

TRANSNET SOC LTD

TENDER NUMBER: TNPA/2023/11/0021/50266/RFP

FOR THE SUPPLY, DELIVERY, TESTING AND COMMISSIONING OF CLASSIFICATION SOCIETY REGISTERED GRAB HOPPER DREDGER WITH A HOPPER CAPACITY OF 750M3, MOUNTED WITH A MARINE EXCAVATOR CAPABLE OF LIFTING AN 8M3 BUCKET FILLED WITH SPOIL AT A MINIMUM RADIUS OF 20M.

ADDENDUM NO. 02

DATED 08 August 2024

The following information is furnished in addition to, in amplification and substitution of, matters contained in the tender documents issued in respect of the above-mentioned work.

1. Section 1: Notice to Tenderers: Closing date

Tender Closing date has been extended from 21 August 2024 at 12:00 noon to **21 September 2024 at 12:00 noon.**

2. T1.2 Tender Data

Respondents are to note that the initial **Tender Data** is superseded and replaced with the revised **Tender Data** attached to this addendum.

3. T2.2-10: RFP Clarification Request Form

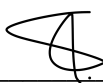
For specific queries relating to this RFP, an RFP Clarification Request Form should be submitted onto the system and to Sisanda Msi (TNPATenderenquiries1@transnet.net) on or before **12:00 noon on 04 September 2024** substantially in the form set out hereto. In the interest of fairness and transparency, Transnet’s response to such a query will be published on the National Treasury e-Tender Publication Portal and Transnet e-Tender Submission Portal.

4. C3.1 Goods Information

Respondents are to note that the initial **Goods Information** is superseded and replaced with the revised **Goods Information** attached to this addendum.

This addendum should be signed and submitted with your tender.

TRANSNET SOC LTD:

Signature:  _____

Date: 08 Aug 2024

TENDERER:

Signature: _____

Date: _____

T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Engineering and Construction Works Contracts. The Standard for Uniformity in Construction Procurement was first published in Board Notice 62 of 2004 in Government Gazette No 26427 of 9 June 2004. It was subsequently amended in Board Notice 67 of 2005 in Government Gazette No 28127 of 14 October 2005, Board Notice 93 of 2006 in Government Gazette No 29138 of 18 August 2006, Board Notice No 9 of 2008 in Government Gazette No 31823 of 30 January 2009, Board Notice 86 of 2010 in Government Gazette No 33239 of 28 May 2010, Board Notice 136 of 2015 in Government Gazette 38960 of 10 July 2015 and Board Notice 423 of 2019 in Government Gazette No 42622 of 8 August 2019.

This edition incorporates the amendments made in Board Notice 423 of 2019 in Government Gazette 42622 of 8 August 2019. (see www.cidb.org.za).

The Standard Conditions of Tender make several references to Tender data for detail that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

Each item of data given below is cross-referenced in the left-hand column to the clause in the Standard Conditions of Tender to which it mainly applies.

Clause	Data
C.1.1	The <i>Employer</i> is Transnet SOC Ltd (Reg No. 1990/000900/30)
C.1.2	The tender documents issued by the <i>Employer</i> comprise: Part T: The Tender Part T1: Tendering procedures Part T2 : Returnable documents Part C: The contract Part C1: Agreements and contract data Part C2: Pricing data
	T1.1 Tender notice and invitation to tender T1.2 Tender data T2.1 List of returnable documents T2.2 Returnable schedules C1.1 Form of offer and acceptance C1.2 Contract data (Part 1 & 2) C1.3 Form of Securities C2.1 Pricing instructions

C2.2 Price Schedule

Part C3: Scope of work

C3.1 Goods Information

C.1.4 The Purchaser's agent is:

Commodity Manager

Name:

Sisanda Msi

Address:

N2 Neptune Road
Off Klub Road TNPA
eMendi Administration Building
Port of Ngqura
6001

E – mail

TNPATenderenquiries1@transnet.net

C.2.1 Only those tenderers who satisfy the eligibility criteria as stated in C.3 below are eligible to submit tenders.

C.2.7 The arrangements for a non-compulsory clarification meeting are as stated in the Tender Notice and Invitation to Tender.

C.2.12 No alternative tender offers will be considered. (An alternative tender offer is regarded as any deviation from the respective Goods Information sections pertaining to item number 1 to item number 51 of the Evaluation Schedule: Compliance to Technical Specification).

C.2.13.3 Each tender offer shall be in the **English Language**.

C.2.13.5 The *Employer's* details and identification details that are to be shown on each tender offer are as follows:

Identification details:

The tender documents must be uploaded with:

- **Name of Tenderer:**
.....
(insert company name)
- **Contact person and details:**
.....
(insert details)
- **The Tender Number:**
TNPA/2023/11/0021/50266/RFP
- **The Tender Description:** Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of

750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m

Documents must be marked for the attention of:
Employer's Agent: Sisanda Msi

C.2.13.9 Telephonic, telegraphic, facsimile or e-mailed tender offers will not be accepted.

C.2.15 The closing time for submission of tender offers is:
Time: **12:00 noon** on the **21 September 2024**
Location: The Transnet e-Tender Submission Portal:
(<https://transnetetenders.azurewebsites.net>).

NO LATE TENDERS WILL BE ACCEPTED

C.2.16 The tender offer validity period is **12 weeks** from the closing date. Tenderers are to note that they may be requested to extend the validity period of their tender, on the same terms and conditions, if Transnet's internal evaluation and governance approval processes has not been finalised within the validity period.

C.2.23 The tenderer is required to submit with his tender:

1. A valid Tax Clearance Certificate issued by the South African Revenue Services.
Tenderers also to provide Transnet with a TCS PIN to verify Tenderers compliance status.
2. A **valid B-BBEE Certificate** from a Verification Agency accredited by the South African Accreditation System [**SANAS**], or a **sworn affidavit** confirming annual turnover and level of black ownership, in line with the code of good practice, together with the tender;
3. Proof of registration on the Central Supplier Database;

Note: Refer to Section T2.1 for List of Returnable Documents

C.3.11 STEP ONE: Test for Administrative Responsiveness

The test for administrative responsiveness will include the following:

Administrative responsiveness check	RFP Reference
<ul style="list-style-type: none"> Whether the Bid has been lodged on time 	<i>All sections</i>
<ul style="list-style-type: none"> Whether all Returnable Documents and/or schedules [where applicable] were completed and returned by the closing date and time 	<i>All sections</i>
<ul style="list-style-type: none"> Verify the validity of all returnable documents 	<i>All sections</i>
<ul style="list-style-type: none"> Verify if the Bid document has been duly signed by the authorised respondent 	<i>All sections</i>

The test for administrative responsiveness [Step One] must be passed for a Respondent’s proposal to progress to Step Two for further evaluation

STEP TWO: Test for Substantive Responsiveness to RFP

The test for substantive responsiveness to this RFP will include the following:

Check for substantive responsiveness	RFP Reference
<ul style="list-style-type: none"> Whether the tender contains completed and signed form of offer and acceptance, and priced pricing schedule 	<i>C.2.1 & C.2.2</i>

The test for substantive responsiveness [Step Two] must be passed for a Respondent’s proposal to progress to Step Three for further evaluation

STEP THREE: Functionality Criteria

The minimum number of evaluation points for functionality is: **60**

The procedure for the evaluation of responsive tenders is Functionality:

Only those tenderers who attain the minimum number of evaluation points for Functionality will be eligible for further evaluation, failure to meet the minimum threshold will result in the tender being disqualified and removed from any further consideration.

Functionality Criteria

The functionality criteria and maximum score in respect of each of the criteria are as follows:

Evaluation Schedules	Maximum number of points
T2.2-01: Company Previous experience	30
T2.2-02: Compliance to Technical Specification	30
T2.2-03: Programme Delivery time	30
T2.2-04: ISO Certification	10
Maximum score for functionality	100

Functionality shall be scored independently by not less than 3 (three) evaluators and averaged in accordance with the functionality schedules.

Each evaluation criteria will be assessed in terms of scores of 0, 20, 40, 60, 80 or 100. The scores of each of the evaluators will be averaged, weighted and then totalled to obtain the final score for functionality.

Note: Any tender not complying with the above-mentioned requirements, will be regarded as non-responsive and will therefore not be considered for further evaluation. This note must be read in conjunction with Clause C.2.1.

Thresholds	Minimum Threshold
Technical / functionality	60

The test for Technical / functionality evaluation [Step Three] must be passed for a Respondent's proposal to progress to Step Four for further evaluation

STEP FOUR: Weighted scoring

Only tenders that passed the functionality step will be evaluated further in accordance with the 90/10 preference points systems:

Evaluation Criteria	Final Weighted Scores
Price	90
Specific goals - Scorecard	10
TOTAL SCORE:	100

90 tender evaluation points for price will be allocated where the financial value of one or more responsive tenders received have a value equal to or above R50 million, inclusive of all applicable taxes.

Up to 10 tender evaluation points for preference (specific goals) will be awarded to tenderers who complete the preferencing schedule and who are found to be eligible for the preference claimed. **Should the evidence required for any of the specific goals applicable in this tender not be provided, a tenderer will score zero preference points for that particular specific goal.**

In terms of Transnet Preferential Procurement Policy (TPPP) and Procurement Manuals, the following preference points must be awarded to a bidder who provides the relevant required evidence for claiming points:

Selected Specific Goal	Number of points allocated (90/10)
B-BBEE Status Level of contributor (1 or 2)	10
Non-Compliant and/or B-BBEE Level 3-8 contributors	0

The following Table represents the evidence to be submitted for claiming preference points for applicable specific goals in a particular tender:

Specific Goals	Acceptable Evidence
B-BBEE	B-BBEE Certificate / Sworn-Affidavit / CIPC B-BBEE Certificate (in case of JV, a consolidate scorecard will be accept) as per DTIC guidelines

The maximum points for this bid are allocated as follows:

DISCRIPTION	POINTS
PRICE	90
B-BBEE Status Level of Contributor 1 or 2	10
Total points for Price and Specific Goals must not exceed	100

Note: Transnet reserves the right to carry out an independent audit of the tenderers scorecard components at any stage from the date of close of the tenders until completion of the contract.

STEP FIVE: Objective Criteria

Objective criterion to justify award to someone other than the highest ranked bidder must have been stated in the bid documents and can be used at this stage.

Transnet will award the tender to the highest scoring bidder/s unless objective criteria exist that justify the award to another bidder. Transnet may apply the objective criteria in this bid process as follows:

- Bidder(s) is not in good standing with Transnet National Ports Authority due to a poor track record of past performance with Transnet SOC Ltd and or Transnet National Ports Authority;
- There is clear, uncontrived and/or overwhelming evidence and/or facts that the bidder has or continues to be in breach of any of the provisions contained in the Integrity Pact (T2.2-15);

-
- The Probity check undertaken by Transnet National Ports Authority establishes the existence of any unmitigated risks which would have a negative impact on the project;
 - Unless the appointment of the bidder would result in a negative impact on Transnet's Return on Investment.
 - It is necessary to rotate Suppliers to promote opportunities for other suppliers, in circumstances where the bidder has been awarded business previously and the award of the tender will result in inequitable allocation of business;
 - The tenderer or its members, directors, partners:
 - Is under restrictions as contemplated in the Integrity Pact (T2.2-15),
 - Is a subject of a process of restriction by Transnet or other state institution that Transnet may be aware of and there is a clear, uncontrived and/or overwhelming evidence and/or facts in relation to the alleged wrongdoing on the basis of which the restriction process has been initiated;
 - in relation to the proposed contract, a due diligence exercise to validate the bidder's proposal that demonstrate that it possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract;
 - Has no legal capacity to enter into the contract;
 - Is insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, being wound up, has its affairs administered pursuant to a court order, has ceased or suspended their business activities, or is subject to legal proceedings in respect of any of the foregoing;
 - Does not comply with the legal requirements, if any, stated in the tender data; and
 - Is not able to perform the contract free of conflicts of interest.

STEP SIX: Post Tender Negotiations if applicable

Post tender negotiation with preferred bidder [2nd and 3rd ranked bidders (if required) in a sequential and not simultaneous manner] if pricing is not market-related.

STEP SEVEN: Award of business and conclusion of contract.

C.3.17 The number of paper copies of the signed contract to be provided by the Employer is 1 (one).



T2.2-10: RFP Clarification Request Form

For specific queries relating to this RFP, an RFP Clarification Request Form should be submitted onto the system and to Sisanda Msi (TNPATenderenquiries1@transnet.net) on or before 12:00 noon on 04 September 2024 substantially in the form set out hereto. In the interest of fairness and transparency, Transnet’s response to such a query will be published on the National Treasury e-Tender Publication Portal and Transnet e-Tender Submission Portal.

RFP No.: TNPA/2023/11/0021/50266/RFP

RFP deadline for questions / RFP Clarifications: On or before 12:00 noon on 04 September 2024.

TO: Transnet SOC Ltd

ATTENTION: The Tender Administrator

EMAIL: TNPATenderenquiries1@transnet.net

DATE: _____

FROM: _____

RFP Clarification No *[to be inserted by Transnet]*

REQUEST FOR RFP CLARIFICATION

GOODS INFORMATION

GRAB HOPPER DREDGER



SECTION A - GENERAL DESCRIPTION	12
A1. GENERAL	12
A2. DESIGN CRITERIA	17
A3. TYPE AND FUNCTION	18
A4. ANTICIPATED MAIN PARTICULARS	22
A5. SPEED	22
A6. DREDGING PERFORMANCE.....	23
A7. CLASSIFICATION	23
A8. CERTIFICATES	24
A9. DRAWINGS AND DOCUMENTATION.....	25
A10. TESTS AND TRIALS.....	31
A11. STANDARDIZATION	36
A12. MAKES.....	37
A13. TRAINING	37
A14. SPARE PARTS, TOOLS AND INVENTORY	39
A15. ASSEMBLING, WELDING, ETC.....	39
A16. NOISE REDUCING MEASURES	40
SECTION B - STEEL HULL.....	41
B1. GENERAL ARRANGEMENT	41
B2. HULL CONSTRUCTION AND SCANTLINGS	42
B3. HULL PLATING	43
B4. DECKS.....	43
B5. DOUBLE BOTTOM	44
B6. STEM AND STERN.....	44
B7. DECKHOUSES	44
B8. FUNNEL	44
B9. PROPELLER SHAFT BRACKETS	45



B10. RUDDERS.....	45
B11. PROPELLER NOZZLES.....	46
B12. BOW THRUSTER TUNNEL.....	46
B13. BUILT-IN TANKS.....	46
B14. VARIOUS SEPARATE TANKS.....	47
B15. HATCHWAYS	48
B16. HAWSE PIPES	48
B17. CHAIN LOCKERS	48
B18. STEEL LADDERS AND STAIRWAYS	48
B19. FLOOR PLATES AND GRATINGS IN ENGINE ROOM	49
B20. MANHOLES	49
B21. STEEL DOORS	49
B22. REMOTE CONTROLLED WATERTIGHT DOORS	50
B23. CATWALK	50
B24. BULWARKS AND RAILINGS.....	50
B25. DRAIN PLUGS	50
B26. BILGE KEELS.....	51
B27. NAMEPLATES, SHIP'S IDENTIFICATION NUMBER, DRAUGHT MARKS, ETC	51
B28. CATHODIC HULL PROTECTION	51
B29. PAINTING AND OTHER PROTECTIVE PROCESSES.....	52
SECTION C - EQUIPMENT	54
C1. STEERING GEAR.....	54
C2. FORWARD WINDLASSES AND CHAIN STOPPERS	54
C3. AFT WINDLASS AND CHAIN STOPPER	55
C4. ANCHORS AND CHAIN CABLES.....	55
C5. BOLLARDS, FAIRLEADS AND MOORING PORTS	55
C6. HAWSERS AND WIRE ROPES.....	55
C7. MOTOR RESCUE BOAT	56

C8. MOTOR RESCUE BOAT AND LIFE-RAFT LAUNCHING DAVIT.....	56
C9. ACCOMMODATION LADDERS	56
C10. GANGWAY.....	56
C11. MASTS AND RIGGING.....	57
C12. HOISTING GEAR IN ENGINE ROOM, TECHNICAL SPACE AND BOW THRUSTER ROOM	57
C13. STORES HANDLING CRANE.....	57
C14. FIXED FIRE-EXTINGUISHING SYSTEMS	58
C15. INTEGRATED FIRE DETECTION AND FIRE ALARM SYSTEM AND	58
SMOKE DETECTION SYSTEM	58
C16. LOOSE FIREFIGHTING EQUIPMENT.....	58
C17. LIFE-SAVING APPLIANCES	59
C18. REPAIR AREAS	59
C19. STORE SPACES.....	60
C20. ARRANGEMENT OF EMERGENCY GENERATOR ROOM.....	60
C21. ENGINE ROOM WATCH CABIN.....	60
C22. MACHINE TOOLS.....	61
C23. PROTECTION COVERS	62
SECTION D - ACCOMMODATION	63
D1. LAYOUT OF ACCOMMODATION	63
D2. PANELLING, PARTITION BULKHEADS AND CEILINGS.....	64
D3. DOORS IN ACCOMMODATION	64
D4. WINDOWS AND PORTHOLES.....	65
D5. STAIRWAYS.....	65
D6. INSULATION.....	66
D7. FLOOR COVERINGS	66
D8. TILED FLOORS	66
D9. FURNITURE	67
D10. UPHOLSTERY.....	68



D11. ACCOMMODATION	68
D12. OFFICERS' MESS ROOM	70
D14. GALLEY	71
D15. DRY PROVISION STOREROOM	72
D16. REFRIGERATED PROVISION STOREROOM	72
D17. DOMESTIC REFRIGERATORS	73
D18. SANITARY EQUIPMENT	73
D19. LAUNDRY	74
D20. LINEN LOCKERS	75
D21. WHEELHOUSE	75
D22. OFFICE.....	75
D23. HOSPITAL	76
D24. FIRST AID OUTFIT	76
SECTION E - NAVIGATION AND COMMUNICATION EQUIPMENT	76
E1. MAGNETIC COMPASS.....	76
E2. GYRO COMPASS	77
E3. ELECTRIC STEERING SYSTEM	77
E4. ELECTRIC RUDDER POSITION INDICATING SYSTEM	79
E5. AUTO PILOT	79
E6. TELEGRAPH REMOTE CONTROL SYSTEM	79
E7. VOYAGE DATA RECORDER (VDR)	80
E8. AUTOMATIC IDENTIFICATION SYSTEM (AIS).....	81
E9. SHIP SECURITY ALERT SYSTEM (SSAS).....	81
E10. NAVIGATION ECHO-SOUNDING EQUIPMENT	81
E11. WATER TRACK SPEED LOG	82
E12. RADAR INSTALLATIONS	82
E13. DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) FOR NAVIGATION PURPOSES.....	83
E14. WIND MEASURING SYSTEM	84



E15. RADIO COMMUNICATION AND SAFETY EQUIPMENT (GMDSS - A3)	84
E16. INMARSAT-FLEET BROADBAND SATELLITE COMMUNICATION	86
SYSTEM.....	86
E17. ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS).....	87
E18. INTEGRATED COMMUNICATION SYSTEM.....	88
E19. HOSPITAL CALL SYSTEM	89
E20. REFRIGERATOR ALARM SYSTEM	89
E21. NAVIGATION LIGHTS	89
E22. DREDGING LIGHTS.....	90
E23. DAY SIGNALS	90
E24. DAYLIGHT SIGNALLING LAMP (ALDIS).....	90
E25. WHISTLE	90
E26. SEARCHLIGHT	91
E27. WINDOW WIPERS	91
E28. CLOCKS	91
E29. TELEVISION AND BROADCAST CENTRAL ANTENNA SYSTEM	91
SECTION F - INVENTORY.....	92
F1. BOATSWAIN'S INVENTORY	92
F2. NAUTICAL INVENTORY	92
F3. GALLEY INVENTORY.....	92
F4. MESS ROOM AND PANTRY INVENTORY	94
F5. BEDDING AND LINEN.....	96
F6. ENGINE ROOM INVENTORY	98
SECTION G - AIR CONDITIONING, HEATING AND VENTILATION.....	102
G1. GENERAL DESIGN CONDITIONS.....	102
G2. AIR CONDITIONING.....	103
G3. HEATING SYSTEM	104
G4. MECHANICAL VENTILATION SYSTEMS.....	104

G5. NATURAL VENTILATION.....	105
G6. AIR INLET MIST ELIMINATORS.....	105
SECTION H - HOPPER.....	105
H1. GENERAL.....	105
H2. BOTTOM DUMPING SYSTEM.....	106
H3. HOPPER SOUNDING EQUIPMENT.....	106
SECTION – I.....	107
DREDGING INSTALLATION	107
I1. JET WATER PUMP.....	107
I2. FILLING AND EMPTYING OF FORE/AFT PEAK TANK	107
I3. EXCAVATOR AND PEDESTAL	107
I4. DISCHARGE PIPING AND VALVES	113
SECTION J - CONTROL CONSOLES AND INSTRUMENTS	113
J1. GENERAL	113
J2. NAVIGATION CONTROL CONSOLE	114
J3. 19" INSTRUMENTS RACK	116
J4. CONTROL PANELS ENGINE ROOM	117
J5. DREDGING CONTROL SYSTEM (DCS)	117
J6. DRAUGHT AND LOADING MEASURING SYSTEM (DLM).....	121
J7. HOPPER VOLUME AND DRY SOLID MASS MEASURING SYSTEM	122
J8. VACUUM, PRESSURE, FLOW AND LEVEL MEASURING SYSTEMS.....	122
J9. DREDGED TRACK PRESENTATION SYSTEM (DTPS).....	123
J10. TANK SOUNDING INSTALLATION	128
SECTION M - ELECTRICAL INSTALLATION.....	129
M1. GENERAL.....	129
M2. ANTI - CONDENSATION HEATING	130
M3. AC GENERATORS.....	131
M4. MAIN SWITCHBOARD - 400 V	132



M5. EMERGENCY SWITCHBOARD - 400 V.....	133
M6. MOTORSTARTERS	134
M7. SWITCHBOARD - 400 V FORE SHIP	134
M8. SHORE SUPPLY CONNECTION BOX	134
M9. 32 V - AC HAND LAMP SUPPLY	135
M10. WELDING CONNECTIONS	135
M11 ACCUMULATORS	135
M12. TRANSFORMERS - 400 V / 230 V	136
M13. POWER DISTRIBUTION BOXES.....	136
M14. LIGHTING DISTRIBUTION BOXES.....	136
M15. CABLES AND CABLE TRAYS.....	136
M16. MAIN LIGHTING - 230 V	137
M17. SOCKET OUTLETS FOR GENERAL USE IN COVERED SPACES	139
M18. EMERGENCY LIGHTING - 230 V.....	140
M19. GENERAL EMERGENCY ALARM SYSTEM.....	140
M20. ENGINEERS' ALARM SYSTEM	140
M21. PERSONNEL ALARM SYSTEM	140
M22. BRIDGE NAVIGATIONAL WATCH ALARM SYSTEM (BNWAS)	141
M23. ENGINE ROOM ALARM AND MONITORING SYSTEM.....	141
M24. BOW THRUSTER MOTOR	142
SECTION N - MACHINERY INSTALLATION.....	144
N1. GENERAL.....	144
N2. CONTROL SYSTEMS MACHINERY INSTALLATIONS	144
N3. MAIN DIESEL ENGINES.....	145
N4. AC GENERATOR DIESEL ENGINE	147
N5. EMERGENCY / HARBOUR GENERATOR DIESEL ENGINE	149
N6. COUPLINGS FOR PROPELLER DRIVE	150
N7. COUPLINGS FOR AC MAIN GENERATOR DRIVE	150



N8. GEARBOXES FOR PROPELLER DRIVE	151
N9. PROPELLER SHAFT EARTHING	151
N10. PROPELLER SHAFT LOCKING DEVICE	151
N11. STERN TUBE AND SEALS	151
N12. BOW THRUSTER.....	152
SECTION 0 - AUXILIARIES.....	153
01. BILGE/FIRE/GENERAL SERVICE PUMPS	153
02. EMERGENCY FIRE PUMP	154
03. BILGE OILY WATER SEPARATOR	155
04. WATER PRESSURE SETS	155
05. FRESH WATER DISINFECTION INSTALLATION.....	157
06. DOMESTIC HOT DRINKING WATER CIRCULATING PUMP.....	157
07. CALORIFIERS	157
08. DRINKING WATER COOLERS.....	157
09. FRESHWATER GENERATOR.....	158
O10. SEWAGE TREATMENT UNIT.....	159
O11. FUEL OIL TRANSFER PUMPS	159
O12. FUEL OIL SEPARATOR UNIT	160
O13. LUBRICATING OIL PUMPS.....	161
O14. LUBRICATING OIL TRANSFER PUMP.....	162
O15. SLUDGE/DIRTY OIL PUMP	162
O16. COOLING WATER SYSTEMS	163
O17. BOX COOLERS.....	165
O18. PROTECTION SYSTEM FOR BOX COOLERS.....	166
O19. PRE-HEATING SYSTEMS FOR DIESEL ENGINES	167
O20. FRESH COOLING WATER TRANSFER PUMP	167
O21. STARTING AIR COMPRESSORS.....	168
O22. STARTING AIR RECEIVERS.....	169



O23. WORKING AIR COMPRESSOR AND RECEIVER.....	169
O24. EXHAUST SILENCERS.....	170
O25. GREASE LUBRICATING PUMP	170
SECTION P - HYDRAULIC INSTALLATION	170
P1. MAIN HYDRAULIC SYSTEM.....	170
P2. HYDRAULIC CYLINDERS	172
P3. OPERATION OF THE SYSTEM.....	172
SECTION Q - SHIP PIPING SYSTEMS.....	173
Q1. GENERAL.....	173
Q2. MATERIALS	174
Q3. BILGE AND BALLAST PIPING	177
Q4. AIR PIPES.....	178
Q5. OVERFLOW PIPES	178
Q6. FILLING PIPES.....	178
Q7. SOUNDING PIPES.....	179
Q8. SCUPPERS	179
Q9. FIRE FIGHTING AND DECK WASH SYSTEM	179
Q10. DOMESTIC PIPE LINES.....	179
Q11. COMPRESSED AIR SYSTEMS	182
Q12. EXHAUST GAS SYSTEMS	183
Q13. INSULATION.....	184
SECTION R – ADDITIONAL CLAUSES	184
R1.	184
R1.1 Waste	184
R1.2 Defect Period -	184
R1.3 Warranties	184
R1.4 Delivery	185
R1.5 Response time	185



R1.6 Technicians	185
R1.7	185
R1.8 Responsibility.....	185
R1.9. Quality Assurance	185
R1.10 Copyright.....	186
R1. 11 Commercial Specification	186
R1.14	187
R1.17 Procedure for Submission & Acceptance of <i>Supplier's</i> Design	188

SECTION A - GENERAL DESCRIPTION

A1. GENERAL

The Goods Information outlines the requirements for the supply, delivery, testing and commissioning of a classification society registered Grab Hopper Dredger (GHD) with a hopper capacity of 750m³, mounted with a marine excavator capable of lifting an 8m³ bucket filled with spoil at a Minimum Radius of 20m. The GHD shall be delivered to A-berth, Port of Durban, South Africa. The details of delivery of the GHD and associated spare parts are to be communicated to the *Supply Manager* at least 2 months prior to offloading/delivery. The excavator to be installed shall be a fit for purpose marine specified/compliant hydraulic excavator fitted to the main deck pedestal incorporated in the design of the GHD of type Liebherr HS 8200 or equivalent. Where an equivalent is provided the *Supplier* must provide suitable evidence of ability to demonstrate local support in the event of breakdowns or servicing to the specific excavator mentioned and must ensure attendance to the vessel within a time period of 24 hours from notification or requirement from the *Purchaser*.

All supporting structures/systems of the hydraulic excavator's counterweight support and securing devices for sea going travel are to be included and incorporated into the design. An appropriate forward mast arrangement, compliant to South African Maritime Safety Authority (SAMSA) Durban and *Purchaser* approved Classification Society requirements is to be included and incorporated into the design. The *Supplier* shall also facilitate and complete the required training as detailed in the relevant section covering both the GHD and the excavator. Failure to deliver within the stipulated timeframe, or such amended timeframe as agreed in the contract shall result in delay penalties being applied to the *Supplier* the details of which is covered in the Contract Data. No further building beyond completion of GHD keel laying is authorised until such time as the acceptance of all long lead equipment items (> 6 months) is accepted by *Purchaser*.

A1.1. All units of measure contained within this Goods Information are based on the International System of Units (SI system).

A1.2. Equipment capacities, powers, flows, pressures and/or head figures as stated in the Goods Information shall be considered as being the minimum required for the vessel, unless stated otherwise. *Supplier* to provide proof of placement of orders for all long lead time equipment items (> 6 months). The proof shall be submitted to the *Purchaser* in the form of an

equipment schedule with each item supported by a purchase order (on each supplier's letterhead) showing the lead time in weeks. The documents shall be submitted 4 weeks after the completion of the following:

Purchaser appointed Classification Society and South African Maritime Safety Authority (SAMSA) Durban letters of engagement and additional requirements (if any) regarding vessel compliance for the grab hopper dredger (including the excavator and pedestal) and *Supplier* completion plan in respect of each of the additional requirements (if any), in accordance with Goods Information & accepted by *Purchaser*.

A.1.3. The *Supplier* may offer an alternative to the mechanical concept (relating to power supply and layout of engine room), complying with the Goods Information, but meeting the performance and functional requirements. The *Supplier* shall state and demonstrate added benefits that contribute to reduction of emissions and energy efficiency of using the GHD and excavator as well as the compliance to environmental regulations, where this is applicable.

A.1.4. A new build GHD shall be built under survey (according to the below) and to the requirements of *Purchaser* approved Classification Society or the equivalent standard of such other recognised Classification Society as may be nominated by the *Supplier* and agreed by the *Supply Manager*. Where the GHD is readily available on stock, it should be of a minimum age of approx. 8 months from completion of build (Minimum age will be calculated 8 months prior to the closing date of the tender) and the associated warranties will only commence upon successful Delivery according to the contract.

A.1.5. When considering hull scantlings, the thickness of plating, stringers, floors, keelson, etc., shall be as per Classification Society's requirements (refer A.1.5). Strength of propeller shafts, intermediate shafts, coupling bolts, rudder stock, dredge wear and impact areas and "A" brackets to be 10% in excess of the Classification Society's requirements.

A.1.6. The GHD and its equipment are to meet all South African Maritime Safety Authority (SAMSA) Durban requirements and is to comply with the International Convention for Safety of Life at Sea (SOLAS), as applied to dredgers and where applicable.

A.1.7. It will be the responsibility of the successful *Supplier* to advise SAMSA Durban of the intention to build the vessel if this is applicable or to liaise with SAMSA Durban in the case that the GHD is readily available (on stock). All *Suppliers* should ascertain and incorporate SAMSA Durban requirements before tendering to ensure a fully compliant vessel is supplied to the *Purchaser*.

A.1.8. All costs in connection with certificates, registration (including registration to *Purchaser*), surveys/approvals by SAMSA Durban and the Classification Society, are to be borne by the *Supplier*. Three hard copies of each test/class type approval certificate for machinery, anchors, cables, deck machinery, etc., are to be supplied, along with one electronic copy.

A.1.9. A maintenance plan for each system and all individual equipment on the vessel is to be formulated and handed over upon Delivery of the vessel. The draft maintenance plan is to be shared with the *Purchaser* to ensure all required standards are met according to the below scenarios:

- During the build process for a newly built GHD
- Not later than 1 months after commencement of contract if the GHD is readily available on stock.

Any changes required by the *Purchaser* are then to be incorporated before handover and acceptance of the final document. Three (3) electronic copies are to be provided.

A.1.10. *Suppliers* must submit full details and outline drawings of their proposals when tendering. The outline drawings are to include a general arrangement profile, midship section and plan (showing dumping system arrangement) and excavator. Frame spacing and all scantlings are to be clearly indicated, with the Classification Society's requirements in brackets followed by the proposed scantlings providing for the *Purchaser's* excess requirements (where this is a new build). The outline drawings may be stamped to show provisional acceptance by the Classification Society. The full details are to be compared against the requirements contained within the Goods Information in a clear and presentable format.

A.1.11. Full particulars (including operating maintenance instructions, dimensioned build drawings) of all machinery and equipment are also to be furnished upon Delivery.

A.1.12. The *Supplier* must indicate, paragraph by paragraph either that his tender complies in every respect with this Goods Information or, if not, precisely how it differs from the Goods Information. This compliance document shall be with the relevant bid documents with heading "Specification Compliance Matrix". All divergences from this Goods Information must be clearly stated on the submitted document. A broad statement that the equipment is in accordance with the Goods Information is not acceptable. No alternative tender offers will be considered. (An alternative tender offer is regarded as any deviation from the respective Goods Information sections pertaining to item number 1 to item number 51 of the Evaluation Schedule: Compliance to Technical Specification).

A.1.13. The successful *Supplier* shall arrange to submit drawings as follows:

- All working drawings within a period of 1 month from commencement of contract if this is a newly built vessel. The final drawings will follow upon the necessary approvals and changes.
- All final and completed and approved drawings within a period of 2 months from commencement of contract if the GHD is already built and is readily available on stock.

The *Purchaser's* representative who will approve such drawings will be communicated by the *Supply Manager* upon commencement of the contract.

A1.14. Three prints of such detailed A0 drawings as described in A.1.13, duly approved by the Classification Society where necessary, are to be supplied within the periods as stated in A.1.13. The prints are to be dated and receipt will be acknowledged. One print will be retained by the *Supply Manager* and two signed prints will be returned to the *Supplier* when approved (if required). One electronic copy of the required drawings will also be submitted along with a drawing register at each submission.

A.1.15. A detailed project plan ("Gantt Chart"), of the entire project including commissioning, testing, handover, training, and delivery is to be provided highlighting relevant milestones and critical paths and aligned to the Activity Schedule. This is to be provided no later than 2 weeks from date of commencement of contract.

A1.16. The *Supplier* shall supply one electronic set (including a copy of the relevant software to view these files) of fully dimensioned drawings of all general arrangement and working drawings showing full details of the vessel and all machinery as actually built. The details of each component included in the GHD shall also be provided. CAD files of all drawings shall also be submitted to the *Purchaser* upon Delivery.

A.1.17. The completed, successfully commissioned and accepted GHD at the *Supplier's* yard shall be sailed to Port of Durban A-berth, South Africa at the *Supplier's* risk. All related costs and items shall be for the *Supplier's* account (including sailing crew, fuel, stores and any other item that may be needed).

A.1.18. It will be the *Supplier's* responsibility to deliver the dredger complete in every respect, fully registered to the *Purchaser* and ready for dredging operations, meeting all requirements of SAMSA Durban and the *Purchaser* approved Classification Society.

A.1.19. The cost of any work, material or equipment not covered by the Goods Information or drawings, but considered necessary (by the Classification Society and/or SAMSA Durban) for the satisfactory completion of the dredger, is to be borne by the *Supplier* and included in their tender prices.

A.1.20. In the event of a new build, after completion of the dredger by the *Supplier* and prior to commencement of the delivery voyage, complete *Supplier's* trials and *Purchaser's* dredging trials are to be carried out at the location of build site. These trials shall include speed trials and complete working trials of the dredger and all its machinery and equipment. Successful completion of all trials is required prior to commencement of the delivery voyage, which will also be witnessed by the *Purchaser*. The *Purchaser* operational team and SAMSA Durban to be present at commissioning of the vessel for a newly built vessel. In the event the vessel is readily available i.e. already built (aligned to Goods Information), then the following will be required:

- the vessel to be aligned with *Purchaser* approved classification society and SAMSA Durban.
- after completion of the dredger by the *Supplier* and prior to commencement of the delivery voyage, complete *Supplier's* trials and *Purchaser's* dredging trials are to be carried out at the location of built site. These trials shall include speed trials and complete working trials of the dredger and all its machinery and equipment. Successful completion of all trials is required prior to commencement of the Delivery voyage, which will also be witnessed by the *Purchaser*.

A.1.21. In addition, the *Supplier* is to include in their tender price three dredging grabs and wires as per the relevant section. The dredging grabs are to be of make Verstegen or equivalent dredging grabs. The *Purchaser* shall review the final design/selection of the dredging grabs prior to commencement of manufacture of the grabs by the *Supplier*. Detailed design, operating and maintenance manuals for the grabs shall be submitted to the *Purchaser* prior to delivery of the grabs.

A.1.22. All software (compatible to the *Purchaser* operating system in use) required to troubleshoot and efficiently run all equipment will be considered as standard delivery items including the associated special tools. Licenses required for all software shall be valid for a 24-month period, commencing from the day the Delivery Certificate is issued by the *Supply Manager*. Upon expiry of the software, the *Supplier* shall provide any assistance necessary for the *Purchaser* to renew the licensing.

A.1.23. The GHD is to be fitted with a complete surveillance system (and in accordance with The International Ship & Port facility Security Code (ISPS) if applicable) for all round view of the surrounding ocean as well as all common spaces on the vessel, including machinery spaces and

the hydraulic excavator. Provision to be made for an additional screen mounted in the hydraulic excavator cabin and shall display the main wires/winchies of the excavator to the operator. Bridge wing screens shall be mounted in the bridge wing consoles enabling operator ease of bringing the vessel alongside. The areas to be covered as a minimum include machinery spaces, FWD and AFT decks showing winches and anchor chain, either side of bridge wings and on the excavator and hopper loading area. The camera system feed shall be able to be accessed remotely by the *Purchaser*.

A.1.24. The GHD shall also be fitted with sufficient lighting in order to illuminate and safely operate during the night or in low light conditions. The lighting is to be of sufficient LUX to enable 24 hour working and be aligned to *Purchaser* approved classification society requirements.

A.1.25 The GHD shall also be fitted with a fendering system on the Port side and Starboard side of the vessel to enable safe working while conducting dredging along quay walls.

A.1.26 The outermost limits of the exposed decks of the GHD shall be enclosed all around with kick plates (vertical installed flat bar) so as to prevent any oil spill from leaking over the side of the vessel, this arrangement on the turret deck shall be done taking cognizance of the working areas.

A.1.27 The Port and Starboard side of the hopper deck shall be fitted with wooden planks of sufficient specification so as to absorb any impact of falling debris while also being resistant to the marine environment and occasional submersion. This should be installed so that they are firmly fixed in place and will not be able to move during sailing or dredging, but also be of sufficient design to enable ease of replacement of a single plank if required. The railings along these sections of the deck shall be made as collapsible.

A.1.28 The GHD shall be fitted with a system at the hopper level designed to secure/lash the grabs firmly in place. This is provided so to ensure safe stowage of the grabs for sailing voyages. The maximum number of grabs that will be secured at any given time will be equal to two.

A2. DESIGN CRITERIA

Conditions of the Design:



The *Supplier* shall design the vessel and all its associated equipment for full operation under the following conditions:

- maximum outside temperature 45 °C
- minimum outside temperature -15 °C
- engine room temperature 55 °C
- maximum sea water temperature 32 °C
- minimum sea water temperature -1 °C
- relative humidity 90% at 35°C

The anchoring equipment is designed for grab dredging under the following conditions:

- Maximum current speed (in longitudinal direction) 4 knots
- Maximum current speed (athwart ships) 1 knots
- Maximum wind speed approx. 14 m/s (6 Beaufort)

Oil requirements:

Oil to be used will be of the following type, unless it is stated otherwise:

Fuel oil

- Main diesel engine..... Marine Diesel Oil ¹⁾
- Auxiliary generator diesel engines..... Marine Diesel Oil ¹⁾

- Lubricating oil..... mineral oil type
- Hydraulic oil mineral oil type

1) Marine Diesel Oil according to ISO 8217:1996(E) with designation ISO-F-DMB

Materials:

-All materials as required for the build of this vessel and all equipment to be installed will be new and of reputable make.

-The *Supplier* is to ensure that the manufacturer of the equipment supplied has an adequate support structure in South Africa and is able to successfully troubleshoot and maintain chosen equipment.

A3. TYPE AND FUNCTION

The Grab Hopper Dredger (GHD) is to have the minimum following characteristics:

- a) Capable of dredging clay, sand, silt, gravel, and rock from the sea bottom of approx. 2000kg/m³ up to a minimum depth of 25 metres by means of a Hydraulic Excavator (fit for purpose marine specified/compliant) of type Liebherr HS 8200 or equivalent. Where an equivalent is provided the *Supplier* must provide suitable evidence of ability to demonstrate local support in the event of breakdowns or servicing to the specific excavator mentioned and must ensure attendance to the vessel within a time period of 24 hours from notification or requirement from the *Purchaser*.
- b) During dredging, the vessel will be positioned by anchors.
- c) Capable to deliver the spoil into the hopper via robust grids (incorporating rail lines longitudinally and of appropriate size and spacing) attached to the top of the coaming and which are able to be easily removed for grid section replacement using the installed hydraulic excavator. The openings of the grids are designed to stop unwanted debris from fouling in the doors while allowing for easy delivery of spoil into the hopper.
- d) Capable to dump the spoil to the seabed through bottom doors. The bottom door arrangement should be an improved design as compared to the current GHD which uses a hydraulic cylinder attached to a chain arrangement for raising and lowering the dump doors, however proposals for dump door arrangements can be presented if they are an improvement and consider ease of dumping while also requiring less maintenance also considering the debris that foul the dump doors/sealing arrangement. In either case, the *Supplier* shall make provision for easy adjustment of the door system while the vessel is afloat in order to obtain tight sealing of the doors at all times and in order to eliminate loss of spoil through bottom doors. A detailed method statement is to be provided for the adjustment process.
- e) The bottom doors are operated by a hydraulic ram cylinder/s, operated remotely from the wheel house.
- f) The hopper is to have coamings, splash screens and be open at the top.
- g) The hopper is required to have overflows, at a level of 750 m³ and these must utilise the environmental turbidity laws as a basis for their placement and discharge point and to ensure that excessive overflow mixture is not absorbed by the jet pumps.

- h) Each propeller is to be driven by its own non-reversible diesel engine.
- i) A controllable pitch propeller (CPP) bow thruster system, driven by an electric motor is appropriately designed and installed for improving the manoeuvrability, remote controlled from the wheelhouse.
- j) The following minimum items are to be remote controlled from the wheelhouse:
- propulsion system
 - anchor system
 - bottom door actuating system
 - bow thruster system
 - winches (with cameras for operator in wheelhouse and cameras for hydraulic excavator main wires)
 - Remote monitoring of load in grab and position interface with dredge program signal to be taken from excavator OEM software.
 - dredging systems
 - Ballast water treatment system (if applicable)
- k) An accommodation space and deck house aft, suitable to accommodate 12 crew, 2 petty officers and 4 officers in an international standard which is accepted by the *Purchaser* and complying with MLC 2006 convention. Total crew complement of 18.
- l) The hull is required to have an evolved form and be capable of inter-port journeys under Southern African Coastal conditions as well as international journeys. Incorporated into the design is an aft peak tank which can be used for trimming the vessel as needed. The vessel should be designed for international sailing without the need to apply spoil into the hopper as a means of ballast.
- m) The fuel and freshwater tanks are to be situated in the buoyancy compartments besides the hopper.
- n) The fore peak tank is arranged as trim tank in order to reduce the vessel's trim in light ship condition or partly loaded condition. The trim tanks (fore peak and aft peak) may be filled and emptied by the jet water/general service pumps and conform to SOLAS regulations in the event of international journeys.
- o) The craft is to be designed to accommodate on the main deck fwd of the accommodation, or in a more convenient place, one approx. twenty-foot container (a lesser size can be

proposed depending on the overall available space) or housing a power pack for a submersible dredge pump/deck generator with automatic twist locks. The hopper is to have discharge piping secured under main beams by means of hanger brackets for use with the submersible dredge pump. Other loose piping required for the connection to submersible dredge pump should be supplied with the delivery of the GHD.

p) Capable of effectively diluting the hopper load and debris (at a sufficient pressure) at selected and all hopper spaces by means of an electrically driven jet water pump to facilitate unloading of the spoil during dumping and wash out of unwanted debris. The diluting pump is to be capable of supplying jet water to the submersible dredge pump via a quick coupling on the deck. The dilution system shall have selectable pressure modes in the event excess pressure is required for material stuck to the hopper.

q) The ship has an automated engine room, suitable for unattended operation, according to the *Purchaser* approved Classification Society requirements.

r) A sound-insulated air-conditioned watch cabin housing the alarm panel with trendable inputs from all field measurements and suitable to accommodate a total of 4 persons at any given time.

s) All software required to troubleshoot and efficiently run all equipment will be considered as standard delivery items including the associated special tools.

t) Three grabs of 8m³ designed for dredging in a marine environment will be supplied with the craft and are to be tested on the hydraulic excavator. The grabs are to be of the two-wire type utilizing approx. a 36mm wire. Two of the grabs should be designed for sand and silt. One grab is to be designed for heavy material such as clay and rock (*Supplier* may propose hydraulic grabs suitable to the dredging material and environment for this option which are based on ease of use and compatibility to the excavator). All grabs to be of the heavy-duty type and make Verstegen or equivalent. Detailed design, operating and maintenance manuals for the grabs shall be submitted to the *Purchaser* prior to delivery of the grabs.

u) Care must be taken for the location of emergency drop valves, thermometers of box coolers (with display units) to enable ease of resetting or viewing. No confined space entry for routine tasks are acceptable in the design.

- v) All fittings, fixtures and furniture to be robust and of an acceptable international marine type that allow for the rolling and pitching of the vessel without undue damage occurring from movement.

A4. ANTICIPATED MAIN PARTICULARS

The below relates to approximate dimensions and minimum capacities, however the *Supplier* shall ensure that the final main particulars are based on the output and performance requirement of the GHD.

- Length overall	approx.	66.00 m
- Breadth, moulded	approx.	15.00 m
- Draught	approx.	4.00 m
- Hopper capacity at highest overflow level		750 m ³
- Dredging depth below light waterline (i.e. ship empty with 100 % stores and water in the hopper up to the water line)		25 m
- 2 Propulsion diesel engines, developing at 1000 rpm minimum		1200 kW
- 1 AC bow thruster motor, developing a minimum		150 kW
- Trial speed at a mean moulded draught minimum		11 knots

Fuel oil, lubricating oil, fresh water and ballast capacities are to allow autonomy of at least 21 Days

When sailing at "International Freeboard Draught", the longitudinal strength of the vessel should allow operation in areas as intended by the hull class notation.

A5. SPEED

The ship with a freshly painted hull, at the mean moulded draught, in smooth deep-sea water with a water depth of approx. 18 m, an unrestricted channel width and a wind force not exceeding Beaufort scale 2, will have a trial speed of 11 knots at the maximum rated continuous output of the propulsion diesel engines.

Should the conditions of the vessel and/or the weather differ, a suitable calculation shall be made to present the results in accordance with the above stated conditions.

- The output of the propulsion diesel engines is to be verified by measurements of torque and speed at propeller shafts

A6. DREDGING PERFORMANCE

The design of the vessels hull is to ensure a stable platform for the operation of the excavator and conform to the manufacturer's maximum allowable deviation from horizontal for the longevity of the slew ring in during dredging operations.

The dumping areas are in the open sea, and in travelling to and returning from the dumping area the ship should maintain a mean speed of 11 knots at 80% maximum propulsive power available at the propeller shafts.

A7. CLASSIFICATION

The GHD shall be built under survey and to the requirements of *Purchaser* approved classification society with the following notations:

Class symbol	: I
Construction mark	: ✕Hull✕Mach
Service notation	: Hopper Dredger
Class notation (machinery)	: ✕ LMC UMS
Navigation notation	: Unrestricted Navigation

Where the GHD is readily available on stock the *Supplier* shall ensure that the vessel is transferred into the *Purchaser* approved classification society where this is applicable.

The vessel and equipment also meet the Rules and Regulations - including Amendments at the date of contract of (but not limited to and where applicable):

- International Convention for the Safety of Life at Sea (SOLAS), 1974
- International Convention on Load Lines, 1966

-
- International Convention on Tonnage Measurement of Ships, 1969
 - International Convention for the Prevention of Pollution from Ships (MARPOL), 1973/1978
 - Annex I, IV and VI.
 - Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972
 - International Telecommunications Union (ITU), as far as practicable for this type of vessel
 - International Electro technical Commission (IEC), as far as practicable for this type of vessel
 - South African Maritime Safety Authority (SAMSA) Durban, as far as applicable and or practicable for this type of vessel. In case of a discrepancy with the latest issue of the concerning International Rules and Regulations, the latter will prevail.
 - IMO Regulations, excluding Recommendations
 - International Ship and Port Facility Security (ISPS) Code 2021
 - Maritime Labour Convention, 2006 (MLC)
 - ISM Code

A8. CERTIFICATES

On delivery of the dredger, the following certificates (hard and soft copies) will be supplied where they are deemed applicable or necessary:

- Certificate of Classification for Hull
- Certificate of Classification for Machinery
- Certificate of Registration to *Purchaser*
- Final Approved Stability booklet (including any *Purchaser* modifications) by SAMSA Durban and *Purchaser* approved classification society
- International Load Line Certificate
- International Tonnage Certificate (1969)
- Cargo Ship Safety Construction Certificate

-
- Cargo Ship Safety Equipment Certificate
 - Cargo Ship Safety Radio Certificate (GMDSS)
 - Builder's Certificate
 - Ship Sanitation Control Exemption Certificate
 - International Oil Pollution Prevention (IOPP) Certificate
 - International Sewage Pollution Prevention Certificate
 - International Air Pollution Prevention (IAPP) Certificate
 - ICASA license certificate
 - International Anti-fouling certificate
 - Certificate of compliance for Engine Air Pollution Prevention (EAPP)
 - All engine certificates
 - International Energy Efficiency Certificate
 - SAMSA Durban approved Fire and Safety Plan
 - Compliance to Cyber Security (UR 26 & 27) and MSC-FAL.1-Circ.3-Rev.2
 - And any other certificate as required by SAMSA or *Purchaser* approved classification society to conform to class and register the vessel to the *Purchaser*.

A9. DRAWINGS AND DOCUMENTATION

Approval of drawings:

Before and during the build period (if applicable), a set of drawings, diagrams and lists shall be submitted to the *Purchaser*, giving the information needed to evaluate the build, arrangement and equipment of the dredger.

The drawings which are submitted to the *Purchaser's* representatives during design stage are subject to *Purchaser's* approval within the description in this Goods Information if required.

The submitted documents will be approved and returned by the *Purchaser's* representatives as soon as possible, but within two weeks.

A copy of all plans approved by the Classification Society will be available at the *Supplier* for perusal by the *Purchaser's* representatives.

The set of information drawings will be composed as follows:

During the Design stage: -

1. General Arrangement Plan Main section
2. Construction plans, including deckhouses and superstructures Arrangement of accommodation
3. Preliminary lay-out of engine room and pump room Preliminary deck lay-outs
4. Arrangement of hopper overflow system
5. Arrangement of bottom doors with actuating mechanism
6. Principal arrangement of propeller drives
7. Principal arrangement of jet pump drive
8. Principal arrangement of bow thruster drive
9. Principal schemes and dimensions of main diesel engines
10. Principal arrangement and design of excavator
11. Principal arrangement of navigating and dredging signals
12. Principal diagram of bilge- and ballast lines
13. Principal diagram of air- and sounding lines
14. Principal diagram of fire-fighting and deck wash lines
15. Principal diagram of gland- and flushing water lines
16. Principal diagram of starting air lines
17. Principal diagram of hydraulic pipe lines
18. Principal diagram of fresh cooling water lines
19. Principal diagram of lubricating oil lines
20. Principal diagram of fuel oil lines
21. Principal diagram of tank: sounding installation
22. Principal diagram of hot- and cold drinking water lines
23. Principal diagram of technical fresh water lines
24. Principal diagram of working air lines
25. Principal diagram of auxiliary cooling water system
26. Diagram of sludge, leak oil and dirty oil lines

27. Principal diagram of waste water lines (grey water)
28. Principal diagram of waste water lines (black water)
29. Principal diagram of jet water and hopper diluting lines
30. Air conditioning system, mechanical ventilation system and natural ventilation system
31. Principal diagram of pneumatic lines for SOS valves
32. One line diagram electric installation
33. Block diagram control system

After Design stage:

1. Section plans

- Buoyancy compartments
- Double bottom
- Decks
- Watertight bulkheads
- Stem and stern
- Deckhouses and superstructures
- Main and auxiliary engine foundations

2. Body plan

3. Universal hydrostatic table, consisting of the following data:

- Draught extreme (meters)
- Volume moulded (m³)
- Total displacement fresh water (tons)
- Total displacement seawater (tons)
- Displacement per cm immersion seawater (tons/cm)
- Displacement per cm immersion fresh water (tons/cm)
- Moment to alter trim one cm in seawater (tm/cm)
- Moment to alter trim one cm in fresh water (tm/cm)
- Longitudinal centre of buoyancy from APP (m)
- Longitudinal centre of flotation from APP (m)
- Vertical centre of buoyancy above base (m)
- Transverse metacentric height above base (m)
- Longitudinal metacentric height above base (m)
- Transverse moment of inertia (m⁴)
- Longitudinal moment of inertia (m⁴)
- Wetted surface (m²)
- Block coefficient
- Water plane area coefficient

- Horizontal prismatic coefficient
- Vertical prismatic coefficient
- Midship section coefficient
- Bonjean particulars giving the section (m²)
- 4. Tank testing plan
- 5. Docking plan
- 6. Safety plan
- 7. Arrangement of cathodic protection
- 8. Rudder with bearings, general arrangement drawing
- 9. Arrangement of steering gear
- 10. Stem tubes
- 11. Propellers
- 12. Arrangement propeller shaft line
- 13. Assembly drawing of reduction gear boxes for propulsion
- 14. Arrangement of engine room
- 15. Arrangement of emergency generator room
- 16. Arrangement of stairs and platforms
- 17. Arrangement plan of stores and workshop/repair areas
- 18. Arrangement of fixed fire extinguishing installation
- 19. Arrangement of converter room
- 20. Drawing of mast
- 21. Deck arrangements
- 22. Arrangement of rescue boats and davits
- 23. Plan of accommodation
- 24. Arrangement plan of wheel house
- 25. Door and window plan
- 26. Ventilation plan with fire-valves
- 27. List of name plates and number plates
- 28. Paint specification
- 29. Sounding scale of tanks
- 30. Hopper capacity diagrams
- 31. Top view of navigation control console
- 32. Top view of auxiliary navigation control console -
- 33. General arrangement of switchboards
- 34. Single wire diagram of switchboards
- 35. General diagram of electric power distribution
- 36. General diagram of electric lighting circuits
- 37. General diagram of electric emergency circuits

38. Electric power consumption table

Diagrams of:

1. Bilge and ballast lines
2. Air and sounding lines
3. Firefighting and deck wash lines
4. Scupper pipes
5. Gland- and flushing water lines
6. Starting air lines
7. Control air lines
8. Hydraulic pipe lines
9. Fresh cooling water lines
10. Lubricating oil lines
11. Fuel oil lines
12. Tank sounding installation
13. Air pipes in accommodation
14. Hot- and cold drinking water lines
 - Technical fresh water lines
 - Working air lines
15. Auxiliary cooling water system
16. Sludge, leak oil and dirty oil lines
17. Waste water lines (grey water)
18. Waste water lines (black water)
19. Hydraulic lines steering gear
20. Pneumatic lines SOS valves
21. Jet water and hopper diluting lines

Lists of:

Auxiliaries in engine room and pump room -
Fittings/name plates
Colours of pipe lines
Hydraulic fittings

"As built" drawings:

At delivery of the vessel, "as built" drawings will be delivered as CAD-file and eligible PDF and in duplicate on paper print (A0) and folded to A4-size.

Text data:

Text data will be delivered in MS-Word (Windows).

Medium:

All files will be delivered on SSD and shall be backed up on a shared drive/cloud storage.

Instruction books:

On delivery of the dredger the assembly drawings, parts lists and instruction books which are necessary for normal maintenance and repair of the dredger will be supplied in digital format in duplicate:

- diesel engines
- auxiliaries
- generators and electric motors
- electric installation
- hydraulic installation
- pneumatic systems
- mechanical ventilation system
- air conditioning system
- deck machinery
- the Yard's standard parts
- dredging equipment
- Excavator

Instruction books and parts lists to be submitted in English.

Miscellaneous:

1. Results of trim and stability calculations will be supplied in duplicate (Intact Stability Booklet).
2. Torsional vibration calculations will be made for propulsion, generator-drive and submitted to the *Purchaser*.
3. Sufficient copies of Damage Control Plan and Fire Control Plan in plasticized execution are displayed at appropriate locations in the vessel.

4. Outside the deckhouse a duplicate set of Fire Control Plans is stored in a prominently marked weather tight enclosure for the assistance of shore side fire-fighting personnel.
5. A board is placed against one of the walls of the watch cabin on which the fuel oil bunkers with the respective tank capacities are indicated, complete with index for tank soundings.

The following documents, as required by the Authorities mentioned in item Classification as described above, will be supplied by the Yard:

1. Damage Control Booklet
2. Minimum safe manning document
3. Fire safety training manual
4. Oil Record Book
5. Shipboard Oil Pollution Emergency Plan (SOPEP)
6. Continuous Synopsis Record
7. Noise Survey Report
8. Wheel house poster, showing maneuvering information

All documents prepared are to be submitted in the English language and two hard copies shall also be provided.

The drawings prepared by the Yard bear English translations for the important parts. The scale of the drawings is according to the Yard's practice.

A10. TESTS AND TRIALS

General:

Tests and trials will be carried out according to a program made by the *Supplier* and agreed to by the *Purchaser*, based on this Goods Information and in accordance with the requirements of the Authorities as mentioned in item Classification as described above. They will be affected in the presence of the *Purchaser* and shall be at expense and risk of the *Supplier*.

The *Supplier* shall give the *Purchaser* sufficient notice of the date of the trials to enable the *Purchaser's* representatives to attend, witness and provide acceptance of trial results.

Test protocols will be supplied containing readings of temperatures, currents, voltages, pressures etc, necessary to show the good working and adjusting of the GHD dredger.

1. Shop tests:

If required by the Authorities mentioned in item Classification as described above, diesel engines, generators and auxiliaries are tested in the respective makers' shops according to

the standard tests of the makers or, if required, to the rules of the Authorities mentioned in item Classification, as described above.

2. Basin trials:

As soon as the vessel has been sufficiently completed, the vessel will undergo basin trials, during which the main and auxiliary engines, hydraulic pumps, electrical installation and all auxiliary equipment, incl. excavator and deck and dredging machinery, electric, pneumatic and hydraulic systems, special installations and will be tested alongside the quay of the *Supplier* designated area. The *Supplier* shall give the *Purchaser* sufficient notice of the date of the trials to enable the *Purchaser's* representatives to attend, witness and provide acceptance of trial results if required. Minimum notice of 3 months will be required.

Where the GHD is already built, tested and readily available on stock, the above test will be repeated at the location of the GHD. The *Supplier* shall give the *Purchaser* sufficient notice of the date of the trials to enable the *Purchaser's* representatives to attend, witness and provide acceptance of trial results if required. Minimum notice of 3 months will be required.

The sole purpose of the trials will be to demonstrate the correct functioning of the machinery. All instruments and operating apparatus are as far as possible tested and adjusted.

Dredging Trials:

The GHD shall be subjected to complete dredging trials in South Africa and shall be at the expense and risk of the *Supplier*. The period of dredging trials will last for a duration of 168 hours measured from the hour that the GHD starts dredging operations. Included as part of the dredging trials shall be the loading and unloading of the hopper and operation of the hopper doors and the excavator and dredging software

The duration of the mentioned trials is in accordance with the *Supplier's* standard practice and shall be accepted by the *Purchaser* prior to implementation, except for the dredging trials the duration of which has been specified.

SUPERVISION AND INSPECTION

The *Purchaser* and/or his representatives have the right to carry out inspections during the build of the dredger, and thus ensure themselves that the vessel is built in accordance with the Goods Information. They have free access to the premises of the *Supplier* and/or of his subcontractor's at all reasonable times. All such inspections will be at *Purchaser's* own expense and risk. They have no right to interfere with the normal proceedings of the work. If in their

opinion the work carried out does not meet the stipulations of the contract, they should immediately report same to *Supplier*. Such report to be confirmed in writing as soon as possible thereafter. Upon acceptance by *Supplier* of claim as being justified, defective/non-compliant work will be rectified at *Supplier's* expense. It may be at the *Purchaser* discretion for an agent to be placed at the *Supplier* yard during build of the GHD and to attend daily progress meetings for the build. In this regard the *Supplier* is to price accordingly and include a workspace area and facilities for a single person.

All tests required by the Authorities, mentioned in item Classification described above, for life saving appliances, rescue boat, fire-fighting, accommodation, navigation lights etc. will be carried out.

Instruments and controls are tested and calibrated as far as possible.

3. Inclining test:

An inclining test will be held with the vessel in a state as complete as practicable to determine the vessel's light weight and centre of gravity in vertical, longitudinal and transverse position.

The results of the test together with calculations of stability for the ship in different loading conditions will be handed over in an Intact Stability Booklet, which will be authenticated by the Classification Society and approved and stamped by SAMSA Durban.

Where necessary, the *Supplier* should provide for the need to re-incline the GHD in the case of any modifications required by the *Purchaser*.

4. Sea trials

Preliminary sea trials:

If the *Supplier* deems it necessary, they may carry out preliminary sea trials. These trials may be attended unofficially by the *Purchaser* representatives, but no official records will be taken.

Official sea trials:

All sea trials will be held in the vicinity of the coast of Durban with permission from SAMSA Durban.

Preliminary works:

Before commencement of the sea trials the following is carried out:

- adjustment of compasses
- checking of echo sounder, radar, VHF, radio equipment and further nautical instruments
- testing of the hydraulic systems
- checking of communication between wheel house and engine room

Hopper loading test:

Filling the hopper with free running sand by means of dredging using the mounted Excavator of type Liebherr HS 8200 or equivalent. Where an equivalent is provided the *Supplier* must provide suitable evidence of ability to demonstrate local support in the event of breakdowns or servicing to the specific excavator mentioned and must ensure attendance to the vessel within a time period of 24 hours from notification or requirement from the *Purchaser*.

During this test the following readings are taken:

- dredging depth
- time for filling the hopper
- contents of the hopper after dredging is topped
- draught and displacement indicator
-

Hopper discharge test:

The following is determined while dumping the hopper load:

- bottom doors opening time
- discharging time
- Bottom doors closing time
- pressure gauge readings of hydraulic system
- readings of the load, draught and displacement measuring system

Speed trials:

Speed trials will be held with the dredger in loaded condition at the mean moulded draught of and under favourable weather conditions (maximum wind force Beaufort 6).

The trial speed will be measured by means of a DGPS system and will be calculated from the results of three runs by the "means of means" method. The equivalent power of the main diesel engines is verified by measurements of torque and speed at propeller shafts.

Should the conditions of the vessel and/or the weather differ from those stated in item Speed as described above, a suitable calculation shall be made to present the results in accordance with the conditions stated in said item.

Endurance test:

The vessel shall run for a total of four hours at uninterrupted full power. In these hours the time needed for the speed trials and turning circle will be included.

Readings of the main diesel engines are taken.

Readings of noise levels will be taken in engine room and accommodation deckhouse.

During the endurance test, the behavior of the automated engine room installation will be checked.

Manoeuvring and steering tests:

- a) With loaded ship full speed ahead a stop test will be carried out. The necessary time to stop and the covered distance are determined by means of DGPS system or other method.

- b) The steering gear will be tested with both hydraulic pumps running. The times are recorded to bring the helm from:
- Amidships to SB
 - SB to PS
 - PS to SB
 - SB to amidships
- c) With loaded ship a full turning circle will be made at full speed ahead. The diameter of the turning circle is determined by means of a DGPS system.
- d) Bow thrust trials will be held, i.e. vessel to perform one turning circle at zero speed ahead. The heading will be recorded at time intervals.
- e) With loaded ship the following zigzag tests will be performed (with and against current, if any):
- 10°/ 10° zigzag test
 - 20°/20° zigzag test.
- The heading will be recorded at time intervals.

Black-out test:

A total black-out is simulated. The time needed for the automatic recovery of the ship's power supply is recorded.

Anchor tests:

FWD anchors are dropped the one after the other. A minimum of 4 to 5 lengths of chain are paid out, the vessel being "dead slow" astern.

With stopped main engines the chains are hauled and the anchors are housed. Water depth, hauling speed and winch readings are verified.

A similar test will be performed with the stem anchors.

A11. STANDARDIZATION

Where applicable, the dredging equipment and all other appropriate parts are manufactured to the International Standard in compliance with and to the satisfaction of the Authorities mentioned in item Classification as described above. Common components between the vessels in the fleet of the *Purchaser* is required e.g. CAT engines/Liebherr excavator or an equivalent. Where an equivalent is provided the *Supplier* must provide suitable evidence of

ability to demonstrate local support in the event of breakdowns or servicing to the specific engine/excavator mentioned and must ensure attendance to the vessel within a time period of 24 hours from notification or requirement from the *Purchaser*.

Where applicable and/or practical in designing and manufacturing equipment and installations, ISO norms will be employed, governed by this specification.

Dredging equipment is fabricated according to the following standards:

For welded steel builds	EN ISO 13920, Class C and G
For welded steel pipes	EN 10224
For castings	EN 1559 (part 1 and 2), quality Class 4
For casting tolerances	ISO 8062 GTB 18/5

Metric screw thread (ISO) is employed throughout, except where the use of such thread on purchased machinery is not feasible.

Only one type of grease nipple is used, except where in purchased items replacement is impractical.

Piping and hull equipment such as but not limited to manholes, bulwarks, railings, ladders, platforms, stairways, separate tanks, bollards, fairleads, mooring ports, etc. will be executed according to the *Supplier's* Standard.

Non-described execution, design parameters and details of equipment are according to manufacturer's standard (i.e. commercial off-the-shelf).

A12. MAKES

The *Supplier* must ensure that makes of chosen equipment are well supported in the South African market. Lead times to respond to breakdowns must be within acceptable industry norms and should not exceed two calendar days. It is understood that a *Supplier* will deal with reputable contractors who have a long history of supply to the *Supplier* and these conditions may be adhered to.

A13. TRAINING

The *Supplier* will be responsible for ensuring that the *Purchaser* personnel that will be manning and supporting the vessels will receive the necessary training (including training material in soft and hard copy for all trainees) regarding the operation of the Grab Hopper Dredger and the excavator and be exposed to a simulation tool or similar prior to completion of vessel. The *Supplier* shall also ensure the safe delivery of the training material to the *Purchaser* offices (after completion of training and where it is unpractical for the training material to be carried in hand due to the size and quantity). The final training plan and schedule shall be approved by the *Purchaser* prior to commencement of training. The table below describes the training requirements from the Purchaser:

Training Requirement	Duration and location	<i>Purchaser</i> GHD Personnel × 10	<i>Purchaser</i> Engineering Department Personnel × 4	<i>Purchaser</i> Project Manager Department Personnel × 3
Formal/Classroom covering all system working principles, fault finding, dredge system and maintenance of GHD and excavator	2 weeks (to be completed prior to GHD Delivery to South Africa)	×	×	×
Basic operation & Familiarisation of GHD and excavator	1 week (to be completed prior to GHD and excavator Delivery to South Africa)	×	×	×
Simulation Training tool & assessment	1 week (to be completed prior to GHD and excavator Delivery to South Africa)	×		×
On Job Training (The <i>Supplier</i> is to allow for a GHD Master, Chief Engineer and excavator operator to be available after	3 weeks (to commence upon GHD and excavator Delivery in South Africa)			



<p>the GHD and excavator have been received, for a minimum period of three weeks. Training is to include theoretical and practical operation of the vessel followed by assessments on each.</p>		<p>×</p>		
---	--	----------	--	--

A14. SPARE PARTS, TOOLS AND INVENTORY

Spares: *Supplier* to include in their price the spares as required in Annexure A. These spares will be delivered to the *Purchaser* warehouse and offloaded by the *Supplier*. The *Purchaser* warehouse is located in Bayhead Road, Durban, South Africa (within a radius of 20 km from the Port of Durban) and can be accessed by road. A mobile crane may be required to offload the items. *Supplier* shall also submit a list of individually priced spare parts required and recommended by each OEM of the installed equipment to operate the vessel effectively and efficiently including those components of a critical nature and minimum quantity of stock level required. The spare parts package shall cover those components as listed in Spare Parts List – Annexure A which is included with the tender documents.

Inventory and tools will be supplied. Special tools will be supplied as described in the relevant Sections. Standard tools normally delivered by the various manufacturers are also included. Spare parts, tools and inventory as far as being delivered by the *Supplier* in accordance with this Goods Information shall be supplied and placed or fitted on board and securely stowed, where possible, in a position adjacent to their use in case of heavy items; small parts are stowed in standard plastic container boxes, suitably labelled, complete with list of components. The boxes are stored in steel racks. Suitable racks are provided for stowage of spare parts that cannot be conveniently boxed. The recommended/critical spare parts list is to be approved by the *Purchaser*.

A15. ASSEMBLING, WELDING, ETC.

Welding will be carried out in accordance with the *Suppliers* "Quality Standard for Welding". Scribing, working up materials and compiling ship structures will be performed according to the classification society requirements. Permissible deviations in aligning of steel ship constructions will meet the standard of the classification society.

This standard provides directives for the maximum tolerable deviations when aligning structural elements, welding and arranging the hull construction.

Execution of the directives given in this standard shall be in concert with the views of the attending surveyor of the Classification Society.

Major rotating machinery will be fitted in place after launching the vessel by means of:

- resin chocks for:
 - each main diesel engine
 - each gearbox for: propeller drive

- steel chocks for:
 - jet pump
- universal adjustable steel chocks for:
 - each AC main generator

Before the basin trials the alignment of all engine installations will be checked.

Tanks will be tested to an extent according to the Rules of Classification Society; tests to be made according to the Rules of Classification Society.

A16. NOISE REDUCING MEASURES

Noise levels will be in accordance with the requirements as laid down Annex 1 Resolution MSC.337(91) - Code on noise levels on board ships, as follows (but not limited to) and where applicable in the design of the GHD:

- | | |
|-----------------------|-----------|
| - Cabins and hospital | 60 dB(A) |
| - Mess rooms | 65 dB (A) |
| - Recreation room | 65 dB(A) |
| - Office | 65 dB (A) |
| - Galley | 75 dB (A) |
| - Pantries | 75 dB (A) |
| - Bridge | 65 dB (A) |
| - Operator Cabin | 65 dB (A) |

-
- Engine room watch cabin 75 dB(A)
 - Engine room repair area 85 dB (A)
 - Welder's area 85 dB (A)

All adequate means such as arrangement of noise generating machinery, insulation and anti-vibration fittings to reduce the noise levels in relation to the above requirements will be taken in co-operation with the relevant subcontractors and up to Supplier's decision.

Noise levels will be judged to be in accordance with above mentioned requirements for the vessel sailing at full speed in loaded condition in deep water without the bow thruster in operation.

Noise reducing measures:

- Floating sound-insulated floor coverings in accommodation and wheel house where necessary to obtain the specified noise levels, see also Section D.
- All weather exposed steel outer walls of accommodation spaces are insulated.
- Paneling, partition walls and ceilings consist of insulated sandwich panels.
- Paneling, partition walls and ceilings in accommodation not in contact with steel bulkheads and decks.
- Window- and porthole casings not in contact with steel bulkheads.
- Flexible suspension of exhaust gas pipelines.
- Auxiliaries in the deckhouse are flexibly mounted.
- The sound-making hydraulic aggregate is located FWD within the
- Special attention is paid to the exhaust silencers of the diesel engines.
- Special attention is paid to the ventilation system.
- The engine room watch post is located in a sound-insulated watch cabin.
- The engine room casing and funnel are arranged outside the accommodation space.

Noise measurements:

The measurements of noise are carried out as described in:

- Annex 1 Resolution MSC.337(91) - Code on noise levels on board ships

SECTION B - STEEL HULL

B1. GENERAL ARRANGEMENT

- The vessel is of the single deck type with forecastle and accommodation deckhouse is aft.
- Transverse watertight bulkheads divide the vessel into the following main compartments:
 - fore peak with chain lockers, water ballast tank and forecastle with boatswain's store
 - bow thruster room
 - technical space with provision store
 - hopper with buoyancy compartments at sides with fuel bunkers, fresh water tanks and water
 - ballast tank
 - engine room with repair area, engine room store, electric store and engine room watch cabin
 - aft peak
 - steering gear room which is accessible from the engine room side internally
- The vessel is constructed of new steel, shot-blasted to SA 2.5 and treated as described at the end of this Section.
- Where advantageous in way of heavily loaded structural parts in the hull, higher tensile strength steel S355JO (AR 36) will be used.

B2. HULL CONSTRUCTION AND SCANTLINGS

- The hull is constructed under the supervision of the Classification Society as mentioned in Section A.
- The hull is of fully welded construction and built to the longitudinal frame system supported by transverse web frames. The aft peak has transverse frames.
- The materials used in the construction of the hull and the scantlings of such materials fully comply with the requirements of the Classification Society.
- Following extra plate thicknesses will be applied over the hopper length above Class requirements:
 - longitudinal bulkheads in the lower hopper part..... + 10%
 - longitudinal inclined hopper plating..... + 10%
 - transverse bulkheads in the hopper + 10%
- Exposed portions of the hopper susceptible to high abrasion will be protected against wear by extra wear resistant material and is to be detailed in the offer. Where necessary in the opinion of the Yard and based on best practice, the prescribed dimensions are to be exceeded.

-
- Scantlings and reinforcements which are not prescribed by the Classification Society are governed and fitted by the Yard's best practice, for instance beneath heavily loaded parts of the deck, foundations and dredging equipment.
 - Continuous welding is applied for all welding work, except for longitudinals on tween decks and for non-watertight welding work in deckhouses, for example stiffeners on bulkheads and deck longitudinals, which are fitted by intermittent welding.
 - Non-destructive testing of welds of main structural parts is made to the extent required by the Classification Society.
 - The testing will be carried out by means of magnetic testing, ultrasonic testing or by X - ray photographs, decided by the Yard in close concert with the Classification Society's surveyor. The fore and aft ship are provided with a double bottom, as described below.
 - Centre and side keelsons are extended as far as practicable throughout the length of the vessel and are incorporated in the foundations of fore and aft ship.
 - Drain holes are cut in all bottom floors as low as possible to facilitate adequate drainage and a good flow to the suctions.
 - The hopper coaming top will allow for spoil level of 750m³.
 - Discontinuities in structure are avoided as far as practicable.
 - The longitudinal hopper walls are continued by brackets to transfer the structural strength gradually to the deck and the bottom structure.
 - The stringer plates on top of the buoyancy compartments at sides of hopper extend gradually into the fore and aft deck.
 - Hopper plating on spoil side is plain, stiffeners are fitted opposite spoil side of the bulkheads. Hopper floors are provided between the bottom door compartments in the hopper in line with the transverse web frames in the buoyancy compartments.
 - The buoyancy compartments beside the hopper are provided with fuel bunkers, fresh water tanks and a water ballast tank, the space above the tanks serving as a pipe and cable tunnel.
 - Frames, longitudinals and stiffeners are generally of bulb plate profiles.

B3. HULL PLATING

- The hull plating is reinforced around openings.
- A big part of the hull is strengthened by longitudinal frames, transversely supported by web frames. The aft part is built to a transverse framing system.
- The hull is to be reinforced in areas that may be subject to impact from the grab during dredging operations.
- Drain plugs are fitted in all tanks and bunkers.

B4. DECKS

- All decks are without sheer and without camber and parallel with the baseline, except the weather exposed main deck, which has a straight camber of 24 mm per 1000 mm with a flat portion on the centreline of the ship.
- All decks are made of steel with insert plates of increased thickness where required by the Classification Society under windlasses and dredging equipment.
- The decks are longitudinally framed by bulb plate profiles, supported by web beams.

B5. DOUBLE BOTTOM

- The vessel has a double bottom structure in fore and aft ship in accordance with the requirements of the Authorities as mentioned in Section A.
- Where necessary, recesses are made in way of the jet water pumps, valves and inboard suction lines. Execution of recesses in accordance with above mentioned requirements. Lubricating oil storage tanks and various smaller tanks are arranged in the double bottom, see relevant Sections.
- The necessary manholes, sounding and vent pipes are provided.

B6. STEM AND STERN

- The stem is well raked forward and is constructed of steel plate with a cylindrical section, suitably strengthened by means of frames and stringers.
- The stern is provided with a double plate centre line skeg, welded to the hull structure. The base of the skeg is in line with the bottom of keel line.

B7. DECKHOUSES

- Deckhouses are of welded steel construction, suitably stiffened.
- Both the inner and outer walls of the accommodation deckhouse are built-up of corrugated plates.
- The aft deckhouse and the wheelhouse are built-up of flat plates with welded-on stiffeners. The decks are made of flat plates, longitudinally stiffened by flat bars, supported by transverse web frames of bulb profiles.
- The decks are without sheer and without camber.
- Web frames of flat bulb profiles or partial bulkheads are fitted according to Classification Rules or, as far as necessary at *Supplier's* option to ensure sufficient transverse strength of deckhouses. Where possible, these web frames are fitted in line with web frames of the hull.
- The height between steel decks in accommodation spaces is 2.90 m.
- The height between the steel decks in the wheelhouse is 2.90 m.

B8. FUNNEL

- A funnel is fitted on the aft deckhouse to accommodate the main, and auxiliary diesel engine exhausts.
- The funnel is built-up of corrugated plates.
- The funnel is closed at the top by a deck, through which all exhaust gas ducts are led.
- A scupper collects the water from said top.
- The funnel serves also as natural exhaust for hot air from the engine room.
- Hot air exhaust louvers are arranged as high as practicable on the aft side of the funnel.
- Ladders are fitted for access to the funnel top.
- The *Purchaser's* Identity symbol, made of stainless steel, is bolted at each side of the funnel.

B9. PROPELLER SHAFT BRACKETS

- The propeller shaft brackets are of fabricated mild steel and have an approximate streamlined cross-section.
- The supporting arms are welded to the boss; they penetrate the hull plating and are suitably connected to the structural members, both longitudinally and transversely.
- The outboard part of the propeller shafts is protected by a steel tube, serving as a stern tube

B10. RUDDERS

- Rudders are rectangular with a streamlined cross section.
- They are of the free hanging fishtail type
- They are adequately stiffened and of all-welded construction.
- The forged rudder stock is supported in two bearings, the lower one is mounted in a tubular support, provided with a bronze bearing bush, strongly incorporated in the hull construction and fitted with a sealing arrangement consisting of a set of rubber V -rings.
- The upper bearing of each rudder is of the roller bearing type and serves also to carry the rudder weight.
- An automatic continuous grease lubricating system is provided for the rudder stock bearings. Internal parts of rudders are flood coated with oil, bituminous solution or equivalent. For this purpose stainless steel fill and drain plugs are fitted.
- Provisions are made to prevent the rudders from lifting.
- The rudder arrangement permits a maximum rudder angle of 60° from centre to each side. One set of tools for mounting/dismounting of the rudder stock cones will be provided.

B11. PROPELLER NOZZLES

- Around each propeller, a fixed high efficiency nozzle will be fitted.
- The whole inside surface is executed in seawater resistant stainless steel with notation X2CrNiN23-4
- The last layers of the outside welding seams are welded with special stainless steel electrodes. The nozzles are provided with a vertical strut outrigger construction for welding in the ship's structure.

B12: BOW THRUSTER TUNNEL

- The intersection between hull and tunnel will be provided with a solid steel round bar or a steel pipe. Diameter of the bar or pipe at least 5% of the diameter of the bow thruster tunnel.
- At each side the bow thruster tunnel will be provided with a steel grid, at least partly removable by means of a bolt connection. The design of the bolted connection to take cognizance of underwater removal by divers if required.

B13. BUILT-IN TANKS

The following tanks are incorporated in the structure of the vessel:

Fuel oil tanks:

- Total capacity of the marine diesel oil as mentioned in Section A.
Marine diesel oil settling tank
- The capacity of the tank is incorporated in the total capacity as mentioned in Section A. Marine diesel oil daily service tank(s) serving the diesel engines in the engine room.
- The capacity of the tank(s), complying with the requirements of the Regulatory Bodies as mentioned in Section A, is incorporated in the total capacity as mentioned in Section A. Marine diesel oil daily service tank in the emergency generator room.
- The capacity of the tank, complying with the requirements of the Regulatory Bodies as mentioned in Section A, is incorporated in the total capacity as mentioned in Section A. Fuel oil overflow tank.

Lubricating oil tanks:

- Lubricating oil storage tank for diesel engines; total capacity as mentioned in Section A
- Lubricating oil storage tank for gearboxes for:
 - propeller drive

The capacity is incorporated in the capacity as mentioned above.

- Dirty oil tank

Fresh water tanks:

- Fresh drinking water; total capacity as mentioned in Section A.
- Technical fresh water; total capacity as mentioned in Section A.

Water ballast tanks:

- Water ballast tank in the fore peak.
- Water ballast tank in the aft peak

- Water ballast tank in the PS buoyancy compartment, enabling to compensate the angle of heel in case the quantity of fresh water and/or fuel oil is insufficient.
The ballast tank is filled and emptied by means of the bilge/ballast pump.

Other built-in tanks:

- dirty water tank
- sludge tank
- fresh cooling water drain tank
- hydraulic oil storage tank

General:

The built-in tanks have sufficient capacity, related to the quantity of the relevant systems. Depending on their duty, the above mentioned tanks are provided with:

- air
- filling and sounding pipes
- drain cock
- manhole(s)
- level gauge for fuel oil daily service tanks

B14. VARIOUS SEPARATE TANKS

System tanks for fuel oil systems, cooling water systems, lubricating oil systems, hydraulic systems, etc., will be provided in accordance with the recommendations of the manufacturers of the components in the relevant systems, Regulatory Bodies as mentioned in Section A and the *Supplier's* practice; depending on the final lay-out of the systems.

Furthermore, the following separate mounted tanks are to be installed:

- 1 general service tank for lubricating oil with a capacity of 200 litres
- 1 tank for cleaning purposes with a capacity of 100 litres

All tanks complete with all necessary fittings, drain cocks and drip-trays as required. Each tank is clearly marked indicating type of fluid and purpose.

A cradle for one loose 200 liter drum is provided mounted in the engine room unit.

B15. HATCHWAYS

- All hatchways are watertight and have steel coamings with a height according to the regulations of the Authorities as mentioned in Section A. They are provided with steel hinged hatch covers, provided with rubber packing.
- Hatchways with dimensions 0.70 x 0.70 m are closed by means of brass hinged bolts with steel eye nuts. Larger hatchways are closed by means of MacGregor cleats.
- Arrangements for securing in the open position are provided.
- Escape hatches are fitted, as required by the Authorities as mentioned in Section A.

B16. HAWSE PIPES

- The hawse pipes are made of steel tube with wearing edges of half-round or similar material at the hull around the hawse pipe opening.
- The hawse pipes can be closed on their upper side by means of steel plate splash covers of the sliding type.
- Each hawse pipe has a connection for flushing the anchor chain fed by the deck washing system.

B17. CHAIN LOCKERS

- The chain lockers are of such size that adequate working space exists above the chain cables. The inside surface is smooth and unlined.
- The bottom is fitted with a removable steel grating. A hand pump is provided for drainage purposes.
- The inboard ends of the chain cables are attached to the chain locker top by means of a quick-release lock.

B18. STEEL LADDERS AND STAIRWAYS

- Vertical steel ladders are provided in fore and aft peak, fuel bunkers, ballast tanks, buoyancy compartments, below escape hatches, to funnel, mast and wheel house, and in addition where required for good accessibility for maintenance and repairs.
- Steel ladders have side rails of flat material and rungs of square section steel, spaced 30 cm apart. Safety cages will be fitted around ladders as required by the Regulatory Bodies.
- All external stairways have steel side rails and anti-slip steps.
- Handrails are of steel tubing.
- Internal stairways in engine room, pump room, technical space and bow thruster room have steel side rails and anti-slip steps and are provided with removable handrails of steel tube, with connection pieces of "Kee Clamp" type.

- The angle of inclination of stairways is not more than 50° from the horizontal. In machinery spaces and small spaces the angle is not more than 60°.

B19. FLOOR PLATES AND GRATINGS IN ENGINE ROOM

- Floor plates are fitted in the engine room consisting of raised pattern plate of 5 mm thickness, secured with self-tapping screws and supported to the ship's structure.
- Platforms, gratings and ladders are fitted where required for accessibility and control railings are arranged where required for safety.
- Railings and stanchions in engine room and in the fore ship along the tween deck are executed dismountable with connection pieces of "Kee Clamp" type.
- The floor plates are bordered by a flange of 3.5 cm height along platforms and floor openings. Safety guards are provided for shafting etc. as required by the Authorities as mentioned in Section A.
- Steel covers in floor plates giving access to valves and similar fittings are clearly marked with screwed in engraved brass nameplates.

B20. MANHOLES

- All manholes are according to the *Supplier's* Standard, if possible diameter 480 mm.
- provided with a steel mounting ring on which a steel plate cover is bolted.
- Cord ring of material suitable for the content of the relevant tank or bunker.
- All built-in tanks have two manholes.

B21. STEEL DOORS

Doors are fitted according to general arrangement plan.

All accommodation outer doors are of steel, except the wheel house doors which are made of 40 mm teak and are provided with a glass window.

Outside doors giving access to spaces below deck, to accommodation deckhouse, store spaces and further service spaces are steel watertight doors, closed by means of four toggles, suitable for one-handle operation.

All doors have a clear width of opening of 700 mm and are of the *Supplier's* Standard design. However, the outside door of the hospital has a width of 800 mm.

Steel doors inside deckhouses and below deck are non-watertight doors according to the *Supplier's* Standard.

Steel doors in escape routes will comply with the relevant SOLAS Regulations.

All steel doors are provided with retaining device.

All hinges and dogs of watertight doors are provided with grease nipples.

B22. REMOTE CONTROLLED WATERTIGHT DOORS

The doors slide horizontally in rails at upper and lower side and will have a clear opening of 700 x 1750 mm.

According to the Classification Rules, the doors are electrically-hydraulically operated with manual backup, operated locally from either side of the door.

"OPEN" and "CLOSED" signal lights are fitted in the navigation control console in the wheel house.

The control panel of the watertight doors in the wheel house will have an interface with the Voyage Data Recording system.

B23. CATWALK

Catwalks are to be fitted for ease of access. They are to include handrails where required.

B24. BULWARKS AND RAILINGS

- Steel bulwarks are fitted around forecastle and foredeck.
- Bulwarks are well stiffened and have a bulb plate profile on top. Bulb plate stays at suitable spaces are welded to the bulwarks.
- Freeing ports are arranged in suitable positions.
- Where not provided with bulwarks, the main deck and the open sides of forecastle deck, coaming deck, accommodation decks and bridge deck are provided with an open railing according to the Yard's Standard.
- These railings consist of flat steel stanchions 50 x 20 mm with a top row of 42 mm diameter galvanized steel tube and two rows of 26 mm diameter galvanized steel tube.
- Railings of identical construction are provided on both sides of the catwalk from fore to aft ship on top of the hopper coamings.
- In way of magnetic compass on top of wheel house, railings are fitted of same construction, however of non-magnetic material where necessary.
- A storm railing of 42 mm diameter galvanized steel pipe is fitted around the outside of the deckhouse walls.

B25. DRAIN PLUGS

- Except dry tanks each tank and bunker is at the lowest point fitted with a stainless steel drain plug according to the *Supplier's* Standard.

- They are situated sufficiently far from the centreline to be free from the keel blocks when drydocking.
- The name of the relevant compartment is indicated on the shell adjacent to each drain plug, by means of weld beads.
-

B26. BILGE KEELS

Bilge keels are fitted parallel amidships on PS and SB, consisting of notched flat bulb profile welded to the bilge plating.

B27. NAMEPLATES, SHIP'S IDENTIFICATION NUMBER, DRAUGHT MARKS, ETC

- Ship's name on either side of the bow in 6 mm steel plate capitals will be welded to the hull and painted.
- Ship's name and home port on the stem will be in the same execution.
- The ship's identification number will be permanently marked, complying with the requirements of the Regulatory Bodies.
- Freeboard Marks as required by the Classification Society are of 6 mm steel plate, welded to the shell and painted.
- Draught marks in welded beads fore and aft on port and starboard side, scale in decimeters, as far as possible located at perpendiculars.
- Marking of light waterline on the hull by means of welded beads, suitably spaced. Nameplates of Resopal are affixed to the outside of interior doors.
- Nameplates on switchboards, control consoles, control cabinets of machinery installations etc. will be made of Resopal.
- Nameplates affixed to important parts of the machinery installation are of brass with engraved letters securely attached.
- *Supplier's* nameplate, plate with building number and year and patent data plate are fixed in suitable positions.
- Two propeller warning boards are fitted on railings at stem.
- A bow propeller warning mark is fitted at the hull plating SB and PS above the bow thruster tunnel.
- Notice, warning and instruction boards as required by the Authorities mentioned in Section A are provided and located as directed.
- Two nameplates with company emblem on either side of accommodation
- All nameplates are provided with English texts.

B28. CATHODIC HULL PROTECTION

- The vessel is equipped with a cathodic hull protection system covering the underwater parts of the external hull, the rudders, box cooler chest and bow thruster tunnel.
- The sacrificial aluminium anodes have a lifetime of about 3 years in moderate climate and under normal conditions.
- The anodes are welded to the hull plating on doubler plates.

B29. PAINTING AND OTHER PROTECTIVE PROCESSES

Before being processed, the steel used in the vessel's build is shot-blasted to remove rust till SA 2.5, ISO 8501-1:1988, SSPC-SP-10 and treated with one coat of shop-primer (Sigmaweld MC or equivalent) of about 18-22 microns thickness.

All steelwork is thoroughly cleaned of rust and other contaminants and pre-treated before any coat of paint is applied. Pre-treatment of galvanized steel, stainless steel, copper and Cunifer will be according to paint-manufactures requirements.

Oil and grease will be removed with a suitable detergent.

Intact shop-primer will be cleaned by means of 3M discs or pads of light sweep blasting. Marking, letters etc. will be removed prior to painting if necessary.

The surfaces will be submitted for approval before painting.

No painting to be executed during rain, too low temperatures, too high relative humidity and too intensive sunshine.

Conditions and drying times specified in the product data sheets of the manufacturer to be respected.

Deviations of the data sheets must have the approval of the manufacturer. To meet the required climate conditions on the data sheets, the Yard has the right to apply a winter system.

Painting must be executed in accordance with the paint supplier prescription.

The surface preparation and painting of the deck equipment will be executed before erection on board.

Cableways, pipe clamps etc. are to be painted before fitting cables and pipes.

Spaces and structures which will become inaccessible after mounting of equipment will be painted with the indicated number of coatings before erection of these parts.

Non-accessible spaces will be painted with Bitumastic or equivalent, and or closed airtight, in accordance with *Supplier's* practice.

Critical spots to be stripe coated.

For the hull outside and large surfaces only airless spraying will be used. After applying and drying, each layer will be checked.

The film thickness will be specified as a Dry Film Thickness and measured as follows:

Procedure:

- for tanks according to the "90 - 10" rule
- other spaces according to the "80 - 20" rule

The first number (90 or 80) means that no measurement may be below 90 or 80% of the specified layer thickness.

- The second number (10 or 20) means that no more than 10 or 20 % of the measurements may be in the range from 90 - 100% respectively 80 - 100% of the specified layer thickness.
- However, if one spot measurement is below the 90 respectively 80% five extra measurements will be taken around this spot, the lowest value expires.
- The quantity of the measurements will be taken randomly per section.
- Dry Film Thickness shall not be measured for machinery; equipment, outfitting, pipes, pipe supports, seats, welding beads and edges of structural members.
- Painting surfaces have to be smooth without sags.
- Subsequent coats have to be distinguishable for identification.
- Painting of machinery and auxiliaries delivered by subcontractors is cleaned from grease and other contaminants and if necessary, treated with the final coat, with exception of switchboards, control desks, refrigerators and such like.
- The chamber of a rubber sealing will be painted with epoxy primer before fitting the sealing. Electric cables, cable trays and all piping (if not specified otherwise) will be painted in the colour of the surroundings. High voltage cables not to be painted.
- Pipes will be marked with coloured rings to denote the nature of the fluid or gas passing through it.
- The hull will be provided with cathodic protection by means of anodes, these anodes are not to be painted.
- Before launching, the outside hull, the inside hull below the waterline and the water tanks shall be painted completely and the exposed sections at least protected by one coat of universal primer.
- The antifouling paint line will correspond with the following waterline:
0.30 m above the waterline of the empty ship with 100% bunker filling and water in the hopper up to the waterline
- Colour scheme and paint specification of equipment to be approved by the *Purchaser*.

- Painting and surface preparation will be executed under supervision of an authorized and experienced inspector of the paint manufacturer for the important parts, i.e. the underwater hull, the freshwater tanks and the ballast tanks.
- Where the GHD is readily available, the Supplier shall submit the duly approved and sign-off quality control plan and inspections for the above item B7 to the *Purchaser*.

SECTION C - EQUIPMENT

C1. STEERING GEAR

- The steering gear is of the electric-hydraulic type.
- The two rudder stocks are linked by means of a heavy rod.
- The hydraulic system of the steering gear is fed by two electrically driven hydraulic pumps, both normally in operation.
- Each pump, together with its driving motor, is mounted on a common bedplate.
- The pumps are installed in the steering gear room and can be started in the steering gear compartment and from the navigation control console in the wheel house.
- The time to bring the rudders from 35° on either side to 30° on the other side does not exceed 18 seconds using one pump, at maximum service speed of the vessel.
- The maximum rudder angle is 60° Port and Starboard.
- The steering gear is controlled from the navigation control console in the wheel house by means of a double electric steering system, consisting of one main system and the second serving as emergency system.
- In case of emergency it is possible to control the steering gear from the wheel house by means of above mentioned second electric circuit, so no emergency hand steering gear is installed in the steering gear room.
- For electric steering system and rudder positioning system,
- Visual and audible alarms of the steering gear are fitted in the navigation control console in the wheel house as required by the Authorities as mentioned in Section A.

C2. FORWARD WINDLASSES AND CHAIN STOPPERS

- Two forward windlasses, of the horizontal hydraulically driven type, are placed on the forecastle deck.
- They are each equipped with a disengage able cast steel cable lifter for stud link chain cable of high tensile strength steel, grade U3.
- The cable lifter is provided with a hand operated screw spindle brake and a hand operated steel dog clutch.
- For mooring purposes, a cast iron warping head is provided for a suitable wire diameter.

- Each windlass is driven by a hydraulic motor via a totally enclosed gearbox, giving the cable lifter a hauling speed of at least 10 m/min.
- The hydraulic motor is fed from the main hydraulic system. The windlasses are controlled locally
- A chain stopper combined with guide roller and turnbuckle is fitted between each windlass and hawse pipe.

C3. AFT WINDLASS AND CHAIN STOPPER

- These windlasses, placed on main deck aft, is of the same execution and construction as the forward windlasses.
- A chain stopper combined with guide roller and turnbuckle is fitted between windlass and hawse pipe.

C4. ANCHORS AND CHAIN CABLES

- 2 stockless bow anchors, high holding power type,
- 2 stockless stern anchor, high holding power type,
- Stud Link Chain and anchors are to be of sufficient weight and construction to meet the minimum requirements.
- Each length of chain cable is fitted with "KENTER" joining shackles. The anchors are mounted to the chain cable by means of a swivel.

C5. BOLLARDS, FAIRLEADS AND MOORING PORTS

- The ship is provided with bollards, fairleads and mooring ports, to enable efficient and adequate use of the mooring equipment.
- All equipment to be suitably rated as per class requirements for the maximum conditions of operation.
- Bollards are of welded construction to the *Supplier's* Standard (with welded steel plate foundations)
- Fairleads and mooring ports are in accordance with standard designs.
- The rollers are fitted with self-lubricating maintenance-free bearing bushes.
- Additional stiffeners and stays are fitted where necessary to provide sufficient support for the mooring ports at the maximum breaking load of the wire or cable for which they are designed.

C6. HAWSERS AND WIRE ROPES

- 1 steel wire towing cable, length 200 m, diameter 34 mm, adequate breaking load, fitted with 1.50 m spliced eye. The towing cable is stowed on a wooden reel.
- 4 polypropylene mooring ropes, length each 180 m, breaking load 217 kN, fitted with 1.50 m spliced eye.
- 2 heaving lines, length each 40 m, diameter 10 mm, with filled leather bag at one end.
- four steel rope drums are provided for stowing the mooring ropes, two on forecastle deck and two on main deck aft.

C7. MOTOR RESCUE BOAT

One motor rescue boat is provided dimensions approx. 4.25 x 1.85 m.

The boat is of the rigid type, fabricated of glass fibre reinforced polyester. Fixed and loose inventory is in accordance with the SOLAS regulations.

The boat is equipped with an outboard motor, suitable for a speed of 6 knots in calm water.

Vessel's name and port of registry are painted on both sides of the boat.

A cover of Bisonyl is included.

C8. MOTOR RESCUE BOAT AND LIFE-RAFT LAUNCHING DAVIT

The motor rescue boat is handled by a slewing davit provided with an electrically driven winch.

Slewing of the davit hydraulically by means of accumulated power.

Both slewing and hoisting/lowering are also possible manually.

This davit is also suitable for handling the life-rafts on portside.

At starboard side of the vessel a slewing davit is installed for handling the life-rafts at starboard side. The winch and the slewing system are manually driven.

Both davits fully comply with the SOLAS regulations.

C9. ACCOMMODATION LADDERS

Two accommodation ladders are fitted on main deck midship. The length of each ladder is sufficient to reach down about one metre above the light waterline at a maximum angle of 55° with the horizontal.

Each ladder is of sea water-resistant aluminum, provided with fixed curved steps, a revolving upper platform, folding railing and a roll at lower end.

An electrically operated hoisting-canting mechanism is provided to stow each ladder flush with the shell plating.

C10. GANGWAY

A loose gangway of sea water-resistant aluminum will be supplied, suitable for use by ship's personnel from deck to shore.

Length of gangway is 6 m, width 0.60 m.

Mass of approx. 90 kg.

The gangway is provided with removable stanchions, steel wire railing at one side and 4 hoisting eyes and gangway net (3 off).

C11. MASTS AND RIGGING

The mast is fabricated of steel pipes and is destined to carry the prescribed navigation lights. The mast is fitted with a platform for the radar installation and other navigation equipment.

Halyards for hoisting and lowering of day signals are provided. The mast is provided with a vertical steel ladder with safety guards.

Wires, blocks, shackles etc. all to the requirements of the Authorities, mentioned in Section A. A flag staff is fitted at aft deck.

C12. HOISTING GEAR IN ENGINE ROOM, TECHNICAL SPACE AND BOW THRUSTER ROOM

Hoisting gear rated to the largest piece of equipment that would generally be lifted in each area is to be supplied.

C13. STORES HANDLING CRANE

For handling provision stores, small maintenance parts etc. a foldable knuckle boom crane is included due to the limited space. The crane shall be a fully self-contained unit and have an integrated hydraulic power pack. The crane shall be installed on coaming deck SB side, provided it is clear of the GHD dredging operations and any falling debris. The capacity of the crane is as follows:

- hoisting capacity..... 6.0 tons
- Maximum outreach 8.5 m (able to reach over the vessel side for loading/unloading of provision stores and maintenance parts).

The crane is designed for operating at a ship's list of 5° and 2° trim. The crane shall be controlled by means of a push-button box and in addition shall also have a hand-held remote pendant. An overload protection device is provided as well as all safety devices and braking devices for the full range of motion. The lifting device should also be able to serve the engine room hatch if this is located forward of accommodation and have a 360-degree rotation.

Save-all to be installed on the deck level for spill containment of any potential leaks from the crane.

C14. FIXED FIRE-EXTINGUISHING SYSTEMS

Fixed Fire-Extinguishing Installation (CO₂)

- A CO₂ fire-extinguishing installation of the "Total Flood" system is installed for the engine room.
- The CO₂ bottle battery is situated in a separate room and is accessible from the open deck.
- The required electrically operated signaling and alarm equipment is installed to warn personnel inside the engine room before discharging CO₂.
- Ventilation units of the engine room are stopped automatically when CO₂ is released.
- A separate CO₂ fire-extinguishing system is installed for the exhaust duct of galley canopy.

Fixed Local Application Fire-Extinguishing System (Water Mist)

- A fixed local application water mist system is installed for the engine room. It can be used without the necessity of engine shut down, personnel evacuation, or sealing of the space. The water mist system is installed for:
 - each main and generator diesel engine
- A water mist tank is situated in the engine room, automatically serviced by the pump.
- The system is automatically released or released manually from the remote release panel in the engine room entrance. In the bridge, a fire alarm panel is installed aligned to SOLAS regulations.

C15. INTEGRATED FIRE DETECTION AND FIRE ALARM SYSTEM AND SMOKE DETECTION SYSTEM

A fixed integrated fire detection and fire alarm system and smoke detection system is installed as required by the Authorities as mentioned in Section A.

The main control and indicating panel is fitted in the 19" instruments rack in the wheel house, provided with alarm buzzer and lamps indicating section on fire.

C16. LOOSE FIREFIGHTING EQUIPMENT

- Loose fire-fighting equipment will be provided, as far as execution, number and capacity, as described by the Authorities mentioned in Section A and will mainly consist of:
 - fire hoses

- portable fire extinguishers
- fire-fighter's outfits with air breathing apparatus - emergency escape breathing devices
- The extinguishers are of an approved type, accessible mounted at suitable locations. Spare charges are supplied according to the requirements of the Authorities mentioned in Section A.
- All fire hoses are stowed in wall mounted boxes of polyester/fibreglass.

C17. LIFE-SAVING APPLIANCES

- Life-saving appliances in accordance with the current regulations of the Authorities mentioned in Section A are supplied, viz.:
- 4 automatic inflatable life rafts, each for 25 persons, two at SB and two at PS, stowed in fibreglass container, complete with launching device
- 2 life buoys with self-igniting light and self-actuating smoke signal, fitted on the bridge wings in instantaneous release racks
- 2 life buoys with self-igniting light, fitted to railing or deckhouse
- 2 life buoys with 30 m life line, fitted to railing or deckhouse
- 2 life buoys with grab line, fitted to railing or deckhouse
- 18 life jackets, stowed on top of the wardrobes in the cabins
- 6 life jackets, stowed in a polyester box (for watch keeping personnel) 21 immersion suits
- 1 line throwing appliance, including four projectiles and four lines
- 12 rocket parachute flares, stowed in watertight canister
- 1 blacksmiths hand hammer for anchor slipping, 4 kg
- 2 ladders for embarkation into the life rafts
- For rescue boat see relevant item of this Section.
- For portable survival craft radio equipment see Section E

C18. REPAIR AREAS

a) Machinery repair area in engine room aft:

A machinery repair area is situated with adequate access to the engine room.

The repair area is enclosed by steel bulkheads, insulated with rock wool panels and provided with a sound-insulating floor to meet the sound level as indicated in Section A, and is accessible by a lockable sound-insulated door and within reach of the engine room floor by means of a stair.

The repair area is equipped with:

- 1 steel workbench with two drawers and vice of 140 mm
- 1 steel locker with 2 doors for tools
- 1 rack with clips for heavy tools, mounted against one of the steel walls

- 2 connections for electric hand tools
- 2 connections for pneumatic hand tools
- 1 connection for stationary electric tools
- 1 connection for electric welding
- 1 beam with hand operated hoisting tackle of 1 ton,
- Machine tools

C19. STORE SPACES

a) Boatswain's store:

The boatswain's store is arranged in the forecastle and is accessible from the main deck by means of hatchway and a steel ladder.

The store is fitted with wooden racks of the *Supplier's* Standard. The total storage area of the racks amounts approx. 10 m³, divided over four layers.

Suspension rods and hooks are fitted.

Paint storage is also provided in this space, consisting of a safety cabinet with boards for stowage of paint brushes, paint pots etc. The cabinet is equipped with self-opening and closing folding doors.

b) Engine room store:

The store is enclosed by wire mesh bulkheads and accessible from the repair area by means of a lockable sound-insulated steel door.

The store is fitted with steel racks of the *Supplier's* Standard. The total storage area of the racks amounts approx. 12 m³, divided over four layers. Also 32 standard plastic container boxes are provided for spare parts.

A steel locker with two lockable doors is fitted in the store room.

c) The provision store room and linen lockers are described in Section D.

C20. ARRANGEMENT OF EMERGENCY GENERATOR ROOM

The emergency generator set is installed in a separate room above main deck level.

Also the emergency switch board is fitted in this room.

The necessary foundations for generator set and switch board are provided as well as a fuel oil tank with a capacity satisfying the requirements of the Authorities mentioned in Section A. The room is mechanically ventilated.

C21. ENGINE ROOM WATCH CABIN

A sound-insulated watch cabin, of sufficient space is installed in the engine room, housing the engine room alarm panel.

The steel watch cabin is mounted on anti-vibration mountings and provided with two double glass windows 900 x 900 mm and is accessible by means of a sound reducing steel door.

Walls and ceilings are sound-insulated with rock wool, finished with panels of non-combustible material.

The floor is insulated with a sound-reducing covering, covered with linoleum.

The watch cabin is fully air conditioned by a separate self-contained air conditioning unit, see Section G.

Furthermore, the watch cabin is provided with:

- a writing desk with two desk chairs
- a locker for storage of manuals
- a white notice board for tank soundings complete with the associated pens and board eraser
- a battery operated clock
- screens for monitoring aligned to class requirements and to an International standard approved by the *Purchaser*. Selected camera system feeds shall also be displayed on the screens.

C22. MACHINE TOOLS

The following machine tools will be supplied:

In the machinery repair area:

- 1 electrically driven lathe, of suitable size for space available. provided with drive plate, steady rest, follower rest, 3-jaw chuck, 4-jaw chuck, face plate, coolant equipment, lighting equipment, middle type drive centre, 2 tailstock centres, centre sleeve and one set of tools
- 1 electrically driven column drilling machine, drilling capacity in mild steel 32 mm, spindle travel 170 mm, with 8 different spindle speeds from 100-1085 rpm., provided with coolant equipment and machine vice
- 1 double wheel grinding machine, bench mounted type, diameter of grinding wheels 200 mm

In the welder's area:

- 1 welding rectifier, suitable for a welding current of 400 A at 100% IR or 450 A at 60 % IR, with remote control unit
 - For welding plugs see Section M.
- 1 electric hand-welding set, consisting of:
- 1 hand-welding shield

- 1 steel chipping hammer 1 electrode holder
- 1 ground clamp
- 1 pair of welding gloves
- 2 x 20 metres cable with soldering cable lugs 1 welding apron 70 x 90 cm
- 1 wire brush

C23. PROTECTION COVERS

Protection covers of Bisonyl are provided for deck-mounted electric motors, radar scanner, standard compass on wheel house, searchlight, loudhailers, controllers of deck-machinery, weather exposed hoisting tackles, and, if not closable, torpedo ventilators, cowls, goose necks, vent pipes and where required by Rules and/or subcontractors.

SECTION D - ACCOMMODATION

D1. LAYOUT OF ACCOMMODATION

The accommodation for crew and officers is arranged above main deck in a deckhouse on the aft ship, Accommodation is arranged for a total complement of 18 persons (ALL SINGLE BERTH), as follows:

Navigation bridge deck

- wheel house

Lower Bridge Deck

- 1 AC room
- 1 Converter room
- 1 Communal Toilet

Officers Deck

- 1 Captain's cabin with bed room and private bathroom annex
- 1 Chief Engineer's cabin with bed room and private bathroom annex
- 3 Single-berth officer's cabin bedroom and private bathroom annex
- 2 Single berth petty officers cabin and private bathroom annex
- 1 Treatment Room

Poop deck (Approx.)::

- 6 Single-berth crew's cabins with bedroom and private bathroom annex
- Ships Office

Main deck(Approx.):

- 5 Single-berth crew's cabins with bedroom and private bathroom annex
 - 1 Crew's mess room
 - 1 Laundry room
 - 1 Galley
 - 1 Officers mess room
-
- 1 food store

-
- 1 dry provision storeroom
 - 1 refrigerated provision store room

 - 1 Room for dirty linen
 - 1 Room for clean linen
 - 1 common use toilet
 - Emergency generator room
 - CO2 room
 - Fan room

The superstructure layout maybe amended to accommodate space constraints with cognizance been given to separation of officers and crew. Proposals for bathroom annex will be considered with cognizance to space requirements and personnel on the vessel will be both male and female. This should be in accordance with the relevant laws.

D2. PANELLING, PARTITION BULKHEADS AND CEILINGS

- Paneling, partition bulkheads and ceilings are non-combustible panels, complying with the latest requirements of the International Convention for Safety of Life at Sea, and 1974, in respect of B-Class material.
- Clear ceiling heights on the accommodation decks are 2100 mm above floor.
- Paneling, partition walls and ceilings in wheelhouse, cabins, hospital, mess rooms, and office are non-combustible panels, consisting of mineral wool with 0.7 mm PVC faced galvanized steel sheets, total thickness approx. 50 mm.
- No linings are fitted to steel inner partition bulkheads in common toilet spaces, galley, pantries, provision store, laundry, linen rooms and steel bulkheads of alleyways.
- Insulated walls in common toilet spaces, galley, pantries, provision store, laundry and linen rooms are finished with hard plastic laminated non-combustible panels of 21 mm thickness. Ceilings in above mentioned rooms are of identical construction with a total thickness of 15 mm. Paneling and partition bulkheads are placed in steel U-profiles and provided with a plastic plinth.
- Paneling and partition bulkheads in galley, common toilet spaces, pantries, laundry, linen rooms and provision store are placed in U-profiles, welded on steel straps reaching above tiled floors and forming gutter-ways.
- All ceilings are mounted on a framework of galvanized steel profiles. For insulation, see description below.
- Paneling, partition walls and ceilings will be delivered in the same colours.

D3. DOORS IN ACCOMMODATION

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

Interior doors of cabins, mess rooms, etc. giving access to an alleyway are fire retarding doors, complying with the latest requirements of International Convention for Safety of Life at Sea, 1974; in respect of B-Class material.

Interior doors of galley and provision store giving access to an alleyway are fire-resisting doors, complying with the requirements of SOLAS for Class A0.

Doors between alleyways and staircase are SOLAS type A0-doors, however of the self-closing type.

Cabin and mess room doors are provided with a ventilation grid, in addition curtains are fitted to all cabin door frame which can be used for privacy when the cabin doors are open. Door frames are of steel with stainless steel sill plates.

All interior and exterior doors are fitted with retaining devices, except the self-closing doors between alleyways and staircase.

Door fittings for outside and interior doors are of dull chromium plated brass. Locks and fittings are according to the International standard.

Nameplates are fitted over all doors to accommodation.

For outside doors of the accommodation and the wheelhouse see Section B.

D4. WINDOWS AND PORTHOLES

Portholes, of the opening type, have a diameter of 300 mm and have steel welding frame, brass glass ring and 10 mm security glass; where prescribed steel port lids are provided.

Windows in cabins, hospital and office have dimensions 600 x 450 mm and have steel welding frame, brass glass ring and 15 mm security glass.

Windows are of the opening type, hinging outwards.

Wheelhouse windows have dimensions as specified below, steel welding frame, brass glass ring and 12 mm security glass.

Rectangular porthole- or window casings are fitted in the paneled bulkheads.

Wheelhouse:

- windows approx.1550 x 900 mm, all around of which 6 windows can be opened, hinging upwards to outside
- portside and starboard entrance doors are provided with fixed security glasses
- the windows (as above) are to be fitted with easy-to-use SOLAS compliant sunscreens

D5. STAIRWAYS

In accordance with the SOLAS requirements, steel staircases are arranged on all accommodation decks, provided with self-closing doors (see description above). Stairways inside accommodation have steel side rails and steel steps finished with a rubber anti-slip covering. Stairs and staircases are equipped with steel railings, fitted with hardwood (IROKO) top rail.

The angle of inclination of stairways inside accommodation is limited to 50° with the horizontal. Storm rails of hardwood (IROKO), fitted on light metal brackets are provided along one side of the alleyways.

D6. INSULATION

The weather exposed outside walls and weather exposed decks of accommodation cabins, office, mess rooms, hospital, office, galley, pantries, fitness room, provision store, laundry and linen rooms are insulated by rock wool panels of 50 mm thickness, fixed with clips, finished with paneling and ceilings as described above.

Deck beams and stiffeners are clad with rock wool slabs of 25 mm thickness.

Wheelhouse walls up to window level and wheel house ceiling are insulated in the same way.

Where required by the SOLAS regulations, concerning the fire integrity of bulkheads and decks, such parts are insulated with mineral wool panels of the required thickness, covered with wire gauge and finished with galvanized metal sheeting or paneling as described above.

To fulfill the required noise levels as specified in Section A, the relevant spaces may be insulated with other type of isolation and/or by special deck covering as described below.

D7. FLOOR COVERINGS

- The wheelhouse, cabins, office, hospital, mess rooms, recreation room, fitness room, AC room, converter room and the alleyways on accommodation decks are provided with a thermal- and sound-insulating floor or a synthetic mortar leveling sub-floor with a thickness and construction suitable to comply with the sound levels specified in Section A.

The floors will be finished with 2 mm polyflor.

- store spaces, repair areas, steering gear room, CO₂ room, fan rooms and similar spaces have no floor coverings.

The steel floors of these spaces are coated with deck paint as indicated in Section B.

D8. TILED FLOORS

Floors in common toilet spaces, galley, pantries, laundry, linen rooms and provision store are surfaced with ceramic tiles having anti-slip surfaces, laid in 30 mm cement. The floors are fitted with curved border tiles of about 30 mm in height and sloped down towards scuppers. For private sanitary units, see sanitary equipment described below.

D9. FURNITURE

Generally, all furniture will be constructed and built according to the International ship building standard and shall be accepted by the *Purchaser*.

Berths:

All berths are of hard plastic laminated chipboard, dimensions 2000 x 800 mm, equipped with a plywood bottom and two drawers underneath.

Wardrobes:

Wardrobes in cabins are of hard plastic laminated chipboard, dimensions 1700 x 400 x 500 mm, provided with shelf and hanging rod.

Settees:

Settees have plywood panels and framework of white fir-wood. Visible woodwork is of IROKO. Legs of settees are of steel tube. Settees have foam rubber seats and polyether backs, both upholstered with artificial leather.

Chairs:

All chairs are of steel with upholstered seats and backs. Desk chairs and mess room chairs are provided with armrests.

Tables:

Tables in cabins, mess rooms and recreation room have tops of 18 mm plywood, covered with hard plastic. Tables in cabins have dimensions 900 x 500 mm. Dining tables are provided with movable anti-rolling fiddles of teak all around. All tables have legs of steel tube, fixed to the deck.

Writing desks:

Writing desks are of hard plastic laminated chipboard. Writing desks with two drawers at one side have dimensions 1220 x 750 mm; writing desks with two drawers at both sides have dimensions 1600 x 750 mm. The writing desks have low drawers at upper side and high drawers for hanging files at lower side.

Remaining furniture:

Further furniture such as cupboards in mess rooms and recreation room, plate and cup racks, bookracks, keyboards, etc. are built-up of hard plastic laminated chipboard and finishing wood of IROKO.

Cupboards in galley and pantries are of stainless steel.

Where applicable, legs are of steel tubing.

Tops of low cupboards in mess rooms are covered with hard plastic.

Coat-hooks are fitted in each cabin and mess room.

Locks and fittings are according to the Yard's Standard.

D10. UPHOLSTERY

All portholes and windows in officers' and crew's cabins and in the mess rooms, office and hospital are fitted with curtains.

Curtains are also fitted around the double berth in the two-person cabins. All berths are provided with spring mattresses and pillows. Doormats are provided for each accommodation entrance.

A curtain is fitted all around the chart table and the table for radio equipment.

D11. ACCOMMODATION

Captain's and Chief Engineer's cabins

Each consisting, a sleeping room and a bathroom (Approx. and dependent on the overall space)

- 1 desk chair with armrests
- 1 desk lamp
- 1 bookrack
- 1 cupboard
- 1 battery-operated clock
- 1 window curtain for each window
- 1 curtain for cabin doorway
- 1 domestic refrigerator, net capacity of approx. 90 litres
- 1 TV-and broadcast receiver connection
- Network connection

In addition, the Captain's cabin is provided with a small safe.

Each sleeping room:

- 1 berth, 2000 x 800 mm
- 2 wardrobes
- 1 bedside lamp
- 2 coat-hooks
- 1 window curtain for the window

Each private sanitary unit:

- 1 WC
- 1 shower
- 1 wash-hand basin

For private sanitary units, see sanitary equipment described below.

Single-berth Cabins (Approx. and dependent on the overall space)
consisting of a combined sleeping/day cabin

- 1 berth, 2000 x 800 mm
- 2 wardrobes
- 1 writing desk with two drawers at one side 1 settee
- 1 desk chair with armrests
- 1 bedside lamp 1 desk lamp
- 1 bookrack
- 2 coat-hooks
- 1 curtain for each window
- 1 curtain for cabin doorway
- 1 TV-and broadcast receiver connection
- Network connection
- 1 private sanitary unit with:
 - 1 WC
 - 1 shower
 - 1 wash-hand basin

Single-berth crew's and petty officer cabins, each with:

- 1 berth, 2000 x 800 mm
- 2 wardrobes
- 1 writing desk with drawers at one side 1 desk chair with armrests

- 1 book rack
- 2 coat-hooks
- 1 curtain for each window or porthole
- 1 curtain for cabin doorway
- 1 set of berth curtains
- 2 bedside lamps
- 1 TV and broadcast receiver connection
- 1 private sanitary unit with:
 - 1 WC
 - 1 shower
 - 1 wash-hand basin

D12. OFFICERS' MESS ROOM

- 1 dining table, 1950 x 750 mm
- 6 chairs
- 1 sideboard with service hatch to pantry 1 book rack
- 6 coat-hooks
- 1 battery-operated clock
- 1 curtain for each porthole
- 1 TV-and broadcast receiver connection
- 1 bookrack 1 domestic refrigerator, net capacity of approx. 240 litres
- 1 hot press 1 automatic water cooker
- 1 wash-hand basin
- Network connection
- Approx. and dependent on overall available space
- 1 wash-hand basin

D13. CREW'S MESS ROOM

- 2 dining table, 1950 x 750 mm
- 12 chairs
- 1 sideboard with service hatch to pantry 1 book rack
- 10 coat-hooks
- 1 battery-operated clock

- 1 domestic refrigerator, net capacity of approx. 240 litres
- 1 hot press
- 1 automatic water cooker
- Network connection
- Cozy corner
- 2 settees
- 2 saloon table
- 1 book rack
- 1 TV- and broadcast receiver connection
- Approx. and dependent on overall available space

D14. GALLEY

- 1 electric cooking range with 4 cooking plates of approx. 2.5 kW each and one baking oven of approx. 4 kW
- 1 stainless steel dresser with double sink and splashguard and cupboards with shelves and drawers underneath
- 1 cupboard, two-doors type
- 1 worktable for food preparation and wooden racks underneath 1 chopping block
- 1 plate rack
- 1 cup rack
- 1 glass rack
- 1 pan rack
- 1 rack for cooking utensils
- 2 extra electric connections for kitchen machines 1 battery-operated clock
- 1 domestic refrigerator, net capacity of approx. 240 litres
- 1 hot press
- 1 automatic water cooker
 - storage capacity 20 litres
 - hour capacity 60 litres
- 1 microwave oven

- 1 universal kitchen mixing machine with 12 litres bowl and accessories for mincing of meat and slicing of vegetables
- 1 coffee machine, capacity 2 x 6 litres per hour
- 1 dishwashing machine, capacity 20 racks/hour
- Two water cooled Freon refrigerating plants are installed, each capable to maintain the specified temperatures in all compartments, when running 18 hours per day automatically under an average outside air temperature of 35°C.
- For cooling water pump, see Section O.
One of the refrigerating machines serves as stand-by.
- The refrigerating installation is automatically controlled by means of a low pressure control system. I
- An electric defrost heater is fitted for the freezing compartment.
Each compartment is fitted with a thermometer, fitted outside the compartments.
- For materials of condenser(s), see Section O.
- Dumb Waiter

D15. DRY PROVISION STOREROOM

- The dry provision storeroom is equipped with:
- wooden racks (the total storage area of the racks amounts approx. 10m³, divided over four layers)
- 1 wooden locker for provisions
- 1 refrigerated provision store as described below

D16. REFRIGERATED PROVISION STOREROOM

- In the dry provision store a cooling and refrigerating unit is fitted. The unit has a total net capacity of 11 m², divided into two compartments, viz.:
- 1 cooling compartment with a temperature of + 4°C
- 1 freezing compartment with a temperature of -20°C

Insulation and finishing of the rooms:

The unit is built-up of a steel frame, insulated with polyurethane panels, the inside finished with galvanized sheets finished with polyester coating ("food proof"), outside finished with galvanized steel sheets.

Floors have fibreglass reinforced covering, fitted with water drains.

Doors and door frames are of polyester and insulated with polyurethane foam.

The freezing compartment is provided with 2 galvanized steel meat rails and stainless steel hooks.

Beech wooden racks are fitted in each compartment. The total storage area of the racks amounts approx. 11 m², divided over four layers.

Note:

A refrigerator alarm system for a trapped person is installed in accordance with the requirements of the Regulatory Bodies as mentioned in Section A.

D17. DOMESTIC REFRIGERATORS

The following domestic refrigerators are installed:

- one in the Captain's cabin, net capacity of approx. 90 litres
- one in the Chief Engineer's cabin, net capacity of approx. 90 litres
- one in the officers' mess, net capacity of approx. 240 litres
- one in the crew's mess, net capacity of approx. 240 litres
- one in the galley, net capacity of approx. 240 litres

The refrigerators are provided with retaining device.

D18. SANITARY EQUIPMENT

Sanitary equipment is provided as follows:

Private sanitary units for cabins and hospital:

They are arranged as complete prefabricated standard units in the following execution:

- the walls are of galvanized steel sheets, fitted against a galvanized steel frame
- the walls are insulated with mineral wool at the outside
- the bottom and walls are finished with ceramic tiles
- the door is finished with a hard-plastic covering

Each unit is provided with:

- wash-hand basin of enameled steel fitted against a removable wall section which can be
 - hinged away for inspection of pipes, cables etc. behind the wall, complete with built-in mirror
 - cabinet (2-doors), toilet lamp, shaver socket and drinking glass holder
 - wc of china with flushometer, complete with:
 - closet paper holder
 - hand grip
-
- shower with:
 - shower curtain

- hand grip
- soap dish
- towel hook
- Ventilation and lighting are provided.

Common toilet spaces

Each common toilet space is provided with:

- 1 wc
- 1 closet paper holder
- 1 coat hook
- 1 wash-hand basin with shelf and mirror
- 1 drinking glass with holder
- 1 towel rail

Further equipment:

- a technical fresh water tap for cleaning purposes is provided in: -
each common toilet space
 - galley
 - laundry
 - provision store
- mixing tap for cold and hot fresh water is provided in/on each:
 - wash-hand basin
 - dresser sinks in galley and each pantry
 - wash trough in laundry
 - thermostatically controlled mixing tap for cold and hot fresh water is provided for each:
 - shower
 - water closets are provided with a flushometer:

Note:

- for domestic pressure water sets - see Section O
- for drinking water coolers - see Section O
- for domestic pipelines - see Section Q

D19. LAUNDRY

The laundry is arranged on main deck and equipped with:

- 2 automatic washing machines, capacity each approx. 7,5 kg dry clothes
- 2 drying tumblers, capacity each approx. 5,5 kg dry clothes
- 1 stainless steel sink for washing clothes by hand
- 1 folding ironing board complete with iron

- 1 small cupboard for cleaning articles

D20. LINEN LOCKERS

A locker for dirty linen and a locker for clean linen are located near the laundry. The lockers are fitted with racks for stowage of linen.

D21. WHEELHOUSE

The wheelhouse is arranged for maximum comfort and visibility.

The walls incline at an angle of 15° to the vertical.

A sun protection visor is fitted all around the wheelhouse top deck.

The bridge wings are extended over the full width of the vessel, to obtain visibility to the ship's sides.

The wheelhouse is equipped with windows all around, see description above.

Effort is made to avoid installation of equipment at window height, whereby the view would be obstructed.

For window wipers, see Section E.

A small platform is arranged for cleaning the windows.

- The wheelhouse contains the various control consoles and equipment for navigation and communication as mentioned in the relevant items of this specification.
- Furthermore, are fitted:
 - 1 chart table with built-in chronometer box and flag locker and chart lamp over
 - 1 table for radio equipment
 - 1 chair for the helmsman
 - 1 chair for the radio operator
 - 1 chair for surveyor
 - 1 binocular box
 - 1 battery-operated clock
 - Cupboards for storage of books and manuals

D22. OFFICE

An office is located on poop deck, equipped with:

- 1 writing desks with drawers at two sides
- 1 desk chairs with armrests, swiveling type
- 1 bookshelf

- 1 locker for storage of books, writing materials, drawings and documents, two doors type
- 1 waste-paper basket
- 1 key cabinet
- 1 desk lamps
- 1 window curtain for each window 2 coat hooks
- 1 broadcast receiver connection
- Network connection

D23. HOSPITAL

A hospital with sanitary space annex is arranged on officer's deck, equipped with:

- 1 single berth, 2000 x 800 rom, accessible from both sides
- 1 wardrobe
- 1 small cupboard beside berth
- 1 writing desk, with drawers at one side
- 1 upholstered chair
- 1 book rack
- 1 medical cabinet for storage of instruments and medicines
- 2 coat-hooks
- 1 curtain for each window
- 1 TV-and broadcast receiver connection
- Network connection

For hospital sanitary unit, see sanitary equipment as described above.

D24. FIRST AID OUTFIT

A medicine chest, equipped in accordance with the current regulations of the Regulatory Bodies as mentioned in Section A is supplied and stored in the hospital.

SECTION E - NAVIGATION AND COMMUNICATION EQUIPMENT

E1. MAGNETIC COMPASS

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

- The magnetic compass equipment, make CASSENS & PLATH, comprises: - compass binnacle of glass fibre reinforced plastic - type REFLECT A 1
- The binnacle, placed on the wheelhouse top deck, complete with:
 - full correction facilities
 - full set of compensating magnets
 - inclinometer
 - transmitting magnetic compass system, comprising:
 - liquid filled compass bowl with 180 mm card with gimbals on self-lubricating bearings - heading sensor, mounted under compass bowl
 - electric steering repeater - square 144 mm, fitted in the navigation control console
 - electronic box with:
 - input of heading sensor
 - output to:
 - steering repeater
 - auto pilot for off course alarm
 - spare compass bowl in storage box
 - standard azimuth device in storage box
 - Power supply lighting : 230 V – AC/24 V -DC
 - Power supply steering repeater : 24 V - DC

E2. GYRO COMPASS

- The gyro compass installation, make ALPHATRON - type Alpha Minicourse, consists of:
 - maintenance free master compass
 - analogue steering repeater compass, fitted in the navigation control console analogue bearing repeater with mounting bracket on each bridge wing digital repeater with mounting bracket in the steering gear room
 - standard azimuth device in storage box
 - interface with:
 - auto pilot
 - voyage data recorder (VDR)
 - automatic identification system (AIS)
 - each radar
 - electronic chart display and information system (ECDIS)
 - Dredged Track Presentation System (DTPS), RTK GPS)
 - Power supply: 24 V - DC

E3. ELECTRIC STEERING SYSTEM

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

- An electric steering system is installed.
 - The steering gear is follow-up/non-follow-up (FU/NFU) controlled. The system, make ALPHATRON, consists of:
 - for mounting in navigation control console:
 - PLC switching unit
 - steering lever unit with helm indication - FU steering
 - steering lever unit - NFU steering
 - steering mode selector switch - FU / NFU / autopilot
 - for take over duty:
 - push button - take control
 - signal lamp - rudder in service
 - control and distribution units
 - push button/signal lamps - start/stop - each steering gear pump
 - alarm signal lamps for steering gear as required by the Regulatory Bodies
- Note:
- The PLC switching unit serves also for switching of the controls of each propulsion system and bow thruster to the respective control position in the wheel house.
 - for mounting in each auxiliary navigation control console:
 - steering lever - FU
 - for take over duty:
 - push button - take control
 - signal lamp - rudder in service
 - for mounting in steering gear room:
 - feedback unit; connected to the rudder stock by means of a lever linkage and driving the
 - potentiometers for steering system and rudder position indicating system
 - motor starter for each steering gear pump
 - distribution units
 - interface with:
 - magnetic compass
 - gyro compass
 - auto pilot
 - voyage data recorder (VDR)
 - electronic chart display and information system (ECDIS)
 - engine room alarm and monitoring system
 - Power supply: 230 V - AC/24 V - DC

E4. ELECTRIC RUDDER POSITION INDICATING SYSTEM

- An electric rudder position indicating system is installed.
- The system, make ALPHATRON, consists of:
 - for mounting in navigation control console:
 - rudder position indicator - square 96 mm
 - for mounting in each auxiliary navigation control console:
 - rudder position indicator - square 96 mm
 - for mounting in steering gear room:
 - feedback unit; connected to the rudder stock by means of a lever linkage and driving a potentiometer for the rudder position indicating system rudder position indicator
 - necessary distribution boxes
 - interface with:
 - voyage data recorder (VDR)
 - Power supply: 24 V - DC

E5. AUTO PILOT

- A digital auto pilot, make ALPHATRON - type AlphaSeapilot MFA, is fitted in the navigation control console.
- The auto pilot is suitable to work in conjunction with:
 - gyro compass
 - steering system
 - steering gear

The auto pilot complete with:

- built-in off course alarm with input from the heading sensor of the magnetic compass
- for interfaces, see electric steering system
- Power supply: 24 V - DC

E6. TELEGRAPH REMOTE CONTROL SYSTEM

- The controllable pitch propellers are electrically remote controlled from the wheel house.
- For emergency purpose an electric emergency telegraph installation links the navigation control console with the control position of each main diesel engine/controllable pitch propeller in the engine room.
- To achieve the above mentioned systems a combined telegraph/remote control system is installed, so that both the remote control system and the telegraph system are operated by one and the same lever.

- The system, make KW ANT CONTROLS, consists of:
 - for mounting in navigation control console:
 - for each propulsion system:
 - control unit with control lever moving into the same direction as the vessel is to sail
 - Further the control unit will be provided with:
 - engine telegraph system - pointer indication - of respective propulsion system
 - transmitter potentiometer for remote control system of respective propulsion system
 - adjustable friction device and palpable zero-stop
 - buzzer for audible telegraph system
 - dial illumination with dimming switch
 - push button/signal lamp - finished with engine - push button signal lamp - engine stand-by
 - selector switch - emergency telegraph system - on/off
- for mounting in each auxiliary navigation control console:
 - for each propulsion system:
 - control unit in the same execution as described for the wheel house control unit, however excluding the telegraph system
 - for mounting in/on each control panel near the control position of each main diesel engine/controllable pitch propeller installation in the engine room:
 - 1 receiver/transmitter - square 144 mm; the instrument executed with:
 - 11 telegraph orders
 - order selector switch
 - 1 loud sounding gong for audible telegraph alarm
 - interface with voyage data recorder (VDR)
 - Power supply: 24 V - DC

E7. VOYAGE DATA RECORDER (VDR)

A Voyage Data Recorder (VDR), make ALPHA TRON - type Alphadata, will be installed; comprising:

- recording control unit
- protective capsule

The required input data will be derived from the several items as specified in this Technical Specification; like:

- gyro compass
- steering system
- rudder position indicating system
- auto pilot

- telegraph/remote control system
- automatic identification system (AIS)
- bridge audio system
- navigation echo-sounding equipment
- water track speed log
- each radar
- global positioning system (GPS) for navigation purposes
- wind measuring system
- each VHF of the GMDSS system
- electronic chart display and information system (ECDIS)
- control system watertight doors
- engine room alarm and monitoring system
- extended and/or adapted as required by the Regulatory Bodies
- RTK GPS

Power supply: 24 V - DC

E8. AUTOMATIC IDENTIFICATION SYSTEM (AIS)

An Automatic Identification System (AIS), make JRC - type JHS-182, will be installed; comprising:

- AIS control/display unit with pilot plug; fitted in the navigation control console
- AIS antenna unit with connection box
- power supply unit 230 V-AC / 24 V-DC with automatic change over interface with:
 - gyro compass
 - voyage data recorder
 - each radar
 - global positioning system (GPS) for navigation purposes
 - electronic chart display and information system (ECDIS)

E9. SHIP SECURITY ALERT SYSTEM (SSAS)

The Ship Security Alert System (SSAS) is integrated in one of the INMARSAT-C satellite communication systems of the radio communication and safety equipment (GMDSS) as described below.

E10. NAVIGATION ECHO-SOUNDING EQUIPMENT

The navigation echo-sounding equipment with depth alarm, make JRC - type JFE-380, consists of:

- display control unit including digital depth indicator, fitted in the 19" instruments rack in the wheelhouse

-
- transducer junction box
 - 200 kHz transducer with hull fitting, mounted in the ship's bottom
 - digital repeater, fitted in the navigation control console
 - interface with:
 - voyage data recorder (VDR)
 - electronic chart display and information system (ECDIS)
 - Dredged Track Presentation System (DTPS)

Selectable scale ranges:

- 0 _ 10m
- 0 - 20m
- 0 - 50m
- 0 _ 100m
- 0 - 200m
- 0 - 500m
- 0 - 800m

Power supply: 230 V - AC

E11. WATER TRACK SPEED LOG

- The single-axis water track log, make JRC - type JLN-205, consists of:
 - display control unit, fitted in the navigation control console
 - data distributor signal processor
 - retractable transducer with hull fitting and valve, mounted in the ship's bottom
 - interface with:
 - voyage data recorder (VDR)
 - each radar
 - electronic chart display and information system (ECDIS)

Power supply: 230 V - AC

E12. RADAR INSTALLATIONS

The following equipment is installed:

- A) One 3 cm (9 GHz) true motion ARPA radar installation, make JRC - type JMA-5310-6 ATA, consisting of:
 - 18.1" colour TFT daylight viewing high resolution display unit with an effective radar picture of 250 mm
 - Range scale: 0.125 - 96 nautical miles.

- 10 kW X-band transceiver, enclosed in antenna unit
 - 6 ft antenna unit
 - performance monitor
 - inter switch
 - interface with:
 - gyro compass
 - voyage data recorder (VDR)
 - water track speed log
 - automatic identification system CAIS)
 - global positioning system (GPS) for navigation purposes
 - electronic chart display and information system (ECDIS) for ARPA targets only
 - power supply unit 230 V-AC/24 V-DC
- B) One 10 cm (3 GHz) true motion ARPA radar installation, make JRC - type JMA-5330-I2, consisting of:
- 18.1" colour TFT daylight viewing high resolution display unit with an effective radar picture of 250 mm
 - Range scale: 0.125 - 96 nautical miles.
 - 30 kW S-band transceiver, enclosed in antenna unit
 - 12 ft antenna unit
 - performance monitor
 - inter switch
 - interface with:
 - gyro compass
 - voyage data recorder (VDR)
 - water track speed log
 - automatic identification system (AIS)
 - global positioning system (GPS) for navigation purposes
 - electronic chart display and information system (ECDIS) for ARPA targets only

Power supply: 230 V - AC

E13. DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) FOR NAVIGATION PURPOSES

The global positioning system, make JRC - type NWZ 4570, comprises:

- display unit, fitted on the chart table
 - active DGPS antenna/receiver unit

- power supply unit 230 V -AC / 24 V -DC with automatic change over
- interface with:
 - gyro compass
 - voyage data recorder (VDR)
 - automatic identification system (AIS)
 - each radar
 - all VHF DSC and channel 70 watch keeping receivers
 - MF/HF DSC controllers
 - satellite communication system(s) for GMDSS system
 - electronic chart display and information system (ECDIS)
 - Dredged Track Presentation System (DTPS)
 - Compatible with RTK base station signals

E14. WIND MEASURING SYSTEM

- The wind measuring system, make OBSERMET - type Obsermet OMC 139, consists of:
 - combined wind speed and wind direction sensor
 - combined wind speed and wind direction display unit, square 144 mm, fitted in the navigation control console interface with:
 - voyage data recorder (VDR)
 - electronic chart display and information system (ECDIS)
 - Dredging Control System (DCS)

Power supply: 230V - AC

E15. RADIO COMMUNICATION AND SAFETY EQUIPMENT (GMDSS - A3)

The complete equipment shall fulfill the requirements of GMDSS for Navigation Area A3.

The equipment will be mounted in the wheel house and shall comprise the following equipment:

- A) Two 25 Watt simplex/semi duplex VHF radio telephones, make THRANE & THRANEtype Sailor RT 5022, each comprising:

- transceiver unit
- transceiver control unit, complete with:
 - DSC modem with channel 70 watch keeping receiver - built-in loudspeaker
 - handset in holder
- two whip antennas
- power supply unit 230V-AC/24V-DC with automatic change over
- interface with:
 - voyage data recorder
 - global positioning system (DGPS) for navigation purposes

Note:

- one of the units is installed in the navigation control console

B) One MF/HF radio telephone, make THRANE & THRANE - type Sailor System 5000, comprising:

- transceiver unit, output 150 Watt PEP
- transceiver control unit, complete with:
 - DSC modem
 - DSC watch keeping receiver
 - handset in holder
- external loudspeaker
- antenna tuning unit
- whip antennas
- remaining antenna materials
- power supply unit 230V-AC/24V-DC with automatic change-over interface with:
 - global positioning system (DGPS) for navigation purposes

C) Two INMARSAT-C satellite communication systems; make THRANE & THRANE - type Sailor TT -3000E Mini-C, each comprising:

- transceiver unit
- data terminal with keyboard
- printer
- distress alert button
- antenna
- interface with global positioning system (GPS) for navigation purposes

- power supply unit 230V -ACI24V -DC with automatic change over

The system incorporates an EGC (Enhanced Group Call) function to receive the SAFETY and FLEETNET service.

Note:

- one of the units is extended with a Ship Security Alert System (SSAS) add-on kit; comprising:
 - two alert push buttons
 - test push button
- D) One navtex receiver, make JRC - type NCR-333, comprising:
 - processor/display unit
 - whip antenna
 - Power supply: 24 V - DC
- E) Emergency power supply for the above-mentioned items, comprising:
 - 24 V-DC lead acid battery with battery box
 - battery charger – AC/DC power supply
 - the necessary distribution boxes
- F) GMDSS communication console with ancillary equipment, including emergency lighting
- G) One Emergency Position Indicating Radio Beacon (EPIRB), make McMURDO - type E5; complete with release mechanism and cover
- H) Two Search And Rescue Radar Transponders (SART), make McMURDO - type S4; each complete with mounting bracket
- I) Three two-way portable watertight GMDSS VHF transceivers, make THRANE & THRANE
 - type Sailor SP3520; each comprising:
 - transceiver
 - re-chargeable Li-Ion battery
 - emergency GMDSS battery pack
 - charger with adapter

E16. INMARSAT-FLEET BROADBAND SATELLITE COMMUNICATION SYSTEM

An INMARSAT-Fleet Broadband satellite communication system for voice, fax and high speed data using the "always on-line" capability will be installed.

The system, make THRANE & THRANE - type Sailor Fleet Broadband FBSOO, comprises: - antenna unit

- communication hub
- voice over IP (VoIP) handset in holder
- communication PC with keyboard - printer/facsimile
- interface with:
 - integrated communication system
 - Dredged Track Presentation System (DTPS)
- power supply unit 230V-AC/24V-DC

E17. ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS)

The ECDIS system - suitable for vector chart data as well as for raster chart data, make ALPHA TRON - type Alpha chart ECDIS, is capable of displaying all chart information necessary for a safe and efficient navigation of the vessel.

The system consists of the following:

- one intel core i9 - 3.0 GHz gen 12 (or better) computer, mounted in the navigation control console in the wheel house
- The PC complete with:
 - 1 Tb SSD
 - 32 Gb RAM
 - DVD/CD drive
 - 8 USB
 - software:
 - operating system - Windows
 - software package allowing the use of:
 - raster chart data; as Admiralty Raster Chart Service (ARCS) and other Hydrographic Chart Raster Format (HCRF) complying formats
 - vector formats; as International Hydrographical Organization (IRO) S57, C-MAP CM93 and *DNCNPF*
 - uninterrupted power supply unit (UPS) with a capacity for a transitional time of 10 minutes

For control of the PC:

- in the navigation control console:
 - 19" TFT/LED colour display
 - membrane type keyboard
 - tracker ball mouse

- interface with:
 - gyro compass
 - voyage data recorder (VDR)
 - automatic identification system (AIS)
 - navigation echo-sounding equipment
 - water track speed log
 - each radar - for targets only
 - global positioning system (DGPS) for navigation purposes
 - wind measuring system
 - Dredged Track Presentation System (DTPS)

Power supply: 230 V - AC

E18. INTEGRATED COMMUNICATION SYSTEM

An integrated communication system, make ALPHATRON or equal, is installed for:

- automatic telephones
- general emergency alarm - see Section M
- public address

The system mainly consists of:

- exchange unit, fitted in the converter room, with interface with:
- Inmarsat-Fleet Broadband system
Power supply: 24 V - DC
- control unit of general emergency alarm system; fitted in the navigation control console in the wheelhouse
- control unit of public address system; fitted in the navigation control console in the wheel house giving an audible signal via loudspeakers, sirens, bells, etc.
- 30 telephone extensions, the location of which has still to be selected. Priority is provided for the following telephone stations:
 - navigation control console
 - captain's cabin

- chief engineer's cabin
- watch cabin
- engine room
- All cabins

Telephone stations of the push button type are of the:

- flush mounted type in control consoles
- wall mounted in:
 - cabins
 - each mess-room
- WT bulkhead mounted type inion: -
 - galley
 - forecastle deck in WT box
 - aft deck in WT box

- WT bulkhead mounted type with headset in acoustic booth in:
 - engine room
 - emergency generator room
 - steering gear room
 - hydraulic room
 - technical space

Telephone stations in technical spaces are provided with an external signal.

This signal is connected to a relays box to which the lighting columns, rotating beam lights and signal horns of engine room alarm and monitoring system are connected.

E19. HOSPITAL CALL SYSTEM

A hospital call system is installed in accordance with the requirements of the Regulatory Bodies.

Power supply: 24 V - DC

E20. REFRIGERATOR ALARM SYSTEM

A refrigerator alarm system for the refrigerated provision storeroom is installed in accordance with the requirements of the Regulatory Bodies.

Power supply: 24 V - DC

E21. NAVIGATION LIGHTS

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

The following navigation lights in dual electric execution are provided:

- 2 masthead lights, white
- 2 sidelights, one red and one green
- 1 sternlight, white
- 2 anchor lights, white

The navigation lights are fed by two separate power supplies:

- 230 V - AC for main lighting
- 230 V - AC for emergency lighting

The lights are controlled from the navigation control console in the wheelhouse.

E22. DREDGING LIGHTS

The following dredging lights as well as the lights for vessel "not under command" (NUC) and "restricted in maneuverability" (RIM) are provided:

- 4 all-round dredging lights in dual electric execution - two at each side of the vessel - each lamp provided with one red and one green inner glass
- 4 red all-round NUC (alternative RIM) lights, two at each side of the mast
- 2 white all-round RIM lights, one at each side of the mast

Power supply: 230 V - AC.

The lights are controlled from the navigation control console in the wheel house.

E23. DAY SIGNALS

The following shapes are provided as day signals to indicate the obstruction/passing side of the vessel; the vessel is not under command, restricted in maneuverability, at anchor and aground respectively:

- seven black balls
- five black diamonds

The necessary halyards etc. for hoisting of the shapes are provided.

E24. DAYLIGHT SIGNALLING LAMP (ALDIS)

A long range daylight signaling lamp is supplied, complete with sighting telescope, portable battery box with feeding cable and a transformer/rectifier for power supply from the ship's main supply via a connection box at each bridge wing.

E25. WHISTLE

The air whistle of the diaphragm type and fed from the compressed air system consists of:

- air whistle, make ZOELLNER, with thermostatically controlled electric heating and solenoid operated valve

The air whistle is mounted on the wheel house top deck.

- automatic control unit, make ZOELLNER - type 5 + S, fitted in the navigation control console

Power supply: 230 V - AC /24 V - DC.

The whistle can also be controlled by means of push buttons fitted in the navigation control console as well as in each auxiliary navigation control console in the wheel house.

E26. SEARCHLIGHT

One searchlight with a 1000 W halogen lamp is mounted on the wheel house top deck and handoperated from inside the wheel house.

E27. WINDOW WIPERS

Five straight line window wipers are fitted; the location of which has still to be selected.

Each window wiper is provided with:

- thermostatically controlled heating
- variable speed drive
- spray wash facilities fed from the domestic freshwater pressure system
- control unit in the respective control console

Power supply: 230 V - AC

E28. CLOCKS

Ten battery operated clocks with 6" dial are provided, the location of the clocks has still to be selected.

The clock in the wheel house is equipped with red marked wireless silence period sectors and a large sweep seconds-hand.

E29. TELEVISION AND BROADCAST CENTRAL ANTENNA SYSTEM

The TV-AM-FM central antenna system comprises:

- an omni-directional TVIFM antenna with built-in aerial amplifier an omni-directional AM antenna
- over-voltage protectors
- head-end amplifier / power supply unit the necessary splitters
- the necessary repeater amplifiers
- combined broadcast / TV connection box in:
 - each cabin
 - each mess-room
 - Power supply: 230V - AC

SECTION F - INVENTORY

F1. BOATSWAIN'S INVENTORY

General outfit:

- 2 x 15 m nylon deck wash hoses with nozzle and coupling, diameter 2"
- 1 pilot ladder with one spreader, length approx. 5 m

F2. NAUTICAL INVENTORY

- battery operated quartz chronometer
- 1 aneroid barometer
- clinometers
- 1 micrometer sextant
- 2 pairs of prism binoculars 7 x 50
- 1 parallel ruler 16"
- 2 pairs of chart dividers
- 2 national flags
- 1 Purchaser's flag
- 1 full set of signal flags
- 1 International Code of Signals book
- 1 illustrated table describing the life-saving signals
- 1 International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual
- 1 bronze fog bell 300 mm, with engraved vessels name and year of construction
-

F3. GALLEY INVENTORY

Galley to be furnished with:

- 1 stainless steel pan 25 litres
- 2 stainless steel pans 9 litres
- 2 stainless steel pans 5 litres
- 2 stainless steel kettles 10 litres
- 2 fish frying pans 15"
- 2 stainless steel stow pans and covers 13 litres
- 2 wire baskets 28 cm
- 1 colander for rice 50 cm
- 2 sugar dredgers
- 2 flour dredgers

- 2 aluminium dippers
- 2 fish slicers
- 1 galley water can, 5 litres, stainless steel
- 2 toasting forks with wooden handle
- 2 meat forks, stainless steel 35 em
- 3 potato peel knives
- 2 rice pudding tins
- 2 rolling pins with bearings 35 em
- 6 round pots and covers, stainless steel, 7 litres
- 2 large baking pans, stainless steel 52 x 42 x 10
- 2 cook's forks, stainless steel
- 1 wire sieve 40 cm
- 2 galley forks, stainless steel 50 cm
- 2 chopping boards 24" x 18" x 2"
- 2 choppers 9"
- 2 vegetable knives
- 2 mincing knives
- 2 soup ladles
- 2 salt boxes
- 3 spoons, stainless steel
- 3 wooden spoons, one each 2 x 35, 2 x 40, 2 x 50
- 1 butcher's knife 10"
- 1 cork screw
- 1 cooks' axe 7"
- 1 cook's steel
- 1 meat saw 18"
- 2 tin openers
- 2 pairs of scissors for fish
- 2 banister brushes
- 2 buckets, plastic
- 3 hand scrubbers
- 2 coir brooms and handles

F4. MESS ROOM AND PANTRY INVENTORY

For officers' mess room and pantry:

- 1 milk can 1 litre, stainless steel
- 1 filler, enameled, 2 litres with measure
- 1 stainless steel basin, 5.5 litres, round
- 1 tea pot, stainless steel
- 1 coffee pot, stainless steel
- 1 ham knife
- 1 bread knife
- 1 pail, galvanized
- 2 tin openers
- 2 cork screws
- 2 bottle openers
- 1 crumb brush and tray, plastic
- 1 tray
- 1 sugar basin, stainless steel
- 8 table spoons
- 8 dessert spoons
- 8 tea spoons
- 8 egg spoons
- 8 table forks
- 8 dessert forks 8 -table knives
- 1 pair of carvers, stainless steel - 8 fish knives and forks
- 1 pepper pot
- 1 mustard pot and spoon 1 salt pot and spoon
- 1 soup ladle
- 1 sauce ladle
- 1 sugar spoon
- 1 pickle fork
- 1 toast rack (5 bars)
- 1 pair of sugar tongs
- 8 stoneware soup plates
- 8 stoneware pudding plates
- 8 stoneware dinner plates
- 8 stoneware breakfast plates
- 8 plastic egg cups

- 8 breakfast cups and saucers
- 8 coffee cups and saucers
- 1 stainless steel soup tureen
- 1 stainless steel small water jug 25 cl.
- 1 stainless steel sauce tureen
- 1 stainless steel large meat dish
- 1 stainless steel small meat dish
- 1 stainless steel vegetable dish without cover
- 1 fireproof dish
- 1 stainless steel pudding basin
- 1 cheese dish
- 1 butter dish, stainless steel
- 1 marmalade dish
- 8 drinking glasses
- 1 hair broom and handle
- 1 scrubbing brush

For crew's mess room and pantry:

- 2 milk cans, stainless steel
- 2 tin fillers, plastic
- 2 tin basins, diameter 36 em plastic
- 2 tea pots
- 2 coffee pots
- 2 ham knives
- 2 bread knives
- 3 tin openers
- 3 cork screws
- 3 bottle openers
- 3 sugar basins
- 3 sugar spoons
- 12 table forks
- 12 table knives
- 12 tablespoons
- 12 stoneware soup plates
- 12 stoneware dinner plates
- 12 stoneware breakfast plates
- 12 strong large mugs
- 12 drinking glasses

- 2 soup spoons
- 2 potato spoons
- 2 vegetable spoons
- 2 sauce spoons
- 12 teaspoons
- 2 pepper, salt, mustard sets
- 2 pails, galvanized
- 2 butter dishes, stainless steel
- 1 crumb brush and tray
- 1 hair broom with handle
- 1 scrubbing brush

F5. BEDDING AND LINEN

All bedding and linen to comply with SOLAS requirements.

- 18 spring mattresses
- 36 mattress covers
- 18 foam rubber pillows
- 36 pillow cases
- 36 white sheets
- 36 fitted sheets
- 36 woolen blankets
- 6 table covers
- 36 bath towels
- 36 linen towels
- 5 kitchen towels
- 5 tea towels
- 20 linen napkins

Hospital:

- 1 spring mattress
- 2 mattress covers
- 1 foam rubber pillow
- 2 pillow cases
- 4 white sheets

Transnet National Ports Authority

Tender Number: TNPA/2023/11/0021/50266/RFP

Tender Description: Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.



- 4 fitted sheets
- 2 woolen blankets
- 2 bath towels
- 2 linen towels

F6. ENGINE ROOM INVENTORY

Any modification or extension shall be governed by the relevant clauses of the contract.

- 1 thread cutting set HSS M5 - M24 in box
- 1 thread cutting set, LIR BSP 3/8" - 5/4" ; in box
- 5 thermometers, copper, with eye
- 1 tank sounding tape, 20 m with weight 1 set vice jaws, nylon, ISO mm
- 1 set vice jaws, copper, ISO mm
- 1 torque multiplier
- 1 torque wrench, max. 300 Nm
- 1 single end adjustable wrench 200 mm 1 single end adjustable wrench 250 mm
- 1 single end adjustable wrench 350 mm
- 1 set socket wrenches, with ratchet in box M8-M22
- 1 set double ended jaw spanners 9x11, 11x14, 14x17, 17x22, 22x27, 27x32, 32x36, 36x41, 41x46, 46x50
- 1 set double ended ring spanners, 9x11, 11x14, 14x17, 17x22, 22x27, 27x32, 32x36
- 1 striking face jaw spanner for M36
- 1 striking face box spanner for M36
- 1 set of "Allen" Hex keys (17 pes.) 1.5 - 24 mm hexagonal
- 1 set open ring spanners 14x15, 14x17, 19x22, 24x27, 30x32
- 4 assorted screw drivers 5-10 mm
- 4 assorted Philips's type screw drivers
- 1 ratchet drill (breast brace) max. 10 mm.
- 1 set of HSS steel drills (26 pes.) 0.5-13 mm
- 1 set ward files
- 12 assorted files with handles, 3 each with a length of 150-200-250-300 mm
- 1 file cleaning brush
- 1 whetstone, fine
- 1 whetstone, coarse
- 3 rolls emery cloth 50 mm
- 1 tube grinding paste, coarse
- 1 tube grinding paste, fine
- 1 bench hammer, soft nose 500 g
- 1 bench hammer, sharp nose 500 g
- 1 hammer, 500 g
- 1 hammer, 1 kg
- 1 hammer, 3 kg
- 1 copper hammer, 1 kg

-
- 1 lead hammer, 2 kg
 - 1 rubber hammer
 - 1 plastic hammer
 - 3 cold chisels 150-200-250 mm
 - 1 bearing scraper, spiral
 - 1 bearing scraper, triangular
 - 2 oil groove chisels, cross out
 - 2 oil groove chisels, round nose
 - 2 oil groove chisels, flat
 - 1 pair of light metal shears
 - 1 pair of industrial heavy duty shears
 - 1 pair of electrician's scissors
 - 2 punches
 - 2 drifts, one of 3 mm and one of 5 mm
 - 2 pair of water pump pliers, 250 mm
 - 2 pair of engineer's combination pliers, heavy type, 165 and 185 mm
 - 2 pair of tower pincers 180-250 mm
 - 1 pair of side cutting pliers 165 mm
 - 1 pair of round nose pliers 200 mm
 - 1 pair of flat nose pliers 200 mm
 - 1 hacksaw
 - 12 saw blades, 300 mm
 - 1 packing knife
 - 1 packing cutter, max. 300 mm diameter
 - 7 hole cutters 8-10-12-16-20-24-28 mm
 - 1 pair of dividers 250 mm
 - 1 pair of inside calipers 250 mm
 - 1 pair of outside calipers 250 mm
 - 1 surface plate 500 x 500 mm
 - 1 try square 150 mm
 - 1 try square 300 mm
 - 1 measuring tape, length 1 m
 - 1 steel rule 300 mm
 - 1 screw pitch table
 - 1 screw pitch gauge, metric
 - 1 feeler gauge set 100 mm
 - 1 feeler gauge set 250 mm
 - 1 steel straight edge, 1 m
 - 1 Vernier caliper gauge 200 mm

- 1 Vernier caliper gauge 300 mm
- 1 crank shaft dial indicator
- 1 drum pump
- 4 pump oilers 0.5 litre.
- 1 funnel with filter, 15 cm
- 1 funnel with filter, 25 cm
- 2 drip trays, 500 x 500 mm
- 1 litre measure
- 2 grease guns with hose and connections
- 1 extension piece N-23 for grease gun
- 1 adjustable drum carrier
- 1 drum hoisting sling
- 2 wire brushes 3 rows
- 2 boiler clamps, 120 mm
- 2 boiler clamps, 100 mm
- 2 screw clamps
- 1 crowbar, 1 m.
- 6 assorted eye bolts range M10 – M27
- 6 assorted eye nuts range M10 - M27
- 2 web belt slings, 500 kg SWL
- 2 web belt slings, 1000 kg SWL
- 1 hoisting sling (steel wire rope) 1000 kg SWL, length 1 m
- 1 hoisting sling (steel wire rope) 1000 kg SWL, length 3 m
- 2 hoisting slings (steel wire rope) 2000 kg SWL
- 2 hoisting slings (steel wire rope) 5000 kg SWL
- 10 D-shackles, assorted
- assorted bolts and nuts
- 1 box assorted Seeger rings
- 1 pair of curved needle nose pliers
- 1 box assorted "O"-rings
- 1 vice grip wrench Swedish type, 345 mm
- 1 pipe die
- 10 flashlights

Electrician's tools:

- 1 pair of engineer's combination pliers, 200 mm, insulated
- 1 pair of engineer's combination pliers, 150 mm, insulated
- 3 stones for collectors
- 1 acid meter
- 25 litres distilled water
- 5 assorted screw drivers 3-6 mm, insulated
- 1 "Megger" insulation tester (MEG-OH1\t1-Meter)
- 1 "Duspol" voltage indicator
- 1 Amprobe 0-60A, 0-100A, 0-150A, 0-300A, 600 V-AC
- 1 Multitester in handbag
- 1 Loop calibrator in handbag
- 1 pair of rubber gloves
- 1 can electrical solvent cleaner 20 litres
- 1 set of open jaw spanners, range 6 - 22 mm, make Gedore
- 1 wire stripper 69 mm
- 1 electric soldering iron 300 W
- 1 solder
- 1 soldering gun 100 W
- 1 electric mains tester (screw driver)
- 1 pair of end cutting nippers 160 mm
- 1 pair of side cutting pliers 160 mm
- 1 Linesman's knife
- 1 pair of round nose pliers (insulated) 140 mm
- 1 sparking free flashlight
- 6 batteries for flashlight

SECTION G - AIR CONDITIONING, HEATING AND VENTILATION

G1. GENERAL DESIGN CONDITIONS

The capacity of the systems are based on the following data:

Design conditions for winter period:

The capacity of the heating systems is sufficient to maintain the temperatures at:

an outside temperature of	5 °C
a relative wind speed of	10 mls
a sea water temperature of	10°C

Design conditions for air conditioning system for accommodation spaces:

The capacity of the cooling installation for the air conditioning system for the accommodation spaces is based on the following conditions:

- outside plus 35 °C -70% R.H. or 32°C - 80% R.H.
- inside plus 25°C - 50% R.H.
- fresh cooling water temperature 38°C

The air conditioning plant for accommodation spaces is designed for 50% return air to be used under the most extreme conditions.

The number of air changes per hour for the air conditioned spaces are based on the transmission heat loss in winter time and the heat load in summer time

Under all circumstances; from the total capacity of air supplied to cabins and mess rooms, a minimum of fresh air of 30 m³/h per person will be supplied to cabins and a minimum of fresh air of 20 m³/h per person to mess rooms.

For further design and calculations the following ISO standard will be followed:

ISO 7547:2002(E) - Ships and marine technology - Air conditioning and ventilation of accommodation spaces.

Design conditions for air conditioning system for watch cabin:

The capacity of the cooling installation for the air conditioning system for the watch cabin is to get a temperature in compliance with regulations for marine personnel and to ensure longevity of electronic equipment inside.

G2. AIR CONDITIONING

Unit AC serving accommodation spaces:

This air conditioning plant is of the single pipe type.

The central unit of the plant is situated in the air conditioning room.

The plant consists mainly of the following components:

- air intake and mixing section with air filters
- high pressure centrifugal fan, V -belt driven by an electric motor
- electric heating section
- air cooler for direct expansion of Freon R407C including thermostatic expansion valve
- air discharge box to which the air supply ducts are connected

The refrigerating plant consists of a Freon R407C installation with electrically driven open compressor with fully automatic control, condenser with built-in receiver, dryer and oil separator.

The compressor is mounted on a common base frame with resilient mountings and fitted with flexible connections.

The condenser is cooled by means of the LT auxiliary cooling water system; see Section O.

Air distribution takes place by means of vapor sealed pre-insulated spiral spun galvanized steel pipes and rectangular ducts.

The ducts are mounted behind the paneling in such a way, that free expansion is possible. Each air conditioned room is provided with one or more outlets, having individual manual temperature control by means of regulating the air quantity.

The air conditioned spaces have natural exhaust through door gratings to the adjoining alleyways.

Heated air can be blown along the windows of the wheel house to avoid condensation.

The supply line to the wheel house is provided with an electric re-heater section during night operations.

Unit AC, serving the galley:

This air conditioning plant is of the single pipe type.

The unit of the plant is situated in the air conditioning room.

The plant consists mainly of the following components:

- air intake and mixing section with air filters

- high pressure centrifugal fan, V -belt driven by an electric motor
- electric heating section
- air cooler for direct expansion of Freon R407C including thermostatic expansion valve

Note:

The air cooler will be served by the cooling system as mentioned above. air discharge box to which the air supply ducts are connected.

Unit AC, serving watch cabin:

The watch cabin is provided with its own split unit air conditioning unit to get a suitable temperature in the cabin and will be a self-contained unit. The unit is placed inside the watch cabin and shall include a mounted remote.

G3. HEATING SYSTEM

A heating system is only provided for the accommodation spaces in the deck house. Electric air heaters are provided in the air conditioning unit.

G4. MECHANICAL VENTILATION SYSTEMS

Each exhaust or supply system consists mainly of:

- one axial flow fan or
- one centrifugal fan with vibration dampers and flexible connections
- supply grills of the lockable and adjustable type
- fixed exhaust grills
- galvanized rectangular ducts or round spiral ducts complete with suspensions

Sheet thickness related to the following dimensions of ducts:

- not-insulated spirally wound spiral ducts pipes : 0.6 mm
- pre-insulated spirally wound spiral ducts pipes : inner and outer duct 0.6 mm;
insulation 15 mm
- rectangular ducts :up to 350 mm;0.75 mm
- 350 - 800 mm;1.00 mm
- above 800 mm;1.25 mm

The exhaust fans of galley and sanitary spaces have such capacities, that the excess air of cabins and mess room will be exhausted by these fans, to avoid entering of smells into these spaces.

A stainless steel canopy with grease filters is provided over the galley range.

The ventilation air is distributed over the engine room and other spaces in such a way, that no hotspots or accumulation of oil moisture will occur and the relevant diesel engines, generators, motors, etc. are provided with sufficient air supply.

As far as not mentioned otherwise the compartments or spaces ventilated by exhaust systems only are supplied by air through adjoining alleyways.

Hand-operated fire valves, with open/closed indication, are fitted in the ventilation openings. An emergency stop of the engine room fans is fitted at the outside of the engine room entrance.

Engine room exhaust will be naturally by means of the funnel.

All fans in accommodation deckhouse are flexibly mounted and flexibly connected to the relevant air ducts in order to reduce noise.

G5. NATURAL VENTILATION

Spaces, not connected to the mechanical ventilation or air conditioning system are naturally ventilated by means of gooseneck or mushroom type ventilating shafts.

G6. AIR INLET MIST ELIMINATORS

To make aspiring of moisture or drops of water as low as possible, air inlet mist eliminators of sea water resistant aluminum type are provided for the air conditioning systems and all mechanical ventilation supply systems.

Air speed through gross width of mist eliminator will be 5 m/s.

SECTION H - HOPPER

H1. GENERAL

The hopper has a capacity as mentioned in Section A.

Along the entire hopper coaming a splash screen of 1.00 m height is provided.

At the extreme forward and aft ends of the hopper, the splash screen is of increased height to prevent splashing and spilling during loading when the ship pitches.

The hopper is provided with an environmentally complaint overflow duct.

The hopper design affords optimal settling and dumping of the spoil, athwart brackets in the longitudinal flow being cut out as far as possible.

The hopper is discharged through hydraulically operated bottom doors, arranged in one row at the centre line. Beside the bottom valves buoyancy compartments are located with adequately protected sloped walls in order to promote optimum discharge of the spoil.

A hopper diluting system is installed, fed by the jet water pumps, capable of diluting the hopper load at selected hopper spaces to facilitate removal of the spoil.

This system is described below.

H2. BOTTOM DUMPING SYSTEM

General:

5 bottom doors are installed for dumping the spoil. As stated above, improved proposals for bottom dumping system (in accordance with the requirements) may be considered.

Bottom doors are operated by a hydraulic cylinder, remote controlled from the wheel house. For the hydraulic installation, see Section P.

Seals:

Sealing of the doors against the hull will be by renewable rubber seals. The seal is fitted with a steel belt around the edge of the door/hull opening and shall also be able to be changed while the vessel is afloat (if possible within the design).

The rubber material is seawater resistant and suitable for tropical conditions.

The rubber seal performs a double function, viz.:

- in loaded condition : preventing loss of spoil from the hopper
- in light draught condition : preventing entrance of sea water into the hopper

Hydraulic cylinders:

The hydraulic cylinder should have an adequate effective stroke and is provided with a front flange connection. A spare stroke of 0.20 m is provided.

For materials of the hydraulic cylinders, see Section P.

Hydraulic oil supply:

Oil for the hydraulic cylinders is supplied by the hydraulic system as described in Section P.

Remote control:

The hydraulic bottom door cylinders are controlled from the wheel house, see Section L. A limit switch for remote signaling "bottom door closed" is fitted for each bottom door.

A signal lamp indicating the open or closed position of each group of bottom door is mounted in the wheel house.

H3. HOPPER SOUNDING EQUIPMENT

For measuring the level of the hopper load, 5 hand-operated sounding winches are fitted on top of the hopper coaming.

The winches are mounted on top of a sounding pipe of 200 x 8 mm.
The winches are provided with calibrated sounding line and sounding weight and are manually operated.
Remote measuring of the hopper level is provided as described in Section L.

SECTION – I

DREDGING INSTALLATION

I1. JET WATER PUMP

One jet water pump of the non-self-priming, centrifugal type is installed serving the hopper diluting system, and the submersible pump unit.
Furthermore, the jet water pump will be used to fill the fore peak trim tank.
Pump, requires a capacity of at least 145 m³/h at a pressure of 8 bar.

I2. FILLING AND EMPTYING OF FORE/AFT PEAK TANK

The forepeak tank is arranged as trim tank, to be filled by means of the jet water pump, in order to reduce the vessel's trim in light ship condition or partly loaded condition.
The discharge system of the jet water pumps is provided with a branch pipe to the forepeak tank, fitted with a hydraulically operated butterfly valve, the bottom of the tank is situated just above the light waterline.
Emptying of the tank will be by means of opening of the hydraulically operated butterfly valve of 350 mm diameter in the draining pipe between tank and ship's bottom as well as via a pump to enable complete drainage for remainder of liquid below sea level.
All butterfly valves are remote controlled from the wheel house.

I3. EXCAVATOR AND PEDESTAL

An excavator of type Liebherr HS 8200 or equivalent (Where an equivalent is provided the *Supplier* must provide suitable evidence of ability to demonstrate local support in the event of breakdowns or servicing to the specific excavator mentioned and must ensure attendance to the vessel within a time period of 24 hours from notification or requirement from the *Purchaser*) which is of the marine specified type and compliant to the additional requirements of the *Purchaser* is to be installed, tested and commissioned. The excavator is to be designed to mitigate against the effects of operating in the harsh marine environment with cognizance that the vessel will be sailing in rough seas. The *Supplier* is to supply the excavator mounted on a suitably designed new pedestal meeting the minimum requirements as described in the table below:

<p>13.1 Marine Specified Excavator</p>	<p>Design, Manufacture, Supply, Installation and Commissioning of a marine excavator mounted on a suitable main deck pedestal on the grab hopper dredger and to conform to the following minimum parameters:</p> <ol style="list-style-type: none"> 1. The marine excavator shall be capable of lifting an 8m³ grab bucket filled with spoil of 2000kg/m³ at a minimum radius of 20m during dredging operations and reaching a depth of 0m - 25m referenced from the waterline. 2. The diesel engine of the marine excavator is to have power of minimum 750kW. 3. The marine excavator and associated sub-systems are to be prepared and painted in a protective coating/paint that is suitable for sea going applications, and is to be able to sustain occasional submersion. The paint specification and preparation of systems for the excavator shall be compliant for extreme exposure, in compliance with the international standard, and should have a lifespan of approximately 20 – 25 years. 4. The marine excavator sub-systems such as (but not limited to) the hydraulic, electrical, electronic, pneumatic, mechanical shall be designed/protected against sea going application/corrosion. Components such as (but not limited to) belly plates, to be made of fiberglass, and covers/storage tanks to be made of stainless steel and are to be incorporated into the marine excavator. A schedule with the specific marine modifications/requirements will be confirmed and submitted to the <i>Purchaser</i> for acceptance prior to the excavator being manufactured. A verification will also be completed prior to the excavator being shipped. 5. Strategically positioned cameras (e.g., main winches/wires) with operator cabin interface to be included in the marine excavator. As a minimum, these should cover positions for the main winches and wires. 6. The marine excavator shall include robust main winches of minimum 35-ton capacity with multiple speed operation and free fall capacity designed for use at sea. 7. The marine excavator shall include appropriate oil spill

	<p>prevention measures according to ISO 19354-2016 where this is applicable and possible in terms of the design.</p> <ol style="list-style-type: none"> 8. A complete tool kit required for daily operation, routine maintenance and fault finding is to be included in the supply of the marine excavator. 9. The marine excavator shall provide for self-assembly and include a full counterweight set for maximum working capacity. of lifting an 8m³ grab bucket filled with spoil of 2000kg/m³ at a minimum radius of 20m during dredging operations and reaching a depth of 0m - 25m referenced from the waterline. 10. The marine excavator shall include a cable management system for signals to be input into the GHD. All existing systems not part of the excavator and located in the existing cab are to be re-wired by the <i>Supplier</i> and included in the commissioning process. 11. The marine excavator shall include a complete boom assembly for required reach, including (but not limited to): <ul style="list-style-type: none"> • Boom A-frame • Boom back stops • Boom foot • Boom head, sheaves, carbon pendants • Fairlead block • Main boom sections of appropriate length • Boom section protectors • Walkways for head, foot and main booms with collapse railings • Catwalk for upper carriage 12. Factory Acceptance Testing (FAT) will be witnessed by the <i>Purchaser</i> representatives and accepted prior to the excavator being shipped. The <i>Supplier</i> acceptance protocols/schedules may be used and the specific requirements pertaining to marine compliance as accepted by the <i>Purchaser</i> will also need to be successfully demonstrated. 13. The marine excavator shall include a stand-alone fire suppression system approved by the class societies and which is able to be serviced within South Africa. 14. Compliance to class Bureau Veritas (BV)/South African Maritime Safety Authority (SAMSA) Durban requirements and applicable legislative requirements
--	--

<p>I3.2 Pedestal</p>	<p>Design, Manufacture, Supply, Installation and Commissioning of a suitable main deck pedestal on the grab hopper dredger and shall conform to the following minimum parameters:</p> <ol style="list-style-type: none"> 1. Design, manufacture, supply, installation and commissioning of new suitable main deck pedestal to accommodate slew ring gear and the marine excavator (for its intended purpose) in above mentioned item A over the lifespan (at a minimum) of the marine excavator. 2. The <i>Supplier</i> shall appoint a Naval Architect/Shipyard or similar for the design of the pedestal which shall conform to South African Maritime Safety Authority (SAMSA) Durban and/or Bureau Veritas (BV) requirements or any other such legislative requirements that may be applicable.
<p>I3.3 Application Packages</p>	<p>The following packages and features shall be included with the marine excavator as minimum parameters:</p> <ol style="list-style-type: none"> 1. Complete dredging interface package including dredging interface, dredging data recording and live excavator monitoring/teleservice with features such as (but not limited to); <ul style="list-style-type: none"> • Dredging grab open/close position • Grab dredging at preset level or depth • Prevention of slack rope • Automatic winch synchronization • Cycle counter • Remote monitoring application • Provision to input/output signals to/from the GHD dredge system. System Architecture Diagram (SAD) is included with the tender pack and the highlighted section on the drawing indicates the input/output signals that may be required. Refer drawing number D0106871 System Architecture Diagram. Note: Drawing shall not be distributed unless authority has been given by the <i>Purchaser</i>. • Live communication between GHD and marine excavator 2. Main winch contact roll 3. Three (3) ton tagline winch with Free fall

	<ol style="list-style-type: none"> 4. Working depth indication for winches 5. Central lubrication swing ring bearings 6. Central lubrication swing ring outside 7. Diesel refueling electric pump 8. Travelling supports for counterweight and marine excavator for inter-port voyages. 9. Rotation alarm/limit for maximum turns than can be handled by cable management system 10. Lockout for winch synchronisation bypass 11. Swing angle display
<p>I3.4 Safety Features</p>	<p>The following safety features/devices shall be included with the marine excavator as minimum parameters over and above the marine excavator standard safety features:</p> <ol style="list-style-type: none"> 1. Limiters for winches 2. Back up control system 3. Boom radius limit device 4. Load moment limit 5. Factory mode restricted access 6. Operator cabin armored glass (while maintaining normal glass appearance) or equivalent
<p>I3.5 Operators Comfort</p>	<p>The following operator comfort features shall be included with the marine excavator as minimum parameters over and above the marine excavator standard operator comfort features:</p> <ol style="list-style-type: none"> 1. Search/flood lights of South African standard and of sufficient Lux for working at night. Minimum quantity of at least six (6) 2. Cabin air-conditioner, appropriately sized for the size and operation. 3. The marine excavator shall be equipped with a larger cabin which shall accommodate additional equipment/interfaces such as UPS, cabin air-conditioner, dredging screens and server PC. Final layout of the cabin to be accepted by <i>Purchaser</i> prior to manufacture. 4. Additional noise and vibration reduction for the operator cabin 5. Must meet the requirements for Code of Safe Working Practice for Merchant Seafarers regarding noise, vibrations, lighting, etc 6. Protection grids fitted to the exterior of the front and right-side cabin windows in order to prevent window

	damage from foreign object impact.
I3.6 Documentation	The following documentation/drawings shall be included with the marine excavator as minimum parameters: <ol style="list-style-type: none"> 1. Operating manual three (3) off 2. Spare part catalogue three (3) off 3. Load capacity charts three (3) off 4. Detailed maintenance instruction schedule for duration of life of excavator three (3) off 5. Electronic copy of each of the above one (3) off 6. Detailed dimensions of the excavator and any other drawings/dimensions that may be required by the <i>Purchaser</i>.
I3.7 Spare Parts	The spare parts package shall cover those components as listed in Spare Parts List – Annexure A which is included with the tender documents.
I3.8 Warranty	The <i>Supplier</i> is to provide for a Defect Period of 24 months for all works done for the entire GHD and Spare parts as listed on Annexure A which is to be included in the proposal. The Defect Period shall commence after Delivery.

The pedestal is to be mounted in a position that allows over the bow dredging as well as either side of the vessel and provide adequate clearance to all deck structures. The conditions on the South African coast are to be considered when carrying out the design of the pedestal to cater for interport journeys and international journeys.

The excavator cab is to be extended/larger size to accommodate the additional dredging computers and monitors required for successfully monitoring and execution of dredging operations. In addition, counterweight should be included in order to ensure the minimum requirements are met. Safe access to the excavator cab is to be provided for from the deck level in the form of a staircase with railings.

The excavator is to be fitted with a rotational limiter and alarm of audio and visual nature.

A cable management system is to be incorporated in the turret to enable a minimum of four revolutions in the clockwise and anti-clockwise directions.

The excavator is to be provided with a dredging monitoring software from the OEM (which can be used as stand-alone) and which will also enable dredging at user defined levels at the sea bed (dredging level depth management) while also allowing remote monitoring. The excavator OEM should have local support for the equipment in the event of breakdowns and maintenance within South Africa.

I4. DISCHARGE PIPING AND VALVES

Discharge piping for a submersible dredge pump is to be installed under main hopper beams via hanger brackets. Valves for even loading to be included in the design at a safe position from falling debris. All piping and valves to be designed with protection from the falling debris.

SECTION J - CONTROL CONSOLES AND INSTRUMENTS

J1. GENERAL

The following are installed:

- in the wheel house:
 - navigation control console
 - dredging control console
 - 19" DCS instruments rack in the converter room
 - GMDSS communication console; see Section E
- control panels in engine room; one at the control position of each main diesel engine

Construction of control consoles:

The consoles with a frame of steel plates and profiles, are provided with removable panels on the front side and hinged top cover to give good access to the inside of the console.

The top cover is flat and has an inclination.

The console has a smooth surface and is provided with a storm rail. The frame and the panels are painted in standard colour.

The top plate on the cover is of opaque perspex, with glued on nameplates of opaque perspex with texts engraved underneath.

Engraved texts are painted:

- yellow fluorescent for control consoles in the wheel house
- white for control panels in engine room

The electric wiring is mounted in plastic tubes and connected to terminals.

The adjustable night lighting (dimming control) over the control consoles in the wheel house consists of UV lamps.

The instruments and texts are good visible at this lighting while it is not disturbing during night operations.

Indicators are executed as follows:

- unless specified otherwise, square 96 mm
- without internal lighting
- in wheel house : black scale, yellow fluorescent figures and pointer
- in engine room control panels : white scale, black figures and pointer
- glass with limited reflection

Remote indicators are of the electric type.

The control apparatus and special items, such as telephones, etc., are in standard execution of the manufacturer.

The signal lamps and push buttons; combined or not, are rectangular 24x48 mm.

The necessary push button switches / signal lamps for control console heating, dimmer devices and test push buttons for the night lighting and the signal lamps are provided.

J2. NAVIGATION CONTROL CONSOLE

A navigation control console is placed in the wheel house. The control console comprises for the following parts:

General

- control units of window wipers
- emergency stop accommodation fans
- radar display unit with ancillary equipment
- for engine room alarm system:
 - LCD indicating display unit with alphanumeric information
 - separately mounted alarm signal lamps as required by the Regulatory Bodies
- indicator for:
 - echo sounding equipment
 - water track speed log
 - wind speed and direction indicator
- remote control WT doors

Communication:

- automatic telephone set control unit:

- public address system
- general emergency alarm system
- engineers' alarm system
- bridge navigational watch alarm system
- for whistle control:
 - automatic control unit
 - push button - normal control
 - push button - emergency control
- GMDSS VHF control unit
- AIS control/display unit

Steering:

- for steering system:
 - PLC switching unit
 - steering lever unit with helm indication - FU steering
 - steering lever unit - NFU steering
 - steering mode selector switch - FUINFU/autopilot
 - for take over:
 - push button - take control
 - signal lamp - rudder in service
 - push button signal lamp - start/stop - each steering gear pump
 - alarm signal lamps for steering gear as required by the Regulatory Bodies
 - control unit autopilot:
 - indicator of:
 - magnetic compass
 - gyro compass
 - rudder position
 - display unit with ancillary equipment for:
 - ECDIS
 - DTPS

Propulsion:

- for each propulsion control system:
 - control unit with one lever for remote control and incorporated emergency telegraph system
 - selector switch - on/off emergency telegraph system
 - push button signal lamp:
 - finished with engine

- engine stand-by
- bridge control/take-over
- signal lamp:
 - bridge control
 - engine room control
- for each main diesel engine:
 - speed indicator
 - for each propeller clutch coupling: - push button/signal lamp - in
 - push button - out
 - push button - emergency out
- for bow thruster:
 - main switch
 - pitch controller
 - pitch indicator
 - ammeter electric motor
 - signal lamp :
 - running - electric motor
 - overload - electric motor

Hydraulic controls:

- push button - emergency stop hydraulic pumps
- push button - emergency closing:
 - suction inlet valve from outboard - jet pump
 - discharge valve jet water to pump

Power supply part:

This part of the navigation control console comprises the distribution for the following systems: - controls for:

- navigation lights
- dredging lights
- deck lighting
- nautical instruments

J3. 19" INSTRUMENTS RACK

A combined 19" instruments rack is installed in the wheel house; comprising:
- 19" racks of 15 HE modules; on top of which a wooden table top is mounted.

The following is fitted in or on the console: - display unit echo sounding equipment central panel of fire detection installation PC's with ancillary equipment for:

- Dredger Control System (DCS)
- Dredged Track Presentation System (DTPS)
- load recorder of draught and loading measuring system for:
- push button signal lamp - start
- push button - stop
- where applicable other instruments etc. can be fitted in this rack

J4. CONTROL PANELS ENGINE ROOM

In the engine room a control panel is fitted in the vicinity of the control position of each main diesel engine

Each panel comprises:

- for emergency telegraph system:
 - receiver/transmitter unit
 - gong for audible alarm
- for remote control system:
 - signal lamp - engine room control
 - signal lamp - bridge control
 - selector switch - engine room control / bridge control
- for propeller clutch coupling:
 - push button/signal lamp - in
 - push button - out
- for main diesel engine:
 - speed indicator
 - push buttons:
 - speed control
 - emergency stop
 - reset emergency stop
- control unit HT cooling water thermostatic control valve
- control unit LT cooling water thermostatic control valve
- a PLC (see Section N) is implemented with the following functions:
 - controls for diesel engine, clutches, etc. related to respective control systems
 - safety devices, interlocking, etc.
 - power management between major consumers as far as applicable
 - extended and/or adapted if required by the Regulatory Bodies

J5. DREDGING CONTROL SYSTEM (DCS)

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

The semi-integrated Dredging Control System (DCS) is based on independent programmable logic controllers (PLC's), which communicate with each other over a redundant network. The PLC system, based on ALLEN-BRADLEY - product range, monitors and controls the dredging functions and provides communication with a PC-based supervisory system. The PC-based supervisory system consists of two independent operating stations; each comprising a PC, operating keyboard and a display unit. The operating stations are connected to two (2) identical server PC's for redundancy operating purposes. The software package on the supervisory PC's will be designed and programmed in order to obtain optimum dredging supervisory.

Note: The *Supplier* must ensure that the systems of the DCS and the excavator dredging software are integrated for maximum accuracy while also having the ability to operate as standalone systems in the event of failure to the integrated system design.

Design:

The system provides service pages and diagnostic pages; arranged as follows:

- loading process
- unloading process:
 - discharging the hopper by means of the bottom doors
- hydraulic pump system
- jet water / hopper diluting system
- services:
 - calibration of draught and loading measuring system
 - calibration and configuration excavator
- diagnostic; which means:
 - the dredge master can take the necessary actions based on this information
 - nevertheless dredging operations can continue because the dredge master has the possibility to override some signals in the DCS
 - diagnostic informs the dredge master on starting conditions of the hydraulic pumps, etc.

Performance and facilities:

For identified dredging operating modes unique presentation- and control pages will be designed.

They provide:

- presentation of mimic layout for dredging system and jet pipelines
- gate valve set-up
- dredge at preset level
- manual control of individual functional components and for maintenance reasons
- communication with DTPS
- presentation of dredging related measuring data

-
- current and historical trend display
 - current and historical event logging
 - reporting facilities
 - replay of trend data
 - data storage on hard disk for historical replay of operator pages
 - dump facilities to DVD on Excel spreadsheet file format
 - dump facilities for desk jet colour printer

Control functions:

Control of components as valves, solenoids, etc. can be done with the keyboards. However the operation of some essential dredging functions will be done with separate switches and controllers, to be able to control them in a rather conventional manner. Actions initiated via the supervisory system or by conventional control components will be processed by the PLC network, which is fully able to perform these tasks.

Operation of gate valves, jet valves and auxiliaries:

The DCS system monitors, controls and interlocks jet- and gate valves. On the display units the position of these valves, possible pipeline layout and route of the pumped mixture is presented in a mimic.

The following additional functions are provided but not limited to, by means of function keys:

- start/stop - jet pumps
- start/stop - hydraulic pumps

The following additional presentations will be provided:

- pressure measurements of hydraulic pumps
- pressure measurements of jet water pumps

Information during the loading process:

During the loading process the following information will be presented:
for the jet pump pressure

- draught, load and load curve of the vessel
- position of:
 - overflow duct
 - open/closed - each jet water valve

Printer and reporting functions:

Printout function:

Colour printouts can be selected from available video pages, giving time, data and status of the dredger together with important process values.

The printouts are for reporting functions only and are not stored for compilation or shift reports.

Interaction with DTPS system:

The Dredged Track Presentation System (DTPS) communicates with the DCS in order to read the relevant data. Dredging progress soundings also to be provided from the system

Modem connection:

Process data within the DCS will be available for analyzing on-shore via the Inmarsat-Fleet Broadband system as mentioned in Section E.

Hardware for the DCS:

PC equipment:

- two intel core i7 3.0 GHz 2nd generation(or better) server computers, mounted in the 19" rack in the wheel house

Each PC complete with:

- 1 Tb hard disk
- 8Gb RAM
- DVD/CD drive
- 8 USB port
- Graphics Card 1 Gb
- software:
 - Windows (latest compatible version)
 - Supervisory Control And Data Acquisition (SCADA) package

For control of the server PC's:

- in/on the 19" rack in the wheel house:
 - two Ethernet switches for redundant operation selector switch to select the respective PC for:
 - 17" TFT/LCD colour display unit
 - ASCII type keyboard with mouse

PC's identical as described above are mounted in the dredging control console:

- one serving the draught and loading measuring system

For control of each PC:

- membrane type, flush mounted keyboard; mounted in the dredging control console
- 17" TFT/LCD colour display units, mounted in the dredging control console

A4/A3 deskjet colour printer on the 19" rack in the wheel house

uninterrupted power supply unit (UPS) for the above mentioned PC's with a capacity for a transitional time of 10 minutes

- PLC equipment:

- one PLC in the dredging control console, providing:
 - i/o capacity for all dredging related control components
 - autonomous processing of minor control and protection circuits
 - lamp test facilities
 - communication with the network

in principal two remote i/o units for hydraulic- and dredging process, the location of

which has still to be selected, providing:

- i/o capacity for the control of the hydraulic installation
- i/o capacity for dredging instrumentation and reporting signals
- communication with the network

Note:

Depending on the final lay-out of the hydraulic system the precise number of remote I/O units will be decided later on.

DCS internal communications:

The PC - PLC network communicates over an internal so-called redundant cable network.

J6. DRAUGHT AND LOADING MEASURING SYSTEM (DLM)

A draught and loading measuring system, make IRC - type DLM, is installed.

It presents accurately and continuously the momentary draught and loading of the vessel on a colour video display unit, together with bar graphs, related numerical data and alarm messages. Performance is based on measuring the water pressure at the bottom of the vessel fore and aft. For load calculation from the displacement, the mean draught is processed together with the trim against a table which is derived from the vessel's Carène-diagram which is stored in the system's memory.

The installation consists of:

- two ceramic pressure transmitters, each with built-in signal conditioner
- two sea chest assemblies for flush mounting of the pressure transmitters with the ship's bottom

Each sea chest assembly provided with shut-off valve allows removal of the transmitter without dry-docking.

- load recorder, fitted in the 19" instruments rack and including 100 rolls of paper

For calculation and presentation of the draught and loading of the vessel, the pressure transmitters are connected to the DCS as described above.

J7. HOPPER VOLUME AND DRY SOLID MASS MEASURING SYSTEM

A hopper volume and dry solid mass measuring system, is installed.

The system measures and calculates actual volume and loaded mass of dry solid material in the hopper by processing hopper level, hopper dimensions, and vessel's displacement and weight as provided by draught and loading measuring system.

To perform the hopper volume and dry solid mass measuring system, the following components will be added to the DLM:

- two ultrasonic temperature-balanced level sensors mounted above the hopper, each provided with signal conditioner

For calculation and presentation of the hopper volume and dry solids, the sensors are connected to the DCS as described above.

J8. VACUUM, PRESSURE, FLOW AND LEVEL MEASURING SYSTEMS

The following systems are provided:

For the jet pump:

A pressure measuring system of the electric type, consisting of a transmitter with built-in amplifier and shut-off valve.

For presentation of the systems, the transmitters are connected to the DCS as described above.

For Hydraulic systems:

For measuring the pressure of hydraulic systems electric type pressure measuring systems are fitted, consisting of a transmitter with built-in amplifier and flexible hose with Minimesh shut-off coupling.

For presentation of the systems, the transmitters are connected to the DCS as described above.

The following indications are presented:

- one for each main hydraulic pump

- one for bottom doors - high/low

Note:

Where possible; different indications are fed by the same transmitter and amplifier. The pressure indicators for the hydraulic system of the windlasses and the capstan fitted at site.

J9. DREDGED TRACK PRESENTATION SYSTEM (DTPS)

The dredged track presentation and dredge visualization system is for on-line hydrographic survey applications as well as for off-line applications. The dredge tracking system presents the dredge operator with on-line actual updates from the dredger on the bathymetric electronic chart in absolute positions.

The essential requirements for a DTPS include:

1. Positioning and Navigation Data:
 - Accurate real-time positioning information for dredging vessels, including latitude, longitude, depth, and heading.
 - Integration with GPS or other positioning systems to provide precise location data.
2. Bathymetric Data:
 - Continuous depth data of the dredged area and its surroundings often obtained using sonar or multibeam echosounders.
 - Real-time updates on the bathymetry to monitor changes and ensure safe navigation.
3. Dredging Progress Information:
 - Information on the dredging progress, including the amount of material removed, the volume of sediment dredged, and the area covered.
 - Dredge head position and depth for tracking the dredging process.
4. Safety and Environmental Information:
 - Alerts and warnings for vessel operators about shallow areas, submerged obstacles, and navigational hazards.
 - Monitoring and reporting on environmental parameters, such as turbidity and water quality, to ensure compliance with environmental regulations.
5. Display and Visualization:
 - User-friendly interface for presenting real-time data to operators.
 - Integration of charts, maps, and 3D visualizations to provide a clear overview of the dredging area and vessel locations.

6. Data Logging and Storage:
 - Data logging capabilities to record historical dredging data for analysis and compliance reporting.
 - Secure storage of data for audit and historical reference.

7. Data Communication:
 - Reliable communication systems to transmit data between the dredging vessels and shore-based control centers.
 - Redundant communication options to ensure connectivity even in remote or challenging environments.

8. Alarms and Alerts:
 - Audible and visual alarms for critical events, such as exceeding depth limits or approaching unsafe areas.
 - Customizable alert thresholds and notification methods.

9. Integration with Dredging Equipment:
 - Integration with dredging machinery and equipment, including dredge heads and pumps, to monitor and control their operations.

10. Data Integration with Geographic Information Systems (GIS):
 - Compatibility with GIS software for mapping, analysis, and reporting purposes.
 - Compatibility with Dredging Services inhouse Software packages like Hypack and PDS 2000
 - Data synchronization with GIS databases for better decision-making.

11. Security and Access Control:
 - Robust security measures to protect sensitive dredging data and prevent unauthorized access.
 - User role management for controlled access to different features and data.

12. Compatibility with Remote Monitoring:
 - Remote monitoring capabilities, allowing stakeholders to access the DTSPS data from different locations.
 - Support for remote troubleshooting and assistance.

13. Compliance with Regulations:
 - Adherence to maritime and environmental regulations, including requirements for safe navigation, reporting, and environmental protection.
14. User Training and Support:
 - Training and support for operators, hydrographers and project managers to ensure the efficient and safe use of the DTSPS.
15. Redundancy and Reliability:
 - Redundant systems and backup power sources to ensure continuous operation in critical situations.
16. Scalability:
 - The ability to expand the DTSPS to accommodate additional vessels, sensors, and data sources as needed.

With one of the Dredge Tracking System tools the operator is also able to see and control the dredger between the required profile and the actual profile or select the autopilot mode for the dredging operation if required.

The system is able to log and to present all relevant data.

The system will derive the following information from the several systems as specified in the respective Sections of this Goods Information:

- position of the vessel (DGPS) - heading of the vessel
- echo sounder
- position of the grab
- average draught of the vessel (DLM)
- electronic chart display and information system (ECDIS)
- RTK signals
- Hydrographic equipment namely a sonar sensor mounted on the hull

The system, installed in the wheel house, consists of hardware components and software.

Hardware for DTSPS:

- for mounting in 19" rack in the wheel house:
 - one intel i7 - 3.0 GHz gen 2 (or better) computer; complete with:
 - 1 Tb hard disk

- 8 Gb RAM
- DVD/CD drive
- 8 usb port
- 1 Gb graphics card
- for control of PC:
 - data/display unit selector switch
 - 17" TFT/LCD colour display unit
 - ASCII type keyboard with mouse
- printing facility via the printer of the DCS system
- for mounting in/on navigation control console:
 - 17" TFT/LCD colour display unit
 - membrane type keyboard
- uninterrupted power supply unit (UPS) with a capacity for a transitional time of 10 minutes
- interface with the Inmarsat-Fleet Broadband system for data exchange ship to shore via the DCS system

Software for DTSP computer:

- Windows
 - DTSP package; consisting of:
 - Wizard configuration module; to configure all possible views, set-ups, projects and locations
 - On-line dredging module; serving dredging operations dependent on the selections made with the help of the wizard module
 - Replay (data processing) module with sub-modules functioning on-line as well as offline. The sub-modules are also available as stand-alone modules.
 - The data processing package provides the various tools for preparation, editing and processing of the dredge data. The package provides the processing of the raw dredge data into output of various forms such as charts and matrixes.
 - Dredging progress soundings

The following sub-modules are provided:

- DESIGN:
 - to design dredging working areas, survey lines, profiles, dump area's and

theoretical models

- DRAW:

- to be used for dredging equipment and to view drawings and reference points of the dredger

- DTM VIEWER (off-line):

- to check DTM's by import and export

- volume calculations over and under dredging between design and update matrixes

- Database wizard (off-line):

- for managing and/or manipulating the DTPS database

This manipulation is to exchange or delete data between two different columns in the database.

The aim of this wizard is to save project elements from on-going or finished projects in a company wide general database and to set-up a new project database with elements from previous projects.

- GARP (Geographic Arithmetic Program):

- for management of the geometric database as delivered by the DTPS Navigation system. It allows additional modifications and display of various elements in the geodesy database.

The application can be used to test settings and perform conversions of data and projections.

- PRINT:

- the print function can be used to print, on scale A4 size, bathymetric chart(s) / DTM chart(s) with or without dredge tracks as well as for final charting use the validated data.

A Dredge Positioning and Monitoring System (DPMS) is crucial for ensuring the precise and efficient execution of dredging operations. It provides real-time data and control capabilities to manage the position and performance of dredging equipment. Amongst essential requirements of a DPMS is the following:

Dredging Progress Information:

- Monitoring of the dredge head position, depth, and material removal rate.
- Information on the amount of material removed and the volume of sediment dredged.
- Visualization of dredging progress in real-time.

Display and Visualization:

- User-friendly interface for presenting real-time data to dredge operators and project managers.

- Integration of charts, maps, and 3D visualizations to provide a clear overview of the dredging area and equipment positions

Data Logging and Storage:

- Data logging capabilities to record historical dredging data for analysis and compliance reporting.
- Secure storage of data for audit and historical reference.

Data Communication:

- Reliable communication systems to transmit data between the dredging equipment and control centers.
- Redundant communication options to ensure connectivity even in remote or challenging environments.

Note: The GHD shall be able to provide real time hydrographic progress soundings of the dredging project at hand and be able to output the data in the form of a report which will be used to present to clients. All reports/information gathered to be in accordance to the international standards for conducting and reporting on hydrographic soundings. The *Supplier* is to include the relevant hull sensors in the design of the vessel and any other equipment or system needed to achieve this objective.

J10. TANK SOUNDING INSTALLATION

- An electric tank sounding system will be provided for each of the following tanks:
 - each water ballast tank
 - each fresh drinking water tank
 - each technical fresh water tank
 - each fuel oil bunker
- fuel oil settling tank
- each fuel oil daily service tank in engine room
- fuel oil daily service tank in emergency generator room
- fuel overflow tank
- dirty oil tank
- sludge tank

Each system consists of:

- pressure transducer - make DAMCOS, mounted in/on the respective tank
- amplifier

The amplifiers are connected to the engine room alarm and monitoring system for read out and alarm.

The system is provided with a list, trim and specific gravity correction.

- The following tanks are provided with a set point for high level alarm:
- fuel overflow tank
- dirty oil tank
- sludge tank

The following tanks are provided with a set point for low level alarm:

- each fuel oil daily service tank in engine room

The following tanks are provided with a set point for low as well as high level alarm.

- fuel oil settling tank
- fuel oil daily service tank in emergency generator room

SECTION M - ELECTRICAL INSTALLATION

M1. GENERAL

The electrical installation and all materials are in accordance with the requirements of *Purchaser* approved Classification Society.

Design conditions; unless specified otherwise:

- degree of protection of machines:

- on open decksIP 56.
- in enclosed spacesIP 44.

degree of protection of switchboards, distribution boards;

- transformers, etcIP 23.
- output of machinescontinuously 100%.
- insulation of machines Class F.
- temperature rise of machines according to insulation Class F
- ambient temperature on open decks 45 deg C.

ambient temperature in enclosed spaces 55deg C
relative humidity 90% at about 35 deg C
theoretical life L_{10h} for roller bearings for machines at least 30000 H

Control system main switchboards:

The control system of the main switchboard is incorporated in the control systems machinery installations - see Section N.

The electrical installation consists of the following systems:

- a 3 x 400 V-50 Hz - AC main system for supplying auxiliaries
 - a 3 x 400 V-50 Hz - AC main system for supplying electric motor for bow thruster drive
 - a 3 x 230 V-50 Hz - AC system for main lighting, emergency lighting, small consumers and other apparatus
- The system will be fed from the 400 V system via three phase transformers.
- two 24 V - DC systems for alarm systems and other appliances; each via a battery charger and DC supply rectifier unit fed from the main supply
- One system is for the aft ship; the other one for the fore ship.

Capacity and arrangement of the systems:

The capacity and arrangement of the main-, auxiliary- and emergency generator and the relevant systems are defined by following operating conditions:

1. Main generators

Each main generator is driven by its own diesel engine.

2. Emergency generator

The emergency generator can be used as follows:
emergency generator in a second stage for supplying the emergency systems as required by the Regulatory Bodies during:
supplying the auxiliaries during harbour watch duty

M2. ANTI - CONDENSATION HEATING

Anti-condensation heating is provided for:

- generators
- electric motors of 5.5 kW and over
- transformers 400 V / 230 V
- switchboards
- control consoles

The anti-condensation heating for generators, motors and transformers is switched on automatically when the main switch or starter concerned is switched off and the heating is signaled on the concerning starter or switchboard.

M3. AC GENERATORS

AC main generator

The self-regulated, self-excited AC main generators is installed in the engine room, driven by diesel engines

The generator has the following specification:

- power factor	0.8 @full load .
- voltage	3 x 400 V
- frequency	50Hz
- speed	1500rpm
- degree of protection .	IP 44 up to shaft level
- air inlet.	with filters
- air outlet .	with drip cover
- method of cooling	air cooled
- bearings	self-ventilated roller bearings
- temperature sensors	2 x PT100 element in each stator winding, for alarm and switching-off

The generator draws cooling air from the engine room and discharge the cooling air into the engine room.

The generator is suitable for running in parallel with the auxiliary generator for take-over duty.

AC emergency generator:

One self-regulated, self-excited AC emergency generator is installed in the emergency generator room, driven by the diesel engine as specified in Section N.

The generator has the following specification:

- power factor	0.8 @full load .
- voltage	3 x 400 V
- frequency	50Hz
- speed	1500rpm
- degree of protection .	IP 44 up to shaft level
- air inlet.	with filters

-
- air outlet . with drip cover
 - method of cooling air cooled
 - bearings self-ventilated roller bearings
 - temperature sensors 2 x PT100 element in each stator winding, for alarm and switching-off
 - SAE Housing according to diesel engine maker's recommendations

The generator draws cooling air from the emergency generator room and discharges the cooling air into the emergency generator room.

The emergency generator set starts automatically when the supply fails from PS main generator as well as the auxiliary generator.

The generator is suitable for running in parallel for take-over duty.

M4. MAIN SWITCHBOARD - 400 V

The main switchboard is situated in the switchboard room and is arranged in panels. On the top and rear the panels are provided with steel plates and on the front with lockable doors.

The switchboards consist of but not limited to main bus bar section with:

- generator panel for AC main generator; fitted with:
- motor operated generator circuit breaker provided with no-voltage coil with delay, a direct working magnetic short circuit security relay and a thermal overload relay as well as the necessary auxiliary contacts
- push button - in/out - generator circuit breaker
- signal lamp for:
 - o generator circuit breaker - in
 - o anti-condensation heating generator - in
- ammeter with selector switch
- voltmeter with selector switch
- frequency meter
- Watt meter
- insulation monitoring system
- outgoing group for:
 - emergency switchboard
 - switchboard - fore ship
- transformer

- main lighting
 - shore supply panel -3 x 400 V-50 Hz - 200 A, fitted with:
 - hand-operated circuit breaker with interlocking device for shore supply
 - signal lamp
 - shore supply
 - ammeter
 - panels with motor starters
 - synchronizing control - in/out
 - speed control auxiliary generator diesel engine
- signal lamps for:
- circuit breaker - in/out
 - anti -condensation heating generator - in
 - ammeter with selector switch
 - voltmeter with selector switch
 - double frequency meter
 - Watt meter
 - synchronoscope

M5. EMERGENCY SWITCHBOARD - 400 V

The emergency generator has its own switchboard, which is installed in the same room as the emergency generator.

The switchboard is fed by the main switchboard when the emergency generator is out of service.

A) One generator panel fitted with:

- motor operated generator circuit breaker, provided with no-voltage coil with delay and the necessary contacts for signaling and interlocking
- signal lamp for:
 - anti-condensation heating generator - in
 - generator circuit breaker - in
- the necessary relays for short circuit and overload protection
- Watt meter
- ammeter with selector switch
- voltmeter with selector switch
- frequency meter
- measuring converter for Watt meter in main switchboard

B) Panel for automatic operation of emergency generator diesel engine with:

- selector switch: off - automatic - harbour duty - test
- signal lamp - emergency generator diesel engine running
- alarm signal lamp for:
 - winding temperature generator - too high
 - overload
- other relevant equipment

C) Connecting panel with the main switchboard, fitted with:

- circuit breaker, provided with no-voltage coil with delay and the necessary auxiliary contacts
- voltmeter
- ammeter

D) Panels with motor starters - see below.

The switchboard complete with the necessary current and voltage transformers, fuses, terminals, relays, busbars, earth fault signaling and wiring. All remote controlled equipment is provided with an isolating switch.

M6. MOTORSTARTERS

Motor starters for auxiliaries with automatic stand-by function and motor starters for other auxiliaries with an automatic function will be installed in the corresponding switchboards. All other motor starters will be mounted at site.

Each fixed type of motor starter for the electric motor of 5.5 kW and over is executed with push buttons - start/stop - and ammeter.

Motor starters which switch automatically by means of a pressostat etc. are fitted with switch hand/automatic.

Unless specified otherwise; motor starters will be direct on line (DOL) starters and depending on the final lay-out of the relevant systems, the decision will be made for the use of other types of motor starters.

M7. SWITCHBOARD - 400 V FORE SHIP

In the fore ship a switchboard is installed for the auxiliaries in the fore ship.

M8. SHORE SUPPLY CONNECTION BOX

A shore supply connection box 400 V-50 Hz - 200 A is provided and connected to the shore supply section of the main switchboard - 400 V.

The box contains:

- main switch/phase selector switch
- fuses
- phase sequence meter
- terminals for shore cable connection

One hand-operated cable reel with 100 m shore supply cable and sockets is installed.

M9. 32 V - AC HAND LAMP SUPPLY

For 32 V - AC hand lamp supply; 10 WT sockets with built-in transformer 230 V - AC / 32 V - AC will be installed.

The sockets, the location of which has still to be selected, are clearly marked.

M10. WELDING CONNECTIONS

Fixed WT welding connections, fed by the welding transformer, are provided as follows:

- 1 x in engine room
- 1 x in engine room repair area
- 1 x in welders' area
- 1 x on coaming deck
- 1 x on forecastle deck

Each welding connection is mounted in a WT box.

Each box will include:

- socket for welding cable
- socket for earthing cable
- socket for remote control unit

M11 ACCUMULATORS

The following accumulators are installed:

A) Two 24 V - DC lead acid accumulator with automatic charger unit and alarm device connected to the engine room alarm system.

One will serve the 24 V consumers in the aft ship and the other one the 24 V consumers in the fore ship

Each unit, fed from the respective main supply, is executed as battery charger and DC supply rectifier unit with separated circuits and provided with a discharge circuit for uninterrupted DC power supply and voltage limitation.

Each charger unit is complete with voltmeter, ammeters, earth fault lamp and the necessary outgoing groups for the 24 V consumers - except the GMDSS equipment.

B) One 24 V - DC lead acid accumulator with automatic charger fed from the 230 V supply for the emergency supply to the GMDSS equipment

The accumulators are stowed in watertight boxes of fibre glass reinforced plastic.

M12. TRANSFORMERS - 400 V / 230 V

Two identical transformer banks 400 V / 230V - 50 Hz - AC supply for lighting, small electric motors and other appliances are provided; each having the following specification:

- voltage primary..... 3 x 400 V
- voltage secondary , 3 x 230 V
- frequency. 50 Hz
- output 65% of the total demand
- taps ± 2 % and ± 5%

Each transformer bank consists of four single phase transformers; three connected and one as spare. I

The transformer banks are of the drip-proof, dry and air cooled type.

One of the transformer banks is connected to the main switchboard, the other one to the emergency switchboard.

The transformer banks are of the drip-proof, dry and air cooled type.

M13. POWER DISTRIBUTION BOXES

The necessary power distribution boxes are fitted.

Each box is provided with one main switch and fuses for the outgoing groups.

M14. LIGHTING DISTRIBUTION BOXES

For the lighting the necessary lighting distribution boxes with mini-circuit breakers are fitted.

M15. CABLES AND CABLE TRAYS

All cables are of a Halogen free and approved marine type - make DRAKA or equal.

Where required for interference, the cables are provided with a metal braiding.

Compression type cable glands of an approved type are used for cable terminations,

For fixing the cables, cable trays of the ladder type are used and mounted on places to Builders option.

For mounting of the cables on the trays plastic cable ties of the UV resistant type are used. The trays are secured to bulkheads, casing etc., by means of welded strips.

Deck cables and cables exposed to mechanical damage are protected by means of galvanized solid drawn steel pipes.

Where cables pass through decks or watertight bulkheads, watertight passages are used. The cabling, cable tray connections, etc. will be executed according to the EMC Regulations.

M16. MAIN LIGHTING - 230 V

- The electric lighting is 230 V - AC.
- In each space the lighting points are divided in two groups.
- Definition of "General measurement points":
 - "General measurement points" means, in relation to any space, those points which, measured at a height of 850 millimetres above the floor, fall on an imaginary line drawn vertically through the following points:
 - every point mid-way between every two adjacent lamps in that space;
 - every point mid-way between any lamp and any position on the boundary of that space to which that lamp is nearer than any other lamp; and
 - where any part of the space available for free movement is shielded from the direct rays of a lamp by a re-entrant angle formed in the boundary of that space, the central point of the space so shielded
 - the electric lighting in any space, mentioned hereafter, is adequate if the lamps, paint work and other surface finishes are new, the illumination in the horizontal plane when measured at the points specified in respect of that space is steady and is maintained, subject to a tolerance of 10% at the value prescribed in respect of those points. Reflection factor of walls is 0.6 or better.

Deck lights:

- 2 WT floodlights 250 W SON-T type on forward side of deckhouse, directed forward
- 2 WT floodlights 250 W SON- T type on aft side of deckhouse, directed aft
- 2 WT floodlight 250 W SON- T type on the funnel, directed aft
- 4 WT floodlights 250 W SON- T above hopper
- 2 WT halogen lights 200 W - one at each side of the funnel- to illuminate the Purchaser's symbols
- 1 WT / FL lamp 18 W above each windlass
- 1 WT / FL lamp 18 W above aft windlass
- 1 WT floodlight 100 W above rescue boat davit

- 1 WT floodlight 100 W above life raft davit
 - 1 WT floodlight 100 W above each accommodation ladder
 - remaining deck lighting by means of WT IFL and I or WT ISON - T type lamps in such a way that an average lighting level of 50 lux on main deck level can be achieved
 - 5 WT socket outlets in WT box
- The WT IFL lamps are of the IP68 enclosure type.

Illumination levels in covered spaces:

The following illumination levels in covered spaces are maintained; as far as these spaces are present:

- sleeping rooms and day rooms:
 - at general measurement points 50 lux
 - at every mirror 200 lux
 - at every seat at a writing desk or table 150 lux
 - at the head of each bed a FL lamp 8 Watt
- mess-rooms:
 - at general measurement points 100 lux
 - at every table and/or sink 150 lux
- recreation room:
 - at general measurement points 50 lux
 - at every recreational table 100 lux
 - at every seat at a writing desk or table 150 lux
- hospital:
 - at general measurement points 50 lux
 - at any washbasin 100 lux
 - at the head of each bed a FL lamp 8 Watt
- offices:
 - at general measurement points 100 lux
 - at every seat at a writing desk or table 200 lux
- sanitary spaces:
 - at general measurement points 100 lux
 - at any mirror 200 lux
- laundries:
 - at general measurement points 100 lux
- galleys and pantries:
 - at working positions 300 lux
- dry provision store rooms and cold store rooms:

- at general measurement points	100 lux
- passageways and companionways:	
- at general measurement points	50 lux
wheel house:	
- at general measurement points	100 lux
- repair areas, watch cabin and/or control rooms:	
- at working position	300 lux
- machinery spaces:	
- at general measurement points	250 lux
- stores:	
- at general measurement points	50 lux
.. - converter room:	
- at general measurement points	100 lux

M17. SOCKET OUTLETS FOR GENERAL USE IN COVERED SPACES

The following socket outlets for general use in covered spaces will be provided:

	400 V -AC	230 V - AC	24 V -DC
- wheel house		4	
- converter room		1	1
each single berth cabin		2	
- each double berth cabin		2	
- office		3	
- each mess room		3	
- galley		3	
- air conditioning room		1	1
- laundry		2	
provision store room		2	
- engine room	1	4	2
- watch cabin		2	1
- separator room		1	1
each repair area	1	2	1
- steering gear room		1	1
- emergency generator		1	1
- hydraulic room		1	1
- fan room		1	
- technical space	1	2	1
bow thruster room		1	1

Note:

- where required by the Regulatory Bodies the socket outlets will be in watertight execution
- the 400 V socket outlets will be 32 A
- the 24 V - DC socket outlets will be provided with a built-in transformer
- 230 V - AC / 24 V - DC / 200 V A
- South African standard

M18. EMERGENCY LIGHTING - 230 V

Approximately half the numbers of the 230 V - AC lighting points serve for emergency lighting, for which purpose they are connected to the emergency switchboard.

The emergency lighting will be switched-on automatically when the emergency generator starts.

M19. GENERAL EMERGENCY ALARM SYSTEM

A general emergency alarm system is provided in accordance with the Regulatory Bodies as mentioned in Section A.

The system is incorporated in the public address system as described in Section E.

M20. ENGINEERS' ALARM SYSTEM

An engineers' alarm system, integrated in the alarm system as described below is provided; comprising a buzzer in the cabin alarm unit in each engineer's cabin and in each public room as required by the Regulatory Bodies as mentioned in Section A.

The buzzer in the engineer's cabins can be pre-selected from the alarm system in the switch board room.

The buzzer in each public room is always activated.

The buzzers are activated at each incoming alarm.

If within a specified time the alarm is not responded, a klaxon in the alleyways of the engineers' and an alarm signal lamp in the navigation control console in the wheel house are activated.

M21. PERSONNEL ALARM SYSTEM

For the safety supervision of the engine room watch keeping personnel a personnel alarm system, integrated in the engine room alarm system as described below, is installed. The system can be switched-on by means of a key controlled switch in the alleyway of the engineers'. After switching-on, the system activates an alarm after 27 minutes in the engine room. This alarm can be reset by means of push buttons of which the number and place has still to be determined to comply with the requirements of the Regulatory Bodies as mentioned

in Section A. If within 3 minutes the alarm is not responded, the personnel alarm system is automatically connected to the engineers' alarm system.

M22. BRIDGE NAVIGATIONAL WATCH ALARM SYSTEM (BNWAS)

A bridge navigational watch alarm system (BNW AS) is provided in accordance with the Regulatory Bodies as mentioned in Section A.

M23. ENGINE ROOM ALARM AND MONITORING SYSTEM

An alarm and monitoring system is provided for warning of faults in the machinery systems, the safety systems and control systems and in addition the monitoring of analogue values as mentioned below.

The execution of the alarm and monitoring system satisfies the requirements of the Regulatory Bodies as mentioned in Section A.

The following systems are incorporated in the engine room alarm and monitoring system: -
general engineers' alarm system

- Personnel alarm system
- computing device for the tank sounding system as described in Section L
- exhaust gas temperature alarm and monitoring system of each main diesel engine
- exhaust gas temperature alarm and monitoring system of dredge pump diesel engine

The alarm and monitoring system comprises:

- in switchboard room:
 - main alarm unit
 - 15.1" TFT touch screen and operating push buttons
 - on duty selection unit of engineers' alarm system
 - control unit personal alarm system
 - alarm printer
- LCD indicating display unit with alphanumeric information, in:
 - technical space
- in navigation control console:
 - LCD indicating display unit with alphanumeric information
 - alarm annunciator unit(s) for separate alarms as required by the Regulatory Bodies
 - on duty indication unit of general engineers' alarm system
- cabin alarm unit:
 - each engineers' cabin
 - each mess room

relevant equipment as indicator columns, rotating beam lights, signal horns etc. in the respective spaces as required

- interface with:
 - voyage data recorder (VDR) - see Section E

Beside the alarms the following indications can also be read out on the display unit in the watch cabin:

contents of the tanks of the tank sounding installation as described in Section L

pressure for:

- starting air
- operating air
- lubricating oil - each main diesel engine

- temperature for:

- HT cooling water - each main diesel engine
- lubricating oil - each main diesel engine
- lubricating oil - each gearbox for propeller drive

The I/O cards - including spare cards - are provided for 256 channels (digital and analogue, however excluding inhibits).

Power supply: 230V - AC124V - DC

M24. BOW THRUSTER MOTOR

The bow thruster is driven by a vertical AC squirrel cage motor with the following specification:

- voltage 3 x 400V
- frequency 50Hz
- speed 1488rpm
- degree of protection IP55
- method of cooling shaft driven fan
- bearings roller bearings
- accessories 2 x PT100 element in each stator winding for alarm and switching off.

The motor is controlled: - from:

- navigation control console
- each auxiliary navigation control console
- at site

Transnet National Ports Authority

Tender Number: TNPA/2023/11/0021/50266/RFP

Tender Description: Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.



SECTION N - MACHINERY INSTALLATION

N1. GENERAL

The machinery installation comprises the following diesel engines:

- PS main diesel engine, driving:
 - at flywheel side a propeller installation through a flexible coupling and a reduction gearbox with built-in multiple disc clutch coupling
 - The gearbox is at the propeller side

- SB main diesel engine, driving:
 - at flywheel side a propeller installation through a flexible coupling and a reduction gearbox with built-in multiple disc clutch coupling
 - The gearbox is at the propeller side

- Two Diesel Engines driving two main generators
- one emergency/harbour generator diesel engine driving the AC emergency/harbour generator

- Ratings:
 - Engine power stated are maximum continuous ratings developed under the following conditions:
 - ambient air temperature 45°C
 - raw water temperature 32°C
 - fresh water temperature of central cooling water system 38°C
 - air pressure 1 bar
 - maximum relative humidity 90 % at abt. 35°C

N2. CONTROL SYSTEMS MACHINERY INSTALLATIONS

The control systems of the machinery installations are based on independent programmable logic controllers (PLC's), which communicate with each other over a redundant network.

The PLC system, based on ALLEN-BRADLEY product range, monitors and controls the relevant systems and provides communication with the Dredging Control System (DCS) for data exchange

The following will be provided and installed in the engine room control panels:

- for each propulsion system:
 - one Programmable Logic Controller (PLC)

The system provides:

- I/O capacity for the propeller drive related signals
- I/O capacity for the main diesel engine related signals
- autonomous processing of propeller drive and main diesel engine, interlocking and protection circuits as far as not executed by the control system of the main diesel engine itself
- communication with the DCS system as described in Section L

The PLC and also the PC network communicate over an internal so-called redundant cable network.

Interaction with main switchboards:

The control systems of the main switchboard are incorporated in the above mentioned system, comprising:

- i/o capacity for related switchboard signals
- autonomous processing of motor starters, interlocking and protection circuits, etc.
- remote starting and stopping of auxiliaries for dredging operations.

Interaction with engine room alarm and monitoring system:

The engine room alarm and monitoring system communicates with the above mentioned system for data exchange.

N3. MAIN DIESEL ENGINES

Each of both turbocharged, after cooled, four stroke diesel engines has the following specification:

- with engine driven pumps

Each engine complete with:

- for fuel:

- engine driven fuel feed pump
- injection pump for each cylinder
- duplex filter fine filter
- sheathed fuel injection pipes
- pressure regulating valve
- fuel oil cooler; served by LT auxiliary cooling water system

- for lubrication:

- engine driven lubricating oil pump
- built-on electrically driven pre-lubrication oil pump
- lubricating oil cooler
- lubricating oil thermostatic control valve
- centrifugal filter
- automatic filter
- pressure control valve
- pipe connections for lubricating oil separator
- wet sump operation
- for spare lubricating oil pumps

- for cooling:

- separated HT and LT cooling water system; each comprising:
- engine driven cooling water pump
- cooling water thermostatic control valve of the electric acting type
- box cooler, see Section 0
- pipe connections for pre-heating of HT cooling water system
- for pre-heating, see Section 0
- for spare cooling water pumps, see Section 0

- air starting motor with electromagnetic starting valve flywheel with hand turning gear forward crankshaft extension

- crankcase relief valves

- exhaust silencer with spark arrestor - 35 dB(A) reducer and expansion joint on turbocharger torsional vibration damper

- if necessary electronic governing system

-
- engine control system to diesel engine maker's standard; however complying with the requirements of the relevant Regulatory Bodies
 - instrumentation to diesel engine maker's standard; however complying with the requirements of the relevant Regulatory Bodies
 - remote indication - via engine room alarm and monitoring system - of:
 - lubricating oil pressure
 - lubricating oil temperature
 - HT cooling water temperature
 - alarm switches to diesel engine maker's standard; however complying with the requirements of the relevant Regulatory Bodies
 - automatic shutdown at:
 - lubricating oil pressure - too low
 - HI cooling water temperature - too high
 - over-speed

Note:

For the diesel engines

- 2 starting air receivers, 30 bar
- 1 set of special tools (imperial and metric)
- 1 set of tools for turbochargers (imperial and metric)
- Complete manual sets

N4. AC GENERATOR DIESEL ENGINE

The auxiliary diesel generators sets are installed in the engine room. The set comprises:

- diesel engine
- AC main / auxiliary generator with SAE housing; as described in Section M
- common torsion rigid base frame for diesel engine and generator

Note:

Diesel engine and close coupled generator mounted on resilient mountings on the common base frame.

The turbocharged, after-cooled, four stroke, diesel engine has the following specification:

- make : CATERPILLAR or equivalent. Where an equivalent is provided the *Supplier* must provide suitable evidence of ability to demonstrate local support in the event of breakdowns or servicing to the specific engine mentioned and must ensure attendance to

the vessel within a time period of 24 hours from notification or requirement from the *Purchaser*.

- power : each with sufficient capacity to provide all electrical power requirements

The engine complete with:

- for cooling:
 - engine driven cooling water pump
 - thermostatic control valves
 - box cooler; see Section 0
 - electric immersion heater for pre-heating
- for lubrication :
 - lubricating oil cooler
 - engine driven lubricating oil pump
 - lubricating oil duplex filter
 - hand pump for emptying crankcase
 - wet sump operation
- for fuel:
 - electronically controlled unit ejectors
 - engine driven fuel transfer pump
 - hand-operated priming pump
 - fuel oil duplex filter
 - fuel oil cooler; integrated in engine cooling water system
 - water/fuel oil separator
- air starting motor with electromagnetic starting air valve flywheel with flexible coupling and hand turning gear SAE flywheel housing
- torsional vibration damper
- if necessary expansion joint on turbocharger
- exhaust silencer with spark arrestor - 35 dB(A)
- electronic governor with speed adjusting device for running in parallel for take-over duty
- instrumentation to diesel engine maker's standard; however complying with the requirements of the relevant Regulatory Bodies
- alarm switches to diesel engine maker's standard; however complying with the requirements of the relevant Regulatory Bodies
- automatic shutdown at:
 - lubricating oil pressure - too low
 - HT cooling water temperature - too high
 - over-speed

Note:

For the generator diesel engines: - one set of standard tools (imperial and metric) and complete manual sets.

N5. EMERGENCY / HARBOUR GENERATOR DIESEL ENGINE

The emergency / harbour diesel generator set is installed in the emergency generator room.
The set comprises:

- diesel engine
- AC emergency /harbour generator with SAE housing; as described in Section M
- common torsion rigid base frame for diesel engine and generator

Note:

Diesel engine and close coupled generator mounted on resilient mountings on the common base frame.

The turbocharged, after-cooled, four stroke diesel engine has the following specification:

- make: CATERPILLAR or equivalent. Where an equivalent is provided the *Supplier* must provide suitable evidence of ability to demonstrate local support in the event of breakdowns or servicing to the specific engine mentioned and must ensure attendance to the vessel within a time period of 24 hours from notification or requirement from the *Purchaser*.

- power : adequate to meet all harbour requirements incl main AC
- speed: 1500 rpm

The engine complete with:

- for cooling:
 - radiator with built-on header tank
 - engine driven cooling fan
 - engine driven cooling water pump
 - thermostatic control valves

- electric immersion heater for pre-heating
- for lubrication:
 - lubricating oil cooler
 - engine driven lubricating oil pump
 - lubricating oil duplex filter
 - hand pump for emptying crankcase
 - wet sump operation
- for fuel:
 - electronically controlled unit ejectors
 - engine driven fuel transfer pump
- hand-operated priming pump
- fuel oil duplex filter
- water/fuel oil separator
- air starting motor with electromagnetic starting valve
- flywheel with flexible coupling and hand turning gear
- SAE flywheel housing
- torsional vibration damper - if necessary
- expansion joint on turbocharger
- exhaust silencer with spark arrestor - 35 dB(A)
- electronic governor
- instrumentation to diesel engine maker's standard; however complying with the requirements of the relevant Regulatory Bodies
- alarm switches to diesel engine maker's standard; however complying with the requirements of the relevant Regulatory Bodies
- automatic shutdown at:
 - lubricating oil pressure - too low
 - cooling water temperature - too high
 - over-speed

N6. COUPLINGS FOR PROPELLER DRIVE

Between each main diesel engine and respective reduction gearbox for propeller drive a flexible coupling is mounted.

N7. COUPLINGS FOR AC MAIN GENERATOR DRIVE

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

Between each AC main generator a flexible coupling is mounted.

N8. GEARBOXES FOR PROPELLER DRIVE

Each propeller is driven through reduction gearbox with a primary. Each gearbox has the following specification:

Each gearbox complete with:

- hardened and ground gears
- built-in multiple disc clutch coupling
- built-in thrust bearing
- forced lubrication with:
 - gearbox driven lubricating oil pump
 - built-on electrically driven stand-by lubricating oil pump
 - lubricating oil cooler, served by the LT auxiliary cooling water system
 - lubricating oil duplex filter
- wet sump operation
- instrumentation to gearbox maker's standard; however complying with the requirements of the relevant Regulatory Bodies
- alarm switches to gearbox maker's standard; however complying with the requirements of the relevant Regulatory Bodies
- remote indication - via engine room alarm and monitoring system - of:
 - lubricating oil pressure
 - lubricating oil temperature

N9. PROPELLER SHAFT EARTHING

To avoid potential corrosion in the ship and parts of machinery a current conductor is fitted on each propeller shaft for earthing the propeller shaft with the hull.

N10. PROPELLER SHAFT LOCKING DEVICE

Each propeller shaft is provided with a hand-operated propeller shaft locking device.

N11. STERN TUBE AND SEALS

Each stern tube is made of thick-walled seamless steel tube welded in the ship's structure. Shaft seals and bearings made of cast iron bushes with white metal liners are fitted at each end of the stem tube.

The housing of aft seal is of bronze and the housing of forward seal is of cast iron The sealing rings run on chrome steel liners.

The aft seal is further provided with:

- bronze distance ring (2/2) between seal and stern tube
- special sealing ring as sand barrier
- wire winder
- rope guard with net cutters, the rope guard will be made in halves

The aft stern bush has a length of 2 times the rule diameter of the propeller shaft and the forward stem bush has a length of 1 time the rule diameter of the propeller shaft.

Means are provided for measuring the wear down of the stem bushes.

The propeller shafts are oil lubricated.

The lubricating system of each stem tube includes a gravity type lubricating oil tank mounted at a suitable height and complete with low level alarm device, a filling pipe, a vent pipe and a drain cock.

One hand pump is installed for filling the two stern tube lubricating oil tanks.

N12. BOW THRUSTER

An electrically driven bow thruster unit with controllable pitch propeller is provided.

The unit consists mainly of the following parts:

- steel tunnel section, welded in the ship's structure
- The tunnel section is complete with foundation on top of the tunnel for vertical mounting of electric motor.
- A stainless steel ring is welded in the tunnel in way of the propeller area. Nickel-Aluminium bronze propeller streamlined bevel gearbox
- flexible coupling
- power pack tank with built-on amongst others: - electrically driven oil pump

- necessary hydraulic parts and sub-assemblies

SECTION 0 - AUXILIARIES

01. BILGE/FIRE/GENERAL SERVICE PUMPS

Two electrically driven, self-priming, centrifugal pumps are installed in the engine room and can be used as:

- bilge pump
- fire pump
- general service pump
- ballast pump

Each pump, running at about 2900 rpm; has a capacity in accordance with the requirements of the Regulatory Bodies.

Materials:

Pump casing :bronze.

Impeller :bronze

Shaft :stainless steel

Bearings :ball bearings

Shaft seal :stuffing box type

Each pump draws from:

- outboard; via two single filters - each 100% capacity
- watertight compartments - if required by the Regulatory Bodies
- fore peak:
- water ballast tank
- aft peak tank

Each pump discharges to:

- outboard
- fore peak
- dirty water tank in engine room
- firefighting and deck wash system
- bilge ejector in pump room
- water ballast tank
- aft peak tank

O2. EMERGENCY FIRE PUMP

One electrically driven, self-priming, centrifugal pump is installed in the fore ship.

The pump, running at about 2900 rpm, has a capacity in accordance with the requirements of the Regulatory Bodies.

Materials of the pump as described in item 01.

The pump draws from:

- outboard; via a strainer

The pump discharges to:

- fire- fighting and deck wash system

For power supply the emergency fire pump is connected to the emergency switchboard.

03. BILGE OILY WATER SEPARATOR

A bilge oily water separator, with a capacity of 1 m³/h is installed in the engine room. The separator will produce effluent with an oil content not exceeding 15 ppm.

An oil content monitor is installed, provided with alarm when exceeding 15 ppm.

Clean bilge water is discharged overboard; the separated oil is drained off automatically to the sludge tank.

The separator, provided with its own built-on pump, draws from:

- dirty water tank in engine room
- outboard

and discharges:

- to outboard
- dirty water tank in engine room when oil content exceeds 15 ppm

04. WATER PRESSURE SETS

Two water pressure sets are installed:

- one serving the drinking water system
- one serving the technical fresh water system.

Each pressure set consists of a vertical galvanized pressure tank with a capacity of 500 litres and an electrically driven, self-priming, centrifugal pump, running at about 1450 rpm with an average capacity of 3 m³/h.

The pump starts and stops automatically by means of a pressure switch, mounted on the pressure tank. Pressures at which the pump automatically starts and stops can be set at 2.5 and 4 bar respectively.

The drinking water system draws from:

- drinking water tank

and discharges via pressure tank to:

- drinking water system

The technical fresh water system draws from:

- technical fresh water tank

and discharges via pressure tank to:

- technical fresh water system

Materials:

- Pump casing : cast iron
- Impeller : brass
- Shaft : stainless steel
- Bearings : ball bearings
- Shaft seal : stuffing box type

05. FRESH WATER DISINFECTION INSTALLATION

An ultraviolet disinfection installation is installed in the technical space, serving the drinking water system. The unit is flexibly mounted.

The installation has a capacity which is adapted to the domestic drinking water system and is fitted in the pressure pipeline of the drinking water pressure system.

The installation consists of:

- stainless steel irradiation chamber, containing:
 - quartz protection pipe
 - ultraviolet burner
- control/monitoring box
- flow control valve in water inlet
- solenoid valve in water outlet

06. DOMESTIC HOT DRINKING WATER CIRCULATING PUMP

For the closed hot drinking water circuit an electrically driven, close-coupled in-line, non-self-priming, centrifugal circulating pump is fitted.

07. CALORIFIERS

The following calorifiers are installed:

- serving the hot drinking water system in the ship, two thermostatically controlled electric calorifiers, each with a capacity of 300 litres
The calorifiers are of the indirectly heated, double walled type.
- serving the wash hand basin in the engine room, one thermostatically controlled electric calorifier with a capacity of 35 litres

08. DRINKING WATER COOLERS

Two drinking water coolers are installed; the location of which is still to be selected.

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

Each drinking water cooler has a capacity of 28 litres per hour water of 12°C at a water inlet temperature of 22 °C and an ambient temperature of 32°C.

09. FRESHWATER GENERATOR

A fresh water generator is installed. The installation is suitable for conversion of sea water into fresh water with a capacity of 5 tons per 24 hours.

The heat is dissipated from the HT cooling water system of one of the main diesel engines. The installation comprises:

- common base frame with:
 - evaporator
 - de-mister
 - condenser
 - brine/air ejector
 - fresh water discharge pump
 - salinometer
 - solenoid valve
 - relief valve
 - all necessary electrical equipment
- combined ejector/raw cooling water pump
- scale inhibitor dosage equipment for feed water
- re-hardening filter for improvement of the fresh water

An alarm is fitted for a too high salt content; in addition the discharge is led to outboard instead of to the drinking water tank.

O10. SEWAGE TREATMENT UNIT

A sewage treatment unit for biological treatment of the sewage discharge is installed in the technical space, serving the separate black and grey water discharge systems of the ship. The unit, using the vacuum toilet flushing system, meets the latest internationally accepted requirements.

The unit is divided in compartments for collection, aeration/purification and chlorinating.

The following items are mounted on the unit:

- electrically driven air blower
- one electrically driven discharge pump
The discharge pump is controlled by float switches in the chlorine contact and discharge chamber and discharge to outboard.
- A by-pass line for direct discharge overboard is provided and also an international shore discharge connection.
- one electrically driven vacuumator pump
- control panel with all necessary switches, relays, etc. for full automatic operation chlorine dosing system with storage tank

O11. FUEL OIL TRANSFER PUMPS

Two identical, electrically driven fuel oil transfer pumps of the screw type are installed. Each pump, running at about 1450 rpm, has a capacity of 15 m³/h at a pressure of 3 bar.

Each pump draws from:

- fuel oil bunkers
- fuel oil settling tank
- fuel oil daily service tanks
- fuel oil overflow tank

and discharges to:

- fuel oil bunkers, trimming duty
- fuel oil settling tank
- fuel oil daily service tanks
- bunker station

Materials:

Pump casing : cast iron
Screws : steel
Shafts : hardened and ground steel
Bearings : hardened and ground sleeve bearings
Shaft seal : lip type seal

O12. FUEL OIL SEPARATOR UNIT

In the engine room a fuel oil separator unit is installed;

comprising:

- common bedplate with sludge collecting pipe, dirty water collecting pipe, piping, fittings, electric cabling and with built-on:
- automatic self-cleaning fuel oil separator with a capacity of 950 l/h marine diesel fuel with a maximum viscosity of 11 cSt at 40°C at a separating temperature of 40 °C

The separator complete with:

- electrically driven fuel oil feed pump of the gear type
- pre-filter
- thermostatically controlled electric fuel oil heater to heat the fuel oil to the desired separating temperature
- combined panel in which are mounted:
 - motor starter fuel oil separator
 - motor starter fuel feed oil pump
 - control unit fuel oil separator

Note:

The feed pump for the fuel oil separator is separately mounted in the engine room.

O13. LUBRICATING OIL PUMPS

The following lubricating oil pumps are installed or supplied:

- For each main diesel engine:
 - engine driven lubricating oil pump
 - built-on electrically driven pre-lubricating oil pump
 - one loose shelf spare lubricating oil pump - ready for mounting
 -
- For main generator diesel engines:
 - engine driven lubricating oil pump
 - built-on hand-operated pump for emptying crankcase
- For emergency generator diesel engine:
 - engine driven lubricating oil pump
 - built-on hand-operated pump for emptying crankcase
- For each gearbox for propeller drive:
 - gearbox driven lubricating oil pump
 - built-on electrically driven stand-by lubricating oil pump
- For both stern tubes:

- one hand pump
The pump draws from:
- lubricating oil storage tank and discharges to:
- respective stem tube

014. LUBRICATING OIL TRANSFER PUMP

One electrically driven lubricating oil transfer pump of the gear type is installed in the engine room.

The pump, running at about 1450 rpm, has a capacity of 3 m³/h at a pressure of 3 bar. The pump draws from:

- respective lubricating oil storage tank and discharges to:
- crankcase each main diesel engine
- crankcase each generator diesel engine
- each gearbox for propeller drive

Materials:

Pump casing	cast iron
Gears	steel, hardened and ground
Shafts	steel, hardened and ground
Bearings	sleeve bearings
Shaft seal	lip type seal

015. SLUDGE/DIRTY OIL PUMP

The sludge/dirty oil pump is an air driven pump of the diaphragm type with a capacity of 5 m³/h at a pressure of 3 bar.

The pump draws from:

- crankcase each main diesel engine
- each gearbox for propeller drive

- sludge tank:
- dirty oil tank
- dirty water tank
- fuel oil overflow tank

and discharges to:

- dirty oil tank
- deck connection

Materials:

Pump chamber	cast aluminum.
Manifolds	cast aluminum
Wetted piston	stainless steel cast
Centre block	aluminum
Clamping rings	stainless steel.
Balls	rubber (Buna-N)
Ball seats	rubber (Buna-N)
Diaphragms	rubber (Buna-N)

O16. COOLING WATER SYSTEMS

The following fresh cooling systems are provided:

- A) Independent cooling water system for:
- radiator cooled emergency generator diesel engine, comprising:
 - engine driven cooling water pump
 - thermostatic control valve
 - engine driven cooling fan
 - radiator with header tank with low level switch
 - ac generator diesel engines, comprising:
 - engine driven cooling water pump
 - thermostatic control valve

- header tank with low level switch
- box cooler

B) Independent low temperature (LT) cooling water system as well as an independent high temperature (HT) cooling water system is provided for:

- each main diesel engine

Each system comprises:

- engine driven cooling fresh water pump
- thermostatic control valve
- header tank: with low level switch
- box cooler

At the lowest point of the system valves are provided for emptying the system to the cooling water drain tank.

Note:

Loose shelf spare cooling water pumps - ready for mounting - are provided for the engine driven pumps as follows:

- one HT cooling water pump for:
 - each main diesel engine
 - each AC generator diesel engine
- one LT cooling water pump for:
 - each main diesel engine
 - each AC generator diesel engine

C) Low temperature auxiliary cooling water system in the engine room, comprising:

- two box coolers; each 50 % capacity
- header tank: with low level switch
- thermostatic control valve
- two fresh cooling water pumps, each 100 % capacity; one as stand-by
- The pumps discharge to:
 - fuel oil cooler of:
 - each main diesel engine

- lubricating oil cooler of:
 - each gearbox for propeller drive

- condenser of:
 - each air conditioning unit
 - provision store refrigerating equipment

- hydraulic oil cooler of hydraulic power unit

At the lowest point of the system valves are provided for emptying the system to the cooling water drain tank.

The above mentioned electrically driven pumps; running at about 1450 rpm; are of the non-self priming, centrifugal type.

Capacity and pressure of the pumps are in accordance with the requirements for their duty.

Materials:

Pump casing	. cast iron
Impeller	. bronze
Shaft	. stainless steel
Bearings	. ball bearings
Shaft seal	. mechanical seal

017. BOX COOLERS

The fresh cooling water systems are cooled by means of box coolers as mentioned above. A box cooler consists of a removable tube bundle fitted in a box integral with the ship's structure, with inlet openings in the bottom and outlet openings in the side plating.

Fresh cooling water flows through the inside of the tube bundle, of which the outside is in contact with sea water for transfer of heat.

In the box a thermal-siphon circulation of sea water arises, based upon the mass differences of water caused by temperature differences. Water with a higher temperature has a lower specific mass than colder water.

The box coolers are suitable for ship lying idle and can be removed with empty ship.

Materials:

Pipes	. Cunifer (CuNi 10 Fe)
Pipe plates	. brass (CuZn40)
Covers	. steel
Pipe connections	. steel
Mounting frame	. steel

018. PROTECTION SYSTEM FOR BOX COOLERS

The natural anti-fouling property of the material of the Cunifer pipes will be used.

The oxide layer on the pipes is toxic for animal growth; to achieve a stable oxide layer it is important to keep the material in balance between cathodic protection and corrosion.

The Cunifer has to keep its natural potential; therefore each box cooler is provided with its own automatically working, electronic control unit to keep the potential of the cooler to a pre-set figure.

The unit, without external power supply, is provided with a built-in battery with a lifetime of at least five years and a LED to indicate proper working of the unit.

The unit is connected to the pipe plate of the cooler as well as to the hull structure.

O19. PRE-HEATING SYSTEMS FOR DIESEL ENGINES

The following pre-heating systems are installed:

- For each main diesel engine:
 - pre-heating unit; comprising:
 - electrically driven, non-self priming, centrifugal circulating pump
 - thermostatically controlled electric heater

For main AC generator diesel engine:

- the HT cooling water system of the auxiliary generator diesel engine is provided with an electric immersion heater

- For emergency generator diesel engine:

- the HT cooling water system of the emergency generator diesel engine is provided with an electric immersion heater

Capacity and pressure of the pumps and heaters are in accordance with the requirements of their duty.

The necessary thermostatic control valves are fitted.

O20. FRESH COOLING WATER TRANSFER PUMP

The following fresh cooling water systems can be drained off to the fresh cooling water drain tank which is incorporated in the ship's structure:

- HT cooling water system of:

- each main diesel engine
- each main AC diesel engine

LT cooling water system of:

- each main diesel engine
- each main AC diesel engine

An air driven pump of the diaphragm type with a capacity of 1 m³/h at a pressure of 3 bar is installed to refill the relevant cooling water system.

The pump draws from:

- fresh cooling water drain tank

and discharges to:

- fresh cooling water drain tank
- HT cooling water system of:
 - each main diesel engine
 - each main Ac diesel engine
- LT cooling water system of:
 - each main diesel engine
 - each main AC diesel engine
- LT auxiliary cooling water system

Materials of the pump as described for the sludge/dirty oil pump as mentioned above.

021. STARTING AIR COMPRESSORS

The following starting air compressors are installed:

- two electrically driven starting air compressors in the engine room
- Each compressor, running at about 1450 rpm, has a capacity of about 17 m³/h F.A.D. at a pressure of 30 bar.
- The compressors of the air cooled type are arranged for automatic operation and supply air to the starting air receivers as described below.
- one hand-operated emergency air compressor for starting from "dead ship" in the emergency generator room
The compressor is mounted on a 30 litres air receiver which is complete with pressure gauge and safety valve.

022. STARTING AIR RECEIVERS

The following starting air receivers are installed:

- two main starting air receivers each with a capacity of 355 litres - 30 bar in the engine room for starting of the diesel engines in the engine room
- one starting air receiver with a capacity of 125 litres - 30 bar in the emergency generator room for starting the emergency generator diesel engine
- The receiver is kept under pressure by the main starting air receivers.
- one starting air receiver with a capacity of 30 litres - 30 bar for starting from "dead ship" as described above.
The receiver is kept under pressure by the main starting air receivers.

023. WORKING AIR COMPRESSOR AND RECEIVER

One electrically driven working air compressor is installed in the engine room.

The compressor of the screw type has a capacity of about 3 m³/min F.A.D. at a pressure of 9.5 bar.

The oil injected rotary screw compressor is arranged for automatic operation and supplies air to a working air receiver of 500 litres via an air cooled after cooler and integrated refrigerant dryer. The after cooler is complete with water separator with automatic drain valve.

O24. EXHAUST SILENCERS

The exhaust gas pipe line of each diesel engine is provided with an exhaust silencer with spark arrestor.

To reduce the exhaust sound level, special attention will be paid to the exhaust silencers of the main diesel engines.

O25. GREASE LUBRICATING PUMP

An electrically driven grease lubricating pump is installed in the steering gear room for continuous lubrication of both rudder stock bearings and both rudder carriers.

The pump is provided with built-on grease container.

SECTION P - HYDRAULIC INSTALLATION

P1. MAIN HYDRAULIC SYSTEM

The main hydraulic power unit is installed in the hydraulic room, comprising a hydraulic oil tank made of stainless steel X2CrNi 19-11 (AISI 304L) and the following electrically driven hydraulic pump sets:

- two main pumps of the variable displacement axial piston type including internal pilot oil/feed oil system.

The capacity calculation of the pumps is based on the highest demand of the following:

Supply, Delivery, Testing and Commissioning of Classification Society Registered Grab Hopper Dredger with a Hopper Capacity of 750m³, mounted with a Marine Excavator Capable of Lifting an 8m³ bucket filled with Spoil at a Minimum Radius of 20m.

-
- a controllable opening and closing time of the bottom door system of approximately 3 and 5 minutes respectively with all bottom door groups working simultaneously
 - two main pumps of the constant displacement internal gear type, serving the high pressure system of:
 - bottom door system for sailing without cotters one pump is serving as stand-by.

With the exception of the pumps for sailing without cotters; the above mentioned pump sets serve for:

- bottom door system
- gate valve system
- overflow system
- butterfly valves in jet pump pipe lines
- butterfly valves in hopper flushing system
- each windlass

Furthermore the hydraulic power unit complete with:

- level gauge
- thermometer
- de-aerating valve
- duplex filter in the main return pipe line
- fresh water cooled hydraulic oil cooler, served by the LT auxiliary cooling water system
- flexible hoses between suction and discharge pipe line of each pump
- piping, flanges, pipe couplings, measuring connections (Minimes), valve panels, safety valves and remaining fittings

- all solenoid operated valves are of the electric pilot controlled type, in addition the solenoid operated valves are provided with built-in signal lamp(s) for indication of the excitation
- alarm switches for:
 - level hydraulic oil tank - low
 - level hydraulic oil tank - too low - stop main hydraulic pumps
 - oil temperature - too high
 - clogged filter in main return pipeline
- electric equipment, wired up to a common connection / control box

Note:

- The design pressure of the system will be 250 bar.
- Each pump set - running at about 1450 rpm - comprises an electric motor, flexible coupling and hydraulic pump; in addition each pump set is also mounted on anti-vibration mountings.
- Hydraulic oil used for all hydraulic systems will be of the mineral oil type
- All calculations for the hydraulic system are based on a momentary viscosity of the hydraulic oil of 50 cSt
- After final installation the complete system is filled with the final hydraulic oil.
- After sea trials the filter will be checked and cleaned.

Emergency closing device is provided for:

- emergency closing for:
 - butterfly valve:
 - inlet from outboard - jet pump
 - jet water to submersible dredge pump

Each device comprises an accumulator which is kept under pressure by means of the main hydraulic system and coupled valves for closing of the valves locally as well as from the wheel house.

P2. HYDRAULIC CYLINDERS

Depending on their service, the hydraulic cylinders are of the oscillating type or of the flange mounted type.

Materials:

Cylinder shell: steel

Piston rod:

- bottom valve cylinder steel, nickel-plated (0.06 mm) and chromium-plated (0.04 mm)
- overflow cylinder steel, nickel-plated (0.06 mm) and chromium-plated (0.04 mm)

P3. OPERATION OF THE SYSTEM

The operation is electric-hydraulic via PLC's.

The following controls are situated in the several control consoles in the wheel house:

- starting and stopping of hydraulic pumps
- bottom door system
- overflow system
- butterfly valves in jet pump pipe lines
- butterfly valves in hopper flushing system
- each emergency closing device
- each windlass

The following controls are situated at site:

- each windlass

SECTION Q - SHIP PIPING SYSTEMS

Q1. GENERAL

All piping systems required for a satisfactory functioning of the installations are installed, together with all fittings such as flow control valves, cocks, filters, pressure gauges, thermometers, etc.

The requirements of the Regulatory Bodies must be met where applicable and where required by the Regulatory Bodies the pipe lines are tested for leaks to the prescribed pressure.

The pipes and pipe ends on machinery are blanked prior to final installation.

Galvanized steel pipe work will be hot dip galvanized.

Piping in oil tanks is not galvanized.

After completion of fabrication work all lubricating oil pipe lines and fuel oil pipe lines from daily service tank to the consumers will be pickled, oiled and blanked prior to final installation. After completion of fabrication works all hydraulic pipe work will be cleaned internally, oiled and blanked prior to final installation.

The pipes are carefully clipped and where necessary fitted with drain plugs and bleeding valves. All piping in machinery spaces is marked with a coloured ring to denote the nature of fluid or gas passing through it.

All valves are fitted with engraved brass name plates in respect of their duty. Where required for their duty flexible pipe connections are used.

Q2. MATERIALS

The materials used for pipes, fittings, etc. are mentioned below. Where the Regulatory Bodies stipulate other materials, these are used.

SYSTEM	MATERIAL	MATERIAL OF FITTINGS
- bilge and ballast	galvanized steel	cast iron
- vent, filling and sounding	galvanized steel	cast iron
- scuppers	galvanized steel	
- fire-fighting and deck washing	galvanized steel	nodular cast iron
- CO ₂ extinguishing	galvanized steel	cast or forged steel
- domestic cold drinking water:		

-	main pipe lines	galvanized steel and/or PVC	cast iron
-	subsidiary pipe lines	copper	brass chromium plated
-	domestic hot drinking water:		
-	main pipe lines	copper	bronze
-	subsidiary pipe lines	copper	brass chromium plated
-	technical fresh water:		
-	main pipe lines	galvanized steel and/or PVC	cast iron
-	subsidiary pipe lines	copper	brass chromium plated
-	waste water system	galvanized steel and/or PVC	cast iron
-	raw cooling water for		
-	fresh water generator	Cunifer 10 steel	Bronze
-	fresh cooling water	steel	cast iron
-	lubricating oil - fuel oil	steel	cast iron
-	compressed air - HP	steel	cast iron
-	compressed air - LP	steel	cast or forged steel
-	exhaust gas	steel	cast iron
-	pneumatic remote control	copper and/or cabled copper pipes	cast iron
-	grease pipe lines:		cast iron
-	open deck	stainless steel	stainless steel
-	covered spaces	steel	Steel
-	jet water lines	steel	nodular cast iron
-	diluting lines	steel	nodular cast iron
-	hydraulic oil	see below	see below

- Inner parts of cast iron, nodular cast iron, cast or forged steel fittings are of bronze or stainless steel.
- Ship side valves are of nodular cast iron or bronze with bronze inner parts.
- Where possible, butterfly valves are used.
The butterfly valves have a rubber lined cast iron body and a bronze vane.
- SOS valves are of nodular cast iron with stainless steel inner parts and remote controlled.
- Storm valves – if used - are of cast steel with bronze clack and fitted with locking device.

Unless specified otherwise, steel pipe work will be executed as follows:

- pipes are of steel, executed as follows:
 - for jet water and hopper diluting system : ERW pipes
 - exhaust gas systems : seam welded pipes
 - for all other systems : ERW pipes
 - for an outside diameter of 30 mm and smaller : precision pipes

fittings as specified above

- pipe joints:
 - pipes with an outside diameter of 30 mm and smaller sizes by means of steel pipe couplings of the cutting ring type
 - pipes with an outside diameter larger than 30 mm by means of:
 - flexible pipe couplings - depending on their duty - or
 - welded steel flanges
- pipe supports by means of steel clips

-Cunifer 10 pipe work will be executed as follows:

- pipes of Cunifer 10
- fittings as specified above
- pipe joints:
 - pipes with an outside diameter of 38 mm and smaller sizes by means of brass pipe couplings of the cutting ring type
 - pipes with an outside diameter larger than 38 mm by means of composite weld necks (inner flanges) with steel outer flanges
- pipe supports by means of steel clips lined with a material to prevent mechanical damage

Hydraulic pipe work will be executed as follows:

-
- pipes on open decks are bright, cold drawn, seamless stainless steel precision pipes, with
 - the notation X2CrNiM017-12-2 (AISI 316 L)
 - pipes in enclosed spaces are bright, cold drawn, seamless steel precision pipes
 - fittings are of cast iron for suction pipe lines and cast- or forged steel for delivery pipe lines
 - pipe joints:
 - pipes with an outside diameter of 28 mm and smaller sizes:
 - by means of steel pipe couplings without ring, Viton sealing ring and mechanically reshaped pipe ends
 - pipes with an outside diameter over 28 mm and up to and including 60 mm:
 - by means of steel flare flanges with an insert in each pipe end and a sealing ring; the pipe ends will be mechanically reshaped (flared):
 - in covered spaces the connection will be complete of steel
 - on open decks:
 - in running pipe lines; the flanges will be of steel and the inserts of stainless steel
 - for connection with the deck passages; the flanges will be of steel and the inserts of stainless steel
 - pipes with an outside diameter over 60 mm:
 - by means of retain ring type connection with steel flanges
 - deck and / or bulkhead passages consist of a thick steel plate welded in the deck and bulkhead respectively; depending on the connected pipe diameters these plates have a thickness of 60 or 80 mm respectively
 - pipe supports by means of pipe supports of synthetic material
 - protection:
 - all pipe couplings, valve blocks and flange connections in running pipelines on open decks will be preserved by means of DENSO® tape

Q3. BILGE AND BALLAST PIPING

Watertight compartments - if required by the Regulatory Bodies - and ballast tank are connected to the bilge system.

The ballast tank is also connected to the ballast system.

A cross connection is arranged between bilge system and ballast system, to enable the general service pump to interchange with the bilge pump.

Suction pipes are led to combined bilge suction distribution pieces.

Mud boxes are fitted to all bilges in the engine room and tail pipes are straight and vertical as possible.

A hand pump is provided to drain the chain lockers in the fore ship.

Another hand pump is provided to drain the chain locker in the aft ship. steering gear room. To drain the steering gear room a pipe line is led to engine room bilge, provided with valve.

Q4. AIR PIPES

Suitable pipes are arranged to tanks, double bottoms, cofferdams, tunnels and other spaces; which are not fitted with alternative ventilation arrangements.

Air pipes of fuel oil bunkers and other oil tanks extending above deck are provided with a tank vent check valve with flame screen and PVC float ball.

Q5. OVERFLOW PIPES

The following over flow pipes are led to the fuel oil over flow tank:

- from each fuel oil bunker
- from fuel oil settling tank
- from fuel oil daily service tank in the emergency generator room

The overflow pipes of the fuel oil bunkers serve also as air pipe to the overflow tank which in turn is provided with an air pipe extended above deck. Above deck this air pipe is provided with a tank vent check valve with flame screen.

The following over flow pipes are led from / to:

- from each fuel oil daily service tank in engine room to fuel oil settling tank

Q6. FILLING PIPES

Filling pipes of fuel oil bunkers, lubricating oil storage tanks, drinking water tank and technical

fresh water tank are extended above deck and provided with a blank flange.

Q7. SOUNDING PIPES

All sounding pipes are provided with a bronze screw cap and where required by the Regulatory Bodies extended above deck.

Sounding pipes of tanks in engine rooms are supplied with a stand pipe and bronze self-closing sounding cock.

Striking pads are fitted under sounding pipes in all tanks and compartments.

Q8. SCUPPERS

Scuppers sufficient in number and size are fitted, in all weather exposed decks of deckhouse and led to the next lower deck.

Scupper pipes in floors in sanitary spaces, galley, passages, etc. are provided with a water lock and led to a main drain.

Q9. FIRE FIGHTING AND DECK WASH SYSTEM

The combined fire-fighting and deck wash system can be supplied from the bilge pump, general service pump and the emergency fire pump.

The place and number of fire-fighting and deck wash valves and the diameter of the piping is in accordance with the requirements of the Regulatory Bodies.

Two international shore connections complying with the requirements of the Regulatory Bodies are provided.

Also each hawse pipe is connected to the system for flushing the anchor chains. The valves for this piping are fitted on the forecastle deck and aft deck respectively.

Q10. DOMESTIC PIPE LINES

General:

For each two deck layers a main pipeline is installed for supply of domestic:

- technical fresh water
- cold drinking water
- hot drinking water

Each main pipeline or main ring pipeline will serve the relevant sanitary consumers of concerned deck layers.

Subsidiary supply lines to consumers are each provided with a stop valve.

Technical fresh water system:

The technical fresh water tank is connected to the technical fresh water pressure set from which a pipe line is led to:

- WC's
- each washing machine
- dish washing machine
- window wipers
- fresh cooling water systems of diesel engines; for supply purposes only
- auxiliary LT cooling water system; for supply purposes only
- separator unit
- tap for cleaning purposes in:
 - provision store
 - laundry
 - galley
- each main and AC generator diesel engine for washing turbo charger

Cold drinking water system:

The drinking water tank is connected to the drinking water pressure set from which a pipe line is led to:

- tap on each deckhouse tier outside
- wash-hand basins;
- showers
- sink in:
 - galley
 - pantry
- wash trough in laundry
- drinking water coolers
- water boiler in pantry

Hot drinking water system:

The hot drinking water system is a closed circuit fitted with an electrically driven circulating pumps and calorifiers and kept under pressure by the drinking water pressure set.

Hot drinking water is supplied to:

- wash-hand basins
- showers
- sink in:
 - galley
 - each pantry
- wash trough in laundry

Waste water systems:

The separate black and grey water pipe systems in fore ship are each provided with siphons and are led into separate collecting pipes which end into the sewage unit with by-pass for direct discharge overboard.

The soil pipe of the galley is provided with a grease trap.

The discharge pump of the sewage unit can discharge the treated water to:

- outboard via storm valves with locking device

- an international shore connection

The storm valves are positioned above the light water line.

Black and grey water pipe systems in the aft ship are also provided with siphons and are led into common collecting pipes which end into the sewage pump unit in the engine room with by-pass for direct discharge overboard.

Where necessary, the collecting pipes are provided with vent pipes with gooseneck.

Q11. COMPRESSED AIR SYSTEMS

The following systems are provided:

A) A HP compressed air system operating at 30 bar for starting the diesel engines.
The system comprises the air receivers and starting air compressors as specified in Section O.

A pipe line is led to:

- diesel engines
- air whistle
- LP compressed air system
- control air system

B) A LP compressed air system operating at 9.5 bar for pneumatic tools and other appliances.
The system comprises the air receiver and working air compressor as specified in Section O.

A pipe line is led to:

- pressure tank of each domestic pressure water set

- air driven sludge/dirty oil pump
- air driven fresh water transfer pump
- control air system; for emergency purposes

The following working air connections are provided:

- two in the engine room
- one in the engine room repair area
- two in welding shop
- two in technical space
- one in bow thruster room
- one on coaming deck in front of the funnel
- one on coaming deck PS half way the hopper
- one on the forecastle deck
-

A connection is provided between HP and LP compressed air system via a pressure reducing valve.

C) A control air system operating at 10bar; fed by the HP compressed air system via pressure reducing valves, air filters and water separators. For emergency the control air system can also be connected to the LP compressed air system.

The control air system furthermore provided with an electrically driven compressed air dryer and air receiver; adapted to the requirements of this system.

A pipe line is led to:

- each main diesel engine
- each main AC generator diesel engine
- bilge oily water separator
- fuel oil separator unit
- SOS valve system

Q12. EXHAUST GAS SYSTEMS

The exhaust gas pipe lines of diesel engines are each provided with a silencer with spark arrestor and the necessary expansion pieces, vibration dampers and flexible connections to allow free expansion and to prevent vibration.

At a suitable place, each exhaust gas pipeline is fitted with a drain point.

Q13. INSULATION

The exhaust gas pipe lines of diesel engines are insulated and externally covered with aluminum plates.

The ring lines for domestic hot and cold water inside the accommodation are insulated by a synthetic foam rubber material

SECTION R – ADDITIONAL CLAUSES

R1.

R1.1 Waste - The Supplier must remove all waste material created or brought by him in the process of completing the work and disposal to be done in accordance with approved SHE file.

R1.2 Defect Period -

A. All goods supplied and services rendered as well as the installation shall be subjected to a 24-month Defect Period after the Delivery has been achieved and signed off by the *Supply Manager*.

B. The *Supplier's* attention is however drawn to the fact that this vessel could at any time during the Defect Period be working at any of the Ports around South Africa or Africa. The *Supplier* will therefore be responsible for rectifying any defects discovered within the duration of this Defect Period at the Port at which the vessel is working at the time of discovery of the defect.

C. A maximum turnaround time of 3 days to correct any Defects.

R1.3 Warranties - A minimum of 24-month defect period must be included for the GHD.

R1.4 Delivery - Delivery shall be defined as:

- Successful receipt and acceptance of the GHD and its associated drawings, manuals and maintenance plan accepted by the *Purchaser*.
- Supply of spares accepted by the *Purchaser*.
- Supply of grabs and its associated drawings, manuals and maintenance plan accepted by *Purchaser*.
- Training of *Purchaser's* personnel accepted by the *Purchaser*.
- Completion of cold and hot commissioning of the GHD accepted by the *Purchaser*.

R1.5 Response time - Technicians to respond within 24-36 hours for onsite malfunctions within the defects period.

R1.6 Technicians - A minimum number of 4 technicians available to support breakdowns after delivery.

R1.7 Where the required material thickness is nonstandard, the next standard SA size to be used.

R1.8 Responsibility

A. Notwithstanding any formal approval of drawings submitted to the *Purchaser*, the sole responsibility for the adequacy of the design, as well as accuracy of workmanship and quality of all materials, shall rest entirely with the *Supplier* who will be required to rectify any defects (at his/her own costs).

R1.9. Quality Assurance

A. The Supplier shall not change any design or specification feature, which has any of the following impacts without formal approval of the Supply Manager.

- (a) Financial
- (b) Interface
- (c) Safety, Environment and Compliance
- (d) Departure from customer requirements.

B. The sole responsibility for ensuring that all components supplied conform to the specifications shall rest with the supplier.

R1.10 Copyright

A. The *Supplier* hereby grants to *Purchaser* a non-exclusive licence:

- to copy any plan, diagram, specification, bill of quantities, design calculation or other similar document made, other than under the direction or control of *Purchaser*, by the *Supplier* in connection with the Works,

- to make free and unrestricted use thereof for its own purposes,

- to provide copies thereof to consultants of *Purchaser* to be used by them for the purpose of the consultancy and

- to provide other parties with copies thereof for the purpose of tenders invited by it.

B. The supplier, furthermore, if any plan, diagram, specification, bill of quantities, design calculation or other similar document made, other than under the direction or control of *Purchaser* by any principal or subcontractor of the *Supplier*, is used in connection with the Works, shall cause such principal or subcontractor to grant to *Purchaser* a similar non-exclusive licence for the purpose set out herein.

C. The provisions of this clause shall not apply to documents made, in the case of equipment to be supplied, in connection with the manufacturing process of the equipment supplied but only to the equipment supplied itself.

D. No separate or extra payment shall be due by *Purchaser* in respect of any non-exclusive licence granted in terms of this clause.

R1. 11 Commercial Specification

A. Activity Programme - The *Supplier* shall submit, as part of the bid, a proposed activity programme, in the form of a Gantt chart (Programme), which will reflect the expected resources and time required to achieve the outcomes as specified ensuring compliance to the overall Delivery Date of the contract. The anticipated monthly cash flow (Activity/Sub activity being complete aligned to *Purchaser's* Activity Schedule) for the contract period shall be provided which should justify the bid price aligned to the *Supplier* Gantt Chart. The *Supplier* ensure Gantt Chart submitted aligns to clause 31 of the conditions of contract.

The appointed *Supplier* shall attend management meetings at the *Purchaser/ Supply Manager* request (It is envisaged that, from the start date of the contract fort nightly virtual progress

meetings (based on progress this may be reduced by the *Supply Manager*) will take place until Delivery has been achieved). The *Supplier* will also attend a kick-off meeting a close out meeting (in person or virtual). The *Supplier* shall present all relevant information such as progress on milestones at the virtual progress meetings. The *Supplier's* progress report will contain the following:

- Project plan high level with start and end dates aligned to Contract Data.
- Project plan per milestone in line with start and end date (aligned to activity schedule)
- Deliverables achieved as per plan (aligned to activity schedule)
- If deviations, then revised plan to achieve the Delivery Date within timelines.

All meetings are to be recorded using minutes or a register prepared and circulated by the person who convened the meeting.

- Invoices And Payment Certificates Invoices for contract payments are to be submitted for attention to the *Supply Manager*.

R1.14 Where the contract is concluded between *Purchaser* and an overseas vendor for the supply of goods to Purchase which are imported into the country by an agent of the vendor, unless otherwise stated in the Schedule, be held to include:

- Making,
- Conveying and delivering,
- Unloading,
- Storing,
- Unpacking,
- Hoisting,
- Setting,
- Fitting and fixing in position,
- Scaffolding and temporary lighting,
- Cutting and waste,

-
- Patterns,
 - Models and templates,
 - Plant,
 - Temporary Works which shall be signed off by the Naval Architect or legal competent person
 - Return of packings,
 - Establishment charges,
 - Profit and
 - All other obligations arising out of the Conditions of Contract.
 - Rigging and Mobile Crane
 - NDT
 - Quality, SHEQ and Compliance
 - Travel, accommodation and allowances
 - Berthing costs other than that of the new GHD

The description shall also be held to include any removal and refitting of equipment, piping, electrical cables, hydraulics, doors or insulating materials, and any opening and closing of hatches required for the work to be carried out.

No separate shipment will be allowed for materials, spares to be sent to the *Purchaser* as this must be transported with the voyage of the GHD.

R1.17 Procedure for Submission & Acceptance of *Supplier's* Design - The *Supplier's* documentation shall be issued to the Supply Manager under cover of the *Supplier's* Transmittal Note indicating all Contract references (i.e. Project No, Contract No, etc.) as well as the *Supplier's* Project Document Number, Revision Number, Title and chronological listing of transmitted documentation. Formats of *Supplier* data submitted is dependent on the project procedure and shall be specified by the Supply Manager, upon the notified request of the *Supplier*.

The *Supplier* shall submit electronic media copies (USB, Drop-box) to the Supply Manager either at the address stated within the Contract Data or at the Project site office.

All electronic documentation shall be submitted by the *Supplier* in Adobe Acrobat (.PDF) and native file format. The *Supplier* shall ensure that all electronic documentation submitted are print compatible i.e. margins aligned, legibility and of the highest quality for future utilisation should the documentation necessitate printing.

Documentation Submission shall be of the highest quality to allow immediate and accurate use by the Supply Manager i.e. without any need for interpretation due to possible illegibility, unclarity or poor quality. This is not limited to Unique Document Description Identifiers for traceability, Incorrect Documentation Revisions or Editions, Incomplete Documentation i.e. missing information, authorised signatories, accompanying completed annexures where applicable. This documentation or drawing submissions will be returned to the *Supplier* for correction prior to being deemed officially submitted to the Supply Manager.

Acceptance of documentation by the Supply Manager will in no way relieve the *Supplier* of his responsibility for the correctness of information, or conformance with his obligation to provide the Goods and Services. This obligation rests solely with the *Supplier*.

Review Codes for *Supplier* Documentation

- Code C1 - Accepted

The Supplier's design/submission of documentation is accepted and the Supplier only needs re-submit documentation only if major changes have been made.

- Code C2 – Accepted with Comments. Revise and Resubmit

In the event that the Supply Manager returns documentation with comments noted, the Supplier shall, within the 'period of reply' as defined in the Contract Data, make the required changes and submit the revised documentation for further review on the next revision.

- Code C3 – Not Accepted. Revise and Resubmit for Review

In the event that the Supply Manager returns documentation with "Not Accepted, Revise and Resubmit" the Supplier, within the 'period of reply', make the required changes and resubmit the revised documentation on a new revision for further review. Should these revisions necessitate changes in other related documentation, the Supplier shall make the appropriate changes and re-submit all the revised related documentation for further review. The Supplier shall not proceed with any activities controlled by the Supplier's documentation until it has been

re-submitted and acceptance indicated or unless prior permission is obtained from the Supply Manager. The Supplier revises and re-submits documentation but on the next revision until a review code 'C1' is achieved. This review process shall not entitle the Supplier to submit any claims due to time loss.

- Code C4 – Review Not Required Documentation signed at "Code C4" level is considered to be for information only by the Supply Manager.

After review, a scan of the reviewed/marked-up drawing/document, with the Supply Manager's consolidated comments and document status marked on the Supplier Review Label, shall be returned to the Supplier for revision, re-submittal as instructed or inclusion in the Data Packs where applicable.

The Supplier shall allow the Supply Manager 2 weeks (unless otherwise stated and agreed) to review and respond to the Supplier's submission of their documentation, i.e. from time of receipt by the project to the time of despatch. However, work shall proceed without delay in the event of late return of the documentation by the Supply Manager with prior notification in writing by the Supplier. No work shall be carried out by the Supplier without prior notification in writing to the Supply Manager being done.

On receipt of the reviewed documentation the Supplier shall make any modifications requested/marked-up and resubmit the revised documentation to the Supply Manager within 2 weeks. Queries regarding comments/changes should be addressed with the Supply Manager prior to re-submittal.

Any re-submittals, which have not included the changes/comments identified, will be returned to the Supplier to be corrected. The Supplier shall re-issue the revised documentation incorporating all comments and other specified details not included in the previous issue within 2 working days of receipt of the marked-up document.

As-built Drawings, Operating Manuals and Data Packs

The Supplier provides the following:

Red Line/Final Documentation:

- All Red Line information to be signed off by the Supplier's responsible Professional/Technologist before issuing to the Supply Manager.

Installation, Maintenance, Training and Operating Manuals and Data Books:

- The Supplier provides installation, maintenance, training and operating manuals in an A4 hard covered, red, grease and waterproof binder, using 2 ring type binders. The manuals are well indexed and user friendly and include a summarized Table of Contents.
- Drawings and charts larger than A4 are folded and those greater than A3 are enclosed in an A4 plastic pocket of adequate strength. All drawings must be A0 compatible soft or hard copy.
- The Supplier submits the draft Table of Contents to the Supply Manager for acceptance prior to the compilation and official submittal of the manuals.
- The originals of all brochures shall be issued to the Supply Manager. When a general brochure is applicable to a range of equipment, then the specific item, catalogue number or model number shall be stated, which is best achieved by introducing a separate index page, which cross-references the specific item to a tag number.
- The address, phone numbers, fax numbers and reference numbers of all Sub-Suppliers is provided
- Where manuals include drawings that still need to be revised to "As-Built" status, and such manuals are required prior to 'As-Built' status, the manual will not be considered to be in its final form until the "As-Built" version of each such drawing has been incorporated.
- The required number of copies of the manual (s) shall be as specified by the Supply Manager and submitted per type or model number of equipment included in the contract, or as specified by the Supply Manager.
- All electronic copies (pdf) of Data Packs to be properly indexed.
- A typical example of what the binder/file (s) shall be marked with on the spine and the front cover is as follows: -

- o Project No./Name
- o Manual Title, e.g. Installation, Maintenance and Operating Manual
- o File Breakdown Structure (FBS) No. and Title
- o Manual Numbering (e.g. Volume 1 of 2, etc.)
- o Contract Number

o Supplier Name

- The required number of copies of all As-Built/Final/Data Packs shall be:
 - o 3 x hard copies (Full size)
 - 3 x CD Roms with Adobe Acrobat (.pdf) and "Native" formats