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गार्डेन रीच शिपबिल्डर्स एण्ड इंजिनियर्स लिमिटेड
Garden Reach Shipbuilders & Engineers Limited
(भारत सरकार का उपक्रम)
रक्षा मंत्रालय

61, गार्डेन रीच रोड,
कोलकाता - 700 024

(A Govt. of India Undertaking)
Ministry of Defence

61, Garden Reach Road,
KOLKATA - 700 024

email: mtl.eproc@grse.co.in
दूरभाष Phone: 033-24893902
फैक्स: FAX: 033-24692020
CIN: L35111WB1934GOI007891
GST Registration No.
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CORRIGENDUM (1)

निविदा संदर्भ सं Tender Ref. No.: **NCM/Imp/ST/DM/THRUSTER/ 004/ET-3031 dtd. 18.07.2024**

विषय Item: **STEERABLE AZIMUTH THRUSTERS and TRANSVERSE BOW THRUSTER** for Bangladesh Dredger (Yd 2121)

This corrigendum is issued for uploading of revised SOTR and revision of warranty clause :

- Revised SOTR is attached.
- Portion of Warranty clause [NIT clause - Annexure-VI clause 17(a)] revised as under

<u>EXISTING</u>	<u>TO BE READ AS</u>
The supplied materials are to be guaranteed / warranted for satisfactory performance for the period of <u>12 months</u> from the date of commissioning of the respective ship <u>36 months</u> from the actual date of final dispatch of equipment / items/materials whichever is earlier.	The supplied materials are to be guaranteed / warranted for satisfactory performance for the period of <u>12 months</u> from the date of commissioning of the respective ship, <u>18 months</u> from the actual date of final dispatch (receipt at GRSE in case delivery at shipyard is under responsibility of the supplier) of equipment / items/materials whichever is earlier"

निविदाकारों से अनुरोध है कि विस्तारित जमा तिथि के अंदर उपरोक्त निविदा में भाग लें.

BIDDERS ARE REQUESTED TO PARTICIPATE IN THE ABOVE-MENTIONED TENDER WITHIN EXTENDED DUE DATE & TIME.

निविदा के अन्य सभी नियम एवं शर्तों में कोई बदलाव नहीं है.

ALL OTHER TERMS & CONDITIONS OF THE TENDER ENQUIRY REMAIN UNALTERED.



**GARDEN REACH SHIPBUILDERS AND
ENGINEERS LIMITED, KOLKATA**

GRSE YARD NO. 2121

**STATEMENT OF TECHNICAL
REQUIREMENT
FOR STEERABLE AZIMUTH THRUSTERS &
TRANSVERSE BOW THRUSTER**

**SPECIFICATION NO:
CDO/ENGG/2121/5 (REV-0)**

SECURITY

This document is the property of the GRSE. The information contained in this document or any other information supplied subsequently about the system or new design ship is not to be communicated to any third party without prior approval of GRSE.

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REVISION HISTORY

0	Initial Issue	20-06-2024	Mr. Debapriya De DM(D)(E)	Mr. Kingshuk Mistry AGM(D)(E)
Rev.	Description	Date	Prepared by	Checked & approved by
Client: Garden Reach Shipbuilders & Engineers Ltd. Kol-700024		Project: TRAILING SUCTION HOPPER DREDGER – BIWTA (Bangladesh Inland Water Transport Authority)		



GRSE Ltd.

**STATEMENT OF TECHNICAL
REQUIREMENT
FOR AZIMUTH & BOW THRUSTERS**

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**CHAPTER 01– INTRODUCTION, GENERAL SPECIFICATION & ENVIRONMENTAL
CONDITIONS OF SHIP****1.1 Introduction**

- (a) This document describes the technical and functional requirements of the below mentioned equipments for Trailing Suction Hopper Dredger (Hopper capacity 1000 m³) to be used by BIWTA (Bangladesh Inland Waterways Transport Authority) on the Riverine Areas of Bangladesh-
- (i) Steerable thrust system consisting of 2 azimuth thrusters along with corresponding shaftlines and couplings
 - (ii) Transverse thrust system consisting of 1 bow thruster along with corresponding shaftline and couplings
- (b) The supplier should submit the quotation based on this SOTR. Following are also to be included along with the technical offer.
- (i) GA Drawings of equipments duly indicating maximum overall dimension, maintenance envelope, weight, material list.
 - (ii) Foot print of equipments duly indicating mounting bracket with overall dimension

1.2 Supplier's offer

The offer should be strictly conforming to the details indicated in this specification. No omission in the specifications shall relieve the supplier of his responsibility to ascertain these requirements to perform work & furnish material in accordance with codes specified. Offer should be complete with all relevant details such as detailed technical specification, material specification, overall dimensions, maintenance requirement, foundation / installation / bolting plan, storage/ preservation details, supported by drawings/documents/data sheets etc.

1.3 General specification & environmental condition of the ship

- (a) The vessel shall be designed and built under the Survey of Bureau Veritas (Classification Society) in accordance with the rules & requirements of class with the following class notations:

Notation: I, + Hull, + Mach, Hopper Dredger, Unrestricted navigation, dredging ≤ 8 miles from shore or Hs ≤ 2,0 m (T=3.9 m), AUT-UMS, COMF-NOISE 3, GREEN PASSPORT

- (b) **Environmental Condition:** The main equipment along with control equipment/system should be suitable for operation under the following ambient conditions:
- (i) Ambient temperature in the range of 10°C to 40°C
 - (ii) Sea-water temperature in the range of 0°C to 32°C
 - (iii) Relative Humidity in the range of 60% to 80%.



- (c) **Rolling & Pitching:** The equipment and the accessories including all integral and associated service system should be capable of continuous operation when the ship is in water corresponding to 'Sea Worthiness' stated at Para 1.3(f) below. All necessary Class rules to be complied to.
- (d) **Ship's Particulars**
The approximate principal particulars for the vessel are as follows:
- | | |
|---------------------|-----------------------|
| (i) Length OA | 58.70 m (approx.) |
| (ii) Beam | 12.20 m (approx.) |
| (iii) Depth | 4.50 m (approx.) |
| (iv) Gross tonnage | 1400 Tonnes (approx.) |
| (v) Summer Draft | 3.20 m |
| (vi) Dredging Draft | 3.90 m |
- (e) **Speed criteria & endurance:**
- (i) Vessel shall achieve a minimum Speed of 10.0 knots @ 100 % MCR at fully loaded draft, in calm and deep water.
- (ii) The vessel shall be built to suit an Endurance of about 14 days of Voyage.
- (f) **Sea Worthiness:**
Main equipment along with its control equipment & accessories should meet sea worthiness criteria as mentioned below.
- (i) Operational seaworthiness at Sea State 2 and shall be capable to navigate until Sea State 4.
- (g) **Units and Language:**
Language shall be English. Metric units are to be used.

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CHAPTER 02 – TECHNICAL AND MATERIAL SPECIFICATION

2.1 Scope:

The objective of this specification is to specify the requirements of the following thrust systems for the project, having the general characteristics as detailed herein, and which shall be fully integrated and coordinated with all other installations and equipment to fulfil the purpose intended.

- (a) Steerable thrust system consisting of **2 steerable azimuth thrusters along with Gear boxes, corresponding shaftlines, couplings and control systems**. Each of the azimuth thruster is driven by a dedicated main diesel engine (Make-Caterpillar; Model-C18 ACERT) via a shaftline. Main propulsion is by means of these 2 steerable thrusters with fixed pitch propellers (FPP) designed to run in high efficiency nozzles.
- (b) Transverse thrust system consisting of **1 transverse thruster along with Gear box, corresponding shaftline, couplings and control system**. This transverse bow thruster is driven by a dedicated main diesel engine (Make-Caterpillar; Model-C7.1) via a shaftline. This transverse thruster installed in the bow improves the maneuverability of the vessel.

This specification relates to the design, manufacture, supply, installation, commissioning, test and trials of Bureau Veritas (BV) / American Bureau of Shipping (ABS) Class approved type equipments as detailed above, which shall be fitted to the corresponding driving diesel engine of the respective thrusters, complete with its associated auxiliaries & ancillaries. OEM shall be responsible in totality, on turn-key basis for undertaking detailed design, manufacture, test, supply of the equipments with its auxiliaries and ancillaries considering general and environmental specification of the ship given in chapter 1 and detail technical specification and scope of supply brought out in the subsequent chapters from Chapter-02 to Chapter-08 meeting the propulsion system requirement as per this SOTR.

2.2 Applicable Standards:

The equipment should adhere to the latest BV/ ABS Class Rules and IMO/ MARPOL standards of pollution control.

2.3 Technical requirement

2.3.1 Steerable Azimuth Thrusters Specifications:

1. Thruster particulars:

(a)	Quantity:	Two (2 Nos.)
(b)	Make:	Veth Propulsion (Twin disc)

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FOR AZIMUTH & BOW THRUSTERS**

(c)	Model:	Z-drive VZ-550
(d)	Type:	Z-drive, top down installation
(e)	Steering:	Hydraulic
(f)	Propulsion power:	500 bkW (MCR at ISO conditions)
(g)	RPM of Engine output shaft	1800
(h)	Direction of rotation of Engine output shaft:	Counter-Clockwise looking from PTO
(i)	Propeller:	Fixed Pitch (FP), approx. 1250 mm
(j)	Propeller blades:	4, Medium skew
(k)	Propeller material:	NiAl-Bronze as per any international standard acceptable to Class
(l)	Blade finishing:	ISO 484 Class II
(m)	Nozzle:	With stainless steel wearing ring around propeller
(n)	Seal type:	Oil lubricated lip seal
(o)	Hydraulic system:	PTO driven
(p)	Cooling system:	<p>The thruster and shaftline is to be cooled by freshwater. Necessary auxiliary items required like cooling water pump, expansion tank, heat exchanger, etc to be supplied by thruster OEM. Expansion tank is to be provided with level switch for high/low level alarms. The cooling water is to be treated with an approved corrosion inhibitor. Mixing ratio of the corrosion inhibitor with fresh water to be indicated. Details of the inhibitor proposed & consumption rate are to be indicated in the offer.</p> <p>The freshwater cooling system will be cooled through box coolers. Thruster OEM to provide the maximum cooling capacity required for this purpose. Thruster OEM is to coordinate with the OEM of boxcoolers regarding the physical and functional interfacing with the thruster freshwater cooling system. Thruster supplier shall source the relevant design data/details from Boxcooler equipment supplier. All necessary</p>



		mechanical fittings, instrumentation for interfacing with the boxcoolers are to be supplied by Thruster OEM. Further, relevant design data/specifications are to be provided by Thruster supplier to Shipyard for procuring boxcooler equipments.
(q)	Duty:	The heavy duty equipment shall have the capacity to run at rated load upto 80% of the time or 10 hours out of 12 hours.
(r)	Other features:	Equipment shall have the capability of monitoring the equipment parameters and percentage of load both locally and remotely.
(s)	Approval:	Type approved from BV/ ABS Classification Society

2. **Shaft & Flexible coupling:** Each thruster with suitable gear box shall be delivered with torsionally flexible coupling suitable for connecting Steel shafts between engines and steerable thrusters to prevent excessive torsional vibration in the shafting and shall absorb relative shock displacement between engine and Gear box of thruster. The shaft as well as flexible couplings are in the scope of supply of thruster OEM. The Flexible Coupling shall ensure good alignment between the engine mount and bed in normal service. In case of slight misalignment (within limit) due to abnormal condition, this coupling shall ensure satisfactory operation within specified limits. The thrust system arrangement and corresponding Torsional Vibration Calculations (TVCs) for determining the technical specifications of the flexible coupling will be carried out by M/s DAMEN, Netherlands. Necessary contact information will be shared by shipyard. Thruster OEM has to communicate with M/s DAMEN to extract the necessary technical information for finalization of the specifications of the shaftlines and flexible couplings. Type and size of flexible couplings are to be determined on the basis of TVC's (Torsional Vibration Calculations) and as per Class requirements. If needed the shaft line is supported by a bearing. In that case support bearings are to be supplied by thruster OEM. Requisite holding down fasteners of thruster with ship foundation & fasteners for connecting flexible coupling with engine shaft and thruster shaft are in the scope of supply of thruster OEM.
3. **Control system propulsion:** The equipment should be controllable both locally (from Local Control Panel) as well as remotely (from remote Control Panel in the wheelhouse). The remote control system is designed to meet Class requirements and includes various interfaces to Vessel alarm and monitoring, navigation as well as the VDR data recorder if required. The main functionalities are proportional azimuth and thrust control. The control box has connections for a redundant power supply. In case of failure on the main power supply, it will switch over automatically to the backup power supply (24V). Remote control panels are installed in the wheelhouse consoles. OEM to ensure Emergency control is possible locally on the equipment.

Vessel propulsion and steering is remote controlled through one single lever for each thruster. In addition, a panel with control buttons is installed in the desk.

Main functionalities include:

- (a) Steering, Follow Up (FU) type
- (b) Backup steering control, Non Follow Up (NFU) type
- (c) Clutch control
- (d) Control transfer
- (e) Emergency stop
- (f) Dimming



2.3.2 Transverse Bow Thruster Specifications:

1. Thruster particulars:

(a)	Quantity:	One (1 No.)
(b)	Make:	Veth Propulsion (Twin disc)
(c)	Model:	Veth-Jet 2-K-1000
(d)	Type:	Channel type, 2 channels
(e)	Drive:	Diesel engine
(f)	Input power:	180 bkW (MCR at ISO conditions)
(g)	Input speed:	2000 RPM
(h)	Direction of rotation of Engine output shaft:	Counter-Clockwise looking from PTO
(i)	Propeller:	Fixed Pitch (FP), Horizontal, 1000 mm dia
(j)	Propeller material:	NiAl-Bronze as per any international standard acceptable to Class
(k)	Blade finishing:	ISO 484 Class II
(l)	Tunnel:	With stainless steel wearing ring around propeller
(m)	Seal type:	Oil lubricated lip seal
(n)	Hydraulic system:	PTO driven
(o)	Cooling system:	<p>The thruster and shaftline is to be cooled by freshwater. Necessary auxiliary items required like cooling water pump, expansion tank, heat exchanger, etc to be supplied by thruster OEM. Expansion tank is to be provided with level switch for high/low level alarms. The cooling water is to be treated with an approved corrosion inhibitor. Mixing ratio of the corrosion inhibitor with fresh water to be indicated. Details of the inhibitor proposed & consumption rate are to be indicated in the offer.</p> <p>The freshwater cooling system will be cooled through box coolers. Thruster OEM to provide the maximum cooling capacity required for this purpose. Thruster OEM is to coordinate with the OEM of boxcoolers regarding the physical and functional interfacing with the thruster</p>



		freshwater cooling system. Thruster supplier shall source the relevant design data/details from Boxcooler equipment supplier. All necessary mechanical fittings, instrumentation for interfacing with the boxcoolers are to be supplied by Thruster OEM. Further, relevant design data/specifications are to be provided by Thruster supplier to Shipyard for procuring boxcooler equipments.
(p)	Duty:	The heavy duty equipment shall have the capacity to run at rated load upto 80% of the time or 10 hours out of 12 hours.
(q)	Other features:	Equipment shall have the capability of monitoring the equipment parameters and percentage of load both locally and remotely.
(r)	Approval:	Type approved from BV/ ABS Classification Society

Note: The transverse thruster is suitable for (dis)mounting when the Vessel is afloat at lightest draught.

- 2. Shaft & Flexible coupling:** Each thruster with suitable gear box shall be delivered with torsionally flexible coupling suitable for connecting Steel shafts between engines and steerable thrusters to prevent excessive torsional vibration in the shafting and shall absorb relative shock displacement between engine and Gear box of thruster. The shaft as well as flexible couplings are in the scope of supply of thruster OEM. The Flexible Coupling shall ensure good alignment between the engine mount and bed in normal service. In case of slight misalignment (within limit) due to abnormal condition, this coupling shall ensure satisfactory operation within specified limits. The thrust system arrangement and corresponding Torsional Vibration Calculations (TVCs) for determining the technical specifications of the flexible coupling will be carried out by M/s DAMEN, Netherlands. Necessary contact information will be shared by shipyard. Thruster OEM has to communicate with M/s DAMEN to extract the necessary technical information for finalization of the specifications of the shaftlines and flexible couplings. Type and size of flexible couplings are to be determined on the basis of TVC's (Torsional Vibration Calculations) and as per Class requirements. If needed the shaft line is supported by a bearing. In that case support bearings are to be supplied by thruster OEM. Requisite holding down fasteners of thruster with ship foundation & fasteners for connecting flexible coupling with engine shaft and thruster shaft are in the scope of supply of thruster OEM.
- 3. Transverse thruster control system:** The equipment should be controllable both locally (from Local Control Panel) as well as remotely (from remote Control Panel in the wheelhouse). The remote control system is designed to meet Class requirements and includes various interfaces to Vessel alarm and monitoring, navigation as well as the VDR data recorder if required. The main functionalities are proportional transverse thrust control. The control box has connections for a redundant power supply. In case of failure on the main power supply, it will switch over automatically to the backup power supply (24V). Remote control panels are installed in the wheelhouse consoles. OEM to ensure Emergency control is possible locally on the equipment. Thrust force and direction are controlled through a single lever. The lever unit also includes control buttons for main functionalities.

Main functionalities include:

- Thrust direction control



- (b) Rpm control
- (c) Control transfer
- (d) Dimming

2.3.3 Common technical requirements for both azimuthal thrusters and bow thruster:

- (a) **Assembly:** The equipment is to be of modular design to facilitate easy dismantling, shipping, unshipping. The OEM is to indicate the dimension & weight of the largest component. Following not exceeding overall dimensions (in mm) are to be indicated in preliminary GA drg submitted along with offer:

- (i) Length
- (ii) Width
- (iii) Height
- (iv) Face to face dimension

- (b) **Manning Policy:** The machinery should be able to be started, monitored, controlled & stopped from the following locations.

- (i) Locally
- (ii) Remotely from wheelhouse

All Electronic control panels (local panels as well as the wheelhouse panels) are to be included in the thruster scope of supply. The panels must be provided with instruction plates for start stop procedure. All control panels must be provided with necessary mounts.

- (c) **Lifting Arrangement:** All components weighting more than 40 kg are to be provided with provisions for fitment of eyebolts; wherever there is a danger of transit damage due to freedom of a dry rotor to move within its casing, a suitable jacking or rotor locking device is to be provided.

- (d) **Torsional vibration calculation:** Torsional vibration analysis of the thruster and shaftline assembly shall be undertaken by thruster supplier. The manufacturer should confirm that concerned equipments are torsionally safe for specified operation.

- (e) **Interfacing Obligations:** OEM to take care all the obligations and necessary action to overcome problems while mechanical and electrical interfacing with equipments supplied by the other vendors. All such necessary mechanical and electrical fittings required for interfacing with other equipments are to be supplied by thruster OEM.

Thruster shall be compatible for interface / integration with other ship systems (Main propulsion, hydraulic), electrical systems, structures of the ship.

The thruster control system is to be fully integrated to propulsion engine control for start/stop, operation, alarms, interlocks, emergencies, data logging, trending. For remote monitoring of all the functional parameters of thruster at Local & Bridge console is to be provided along



with warnings, alarms and trip exceeding normal operating limits. The interface between thruster control Panel and propulsion engine control panel shall be through serial link and hard wired. All sensors/switches required for interfacing of thruster parameters/alarms/trips are to be included in firm's scope of supply & type of the same to be clearly indicated in technical offer. Thruster OEM to be present during CDR/PDR for finalization of interface requirement with other Propulsion system.

- (f) **Weights:** Total weight of the equipment along with OEM tolerance shall be indicated in the technical offer as well as on the GA drawing.
- (g) **Materials:**
A component wise material specification of materials used for the construction of various parts of the equipments are to be indicated in the proposal. Selection of material should be as per requirement of Classification authority.
- (h) **Type approval requirement:** BV/ ABS Type approval certificates for the offered thruster models is required to be provided by OEM along with the technical offer.
- (i) **Safety requirements:** The system should incorporate adequate safety interlocks along with indication on Azimuth and Bow Thruster Control Panels. Following Safety interlocks are to be provided as applicable:
- (i) Main propulsion Brake engage/ disengaged interlock
 - (ii) Any other interlock recommended by OEM or as required by Classification Society
- Other safety devices are to be fitted as required by Class rules.

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CHAPTER 03 – TECHNICAL ASSISTANCE, SERVICE & COMMISSIONING

3.1 Technical Assistance / Service:

- (a) OEM shall be responsible for interfacing the thrusters with respective shafting to meet the specified performance requirements. OEM shall also be responsible for supply, assistance for erection, installation & alignment of such equipment. Technical Assistance/Service shall be rendered by the equipment manufacturer/ supplier for Re-assembly (if necessary); Re-preservation, Installation, Alignment, installation checking, set to work, trials, Post Trial Inspection and Final Machinery Trial. Delegation of manufacturer's/ supplier's personnel shall be made available on the requirement projected by GRSE. The technical services shall be provided by Supplier without any additional commercial implications. OEM's assistance includes presence of skilled technicians for supervision during on board installation & commissioning of the equipment for following activities:
- (i) **Installation:** A procedure for the erection and alignment of the equipment shall be provided by OEM.
 - (ii) **Setting to work, trials, commissioning:** The OEM shall have the responsibility for setting to work and satisfactory completion of HAT/CST/FMT for acceptance of equipment by BV/ ABS Class.
 - (iii) **Co-ordination with other OEMs:** The manufacturer of the thrusters shall be solely responsible to co-ordinate with other OEMs of diesel engine, boxcoolers, TVCs to collect / share / exchange the relevant data/ technology/information required by thruster manufacturer / other OEM with a copy marked to GRSE / design agencies.

Above activities are to be undertaken to ensure satisfactory performance of the system onboard and proving the system to the inspection agencies as per approved test procedure.

- 3.2 OEM shall depute their reps at GRSE during receipt inspection of the items.

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CHAPTER 04 –QUALITY ASSURANCE PLAN

- 4.1 Necessary Quality Assurance Plan (QAP) shall be made by the vendor. The Quality Assurance plan is to comply with requirement specified in relevant class documents/ standards and this SOTR. Firm will forward the same to BV/ ABS Class for approval. Changes, if any, recommended by the QAP approval authority shall be binding on the supplier and to be incorporated in the Final QAP and the same to be stamped & approved by BV/ ABS Class.
- 4.2 Prepared Quality Assurance Plan (QAP) shall include the schedule for inspection, Test & trials and should be drawn up in such a way that all inspections including component level inspection, trials of subassemblies, etc., should be, as far as practicable performed at the corresponding stage of manufacture. Detailed measurements should be carried out at the appropriate stage of manufacturing of the product.
- 4.3 Stamped approved copy of QAP is to be submitted to GRSE for reference/records.
- 4.4 During manufacturing & proving of the equipment, inspection shall be carried out by BV/ ABS Class representative iaw approved QAP. During on board installation inspection shall be carried out by BV/ ABS Class & GRSE(QA).
- 4.5 FAT protocol shall be submitted by OEM for approval by Class.
- 4.6 FAT to be witnessed by both Class and Shipyard (GRSE) representative.

CHAPTER 05- TRAINING

The ship's crew shall be trained on the equipment and accessories related to the main equipment installed on board. Such introductory training shall be arranged by OEM on operation, maintenance and repair aspects of the equipment, as applicable.

On board training: OEM to depute reps to conduct training either at GRSE or at suitable location in India as per BIWTA requirement.

CHAPTER 06- SPARES & TOOLS

Spare parts of equipments as per Class requirements shall be delivered according to Maker's recommendations for two (2) years normal consumption. The list of OBS to be included in Technical offer. OEM to ensure supply of OBS as per OEM recommended list as per the Class rules & regulation.

OEM is to provide 01 set of standard and special tools as per manufacturer's recommendation / Class requirements. OEM recommended special tools, if any are to be included in Technical offer.

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CHAPTER 07 - DOCUMENTATION & BINDING DRAWINGS

7.1 Documentation:

All documentations are to be in English language and to be approved from Classification Society by OEM. OEM shall ensure that all such documents be prepared incorporating all comments / recommendations of customer and Class.

7.1.1 Hard copy documentation:

Hard copy manuals consisting of following separate books to be supplied.

- (i) Technical/operational manual.
- (ii) Maintenance manual (for on board as well as base & depot maintenance)
- (iii) 05 sets of drawings including approved data/drawings & binding data/drawings as elaborated in clause 7.2.
- (iv) Comprehensive Part Identification List (CPL/PIL) with list of all changeable/replaceable parts. Part nos of all flexible connections (hoses/bellows) external to the equipment (and connected with the ships piping/ports) to be provided in a separate chapter under CPL/PIL book.
- (v) Certificates: A separate book consisting of all certificates (as applicable) to be provided.
- (vi) FAT reports.

Note: In case anything mentioned above is not applicable, same to be brought out clearly & finalized during TNC.

7.2 Binding Data & Drawings:

Binding data & drawings to be supplied both in hard copy & soft copy. Following information must be submitted along with the binding data/drawings duly approved by authorized agency:

- (i) List of binding data & drawing clearly mentioning the category (like information/approval).
- (ii) Equipment GA drawing indicating overall maintenance space requirement, dimension, material specification, lifting arrangement, weight and location of CG.
- (iii) Footprint drawings are to separately submitted by OEM a part of GA drawing along with details of materials and sizes of bolts/nuts/fasteners, chock-fasting, holding down details, etc.
- (iv) Exploded drawings of machinery or equipment which require periodic dismantling for maintenance required to be provided.
- (v) GA drawing of all accessories & control panels indicating overall maintenance space requirement, dimension, lifting arrangement, weight and location of CG.
- (vi) Internal P&I diagram of each system/utility with proper annotation, BOM with part no of each item.

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- (vii) Light version 3D model in (.stp) file format is required to be submitted along with binding drawing for installation feasibility checking.

Note:

- (i) Soft copy of all binding drawings to be supplied in AutoCAD as well as in pdf format.

7.3 Approval of binding drawing:

- a) All drawings/control philosophy/scheme required for BV/ ABS Class approval will be responsibility of OEM. OEM shall submit binding data/drawings to shipyard for shipyard's comment. With shipyard's comment OEM shall forward the binding data/drawing to classification society for obtaining their approval/comments. OEM is also required to consolidate the comments received from shipyard & class & prepare the revised/final binding data based on the same.

7.4 First submission of data:

Following data are to be provided within 7 days of placement of LOA/Purchase order (whichever is earlier)

7.5 Certificates required:

Following certificates, but not limited to, shall be provided:

- (i) Type approval certificate from Classification Society for the equipments
(ii) Shop test/ Factory Acceptance Test certificate

CHAPTER 08 - Packing & Dispatch

Packing & Dispatch:

- (a) Dispatch clearance is to be given by shipyard subject to satisfactory clearance of FATs by Class and shipyard.
- (b) Packing of the preserved equipment shall follow standard method of packing i.e. normally as per the method followed for the respective equipment. Packing shall be durable and suitable for normal storage up to 36 months.
- (c) All items fitted / loose supplied shall also be listed on the packing list duly indicating/tagged the GRSE material code & firm's part no.