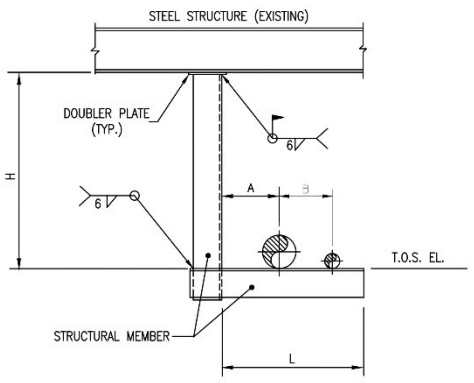
| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | PLATE | ASTM A36 |
| 2 | ANGLE | ASTM A36 |

| MEMBER SIZE REF. | SIZE OF STRUCTURAL MEMBER | MAX. HEIGHT 'H' (NOTE-1) | MAX. LENGTH 'L' (NOTE-1) | MAX. LOAD IN KG |
|---|---|---|---|---|
| 1 | ANGLE 80x80x8 | 500mm | 300mm | 300 |
| 2 | ANGLE 100x100x10 | 750mm | 500mm | 400 |
| 3 | CHANNEL 152x76x18 | 1000mm | 600mm | 500 |

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. DIMENSIONS A, B, C, D TO BE FOLLOWED AS PER PIPNG GA

# HANGER `L' TYPE SUPPORT (HS-03)




ELEVATION

| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | PLATE | ASTM A36 |
| 2 | ANGLE | ASTM A36 |

| MEMBER SIZE REF. | SIZE OF STRUCTURAL MEMBER | MAX. HEIGHT 'H' (NOTE-1) | MAX. LENGTH 'L' (NOTE-1) | MAX. LOAD IN KG |
|---|---|---|---|---|
| 1 | ANGLE 80x80x8 | 500mm | 300mm | 300 |
| 2 | ANGLE 100x100x10 | 750mm | 500mm | 400 |
| 3 | CHANNEL 152x76x18 | 1000mm | 600mm | 500 |

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. DIMENSIONS A, B TO BE FOLLOWED AS PER PIPNG GA



All dimensions in mm unless noted otherwise; Do not scale the drawing

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| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
| -- | - | - | - | - |

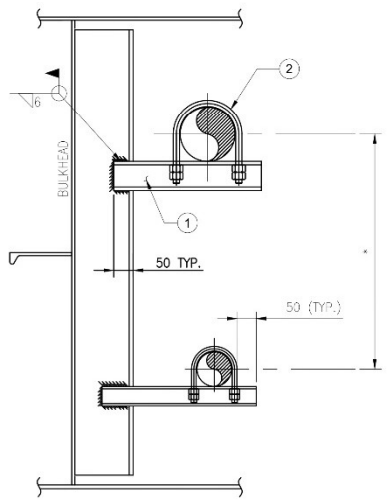
Client: ---

Project / Vessel: ---

Drawing Name: STANDARD SUPPORT DRAWING

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 7 OF 10 | 1:1 | A3 |

# CANTILEVER SUPPORT-4 (CL-04)




**MATERIAL SELECTION MATRIX**

| PIPE SIZE (INCH) | NO. OF PIPES | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 3/8" | A | A | A | A |
| ½" | A | A | A | A |
| 1" | A | A | A | A |
| 1¼" | A | A | A | A |
| 1½" | A | A | A | A |
| 2" | A | A | A | A |
| 2½" | A | A | A | A |
| 3" | A | A | A | A |
| 4" | A | A | A | B |
| 5" | B | B | B | B |
| 6" | B | B | C | C |
| 8" | B | B | C | C |
| 10" | C | C | D | D |

**ITEMS LIST**

| ITEM | QTY | DESCRIPTION |
|---|---|---|
| 1 | 1 | ANGLE/CHANNEL, GR A-36 OR SIM. (SEE TABLE) |
| 2 | 1 | U-BOLT (SEE STD UB-02) |

**KEY TO MATERIALS**

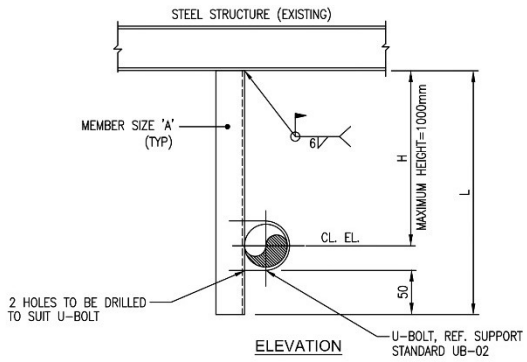
| IDENT. | ANGLE/CHANNEL SIZE |
|---|---|
| A | L50 x 50 x 6 |
| B | L75 x 75 x 9 |
| C | L100 x 100 x 13 |
| D | C150 x 65 x 18.8 |

NOTE

1. ALL SHARP CORNERS SHALL BE ROUNDED OFF.



# HANGER SUPPORT (HS-01)




ELEVATION

| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | ANGLE | ABS GR. AH36 OR EQUAL |
| | | |

| MEMBER SIZE REF. | SIZE OF STRUCTURAL MEMBER | MAX. HEIGHT 'H' | MAX. LOAD IN KG. |
|---|---|---|---|
| 1 | ANGLE 90x90x8 | 750mm | 813 |
| 2 | ANGLE 100x100x10 | 1000mm | 915 |

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.

All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
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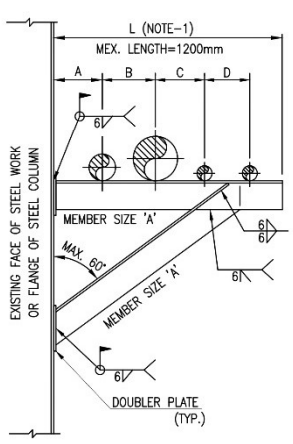
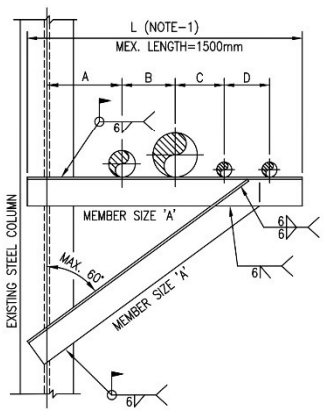
| | |
|---|---|
| Client | --- |
| Project / Vessel | --- |
| Drawing Name | STANDARD SUPPORT DRAWING |

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 6 OF 10 | 1:1 | A3 |

# CANTILEVER SUPPORT-3 (CL-03)




CONNECTION TYPE-A




CONNECTION TYPE-B

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. DIMENSIONS A, B, C, D TO BE FOLLOWED AS PER PIPNG GA

| MEMBER SIZE REF. | SIZE OF STRUCTURAL MEMBER 'A' | MAX. LOAD IN KG |
|---|---|---|
| 1 | ANGLE 80x80x8 | 407 |
| 2 | ANGLE 100x100x10 | 508 |
| 4 | CHANNEL 152x76x18 | 814 |

| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | ANGLE | ASTM A36 |
| 2 | CHANNEL | ASTM A36 |



All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
| | | | | |
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| -- | - | - | - | - |

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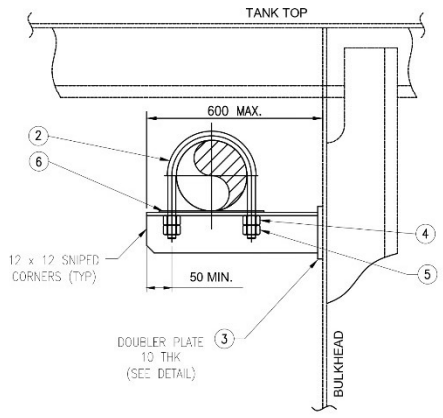
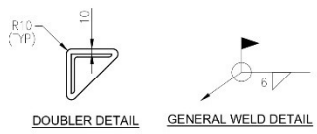
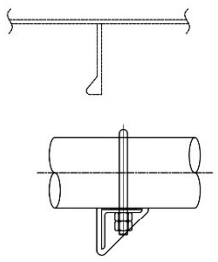
| | |
|---|---|
| Client | --- |
| Project / Vessel | --- |
| Drawing Name | STANDARD SUPPORT DRAWING |

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 5 OF 10 | 1:1 | A3 |

# CANTILEVER SUPPORT-2 (CL-02)



MATERIAL SELECTION MATRIX

| PIPE SIZE (INCH) | NO. OF PIPES | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 3/8" | A | A | A | A |
| ½" | A | A | A | A |
| 1" | A | A | A | A |
| 1¼" | A | A | A | A |
| 1½" | A | A | A | A |
| 2" | A | A | A | A |
| 2½" | A | A | A | A |
| 3" | A | A | A | A |
| 4" | A | A | A | B |
| 5" | B | B | B | B |
| 6" | B | B | C | C |
| 8" | B | B | C | C |
| 10" | C | C | D | D |

ITEMS LIST

| ITEM | QTY. | DESCRIPTION |
|---|---|---|
| 1 | – | ANGLE/CHANNEL, GR A-36 OR SIM. |
| 2 | – | 'U' BOLT AND 4 HEX NUTS (REF STD P2A) |
| 3 | – | DOUBLER PLT, GR A-36 OR SIM. |
| 4 | – | NUTS (REF STD P2A) |
| 5 | – | LOCKNUTS (REF STD P2A) |
| 6 | – | PAD (REF STD P2A) |

NOTES

1. 'U' BOLT HOT DIP GALVANISED OR EQUIVALENT.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. CARE TO BE TAKEN WHEN LOCATING SUPPORTS, TO ENSURE ALIGNMENT WITH STRUCTURAL MEMBERS.

KEY TO MATERIALS

| IDENT. | ANGLE/CHANNEL SIZE | DOUBLER SIZE |
|---|---|---|
| A | L50 x 50 x 6 | 80 x 80 x 10 |
| B | L75 x 75 x 9 | 110 x 110 x 10 |
| C | L100 x 100 x 13 | 125 x 125 x 10 |
| D | C160 x 65 x 18.8 | 190 x 90 x 10 |



All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
| -- | - | - | - | - |

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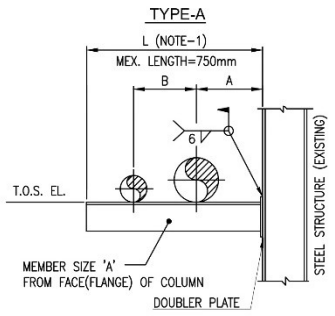
Client: ---

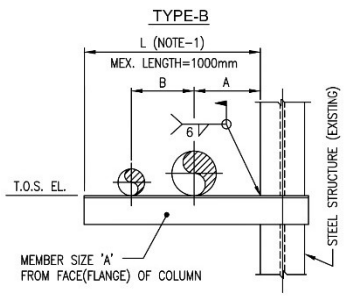
Project / Vessel: ---

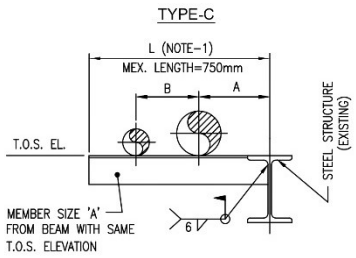
Drawing Name: STANDARD SUPPORT DRAWING

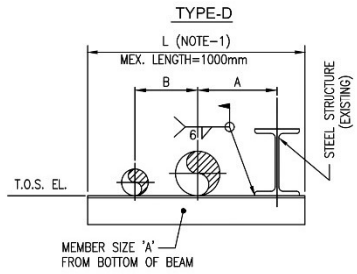
| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 4 OF 10 | 1:1 | A3 |

# CANTILEVER SUPPORT-1 (CL-01)




| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | ANGLE | ASTM A36 |

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. DIMENSIONS A, B TO BE FOLLOWED AS PER PIPNG GA

| MEMBER SIZE REF. | SIZE OF STRUCTURAL MEMBER 'A' | MAX. LOAD IN KG. |
|---|---|---|
| 1 | ANGLE 80x80x8 | 110 |
| 2 | ANGLE 100x100x10 | 151 |
| 3 | ANGLE 120x120x10 | 305 |



All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
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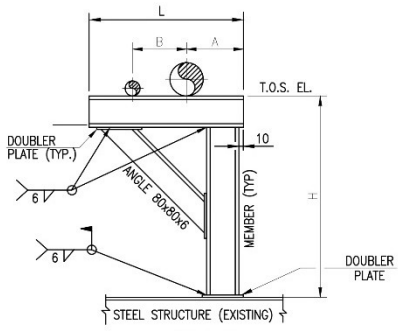
Client: ---

Project / Vessel: ---

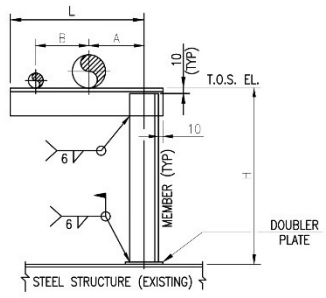
Drawing Name: STANDARD SUPPORT DRAWING

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 3 OF 10 | 1:1 | A3 |

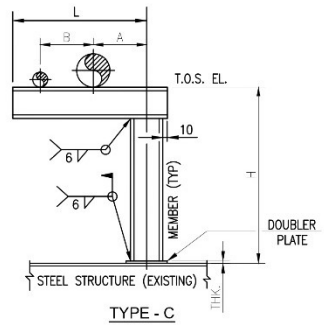
# ANGLE POST SUPPORT (AP-01)



TYPE - A



TYPE - B



TYPE - C

| ITEM NO. | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | STEEL/PROFILE | ASTM A36 |
| 2 | PLATE | ASTM A36 |

| SUPPORT MEMBER | | H (MAX.) | L (MAX.) | MAX. LOAD |
|---|---|---|---|---|
| REF. | SIZE | NOTE 1 | NOTE 1 | IN KG. |
| 1 | ANGLE 100x100x10 | 750mm | 500mm | 610 |
| 2 | ANGLE 80x80x8 | 500mm | 300mm | 250 |
| 3 | ANGLE 80x80x6 | 500mm | 300mm | 230 |
| 4 | UPN-100x50x10.6 | 750mm | 500mm | 1525 |
| 5 | CHANNEL 152x76x18 | 1000mm | 600mm | 2030 |
| 6 | CHANNEL 203x76x24 | 2500mm | 1500mm | 1020 |

NOTES

1. MAXIMUM DIMENSION OF SUPPORT AND LOAD GIVEN IN THE TABLE FOR GUIDANCE ONLY. FOR LOWER LOAD MAXIMUM DIMENSION CAN BE INCREASED PROPORTIONATE TO THE MAXIMUM ALLOWABLE LOAD.
2. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
3. DOUBLER PLATE IS APPLICABLE ONLY WHEN SUPPORT IS WELDED ON BULKHEAD.
4. FOR DOUBLER PLATE, REFER STANDARD DP01
5. DIMENSIONS A, B TO BE FOLLOWED AS PER PIPNG GA



All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
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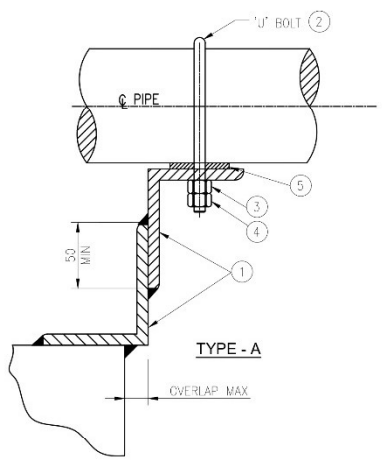
Client: ---

Project / Vessel: ---

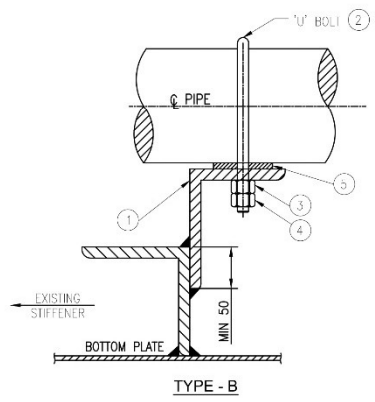
Drawing Name: STANDARD SUPPORT DRAWING

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 2 OF 10 | 1:1 | A3 |

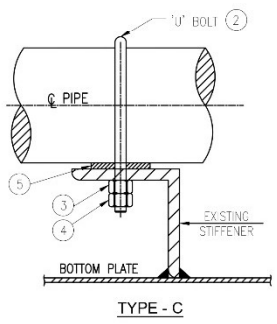
# PIPING SUPPORT (PS01)



TYPE - A



TYPE - B



TYPE - C

ITEMS LIST

| ITEM | QTY | DESCRIPTION |
|---|---|---|
| 1 | 2 | ANGLE BAR, GR A-36 OR SIM. |
| 2 | 1 | U-BOLT (SEE STD UB-02) |
| 3 | 2 | NUTS ( SEE STD UB-02) |
| 4 | 2 | LOCKNUTS (SEE STD UB-02) |
| 5 | 1 | |

| PIPE SIZE (INCH) | MAX OVERLAP ALLOWABLE (mm) | | |
|---|---|---|---|
| | L50x50x6 | L75x75x9 | L100x100x7 |
| 2" | 25 | 55 | 75 |
| 2½" | 25 | 55 | 75 |
| 3" | 25 | 55 | 75 |
| 4" | 25 | 55 | 75 |
| 5" | 25 | 55 | 75 |
| 6" | 25 | 55 | 75 |
| 8" | 25 | 55 | 75 |
| 10" | 25 | 40 | 75 |



All dimensions in mm unless noted otherwise; Do not scale the drawing

| Rev | Date | Drawn | Checked | Revision Subject |
|---|---|---|---|---|
| -- | - | - | - | - |

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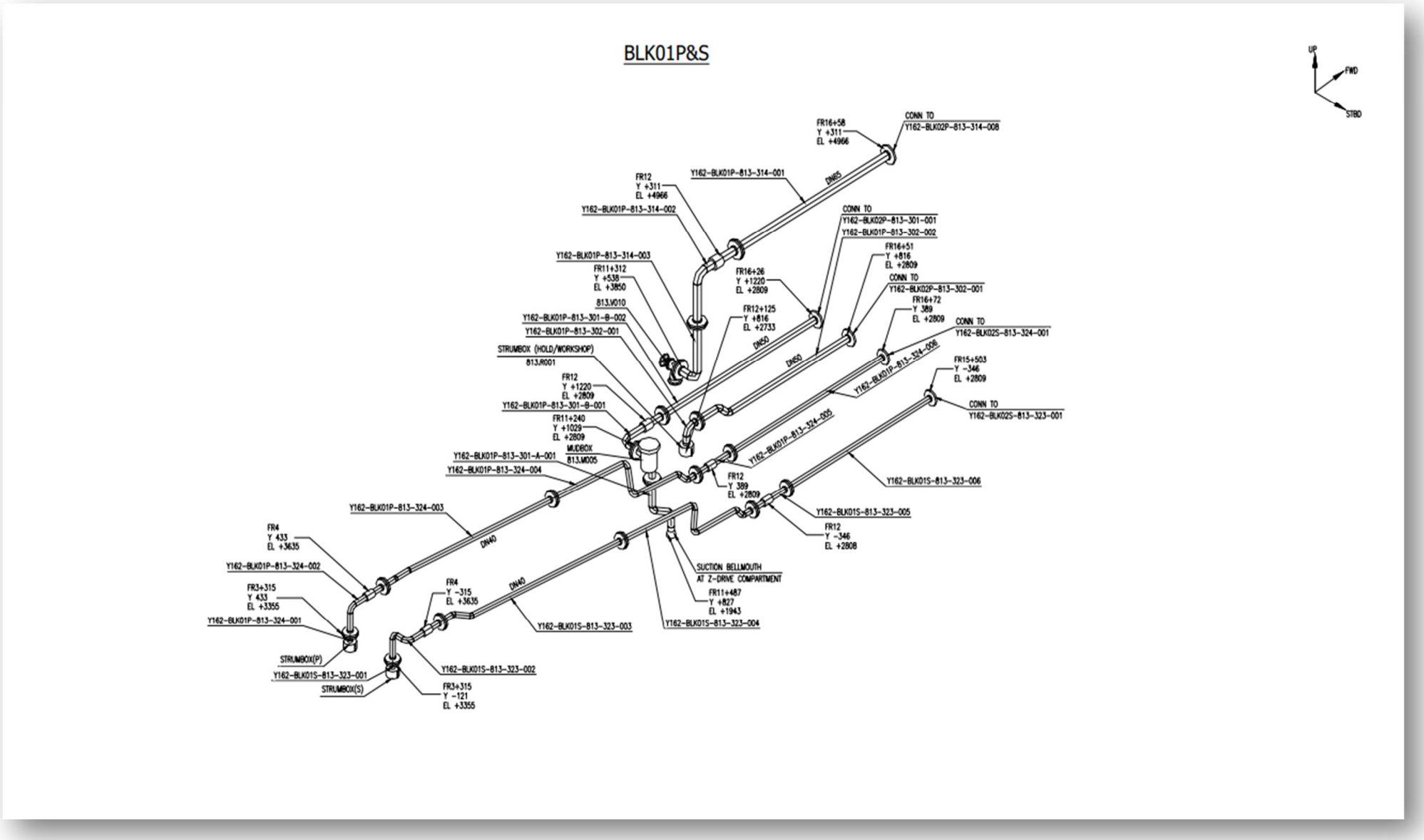
Client: ---

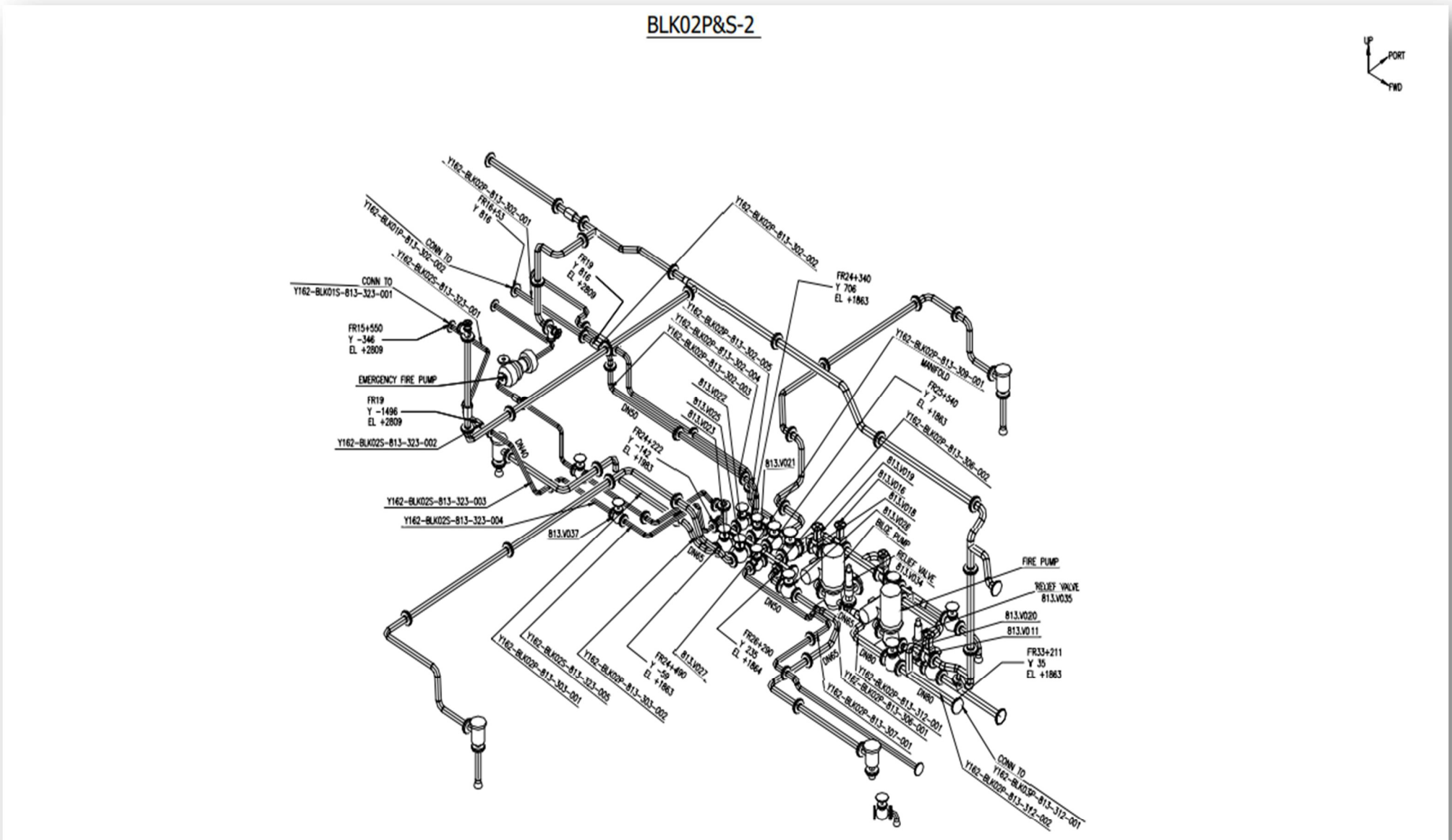
Project / Vessel: ---

Drawing Name: STANDARD SUPPORT DRAWING

| Drawing No: | Rev | Sheet | Scale | Size |
|---|---|---|---|---|
| -- | - | 1 OF 10 | 1:1 | A3 |

## Isometric piping arrangement Sample Drawings: -



# Encl 3 Penetration List

**PRTELIMINARY PENETRATION LIST - TUG PROJECT / VESSEL**

| SL. NO. | PEN NO. | PEN TYPE | SYSTEM | BLOCK NO. | PIPE SIZE | CUT OUT SIZE | X | Y | Z | PENETRATION SURFACE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PN-TW-01 | TYPE-2 | TECHNICAL WATER | 1 | DN50 | 96 | FR.4 | PS 150 | 3700 ABL | BHD |
| 2 | PN-TW-02 | TYPE-2 | TECHNICAL WATER | 1 | DN50 | 96 | FR.4 | SB 150 | 3700 ABL | BHD |
| 3 | PN-MC-01 | OBD | MACHINERY COOLING | 1 | DN80 | 95 | FR.10 + 275 | SB | 4100 ABL | SIDE SHELL |
| 4 | PN-MC-02 | OBD | MACHINERY COOLING | 1 | DN50 | 66 | FR.12-274 | SB | 4100 ABL | SIDE SHELL |
| 5 | PN-MC-03 | OBD | MACHINERY COOLING | 1 | DN80 | 95 | FR.11-274 | PS | 4100 ABL | SIDE SHELL |
| 6 | PN-MC-04 | OBD | MACHINERY COOLING | 1 | DN50 | 66 | FR.12-274 | PS | 4100 ABL | SIDE SHELL |
| 7 | PN-MC-05 | TYPE-1 | MACHINERY COOLING | 1 | DN80 | 120 | FR.13 | SB 1834 | 2327 ABL | BHD |
| 8 | PN-MC-01 | TYPE-1 | MACHINERY COOLING | 1 | DN80 | 120 | FR.13 | SB 1355 | 2125 ABL | BHD |
| 9 | PN-TW-03 | TYPE-1 | TECHNICAL WATER | 1 | DN50 | 96 | FR.13 | SB 1925 | 2120 ABL | BHD |
| 10 | PN-TW-04 | TYPE-1 | TECHNICAL WATER | 1 | DN50 | 96 | FR.13 | SB 1735 | 2120 ABL | BHD |
| 11 | PN-MC-07 | TYPE-1 | MACHINERY COOLING | 1 | DN50 | 96 | FR.13 | SB 3054 | 4755 ABL | BHD |
| 12 | PN-FO-01 | TYPE-1 | FUEL OIL | 1 | DN80 | 120 | FR.13 | SB 3054 | 4347 ABL | BHD |
| 13 | PN-CA-01 | TYPE-1 | COMPRESSED AIR | 1 | DN25 | 54 | FR.13 | SB 354 | 2113 ABL | BHD |
| 14 | PN-BF-01 | TYPE-1 | BILGE AND FIRE | 1 | DN50 | 96 | FR.13 | SB 750 | 2400 ABL | BHD |
| 15 | PN-BF-02 | TYPE-2 | BILGE AND FIRE | 1 | DN65 | 120 | FR.13 | SB 385 | 4400 ABL | BHD |
| 16 | PN-MC-08 | TYPE-1 | MACHINERY COOLING | 1 | DN50 | 96 | FR.13 | PS 3121 | 4794 ABL | BHD |
| 17 | PN-FO-02 | TYPE-1 | FUEL OIL | 1 | DN80 | 120 | FR.13 | PS 3271 | 4347 ABL | BHD |
| 18 | PN-HVAC-01 | TYPE-4 | HVAC | 1 | DN200 | 280 | FR.13 | SB 2250 | 4700 ABL | BHD |
| 19 | PN-HVAC-02 | TYPE-4 | HVAC | 1 | DN200 | 280 | FR.13 | PS 3654 | 4680 ABL | BHD |
| 20 | PN-FO-03 | BHD FLANGE | FUEL OIL | 2 | DN50 | | FR.14+251 | SB 4050 | 4800 ABL | BHD |
| 21 | PN-FO-04 | BHD FLANGE | FUEL OIL | 2 | DN32 | | FR.15+131 | SB 4050 | 4900 ABL | BHD |
| 22 | PN-FO-05 | BHD FLANGE | FUEL OIL | 2 | DN40 | | FR.16+200 | SB 4050 | 4750 ABL | BHD |
| 23 | PN-FO-06 | BHD FLANGE | FUEL OIL | 2 | DN50 | | FR.18+200 | SB 4050 | 4090 ABL | BHD |
| 24 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.19-104 | SB 4050 | 4125 ABL | BHD |
| 25 | PN-FO-07 | BHD FLANGE | FUEL OIL | 2 | DN20 | | FR.19 | SB 4138 | 4333 ABL | BHD |
| 26 | PN-FO-08 | BHD FLANGE | FUEL OIL | 2 | DN50 | | FR.17+205 | PS 4050 | 4964 ABL | BHD |
| 27 | PN-FO-09 | BHD FLANGE | FUEL OIL | 2 | DN50 | | FR.18+198 | PS 4050 | 4042 ABL | BHD |
| 28 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.19 | PS 4731 | 5053 ABL | BHD |
| 29 | PN-FO-010 | BHD FLANGE | FUEL OIL | 2 | DN20 | | FR.19 | PS 4800 | 4333 ABL | BHD |
| 30 | PN-FO-011 | BHD FLANGE | FUEL OIL | 2 | DN32 | | FR.19 | PS 5100 | 4900 ABL | BHD |
| 31 | PN-FO-012 | BHD FLANGE | FUEL OIL | 2 | DN40 | | FR.19 | PS 5428 | 4749 ABL | BHD |
| 32 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.19 | PS 5475 | 4112 ABL | BHD |
| 33 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.13+122 | PS 1929 | 2000 ABL | TANK TOP |
| 34 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.19-99 | PS 100 | 2000 ABL | TANK TOP |
| 35 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.22-168 | SB 5390 | 2000 ABL | TANK TOP |
| 36 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.21-222 | PS 5390 | 2000 ABL | TANK TOP |
| 37 | PN-SO-01 | OBD | SLUDGE & OILY WATER | 2 | DN40 | 54 | FR.20+275 | PS | 4006 ABL | SIDE SHELL |
| 38 | PN-SD-01 | OBD | SCUPPERS AND DRAIN | 2 | DN50 | 66 | FR.21+275 | PS | 4006 ABL | SIDE SHELL |
| 39 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 2 | DN40 | 79 | FR.19-175 | SB 4375 | 4200 ABL | DAY TANK BOTTOM |
| 40 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 2 | DN40 | 79 | FR.19-174 | PS 4750 | 4200 ABL | DAY TANK BOTTOM |
| 41 | PN-SO-02 | TYPE-3 | SLUDGE & OILY WATER | 2 | DN25 | 54 | FR.23-194 | SB 1517 | 1400 ABL | TANK TOP |
| 42 | PN-FO-013 | TYPE-3 | FUEL OIL | 2 | DN80 | 120 | FR.19+201 | PS 1876 | 1400 ABL | TANK TOP |
| 43 | PN-FO-014 | DECK PEN FLANGE | FUEL OIL | 2 | DN50 | | FR.20-49 | PS 1219 | 1400 ABL | TANK TOP |
| 44 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN100 | 146 | FR.20+101 | PS 1876 | 1400 ABL | TANK TOP |
| 45 | PN-FO-015 | DECK PEN FLANGE | FUEL OIL | 2 | DN15 | | FR.21-203 | PS 1219 | 1400 ABL | TANK TOP |
| 46 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN80 | 120 | FR.21-274 | PS 312 | 1400 ABL | TANK TOP |
| 47 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 2 | DN40 | 79 | FR.21-150 | PS 105 | 1400 ABL | TANK TOP |
| 48 | PN-SO-03 | TYPE-4 | SLUDGE & OILY WATER | 2 | DN40 | 79 | FR.22+107 | SB 35 | 1400 ABL | TANK TOP |
| 49 | PN-SO-04 | TYPE-4 | SLUDGE & OILY WATER | 2 | DN40 | 79 | FR.22+264 | PS 150 | 1400 ABL | TANK TOP |
| 50 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 2 | DN40 | 79 | FR.23-262 | SB 125 | 1400 ABL | TANK TOP |
| 51 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.23-87 | SB 93 | 1400 ABL | TANK TOP |
| 52 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 2 | DN40 | 79 | FR.23-125 | PS 150 | 1400 ABL | TANK TOP |
| 53 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 2 | DN80 | 120 | FR.23-145 | PS 615 | 1400 ABL | TANK TOP |
| 54 | PN-SO-05 | TYPE-3 | SLUDGE & OILY WATER | 2 | DN40 | 79 | FR.23-145 | PS 795 | 1400 ABL | TANK TOP |
| 55 | PN-SO-06 | TYPE-3 | SLUDGE & OILY WATER | 2 | DN65 | 120 | FR.23-145 | PS 968 | 1400 ABL | TANK TOP |
| 56 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN65 | 120 | FR.24-184 | SB 283 | 1400 ABL | TANK TOP |
| 57 | PN-FO-016 | DECK PEN FLANGE | FUEL OIL | 3 | DN50 | | FR.26+190 | SB 3525 | 1400 ABL | TANK TOP |
| 58 | PN-FO-017 | DECK PEN FLANGE | FUEL OIL | 3 | DN50 | | FR.26+177 | PS 3521 | 1400 ABL | TANK TOP |
| 59 | PN-FO-018 | DECK PEN FLANGE | FUEL OIL | 3 | DN50 | | FR.28+233 | SB 837 | 1400 ABL | TANK TOP |
| 60 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.30+200 | SB 1900 | 850 ABL | SEA CHEST |
| 61 | PN-MC-09 | SEA CHEST | MACHINERY COOLING | 3 | DN200 | | FR.30+269 | SB 1604 | 850 ABL | SEA CHEST |
| 62 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN15 | 54 | FR.31-154 | SB 1309 | 850 ABL | SEA CHEST |
| 63 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN15 | 54 | FR.31-154 | PS 1309 | 850 ABL | SEA CHEST |
| 64 | PN-MC-10 | SEA CHEST | MACHINERY COOLING | 3 | DN200 | | FR.30+269 | PS 1605 | 850 ABL | SEA CHEST |
| 65 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.31-154 | PS 1900 | 850 ABL | SEA CHEST |
| 66 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.31+150 | PS 2750 | 1400 ABL | FIFI SEA CHEST |
| 67 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN15 | 54 | FR.33-256 | PS 2825 | 1400 ABL | FIFI SEA CHEST |
| 68 | PN-FI- | SEA CHEST | EXTERNAL FIFI | 3 | REDUCER | | FR.33+50 | PS 2500 | 1400 ABL | FIFI SEA CHEST |
| 69 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 3 | DN40 | 79 | FR.32-134 | SB 150 | 1400 ABL | TANK TOP |
| 70 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 3 | DN40 | 79 | FR.32+194 | SB 150 | 1400 ABL | TANK TOP |
| 71 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 3 | DN40 | 79 | FR.32+124 | PS 142 | 1400 ABL | TANK TOP |
| 72 | PN-FI- | TYPE-4 | EXTERNAL FIFI | 3 | DN15 | 54 | FR.33-183 | SB 150 | 1400 ABL | TANK TOP |
| 73 | PN-OD- | TYPE-4 | DISPERSENT | 3 | DN25 | 54 | FR.33-273 | PS 142 | 1400 ABL | TANK TOP |
| 74 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 3 | DN40 | 79 | FR.36-200 | SB 3075 | 1400 ABL | TANK TOP |
| 75 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN65 | 120 | FR.34-196 | SB 1927 | 1400 ABL | TANK TOP |
| 76 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.35+59 | SB 1968 | 1400 ABL | TANK TOP |
| 77 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 3 | DN65 | 120 | FR.34+231 | PS 1772 | 1400 ABL | TANK TOP |
| 78 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.35-119 | PS 1772 | 1400 ABL | TANK TOP |
| 79 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 3 | DN40 | 79 | FR.36-200 | PS 2200 | 1400 ABL | TANK TOP |
| 80 | PN-BG- | TYPE-1 | BLACK & GREY | 3 | DN50 | 96 | FR.36 | SB 4515 | 3205 ABL | BHD |
| 81 | PN-BF-05 | TYPE-1 | BILGE AND FIRE | 3 | DN50 | 96 | FR.36 | SB 4510 | 3405 ABL | BHD |
| 82 | PN-BG- | TYPE-1 | BLACK & GREY | 3 | DN80 | 120 | FR.36 | SB 4523 | 3685 ABL | BHD |
| 83 | PN-BG- | TYPE-1 | BLACK & GREY | 3 | DN80 | 120 | FR.36 | SB 4153 | 3629 ABL | BHD |
| 84 | PN-TW- | TYPE-1 | TECHNICAL WATER | 3 | DN50 | 96 | FR.36 | SB 4153 | 2585 ABL | BHD |
| 85 | PN-TW- | TYPE-1 | TECHNICAL WATER | 3 | DN50 | 96 | FR.36 | SB 4153 | 2775 ABL | BHD |
| 86 | PN-BG- | TYPE-1 | BLACK & GREY | 3 | DN100 | 146 | FR.36 | SB 1699 | 3679 ABL | BHD |
| 87 | PN-MC- | TYPE-1 | MACHINERY COOLING | 3 | DN65 | 120 | FR.36 | SB 1268 | 1722 ABL | BHD |
| 88 | PN-FA- | TYPE-2 | FILL VENT AND SOUNDING | 3 | DN65 | 120 | FR.36 | SB 1164 | 3831 ABL | BHD |
| 89 | PN-BG- | TYPE-1 | BLACK & GREY | 3 | DN50 | 96 | FR.36 | SB 339 | 3879 ABL | BHD |

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|---|---|---|---|---|---|---|---|---|---|---|
| 90 | PN-BF-06 | TYPE-1 | BILGE AND FIRE | 3 | DN32 | 66 | FR.36 | SB 175 | 3865 ABL | BHD |
| 91 | PN-FA- | TYPE-2 | FILL VENT AND SOUNDING | 3 | DN80 | 120 | FR.36 | PS 767 | 3856 ABL | BHD |
| 92 | PN-BF-07 | TYPE-1 | BILGE AND FIRE | 3 | DN50 | 96 | FR.36 | PS 1205 | 1513 ABL | BHD |
| 93 | PN-BF-08 | TYPE-1 | BILGE AND FIRE | 3 | DN50 | 96 | FR.36 | PS 1405 | 1513 ABL | BHD |
| 94 | PN-BF-09 | TYPE-1 | BILGE AND FIRE | 3 | DN65 | 120 | FR.36 | SB 190 | 6440 ABL | BHD |
| 95 | PN-CA- | TYPE-1 | COMPRESSED AIR | 3 | DN25 | 54 | FR.36 | PS 1995 | 1500 ABL | BHD |
| 96 | PN-BG- | TYPE-1 | BLACK & GREY | 3 | DN50 | 96 | FR.36 | PS 3501 | 3876 ABL | BHD |
| 97 | PN-BF-26 | TYPE-1 | BILGE AND FIRE | 3 | DN50 | 96 | FR.36 | PS 4710 | 3845 ABL | BHD |
| 98 | PN-BG- | TYPE-3 | BLACK & GREY | 4 | DN80 | 120 | FR.37-231 | SB 1439 | 1400 ABL | TANK TOP |
| 99 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 4 | DN65 | 120 | FR.37-247 | SB 801 | 1400 ABL | TANK TOP |
| 100 | PN-BG- | TYPE-3 | BLACK & GREY | 4 | DN50 | 96 | FR.36+267 | SB 601 | 1400 ABL | TANK TOP |
| 101 | PN-BG- | TYPE-4 | BLACK & GREY | 3 | DN50 | 96 | FR.36+100 | SB 310 | 1400 ABL | TANK TOP |
| 102 | PN-FA- | TYPE-4 | FILL VENT AND SOUNDING | 4 | DN40 | 79 | FR.36+200 | SB 140 | 1400 ABL | TANK TOP |
| 103 | PN-BG- | TYPE-4 | BLACK & GREY | 3 | DN50 | 96 | FR.36+100 | PS 265 | 1400 ABL | TANK TOP |
| 104 | PN-BG- | TYPE-3 | BLACK & GREY | 3 | DN100 | 146 | FR.36+127 | PS 540 | 1400 ABL | TANK TOP |
| 105 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 4 | DN80 | 120 | FR.36+214 | PS 767 | 1400 ABL | TANK TOP |
| 106 | PN-BF-18 | TYPE-2 | BILGE AND FIRE | 4 | DN50 | 96 | FR.42-250 | SB 1000 | 1245 ABL | BHD |
| 107 | PN-BF-19 | TYPE-2 | BILGE AND FIRE | 4 | DN50 | 96 | FR.42-250 | PS 1000 | 1245 ABL | BHD |
| 108 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 4 | DN40 | 79 | FR.41+150 | PS 1000 | 412 ABL | BHD |
| 109 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 4 | DN40 | 79 | FR.41+150 | PS 1000 | 3951 ABL | BHD |
| 110 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 4 | DN40 | 79 | FR.41+150 | SB 1000 | 412 ABL | BHD |
| 111 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 4 | DN40 | 79 | FR.41+150 | SB 1000 | 3951 ABL | BHD |
| 112 | PN-PW- | TYPE-2 | POTABLE WATER | 4 | DN40 | 79 | FR.44-155 | SB 1000 | 1513ABL | BHD |
| 113 | PN-PW- | TYPE-2 | POTABLE WATER | 4 | DN40 | 79 | FR.44-155 | PS 1000 | 1513ABL | BHD |
| 114 | PN-TW- | TYPE-4 | TECHNICAL WATER | 4 | DN50 | 96 | FR.44 | PS 214 | 1840 ABL | BHD |
| 115 | PN-TW- | TYPE-2 | TECHNICAL WATER | 4 | DN50 | 96 | FR.47 | PS 214 | 1840 ABL | BHD |
| 116 | PN-BF-24 | TYPE-2 | BILGE AND FIRE | 4 | DN50 | 96 | FR.47 | PS 3025 | 4750 ABL | BHD |
| 117 | PN-MC- | OBD | MACHINERY COOLING | 3 | DN80 | 95 | FR.23+249 | SB | 4101 ABL | SIDE SHELL |
| 118 | PN-SD- | OBD | SCUPPERS AND DRAIN | 3 | DN50 | 66 | FR.24+250 | SB | 4101 ABL | SIDE SHELL |
| 119 | PN-BG- | OBD | BLACK & GREY | 3 | DN80 | 95 | FR.26-239 | SB | 4251 ABL | SIDE SHELL |
| 120 | PN-BG- | OBD | BLACK & GREY | 3 | DN50 | 66 | FR.27-239 | SB | 4251 ABL | SIDE SHELL |
| 121 | PN-BF-22 | OBD | BILGE AND FIRE | 3 | DN50 | 66 | FR.28-250 | SB | 4400 ABL | SIDE SHELL |
| 122 | PN-MC- | OBD | MACHINERY COOLING | 3 | DN65 | 79 | FR.28+275 | SB | 4101 ABL | SIDE SHELL |
| 123 | PN-MC- | OBD | MACHINERY COOLING | 3 | DN80 | 95 | FR.23+269 | PS | 4101 ABL | SIDE SHELL |
| 124 | PN-MC- | OBD | MACHINERY COOLING | 3 | DN20 | 32 | FR.26+262 | PS | 4100 ABL | SIDE SHELL |
| 125 | PN-BF-27 | OBD | BILGE AND FIRE | 3 | DN50 | 66 | FR.27-140 | PS | 4400 ABL | SIDE SHELL |
| 126 | PN-BF-23 | OBD | BILGE AND FIRE | 3 | DN65 | 79 | FR.29-240 | PS | 4400 ABL | SIDE SHELL |
| 127 | PN-FI- | OBD | EXTERNAL FIFI | 3 | DN100 | 120 | FR.30-219 | PS | 4325 ABL | SIDE SHELL |
| 128 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 1 | DN65 | 120 | FR.3-126 | SB 2750 | MAIN DECK | DECK |
| 129 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 1 | DN65 | 120 | FR.3-126 | PS 2750 | MAIN DECK | DECK |
| 130 | PN-FA- | SOUNDING-FLUSH | FILL VENT AND SOUNDING | 1 | DN40 | | FR.4-176 | SB 300 | MAIN DECK | DECK |
| 131 | PN-FA- | SOUNDING-FLUSH | FILL VENT AND SOUNDING | 1 | DN40 | | FR.4-176 | PS 300 | MAIN DECK | DECK |
| 132 | PN-FO | TYPE-1 | FUEL OIL | 1 | DN80 | 120 | FR.12+198 | SB 5070 | MAIN DECK | DECK |
| 133 | PN-FO | TYPE-1 | FUEL OIL | 1 | DN80 | 120 | FR.11+176 | PS 5070 | MAIN DECK | DECK |
| 134 | PN-BF-03 | TYPE-1 | BILGE AND FIRE | 2 | DN65 | 120 | FR.18-150 | SB 770 | MAIN DECK | DECK |
| 135 | PN-CA- | TYPE-1 | COMPRESSED AIR | 2 | DN15 | 54 | FR.18-123 | PS 1090 | MAIN DECK | DECK |
| 136 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 2 | DN65 | 120 | FR.18-142 | PS 1410 | MAIN DECK | DECK |
| 137 | PN-FA- | SOUNDING-FLUSH | FILL VENT AND SOUNDING | 2 | DN40 | | FR.19-175 | SB 4375 | MAIN DECK | DECK |
| 138 | PN-FA- | SOUNDING-FLUSH | FILL VENT AND SOUNDING | 2 | DN40 | | FR.19-175 | PS 4750 | MAIN DECK | DECK |
| 139 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 2 | DN40 | 79 | FR.21+150 | SB 5301 | MAIN DECK | DECK |
| 140 | PN-OD- | TYPE-1 | DISPERSENT | 2 | DN50 | 96 | FR.23-252 | SB 5276 | MAIN DECK | DECK |
| 141 | PN-OD- | TYPE-1 | DISPERSENT | 2 | DN50 | 96 | FR.22-200 | PS 5125 | MAIN DECK | DECK |
| 142 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN65 | 120 | FR.25+240 | SB 5083 | MAIN DECK | DECK |
| 143 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN80 | 120 | FR.25+176 | PS 5060 | MAIN DECK | DECK |
| 144 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.29-250 | SB 5051 | MAIN DECK | DECK |
| 145 | PN-FI- | TYPE-1 | EXTERNAL FIFI | 3 | DN50 | 96 | FR.29+250 | SB 4940 | MAIN DECK | DECK |
| 146 | PN-FI- | TYPE-1 | EXTERNAL FIFI | 3 | DN80 | 120 | FR.30-144 | SB 4000 | MAIN DECK | DECK |
| 147 | PN-FI- | TYPE-4 | EXTERNAL FIFI | 3 | DN350 | 412 | FR.30+250 | SB 4100 | MAIN DECK | DECK |
| 148 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN65 | 120 | FR.32-274 | SB 5067 | MAIN DECK | DECK |
| 149 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.33-213 | SB 5157 | MAIN DECK | DECK |
| 150 | PN-BF-04 | TYPE-2 | BILGE AND FIRE | 3 | DN65 | 120 | FR.33-250 | SB 190 | LOWER DECK | LOWER DECK |
| 152 | PN-BF-11 | TYPE-1 | BILGE AND FIRE | 4 | DN32 | 66 | FR.38-170 | SB 5050 | LOWER DECK | LOWER DECK |
| 153 | PN-BF-13 | TYPE-1 | BILGE AND FIRE | 4 | DN32 | 66 | FR.38+215 | PS 4975 | LOWER DECK | LOWER DECK |
| 154 | PN-BF-20 | TYPE-2 | BILGE AND FIRE | 4 | DN32 | 66 | FR. 48-196 | SB 3543 | 7045 ABL | BHD - BULWARK |
| 155 | PN-BG- | TYPE-1 | BLACK & GREY | 4 | DN50 | 96 | FR.37+175 | SB 5075 | MAIN DECK | DECK |
| 156 | PN-BF-12 | TYPE-1 | BILGE AND FIRE | 4 | DN25 | 54 | FR.38-170 | SB 5050 | MAIN DECK | DECK |
| 157 | PN-TW- | TYPE-1 | TECHNICAL WATER | 4 | DN50 | 96 | FR.39-168 | SB 4931 | MAIN DECK | DECK |
| 158 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 4 | DN40 | 79 | FR.44+198 | SB 4151 | MAIN DECK | DECK |
| 159 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 4 | DN50 | 96 | FR.46-250 | SB 4055 | MAIN DECK | DECK |
| 160 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 4 | DN65 | 120 | FR.46+225 | SB 3796 | MAIN DECK | DECK |
| 161 | PN-BF-16 | TYPE-1 | BILGE AND FIRE | 4 | DN32 | 66 | FR.47-130 | SB 3865 | MAIN DECK | DECK |
| 162 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 4 | DN65 | 120 | FR.47+150 | SB 3514 | MAIN DECK | DECK |
| 163 | PN-BF-17 | TYPE-1 | BILGE AND FIRE | 4 | DN32 | 66 | FR.48+170 | SB 3300 | MAIN DECK | DECK |
| 164 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 5 | DN65 | 120 | FR.49-190 | SB 2925 | MAIN DECK | DECK |
| 165 | PN-FA- | SOUNDING-FLUSH | FILL VENT AND SOUNDING | 5 | DN40 | | FR.48-255 | SB 150 | MAIN DECK | DECK |
| 166 | PN-CA- | TYPE-1 | COMPRESSED AIR | 4 | DN15 | 54 | FR.38+117 | SB 1221 | MAIN DECK | DECK |
| 167 | PN-BF-10 | TYPE-1 | BILGE AND FIRE | 4 | DN65 | 120 | FR.38+140 | SB 190 | MAIN DECK | DECK |
| 168 | PN-SO- | TYPE-1 | SLUDGE & OILY WATER | 3 | DN40 | 79 | FR.25-155 | PS 4000 | MAIN DECK | DECK |
| 169 | PN-SO- | TYPE-1 | SLUDGE & OILY WATER | 3 | DN40 | 79 | FR.25+257 | PS 4000 | MAIN DECK | DECK |
| 170 | PN-FI- | TYPE-1 | EXTERNAL FIFI | 3 | DN80 | 120 | FR.28-179 | PS 4000 | MAIN DECK | DECK |
| 171 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN80 | 120 | FR.28+168 | PS 4000 | MAIN DECK | DECK |
| 172 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.28+156 | PS 5065 | MAIN DECK | DECK |
| 173 | PN-FI- | TYPE-1 | EXTERNAL FIFI | 3 | DN150 | 225 | FR.29+275 | PS 4034 | MAIN DECK | DECK |
| 174 | PN-FI- | TYPE-1 | EXTERNAL FIFI | 3 | DN50 | 96 | FR.29+195 | PS 4941 | MAIN DECK | DECK |
| 175 | PN-FI- | TYPE-4 | EXTERNAL FIFI | 3 | DN350 | 412 | FR.30+250 | PS 4100 | MAIN DECK | DECK |
| 176 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.30-120 | PS 5062 | MAIN DECK | DECK |
| 177 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN65 | 120 | FR.30+201 | PS 5067 | MAIN DECK | DECK |
| 178 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 3 | DN50 | 96 | FR.31-138 | PS 5184 | MAIN DECK | DECK |
| 179 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 4 | DN40 | 79 | FR.44+198 | PS 4151 | MAIN DECK | DECK |
| 180 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 4 | DN50 | 96 | FR.46-250 | PS 4055 | MAIN DECK | DECK |
| 181 | PN-FA- | TYPE-1 | FILL VENT AND SOUNDING | 4 | DN65 | 120 | FR.46+225 | PS 3796 | MAIN DECK | DECK |

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|---|---|---|---|---|---|---|---|---|---|---|
| 182 | PN-FA- | TYPE-3 | FILL VENT AND SOUNDING | 5 | DN65 | 120 | FR.48+160 | PS 3360 | MAIN DECK | DECK |
| 183 | PN-BF-14 | TYPE-1 | BILGE AND FIRE | 4 | DN32 | 66 | FR.47-130 | PS 3865 | MAIN DECK | DECK |
| 184 | PN-BF-15 | TYPE-1 | BILGE AND FIRE | 4 | DN32 | 66 | FR.48+170 | PS 3300 | MAIN DECK | DECK |
| 185 | PN-BF-21 | TYPE-2 | BILGE AND FIRE | 4 | DN32 | 66 | FR. 48-196 | PS 3543 | 7045 ABL | BHD - BULWARK |
| 186 | PN-LO-01 | TYPE-1 | LUBE OIL | DH | DN80 | 120 | FR.23-185 | SB 3210 | FUNNEL TOP | FUNNEL TOP |
| 187 | PN-LO-02 | TYPE-1 | LUBE OIL | DH | DN80 | 120 | FR.23-185 | SB 2915 | FUNNEL TOP | FUNNEL TOP |
| 188 | PN-LO-03 | TYPE-1 | LUBE OIL | DH | DN80 | 120 | FR.23-185 | PS 2915 | FUNNEL TOP | FUNNEL TOP |
| 189 | PN-LO-04 | TYPE-1 | LUBE OIL | DH | DN80 | 120 | FR.23-185 | PS 3210 | FUNNEL TOP | FUNNEL TOP |

Encl 4 Hydraulic tubes-fittings BOM and P&IDs

**Annexure – A**

| 1. Hydraulic Pipes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| a. Stainless steel Hydraulic pipes | | | | | | | | |
| Sl No. | Item Description | Material | Material Standard | Size OD (mm) | Thick (mm) | Working Pressure (bar) | QTY/ VESSEL (m) | QTY - 4 VESSEL (m) |
| 1 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø12 | 2 | 80 BAR | 65.2 | 264 |
| 2 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø12 | 2 | 250 BAR | 24.1 | 102 |
| 3 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø16 | 2 | 80 BAR | 16.3 | 66 |
| 4 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø16 | 2 | 30 BAR | 9.6 | 42 |
| 5 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø16 | 2 | 250 BAR | 9.6 | 42 |
| 6 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø20 | 2 | 30 BAR | 9.6 | 42 |
| 7 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø28 | 4 | 30 BAR | 69 | 276 |
| 8 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø28 | 4 | 80 BAR | 16.3 | 66 |
| 9 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø28 | 4 | 250 BAR | 67.2 | 270 |
| 10 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø42 | 6 | 250 BAR | 40.4 | 162 |
| 11 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø42 | 6 | 30 BAR | 7.8 | 36 |
| 12 | Seamless Precision Tube | AISI316 | 1 .4571,DIN24131 | Ø42 | 3 | 30 BAR | 7.8 | 36 |

## 2. Hydraulic Pipe Fittings

All hydraulic pipe fittings are to be of single ferrule type.

**a. Straight Connectors- Stainless steel**

| Sl No. | Item Description | Material | Material Standard | Size OD (mm) | Working Pressure (bar) | QTY/ VESSEL (Nos) | QTY - 4 VESSEL (Nos) |
|---|---|---|---|---|---|---|---|
| 1 | Straight Connector | AISI316 | DIN2353 | Ø12 | 250 BAR | 12 | 48 |
| 2 | Straight Connector | AISI316 | DIN2353 | Ø12 | 80 BAR | 33 | 132 |
| 3 | Straight Connector | AISI316 | DIN2353 | Ø16 | 250 BAR | 5 | 20 |
| 4 | Straight Connector | AISI316 | DIN2353 | Ø16 | 30 BAR | 5 | 20 |
| 5 | Straight Connector | AISI316 | DIN2353 | Ø16 | 80 BAR | 8 | 32 |
| 6 | Straight Connector | AISI316 | DIN2353 | Ø20 | s | 5 | 20 |
| 7 | Straight Connector | AISI316 | DIN2353 | Ø28 | 250 BAR | 34 | 136 |
| 8 | Straight Connector | AISI316 | DIN2353 | Ø28 | 30 BAR | 34 | 136 |
| 9 | Straight Connector | AISI316 | DIN2353 | Ø28 | 80 BAR | 8 | 32 |
| 10 | Straight Connector | AISI316 | DIN2353 | Ø42 | 250 BAR | 21 | 84 |
| 11 | Straight Connector | AISI316 | DIN2353 | Ø42 | 30 BAR | 8 | 32 |

## 2. Hydraulic Pipe Fittings

All hydraulic pipe fittings are to be of single ferrule type.

**b. Elbow Connectors- Stainless steel**

| Sl No. | Item Description | Material | Material Standard | Size OD (mm) | Working Pressure (bar) | QTY/ VESSEL (Nos) | QTY - 4 VESSEL (Nos) |
|---|---|---|---|---|---|---|---|
| 1 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø12 | 250 BAR | 18 | 72 |
| 2 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø12 | 250 BAR | 4 | 16 |
| 3 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø12 | 80 BAR | 32 | 128 |
| 4 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø12 | 80 BAR | 8 | 32 |
| 5 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø16 | 250 BAR | 8 | 32 |
| 6 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø16 | 250 BAR | 2 | 8 |
| 7 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø16 | 30 BAR | 8 | 32 |
| 8 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø16 | 80 BAR | 12 | 48 |
| 9 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø16 | 80 BAR | 4 | 16 |
| 10 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø20 | 30 BAR | 8 | 32 |
| 11 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø28 | 250 BAR | 28 | 112 |
| 12 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø28 | 250 BAR | 10 | 40 |
| 13 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø28 | 30 BAR | 42 | 168 |
| 14 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø28 | 30 BAR | 12 | 48 |
| 15 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø28 | 80 BAR | 10 | 40 |
| 16 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø28 | 80 BAR | 2 | 8 |
| 17 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø42 | 250 BAR | 24 | 96 |
| 18 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø42 | 250 BAR | 8 | 32 |
| 19 | Elbow Connector 90 deg | AISI316 | DIN2353 | Ø42 | 30 BAR | 12 | 48 |
| 20 | Elbow Connector 45 deg | AISI316 | DIN2353 | Ø42 | 30 BAR | 2 | 8 |

## 2. Hydraulic Pipe Fittings

All hydraulic pipe fittings are to be of single ferrule type.

### c. Tee Connectors- Stainless steel

| Sl No. | Item Description | Material | Material Standard | Size OD (mm) | Working Pressure (bar) | QTY/ VESSEL (Nos) | QTY - 4 VESSEL (Nos) |
|---|---|---|---|---|---|---|---|
| 1 | Equal Tee Connector | AISI316 | DIN2353 | Ø28 | 30 BAR | 3 | 12 |
| 2 | Equal Tee Connector | AISI316 | DIN2353 | Ø42 | 30 BAR | 1 | 4 |
| 3 | Equal Tee Connector | AISI316 | DIN2353 | Ø42 | 250 BAR | 1 | 4 |

## 2. Hydraulic Pipe Fittings

All hydraulic pipe fittings are to be of single ferrule type.

### d. Reducer Connectors- Stainless steel

| Sl No. | Item Description | Material | Material Standard | Size OD (mm) | Working Pressure (bar) | QTY/ VESSEL (Nos) | QTY - 4 VESSEL (Nos) |
|---|---|---|---|---|---|---|---|
| 1 | Straight Reducing Connector | AISI316 | DIN2353 | Ø12x10 | 250 BAR | 2 | 8 |
| 2 | Straight Reducing Connector | AISI316 | DIN2353 | Ø12x10 | 80 BAR | 4 | 16 |
| 3 | Straight Reducing Connector | AISI316 | DIN2353 | Ø16x15 | 30 BAR | 2 | 8 |
| 4 | Straight Reducing Connector | AISI316 | DIN2353 | Ø16x15 | 80 BAR | 2 | 8 |
| 5 | Straight Reducing Connector | AISI316 | DIN2353 | Ø28x16 | 30 BAR | 1 | 4 |
| 6 | Straight Reducing Connector | AISI316 | DIN2353 | Ø28x25 | 250 BAR | 4 | 16 |
| 7 | Straight Reducing Connector | AISI316 | DIN2353 | Ø42x28 | 250 BAR | 1 | 4 |
| 8 | Straight Reducing Connector | AISI316 | DIN2353 | Ø42x28 | 30 BAR | 1 | 4 |
| 9 | Straight Reducing Connector | AISI316 | DIN2353 | Ø42x38 | 250 BAR | 5 | 20 |

## 2. Hydraulic Pipe Fittings

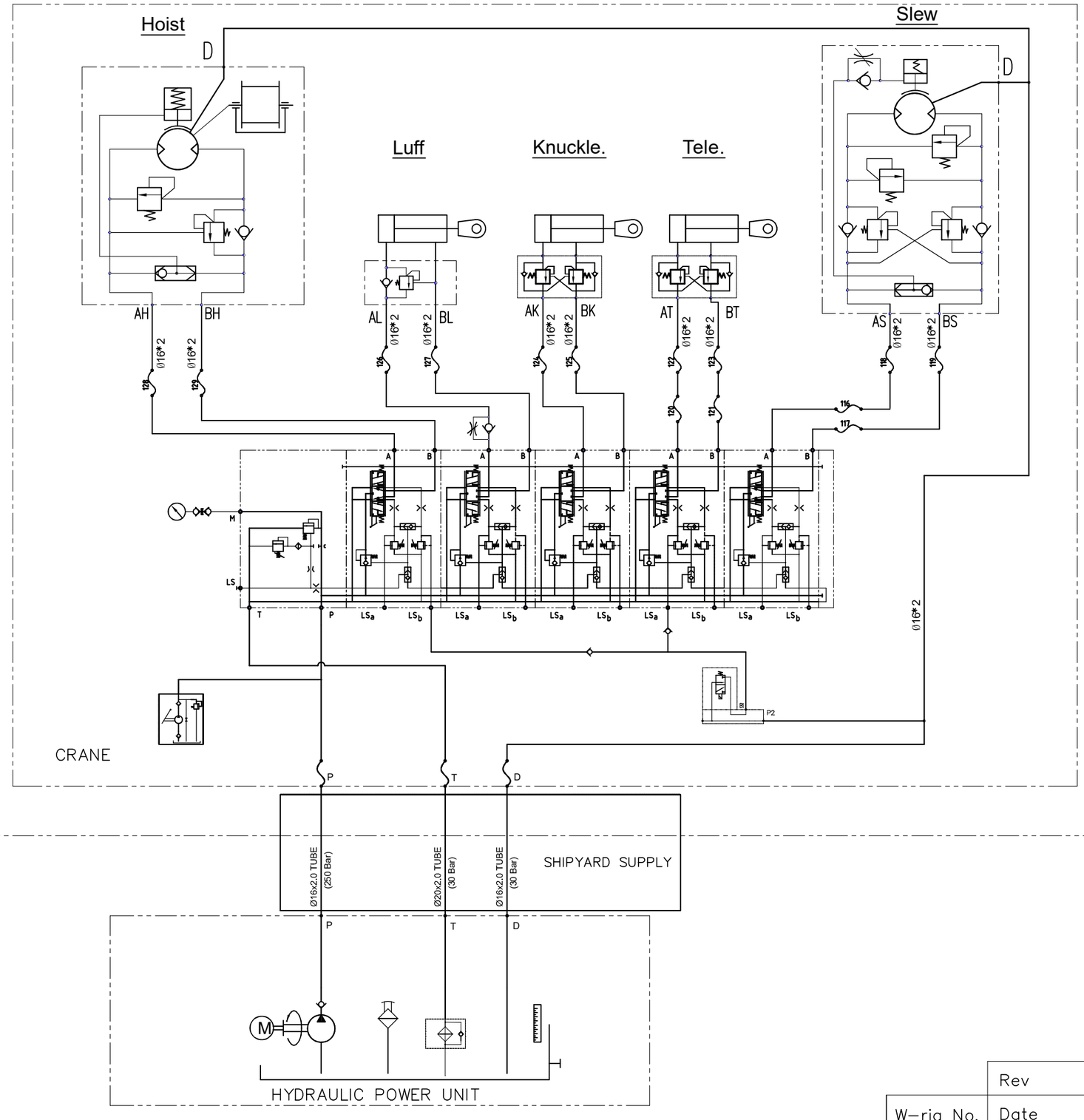
All hydraulic pipe fittings are to be of single ferrule type.

**e. Bulkhead Penetration fitting- Both sides ferruled**

| Sl No. | Item Description | Material | Material Standard | Size OD (mm) | Working Pressure (bar) | QTY/ VESSEL (Nos) | QTY - 4 VESSEL (Nos) |
|---|---|---|---|---|---|---|---|
| 1 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø12 | 250 BAR | 4 | 16 |
| 2 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø12 | 80 BAR | 8 | 32 |
| 3 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø16 | 250 BAR | 2 | 8 |
| 4 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø16 | 30 BAR | 2 | 8 |
| 5 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø16 | 80 BAR | 2 | 8 |
| 6 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø20 | 30 BAR | 2 | 8 |
| 7 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø28 | 250 BAR | 8 | 32 |
| 8 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø28 | 30 BAR | 10 | 40 |
| 9 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø28 | 80 BAR | 2 | 8 |
| 10 | Weld Bulkhead Fitting | AISI316 | DIN2353 | Ø42 | 250 BAR | 4 | 16 |

## 3. Hydraulic Pipe Supports

| Sl No. | Item Description | Size OD (mm) | Working Pressure (bar) | QTY/ VESSEL (Nos.) | QTY - 4 VESSEL (Nos.) |
|---|---|---|---|---|---|
| 1 | Box Type Hyd. Support- Heavy Duty | Ø12 | 250 BAR | 15 | 60 |
| 2 | Box Type Hyd. Support- Heavy Duty | Ø12 | 80 BAR | 40 | 160 |
| 3 | Box Type Hyd. Support- Heavy Duty | Ø16 | 250 BAR | 10 | 40 |
| 4 | Box Type Hyd. Support- Heavy Duty | Ø16 | 30 BAR | 10 | 40 |
| 5 | Box Type Hyd. Support- Heavy Duty | Ø16 | 80 BAR | 10 | 40 |
| 6 | Box Type Hyd. Support- Heavy Duty | Ø20 | 30 BAR | 8 | 32 |
| 7 | Box Type Hyd. Support- Heavy Duty | Ø28 | 250 BAR | 35 | 140 |
| 8 | Box Type Hyd. Support- Heavy Duty | Ø28 | 30 BAR | 35 | 140 |
| 9 | Box Type Hyd. Support- Heavy Duty | Ø28 | 80 BAR | 10 | 40 |
| 10 | Box Type Hyd. Support- Heavy Duty | Ø42 | 250 BAR | 25 | 100 |
| 11 | Box Type Hyd. Support- Heavy Duty | Ø42 | 30 BAR | 8 | 32 |

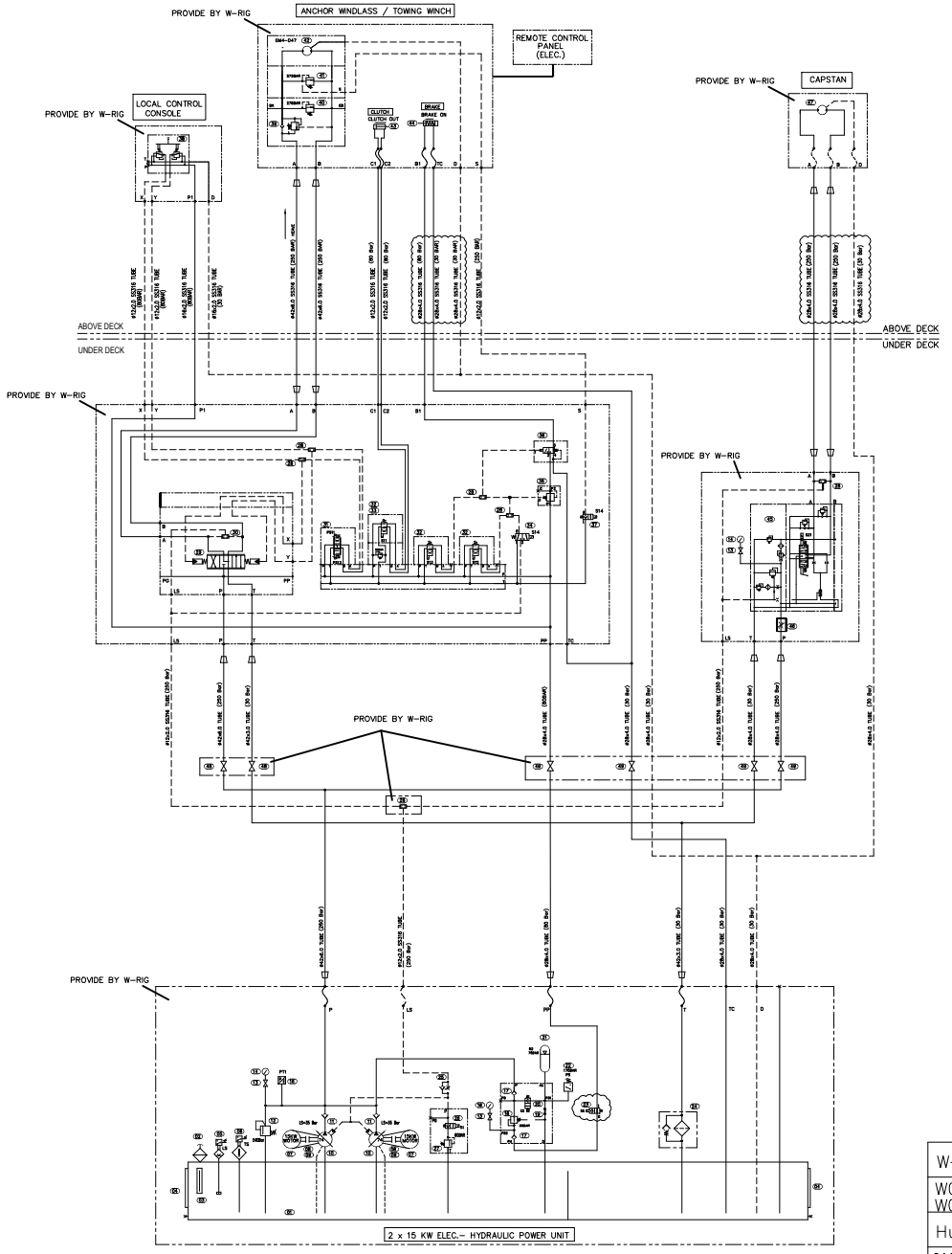



PORT CONNECTION :
The following are all Welding form

| KTC: | |
|---|---|
| P | 16*2.0 WELDING CONE |
| T | 20*2.0 WELDING CONE |
| D | 16*2.0 WELDING CONE |

| HPU: | |
|---|---|
| P | 16*2.0 WELDING CONE |
| T | 20*2.0 WELDING CONE |
| D | 16*2.0 WELDING CONE |

| | | | |
|---|---|---|---|
| | Rev | A1 | TITLE : HYDRAULIC SCHEMATIC / PIPING LAYOUT |
| W-rig No. | Date | 2024.12.15 | |
| W0497R1/498R1 W0506R1/507R1 | Approved | WG | |
| Hull No. | Checked | ZJY | SCALE: 1:1 / MODEL NO.:- |
| 01124001/01224002 01324003/01424004 | Drawn | GK/WXD | WT.: / SHT. 1/1 / DRG. NO.: HSP-HKTC-GA |




NOTE:

1. ALL TUBE TO BE SEAMLESS PRECISION STAINLESS STEEL TUBE AND THE SPECIFICATION TO BE COMPLY TO 1.4571, DIN24131.

2. ALL WELDING PIPE TO BE SEAMLESS STEEL PIPE AND THE MATERIAL TO BE ANSI 316 or C20, GB5312-85.

3. ALL HOSES PERFORMANCE TO BE MEET OR EXCEED SAE100R1AT, SAER2AT, SAE100 R12/13, IF ANY.

4. SUFFICIENT FLUSHING TO REMOVE FOREIGN MATTERS IN PIPES ARE NECESSARY AFTER PIPING INSTALLATION. THE OIL CLEANLINESS TO BE MEET OF ISO 18/16/14 OR BETTER.

5. PIPELINES ON COMPLETION TO BE HYDRAULICALLY TESTED TO 1.5 TIMES WORKING PRESSURE.

REMARK:

1. ALL TUBES, PIPES, FITTINGS BEYOND HYDRAULIC POWER UNITS, CONTROL UNIT AND WINCHES WILL BE SUPPLIED BY YARD.

REMARK:
NORMALLY CLOSED

PORT CONNECTION :
The following are all Welding form

| | |
|---|---|
| AWT: | |
| A/B | 38*5.0 WELDING CONE |
| C1/C2 | ø14 WELDABLE STUD CONE<br>LENGTH OF HOSES? 800mm |
| B1 | 28*2.5 WELDING CONE<br>LENGTH OF HOSES? 1100mm |
| TC | 28*2.5 WELDING CONE<br>LENGTH OF HOSES? 500mm |
| D | 28*2.5 WELDING CONE |
| LCC-TGW: | |
| P1/D | 15*2.0 WELDING CONE |
| X/Y | 10*2.0 WELDING CONE |
| HCU-TGW: | |
| P | 38*5.0 WELDING CONE |
| T | 42*3.0 WELDING CONE |
| A/B | 38*5.0 WELDING CONE |
| P1 | 16*2.0 WELDING CONE |
| X/Y | 10*2.0 WELDING CONE |
| C1/C2 | 10*2 WELDING CONE |
| B1 | 28*2.5 WELDING CONE |
| PP | 28*2.5 WELDING CONE |
| TC | 28*2.5 WELDING CONE |
| LS | 10*2.0 WELDING CONE |

| | |
|---|---|
| CPT: | |
| A/B | 25*3.0 WELDING CONE<br>LENGTH OF HOSES? 800mm |
| D | 28*2.5 WELDING CONE<br>LENGTH OF HOSES? 800mm |
| LCC-CPT: | |
| A/B | 25*3.0 WELDING CONE |
| P | 25*3.0 WELDING CONE |
| T | 28*2.5 WELDING CONE |
| LS | 10*2.0 WELDING CONE |

| | |
|---|---|
| HPU: | |
| P | ø44 WELDABLE STUD CONE<br>LENGTH OF HOSES? 800mm |
| T | 42*3.0 WELDING CONE<br>LENGTH OF HOSES? 800mm |
| PP | 28*2.5 WELDING CONE<br>LENGTH OF HOSES? 800mm |
| LS | 10*2.0 WELDING CONE<br>LENGTH OF HOSES? 800mm |
| TC | 28*2.5 WELDING CONE |
| D | 28*2.5 WELDING CONE |

| NO | DESCRIPTION | QTY | PART LIST |
|---|---|---|---|
| 1 | RESERVOIR | 1 | HCS-W0497-AWT-01 |
| 2 | AIR BREATHER | 1 | HCS-W0497-AWT-02 |
| 3 | OIL LEVEL GAUGE | 1 | HCS-W0497-AWT-03 |
| 4 | INSPECTION COVER | 2 | HCS-W0497-AWT-04 |
| 5 | OIL LEVEL SWITCH | 1 | HCS-W0497-AWT-05 |
| 6 | THERMOSTAT | 1 | HCS-W0497-AWT-06 |
| 7 | ELECTRIC MOTOR (15KW) | 2 | HCS-W0497-AWT-07 |
| 8 | BELL HOUSING | 2 | HCS-W0497-AWT-08 |
| 9 | DRIVE COUPLING | 2 | HCS-W0497-AWT-09 |
| 10 | HYDRAULIC PISTON PUMP | 2 | HCS-W0497-AWT-10 |
| 11 | CHECK VALVE | 2 | HCS-W0497-AWT-11 |
| 12 | PRESSURE RELIEF VALVE | 1 | HCS-W0497-AWT-12 |
| 13 | NEEDLE VALVE | 3 | HCS-W0497-AWT-13 |
| 14 | PRESSURE GAUGE | 2 | HCS-W0497-AWT-14 |
| 15 | PRESSURE TRANSDUCER | 1 | HCS-W0497-AWT-15 |
| 16 | PRESSURE GAUGE | 1 | HCS-W0497-AWT-16 |
| 17 | CHECK VALVE | 2 | HCS-W0497-AWT-17 |
| 18 | PRESSURE REDUCING VALVE | 1 | HCS-W0497-AWT-18 |
| 19 | NEEDLE VALVE | 1 | HCS-W0497-AWT-19 |
| 20 | SOLENOID VALVE | 1 | HCS-W0497-AWT-20 |
| 21 | ACCUMULATOR (20L) | 1 | HCS-W0497-AWT-21 |
| 22 | PRESSURE SWITCH | 1 | HCS-W0497-AWT-22 |
| 23 | SOLENOID VALVE | 1 | HCS-W0497-AWT-23 |
| 24 | RETURN FILTER | 1 | HCS-W0497-AWT-24 |
| 25 | FLOW CONTROL VALVE | 1 | HCS-W0497-AWT-25 |
| 26 | SOLENOID VALVE | 1 | HCS-W0497-AWT-26 |
| 27 | PRESSURE RELIEF VALVE | 2 | HCS-W0497-AWT-27 |
| 28 | SHUTTLE VALVE | 6 | HCS-W0497-AWT-28 |
| 29 | PROPORTIONAL DCV | 1 | HCS-W0497-AWT-29 |
| 30 | SHUTTLE VALVE | 1 | HCS-W0497-AWT-30 |
| 31 | PROPORTIONAL DCV | 1 | HCS-W0497-AWT-31 |
| 32 | SOLENOID VALVE | 3 | HCS-W0497-AWT-32 |
| 33 | PRESSURE RELIEF VALVE | 1 | HCS-W0497-AWT-33 |
| 34 | SOLENOID VALVE | 1 | HCS-W0497-AWT-34 |
| 35 | PRESSURE REDUCING VALVE | 1 | HCS-W0497-AWT-35 |
| 36 | PILOT OPERATED VALVE | 1 | HCS-W0497-AWT-36 |
| 37 | SOLENOID VALVE | 1 | HCS-W0497-AWT-37 |
| 38 | HYDRAULIC JOYSTICK | 1 | HCS-W0497-AWT-38 |
| 39 | COUNTERBALANCE VALVE | 1 | HCS-W0497-AWT-39 |
| 40 | PRESSURE RELIEF VALVE | 1 | HCS-W0497-AWT-40 |
| 41 | PRESSURE RELIEF VALVE | 1 | HCS-W0497-AWT-41 |
| 42 | HYDRAULIC MOTOR | 1 | HCS-W0497-AWT-42 |
| 43 | CLUTCH CYLINDER | 1 | HCS-W0497-AWT-43 |
| 44 | BRAKE CYLINDER | 1 | HCS-W0497-AWT-44 |
| 45 | FLOW CONTROL VALVE | 1 | HCS-W0497-AWT-45 |
| 46 | MANUAL OPERATED DCV | 1 | HCS-W0497-AWT-46 |
| 47 | HYDRAULIC MOTOR | 1 | HCS-W0497-AWT-47 |
| 48 | BALL VALVE, 1.25" PN=250BAR | 2 | HCS-W0497-AWT-48 |
| 49 | BALL VALVE, 3/4" PN=250BAR | 4 | HCS-W0497-AWT-49 |

| | | | | | |
|---|---|---|---|---|---|
| | Rev | F | TITLE : HYDRAULIC SCHEMATIC / PIPING LAYOUT | | |
| W-rig No. | Date | 2024.12.18 | | | |
| W0497/98<br>W0506/07 | Approved | WG | | | |
| Hull No. | Checked | ZJY | | CSALE: 4:1 | MODEL NO.: - |
| 01124001/01224002<br>01324003/01424004 | Drawn | WXD | WT. :~KG | SHT.: 1/1 | DRG. NO.: W0497~98-HCS-AWT |

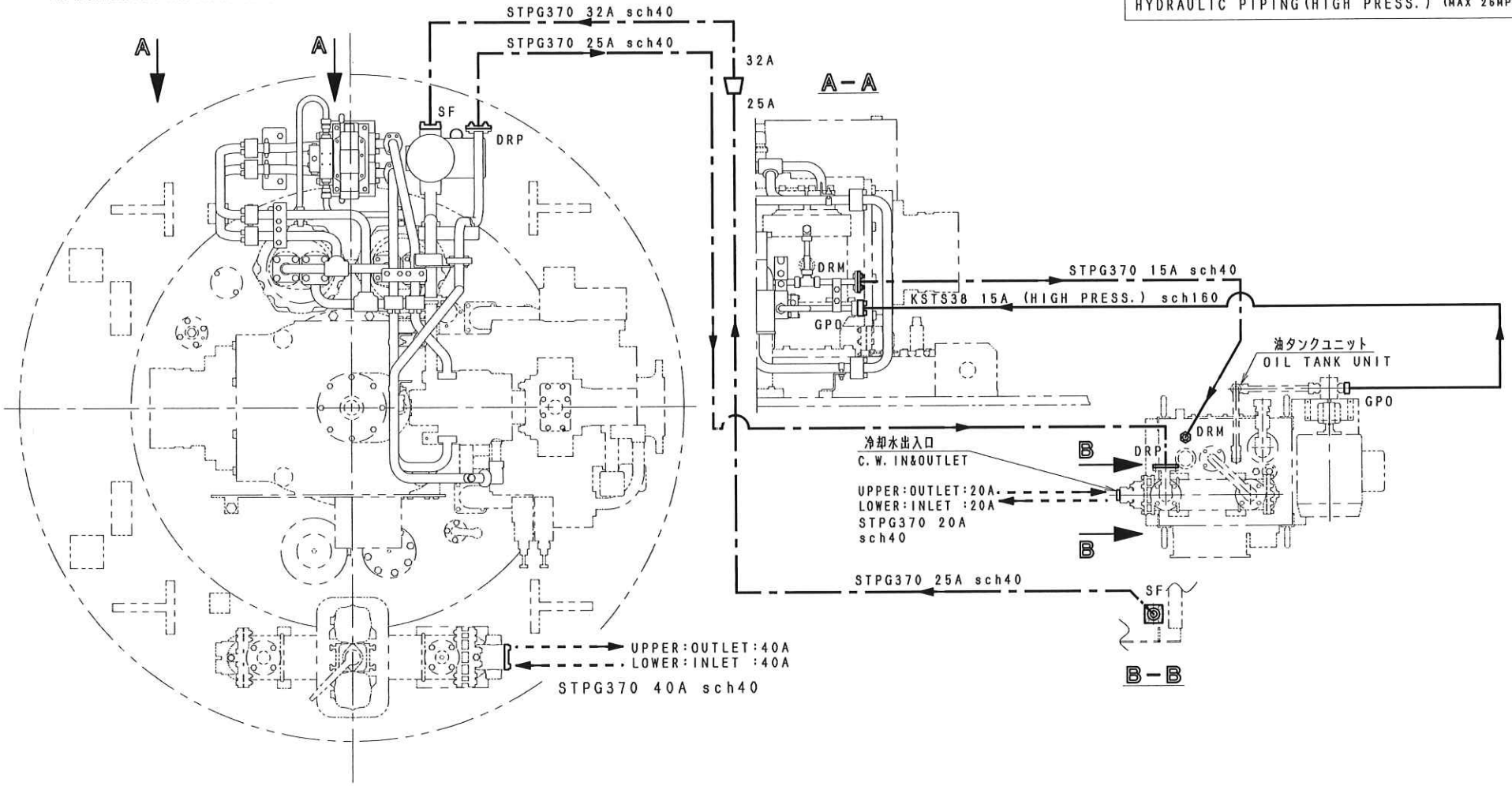
注記 NOTE

1. 艤装旋回油圧配管ハ、造船所殿ニテ酸洗イヲ実施願イマス。
   THE ACID PICKLING SHOULD BE OPERATED BY SHIPYARD FOR THE HYDRAULIC SHIPYARD PIPING.
2. 艤装旋回油圧配管ハ、造船所殿ニテフラッシングヲ実施願イマス。
   THE FLASHING SHOULD BE OPERATED BY SHIPYARD FOR THE HYDRAULIC SHIPYARD PIPING.
3. ※印ノ艤装油配管ハ、バルブヲ装着セズニ配管願イマス。
   THE HYDRAULIC SHIPYARD PIPING MARKED'※' SHOULD BE SET ONTO THE STEERING SYSTEM WITHOUT CONNECTING VALVES.

FOR STBD

造船所殿所掌配管
SHIPYARD PIPING

| | |
|---|---|
| 冷却水配管 COOLING WATER PIPING | (MAX 0.15MPa) |
| 作動油低圧配管 HYDRAULIC PIPING(LOW PRESS.) | (MAX 0.5MPa) |
| 作動油高圧配管 HYDRAULIC PIPING(HIGH PRESS.) | (MAX 26MPa) |






CAD

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|---|---|---|---|---|---|---|---|
| △ | | 承認 APPD. | 摘要 DESCRIPTION CL搭載_溶接台床_旋回補助P有_右舷 | 承認 APPD. 高橋 | 図名 TITLE センカイユアツハイカン HYDRAULIC PIPING | | |
| △ | | 照査 REV. | 参照図 REF. DRW. | 照査 REV. 高橋 | | | |
| △ | | 変更 CHG. | 参照図番 REF. NO. | 担当 CHD. 池田 | | | |
| △ | K245863_印CS造451殿向トシテ調製 | 使用先 ISSUED FOR ZP-21 | 変更前図 BEFORE NO. | 尺度 SCALE 1:15 | 製図 DWN. 池田 | 図番 DRAWING NO. AM7300-0029 | 改訂 REV. 00 |
| 記号 | 来歴 | 年月日 | 株式会社IHI原動機 IHI Power Systems Co., Ltd. | | 年月日 DATE 2025/01/30 | | 1/1 |

310030-A3AF

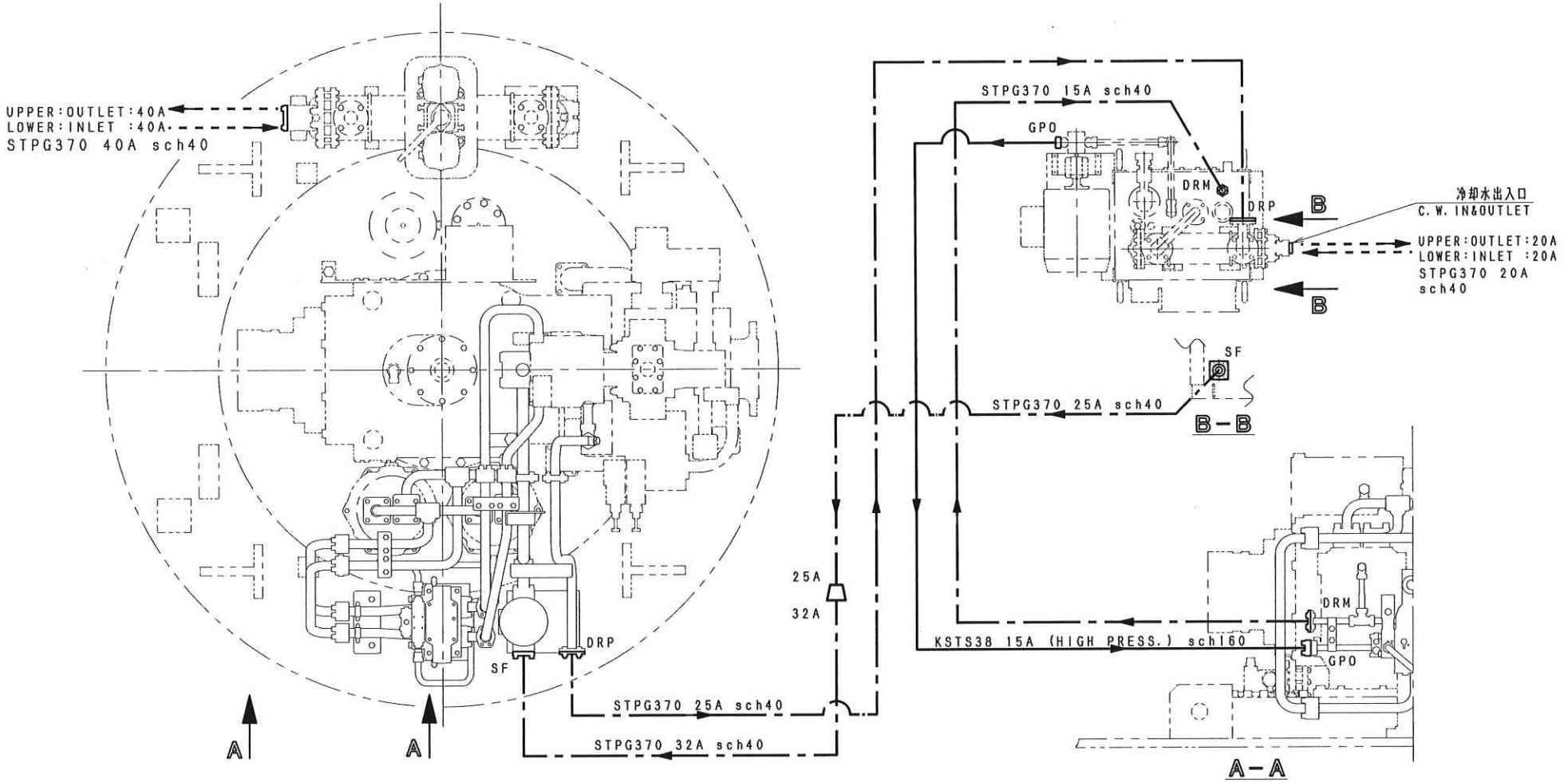
注記 NOTE

1. 艤装旋回油圧配管ハ、造船所殿ニテ酸洗イヲ実施願イマス。
   THE ACID PICKLING SHOULD BE OPERATED BY SHIPYARD FOR THE HYDRAULIC SHIPYARD PIPING.
2. 艤装旋回油圧配管ハ、造船所殿ニテフラッシングヲ実施願イマス。
   THE FLASHING SHOULD BE OPERATED BY SHIPYARD FOR THE HYDRAULIC SHIPYARD PIPING.
3. ※印ノ艤装油配管ハ、バルブヲ装着セズニ配管願イマス。
   THE HYDRAULIC SHIPYARD PIPING MARKED'※' SHOULD BE SET ONTO THE STEERING SYSTEM WITHOUT CONNECTING VALVES.

FOR PORT

造船所殿所掌配管
SHIPYARD PIPING

| | |
|---|---|
| 冷却水配管 COOLING WATER PIPING | (MAX 0.15MPa) |
| 作動油低圧配管 HYDRAULIC PIPING(LOW PRESS.) | (MAX 0.5MPa) |
| 作動油高圧配管 HYDRAULIC PIPING(HIGH PRESS.) | (MAX 26MPa) |




| 記号 | 来歴 | 年月日 |
|---|---|---|
| △ | | |
| △ | | |
| △ | | |
| Ⓓ | K245863_印CS造451殿向トシテ調製 | |

| | |
|---|---|
| 承認 APPD. | |
| 照査 REV. | |
| 変更 CHG. | |
| 使用先 ISSUED FOR | ZP-21 |
| 摘要 DESCRIPTION | CL搭載_溶接台床_旋回補助P有_左舷 |
| 参照図 REF. DRW. | |
| 参照図番 REF. NO. | |
| 変更前図 BEFORE NO. | |
| 尺度 SCALE | 1:15 |
| 株式会社IHI原動機 IHI Power Systems Co., Ltd. | |
| 承認 APPD. | 齊藤 |
| 照査 REV. | 齊藤 |
| 担当 CHD. | シマ |
| 製図 DWN. | シマ |
| 年月日 DATE | 2025/01/30 |

図名 TITLE: センカイユアツハイカン HYDRAULIC PIPING

図番 DRAWING NO.: AM7300-0030 | 改訂 REV.: 00 | 1/1



310030-A3AF