

FIRST SCHEDULE

PROCUREMENT SPECIFICATION

OF

ONE STEEL TUG

FOR

MARINE DEPARTMENT

Marine Department

The Government of the Hong Kong Special Administrative Region

of the People's Republic of China

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CHAPTER 1

GENERAL PROVISIONS

1. INTRODUCTION

1.1 This Procurement Specification (PS) intends to provide details of Marine Department (hereinafter referred to as MD) requirements for **One (1) Steel Tug** (hereinafter referred to as Vessel) for the use by the Fleet Operations Section of Marine Department (hereinafter referred to as FOS) with respect to its:

2 Performance, design and construction;

3 Safety;

4 Operation;

5 Fitting out; and

6 Drawings and documentation.

1.2 The Government New Construction Section (GNC) of MD is the section responsible for the procurement of the Vessel for the Government of the Hong Kong Special Administrative Region (HKSAR) of the People's Republic of China (hereinafter referred to as Government). Electrical and Mechanical Services Department (EMSD) will supervise the Electronic Navigation Equipment (ENE) technical acceptance.

1.3 Tenderers are invited to submit their proposals and list of equipment that would best fit the requirements herein stated in this PS.

1.4 Together with this PS, the General Conditions, the payment terms, requirements for guarantees, and liquidated damages as stipulated in the tender document issued by Government under the Gazette Notice, shall form part of the Contract. The PS shall form the First Schedule of the Contract.

1.5 The delivery time of the Vessel quoted by the tenderer will start to run from the date MD issues the Notification Letter of Acceptance.

2. DESIGN AND CONSTRUCTION RESPONSIBILITY

2.1 Of essence, it is the SOLE responsibility of the Contractor to supply a safe and suitable working Vessel to meet all the requirements given in this PS, which include requirements for safety, speed, hull form design features, structure, method and materials for construction and fitting out, manoeuvrability, stability, sub-division, bollard pull capacity, stopping capability and operational efficiency.

- 2.2 The Contractor should note that the intent of the Contract is to design, build and supply the Vessel in full compliance with the requirements given in this PS for quality in every aspect which, where necessary for the specific role of the Vessel, may be over and above that normally required by statutory and Classification rules.
- 2.3 If the Contractor employs a consultant to design the Vessel, whether this is agreeable to MD or not, this would not in any way whatsoever diminish the Contractor's contractual responsibility towards the design of the Vessel.

3. PROVISION OF DOCUMENTS BY SUCCESSFUL TENDERER

- 3.1 The following documents should be submitted by the successful tenderer after receiving the Notification Letter of Acceptance from MD:
- (a) Full name and position of the representative(s) of the successful tenderer who are authorized by the Memorandum and Articles of Association, to enter into and execute the Contract on the Company's behalf;
 - (b) One photocopy of the Latest Memorandum and Articles of Association of the successful tenderer;
 - (c) One photocopy of the Notice of Directors and Secretary and their particulars under the Companies Ordinances;
 - (d) The original and three photocopies of the insurance policy and the premium receipt for the Contract (refer to Clause 7 of the General Conditions in the tender document);
 - (e) One photocopy of the employee compensation insurance policy and the premium receipt for the shipyard;
 - (f) One photocopy of the Business Registration Certificates; and
 - (g) Within 21 days from the issuing date of this letter, the original and three photocopies of the irrevocable guarantee for the Contract in accordance with the Third Schedule and Clause 15 of the General Conditions.

4. LIQUIDATED DAMAGES AND PAYMENT TERMS

- 4.1 Tenderers are hereby informed that the liquidated damages and payment terms stipulated herein this PS must be acceptable to the tenderer before submitting their bid. **Otherwise the bid from the tenderer would be deemed invalid.**

5. WARRANTY

- 5.1 Details of warranty terms are given in the General Conditions. Additional warranty is given in this section and also stipulated in **APPENDIX 1**.
- 5.2 The Contractor is required to have (or have arranged) substantial and established ship repairing/servicing facilities in the HKSAR capable of servicing the Vessel during the 12-month warranty period. **Otherwise the submitted tender shall not be considered.**
- 5.3 Notwithstanding and without prejudice to the Contractor's warranty obligation for the total Vessel under Clause 16 of the General Conditions of Contract, the original copy of the manufacturer's warranty certificates and/or documents of all bought in machinery, equipment and apparatus valid for 12 months from the date of acceptance of the Vessel, shall be handed over to MD at time of Delivery Acceptance.
- 5.4 The Contractor is responsible for arranging the Vessel for guarantee slipping by the end of the 12-month warranty period. In addition to warranty defects as required by Clause 16 of the General Conditions of Contract, the Contractor should also be responsible for the rectification of any design and/or manufacturing faults found after delivery.
- 5.5 The Contractor is required to have a duly authorized (by the Contractor) representative in the HKSAR during the warranty period to handle all warranty matters. The Contractor's representative in the HKSAR should be a reputable firm in the HKSAR, and should be acceptable to GNC of MD. **Otherwise the submitted tender shall not be considered.**

6. ACCEPTANCE AND DELIVERY

- 6.1 Acceptance of the Vessel is to be carried out in two parts:

Part 1: Technical Acceptance by GNC

Part 2: Delivery Acceptance by MD

- 6.2 Technical Acceptance

- (a) This includes all the technical, mechanical and electrical tests considered necessary by GNC, including Equipment Tests, Speed Trial, Manoeuvring Tests, Endurance Tests, Stability Test, Static Bollard Pull Test and Bottom Survey in the dry dock or on the slipway after the Official Sea Trials in the HKSAR.
- (b) The Contractor shall pay for all material and labour costs for the tests stated in the above paragraph.
- (c) The main items that must be inspected by GNC are listed in the Main Inspection Items (M.I.I.) in **APPENDIX 2, Table APP 2.1**.

6.3 Delivery Acceptance

- (a) The Vessel, after its successful completion of Technical Acceptance, should be delivered at the Contractor's expense to Government Dockyard.
- (b) If the delivery of the Vessel is 120 days later than the delivery date specified in the Contract, at the discretion of Government, Delivery Acceptance may not take place and the Contract may be terminated according to the terms stipulated in the General Conditions.
- (c) On delivery, the Vessel must be in a clean, tidy and fully fitted and operational condition. Also it should not have undergone delivery sea voyages under its own power.
- (d) The Contractor must demonstrate to MD that all machinery, electrical and electronic equipment are in good working order; and must hand over the Vessel, its fixtures and equipment to MD in good and complete condition.
- (e) The Delivery Acceptance of the Vessel should be carried out by GNC in accordance with the terms stipulated in the General Conditions. The Delivery Acceptance is only completed when the Acceptance Certificate is issued by the Director of Marine.
- (f) In not later than six weeks before the Delivery Acceptance of the Vessel, the Contractor is required to submit to MD four copies of the Inventory List covering the entire Vessel. The Inventory List, which is *without prejudice* to the General Conditions of Contract, shall need to be agreed by MD before the day of Delivery Acceptance. At the Delivery Acceptance of the Vessel the agreed Inventory List will be used to check that all the items have been delivered to MD in a satisfactory state. Details of each inventory item should include: item name, description, type, quantity, manufacturer's name, manufacturer's part reference number and/or serial number, and the items' location in the Vessel.
- (g) All equipment and machinery manuals and documentation, spares and stores, special tools and testing equipment SHALL be delivered to MD at the Delivery Acceptance of the Vessel. Delivery Acceptance will follow GNC's Delivery Acceptance Procedures, a copy of which is available to the tenderer upon the tenderer's request. The Contractor must provide 14 days advance notice in writing for Vessel delivery when the Vessel is considered to be completed in accordance with the Contract and ready for Delivery Acceptance.

7. SURVEYS

- 7.1 Tenderers shall note that the tender price quoted in their "Tender Form" must include the cost for surveys to be carried out by the relevant Classification Society (if required) and surveys by GNC officers (or their appointed representatives) as owner representatives.

- 7.2 The tenderers shall state the Classification Society and type of the Vessel that the proposed Vessel will be designed and built to. The following international Classification Societies are acceptable to MD:

ABS, BV, CCS, DNV, GL, KR, LR, NK and RINA

- 7.3 All plans and drawings shall be approved by GNC (see **APPENDIX 3** for the list of drawings to be submitted to MD for approval). All electronic items and their installations shall be approved and inspected by EMSD. Subject to the next paragraph, an advanced written notice of not less than 5 and 10 working days must be given to MD before a survey visit is carried out in P.R. China and Overseas respectively.
- 7.4 A programme for acceptance inspections, tests and trials of hull, machinery, electrical and electronic items, should be prepared by the Contractor and be acceptable to MD within 40 days after signing the Contract. The Government may suspend payment if the programme is not produced by the Contractor or if the progress of work does not follow that indicated in the programme. **A monthly work progress report with photographs is required to be submitted to MD during the construction of the Vessel.**
- 7.5 After arriving at the site, if the MD officer considers it is UNSAFE to carry out the test or inspection, the test/inspection will not be carried out. The Contractor shall have to arrange another additional survey visit at the Contractor's own expense. The same arrangement shall apply if the test fails to meet a prior agreed standard between the Contractor and MD.
- 7.6 When the cost for the services of a Classification Society is incurred, the Contractor is responsible to pay the Classification Society all the relevant fees, charges and the associated expenses. Such fees shall include charges for drawing approval, surveys (if deemed necessary), issues of certificates, and any other expense reasonably required by the Classification Society.
- 7.7 If the Vessel is built outside the HKSAR, tenderers are required to arrange and pay for MD officers to carry out survey visits/construction progress visits to the Vessel. As a minimum, the number of visits for GNC officers should be about 40 man-visits for the Vessel to be built (assumed 1 night stay for each visit for Vessel built in P.R. China, while for Vessel built overseas the tenderers should allow a longer period of stay and reduce the survey visit frequency). In addition, arrangements should be made for 2 FOS officers to visit the construction yard about 4 times, i.e. 8 man-visits for the Vessel (assume 1 night stay for each visit for Vessel built in P.R. China).

8. SPEED REQUIREMENTS

- 8.1 As part of the Acceptance Trial, the Contractor must carry out an Official Speed Trial in the presence of GNC officers, or MD authorized representatives. Of essence the Vessel shall achieve the GUARANTEED SPEED. **Otherwise the tender shall not be considered.**

- 8.2 The GUARANTEED SPEED is the actual mean speed (i.e. NOT theoretical) obtained during the Official Speed Trial runs. The speed calculations must NOT be corrected for wind, wave, tidal current, shallow water effects and weather condition.
- 8.3 The mean speed is to be calculated as the arithmetic mean of not less than FOUR continuous runs, i.e. TWO runs in each direction.
- 8.4 The GUARANTEED SPEED is considered not achieved if the GUARANTEED SPEED cannot be obtained during the Official Speed Trial after a total of FIVE runs in each direction.
- 8.5 **The GUARANTEED SPEED for the Vessel under trial condition as stated in APPENDIX 5 is at least 12 knots at 100% maximum power. (Also refer to Fourth Schedule, Part C for liquidated damages)**
- 8.6 The Official Speed Trial is to be carried out in HKSAR waters by using the Differential Global Positioning System (DGPS) navigator as provided by MD for measurement of the speed trial distance.
- 8.7 The Contractor must submit to MD, for MD approval, an Official Speed Trial and Sea Trial Programme, which should include details of proposed procedures. This programme must be submitted to MD in not less than 14 working days before the trials commenced.
- 8.8 The speed, time of the day, wind direction and velocity and engine running conditions, etc. must be properly recorded by the Contractor, and signed as witnessed by GNC officers (or their representatives) during the Official Speed Trial. A copy of the report shall be submitted to MD before Delivery Acceptance.
- 8.9 Progressive speed trial is also required for the Vessel run at five different engine revolutions in order to obtain a speed to power curve.

9. STATIC BOLLARD PULL REQUIREMENTS

- 9.1 **The GUARANTEED STATIC BOLLARD PULL for the vessel under trial condition is at least 8 tonnes at 100% maximum power. (Also refer to Fourth Schedule, Part D for liquidated damages).**
- 9.2 The Contractor must submit to MD, for MD approval, an official static bollard pull test procedures to meet the requirements of Appendix 6 “Bollard Pull Test Requirements”. The static bollard pull test procedures must be submitted to MD not less than 14 working days before commencing the trial.

10. MANOEUVRABILITY AND CRASH STOP TESTS

- 10.1 The tests should cover:
- (a) Forward turning circle (Port and Starboard) tests;

- (b) Astern running tests when both engines are running at full power;
- (c) Manoeuvring on a single main engine (for port and starboard);
- (d) Emergency reversals from ahead to astern to establish stopping time and distance;
and
- (e) Emergency hand steering trial at lower speed.

10.2 The Contractor must provide a trial report to MD after the trials. The report shall contain information regarding method of test, sea and weather condition, wind condition, vessel loading condition, heel angle during turn (for forward turning with engine running), and any other relevant information; and shall be prepared in a format agreed by MD.

11. ENDURANCE

11.1 In the Acceptance Trials, the Contractor is required to carry out at his own expense (including fuel oil, lubrication oil, crew, application for sea trial permit if necessary and other necessary expenses) in the presence of MD officer(s) the Official Speed Trial.

11.2 The Vessel must be in the trial condition (see **APPENDIX 5**) during the Official Speed Trial. The endurance tests should include a 1 hour continuous running at 100% maximum power, 30 minutes continuous running at 80% maximum power and 30 minutes continuous running at 50% maximum power. All equipment should also be in operation during the trial.

11.3 The speed, time of the day, engine running conditions, sea condition, etc., must be properly recorded by the Contractor, and signed as witnessed by GNC officers (or their representatives) during the trial. A copy of the report shall be given to MD before Delivery Acceptance.

12. SUPPORT SERVICES

12.1 The Vessel must be designed for through life support and easy maintenance in the HKSAR at an operating profile as mentioned in **Chapter 3, Paragraph 4**.

12.2 The above applies not only to main propulsion machinery but also to all equipment installed in the Vessel.

12.3 All machinery/equipment installed in the Vessel must be supportable in the HKSAR.

13. MARKINGS AND COLOUR SCHEME

13.1 Markings and colour scheme shall be provided as per requirements given in **APPENDIX 7**.

CHAPTER 2

MANDATORY REQUIREMENTS

1. The tender shall comply with the following mandatory requirements:

1.1 Contractual:

- (a) **APPENDIX 1** – Warranty and Guarantee Slipping
- (b) **Second Schedule** – Payment and Retention Money
- (c) **Third Schedule** – Irrevocable Guarantee
- (d) **Fourth Schedule** – Liquidated Damages for Breach of Contract

1.2 Technical:

(a) Particulars of Vessel:

- (i) Overall Length : 17 - 18 metres
- (ii) Breadth : 5 - 5.5 metres
- (iii) Material of Construction: Steel hull and deckhouse.
- (iv) Guaranteed Speed: 12 knots when main propulsion engines running at 100% maximum power, and with the completed Vessel loaded in the trial condition as described in **APPENDIX 5**.
- (v) Guaranteed of Static Bollard Pull: 8 tonnes when main propulsion engines running at 100% maximum power, and with the completed Vessel loaded in the trial condition as described in **APPENDIX 5**.
- (vi) Propulsion System: The Vessel shall be propelled by two propellers with fixed type kort nozzles which are driven by marine diesel engine(s) fulfilling the operating profile in **Chapter 3, Paragraph 4**. Catalytic converters shall be fitted to the engine exhaust pipes to reduce the toxic gases discharged into the atmosphere. In addition, the tenderer is required to propose two options of engine makers for consideration by MD.
- (vii) Solar panels shall be installed to convert the solar energy to power the shipboard lightings and electrical fans in the deck house in addition to the shipboard electrical power.

(viii) The thickness of keel plate and bottom plate in way of engine seating shall not be less than 8 mm. The bilge plate, shell plate and deck plate shall not be less than 7 mm. The deckhouse side plate and deck and roof plate shall not be less than 5 mm. The bulwark shall not be less than 8 mm.

(b) Vessel of Proven Design

The Vessel should be a proven monohull design with a verifiable service record for towing and general purpose or equivalent, (i.e. a similar vessel is already in service, or the design is based on model test / modification of a similar vessel). “Similar vessel” is a vessel of similar dimensions i.e. $\pm 5\%$ of the Geometrical Similarity (length/breadth ratio, breadth/depth ratio, etc.) and a vessel of Similar Speed i.e. $\pm 5\%$ of the Dynamical Similarity (Froude Number (V/\sqrt{gL})). The user’s information / reference / certificate of acceptance, speed trial or model test reports, photos, etc. should be submitted for tender evaluation.

(c) Proven Record of Shipyard:

The shipyard should have experience in building similar or larger vessels with verifiable records (i.e. the user’s information / reference / certificate of acceptance, photos, etc. should be submitted for tender evaluation)

(d) Submission of all required information as stipulated in Paragraph 7 and 8 of the Standard Terms of Tender.

2. The tender that fails to comply with the Mandatory Requirements shall not be considered by MD.

CHAPTER 3

GUIDELINE REQUIREMENTS – GENERAL

1. GENERAL

- 1.1 The Guideline Requirements given in this PS are not mandatory for the tenderers to comply with. They are guidelines for tenderers to understand the characteristics of the Vessel that MD has in mind. Tenderers should carry out their own evaluation to ascertain the practicability of these requirements. If the tenderer considers any of these requirements are uneconomical or impractical to achieve, the tenderer is free to propose alternatives. In such a case, the tenderer must put forward reasons for the change.
- 1.2 If there are any discrepancies between the Mandatory Requirements and Guideline Requirements, the Mandatory Requirements shall prevail.
- 1.3 The tenderers have to confirm whether the submitted tender can comply with the guideline requirements by deleting ‘YES’ or ‘NO’ in **APPENDIX 10**. Otherwise, the submitted tender is considered to have fully complied with the guideline requirements. Tenderers who intend not to comply with all the guideline requirements, must give an alternative offer as detailed in **APPENDIX 11**.

2. RULES, REGULATIONS AND CLASSIFICATION

- 2.1 The Vessel and all related works shall be in compliance with the requirements of the various regulatory bodies and rules listed below that are in force at the time of Contract signing insofar as they may apply:
 - (a) Relevant Rules and Regulations applicable to this type of vessel for the construction of hull and machinery from one of the recognized ship Classification Societies;
 - (b) Hong Kong Marine Department “Code of Practice –Safety Standards for Classes I, II and III Vessels”.
 - (c) International Regulations for Preventing Collisions at Sea 1972 (as amended by IMO resolution A.464(XII) and A.626(XV));
 - (d) IEC Regulations for the Electrical and Electronic Equipment of Ships in respect of electrical installations;
 - (e) All fittings shall be produced and installed in accordance with an accredited national or international standards, (e.g. British Standards, JIS, ISO); and
 - (f) Quality and standards of construction not mentioned in this specification shall comply with the relevant international standards or rules.

2.2 The Contractor shall note that although the Vessel is to be built to international Classification rules, the Vessel shall not be classed. The interpretation of the rules shall normally follow past and common practice. Nevertheless the final interpretation of rules shall rest with MD.

3. ROLE OF VESSEL

3.1 This Vessel will be used in towing / pushing of vessels within Government Dockyard basin for docking / undocking purposes. In addition, the Vessel will be used to convey Government Officers as well as engaged in towing / pushing services within Hong Kong waters.

4. OPERATING PROFILE

4.1 The operating profile is based on 300 days per year. The Vessel should be capable of maintaining operations for at least 12 hours without re-fuelling or replenishing of fresh water, with a complement of three (3) and eight (8) working members, normal operational stores and fulfilling the following speed/time profile:

<u>Ship speed</u> <u>With engine running at</u>	<u>Operating hours per day</u>
100% (Maximum Continuous Rating MCR)	1.5
80% (Maximum Continuous Rating MCR)	1.5

4.2 The Contractor should take into consideration that the Vessel would normally be stationed inside Government dockyard basin where the speed limitation is not more than 5 knots. The propulsion system should also be suitably designed for this special operating profile.

5. WORKMANSHIP AND QUALITY CONTROL

5.1 The Contractor shall ensure that the workmanship is of a consistently high quality so that the requisite watertightness is obtained, exposed surfaces are smooth, proper fit and alignment accomplished, and stress concentration avoided.

5.2 Welding shall be done by properly trained and qualified personnel. All welders shall be pre-qualified by a recognized Classification Society for the type of material and welding processes being used.

5.3 For steel construction, welding and fabrication control, the International Association of Classification Society's "Shipbuilding and Repair Quality Standard" should be followed respectively. A Contractor's Shipyard Quality Control Standard or equivalent standard acceptable to MD would also be considered. **The tenderer should specify the quality control standard in the tender proposal.**

6. MATERIALS

6.1 The hull and deckhouse shall be manufactured in mild steel. All material shall be manufactured and certified in accordance with the latest requirements of a recognized Classification Society.

6.2 Except where otherwise specified, stainless steel specified herein shall be of the following grades:

(a) For interior applications: AISI 304 or 304L; and

(b) For exterior applications: AISI 316 or 316L.

6.3 Plywood, if used, shall be of marine type to B.S. 1088: 2003 or other equivalent standard.

7. TALLY PLATES

7.1 Tally plates in both English and Chinese characters should be fitted for spaces and equipment in the following locations:

(a) Machinery in the engine room and wheelhouse;

(b) Electrical and communication equipment;

(c) Deck machinery;

(d) Accommodation spaces, toilets, stores, etc.;

(e) Ventilation inlets and outlets and air pipes on weather deck;

(f) All valves;

(g) Control panels, switchboards, distribution boxes and electrical circuits;

(h) Locking/opening positions of weathertight door handles; and

(i) Any other equipment/fittings as required.

- 7.2 Information engraved on tallies will include the following, where applicable:
- (a) Machinery in the engine room and wheel house;
 - (b) Service, function, mode of operation, source of power;
 - (c) Supply, services supplied, fuse rating, voltage, warning;
 - (d) Safe working load, dates of installation, etc.; and
 - (e) Any other items as required.
- 7.3 Tally plates exposed to weather should be in durable and non-corrosive material, and be securely fastened.
- 7.4 A tally plate specifying the maximum number of the crew and passengers to be carried on board shall be displayed at a prominent position on the main deck.
- 7.5 All cable terminations should be clearly identified for disconnection and reconnection. The capacity and service of all fuses should be marked at convenient places adjacent to the fitted position of the fuses.

CHAPTER 4

GUIDELINE REQUIREMENTS – HULL

1. HULL DESIGN FEATURES

- 1.1 The hull form of the Vessel should be developed, evolved, modified or derived from an established parent hull form of hydrodynamically efficient type with good seakeeping and good manoeuvrability and shall have a pleasing profile. The performance and characteristics of the parent hull form (from which the hull design is developed / derived) must be accredited with full details of tank tests, and/or trial results obtained from an existing in-service vessel. **A full list of vessels of that hull type and the name and correspondence address of the operators shall be submitted together with the tender.**
- 1.2 To perform its primary role, the Vessel will be required to operate, under its operational loading with respect to the crew, fuel and stores, within HKSAR waters in weather conditions up to and including moderate seas of Sea State 5 and Beaufort Wind Scale 6. Under these conditions, the Vessel must provide an effective platform for crew engaged in continuous operations without endanger the crew and giving rise to excessive crew fatigue.
- 1.3 The combined effect of the design of the principal dimensions and hull form shall allow the Vessel to have good seakeeping and to provide an acceptable level of comfort to the crew / passengers / casualties, particularly with regard to high vertical acceleration and high rolling frequency, when the Vessel is normally operated in rough sea conditions. The permanent list of the Vessel should not be greater than one degree.
- 1.4 The Vessel will have good manoeuvrability for the operational requirements mentioned in **Chapter 3, Paragraph 3 and 4.**
- 1.5 All underwater appendages of the Vessel shall be resistant to or protected from damage by floating and semi-submerged debris. All systems using seawater should be designed to allow quick and easy clearance of ingested debris from water inlets with access from inside the Vessel.
- 1.6 All exposed weather decks and wheelhouse top regardless of size or extent shall be provided with a camber and/or sheer to facilitate easy drainage. The camber and/or sheer shall be adequate such that no standing water or pond occurs even in the presence of local structural unfairness, list or trim.
- 1.7 Clear headroom in normally occupied spaces, e.g. accommodation and wheelhouse, shall not be less than 2 metres. All other spaces shall be safe and easily accessible for inspection and maintenance.
- 1.8 The Vessel shall be designed to facilitate the replacement of the main engines, gearboxes and steering gear. Flushed weathertight hatches on the main deck and deckhouse top shall be provided for lifting the engines directly from the Vessel.

2. HULL STRUCTURAL REQUIREMENTS

2.1 General

- (a) Scantlings of hull structural members shall be determined in accordance with the latest Classification Rules and Regulations for the construction of this type of vessel. However, this should be subject to any increase of scantling as considered necessary by MD, with due regard to weather, vibration, local concentrated load, berthing impact, slamming forces, etc.
- (b) Where local strengthening is required, insert plates shall be used. Doubler plates will not be accepted for local strengthening but are permitted as sacrificial wear and abrasion surfaces in areas where replacement can be reasonably achieved without having to also remove the non-sacrificial structure. Edges of insert plates shall be tapered to match the thinner plate.
- (c) The hull shall be capable of sustaining frequent minor impacts during boarding operations by FOS within HKSAR waters.
- (d) Limber holes should be suitably provided in bottom floors, longitudinals, webs and transverse frames, etc., to facilitate efficient drainage of bilge water to each bilge suction position irrespective of trim. However, the number of limber holes shall be kept to an adequate and minimal level.
- (e) Ample drainage from all exterior decks shall be provided directly overboard so that there is no standing water when the Vessel is operating throughout its anticipated list and trim range. Water that drains from higher decks or wheelhouse top shall not be allowed to flow free on lower decks, but must be directed into wells and drains that lead to overboard discharge.

2.2 Construction Requirements

- (a) All hull openings shall be suitably strengthened. Large deck openings shall have suitable structural arrangements to compensate for loss in strength.
- (b) Large openings on the main deck such as engine removal hatch(es) shall be provided with well rounded/parabolic shaped corners, insert plates and strong webs.
- (c) Suitable reinforcements and stiffeners should be fitted under the windlass seat, bollards and other heavy deck equipment.
- (d) Major penetrations or access openings through the transverse hull bulkheads below the margin line shall be avoided as far as practicable. Cable penetrations shall be located as high and as far inboard as possible. Any and all penetrations through bulkheads below the main deck shall be fitted watertight as though the bulkhead was to be entirely watertight.

- (e) Weathertight deckhouse located above the main deck shall, in their outside boundaries, have means of closing openings with sufficient strength such as to maintain weathertight integrity in all damage conditions where the space in question is not damaged. Furthermore, the means of closing shall be such as to maintain weathertight integrity in all operational conditions.
- (f) The tank space and store hold is to be fitted shelves and racks for stowage of tow rope, warps etc. Access by means of a watertight hatch. Fuel oil tanks (port and starboard) are to be located at forward end of the tank space compartment.

3. SPEED AND POWER

- 3.1 **The tenderer shall provide speed and power calculations for the Vessel in the full load and trial conditions with all margins. The basis of the calculations shall be clearly described. Any supporting data available from similar vessels in service or prior model tests shall be submitted with the tender proposal.**

4. DESIGN AGAINST NOISE AND VIBRATION

- 4.1 The Vessel shall be designed free of excessive noise and vibration overall, as well as localised, structural vibrations. Vibration resonance in any part of the hull, deckhouse, fittings, machinery and piping shall not be accepted.
- 4.2 Both air and structural orientated noise levels shall be kept to a minimum in the wheelhouse and accommodation area. The resultant noise level with all windows and doors closed shall not exceed 85dB(A).

5. ACCOMMODATION AND COMPARTMENT ARRANGEMENT

5.1 General Arrangement

- (a) The Vessel should be designed and built as a monohull craft. The hull and deckhouse shall be constructed of all welded Grade A mild steel. The deckhouse, and fittings on it, and the mast and antenna arrays must be designed to avoid damage from counter-rolling while alongside a larger vessel.
- (b) An adequate side deck (at least 900 mm wide) extending the full length of the deckhouse is required. Obstructions at both sides, such as air pipes, vents, etc., should be recessed in or close to bulwark.
- (c) Subject to full compliance with the requirements of stability and subdivision, the hull should be divided by transverse watertight bulkheads into five compartments as follows:

- (i) Fore Peak / Chain Locker;
 - (ii) Crew space;
 - (iii) Engine Room;
 - (iv) Tank Space and Store Hold; and
 - (v) Steering Gear Compartment.
- (d) The deckhouse includes a wheelhouse / steering console on the navigation deck, the passenger space, toilet and pantry with a CO₂ locker located on main deck. Tow hook and seating located after end of deckhouse on main deck.
 - (e) The deck casing is to be covered by portable nylon awning, the forward stanchions being permanently attached to house and the after stanchions, socketed into the bulwark.
 - (f) Crew space is to be below deck forward with main access from the port side lobby with an escape trunk to house front opening on to the open deck.
 - (g) A Guidance General Arrangement Plan is attached in **APPENDIX 13**

5.2 Furnishing and fittings

- (a) Built-in furniture, if any, should be of a simple lightweight, tough and robust design, and shall be faced with decorative melamine laminate. Upholstery, e.g. seat cushions, back rests and settees shall be self-extinguishing urethane foam to BS 3379 or equivalent of thickness not less than 100mm and covered with imitation leather. Lockers shall be provided with built-in locks and keys, where appropriate, and shall be fitted under the direction of GNC officers.
- (b) All hardware including screws, hooks, hasps, hinges, handles, sliding bolts, etc. should be brass with chrome plated finish or stainless steel.
- (c) Other fittings and hardware such as coat hooks, ceiling lights, bulkhead mounted desk lights, etc. should be of a high quality chrome finish. They should be fitted in the accommodation spaces as appropriate.
- (d) Colour and decoration schemes or a furnishing sample board showing materials and colour to be used in accommodation spaces shall be submitted by the Contractor to MD for approval. The material and colour of the seats should be in line with those of the proprietary make chairs for the purpose of uniformity and should be approved by MD.

5.3 Forepeak / Chain Locker

- (a) A forepeak should be arranged at the foremost of the hull. The position of the collision bulkhead shall be complied with the Classification Society's requirements. A weathertight hatch should be provided on the main deck for access to a chain locker fitted inside the forepeak.
- (b) A store space is to be arranged inside the fore peak compartment. Suitable sparred wood shelves and perforated marine ply flooring are to be provided for storing the anchor chains. Racks for shapes and fire extinguisher spares are to be provided.

5.4 Wheelhouse / Steering console

- (a) The air-conditioned wheelhouse shall be designed for Three (3) FOS crew and in a configuration arranged to provide a steering console with the best possible all-round visibility. In general, the wheelhouse layout shall be as follows:

- (i) Steering Console

The steering position should be situated at the centreline forward and incorporated with the steering controls and all navigation equipment which shall be in easy reach of the coxswain.

The following major fittings and equipment shall be arranged in this console:

- a) Main and emergency steering controls;
 - b) Rudder angle indicators;
 - c) Engine speed and clutch controls;
 - d) Main and auxiliary engines monitoring indicators and tachometers;
 - e) Electronic navigation equipment and displays mentioned in **Chapter 7**;
 - f) Navigation lighting controls;
 - g) Searchlights controls.
 - (b) All the console arrangements shall be of an ergonomically configuration with the more frequently used controls grouped within easy reach of a man of normal Asian stature in the sitting position. Sufficient legroom should be provided to all consoles. The console surface should be tilted-up for easy viewing of the instrumentation.
 - (c) All equipment and gauges, etc. shall be waterproof, shockproof and suitable for marine use to ensure reliable operations under normal environmental conditions.
 - (d) Lights and all fixtures and equipment in the wheelhouse shall be provided with dimmer switch and controllable at each console.

- (e) Surface finishing and interior linings of the wheelhouse should be of a matt non-reflecting finish to facilitate night operation.
- (f) Pillars should not be fitted inside the wheelhouse.
- (g) All detailed technical requirements of electronic navigation and communication equipment shall be found at **Chapter 7**.
- (h) The consoles and all instruments and fittings shall be designed and fitted to minimise injury to personnel in the event of unintentional forceful contact.
- (i) Other fittings and equipment required in the wheelhouse are:
 - (i) Tow hook quick release mechanism located at aft end of wheelhouse;
 - (ii) Electrical switchboards;
 - (iii) Fire detection and smothering panel;
 - (iv) Display board with velvet cloth cover, and with a transparent acrylic cover plate, for posting plans, maps and notices, etc.;
 - (v) Two heavy duty dampened seats model KAB 301E or equivalent with cushion back rests shall be provided for the coxswain and for the navigator behind the control console.
 - (vi) One framed safety plan of appropriate size;
 - (vii) Pigeon holes for stowage of international code flags;
 - (viii) One set of international code flags suitable for the mast, with canvas bag;
 - (ix) One set of open shelves for stowage of log books and files;
 - (x) One chart table with lamp and dimmer over;
 - (xi) One dial type inclinometer and one thermometer for marine use;
 - (xii) One magnetic compass (diameter about 13cm) with independent illuminated dimmer switch should be fitted on the top side of the forward vertical panel of the master console. The compass shall be of weatherproof type and shall be adjusted in the HKSAR for issue of the deviation card prior to the delivery of the Vessel to the Government;
 - (xiii) One electric powered marine wall clock;
 - (xiv) Three wooden cup holders;
 - (xv) One swing-type metal rubbish bin with cover which should be stowed inside a cabinet/locker;

- (xvi) Non-skid handholds at suitable locations for crew movement in rough sea conditions;
- (xvii) Retractable roller type solar blinds (UV roller blind) should be installed on all windows.
- (xviii) Wooden / Metal key box;
- (xix) Air-conditioner; and
- (xx) Rear view mirror on port and starboard side of the wheelhouse.

5.5 Main Deck Cabin

The air conditioning main deck cabin includes a passenger space at fore end, toilet and pantry at after end. Two stairways should be provided, one leading to the wheel house, one leading to the underdeck crew space. Means of escape should also be provided for crew space.

(i) Passenger space

- (i) The passenger space with door is located at the fore end of the main deck cabin. The room shall be provided with 8-person high-dense foam settees with cushion backrest, one marine clock and lockers as shown in the General Arrangement. Windows with roller blinds (fabric type not acceptable) should be provided at port and starboard side of the room.
- (ii) One “formica” topped writing table.

(ii) Lobby

- (a) Deck covering approved composition or vinly tiles laid on suitable composition base.
- (b) One glass fronted frame for mounting emergency control plan.
- (c) Four coat hooks in lobby.

(iii) Pantry

The pantry should be designed so that the following facilities could be provided and installed:

- (a) One wall mounted oscillating AC fan of diameter 250 mm;

- (b) One stainless steel topped pantry table with storage cupboard underneath and incorporating one stainless steel sink unit with spring loaded cold fresh water tap. Sufficient storage space for dry provisions should be provided.
- (c) One 100-litre capacity refrigerator;
- (d) One 2kW electric kettle with automatic switch off;
- (e) One portable 1kW cooking power inverter microwave oven;
- (f) One 12-person electric rice cooker;
- (g) Two electric 3.5kW induction cookers;
- (h) One stainless steel extractor hood;
- (i) Sufficient Chinese cooking utensils for 12 persons;
- (j) One chopping board (hardwood); and
- (k) One large rubbish bin with cover.

(iv) Toilet

A decorated toilet compartment with non-slip floor should be provided and suitably fitted out with the following:

- a) One stainless steel wash basin with spring loaded cold freshwater supply tap;
- b) One bulkhead –mounted fresh water supply valve for washing purpose;
- c) One mirror cabinet size 300 × 400mm;
- d) One toilet water closet;
- e) One toilet paper holder;
- f) Two stainless steel coat hooks (double type);
- g) High quality plastic perforated grating floor;
- h) One electric exhaust fan;
- i) One towel rack;
- j) Stainless steel grip rails;

- k) One liquid soap dispenser; and
- l) One paper towel waste bin.

5.6 Crew Space

- (a) Crew space is located below main deck forward. A stairway located at port side of the room leading up to the main deck.
- (b) Crew space should be provided with two units of two-person high dense foam settee and lockers.

5.7 Engine Room

- (a) The Vessel shall operate with an unattended engine room and provide for attendance of an engineer in the wheelhouse.
- (b) The engine room shall have sufficient space to accommodate the main engines, generators, together with batteries, pumping and piping, shafting, and any other related machinery/equipment in an orderly and efficient manner.
- (c) Access shall be provided to all items not easily reached from the normal workspace. Equipment shall be so arranged to minimise the risk of inadvertent contact or knock by the crew during normal operation.
- (d) The unmanned engine room shall be protected by a fixed fire smothering system (CO₂) against fire. For details refer to **Chapter 5, Paragraph 19**.
- (e) All hot or moving components shall be protected by guards and/or handrails/insulation.
- (f) Aluminium chequer plate floor shall be fitted.

5.8 Tank Space and Store Hold

- (a) The tank space shall be arranged for the installation of the fuel oil tank and the fresh water tank. These tanks shall be separately installed to avoid contamination.
- (b) The capacity of the fuel oil tank and fresh water tank shall be referred to the relevant paragraphs in Chapter 5.
- (c) The store hold is to be provided with perforated plywood floor boards and adequate sparred wood shelves all round for the stowage of tow ropes and equipment, with adequate means of fastening down all loose items.
- (d) Aluminium chequer plate floor shall be fitted.

5.9 Steering Gear Compartment

The steering gear compartment shall be arranged for installing, operating and providing access for maintenance of the steering gear system. Readily accessible space shall be provided for the operation of an emergency manual hydraulic pump with independent piping. Aluminium chequer plate floor shall be fitted.

6. TOWING EQUIPMENT

6.1 Tow Hook

- (a) A Liverpool type or equivalent spring loaded tow hook, with release mechanism controllable from the wheelhouse and at the hook itself. The local control should be of the direct mechanical type. The hook and mechanism is to be removable and when not in use will be stored at Government Dockyard.
- (b) Bulkhead stiffening in way of hook connection to be specially submitted. Stiffening is not to restrict engine removal, a vertical centreline web of at least 150 mm depth with face flat together with horizontal stiffeners, in line with hook brackets is to be arranged internally.
- (c) The hook is to be supported by a semicircular stainless steel track, with stops, also a locking device to prevent hook swinging when not in use.

6.2 Tow Beam

- (a) The tow beam is to be removable and the side supports to be faired into the bulwarks and bolted. The beam is to be of T-section at least 150 mm wide, fitted with a tow piece seasoned teak capping, the lower being bolted to the tow bar, and the upper spiked to lower for ease of renewal, each capping 25mm thick. The upper surface is to be well rounded, smoothed and polished, to reduce tow rope wear.

6.3 Tow Rope

- (a) A terylene tow rope 20 fathoms x 100 mm circumference. With a 140 mm circumference Manila rope tail to take the chafe in way of the hook and tow beam. A proof test certificate for 8 tonnes to be provided.
- (b) The tow rope is to be stowed in the the Tank Space and Store Hold, in a slatted well ventilated box.

7. FENDER

7.1 Pushing Head Fender

- (a) Strengthening is required to the fixed circular hollow section rubber fender of 200 mm x 50mm bore fitted vertically at the bow of the Vessel where it will have directly contacted with other vessels in operations. The material of the rubber shall have excellent resistance to impact abrasion, hot and cold climatic extremes, and not to be affected by petrol, diesel or oil. The securing of fenders by bolts through the hull plating is not allowed. **Tenderers shall submit catalogues and a design(s) of the fendering system for evaluation purposes.**
- (b) Top and bottom edges of vertical fendering to be chamfered back at 45°, to half diameter.

7.2 Sides and Stern Fender

- (a) An 200 mm x 100mm x 12 mm thickness semi circular steel fender is to be fitted continuously along the ship side and stern at main deck level. Internal steel ribs are to be provided every two frame spaces plug welded to sheerstrake, if fender fitted in long sections.
- (b) At least nine (9) portable tyre fenders at about 1000 mm diameter with stainless steel securing rings on each side of the Vessel shall be provided.

8. INSULATION AND LINING

- 8.1 All insulation and lining materials shall be free of asbestos and certified by a Classification Society. All boundaries of the crew space, wheelhouse and passenger space exposed to the weather shall be heat insulated. The engine room shall be fire and sound insulated. The noise level in the wheelhouse, passenger space and crew space should not exceed 85dBA at full speed in the sea trial condition.
- 8.2 Wheelhouse and crew space, walls and ceilings should be lined with lightweight, fire-retarding and rigid panels. Lining panels should be removable for easy maintenance. All lining material should be provided with fire test certificate(s). Samples of wall, ceiling panels and joints should be submitted for MD approval before installation.

8.3 All trunkings, cables and pipes shall be concealed behind linings or ceilings. Where this is not possible, electrical cables shall be enclosed in suitable conduit subject to prior approval by MD before fitting. Access panels shall be provided where necessary for easy access to wiring, equipment, etc. for operation, maintenance and repair.

9. DECK COVERING

9.1 In the tank space, engine room and steering gear compartment, the floors shall be provided with properly secured unpainted aluminium chequer plate. Aluminium chequer plates adjacent to valves, shafts, etc., shall be easily removable for daily maintenance. Hinged access plates should be fitted in way of valves.

9.2 The floor of the wheelhouse, passenger space and crew space shall be flat and covered with a heavy duty commercial grade non-skid hard-wearing fire retardant vinyl PVC sheet. Open deck spaces shall be self-draining and covered with non-slip epoxy paint, and/or a proprietary non-slip deck covering.

9.3 The colour of all deck coverings shall be assigned by MD / FOS.

10. PAINTING

10.1 The Vessel shall be well protected from corrosion by suitable and adequate paints of a good quality for marine application and applied in accordance with the manufacturer's specification. The surface preparation before coating shall strictly follow the instruction required by the proposed paint manufacturer. A painting report shall be submitted to MD upon completion of work.

10.2 **A painting scheme shall be submitted together with the tender for consideration.** The proposal should contain a list and the detailed specification of the paint intended to be used. The dry film thickness of each coating should be specified in the painting scheme.

10.3 All paintwork shall carry a one-year guarantee provided by the paint manufacturer against defects in material and by the Contractor against workmanship. The Contractor shall provide MD at Acceptance Delivery a letter of certification from the paint manufacturer.

10.4 The colour scheme shall be assigned by MD. All fire lines should be painted red. Miscellaneous piping shall be coloured the same as the surrounding structural members or advised by MD. Colour coding to British Standard or equivalent should be followed.

10.5 Tributyltin(TBT) free anti-fouling paint shall be applied to the underwater hull. Two coats of fire-retarding primer and fire-retarding paint should be applied to all concealed woodwork. The application of fire-retarding paint shall be inspected by GNC officers.

10.6 Internal surfaces of the fuel oil tank shall be left unpainted; and the internal shall be cleaned thoroughly and inspected by MD. The fresh water tank internal should be cleaned thoroughly and inspected by MD.

11. CATHODIC PROTECTION

- 11.1 A permanent system of self-energised cathodic protection suitable for a minimum of one year life should be fitted comprising a number of anodes secured to the hull below the light waterline at the appropriate location.
- 11.2 The actual number, size and positions of anodes and method of securing shall strictly follow the instruction required by the proposed anode manufacturer.

12. LIGHTNING PROTECTION

- 12.1 A complete lightning protection system shall be provided and shall include a mast-top lightning terminal, a main grounding conductor and secondary lightning arrestors and lightning protective gaps.
- 12.2 The lightning terminal shall incorporate both point discharge and lightning rod protection principles to provide a cone-shaped zone of protection for the Vessel.
- 12.1 Lightning arrestors and lightning gaps, matched to antenna cable size and frequency band, shall be provided to protect the communication and sensitive navigation electronic equipment.

13. MAST

- 13.1 One mast fabricated should be fitted on the wheelhouse top for the placement of all navigational light and sound signals, radar, ensign hoist, two signal hoists.
- 13.2 Maintenance and service access to all mast mounted equipment and fixtures shall be provided. Arrangement shall be made such that flags can be worked without fouling any aerials.
- 13.3 All fitted cabling on the mast is to be supplied with weathertight male/female connectors. Cable conduits, of not less than 20mm diameter or equivalent if not circular, should be provided from the mast leg(s) to the radio and radar positions. They are to have weathertight glands at the deck exit, and a "mouse" run through them to facilitate retrofitting.
- 13.4 One staff with suitable fittings for the HKSAR's flag shall be supplied at the top of the deckhouse aft.

14. ACCESS, DOORS, LADDERS AND HATCHES

- 14.1 The tenderers are free to propose proprietary make access, doors, hatches and other openings to suit the design.

- 14.2 The design of all outfitting including, but not limited to, doors, hatches, ladders, ventilation heads, etc. must be submitted to MD for approval prior to installation. Detailed specifications (such as JIS, ISO, BS, or other internationally recognized standards) including structural arrangement, scantlings, material and welding procedures must also be submitted. If proprietary make items are used, catalogues of these items with full technical details not less than those aforementioned shall be submitted by the Contractor to MD for acceptance and approval before procurement. Failing to do so may result in dismantling and re-installing or replacing the relevant complete items with other approved items, at the total expense (in terms of time and money) of the Contractor.
- 14.3 The coaming height of access hatches should be of minimum 380 mm. Where the used of hatch is impractical, flushed type manhole should be used. Subject to approval from MD, tenderers are free to propose alternative arrangement to suit the overall design. Final arrangement shall be subject to approval from MD.
- 14.4 Where the hatches are used for escape purposes, it should be operable from both sides. All hatches should be fitted with a hold back device.
- 14.5 The external doors should be fitted with a padlock hasp. All internal doors should be fitted with locks. Three keys should be provided for each lock in all cases.
- 14.6 All doors and hatches shall be fitted with necessary self-lubricated hinges, toggles, handles, packing and stiffeners, etc.
- 14.7 Stairway slopes shall not be more than 50 degrees to the horizontal and shall be fitted with handrails on each side. A minimum clear width of 600mm shall be allowed across the inside of the handrails.
- 14.8 Vertical ladders should be constructed with thread round bars at suitable step space intervals. Adequate footsteps and handholds for access to the chain locker, self-supporting masts should be provided.

15. WINDOWS

- 15.1 All proprietary make windows and port lights shall be of robust construction with marine quality anodized aluminium frame, fitted with weathertight gaskets and toughened clear safety glass complying with BS, JIS or equivalent standards. Detailed specifications (such as JIS, ISO, BS, or other internationally recognized standards) including structural arrangement, scantlings, material and welding procedures must be submitted.
- 15.2 Sufficient windows should be fitted to maximise the natural lighting condition inside wheelhouse. The number and position of windows should be decided by MD upon plan approval.

- 15.3 All windows shall be of fixed type; except one each at port and starboard side next to the master console which shall be of sliding type. UV roller blinds should be provided for all windows in the wheelhouse as per Paragraph 5.4(i) (xvi). Curtain should be provided for windows in passenger space.
- 15.4 Front windows of the wheelhouse should be inclined outwards (from window base) to reduce reflection from the sun and the panel. These windows should be extended as close as possible to the console top to give a good view forward for the coxswain and onto the main deck. The front windows should be as wide as possible and fitted with horizontal window wipers with dual speed control and with an electrically operated freshwater window washing nozzle system. The sweeping width of the wipers shall cover at least 85% of the window width. Individual speed and on/off controls should be arranged for each window wipers.
- 15.5 The supporting structures of the wheelhouse window frame should be designed as narrow as possible so that a better visibility can be obtained.

16. BULWARK, RAILING AND AWNING

- 16.1 The Vessel shall have a bulwark. Bull eyes with half-round bar at edge shall be provided at port and starboard of the bulwark. The bulwark shall be of a height of not less than one metre.
- 16.2 The bulwarks shall be suitably stiffened and supported by bulwark stays at every other frame and with bulwark capping of not less than 100mm wide and railings are to be fitted on the capping. Half height bulwark stiffening to be provided by longitudinals.
- 16.3 In way of mooring pipes etc. bulwark to be doubled with thicker plate. Freeing port edges to be stiffened with flat bar. Bulwark to be given 75 mm tumblehome amidships increasing toward the ends.
- 16.4 An inward hinging bulwark door is to be arranged (port and starboard) of forward deckhouse. Substantial means of holding the door open and closed to be provided. i.e. a single hasp bolt, with a snap link on a keep chain.
- 16.5 Sufficient internal and external hand holds should be fitted on the Vessel to allow the passengers and crew to move around the Vessel for operational needs in rough sea conditions.
- 16.6 Hand rails should be fitted around the outside of the Navigation Bridge Deck and Wheel House Top for protection of crew.
- 16.7 The design and arrangement of all onboard fittings, including guard railings, their position, fitting arrangement, etc. shall be made acceptable to and approved by MD before fitting.
- 16.8 A portable blue and white striped heavy duty nylon awning, supported by galvanised mild steel, portable pipe stanchions and spreaders, is to be arranged after the deckhouse. Forward support should be permanently fastened to house side, after the portable supports in bulwark sockets of galvanised steel tube. Fastenings to be cadmium plated steel bolts.
- 16.9 A polished stainless steel handrail is to be provided (port and starboard) in the engine room central passage between the main engines and in way of exhaust manifold to guard against accidental contact in heavy weather. Crew space ladder handrail shall be made of P.V.C. moulding or stainless steel.

17. LIFE-SAVING APPLIANCES

- 17.1 Subject to the final arrangement of the Vessel, the Contractor should supply and install the following minimum scale of life saving appliances. Approval certificates issued by a maritime organisation should be submitted to MD.

<u>Types</u>	<u>Quantity</u>
Lifebuoys	8
Life-jackets	11

17.2 The Contractor shall provide stowage for all life saving equipment. The types, quantity and location shall be agreed with MD before installation.

18. FIRE FIGHTING APPLIANCES

18.1 Subject to the final arrangement of the Vessel, the Contractor should supply and install the following minimum scale of portable fire fighting appliances.

<u>Types</u>	<u>Quantity</u>
3kg CO ₂ Fire Extinguisher	2
4.5kg Dry Powder Fire Extinguisher	2
9 Litres Foam Fire Extinguisher	4

18.2 Fire extinguishers should be of a type acceptable to MD. Approval certificates issued by a recognised maritime organisation shall be forwarded to MD. The Contractor shall submit details of portable fire fighting appliances for MD's approval prior to procurement and installation. Fire point (FP) should be marked on designated location of each fire extinguisher.

18.3 The fire protection, detection and fire extinguishing system shall comply with Classification requirements. For details refer to **Chapter 5, Paragraph 20**.

19. VENTILATION

19.1 Natural ventilation should be provided to the following areas:

- (a) Air pipes for Forepeak, Tank Space and Store Hold, Pantry and Toilet, Steering Gear Compartment and all void spaces;
- (b) Air pipes for fixed fire smothering system gas bottle locker and the door shall be fitted with louvres at the lower portion; and
- (c) The toilet door shall be fitted with louvres at the lower portion.

19.2 Mechanical ventilation should be provided to the following areas:

- (a) Engine room (mechanical fans), see **Chapter 5, Paragraph 10**;

- (b) For wheelhouse, passenger space and crew space (air-conditioning system), see **Chapter 5, Paragraph 11;**
- (c) Toilet
 - (i) The toilet area shall be provided with an extraction fan of not less than 36 air changes per hour.
 - (ii) The outlet of the extraction fan shall be located far away from the fresh air inlet of the air-conditioning system.
- 19.3 Ventilation inlet and exhaust vents shall have louvres on the open deck and be suitably sited at high locations, provided with a means of water separator/trap and drainage to avoid ingress of seawater spray when the ship is running at full speed.
- 19.4 All air pipes and vents shall be fitted with weathertight covers and fire dampers, where necessary. The coaming height of all air pipes and vents shall not be less than 380mm.

20. NAVIGATIONAL AND SIGNALLING EQUIPMENT

- 20.1 Navigational light fittings and arrangement shall comply with the International Regulations for Preventing Collisions at Sea 1972; as amended by IMO Resolution A.464 (XII) and A.626 (XV). The following specific requirements should also be complied with:
 - (a) Navigation lights shall be controllable from a control and alarm signal panel;
 - (b) All light circuits shall have switches, protection fuses, indicating lights and alarms;
 - (c) Dimmers for mimic panel lights, buzzer stops and lamp test buttons;
 - (d) Navigation light circuits shall be independent from any other circuit;
 - (e) 2 power sources from:
 - (i) Main supply; and
 - (ii) Emergency battery.
(in case of power failure, emergency power will supply necessary power automatically)
 - (f) Provision of the following fixed navigation/signal lights with double pole circuit breaker:
 - (i) Port side light;
 - (ii) Starboard side light;
 - (iii) Stern light;

- (iv) Masthead light;
- (v) Anchor light;
- (vi) Not-under-command (NUC) lights;
- (vii) Tow lights; and
- (viii) Any other navigation lights as required.

20.2 The following signalling/navigation equipment should also be supplied:

- (a) One set of 300mm diameter collapsible shapes (3 black balls and one black diamond);
- (b) One efficient brass bell, 200mm in mouth diameter engraved with name of the Vessel, fitted forward;
- (c) One 24V electric fog horn and three loud speakers;
- (d) One pairs marine grade binocular, 10×50, field of view: 100m at 914m;
- (e) One full set of nautical charts of HKSAR waters published by the Hong Kong Hydrographic Office of MD with chart reading instruments including parallel rules, set square, dividers and protractor;
- (f) One depth sounding lead.
- (g) One siren (two-tone horn) on wheelhouse top.

21. ANCHORING AND MOORING

21.1 The anchoring and mooring equipment shall comply with Classification Society requirements and be acceptable to MD. The size of chain locker should be suitable for self-stowing of chain by gravity in all conditions. The chain locker should be fitted with hard wood board not less than 50 mm thick on the bottom. A flush watertight access hatch and steel ladder should be provided for access.

21.2 The windlass should comply with the following requirements:

An AC electric windlass with its associated gypsy and warping drum, cable stopper, hawse pipe, bollards and fairleads shall give an easy run for anchor chain cables and mooring lines.

The windlass shall be capable of lifting one anchor with sufficient length of chain, at a speed of at least 9m/min. The unit shall be fitted with an emergency manual operating mechanism.

Starting/stopping of the unit should be locally controlled through a starter unit enclosed in the weathertight box.

Emergency stop button for windlass to be provided at forecastle locally.

- 21.3 One high holding power type hot dip galvanized anchor as per Classification Society requirements or proven arrangement should be provided. Suitable swivel, shackles and secured stowage shall be provided. One maintenance kit complete with spare links, chain punches, hammers, bolt croppers, etc. should be provided per Vessel.
- 21.4 Seven (7) Sampson posts as indicated on the General arrangement drawing. Side Sampson posts to stand 380 mm above bulwark, and raked inboard following the line of bulwark. Head Sampson post 610 mm above bulwark carried through the deck and welded to breast hook. All posts 180 mm x 10 mm thick steel tube with cape bars at 150 mm intervals. Each Sampson post is to be fitted with a substantial cleats below the level of bulwark..
- 21.5 Mooring ropes with suitable stowage should be provided; type and size are to be agreed with MD. Chaffing solid half round bar to be provided in way of each towing post.

22. GENERAL STORES

- 22.1 Storage spaces shall be provided for the following:
- (a) Mooring lines, fenders, spare cordage, tow ropes;
 - (b) Lubricants, onboard tools and spare gear;
 - (c) Life saving appliances, internal fire fighting appliances, and
 - (d) First-aid kits.
- 22.2 Other built-in lockers and storage spaces for small items (for personal and/or ship use) shall be provided in spaces such as the wheelhouse, passenger spaces, pantry and toilets, crew space etc.

23. MEASUREMENT AND MARKING OF VESSEL

- 23.1 The principal dimensions of the Vessel shall be measured and the draft marks shall be verified in the presence of GNC officers.
- 23.2 Permanent markings shall be provided for the Vessel's identification (both English and Chinese) shall be painted on transom and each side of the bow and wheelhouse and draft marks. The size, colour and locations of the permanent markings will be assigned by MD (see APPENDIX 7).

CHAPTER 5

GUIDELINE REQUIREMENTS – MACHINERY

1. GENERAL MACHINERY REQUIREMENT

- 1.1 The Vessel should be equipped with two marine propulsion engines, two independent generator sets and other auxiliaries as deemed necessary. **A diesel hybrid propulsion system which includes diesel engines, motor-generators and banks of gel cell batteries shall be proposed for consideration.**
- 1.2 The engine room is an unmanned machinery space (UMS), designed for unmanned operation. Under normal operation, all controls are directed from the wheelhouse where the control consoles shall be fitted with a full set of monitoring instrumentation and alarm indications. Essential local manual controls shall be provided for emergency operation of the main propulsion engines and steering gear.
- 1.3 The propulsion system shall be highly reliable under all circumstances, but simple and easy in operation and maintenance. Easy access and ample headroom around all machinery shall be provided for local operation, routine checking and ‘in-situ’ maintenance. Well-planned removal routes shall be provided for the major items such as the main propulsion engines, gearboxes, and the generator sets, etc.
- 1.4 Lifting brackets for moving heavy equipment should be mounted underneath the deck head of the engine room, the engine room entrance and other appropriate locations. The lifting capacity shall be marked on every of these lifting brackets after a load test.
- 1.5 All emergency stops shall be fitted with protective guards to prevent inadvertent use.
- 1.6 **Technical brochures showing details specification of the machinery(main engines, gearboxes, generator sets, air conditioning plant and auxiliaries) shall be submitted with the tender.**

2. MAIN PROPULSION ENGINES AND GEARBOX

- 2.1 Two freshwater cooled marine diesel propulsion engines of compact design shall be supplied with the recognized Classification certificates to ensure the design standard, performance and quality.
- 2.2 The rating of the engines shall comply with the operating profile as stipulated in **Chapter 3, Paragraph 4.**
- 2.3 The engines should be of same hand rotation and each engine shall be complete with all standard accessories, freshwater and seawater cooling pumps, lubricating oil pump, 24V DC starter, battery charger, standard alarms and instrumentation meeting class requirements. All the alarm systems shall be as per the engine maker recommendation as a minimum.

- 2.4 Lubricating oil renewal, a hand pump connected to the lowest point of the engine and gearbox sump shall be provided.
- 2.5 Approval certificates issued from a recognized Classification Society must be produced for the main engines and the gearboxes. Flexible couplings used between the gearbox and the engine must be of the engine maker's recommended type and approved by a recognized Classification Society.
- 2.6 The engines must be resiliently mounted to attenuate the energy transmitted into the ship structure. The mountings used shall be the type approved by a recognized Classification Society.
- 2.7 The main engines are always in standby mode and pre-lubricated by priming pumps with pressure sensor, adjustable timer and override control. This shall not hinder the instantaneous starting of the engine either locally or remotely from the wheelhouse.
- 2.8 An engine-mounted alternator with built-in voltage regulator shall be provided on each engine for charging their respective starting batteries.
- 2.9 High pressure fuel pipes shall have double skin pipe shields.

3. GENERATOR SET

- 3.1 Two 24V DC electric started, freshwater cooled diesel engines each integrated with an AC alternator of self-excited and brushless type should be installed. The generator sets shall be provided with a recognized Classification certificate.
- 3.2 The rating of the diesel engine should be capable of developing an overload power of not less than 10% of the alternator's continuous service rating (CSR) for period of 15 minutes.
- 3.3 The engines should be integral with an engine driven freshwater cooling pump, seawater pump, L.O. pump and F.O. pump (if necessary). Accessories like the engine mounted freshwater/seawater heat exchangers, L.O. cooler, F.O. filters, hand pump for L.O. renewal, engine-mounted instrument panel with essential gauges shall be provided. The package shall include protection devices and other ancillary fittings recommended by the engine maker for efficient operation.
- 3.4 The AC alternator should be 220V, 50 Hz, 1-phase, self-excited, dip-proof, brushless and ventilated type. The insulation used for the winding shall be Class F. Anti-condensation heaters with indicator lamps should be fitted.
- 3.5 The continuous service rated (CSR) power of each diesel generator shall fulfil the following requirements:

- (a) To supply full operation electrical load (including air-conditioning) of the Vessel plus 15% reserve margin; and
- (b) To permit the starting of the largest motor without causing interruption to other loading of the Vessel.

3.6 **An electrical load analysis shall be submitted to MD in the tender for evaluation.**

3.7 The resiliently mounted generator set designed for marine application should be of proprietary make. The arrangement of the electrical and piping systems shall facilitate quick dismantling and easy replacement of the unit.

3.8 Normal shore supply voltages on the Vessel are 220V for essential electric apparatus. One 220V single phase power supply to the electric equipment from the distribution board should be through circuit breakers. The distribution system for 220V AC should be 2 wires insulated.

4. ENGINE INSTALLATION

4.1 The main and auxiliary engines shall be installed in accordance with the engine maker's instructions and requirements. The Contractor shall submit a certificate/report issued by the engine maker showing that the design and workmanship, power output of the engine installation is suitable for the application / service profile of the Vessel and up to his satisfaction.

5. ENGINE EMISSION

5.1 The emission of main engines and generator engines should comply with the requirements set out in Regulation 13 of Annex VI of MARPOL 73/78. Contractor should provide copy of certificate to prove that the engine emission requirements are met. **Catalytic Converters shall be installed in the engine exhaust pipes to reduce the contents of nitrogen oxides, carbon monoxide and hydrocarbons being discharged into the atmosphere.**

6. CONTROL AND INSTRUMENTATION

6.1 Instrumentation and control systems for the main and auxiliary machineries should be designed for unmanned engine room operation. Normal operation and berthing should be controlled from the wheelhouse master console.

6.2 Essential machinery such as main engines, generator sets and gearboxes shall be equipped with local controls and instrumentation to allow local operation.

6.3 All the monitoring probes and sensors fitted to the machineries shall be type approved by a recognized Classification Society.

- 6.4 All indication lights, illumination of instrumentation gauges fitted on the consoles shall be fitted with dimmers for day and night operation.
- 6.5 The control console relating to the main engines shall contain the following for each engine:
- (a) Start/stop keys or push buttons and “Emergency Stop” button with guard covers, with running and stop indication lamps;
 - (b) Speed control device;
 - (c) Shaft tachometers;
 - (d) Wheelhouse/Local control change-over switch and indicator; and
 - (e) Instrumentation and alarm panel containing the following:
 - (i) Engine speedometer and running hour counter;
 - (ii) Cooling freshwater temperature and pressure gauges;
 - (iii) Engine L.O. temperature and pressure gauges;
 - (iv) Gearbox L.O. temperature and pressure gauges;
 - (v) Exhaust gas pyrometer;
 - (vi) Engine cooling water high temperature visual and audible alarms and trip device with adjustable time delays;
 - (vii) Exhaust manifold or turbo-charger cooling water high temperature alarm (visual and audible) and trip device with adjustable time delays;
 - (viii) Engine L.O. low pressure visual and audible alarms and trip device with adjustable time delays;
 - (ix) Gearbox L.O. low pressure visual and audible alarms and trip device with adjustable time delays;
 - (x) Expansion tank (if fitted) low level visual and audible alarms;
 - (xi) Sheathed fuel injection line leakage visual and audible alarms;
 - (xii) Exhaust gas high temperature visual and audible alarms;
 - (xiii) Engine starting battery charging ammeter;
 - (xiv) Engine overspeed trip visual and audible alarms;
 - (xv) Lamp test switch;

- (xvi) Alarm reset button;
- (xvii) Alarm acknowledged push button; and
- (xviii) Any other instrumentation recommended by the engine maker and MD.

7. ENGINE EXHAUST AND SILENCER

- 7.1 Wet exhausts with proprietary make silencers or other effective engine exhaust systems recommended by the engine maker should be provided for the main propulsion engines, the generator sets. The exhaust outlets shall be at a minimum vertical distance of 300 mm above the loaded water line and are to extend through a distance piece to clear the hull but without the risk of damage. Along the length of the exhaust piping, at least one thermal expansion piece should be fitted in each compartment to absorb thermal expansion and vibration. The run of the exhaust pipes should be suitably looped / inclined to prevent water ingress into the silencers which have to be provided with drain valves and pipes. Cooling of the exhaust pipes is provided by water injection at the downstream section of the silencer. The water-cooled section shall be able to self-drain. A temperature sensor of approved type shall be fitted on each exhaust pipe and the high temperature alarm shall be fitted in the wheelhouse and local engine control panel.
- 7.2 The exhaust pipes and silencers should be of stainless steel or equivalent corrosion-free material, and should be lagged with asbestos-free heat insulating material. A suitable flange connection method should be adopted for ease of maintenance. Any openings on the hull shall be suitably reinforced.

8. SHAFTS, STERN TUBES, SHAFT BRACKETS AND NOZZLES

- 8.1 The design and installation of the propeller shafting should be complied with the Classification Society's requirements. The shafts shall be made of marine grade stainless steel with recognised Classification Society's certificates.
- 8.2 Fixed pitch propellers & blades should be made of cast manganese bronze and in opposite hand rotation.
- 8.3 Stern tube to be water lubricated and type approved by a recognised Classification Society. Stern tube gland shall be of packing type.
- 8.4 Each shaft bracket shall be a single solid aerofoil strut in supporting the propeller shaft, nozzle and rudder sole piece. The brackets are to be rigidly welded to internal hull girders through the bottom plating.

- 8.5 The nozzles are to be fabricated from mild steel and designed to minimise cavitation. Two brass drain plug with rubber washers and effective locking devices are to be provided for each nozzle. On completion the nozzles are to be watertight tested and then filled with a suitable oil compound and drained. Air vents and plugs are to be provided at the tops for this purpose.
- 8.6 Sufficient wear down allowance shall be provided especially in way of bearing areas.

9. STEERING GEAR SYSTEM

9.1 Steering Gear System

- (a) Steering of the Vessel should be performed by electro-hydraulic with two independent power units, each running unit is capable of providing the maximum torque operating on twin rudders from 35 degrees on either side to 30 degrees on the other side within 28 seconds;
- (b) Rudders are controlled by steering wheel and quick action lever control in the wheelhouse. The power hydraulic pump could be started and stopped either in wheelhouse or in steering gear compartment.
- (c) Upon failure of generator, the control of the rudder shall be switched from electro-hydraulic steering to emergency hydraulic helming via a change-over switch in wheelhouse;
- (d) The emergency hydraulic lines are independent to the remote hydraulic lines so as to resume the control of steering in case of rupture of remote hydraulic lines;
- (e) Separated DC-24V illuminated ruder angle indicator with dimmer switch, running and overload alarm should be provided in wheelhouse; and
- (f) Emergency tiller steering system shall be provided.

9.2 Rudders And Rudder Stock

- (a) Stuffing box, carrier, jumping collars, gland, key etc. shall be provided for the rudders;
- (b) Rudder angle indicators shall be provided in the steering gear compartment. The port and starboard degree markings in the intervals not greater than 5 degrees shall be permanently marked and distinguished by red (port) and green (starboard) with proper wordings in English and Chinese;
- (c) Extremes of rudder travel shall be stopped by mechanical stoppers in the steering controls in the steering gear compartment;

- (d) Rudder control should be operated in coxswain operation area by a stainless steel steering wheel and a quick action lever control; and
- (e) Twin streamlined balanced-type rudders to be fabricated steel construction with the palm keyed to a cast steel coupling flange at top of blade and secured by bolts with nuts locked by continuous stainless steel wire. Classification Society certificates for the rudder stock material to be supplied or tests carried out on samples.
- (f) The completed rudders to be watertight tested and then filled with a suitable oil compound and drain. Air vents and plugs are to be provided for this purpose.
- (g) Suitable bronze liners are to be provided in way of the watertight packing gland and upper bearing. A sled runner keyway of ample proportions is to be incorporated at the tiller bossing. Means are to be provided for preventing the tiller from vertical movement. One of the rudder stocks is to be arranged for hand operation by an emergency tiller from above the main deck. A watertight stuffing box with steel case, bronze liner and packing gland is to be arranged at the base of the carrier bearing unit in way of rudder stock penetration of the bottom shell.

9.3 Bottom Bearing

- (a) A brass bush in a cast steel sole piece of substantial size with stainless steel bottom disc.

10. ENGINE ROOM VENTILATION

- 10.1 Four sets of marine high pressure axial type ventilation fans, two supply and two exhaust, shall be installed for engine room ventilation in order to maintain a measurable positive static pressure head in these compartments when the main engines and auxiliary machineries are running at full load. Each fan shall have individual start, stop and an emergency stop buttons both on the control console in the wheelhouse and outside the engine room next to the fire detection and control panel. Emergency stops should be supplied with protection covers.
- 10.2 The capacity of the engine room fans shall be sufficient to meet the air consumption of main and auxiliary engines and cooling needs in the engine room. The total capacity of ventilation fans shall be sufficient to ensure efficient engine operation.
- 10.3 The engine room temperature shall not exceed 45°C with engines at full load when the ambient air temperature is 32°C.
- 10.4 Calculation of engine room ventilation should be submitted for approval.

10.5 The air supply inlet vents shall be connected to louvres of efficient design in preventing ingress of water due to heavy rain and salt water spray. Externally, all vents should be provided with weathertight covers, fire dampers and coamings of adequate height. Internally, the arrangement of the ventilation ducting system shall be designed to give effective thorough ventilation to all machinery in the engine room and the supply air shall not be directed onto any electrical equipment.

11. AIR-CONDITIONING SYSTEM

11.1 Air-conditioning with adequate back up ventilation shall be provided for the wheelhouse, pantry, passenger and crew spaces to maintain comfort when operating in heavy spray and in a high temperature, high humidity summer.

11.2 The air-conditioned space temperature shall be 22°C for 60% relative humidity when the ambient air temperature is 35°C at 85% relative humidity with full complement onboard.

11.3 The air-conditioning plant shall be of a proprietary make water-cooled type suitable for marine use. Two separate seawater cooling pumps (one for standby) with not less than 10% excess of capacity, individual seawater strainer and sea suction valve shall be provided. All compressor units shall be interlocked by the control circuit of the seawater cooling pump, i.e. the system cannot be started without seawater cooling pump being run.

11.4 The refrigerant shall be CFC and HCFC free.

11.5 All windows in the wheelhouse shall be equipped with a facility to avoid any condensation on the windows due to temperature difference.

11.6 Remote emergency stop buttons in the wheelhouse shall be provided to stop the air-conditioning units in an emergency.

11.7 Sufficient fresh air induced to the air-conditioned area is required and there should be not less than 25m³/hr per person so as to keep the CO₂ level low enough for health reasons. Adjustable vanes for air supply and return shall be provided.

11.8 The design of the cooling air arrangement should be evenly distributed. An adequate quantity of cool air outlets and individual control panels shall be provided in each compartment.

11.9 Mould and bacteria resistant replaceable filters shall be fitted.

12. PIPING CONSTRUCTION AND TESTS

- 12.1 Piping connections should be of flange type. The coupling bolts, welding and thickness of coupling flanges should be adequate for the working pressure. Pipe bends should be kept to a minimum and have sufficient radius to facilitate smoothness of flow. Pockets in pipelines shall be avoided. When the presence of pockets is unavoidable, a valve or screwed plug for air purging shall be provided.
- 12.2 All piping shall be secured firmly with suitable supports lined with appropriate material to minimize vibration. Bare metal rubbing between pipes is not allowed.
- 12.3 Penetration pieces of the three flange types should be fitted at all watertight bulkhead and deck penetrations. Galvanic corrosion shall be avoided if different materials are found in the system.
- 12.4 Except where otherwise specified, all piping material shall be compatible to the hull material. However, no PVC pipe is allowed. The method of insulation and the material used for any piping passing through bulkheads of dissimilar materials should be clearly stated by the Contractor.
- 12.5 All piping connections to vibration isolated equipment shall incorporate flexible couplings specifically designed to attenuate structure-borne and fluid-borne noise and vibration.
- 12.6 All piping in the wheelhouse, pantry, passenger and crew spaces shall be concealed behind ceilings and sheathing. Approved compensation should be made when the piping is passing through structural members.
- 12.7 All valves and valve actuators shall be located so as to be accessible for easy operation and repair. All valves and piping shall be clearly marked. Where piping is below floor plates, the hand wheels shall be close to but below floor plates, with floor plate access provided over the hand wheels. Reach rods shall be fitted where required.
- 12.8 Lists of material, thickness, joint methods, filler metal and specification of all piping system (for seawater, freshwater, fuel, etc.) should be submitted to MD for approval. Hydraulic tests to the recognized Classification Society's requirements should be carried out in the presence of GNC officers.

13. FIRE FIGHTING SYSTEM

- 13.1 One AC electric fire pump should be designed to have sufficient capacity to pump water from the sea chest to deck hydrant with a jet throw of at least 12 m. The fire pump shall be controlled from the wheelhouse.

- 13.2 A semi-rotary hand pump of brass casing should be provided on deck for fire fighting purposes. The pump should be capable to produce a flow jet of at least 6m distance. The suction sea chest of the hand pump shall be fitted outside the engine room and the suction valve should be operated by an extended spindle on the deck. Installation shall comply with the recognized Classification Society's requirements.
- 13.3 Isolating valves shall be fitted at appropriate locations and at hydrant outlets. The hydrant shall be supplied with a complete set of fire fighting accessories including appropriate length of fire hose made of suitable material and spray/jet nozzle. The hose and nozzle shall be stowed inside a fire box located in the vicinity of the hydrant.
- 13.4 A deck washing pipe line should be branched off from a fire line.

14. BILGE AND GENERAL SERVICE SYSTEM

- 14.1 The bilge and general service system shall be served by two electric AC pumps with the discharge connected to an oily bilge holding tank of appropriate size. A bypass for a direct overboard and shore connection should be provided.
- 14.2 The bilge pipe provided for each watertight compartment shall be independent from other branches. All bilge pipes should be of adequate diameter in conformity with a recognized Classification Society's requirements and the suction open end shall be completed with a non-return valve and strainer. If an isolating valve for the forepeak bilge is fitted, it shall have a spindle extended to the main deck for closing and opening. The piping should be led to a suction valve chest of non-return type connecting to the bilge pump in the engine room.
- 14.3 A bronze semi-rotary manual bilge pump should be positioned on deck and connected to the bilge main for pumping bilge water from each compartment. A tarpaulin cover should be provided for this hand pump.
- 14.4 Bilge high-level alarms shall be provided for the engine room and all other watertight compartments. The alarm signals (audio and visual) shall be extended to the wheelhouse on a panel which contains also the buzzer, alarm test button, alarm acknowledgement button and reset button.
- 14.5 All bilge pipes shall be of substantial thickness and the material used shall be galvanised steel pipe. Doublers or striking plates should be fitted on shell plating exposed to the bilge suctions and sounding pipes.
- 14.6 An interlock device is provided for inadvertent pumping of bilge water into the fire fighting system.
- 14.7 General service piping shall lead from the engine room and run underneath the main deck fore and aft up to hawse pipe washing jets.

15. SEAWATER SYSTEM

- 15.1 All sea valves, of cast steel or other approved material compatible to the hull material, connected to the sea chests shall be hydraulically tested. Sea chests provided for the main and auxiliary machineries should be installed in the vicinity of their respective seawater pump suction but with adequate distance between each other to avoid water flow disturbance. Seawater piping shall be constructed galvanised steel pipe. A suitable strainer with isolation valves and air vent should be fitted to each seawater system. Due consideration shall also be given for quick and easy access to the seawater strainers.

16. SANITARY SYSTEM

- 16.1 The toilet water closet shall be flushed by an integral electric powered pump and emergency hand operated flushing pump. Including the hand basin discharge and floor drains, all discharges will be directed overboard via shipside non-return valves.
- 16.2 A freshwater tap for floor washing shall be provided in the sanitary space.
- 16.3 Piping material should be of copper and chrome plated of substantial thickness.

17. FUEL OIL SYSTEM

- 17.1 The capacity of the fuel oil tank(s) shall be adequate for the main engines and one generator set with the necessary auxiliaries running at maximum power for 12 hours. The tank shall be rigid enough with no deformation at full capacity. Tank(s) should be hydrostatic tested to the Classification rule requirements.
- 17.2 The fire integrity of the separating bulkhead/deck between the engine room and the fuel oil tank space shall be maintained at all times in accordance with that specified by a recognized Classification Society.
- 17.3 Appropriate fittings including the filling and sounding pipes, air vent with flame trap on deck, self-closing drain valve, discharge valve with remote-operated quick-closing device and drip tray, etc. shall be provided for the fuel oil tank(s). An easily removable coarse strainer shall be built into the filling line. Inspection manholes shall be provided for the tank(s). One sounding tape or rod calibrated in litres should be supplied for each tank. A tank content gauge and low-level alarm shall be fitted in the wheelhouse.
- 17.4 Each engine should be supplied with duplex filters with change-over cock to allow cleaning to be done during operation. Water separators should be fitted to the fuel supply line.
- 17.5 All fuel oil filters and valves must be positioned at easily accessible locations above floor plate level. Savealls should be provided for all fuel oil tanks, filters and manifolds.
- 17.6 Fuel pipes shall be of stainless steel seamless construction and hydraulically tested in the presence of GNC officers. High pressure fuel pipes should be protected by

double-skinned pipe shields and shall be supplied by engine maker. Supports shall be adequate to prevent fatigue failure due to vibrations induced by the engines as well as due to the inherent high pressure pulses of the fuel system itself. Piping connections shall all be flanged and the use of compression couplings is not permitted. If short flexible pipes should be used, the pipe shall be of an approved type and must be a standard item of the engine. All gasket and seal ring materials and any jointing compound used shall comply with the requirements of the engine maker. Where necessary, step-over protection gratings and drip trays shall be fitted along the fuel pipe length.

18. FRESHWATER SYSTEM

- 18.1 The capacity of the stainless steel SS 316 freshwater tank should not be less than 400 litres. The freshwater tank should be an independent tank fitted with the following:
- (a) Inspection / cleaning access cover;
 - (b) Filling / sounding pipe; and
 - (c) Air pipe.
- 18.2 The freshwater tank shall not be directly adjacent to any other tanks. The tank should be hydraulically tested to the Classification Society's rule requirements. One sounding tape or rod calibrated in litres should be supplied. A contents gauge for the tank should be fitted in the wheelhouse.
- 18.3 Domestic freshwater piping should be of copper where exposed. Precaution must be taken to avoid galvanic corrosion especially for the pipes passing through the division bulkhead.
- 18.4 Cold freshwater taps completed with PVC braided / reinforced transparent hoses should be fitted on the main deck aft and wheelhouse top for cleansing purposes.
- 18.5 The pressurised unit shall include a starter, pressure switch, pressure gauge, relief valve and suction valves together with a sight level gauge mounted on the pressurised tank. The freshwater pump shall cut-in and cut-out automatically depending on the unit's water pressure. A long-run alarm for the pump shall be fitted at the wheelhouse. The relief valve setting (if fitted) and the pressure testing of the freshwater tank shall be conducted in the presence of a GNC officer.
- 18.6 Detailed specifications of the pressurised unit including manufacturers' catalogue should be submitted for MD approval.

19. ENGINE ROOM FIRE DETECTION AND SMOTHERING SYSTEM

- 19.1 The engine room fire detection system shall be proprietary make and fitted with heat and smoke detectors. Fire and smoke detectors shall be sited to provide effective coverage of hazardous areas.

- 19.2 The fire detection and control panel shall be located in the wheelhouse, powered by both a DC 24V distribution board in the wheelhouse and by the maker's battery. Visual and audible alarms shall be activated automatically at the wheelhouse and engine room whenever any detector comes into operation. An alarm in the engine room shall consist of an independent warning siren and flashing beacon.
- 19.3 The engine room smothering system should be designed and manufactured by a specialist maker. Classification Society's certificates shall be provided for the containers of the gas extinguishing media. The system shall comply with MD and/or the recognized Classification Society's requirements, whichever is higher.
- 19.4 An environmentally friendly fire extinguishing media shall be stowed outside the engine room in a well-ventilated and insulated room which serves as a gas release control station.
- 19.5 The manual release control shall be equipped with a pre-releasing warning alarm consisting of both siren and flashing beacon. The warning release alarm shall be provided both at the wheelhouse and engine room.
- 19.6 The gas releasing alarm shall be activated when the door to the gas release control station is opened and, all ventilation fans and fuel transfer pumps will be cut off immediately. Instruction for gas releasing procedures shall be provided at the gas release control station.

20. ANTI-FOULING SYSTEM

- 20.1 An automatic self-monitoring system using electrolytic principles to control marine growth and fouling in seawater systems for main and the auxiliary engine should be provided and fitted.
- 20.2 The system should be compatible with the steel hull and the materials of the pipelines.

21. FLOOR PLATES, HANDRAILS AND GUARDS

- 21.1 All boundary bars, handrails, gratings, ladders, platforms, stanchions and vertical supports, etc. in the engine room and steering gear compartment shall be of lightweight construction. Chequer floor plates shall be secured by fixing with sections but shall be readily removable for access to bilges, pipe work and strainers, etc.
- 21.2 Removable guards for the protection of personnel and machinery shall be provided over exposed moving parts of the machinery, hot pipe work, etc.
- 21.3 Splash plates, casings, fenders, screens, etc. should be provided for the protection of personnel and machinery.

CHAPTER 6

GUIDELINE REQUIREMENTS – ELECTRICAL

1. GENERAL ELECTRICAL REQUIREMENT

- 1.1 All electrical equipment and their installations shall comply with the latest Regulations and, the recognized Classification Society's requirements for electrical installations shall be followed.
- 1.2 Drawings and detailed particulars of all electrical equipment and their installations shall be submitted for approval by MD prior to installation.
- 1.3 Fittings and protection devices which are essential for the proper functioning of the entire electrical system should be provided.
- 1.4 Exposed metal parts of electrical equipment shall be earthed.
- 1.5 Circuit breakers, switchboards and junction boxes shall be labelled with appropriate universal warning signs and warning notice like “Disconnect the mains before open the cover”.
- 1.6 The electrical equipment should be so sited that they can be accessed easily and safely for inspection and maintenance.
- 1.7 Solar energy shall be installed to convert the solar energy to power the shipboard lightings and electrical fans in the deck house.

2. DC POWER SOURCE

- 2.1 Two groups of sealed, maintenance free batteries should be provided:
 - (a) Group 1 batteries are for starting the main engines and the generator set
24V batteries shall be provided for starting the main engines and the generator set. The capacity of the batteries shall be sufficient to provide at least six (6) consecutive starts of one main engine and at least three (3) consecutive starts of the generator set from cold without recharging. Electrical connections shall be arranged so that the batteries can be used to start either main engine or generator engine by operating a manual change-over switch at the wheelhouse master console or locally in the engine room.
 - (b) Group 2 batteries are for 24V DC routine and emergency supply.
This group shall consist of 24V DC batteries to provide routine and emergency electrical supply for the DC power system. In event of main electrical AC power supply failure, the batteries shall provide effective services automatically for emergency lighting and

other essential instrumentation and control systems. Under an emergency supply condition, the capacity of the batteries shall be sufficient to power the navigation lights, radios and sufficient internal lighting for 3 hours and the radar for 1 hour without recharging and during such period, the voltage of the battery set shall be no more than 12% below its nominal voltage or within the tolerance of the supply voltage for the electronic equipment critical to the safety of the Vessel, whichever is the lowest.

- 2.2 Group 1 starting batteries shall be located as close as practicable to the engines in order to minimise the voltage drop.
- 2.3 Group 2 batteries should be installed in a separate locker outside the engine room above deck. The locker shall be so designed to prevent ingress of water.
- 2.4 Individual double pole isolator switches shall be provided and installed as close as practicable to each battery bank. Local information plates showing the voltage, ampere-hour rating, group number and application shall be provided for each battery set.
- 2.5 Batteries shall be housed in GRP lined storage boxes. Each box shall be provided with a removable cover with locking clips for ease of maintenance. Drainage shall also be provided to avoid accumulation of moisture.

3. BATTERY CHARGING ARRANGEMENT

- 3.1 Group 1 batteries are normally charged by engine driven alternators with backup service provided by an automatic battery charger. Interlock or protective devices should be provided to prevent simultaneous charging from the charger and the alternator. The battery charger shall also be prevented from charging the batteries during main engine starting. Each engine driven alternator shall have its own built-in voltage regulators, automatic cut-off, and any other required protective devices.
- 3.2 Group 2 batteries are subjected to continuous trickle charge under normal operation of the Vessel by an automatic battery charger. Provision shall also be made to allow the batteries be charged by engine driven alternator if necessary. The charger shall be able to perform a quick charge function.
- 3.3 The battery chargers shall be of proprietary make and shall provide automatic control between float and boost charges. Each charger shall be provided with a voltmeter, voltage regulator, selector switch, blocking rectifier, and the required devices for protecting the chargers against short circuit, reverse connection, excessive temperature and overloading. The capacity of each battery charger shall be sufficient for charging one set of completely discharged starting batteries to fully charged condition within 10 hours.
- 3.4 An instruction plate with a schematic wiring diagram illustrating the operation procedures and precautions for the selection of battery banks and charging of batteries shall be provided in the vicinity of the charger, battery selection switchboard and charging distribution board. All charging control shall be conducted in the wheelhouse.

4. ELECTRICITY DISTRIBUTION NETWORK

- 4.1 The main AC electrical supply should be generated at and distributed through a 220V, 50 Hz, single phase, 2-wire insulated system. The distribution of the electricity to the equipment is through circuit breakers.
- 4.2 The 24V DC low voltage supply system should be provided for the electronic equipment and other relevant apparatus as well as performing emergency duty. Each supply panel should be fitted with a miniature circuit breaker of double-pole type with over-current and short circuit trips. All junction boxes should be readily accessible and the prime supply panel should be positioned inside the wheelhouse. A special arrangement is required for the navigation lights supplied from this prime panel.

5. MAIN SWITCHBOARD

- 5.1 A self-standing proprietary make dead front marine type main switchboard of steel or aluminium construction with adequate ventilation louvres should be fitted in an accessible and well ventilated position in the engine room. Due consideration shall be given in respect of the switchboard location to avoid any risk of damage resulting from oil and water spray or other mechanical hazards. Adequate guardrail(s) and insulated mat(s) shall also be provided. Switchboard panels shall be hinged at the front for easy opening. All terminal points shall be connected with approved fittings.
- 5.2 Megger test and other relevant safety tests should be witnessed by a GNC officer. Test results should be submitted to MD.
- 5.3 An appropriate laminated electrical diagram should be placed on each switchboard.
- 5.4 Apart from the spare feeder breakers, the switchboard shall contain the following:

- (a) Sector for Generator Set

This sector provides the following fittings:

- (i) Automatic voltage regulator;
- (ii) Generator air circuit breaker of adequate capacity with over-current trip, reverse power trip and short circuit trip. Over current protection should be provided for each phase;
- (iii) Voltmeter and ammeter;
- (iv) Wattmeter and frequency meter;
- (v) Indication lights for "Power Available", "Breaker Opened" and "Breaker Closed"; and
- (vi) All necessary fittings and any other protective devices.

(b) Sector for 220V 1-phase System

This sector shall contain the following:

- (i) Earth lamps;
- (ii) Moulded case circuit breakers with over-current and short circuit trips for the distribution of 220V AC power supply to lighting services, fans, motors, etc.; and
- (iii) Any other necessary fittings and protective devices.

(c) Sector for 24V DC Feeder

This sector shall contain the following:

- (i) Transformer / rectifier of adequate capacity for converting AC power to DC power. The rectifier shall be of 1-phase full wave regulated type with voltage regulation $\pm 5\%$ and ripple factor 4% at 100 Hz;
- (ii) Magnetic automatic relay switch for activating emergency 24V DC supply in event of AC power failure;
- (iii) Supply source indicator lamp for transformer / rectifier;
- (iv) Ammeter for charging unit;
- (v) Voltmeter with selector switch;
- (vi) Earth lamps;
- (vii) Moulded case circuit breakers with over-current and short circuit trips for 24V DC bus and feeder circuits; and
- (viii) Any other necessary fittings and protective devices.

(d) Sector for Shore Power Connection

A moulded case circuit breaker for shore connection box shall be provided on the main switchboard. The shore connection box shall be capable of receiving 220V single phase 50 Hz 30 Amp current on a 2-wire system and the cables between the connection box and the main switchboard should be of sufficient capacity to supply the necessary electrical equipment. An earth terminal shall be provided for connection of the Vessel earth to the shore earth. An instruction shall be provided at the connection box to give full information of the system and the procedures for carrying out the connection. In addition, the circuit breaker on the main switchboard shall contain the following fittings:

- (i) Circuit with under-voltage protection and interlocking device to ensure electrical isolation during the change-over;
- (ii) Indication light for "Shore Power Available";
- (iii) Indication light for "Shore Power Breaker Opened"; and
- (iv) Indication light for "Shore Power Breaker Closed".

6. CIRCUIT BREAKERS

- 6.1 All circuit breakers shall have time delay thermal overload trip and instantaneous short circuit current trip. The overload trip should be set at 110 % of the maximum circuit load current. The cable rating should be in excess of the circuit breaker overload tripping current.
- 6.2 In general, a circuit breaker is considered as a protective device and is therefore not suitable for switching purposes. As such, an individual On/Off switch shall be installed for each electrical fitting.

7. EMERGENCY SWITCHBOARD

- 7.1 The back-up control panels and the indication panel for manoeuvring must always be fed from the emergency switchboard. The emergency batteries and the emergency switchboard shall be located in such a position that they shall survive if the main switchboard is damaged.

8. SHORE POWER CONNECTION BOX

- 8.1 The connection box must be of proper watertight design with quick release receptacle for marine application. A 15-metre long shore connection power cable of adequate rating with quick release watertight plug and is rolled on a portable reel should be provided with the connection box.

9. MOTOR AND CONTROL GEAR

- 9.1 Motors selected should be suitable for the electrical system applied. Motors should be started directly on line. All starters should be contact type.
- 9.2 Where a starter is situated remotely from the motor, stop and start buttons should be provided near the motor for local operation. All electric motors of essential services shall have separate start and stop push buttons and dimmable running indication lights inside the wheelhouse.

9.3 Motors installed in the engine room and other enclosed spaces shall be of semi-enclosed drip-proof type. Motors installed in locations exposed to weather or moisture shall be of waterproof construction.

9.4 A circuit diagram should be placed in the local control box of each electrical installation.

10. CABLE, WIRING AND FUSE

10.1 Where cables are exposed to weather or mechanical damage, armoured cable or metal conduit for the cables should be provided. The space factors of the metal conduit shall conform to regulations in order to prevent bunching up cables and to minimise earth faults.

10.2 The metallic sheathing, armour or braid of cable shall be properly earthed at both ends. All bare terminals shall be properly insulated by approved cable insulators.

10.3 Wiring shall be run along perforated metal trays and shall be secured in such positions as to allow easy maintenance. Wiring shall not be installed below the engine room floor plates. Cables and wiring inside accommodation areas shall run behind linings which shall have removable panels for inspection and maintenance. Where electric cables have to be fitted on the decorative surface of bulkheads, they shall be enclosed in conduits. Class approved watertight cable glands shall be provided in way of watertight bulkhead or deck penetrations.

10.4 Cables and the wiring terminals of AC and DC power supplies should be laid separately and shall have a distinctive code and labelling system for easy identification to facilitate tracing.

10.5 Tally plates showing the cable size and the number of cores shall be provided for each of the main power cables.

10.6 All fuses shall preferably be of cartridge type and rated adequately for the protected circuits.

11. LIGHTING FIXTURE

11.1 General lighting should be provided for all compartments and should be arranged to give sufficient illumination to all working areas. Fluorescent lamps of 220V AC single phase 50 Hz should be used. The lamps should be marine commercial standard fittings with diffuser and should be recessed into the accommodation ceiling lining wherever practicable. General lighting shall have individual or group switches to conserve power.

11.2 Lighting in the wheelhouse shall be fitted with a dimmer control. Red lights with dimmers and switches shall be provided for operation at night. Lighting from the engine room shall not be seen through the ventilation louvres during operation at night.

11.3 Emergency lights shall be provided for all compartments including the stowing position

of life saving and fire fighting appliances. These 20W light bulbs shall come into operation automatically upon failure of the main AC supply.

- 11.4 Lighting fixtures inside the engine room shall be gastight. All external light fittings should be watertight.
- 11.5 Supply voltage for pilot and indication lights should not be higher than 24V.

12. SEARCHLIGHT

- 12.1 Two proprietary make (220V AC 600W halogen white bulb) adjustable remote control searchlights with sufficient illumination at a distance of 50 m are required for operation. The searchlights should be installed at the wheelhouse top and shall be remotely controlled by electric motor from the wheelhouse for turning and tilting. The final locations of the searchlights should be agreed with MD.
- 12.2 The searchlights shall be capable of withstanding a corrosive environment. Tarpaulin covers shall be provided for the searchlights.
- 12.3 Two 24V DC 150W portable search lights with 30m water proof cable reels and plugs should be provided.

13. FLOODLIGHT

- 13.1 Five proprietary make (220V AC 300W halogen white bulb) floodlights with sufficient illumination should be installed on wheelhouse top. One at fore amidship, two on port and starboard sides and two at the aft corners of the deck house top. The final positions of the floodlights should be agreed with MD.
- 13.2 The floodlights shall be capable of withstanding a corrosive environment.

14. POWER SOCKET

- 14.1 A system of 220V AC 13A and 24V DC 5A socket outlets should be provided in the engine room. The accommodation area requires 220V AC power sockets only for the portable apparatus and the domestic equipment. 220V AC and 24V DC power sockets shall also be available on the fore and aft ends of the Vessel on the weather deck and in the fore peak of the Vessel.
- 14.2 Each socket outlet shall be integrated with an 'On/Off' switch to facilitate local switching of the electrical equipment.
- 14.3 Sockets for different voltage systems shall be clearly labelled and with different pin sizes so that one system cannot plug into the other.

14.4 Power sockets on the weather deck, in the engine room and other damp locations should be watertight and corrosion resistant construction and be provided with watertight covers and switches. All power plugs provided for the portable equipment intended to be used in these areas shall also be of weatherproof marine type.

CHAPTER 7

GUIDELINE REQUIREMENTS – ELECTRONIC

1. GENERAL ELECTRONIC EQUIPMENT REQUIREMENT

- 1.1 The Contractor is required to supply and is responsible for delivery, testing, installation, commissioning and warranty of the following equipment / systems to be fitted onboard the Vessel:
- (a) Marine Daylight Viewing Colour Radar;
 - (b) GPS Receiver;
 - (c) Echo Sounder and Depth indicator;
 - (d) Loudhailer and Siren System;
 - (e) Intercommunication System consisting of one master station and five slave stations;
 - (f) Public Address (PA) System;
 - (g) A VHF Maritime Transceiver complete with a fist microphone with press-to-talks witch, microphone and loudspeaker;
 - (h) An electronic marine FM/AM radio broadcast receiver with suitable aerial with DVD player and two speakers at wheelhouse;
 - (i) Wind speed / direction indicator;
 - (j) Marine band handheld water-proof radio.
- 1.2 All communication equipment shall be a type approved by the Office of the Telecommunication Authority (OFTA) of the HKSAR Government; or equivalent.
- 1.3 All the equipment shall be installed at / on the control console except otherwise specified. The Contractor shall submit a layout plan showing the exact locations of the equipment.
- 1.4 When siting the equipment, due consideration shall also be given to ensure that the equipment shall be easily and safely accessed for repair and maintenance.
- 1.5 All equipment offered shall be designed for marine applications and shall allow effective operation under most arduous condition i.e. poor weather, strong winds, heavy rains, severe vibration, etc. Exposed components shall be of weather proof and adequate protection against splash and water shall be provided for all electronic equipment fitted onboard.
- 1.6 All components of the equipment exposed to the weather shall be seawater resistance.

Internal components shall be fully enclosed with heavy-duty seals.

2. SPECIFIC REQUIREMENTS

- 2.1 Compass will be electronic and GPS will not cause deviation
- 2.2 The power supply shall be compatible with Vessel's DC electrical system.
- 2.3 All equipment installed in the coxswain operation area unless otherwise specified
- 2.4 Installation location shall be easily accessible for inspection and maintenance. Exact location subject to MD approval.
- 2.5 Exposed components shall be of marine application and weather proof.
- 2.6 Lightning protection shall be provided and installed wherever applicable. The lightning arresters for all outdoor antennas shall be installed at the antenna ends.
- 2.7 Power supply shall be compatible with Vessel's DC electrical system
- 2.8 Equipment supplied complete with all standard and/or maker recommended accessories as required for normal operation
- 2.9 All equipment shall be protected by appropriate rated fuses with independent fuse holders
- 2.10 All exposed cables and wiring shall be sheathed or protected by metal conduits
- 2.11 Polarity of power cables shall be labelled
- 2.12 Watertight cable glands shall be provided in way of watertight bulkhead or deck penetration
- 2.13 Installed location of equipment shall not cause interference to other equipment by way of the emitted interference.
- 2.14 Induced mutual interference for a number of equipment should be within acceptable level
- 2.15 Signal wiring shall be separated from power supply cables and housed in separate screened conduits or trunkings.
- 2.16 All cables shall be clearly labelled and carry its own unique identification code
- 2.17 All siting, installation and cabling in respect of compass, VHF, radar etc. shall comply with the relevant rules and regulations.
- 2.18 When the generation / use of calendars are employed for logging of reports, activation off

equipment, or as any essential part of logic for the proper functioning of the system, then the calendar generation shall function without any error or manual intervention for all leap years.

- 2.19 All electronic equipment and electrical appliances should have Hong Kong warranty and their on-site maintenance shall be locally available.

3. ACCEPTANCE TEST

- 3.1 The acceptance tests shall comprise the following:

- (a) A bench acceptance test which includes functional tests and detailed measurements of the performance of the equipment to verify that each equipment complies with all the required performance specification.
- (b) On site commissioning test shall be carried out by the Contractor in the presence of the Electrical and Mechanical Services Department's (EMSD) representatives after completion of the installation of each system. The overall installation standard and operational features of each system shall be evaluated. The test shall be carried out during sea and basin trial.

- 3.2 The Contractor shall arrange to submit test reports on the performance of the equipment and deliver the test reports and equipment to the for bench acceptance test prior to the installation.

- 3.3 The Contractor shall submit schedule of commissioning test of the electronic equipment installed onboard at least one month prior to the commissioning test date.

4. MARINE DAYLIGHT VIEWING COLOUR RADAR

- 4.1 General requirements

- 4.1.1 The equipment shall be relative motion high performance radar suitable for small vessels and comprises a transceiver, a scanner unit and a colour display unit. The radar shall have interface to accept navigation data such as latitude/longitude position of the vessel given by the DGPS receiver.

- 4.1.2 The transceiver shall be housed in the scanner unit and shall be designed by aloft mounted construction and capable of satisfactory operation at high wind speeds. The scanner assembly shall be housed in a weatherproof housing.

- 4.1.3 The radar scanner unit shall be installed well clear of obstruction to minimize undue interference. Care shall be taken to ensure the scanner mounting does not give excessive shadow sectors for navigation lights.

- 4.1.4 The display unit shall be of table top mounting type providing a clear and clutter free picture in all weather conditions and suitable for bright daylight viewing. It shall indicate

clearly the important parameters such as radar targets, range marker, bearing line, heading marker, range rings, guard zone and background, etc.

4.1.5 Guard zones and alarm functions shall be provided in the radar. The zone can be set and shown on the display screen. Audible alarm shall be activated if other vessels enter the zones set.

4.1.6 On the viewing side of the display unit, the following controls shall be provided:

- (a) Power On/Off
- (b) Standby/transmit
- (c) Automatic adjustment of gain, sea clutter and tune keeps targets clearly in view
- (d) True motion display the vessel's movements relative to fixed targets
- (e) Range scale selection
- (f) Display brilliance & illumination
- (g) Heading marker On/Off
- (h) Variable range marker
- (i) Tuning
- (j) Bearing cursor rotation
- (k) Selection of background colour and target colour

4.1.7 Flux-gate compass or sensor shall be provided to allow the operation of the radar in north stabilized mode and supply heading direction information to colour plotter system.

4.1.8 Beside fluxgate compass or sensor in the preceding cause, data inputs from DGPS shall be fed to the radar.

4.1.9 The power of the equipment shall be supplied from the nominal 12V DC or 24V DC power supply of the Vessel.

4.1.10 Rotational speed of antenna compatible to vessel speed of at least 25knots providing uninterrupted picture updating from vessel.

4.1.11 The radar shall be equipped with collision avoidance function, i.e. Automatic Radar Plotting Aid (ARPA) or Electronic Plotting Aid (EPA), or any other equivalent function capable of tracking at least 10 targets.

4.2 Specific requirements

(a) Range

Range Scales	:	At least 8 scales from 0.25nm to 48nm
Range ring accuracy	:	Better than 0.5% of maximum scale in use or 50m
Minimum range	:	less than 23m or 0.25nm
Range discrimination	:	Better than 35m on 0.25nm

(b) Transceiver

Operating frequency	:	9410 \pm 30 MHz (X-band)
Peak power output	:	6 kW
Receiver noise level	:	less than 6 dB

(c) Scanner

Type	:	1800 - 2000 mm (6 feet) open radiator
Horizontal beam width	:	1.2 degrees at half power point or better
Vertical beam width	:	22 degrees at half power point or better
Sidelobes	:	-23 dB within \pm 10 degrees of main beam or better
Polarization	:	Horizontal
Rotation speed	:	24 \pm 1 rpm within satisfactory operation at relative wind speed up to 100 knots

(d) Display

Display unit	:	At least 380mm diagonal viewing area
Effective diameter	:	185mm, Pixel 1024 (H) x 768(V) dots
Display modes	:	Head-up, Course-up, North-up, Head up true bearing
Minimum range	:	35m
Minimum discrimination	:	better than 35m
Range accuracy	:	1% of range in use or 10m whichever is greater
Bearing accuracy	:	EBL accuracy \pm 1 degree
Echo trail	:	15, 30 sec., 1,3,6,15,30 min or continuous

(e) Environmental requirement

Temperature	:	- 25°C to +70°C (antenna unit)
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- 15°C to +55°C (display)

5. GPS RECEIVER

5.1 General requirements

- a) The contractor should supply, install and test one set of GPS receiver
- b) Consists of main GPS / display/control unit, a remote GPS antenna and Differential Beacon Receiver
- c) Information received by the receiver shall be able to be output to the marine radar.
- d) Output of the receiver shall give the vessel position in a format acceptable to marine radar in the NMEA 0183 format
- e) Fitted with at least 2 bi-directional NMEA 0183. RS422 compatible. One port can be configured as an RS232 port
- f) Capable of input not less than 20 routes of 100 waypoints with 20 character alphanumeric names and icons
- g) Language to be used is English (English & Chinese preferred)

5.2 Specific requirements

(a) Display

- Display unit : True sunlight readable 640 x 480 pixel (or better) back-lit LCD display.
- Display mode : NAV data, 3-D panorama display
- Position indication : Latitude/Longitude, UTM
- Position resolution : 4 decimal places

(b) GPS receiver

- Receiving channel : 8 channels parallel receiver or better
- Rx frequency & code : 1575.42± 1 MHz (C/A code), L1
- Position accuracy : Approx. 50 m, 95% of the time
- Speed accuracy : (w/GPS) 1-5m. Velocity +/- 0.05m/s. 70cm RMS with accuode corrections
- Warm start fix time : Less than 30 seconds
- Cold start fix time : Less than 15 minutes
- Re-acquisition rate : 5 seconds or better

Sensitivity : -143 dBM Coast threshold
DGPS input : RTCM SC-104 format, from internal beacon receiver

(c) DGPS Receiver

Frequency range : 283.5 to 325 KHz
Frequency resolution : 100 KHz
Sensitivity : -95dBm or better
Dynamic range : 75 dB or better
Adjacent channel rejection : >26dB at 500 Hz, offset
Minimum SNR : Not < 12 dB
Maximum acquisition time : Not > 30 seconds at 12 dB SNR
Station selection : Automatic or manual Accuracy 5 metres

(d) Environmental Requirements

Temperature : Operating temperature -15°C to 55°C
Others : Water resistance splash proof

6. ECHO SOUNDER AND DEPTH INDICATOR

6.1 Specific requirements

- (a) Quality standard of proprietary make
- (b) Readout of water depth in metres
- (c) Measuring depth up to 200 m
- (d) Shallow water audible alarm
- (e) 3 selectable ranges to indicate shallow, mid and deep ranges
- (f) Electronic accuracy of depth reading $\pm 5\%$ full scale range
- (g) RMS transmitted power over 500 watts
- (h) Dual frequency 500 KHz or 50 KHz for optimal detection in shallow & deepwater situation
- (i) Colour TFT at least 180mm (diagonal) display with resolution of 640 x 480 pixels

7. LOUDHAILER / SIREN SYSTEM

- 7.1 The system shall function as a public address system for outside broadcast in marine environment. The equipment shall be of a well-known proprietary make. It shall comprise a master control unit, amplifier and a horn type loudspeaker fitted at suitable location for both siren and loudhailer purpose.
- 7.2 It shall have the capacity to generate siren and two tone horn sound and comprises of a master control unit, amplifier and three (3) weatherproof horn type loudspeakers and receiver fitted at suitable locations at forward centre and port and starboard sides of the Vessel.
- 7.3 The crew working on forward/aft deck can use the system to communicate with the wheelhouse.
- 7.4 The master control unit, which shall be completed with fist microphone and microphone hanger, shall be mounted on the console with the following facilities provided at the front panel:
 - (a) Power ON/OFF
 - (b) Hail volume control
 - (c) Function control

- 7.5 The output power of the amplifier shall be about 25 Watts and supplied from DC 12 V with the following characteristics:
- (a) Hail sensitivity: Not greater than 30mV for 25 Watts output at 1 kHz
 - (b) Hail distortion: Not greater than 10% at 25 Watts output at 1 kHz
- 7.6 The horn type loudspeaker shall be weatherproof reflex type, 8 ohms impedance with power rating of about 25 Watts (Actual rating should match with the amplifier). **Catalogues of the equipment shall be submitted in tender specification.**
- 7.7 A portable loudhailer shall be provided.
- 7.8 An electric fog horn shall be installed.

8. INTERCOMMUNICATION SYSTEM

- 8.1 The equipment shall be of proprietary make. The system shall function as an intercommunication system for internal broadcast in the Vessel.
- 8.2 The system should provide broadcasting function through microphone, CD/Cassette and includes one master control station in wheelhouse and four substations locating at main deck after, passenger cabin and crew space.
- 8.3 All substations should have press and talk function for talk back to the master control station.
- 8.4 Two ceiling type speakers of 8 ohm impedance and power rating of about 25 Watts (actual rating should match with the broadcasting amplifier) should be provided at each of the following space:
- (a) Wheel house
 - (b) Passenger cabin
 - (c) Store/Pantry

9. VHF MARITIME TRANSCEIVER

- 9.1 General requirements
- (a) A type approved by the OFTA; or equivalent
 - (b) Two (2) sets of proprietary make for marine application
 - (c) Equipped with all the 55 international maritime VHF channels
 - (d) Complete with a fist microphone with press-to-talk switch, microphone hanger,

mounting bracket and loudspeaker.

9.2 Specific requirements

- (a) Power ON/OFF
- (b) Squelch control
- (c) Volume control for loudspeaker
- (d) “Transmit” indicator lamp
- (e) Socket for plug of microphone
- (f) Dual watch selection: monitor channel 70/working channel
- (g) Channel selection h) Transmission power selector for High and Low (25Watts/1 Watt)

9.3 Incorporated with DSC watch on Channel 70.

9.4 Transmitter Characteristics

Output power	:	25 Watts
Modulation	:	frequency modulation with maximum frequency deviation of ± 5 kHz
Output impedance	:	50 Ohms unbalanced
Frequency stability	:	not greater than $\pm 0.001\%$ over a temperature range of 0 - 40°C
Spurious and harmonics	:	-70 dB or better
Modulation response	:	within +1 dB to -3 dB of 6 dB/octave pre-emphasis characteristic over the range of 300 Hz - 3 kHz

9.5 Receiver Characteristics

Sensitivity	:	less than 1 μ V for 20 dB SINAD
Adjacent channel selectivity	:	less than 70 dB or better
Frequency stability	:	not greater than $\pm 0.001\%$ over a temperature 0-40°C
Spurious & image rejection	:	less than 70 dB or better
Inter-modulation	:	less than 70 dB or better
Audio output	:	not less than 1 Watt and at rated output with less than 10% distortion

9.6 Aerial and Feeder

- (a) Marine type aerial with unity gain, vertically polarized, omni-directional and suitable for mounting on the Vessel
- (b) The V.S.W.R. of the aerial installed shall be less than 1.5:1
- (c) Aerial feed shall be RG58U type or the equivalent
- (d) Coaxial cable lightning suppressor (AEA LS90 series or equivalent types) shall be provided for protecting the radio equipment. All outdoor connector joint shall be properly covered water proof tape or material.

10. PORTABLE MARINE VHF TRANSCEIVER

- 10.1 The Contractor should provide one set waterproof Marine band handheld radio and four sets handheld maritime VHF transceivers.
- 10.2 Each portable maritime VHF transceiver should be of proprietary make and completed with two sets of rechargeable batteries, batteries charger, helical antenna with VSWR not exceeding 1.5:1 and carrying case (with shoulder strap or belt clip).
- 10.3 The operation period of each fully charged battery shall not be less than 8 hours per charge (10% transmit, 10% receive, 80% stand-by). The charger shall be designed for 220V AC input power supply and equipped with a BS 1363 type 13A power plug.
- 10.4 The portable transceiver shall be at least able to transmit and receive on all the 55 International Maritime VHF channels, together with the private maritime VHF single frequency channels 96 (157.925 MHz) and/or 99 (157.975 MHz).
- 10.5 The transceiver shall be of robust, splash-proof, light weight design and made with shock proof material suitable for hand held radio communication both on the boat and ashore.

- 10.6 The transceiver is to be fully solid state and of software programmable carrier frequency type. Add-on crystal for carrier frequency will not be acceptable.
- 10.7 The unit shall be a type approved model accepted by OFTA for maritime frequency band application; or equivalent,
- 10.8 Control
- 10.9 The transceiver shall at least incorporate with the following controls / switches / facilities :
- (a) power on / off button
 - (b) volume control
 - (c) high / low transmitting power switch
 - (d) press to talk switch
 - (e) built-in microphone and loudspeaker
 - (f) channel selector and operating channel display
 - (g) sockets for external microphone, press to talk switch and loudspeaker

10.10 Technical Specification

The transceiver shall at least comply with the following technical specifications :

General

Operating Centre Frequency Range	:	International Maritime VHF Band
No. of Operating Channel	:	99 (Programmable)
Operating Mode	:	Simplex or Two Frequency Simplex
Channel spacing	:	25 kHz
Frequency stability	:	+/- 8 ppm between 0 to 50 deg C
Housing IP Category	:	IP 57
Dimension of transceiver	:	Not greater than 200 mm (H) x 70 mm(W) x 50 mm (D)

Transmitter

RF Transmitting Power	:	2 Watts at High Power Mode 0.25 Watts at Low Power Mode
Adjacent Channel Power	:	Below -65 dBC
Spurious and Harmonic Emission	:	Below 25 μ W
FM Hum & Noise	:	40 dB or better

Receiver

Receiver Sensitivity	:	0.3 dB μ V or better for 12 dB SINAD
Receiver adjacent channel selectivity	:	70 dB or better
Intermodulation Response Rejection	:	70 dB or better
Blocking/Desensitisation Level	:	90 dB μ V or better
Spurious Response	:	70 dB or better
Spurious Emission	:	Below 20 nW
Total Harmonic Distortion	:	Less than 10 %
Signal/Noise Ratio	:	40 dB or better

11. INSTALLATION REQUIREMENTS

- 11.1 The equipment shall be supplied complete with all the auxiliary items required for normal operation including connectors, circuit breakers, power sockets, plugs and cables with conduits. Additional power conditioner or filtering devices shall be installed if required.
- 11.2 The power supply for all the equipment shall be obtained from the Vessel's 12 V DC supply and shall be protected by appropriately rated fuses. The fuses shall be contained in independent fuse holders which are easily accessible. The polarities of the power cables shall be labelled.
- 11.3 All exposed cables and wirings shall have proper sheathing or to be protected by metal conduits. Cable glands shall be provided in way of watertight bulkhead or deck penetrations.
- 11.4 RF connectors of suitable impedance shall be provided and used for connections of the RF cables, antennae and radio equipment. Connectors between the feeder cables and antennae shall be protected by weatherproof material to avoid water seepage.

- 11.5 Adequate measures to prevent interference between the electronic equipment shall be provided which includes :
- (a) Separate screened conduits or trunkings shall be provided.
 - (b) Rules, regulations and recommended practices regarding screening of electric wiring must be observed.
 - (c) Receiving apparatus and other electronic equipment which may be affected by radio frequency induced voltages must be efficiently earthed, screened and protected against such voltages.
 - (d) Lightning protection devices shall be fitted.
- 11.6 Each cable shall be clearly labelled and preferably carry its own unique identification code. All wiring shall be finished in a neat and approved manner and shall each be separately identified by a wiring code number.
- 11.7 All siting, installation and cabling work shall be undertaken to the highest standard to ensure :
- (a) Satisfactory performance of the equipment
 - (b) Protection from mechanical and water damages
 - (c) Ease of accessibility for maintenance and repair
 - (d) Manufacturers' recommendations are to be strictly observed
 - (e) The latest version of the relevant Merchant Shipping Notices ('M' Notices) published by the Department of Trade (London), in respect of siting and installing the compass, VHF radio etc. are to be observed.
- 11.8 All electrical work and material shall comply with the latest version of the IEC Regulations for the Electrical and Electronic Equipment of Ships.

12. DOCUMENTATION

- 12.1 The tenderers shall supply with the tenders the following documentation:
- (a) **Technical information in English sufficiently detailed to enable a technical appraisal of the equipment in this Chapter to be made.**
 - (b) **Tenderers shall list the electronic equipment with unit price in APPENDIX 8.**
- 12.2 The Contractor shall within 1 month prior to equipment delivery, supply 3 sets of equipment handbook in English language (at least 1 original) giving full details on:

- (a) Principle of operations;
- (b) Details of installation and setting up procedures;
- (c) Maintenance instructions;
- (d) Schematic and block diagrams;
- (e) Circuit diagrams with details down to component levels with their respective descriptions;
- (f) P.C.B. layout;
- (g) Calibration procedures;
- (h) Full part lists; and
- (i) If microprocessors are used, all program storage devices (ROM's, EPROM's etc.) shall be supplied with comprehensive part and version numbers for ordering of replacement; additionally, the method of generation/duplication of the data in the storage devices shall be given.

13. SEPARATE SPARE PARTS (ELECTRONICS)

- 13.1 Tenderers have to separately quote the spare units for replacement as listed in **Chapter 8, Section 8** and to submit a list of recommended spare parts (e.g. PCB, electronic and mechanical components) good for one year maintenance purposes in the format of **Chapter 8, Section 8**. The price quoted for the spare parts shall have the same validity period as the tender submitted and **shall not form part of the tender price**. Shall all or part of this list be found to be suitable, procurement of these spare parts may be procured together with the award of Contract.
- 13.2 These spare parts shall be delivered in the presence of MD and EMSD officers in Kowloon Bay store during acceptance of the completed Vessel.
- 13.3 Spare parts are to be properly documented, preserved and packaged.

14. TRAINING

- 14.1 Contractor shall be responsible and bear the expenses for a training course on the operation of the electronic equipment for 10 operators of FOS. The course should be conducted in Chinese, training manuals in Chinese and English shall be provided and submitted to MD for approval prior to commencement of the course. The instructor and material provided shall be appropriate for local operators.
- 14.2 The training shall include the following items:
- (a) the equipment stated in this chapter;
 - (b) the operation, special features, manoeuvrability and sea-keeping performance of the Vessel; and
 - (c) the daily servicing of the Vessel.

CHAPTER 8 SUPPORT SERVICES

1. GENERAL PHILOSOPHY

1.1 The Vessel must be specifically designed from the outset for through life support and ease of maintenance in the HKSAR. All equipment and outfitting, etc. shall be selected bearing in mind that the Vessel is intended to have the minimum through life cost whilst maintaining its required level of performance. This means that a balance must be made between the following factors:

- (a) Vessel performance (e.g. engine rating, size, etc.);
- (b) Initial cost;
- (c) Ongoing cost (e.g. maintenance, fuel consumption, spare parts, etc.);
- (d) Reliability (frequency and time to repair breakdowns);
- (e) Time between maintenance periods;
- (f) Time to undertake scheduled maintenance (downtime); and
- (g) All machineries and equipment installed in the Vessel shall be supportable in the HKSAR.

1.2 The above applies to main propulsion machinery and all equipment installed on board. The allowable vessel downtime should be 10% or less. The Vessel is required to be available and will normally be deployed 300 days/year. The Vessel must be capable of operating on one engine for long period.

2. SOURCE OF EQUIPMENT

2.1 It is essential that all the equipment installed in the Vessel is supportable in the HKSAR. The support may be based outside the HKSAR but arrangements for rapid and reliable long-term supply shall be readily available. Details shall be provided before the acceptance of the Vessel.

3. MAINTAINABILITY

- 3.1 It is essential that good access is provided to all items that need to be monitored, serviced and overhauled. Ease of in-situ maintenance is vital. Sufficient space must be provided around all equipment, machinery, etc. to enable personnel to access the required item easily and to withdraw and replace parts as needed. Where space for access is at a premium, priorities shall be set as to which items have precedence based on the regularity of access needed and the difficulty of the operation need, etc. If necessary, equipment mountings, etc. shall be designed and constructed in such a way that the equipment can be easily moved into a more advantageous position for maintenance.
- 3.2 Adequate maintenance and inspection access shall be provided for all equipment and machinery requiring servicing. Open space shall be provided for the removal of equipment components that require regular inspection, replacement or measurement.
- 3.3 Routes shall be provided for removing the various equipment and machinery items throughout the Vessel. Special attention shall be paid to providing the most economical and efficient means possible to remove equipment.
- 3.4 In general cableways or other substantial obstructions shall not be located in way of intended equipment removal routes. Where piping, ductwork or other interferences cannot practically be routed in a manner that avoids any impediment to equipment removal activities, suitable takedown joints shall be provided to make the impediment readily removable.

4. REPAIR BY REPLACEMENT

- 4.1 When equipment or machinery requires full overhaul or extensive running repair this may be done by removing the whole unit ashore and replacement with a spare unit. The need to break down units to effect removal shall be minimised. All major units must be capable of removal by direct lift through portable panels without the need to disturb other installations and accommodation.

4.2 SPARE AND REPLACEMENT PARTS (OTHER THAN ELECTRONICS)

- (a) **Tenderers are required to quote separately the minimum spare parts including running spare parts, repair by replacement units, and service tools as listed in Paragraphs 6 and 7.** Additional spare parts shall be quoted where necessary for MD consideration.
- (b) All items supplied shall be identical in make, quantity and size to the parts currently in use.
- (c) All items shall be properly documented, preserved and packed.

- (d) MD reserves the right to require the Contractor to REPLACE the delivery spare and replacement parts should the parts be found not identical to the existing ones currently in use on board.
- (e) The Contractor shall give at least FIVE working days notice in writing to MD before delivery and acceptance of any spare/replacement parts included in the Contract.
- (f) A comprehensive schedule for recommended spare parts to be provided shall be prepared. The recommendations for the provision of spare parts shall be based on the following criteria:
 - (i) On board spares to a range and scale appropriate to the proposed operational and shipboard maintenance procedures plus minor running repairs and consumable parts;
 - (ii) Government Dockyard base spares to a range and scale appropriate to the scheduled maintenance procedures plus consumable parts and an allowance for running repairs; and
 - (iii) Repair by replacement units to a range and scale appropriate to the scheduled maintenance procedures and major foreseen running repairs.
- (g) When defining the range and scale, the following factors shall be taken into consideration:
 - (i) Availability of supply in the HKSAR;
 - (ii) Time taken for delivery in the HKSAR;
 - (iii) Shelf life;
 - (iv) Usage rate; and
 - (v) Unit cost.
- (h) Spares will be required to be provided to the agreed schedules at appropriate times, i.e.
 - (i) On board spares, Government Dockyard base spares and repair by replacement units at acceptance if needed for immediate availability even in initial work up and operation;
 - (ii) During the warranty period if of less priority; and
 - (iii) By completion of warranty if needed on a longer term basis (e.g. spare, repair by replacement items, main engine units, impeller shafting or items modified during warranty).

4.3 ELECTRONIC SPARE PARTS / SPECIAL TOOLS / TESTING EQUIPMENT (Separately quoted)

- (a) All items shall be properly documented, preserved and packed before delivery to EMSD during the acceptance of the Vessel.
- (b) **Tenderers are requested to quote for a list of recommended spare parts and components with part number, special tools and test equipment with itemized prices for the major equipment offered in accordance with the formats given at Paragraph 8 at the time of tendering.**
- (c) Proposed spare parts and components shall be suitable for appropriate maintenance for a 2-year period. Tenderers shall make a genuine effort to ensure that the spare parts and components quoted reflected the actual needs for maintenance over a 2-year period, following the end of warranty period.
- (d) All items shall be separately quoted and therefore will not form part of the tender price. The price quoted shall have the same validity period as the submitted tender. Should any or whole part of the list be found to be suitable, procurement of such will be made together with the offer of Contract.

5. SUPPORT INFORMATION

5.1 INFORMATION PROVIDED PRIOR TO AND AT ACCEPTANCE

- (a) A detailed inventory list with any special tools or test equipment for the whole Vessel should be made available for agreement at least 6 weeks prior to the Vessel acceptance.
- (b) The detailed inventory should cover all discrete items down to major component level. Full details of each item should include:
 - (i) Item name;
 - (ii) Description;
 - (iii) Type/model;
 - (iv) Quantity;
 - (v) Manufacturer;
 - (vi) Manufacturer's reference no.;
 - (vii) Location in Vessel;
 - (viii) Local Agent/Supplier address, telephone no. and fax no.;
 - (ix) Order time;

- (x) Shelf Life;
- (xi) Unit cost.
- (c) Four (4) copies of the agreed inventory list shall be presented at the acceptance of the Vessel.

5.2 “AS FITTED” VERSION DRAWINGS AND OTHER INFORMATION TO BE SUPPLIED

- (a) The Contractor shall supply at the acceptance of the Vessel the following:
 - (i) Four (4) complete sets of paper print drawings as per **APPENDIX 3**;
 - (ii) Four (4) complete sets of paper print as-fitted electrical schematic, cabling, wiring and single line diagrams for electrical equipment conduit / trunking routes;
 - (iii) One (1) set of clear plastic over-laid plan of convenient size for the bilge and pumping system to be installed in wheelhouse;
 - (iv) One (1) set of framed coloured Safety Plan for the wheelhouse;
 - (v) Four (4) copies of the Vessel equipment list for all bought-in machineries and electrical equipment. The list shall include:
 - a) Description;
 - b) Type / model;
 - c) Maker Part No. or equivalent;
 - d) Location in Vessel;
 - e) Quantity;
 - f) Supplier or agents name and contact address;
 - g) Order time;
 - h) Shelf Life; and
 - i) Unit cost.
 - (viii) Four (4) copies (at least 1 original) of maker operation, maintenance and workshop manuals for ALL machineries / equipment in English;
 - (ix) Four (4) copies of the “Docking Plan” drawing, which shall include profile, plan and sections;

- (x) Four (4) copies of the Onboard Operator's Manual (in English and Chinese) covering:
 - a) Daily user check and operation procedure;
 - b) Operation details of each system;
 - c) Emergency operation procedure; and
 - d) The precise format and detail required will be agreed when the configuration of the Vessel and outfitting is decided.
- (b) The first draft of the Onboard Operator's Manual (both English and Chinese), and in hard and soft copy, shall be submitted to MD for approval **ONE** month before documentation acceptance. Updated information regarding modifications or incorporating in-service experience should be provided up to the end of the warranty period as appropriate.

5.3 PHOTOGRAPHS

- (a) "As-Fitted" Photographs:
 - (i) Two sets of colour prints (130 mm × 90 mm) from different aspects to give overall picture of various parts/areas of the Vessel; and
 - (ii) Each print shall be enclosed in a suitable album and labelled, showing the position of the content.
- (b) Official Colour photographs showing the running profile of the Vessel in HKSAR waters:
 - (i) Four (4) framed colour photos of picture size not less than 350 mm × 270 mm and frame size not less than 510 mm × 400 mm;
 - (ii) Four (4) 200 mm × 150 mm colour photos; and
 - (iii) Four (4) 150 mm × 100 mm colour photos.

5.4 CERTIFICATES AND REPORTS

- (a) Three copies of the following certificates and reports (one original and two copies), filed in clear folders, shall be forwarded to MD at the time of delivery of documents:
 - (i) Associated test certificates;
 - (ii) Performance test certificates of main engines, generator, pump engine, electrical and electronic equipment;

- (iii) MD recognized Classification Society certificates for main engines and gearboxes;
- (iv) Copy of any tests carried out by or for the Contractor on resistance and propulsion experiments;
- (v) Inclining experiment report and stability information booklet;
- (vi) Complete record of the sea trial commissioning tests;
- (vii) Complete record of the Static bollard Pull tests;
- (viii) Original copy of the warranty certificates of all bought-in machineries, equipment and apparatus (valid for twelve months from the date of acceptance of the Vessel);
- (ix) Certificates of light and sound signalling equipment;
- (x) Builder certificates;
- (xi) Certificates of building material;
- (xii) Deviation card (after adjustment in the HKSAR by a qualified compass adjuster) for compass;
- (xiii) Hull construction material issued by a recognized Classification Society; and
- (xiv) Any other certificates as appropriate.

5.5 SHIP MODEL

The tenderers are required to quote a separate price for the supply of ONE model (scale 1:25) for display and training purposes. The price should be excluded from the tender price of the Vessel in the Tender Form. **(Tenderers shall fill in the price in APPENDIX 9)**

6. ONBOARD RUNNING SPARE PARTS

6.1 **Tenderers should note that the prices of the following items shall be INCLUDED in the tender price of the Vessel in the Tender Form.**

6.2 Tenderers MUST quote the unit price, total price, model and part number.

(a) Main Engine (1st Proposed Engine) Spare Parts (Maker/Model)

Item No.	Description	Qty.	Unit Price HK\$	Total Price HK\$	Part No.
1	Air filter	8 pcs			
2	Lub. oil filter	16 pcs			
3	Fuel oil filter	16 pcs			
4	Vee belt (alternator)	4 sets			
5	Zinc anode	20 pcs			
6	Inlet valve	1 engine set			
7	Exhaust valve	1 engine set			
8	Oil cooler tube-stack	1 set			
9	Heat exchanger tube-stack	1 set			
10	Fuel valve	1 ship set			
11	Cylinder head gasket	1 engine set			
12	Main bearing	1 engine set			
13	Cylinder head bolt	1 engine set			
14	Connecting rod bearing	1 engine set			
15	Cylinder head complete assembly	2 units			
16	FW pump repair kit	1 sets			
17	SW pump repair kit	2 sets			
18	SW pump assembly (complete set)	2 sets			
19	FW pump assembly (complete set)	1 set			
20	Fuel pump	1 pc			
Total Price					

(b) Main Engine (2nd Proposed Engine) Spare Parts (Maker/Model)

Item No.	Description	Qty.	Unit Price HK\$	Total Price HK\$	Part No.
1	Air filter	8 pcs			
2	Lub. oil filter	16 pcs			
3	Fuel oil filter	16 pcs			
4	Vee belt (alternator)	4 sets			
5	Zinc anode	20 pcs			
6	Inlet valve	1 engine set			
7	Exhaust valve	1 engine set			
8	Oil cooler tube-stack	1 set			
9	Heat exchanger tube-stack	1 set			
10	Fuel valve	1 ship set			
11	Cylinder head gasket	1 engine set			
12	Main bearing	1 engine set			
13	Cylinder head bolt	1 engine set			
14	Connecting rod bearing	1 engine set			
15	Cylinder head complete assembly	2 units			
16	FW pump repair kit	1 sets			
17	SW pump repair kit	2 sets			
18	SW pump assembly (complete set)	2 sets			
19	FW pump assembly (complete set)	1 set			
20	Fuel pump	1 pc			
Total Price					

(c) Diesel Generator Set Spare Parts

Item No.	Description	Qty.	Unit Price HK\$	Total Price HK\$	Part No.
1.	Air filter	4 pcs			
2.	Lub. oil filter	8 pcs			
3.	Fuel oil filter	8 pcs			
4.	Fuel valve	1 engine set			
5.	Zinc anode	20 pcs			
6.	SW pump assembly (complete set)	2 sets			
7.	SW pump repair kit	3 sets			
8.	Cylinder head complete	1 ship set			
9.	Vee belt (alternator)	4 sets			
Total Price					

(d) Electrical & Main Propulsion Control System Spares

Item No.	Description	Qty.	Unit Price HK\$	Total Price HK\$	Part No.
1.	Lighting bulbs for searchlight	10% of total fitted			
2.	Lighting bulbs for floodlight	10% of total fitted			
3.	Lighting bulbs for emergency lamp	1 set			
4.	Indication light for control panel	1 set			
5.	Accommodation lighting bulb/tube	10% of total fitted			
6.	Light bulb for alarm signal	1 set			
7.	Light bulb for navigation light	1 set			
8.	Fuses of each type/rating (incl. circuit breaker)	10% of total fitted on board			
Total Price					

7. REPAIR BY REPLACEMENT SPARES (OPTIONAL)

7.1 Tenderers should note that the repair by replacement spares as listed below shall be quoted separately and will **NOT form parts of the tender price.**

7.2 Tenderers **MUST** quote the unit price, total price, model and part number.

Repair by Replacement Spares

Item No.	Marker/Description	Quantity	Unit Price HK\$	Total Price HK\$	Model No.	Part No.
1.	Spare main engine set	1 set				
2.	Spare generator (incl. alternator)	1 set				
3.	Spare gearbox	1 set				
4.	Propellers	2				
Total Price						

8. ELECTRONIC SPARE PARTS / SPECIAL TOOLS / TESTING EQUIPMENT (OPTIONAL)

8.1 Tenderers should note that all electronic spare parts, components, special tools and testing equipment shall be quoted separately and will **NOT form part of the tender price.**

8.2 Tenderers **MUST** quote the unit price, total price, model and part number.

8.3 As all spare parts may be subject to an acceptance test by the Contractor in the presence of the representatives from EMSD, the tenderers shall also quote separately the price for carrying out such acceptance tests in (B) if required by the representatives from EMSD.

(a) Price for Electronic Spare Parts, Special Tools and Testing Equipment

Item No.	Marker/Description	Quantity	Unit Price HK\$	Total Price HK\$	Model No.	Part No.
1						
2						
3						
4						
Total Price						

(b) Separately quoted total price for carrying out acceptance test for all the electronic spare parts = HK\$_____

APPENDIX 1 WARRANTY AND GUARANTEE SLIPPING

1. WARRANTY

The Contractor, or his appointed agent, is required to have (i.e. the Contractor's own shipyard or that an arrangement has been made by the Contractor with a local shipyard or repair yard in the HKSAR) substantial and established ship repairing/servicing shipyard facilities in the HKSAR capable of servicing all aspects of the Vessel during the currency of the warranty period under Clause 16 of the General Conditions of Contract, including guarantee slipping as stipulated in this specification. Full details of the repairing / servicing shipyard facilities including establishment, repair equipment/vessels, etc. shall be submitted with the tender.

Purposes of requiring a repairing/servicing shipyard is to facilitate rectification of the warranty defects without delay to the Vessel's operation. As such, the Contractor should give full authorization to the repairing/servicing shipyard or agent in the HKSAR for making decision on validity of the warranty claims. If such authorization is not given, the Contractor should specify in the tender the means by which the repairing/servicing shipyard could receive immediate agreement from the Contractor, so that rectification of the warranty defects could be carried out in the most fast and efficient manner.

For those equipment to which the manufacturer/supplier does not offer one-year warranty on each equipment, in this case the shipbuilder should arrange repairs for the remaining warranty period at his own cost, i.e. the tenderer must at its sole cost and expense either (i) provide the warranty for a continuous period of 12 months commencing on the delivery of the Vessel; or (ii) procure the manufacturer/supplier to provide the warranty for a continuous period of 12 months commencing on the delivery of the Vessel. No counterproposal by the tenderer will be considered by the Government. For other loose equipment and installation, such as life saving and fire fighting equipment, etc., which are required to be serviced, inspected or renewed annually, shall have a validity period of not less than 10 months from the delivery date of the Vessel. These items shall not include machinery, electrical and electronic equipment.

The Contractor should also follow the details / procedures stipulated in this section to implement his warranty obligations. During the warranty period, when the Vessel is handed over to the Contractor, or his representative/agent for rectification of Contract outstanding items, warranty repair and/or guarantee slipping, the Contractor shall be responsible for the due return of the Vessel in good order. Should there be any loss or damage caused by any reason while the Vessel is in the possession or control of the Contractor or his representative/agent, the Contractor shall pay for the cost for the loss or damage plus 20%. During such period, and until the Vessel is returned to MD, the Vessel is deemed to be at the Contractor's risks, and the Contractor shall insure and keep insured, at his own expense, for an amount of not less than the purchase price of the Vessel plus 20% to protect the Government property against any risks of damages. Certificate of Insurance and evidence showing premium being paid shall be available for inspection in advance. **The Contractor should provide this insurance policy before the**

signing of Contract.

(Tenderers should note that the premium of the insurance policy shall be included in the tender price of the Vessel in the Tender Form).

1.1 Total Vessel Warranty

It is required that the Vessel is covered by the Contractor's warranty for one year after the date of acceptance of the Vessel. It is intended that this warranty cover the entire Vessel and all its associated equipment, fittings and outfit (including spare parts, documentation and repair by replacement items) against defects of design, construction and failure of materials. This warranty may be backed up by the Contractor using individual equipment suppliers/manufacturers warranties but the Contractor shall remain solely liable to MD for such warranty. Notwithstanding and without prejudice to the Contract on warranty obligations for the total Vessel, any individual equipment supplier/manufacturers warranty extending beyond the one year total vessel warranty must be passed on to MD as appropriate.

1.2 Procedures for Warranty Claim

A detailed procedure for dealing with warranty claims must be proposed by the Contractor and agreed by MD before acceptance of the Vessel. This should be based on the following principles:

- (a) Warranty for total vessel between MD and the Contractor.
- (b) Notification of claimed defect to be sent from MD to the Contractor by a defined route.
- (c) Joint inspection to agree defect and remedial action to the satisfaction of MD.
- (d) The Contractor should undertake as far as practicable and reasonable on-site warranty services/repairs (including parts, labour and transportation cost) wherever the Vessel is berthed in Government Dockyard or any Marine Bases of within HKSAR waters.
- (e) Rectification of defect must have minimum effect on the operation of the Vessel in service, e.g. provision of on loan equipment when the anticipated repair time exceeds a reasonable time frame to be agreed.

The Contractor will be expected to undertake all defect rectification at his expense and using his own facilities, resources, etc. As such any Contractor must have suitable facilities in the HKSAR to undertake his obligation under the warranty. This is considered by MD to mean a minimum of established repairing/servicing/yard facilities capable of servicing all aspects of the Vessel.

The Contractor shall be responsible for rectification including repair and replacement as

necessary for warranty claims. This shall, at no cost to MD, include services described in the following sub paragraphs:

- (a) To attend to any requirement for inspection and repair within 24 hours (excluding Hong Kong public holidays) of receiving the report of a fault and to take immediate action of rectifying the fault after inspection. MD should be informed of what the rectification action has been taking within 48 hours of receiving the above-mentioned report. The Vessel will be alongside at a maintenance base.
- (b) To provide all necessary transport, labour and material, tools and testing instruments required for the warranty repair service.
- (c) Any replacement items necessary shall be recognized from the manufacturer spare parts list. Alternative components shall not be used without prior approval in writing of MD.
- (d) The Contractor shall bear all costs, insurance, risk of labour and transportation for agreed warranty claims.

If the Contractor fails to response against any reported warranty claims within 48 hours at no reason, MD may arrange defect rectification as deemed appropriate with a view to minimising any downtime incurred. In such case MD should reimburse the cost of such repairs from the Contractor afterwards.

1.3 Extension of Warranty

The warranty period for all goods requiring service under warranty shall be frozen whilst the Contractor fails to repair and correct satisfactorily all hardware and software defects within an agreed and reasonable period.

Electronic equipment sub-assemblies or components which are replaced during the warranty period shall have a new warranty period for one year commencing from the date of replacement.

1.4 Recurrent Defects

During the warranty periods specified above, should a second and similar defect arise, this shall be construed as conclusive evidence of the equipment's unsuitability for the purpose intended, and the Contractor shall take immediate steps to conduct a thorough investigation jointly with MD at the Contractor's expense, to ascertain the reasons for any such defect and shall forthwith at MD's option and the Contractor's expense, manufacture and effect delivery of equipment with a new design suitable for the purpose intended to replace those defective.

2. ITEMS TO BE PROVIDED DURING THE WARRANTY PERIOD

2.1 Updated/Upgraded Information

It is expected that during the warranty period certain equipment may be modified or changed. All documentation affected by this change must be updated to reflect the new situation. A system for configuration control must be set up and rigorously applied to ensure this works.

2.2 Support Information

The above principal applies particularly to support documentation such as the ship equipment list, job information and maintenance scheduling. At the expiry of the warranty period it is required that the Contractor should provide a means of reproducing these items to allow future modifications to the Vessel to be input into the system.

3. GUARANTEE SLIPPING

As stated in the section "Warranty" above, guarantee slipping shall be carried out at the end of the 12-month warranty period.

At the guarantee slipping, the Contractor shall carry out the following work with all the necessary cost, labour, materials and paint, etc., provided by the Contractor. Contractor should separately quote the cost of work for the guarantee slipping, which should be included into the contract price.

3.1 Electrical and Mechanical Items

(a) Propulsion Engines, Gearboxes and Auxiliary Engine

- (i) Replace engines' and gearboxes' lubrication oil and lubrication oil filters.
- (ii) Replace all engines' fuel filters (primary and secondary).
- (iii) Change/clean all engines' air filter elements.
- (iv) Renew all zinc anodes in seawater cooling passage of heat exchanges and coolers.
- (v) Tighten all engine mounting bolts and nuts.
- (vi) Adjust driving belts of all engines and replace any deteriorated belts as found.
- (vii) Adjust all engines' inlet and exhaust valves clearance.
- (viii) Check electrolyte level and specific gravity of all batteries. Topping up and recharging the batteries if necessary.

- (ix) Check and test for correct operation of all engines/gearboxes instrumentation gauges and sensors. Repair/replace any defective components.
- (x) Functional tests of all engines/gearboxes protection system and associated sensor switches. Repair/replace any defective components.
- (xi) Strip down all diesel generator engine starters, charge alternators and auxiliary engines for inspection. Renew all bearings. Clean up and megger test all windings. Check for correct operation of all components. Carry out repairs or parts replacement if found necessary. Reassemble all items in good working condition.
- (xii) Run up and check for normal operation of all engines / gearboxes. Conduct sea trials afterwards.
- (xiii) Performance and trial reports shall be submitted.
- (xiv) All the above work shall be carried out by the local service agent of the engine makers.
- (xv) All involved work procedures and specifications shall be carried out in compliance with the corresponding service manuals from original engine maker.
- (xvi) Check/change engine coolant and apply engine maker' s recommended coolant inhibitor.
- (xvii) Heat exchangers/coolers-remove exchangers/coolers ashore and apply chemical cleaning and carry out hydraulic test. Clean thoroughly tube stacks, cooling water passages and refit all to good order (chemical solvent to be supplied by Contractor).
- (xviii) Fire pump/Seawater pump/freshwater pump – strip down the pumps, clean and check wear on impeller, housing, shaft, bearings, bushes and seals. Renew all defective parts and refit all the parts to good order.

(b) Under-water Fittings

- (i) Open up all seawater suction valves and clear marine growth. Apply anti-fouling paint to interior of valve chests.
- (ii) Replace tailshaft packing.
- (iii) Replace rudder packing.
- (iv) Replace all zinc anodes.
- (v) Inspect, clean, polish and coat propeller with oil.
- (vi) Check all tailshaft bushes clearance and replace off-limit bushes.
- (vii) Inspect and clear all marine growth on all under-water fittings.

Dye penetration test for the keyway (if any) and cone of the propeller shafts

(c) Air-conditioning System

- (i) Check for normal operation of all air-conditioning systems and recharge refrigerant if necessary. Clean up all air filter elements, cooling coils and condensing coils.
- (ii) If a seawater cooled system is employed, then; clean up seawater strainers; strip down seawater cooled condensers and clean up marine growth, by using a brass tube brush on the shell and condenser, and by applying a suitable chemical for tubes in the condenser, and clean off all marine growth.
- (iii) Check all pressure switches, flow switches and instrumentation gauges, etc. Carry out repairs or parts replacement if necessary.
- (iv) Replace all drier core elements for refrigerant circuits. In case a semi-hermetic compressor is used, replace also the compressor lubricant.
- (v) All work shall be carried out by a local reputable air-conditioning Contractor.
- (vi) Performance and test reports shall be submitted.

3.2 Hull and Deck Items

- (a) Clean off all marine growth.
- (b) Renew all zinc anodes.
- (c) Repair damage paint properly and apply two touches up primer, one touch up and one full coat of anti-fouling paint to hull below waterline.
- (d) Repair damage paint properly to hull exterior above waterline and all other area including hull interior, superstructure and fittings, etc. Apply two touches up coats primer, one touch up and one full finishing coat as original.
- (e) Gratings to be removed, cleaned and painted one coat each as per hull bottom item (3). Hull apertures behind gratings to be of the same treatment.
- (f) Paint in the Vessel's name, draft marks and insignia two coats.
- (g) Scrape, clean, wash and paint all deck surfaces. Apply two touch up coats deck primer and one full coat non-slip deck paint to all decks.
- (h) Scrape, clean and apply two touch up coat primer, one touch up and one full finishing coat to superstructure, deckhouse and all deck fittings including mast, rails, stanchions, hatches, etc.

- (i) All varnish work to sand down, smooth, clean and re-varnish two coats. Slightly sand down between coats.
- (j) Free, clean, grease and recondition all moving parts of the deck fittings, i.e. WT hatches, WT doors, vent covers, roller and fairleads and anchor chain stopper, etc.
- (k) Strip down, overhaul all fire hydrants, hand pumps, toilet, pumps and reassemble above items in good working order.
- (l) Open up all bilge (except in the engine room) and chain locker for inspection. Dry, clean and paint one touch up coat primer and one full coat as original.
- (m) Range anchor cables for inspection, chip, scrape, wire brush, clean and paint one full finishing coat. Replace the anchor cables and anchors as original position.

3.3 Dock trial / sea trials after guarantee slipping

To ensure proper functioning and operation of the following before and during sea trials after the Vessel's warranty slipping:

- (a) Before Sea Trial
 - (i) Fire alarm and fire extinguishing system.
 - (ii) Bilge pumping system and bilge high level alarm.
 - (iii) Air-conditioning system, ventilation system and emergency stopping of vent fan(s).
 - (iv) Domestic / Sanitary and /or sewage system (if applicable),
 - (v) Main engines control system.
 - (vi) Main engines and auxiliary engines alarm and shut down function (including emergency stopping of engines).
 - (vii) Navigational equipment, light and sound signals.
 - (viii) Anchoring machinery test.
 - (ix) Other trials as recommended and required.
- (b) At Sea Trial
 - (i) Engine performance trial.
 - (ii) Ahead and astern running and crash stopping test of main engines.
 - (iii) Steering trial.
 - (iv) Other trials as recommended and required.

APPENDIX 2

MAIN INSPECTION ITEMS (M.I.I.)

Tenderers shall complete the following tables so as to plan and estimate the required number of Overseas (i.e. places outside of the HKSAR) Survey Visits to be made by GNC officers (about 44 man-days visits) and FOS officers (8 man-days visits). Tenderers should also specify any items to be inspected by a Classification Society if applicable. (*Note: A number of survey items can be carried out within one trip*).

The items included in **Table APP 2.1** are key activities in the construction progress. Tenderers should add other relevant inspection items/activities not mentioned below. In any case, MD may require other activities and /or items to be inspected at any other time.

Notes :

- (a) Tenderers shall note that the inspection items listed in **Table APP 2.1** are for the evaluation of overseas survey expenses. The survey of the listed items shall also be carried out even if the Vessel is built in the HKSAR.
- (b) The total cost of survey shall be included in the tender price offered by the tenderers as indicated in the tender form submitted by the tenderers.

Table APP 2.1

MAIN INSPECTION ITEMS LIST

(This list also indicates the items that must be inspected, as a minimum, before a stage payment can be made)

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list				Outstanding Re-inspection Remarks
			* Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.				
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory			
Item				Inspector		Surveyor	
Items to be inspected			Name	Signature	Name	Signature	
	Hull Structure, Layout and Outfitting Inspection						
H-1	Mould Lofting		P2				
H-2	Construction Materials – steel plate mark checking for hull & superstructure						
	a.	Steel plate mark checking for hull & superstructure	P2				
	b.	Material certificates verification	P2				
H-3	Welding consumables & welders certificates		P2				
H-4	Keel laying for hull		P2				
H-5	Fabrication of hull up to main deck in stages of work, including:						
	a.	Alignment	P2				
	b.	Edge Preparation	P2				
	c.	Welding	P2				
	d.	Workmanship	P2				
	e.	Compliance with approved plans	P2				
	f.	NDT (X-ray) of welds	P2				
	g.	Hull internal steel work inspection	P2				
	h.	Plating thickness gauging	P2				

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected			Inspector		Surveyor		
			Name	Signature	Name	Signature		
H-6	Engine bearers fabrication / welding	P2						
H-7	Superstructure scantling & welding checking	P2						
H-8	Welding construction and pressure tests of tanks							
	Fuel oil tank							
	a. Tank construction (internal/external/fitting)	P3						
	b. Tank pressure test	P3						
	Freshwater tank							
	a. Tank construction (internal/external/fitting)	P3						
	b. Tank pressure test	P3						
	Grey water tank							
	a. Tank construction (internal/external/fitting)	P3						
	b. Tank seating construction/securing arrangement	P3						
	Oily Water tank							
	a. Tank construction (internal/external/fitting)	P3						
	b. Tank seating construction/securing arrangement	P3						
H-9	Hose test for hull & superstructure	P3						
H-10	Mock up inspection for the wheelhouse (also attended by two FOS officers)	P3						
H-11	Installation of various outfitting items							
	a. Anchor and chain	P4						
	b. Windlass	P4						
	c. Hand pump	P4						
	d. Hatches	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”				★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”				Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected				Inspector		Surveyor		
				Name	Signature	Name	Signature		
	e.	Doors	P4						
	f.	Windows	P4						
	g.	Ventilators	P4						
	h.	Seating of heavy equipment and masts	P4						
H-12	Function tests of various outfitting items		P4						
H-13	Watertightness or weathertightness of openings								
	a.	Manholes	P4						
	b.	Hatches	P4						
	c.	Doors	P4						
	d.	Windows	P4						
	e.	Ventilator & air pipes	P4						
H-14	Painting inspection of different layers		P4						
H-15	Draught marks and vessel dimensions verifications		P4						
H-16	Arrangement of wheelhouse and accommodation		P4						
H-17	Zinc anodes and lightning system								
	a.	Installation of zinc anodes	P4						
H-18	Inspection of fire, heat and sound insulation								
	a.	Fire insulation	P4						
	b.	Heat insulation	P4						
	c.	Sound insulation	P4						
H-19	Interior furnishings (also attended by two FOS officers)								
	a.	Console area	P4						
	b.	Wheelhouse	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”				★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”				Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected				Inspector		Surveyor		
				Name	Signature	Name	Signature		
	c.	Passenger space	P4						
	d.	Toilets and pantry	P4						
H-20	Life saving appliances and fire fighting appliances								
	a.	Life saving appliance	P4						
	b.	Fire fighting appliance	P4						
H21	Inspection of Sea chest and grating								
	a.	Sea chest							
	b.	Grating							
H-22	Inclining experiment			P4					
H-23	Sea trials including operation test of outfitting equipment			P4					
H-24	Towing hook static bollard pull test			P4					
H-25	Site towing demonstration trial			P4					
H-26	Cleanliness inspection before acceptance			P4					
H-27	Inventory check in the HKSAR			P4					
H-28	Acceptance and delivery			P4					

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected			Inspector		Surveyor		
			Name	Signature	Name	Signature		
	Machinery and Electrical Installation							
EM- 1	General inspection on installation of Machinery:	P3						
(a)	General inspection on installation of main engines	P3						
(b)	General inspection on installation of generator sets							
(c)	General inspection on installation of auxiliary engines	P3						
(d)	General inspection on installation of shafting	P3						
(i)	Propeller taper bedding test							
(ii)	Coupling taper bedding test							
(iii)	Coupling and rudder bolts fitting							
EM- 2	Main engines:	P4						
(a)	Test of engine safety devices and alarms	P4						
(b)	Test of emergency stop	P4						
(c)	Inspection of exhaust pipe before lagging	P4						
EM- 3	Hydraulic test of sea valve	P4						
EM- 4	Inspection of sea water suction strainer	P4						
EM- 5	Freshwater system:	P4						
(a)	General inspection & dimension checking of freshwater system	P4						
(b)	Freshwater tank low level alarm test	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected			Inspector		Surveyor		
			Name	Signature	Name	Signature		
(c)	Freshwater tank final cleaning/internal inspection before filling	P4						
(d)	Freshwater tank high level alarm test	P4						
(e)	Freshwater tank content gauge calibration and test	P4						
(f)	Inspection of piping penetration of bulkhead and deck	P4						
(g)	Hydraulic test of freshwater piping	P4						
(h)	Functional test of freshwater system	P4						
EM- 6	Fuel oil system:	P4						
(a)	General inspection & dimension checking of fuel oil system	P4						
(b)	Fuel oil tank low level alarm test	P4						
(c)	Fuel oil tank final cleaning/internal inspection before filling	P4						
(d)	Fuel oil tank high level alarm test	P4						
(e)	Fuel oil tank content gauge calibration and test	P4						
(f)	Inspection of piping penetration of bulkhead and deck	P4						
(g)	Hydraulic test of fuel oil piping	P4						
EM- 7	Bilge system:	P4						
(a)	General inspection & dimension checking of bilge system	P4						
(b)	Bilge tank high and low level alarms test	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected			Inspector		Surveyor		
			Name	Signature	Name	Signature		
(c)	Inspection of piping penetration of bulkhead and deck	P4						
(d)	Hydraulic test of piping	P4						
(e)	Functional test of bilge system	P4						
EM- 8	Sanitary system:	P4						
(a)	General inspection & dimension checking of sanitary system	P4						
(b)	Inspection of piping penetration of bulkhead and deck	P4						
(c)	Hydraulic test of piping	P4						
(d)	Functional test of sanitary system	P4						
EM- 9	Fire fighting system:	P4						
(a)	General inspection & dimension checking of fire line system (including the emergency fire line system)	P4						
(b)	Inspection of piping penetration of bulkhead and deck	P4						
(c)	Hydraulic test of fire line	P4						
(d)	Function test of fire line(including emergency fire line)	P4						
EM- 10	Fire extinguishing system:	P4						
(a)	General inspection & dimension checking of (gas) fire extinguishing system	P4						
(b)	Hydraulic & blow test of gas fire extinguishing piping	P4						
(c)	Test of (gas) fixed fire extinguishing alarm system	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected			Inspector		Surveyor		
			Name	Signature	Name	Signature		
(d)	Test of fire detection (smoke & heat detectors) alarm system	P4						
EM- 11	Functional test of drainage system	P4						
EM- 12	Hydraulic system	P4						
(a)	General inspection & dimension checking of hydraulic system	P4						
(b)	Inspection of piping penetration of bulkhead and deck	P4						
(c)	Hydraulic test of piping	P4						
(d)	Functional test of hydraulic system	P4						
EM- 13	E/R ventilation system:	P4						
(a)	Inspection of E/R ventilation fans installation	P4						
(b)	Function test of start/stop at remote and local control for E/R ventilation fans	P4						
EM- 14	Air Conditioning system:	P4						
(a)	General inspection of air-conditioning system	P4						
(b)	Inspection and hydraulic test of cooling water system	P4						
(c)	Function test of air-conditioning system	P4						
(d)	Air Conditioning full load test during sea trial	P4						
EM- 15	Batterries:	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected			Inspector		Surveyor		
			Name	Signature	Name	Signature		
(a)	Inspection of battery connectors and housing boxes	P4						
(b)	Inspection of battery charger	P4						
(c)	Operational test of battery charger Test of main engines and generator consecutive starting by each group of battery (start/stop at remote and local control)	P4						
EM- 16	Electrical Installation:	P4						
(a)	Inspection of lightning conductor	P4						
(b)	General inspection of cable layout & checking of cable sizes	P4						
(c)	Inspection of cable penetrations of bulkhead and deck	P4						
(d)	Inspection of transformers	P4						
(e)	Inspection of tally plates	P4						
EM- 17	Main switchboard & panels:	P4						
(a)	Main switchboard & panels - high voltage injection test	P4						
(b)	Cable size checking of electrical switchboard installations	P4						
(c)	Inspection of AC distribution panel	P4						
(d)	Inspection of DC distribution panel	P4						
(e)	Megger test of the electrical system	P4						
	Earthing test of the electrical system	P4						
EM- 18	Control Console:	P4						
(a)	Inspection of wheelhouse control console	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
Item	Items to be inspected			Inspector		Surveyor		
			Name	Signature	Name	Signature		
(b)	Functional test of wheelhouse console controls	P4						
(c)	Inspection of navigation equipment control panel	P4						
EM- 19	Lighting:	P4						
(a)	Inspection and functional test of general lighting	P4						
(b)	Inspection and functional test of emergency lighting	P4						
(c)	Inspection and functional test of floodlight installation	P4						
(d)	Inspection and functional test of searchlight installation	P4						
EM- 20	Navigational Lights and Signals	P4						
(a)	Inspection and functional test of Navigational lights	P4						
(b)	Test of horn/whistle	P4						
EM- 21	Shafting (tailshaft and coupling) system:	P4						
(a)	Marking/Stamping and material check	P4						
(b)	Dimension check and taper bedding test	P4						
(c)	Shaft line checking of stern/shaft bracket and alignment of main engines and tailshafts	P4						
EM- 22	Test of window wipers	P4						
EM- 23	Inspection of lightning conductor	P4						

MAIN INSPECTION ITEMS FOR REPLACEMENT OF “MARINE 32”			★The inspection items are not exhaustive, any items found necessary to be included at a later date will be added into this list * Material test be witnessed by Class/MD surveyors, or relevant Classification Certificates to be submitted.					
VESSEL NAME : “MARINE 32”			Inspection date	Satisfactory				Outstanding Re-inspection Remarks
				Inspector		Surveyor		
Item	Items to be inspected		Name	Signature	Name	Signature		
EM- 24	Electronic equipment tested by EMSD	P4						
EM- 25	Test of noise level during sea trial	P4						
* Items should be inspected before paying the relevant instalment (or stage payment)								
P2-	On completion of hull construction up to the main deck	P4-	On delivery of the Vessel to the Government Dockyard after successful completion of acceptance trials in the HKSAR in accordance with Clause 10 of the General Conditions and on delivery of all documents as required in the Contract in the HKS					
P3-	On completion of main engines and generator installations							

Table APP 2.2

(Note: This table shall be completed by tenderers and shall be committed by tenderers as a basis for preparation of programme stipulated in Chapter 1, Paragraph 7.4)

Summary of required surveys man-days for HULL and E&M equipment			
Trip Nos.	Item No	Man-days	Remarks
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

Total number of man-days required = _____ Man-days
Total number of trips required = _____ Trips

Table APP 2.3
SURVEY VISIT DETAILS AND EXPENSES
(To be filled in by all tenderers)

Tenderers should note that the prices of the following items shall be INCLUDED in the tender price of the Vessel in the Tender Form.

Tenderers shall complete the following table, based on data submitted in **APPENDIX 2** and **APPENDIX 4** for tender evaluation purposes.

Overseas Survey Expense					
Description	Unit Amount (HK\$)	No. of Visits	No. of Officers	No. of Nights Stay	Subtotal Amount (HK\$)
International full fare unrestricted economy class outward and return air ticket for each visit			N.A.	N.A.	
Outward and return ferry/train/bus tickets for each visit (if applicable)			N.A.	N.A.	
Local transport fare in the HKSAR and Overseas (between airport, hotel, shipyard, sub-contractors, etc. during the entire trip) for each officer per visit				N.A.	
Subsistence allowance for each officer for each night stay (see APPENDIX 4)		N.A.			
Total expenses allowed for the survey of vessel construction for government officers (HK\$)					

Note 1 The total expenses allowed for the survey of the Vessel construction as specified above should have been included in the Contract price.

Note 2 Not later than 1 month after the signing of the Contract, the Contractor is required to deposit with the Government a sum equal to the above “total expenses allowed for the survey of Vessel construction” , and bear the bank charges, if any. The Government will arrange the survey visits and all expenses relating to the visits will be met from the deposit account

Note 3 During the construction of the Vessel. If it is observed that the deposit account is likely to be insufficient to meet the survey expenses incurred, the Contractor is required to deposit on demand with the Government a further sum as deemed necessary by the Government, and bear the bank charges, if any. As the total of the actual survey expenses is greater than the specified “total expenses allowed for the survey of Vessel construction” , the balance of the deposit account would be refunded without interest to Contractor. If at the Contractor’ s request, refund is to be made to the Contractor’ s overseas bank account, the overseas bank charges would be borne by the Contractor. The excess expenses would be borne by the Contractor and cannot be claimed against Government.

Note 4 If the total of the actual survey expenses is less than the specified “total expenses allowed for the survey of the Vessel construction” , the Contractor is required to pay to the Government the difference between the specified “total expenses allowed for the survey of the Vessel construction” and the actual survey expenses incurred by charging the deposit account. If the Contractor deposit more than the specified “total expenses allowed for the survey of the Vessel construction” , then the balance of the deposit account would be refunded without interest to the Contractor. If at the Contractor’ s request, refund is to be made to the Contractor’ s overseas bank account, the overseas bank charges would be borne by the Contractor.

Note 5 All refunded can only be made upon production of the original deposit receipt(s).

Note 6 N.A. = Not Applicable

APPENDIX 3

LIST OF DRAWINGS AND DOCUMENTS TO BE SUBMITTED

1. Drawings And Documents To Be Submitted For Approval

Four (4) copies (unless otherwise stated) of each of the drawings/documents as listed below should be forwarded to MD for approval/reference as appropriate, before the relevant work on the Vessel is commenced. Adequate time (at least 4 weeks) should be allowed for MD's reply to be received. One copy will be returned to the Contractor with or without comments.

The drawings, etc. should embody and amplify as necessary all amendments as agreed at the time of placing Contract and during subsequent detailed development of the design.

A copy of the programme for preparation and submission of such drawings and specifications should be supplied to MD within one month after the Contract is awarded.

Should any drawings be modified by the Contractor after first forwarding copies to MD (including those drawings modified to incorporate MD comments) the appropriate number of further print copies of the modified version should be forwarded to MD concurrently with issue of the revised version to the yard.

The following drawings/calculations/documents (or equivalent) should be submitted. The right-most column states the purpose of submission - "A" for approval and "R" for reference.

Item No.	Items	Purpose
1.	<u>One copy</u> of schedule of drawings/documents submission to be submitted within one month after Contract signing	R
2.	General arrangement (scale 1:25) showing external profile, plan view at various deck and cross-sections	A
3.	Lines plan (scale 1: 25) including offset table. The lines plan should include profile view with buttocks, plan view and sections of the hull	R
4.	Sea trial record of proven sister vessel/details of power/speed predictions	R
5.	Design calculations, including hydrostatic data, breakdown of weights estimate and centres of gravity	R
6.	Preliminary and final stability information booklet	A
7.	Details of draught marks	A
8.	Midship section & bulkheads	A
9.	Construction profile and decks, shell expansion, deckhouse, engine foundation and heavy load bearing areas, etc.	A

10.	Scantling calculation	A
11.	Safety Plan showing arrangement of life saving appliances, fire fighting appliances, light and sound signals, means of escapes, etc.	A
12.	Anchoring and mooring equipment with windlass. Tow hook and quick release mechanism. Towing bitt construction and arrangement.	A
13.	Joiner plan of wheelhouse and accommodation space (scale 1:25) including all hardware, fittings and lighting fixtures	A
14.	Insulation plan (including fire, heat and sound)	A
15.	Weathertight and watertight closing appliances	A
16.	Mast, miscellaneous fittings and railings details and arrangement	A
17.	Colour and painting scheme	A
18.	Layout of engine room (scale 1:25 or 1:10) including profile and sections	A
19.	Main engines and gearboxes approval certificates issued by a recognized Classification Society	R
20.	Arrangement of shafting system (including calculations of torsional vibration)	A
21.	Arrangement of steering system, Stern tube, shaft bracket and kort nozzle construction plan.	A
22.	Rudder & rudder arrangement & details	A
23.	Arrangement of fuel and lube oil pumping and piping system (including tank construction)	A
24.	Arrangement of sanitary system (for freshwater, sanitary service, drainage systems - including tank construction)	A
25.	Arrangement of bilge system (including tank construction)	A
26.	Arrangement of internal fire fighting system	A
27.	Arrangement of fixed fire detection and fighting system (design and calculation of fixed fire extinguishing, fire detection system)	A
28.	Arrangement of engine cooling water piping system (for both main and auxiliary engines - including, exhaust system, etc.)	A
29.	Arrangement of main and auxiliary engines, monitoring / instrumentation protection system	A
30.	Air-conditioning, mechanical and natural ventilation system, (including design calculation and ducting arrangement)	A
31.	Battery charging system	A
32.	Lighting fixtures and fittings	A

33.	General and emergency lighting systems, fixtures and fittings	A
34.	Arrangement and line diagrams of switchboard protection device, electrical distribution and installation, including cable type, size and working load in circuit, type and make of circuit breakers and fuses	A
35.	Arrangement of antennas and associated feeder cables	A
36.	Arrangement of major units of electronic equipment in operations area and wheelhouse (including consoles layout)	A
37.	Conduit / trunking route diagrams for electronic equipment	A
38.	Guidance installation documents for electronic equipment	A
39.	Lightning arrestor	A
40.	Docking plan	A
41.	Hydraulic system and power pack unit	A
42.	Propeller Plan	A
43.	<u>One copy each</u> of drawings/plans/calculations approved by a recognized Classification Society with covering letter (if any)	R
44.	List of lube oils used in various systems	R
45.	Inclining experiment report	A
46.	Static bollard pull test report	A
47.	Painting report (compiled and signed by Coating Advisor of an established paint manufacturer)	R
48.	Oblique plans of general arrangement, engine room and wheelhouse	R
49.	Any relevant class certificates and other drawings required by MD	A/R

In addition to the above, the originals of inspection records, endorsements, defect reports, records of rectification as recommended by class surveyors, etc., duly signed by the class surveyors (if any) shall be well documented and readily available for inspection and/or scrutiny by GNC officers upon request during site inspection throughout the construction stages.

APPENDIX 4
GOVERNMENT SUBSISTENCE ALLOWANCE SCALE

Country / City	First 28 nights		Thereafter
	Currency	Amount	
Australia (Adelaide)	AUD	348	All rates to be reduced by 10% for stay in any one city
Australia (Brisbane)	AUD	374	
Australia (Perth)	AUD	348	
Australia (Sydney)	AUD	407	
China (Beijing)	RMB	2,382	
China (Guangzhou)	RMB	1,843	
China (Shenzhen)	RMB	1,891	
China (Shanghai)	RMB	2,457	
China (Other cities)	RMB	1,106	
Taiwan (Taipei)	TWD	9,780	
Taiwan (Others)	TWD	5,444	

The above rate of subsistence allowance is provided for duty visits in some overseas cities. For other countries or cities, please contact GNC Section, MD for information.

APPENDIX 5

STABILITY REQUIREMENTS

1. GENERAL

All calculations and drawings shall be in metric units. The calculations can be carried out by using a proven (viz. recognized by a government authority or Classification Society) computer program. If a computer programme is used, the user manual, input and output format shall first be acceptable to MD. The submitted output data shall be accompanied with input data.

2. INCLINING EXPERIMENT

An inclining experiment should be carried out with the attendance of GNC officers. Guidance should be sought from Chapter 7 and Annex I of IMO Resolution A.749(18) in conducting such an inclining experiment to determine the lightship weight and centres of gravity.

The Contractor shall submit at least 14 working days in advance a "Scheme of Inclining Experiment" which includes:

- (a) The Vessel's intended condition during the Inclining Experiment with intact stability results;
- (b) The proposed locations and movements of inclining weights;
- (c) The calculation of estimated heel and trim of the Vessel before and during the experiment;
- (d) The proposed number, location and lengths of pendulum used; and
- (e) The list of data to be measured (i.e. draughts, specific gravity of floating water, etc.).

The Inclining Experiment shall only be conducted:

- (a) After the "Scheme of Inclining Experiment" has been approved by GNC officers; and
- (b) In the presence of GNC officers. Request for attendance should be made at least five working days in advance.

The lightship weight and centres of gravity shall be calculated and presented in the Inclining Experiment Report. The GM of the Vessel after each and every shift of inclining weight shall be determined. Free surface of liquids remaining onboard shall be taken into account.

This Inclining Experiment Report shall be submitted to MD for approval. The report shall include a statement from the Contractor stating that the Vessel should be safe to go to sea for the intended sea trials specified in the Contract. No Official Speed Trials should be conducted until MD, based on the information given in the Inclining Experiment Report, agrees to carry out such trials.

3. STABILITY INFORMATION BOOKLET

The Contractor is to supply to MD four copies of the Stability Information Booklet. The Stability Information Booklet shall be given to MD at time of Delivery Acceptance.

The Vessel shall comply with the stability criteria as mentioned in **Paragraph 4 and 5 of this APPENDIX** or the applicable IMO regulations. Furthermore, stability due to wind and rolling for the required service environment of the Vessel shall be calculated. In addition to the requirements stated above, the booklet in its final version shall include:

- (a) Ship particulars, sketch of general arrangement drawing showing different compartment and tank positions hydrostatic curves and cross curves;
- (b) Tank calibration/sounding tables, fuel oil tank, freshwater tank, etc. These tables shall consist of locations of tanks (frame numbers), levels from tank bottom, capacities, VCG/LCG/TCG and free surface moments, and location of sounding points. The trim and heel of the Vessel where these tables are applicable shall be stated;
- (c) Stability calculation for each loading condition shall include a profile drawing, items of deadweight, lightship, displacement, drafts, trim, VCG, GM(solid & fluid), LCG, down-flooding angle, statical stability curve, etc.;
- (d) Any other information as reasonably required by MD; and
- (e) Inclining experiment report approved by MD.

In the preliminary and final stability calculation, the estimated and the final (obtained after conducting an Inclining Experiment) lightship data shall be used respectively. Both the preliminary and final Stability Information Booklet shall include the following loading conditions (and any other conditions as may be required by MD during the construction of the Vessel) and their stability results shall be presented as per the IMO Code on Intact Stability or requirements of Merchant Shipping (Safety) (Load Line) Regulations:

Loading Conditions		Fuel Oil (%)	Freshwater (%)	Crew & Effects
1	Lightship	Nil	Nil	Nil
2	Full Load	98	100	1,000kg
3	Arrival	10	10	1,000kg
4	Sea Trial	98	100	1,000kg

The maximum free surface moments shall be used in calculating the stability of the Vessel in all of the above conditions.

Weight of each crew and passenger is assumed to be 75kg, and effect per person to be 10 kg.

VCG of each crew/officer will be assumed as 750mm above deck. LCG of each crew/officer will be in their most likely position on board.

Wind moment in various loading conditions due to Beaufort Wind Scale 6 should also be considered in the stability calculation.

4. INTACT STABILITY CRITERIA

Stability and freeboard will be considered satisfactory if the following criteria are complied with, after taking free surface effects into account, for lightship and loaded conditions as specified above.

- a) The maximum righting lever (GZ) occurs at an angle of heel of not less than 30 degrees;
- b) The righting lever GZ should be at least 200 mm;
- c) The area under the GZ curve should not be less than:
 - (i) 0.055 metre-radian up to an angle of 30 degrees;
 - (ii) 0.090 metre-radian up to an angle of 40 degrees or the angle at which the lower edges of any openings in the hull superstructures or deckhouses, being openings which cannot be closed weathertight, are immersed if that angle be less;
 - (iii) 0.030 metre-radian between 30 and 40 degrees or such lesser angle as is referred to in (ii) above;
- d) The initial transverse metacentric height should not be less than 0.15 metre.
- e) In the worst service condition, the angle of heel due to the effect of either crowding of passengers or turning the Vessel should not be greater than 10 degrees or 80% of angle of deck edge immersion, whichever is less. The effects should be determined as follows:

- (i) Crowding of passengers - the passengers should be assumed to be congregated at 0.25 square metres per person on the uppermost deck(s), with two-thirds of the passengers distributed on one side of the ship and one-third on the other side. The vertical centre of gravity of each person should be taken as a standing passenger.
- (ii) Turning moment of the Vessel - the heeling moment developed due to the effect of turning the Vessel should be calculated by the following formula:

$$M_R = 0.02 V_o^2 \Delta (KG - d/2)/L_{W1}$$

Where

M_R = heeling moment, in tonnes metres

V_o = service speed, in metre/sec.

L_{W1} = length of ship at waterline, in metres

Δ = displacement, in tonnes

d = mean draft, in metres

KG = height of centre of gravity above keel, in metre

- (iii) Towing Stability – to meet either (a) or (b) of the following criteria:

- (a) Vessel permitted to tow should conform to the following criteria:

$$GM_T = \frac{P \times H}{110 \times \Delta \times F/B} \quad (\text{metres})$$

Where

P = total brake power of main engines (KW)

H = vertical distance between top of towing point to centre of propeller (m)

Δ = displacement (tonnes)

F = freeboard (m)

B = maximum breadth (m)

- (b) Vessel permitted to tow should conform to the following criteria:

- The residual area between a righting lever curve and a heeling lever curve developed from 70% of the maximum bollard pull force acting 90 ° to the ship-length direction should be not less than 0.09 m-rad. The area has to be determined between the first interception of the two curves and the second interception or the angle of down flooding whichever is less.

- Alternatively, the area under a righting lever curve should not be less than 1.4 times the area under a heeling lever curve developed from 70% of the maximum bollard pull acting in 90 ° to ship-length direction. The areas to be determined between 0 ° and the 2nd interception or the angle of down flooding whichever is less.

The heeling lever curve should be derived by using the following formula:

$$b_h = 0.7 TH \cos / 9.81\Delta$$

Where:

b_h = heeling arm, in m

T = maximum bollard pull, in KN

H = vertical distance, in m, between the towing hook and the centre of the propeller

Δ = loading condition displacement, in t.

5. DAMAGED STABILITY CRITERIA

Transverse bulkheads shall be arranged to sustain flooding of any one full compartment and asymmetric flooding due to damage of any smaller watertight compartment within the full compartment. The residual stability shall be sufficient to maintain the Vessel operating in the required sea condition safely.

N.B.

The Contractor should note that the opening to be used to determine the down flooding angle should be agreed with MD.

APPENDIX 6

BOLLARD PULL TEST REQUIREMENTS

1. A proposed test programme should be submitted prior to the testing.
2. During testing of continuous bollard pull (BP) the main engines should be run at the manufacturer's recommended maximum torque according to the maximum continuous rating. Verification on the actual output should be requested during the test.
3. The propellers fitted when performing the test should be the propellers used when the vessel is in normal operation.
4. The length of the towline should not be less than twice the vessel length.
5. The water depth at the test location should not be less than twice the maximum draft of the vessel.
6. The test should be carried out with the vessel's displacement corresponding to the trial condition.
7. The vessel should be trimmed at even keel or at a trim by stern not exceeding 2% of the vessel's length.
8. The vessel should be able to maintain a fixed course for not less than 10 minutes while pulling as specified in item 2 above. Certified continuous bollard pull is the average reading of the 10 minutes period.
9. The test should be performed with a wind speed not exceeding 5m/s.
10. The current at the test location should not exceed 0.5m/s in any direction.
11. The load cell used for the test should be approved by a competent body and be accurate within +/- 2% within the range of loads to be measured and for the environmental conditions experienced during the test.
12. An instrument giving a continuous read-out and also a recording instrument recording the bollard pull graphically as a function of time should both be connected to the load cell. The instruments should if possible be placed and monitored ashore.
13. The load cell should be fitted between the eye of the towline and the bollard.
14. The figure certified as the vessel's continuous bollard pull shall be the towing force recorded as being maintained without any tendency to decline for a duration of not less than 10 minutes.
15. A communication system shall be established between the vessel and the persons monitoring the load cell and the recording instrument ashore, by means of VHF or telephone connection, for the duration of the test.

APPENDIX 7 MARKINGS AND COLOUR SCHEME

16. VESSEL'S NAME

The Vessel's name shall be cut from steel plate and be welded on bulwark at forward of the Vessel on both sides of the hull and at the transom. The Marine Department's crest shall also be displayed at a prominent position on each side of the deckhouse. The exact size and letters/numbers will be provided by GNC.

The wording and calligraphy should be in line with the one displayed on the existing MD vessels. The wording and size of the Vessel's name shall be agreed by MD, including the colour to be used.

Location and size of the Contractor's name plate fixed on the Vessel shall be agreed by MD.

17. COLOUR SCHEME

It is important that ALL colour used, including fabrics for upholstery, curtains, floor tiles and furniture, shall be approved by MD before installation.

All colour samples will be submitted by the Contractor for approval before application.

Piping colour codes will comply with BS 1710: 1975 or equivalent and be approved by MD.

Colour of draught marks, name, insignia and other colour markings, etc. will be provided, as required by MD.

18. DRAUGHT MARKS

Draught marks should be cut from steel plate and be welded on the hull at the port and starboard of stem and stern. The marks shall be painted in a colour contrasting with the hull colour.

Draught marks shall be measured from the lowest point of the Vessel to the underside of the number markings. The marks shall be in Arabic numerals 100 mm high and spaced every 200 mm, and shall be marked as follows:

2M
8
6
4
2
1M

**APPENDIX 8
MACHINERY, OUTFITTING & ELECTRONIC EQUIPMENT
PROPOSED BY TENDERER**

1. The tenders should ensure the tender price quoted in the Tender Form should have included all the items listed in the following table.
2. Only the items that are considered most economical and comply with the tender specification requirements shall be listed in the following table. Therefore, there is no need to specify more than one item.
3. The quantity of supply items will be evaluated based on the details given in the following table.
4. If the tenderers wish to propose an alternative offer for the item, please use a separate table. The tenderers should note that normally the quantity of supply will be evaluated based on the item (one only) specified in this table.
5. The prices quoted in the following table will be used to finalise the purchases price in case the item is not required or in case more units of the item will be purchased.
6. Refer to Standard Terms of Reference of Tender, clause 7(f) before filling in this table.

** Delete as appropriate*

Item (reference to Ch. 4 to Ch. 6)	No. off	Maker	Model	Operator Manual	Service Manual	Technical Brochure	Equipment Agent in HK with name, tel., fax no., for after sales service	Unit inclu access HK\$
Towing Equipment Ch.4, Para. 6				Yes/No*	Yes/No*	Yes/No*		
Fender Ch. 4, Para. 7				Yes/No*	Yes/No*	Yes/No*		
Insulation and Lining Ch. 4, Para. 8				Yes/No*	Yes/No*	Yes/No*		
Deck Covering Ch. 4, Para. 9				Yes/No*	Yes/No*	Yes/No*		
Painting Ch. 4, Para. 10				Yes/No*	Yes/No*	Yes/No*		
Cathodic Protection Ch. 4, Para. 11				Yes/No*	Yes/No*	Yes/No*		

Lightning Protection Ch. 4, Para. 12				Yes/No*	Yes/No*	Yes/No*		
Access, Doors, Ladders and Hatches - Ch. 4, Para. 14				Yes/No*	Yes/No*	Yes/No*		
Windows Ch. 4, Para. 15				Yes/No*	Yes/No*	Yes/No*		
Life Saving Appliances – Ch. 4, Para. 17				Yes/No*	Yes/No*	Yes/No*		
Fire Fighting Appliances– Ch. 4, Para. 18				Yes/No*	Yes/No*	Yes/No*		
Navigational, Signalling Equipment - Ch. 4, Para. 20				Yes/No*	Yes/No*	Yes/No*		
Anchoring & Mooring Ch. 4, Para. 21				Yes/No*	Yes/No*	Yes/No*		
Main Propulsion Engines (proposal 1) - Ch. 5, Para. 2				Yes/No*	Yes/No*	Yes/No*		
Main Propulsion Engines (proposal 2) - Ch. 5, Para. 2				Yes/No*	Yes/No*	Yes/No*		
Gearboxes Ch. 5, Para. 2				Yes/No*	Yes/No*	Yes/No*		
Generator Sets Ch. 5, Para. 3				Yes/No*	Yes/No*	Yes/No*		
Main Control & Instrument. Ch. 5, Para. 6				Yes/No*	Yes/No*	Yes/No*		
Engine Exhaust and Silencer Ch. 5, Para. 7				Yes/No*	Yes/No*	Yes/No*		
Engine Room Ventilation Ch. 5, Para. 10				Yes/No*	Yes/No*	Yes/No*		
Air-conditioning System Ch. 5, Para. 11				Yes/No*	Yes/No*	Yes/No*		

Fire Fighting System Ch. 5, Para. 13				Yes/No*	Yes/No*	Yes/No*		
Bilge & General Service System - Ch. 5, Para. 14				Yes/No*	Yes/No*	Yes/No*		
Engine Room Fire Detection and Smothering System Ch. 5, Para. 19				Yes/No*	Yes/No*	Yes/No*		
Anti-fouling System Ch. 5, Para. 20				Yes/No*	Yes/No*	Yes/No*		
Switchboards, Batteries & Charging System Ch. 6, Para. 3 & 5				Yes/No*	Yes/No*	Yes/No*		
General & Emergency & Mission Lighting Ch. 6, Para. 7 & 12-14				Yes/No*	Yes/No*	Yes/No*		
Marine Daylight Radar Ch. 7, Para.4				Yes/No*	Yes/No*	Yes/No*		
GPS Receiver Ch. 7, Para. 5				Yes/No*	Yes/No*	Yes/No*		
Echo Sounder & Depth Indicator - Ch. 7, Para. 6				Yes/No*	Yes/No*	Yes/No*		
Loudhailer/Siren System Ch. 7, Para.7				Yes/No*	Yes/No*	Yes/No*		
Intercommunication System Ch. 7, Para.8				Yes/No*	Yes/No*	Yes/No*		
VHF Transceiver Ch. 7, Para. 9				Yes/No*	Yes/No*	Yes/No*		
Portable VHF Transceiver Ch. 7, Para. 10				Yes/No*	Yes/No*	Yes/No*		

APPENDIX 9
SUMMARY QUOTATION LIST FOR OPTIONAL ITEMS

NOTES:

1. The following items shall be quoted separately; these items shall **NOT be included in the tender price quoted in the Tender Form.**
2. Tenderers shall quote the price separately for all the items as listed the following table:

Item No.	Description	Reference	Amount in HK\$	Remark
1	Repair by Replacement Spares	Ch. 8, Para. 7		
2	Ship Model (1:25)	Ch. 8, Para. 5.5		
3	Electronic Spares	Ch. 8, Para. 8		

APPENDIX 10
COMMITMENT TO COMPLY WITH GUIDELINE REQUIREMENTS
(To be filled in by all tenderers)

The tenderer has to delete either “YES” or “NO” for confirmation of compliance and non-compliance with the guideline requirements in each section of each chapter of the PS respectively. For non-compliance, please give details of alternative offer in **APPENDIX 10**.

CHAPTR 1 GENERAL PROVISIONS

1.	INTRODUCTION.....	YES/NO
2.	DESIGN AND CONSTRUCTION RESPONSIBILITY	YES/NO
3.	PROVISION OF DOCUMENTS BY SUCCESSFUL TENDERER	YES/NO
4.	LIQUIDATED DAMAGES AND PAYMENT TERMS	YES/NO
5.	WARRANTY	YES/NO
6.	ACCEPTANCE AND DELIVERY	YES/NO
7.	SURVEYS.....	YES/NO
8.	SPEED REQUIREMENTS.....	YES/NO
9.	STATIC BOLLARD PULL REQUIREMENTS.....	YES/NO
10.	MANOEUVRABILITY AND CRASH STOP TESTS	YES/NO
11.	ENDURANCE	YES/NO
12.	SUPPORT SERVICES	YES/NO
13.	MARKINGS AND COLOUR SCHEME.....	YES/NO

CHAPTER 3 GUIDELINE REQUIREMENTS - GENERAL

1.	GENERAL.....	YES/NO
2.	RULES, REGULATIONS AND CLASSIFICATION.....	YES/NO
3.	ROLE OF VESSEL.....	YES/NO
4.	OPERATING PROFILE.....	YES/NO
5.	WORKMANSHIP AND QUALITY CONTROL	YES/NO
6.	MATERIALS	YES/NO
7.	TALLY PLATES	YES/NO

CHAPTER 4 GUIDELINE REQUIREMENTS - HULL

1.	HULL DESIGN FEATURES	YES/NO
2.	HULL STRUCTURAL REQUIREMENTS.....	YES/NO
3.	SPEED AND POWER	YES/NO
4.	DESIGN AGAINST NOISE AND VIBRATION.....	YES/NO
5.	ACCOMMODATION AND COMPARTMENT ARRANGEMENT.....	YES/NO
6.	TOWING EQUIPMENT.....	YES/NO
7.	FENDER	YES/NO
8.	INSULATION AND LINING	YES/NO
9.	DECK COVERING	YES/NO
10.	PAINTING	YES/NO
11.	CATHODIC PROTECTION	YES/NO
12.	LIGHTNING PROTECTION	YES/NO
13.	MAST.....	YES/NO
14.	ACCESS, DOORS, LADDERS AND HATCHES.....	YES/NO
15.	WINDOWS.....	YES/NO
16.	BULWARK, HAND HOLDS AND GRAB RAILS.....	YES/NO
17.	LIFE-SAVING APPLIANCES.....	YES/NO
18.	INTERNAL FIRE FIGHTING APPLIANCES.....	YES/NO

19.	VENTILATION	YES/NO
20.	NAVIGATIONAL AND SIGNALLING EQUIPMENT	YES/NO
21.	ANCHORING AND MOORING.....	YES/NO
22.	GENERAL STORES.....	YES/NO
23.	MEASUREMENT AND MARKING OF VESSEL.....	YES/NO

CHAPTER 5 GUIDELINE REQUIREMENTS - MACHINERY

1.	GENERAL MACHINERY REQUIREMENT	YES/NO
2.	MAIN PROPULSION ENGINES.....	YES/NO
3.	GENERATOR SET	YES/NO
4.	ENGINE INSTALLATION.....	YES/NO
5.	ENGINE EMISSION	YES/NO
6.	CONTROL AND INSTRUMENTATION.....	YES/NO
7.	ENGINE EXHAUST AND SILENCER	YES/NO
8.	SHAFTING, STERN TUBE, SHAFT BRACKET AND NOZZLES	YES/NO
9.	STEERING GEAR SYSTEM AND RUDDER	YES/NO
10.	ENGINE ROOM VENTILATION.....	YES/NO
11.	AIR-CONDITIONING SYSTEM.....	YES/NO
12.	PIPING CONSTRUCTION AND TESTS	YES/NO
13.	INTERNAL FIRE FIGHTING SYSTEM	YES/NO
14.	BILGE AND GENERAL SERVICE SYSTEM	YES/NO
15.	SEAWATER SYSTEM.....	YES/NO
16.	SANITARY SYSTEM.....	YES/NO
17.	FUEL OIL SYSTEM.....	YES/NO
18.	FRESHWATER SYSTEM	YES/NO
19.	ENGINE ROOM FIRE DETECTION AND SMOTHERING SYSTEM	YES/NO
20.	ANTI-FOULING SYSTEM.....	YES/NO
21.	FLOOR PLATES, HANDRAILS AND GUARDS	YES/NO

CHAPTER 6 GUIDELINE REQUIREMENTS - ELECTRICAL

1.	GENERAL ELECTRICAL REQUIREMENT	YES/NO
2.	DC POWER SOURCE.....	YES/NO
3.	BATTERY CHARGING ARRANGEMENT	YES/NO
4.	ELECTRICITY DISTRIBUTION NETWORK.....	YES/NO
5.	MAIN SWITCHBOARD	YES/NO
6.	CIRCUIT BREAKERS	YES/NO
7.	EMERGENCY SWITCHBOARD	YES/NO
8.	SHORE POWER CONNECTION BOX.....	YES/NO
9.	MOTOR AND CONTROL GEAR.....	YES/NO
10.	CABLE, WIRING AND FUSE.....	YES/NO
11.	LIGHTING FIXTURE.....	YES/NO
12.	SEARCHLIGHT	YES/NO
13.	FLOODLIGHT.....	YES/NO
14.	POWER SOCKET	YES/NO

CHAPTER 7 GUIDELINE REQUIREMENTS - ELECTRONIC

1.	GENERAL ELECTRONIC EQUIPMENT REQUIREMENT	YES/NO
2.	SPECIFIC REQUIREMENTS	YES/NO
3.	ACCEPTANCE TEST.....	YES/NO
4.	MARINE DAYLIGHT VIEWING COLOUR RADAR	YES/NO
5.	GPS RECEIVER	YES/NO
6.	ECHO SOUNDER AND DEPTH INDICATOR.....	YES/NO
7.	LOUDHAILER / SIREN SYSTEM.....	YES/NO
8.	INTERCOMMUNICATION SYSTEM	YES/NO

- 9. VHF MARITIME TRANSCEIVER YES/NO
- 10. PORTABLE MARINE VHF TRANSCEIVER YES/NO
- 11. INSTALLATION REQUIREMENTS YES/NO
- 12. DOCUMENTATION..... YES/NO
- 13. SEPARATE SPARE PARTS (ELECTRONICS) YES/NO
- 14. TRAINING YES/NO

CHAPTER 8 SUPPORT SERVICES

- 1. GENERAL PHILOSOPHY YES/NO
- 2. SOURCE OF EQUIPMENT YES/NO
- 3. MAINTAINABILITY YES/NO
- 4. REPAIR BY REPLACEMENT..... YES/NO
- 5. SUPPORT INFORMATION YES/NO
- 6. ONBOARD RUNNING SPARE PARTS YES/NO
- 7. REPAIR BY REPLACEMENT SPARES (OPTIONAL) YES/NO
- 8. ELECTRONIC SPARE PARTS/SPECIAL TOOLS/TESTING EQUIPMENT (OPTIONAL)..... YES/NO

APPENDIX 1 WARRANTY AND GUARANTEE SLIPPING..... YES/NO

APPENDIX 2 MAIN INSPECTION ITEMS (M.I.I.) YES/NO

APPENDIX 3 LIST OF DRAWINGS AND DOCUMENTS TO BE SUBMITTED YES/NO

APPENDIX 5 STABILITY REQUIREMENTS..... YES/NO

APPENDIX 6 BOLLARD PULL TEST REQUIREMENTS..... YES/NO

APPENDIX 7 MARKINGS AND COLOUR SCHEME YES/NO

APPENDIX 11
ITEMIZED SUMMARY OF ALTERNATIVE OFFER
FOR GUIDELINE REQUIREMENTS

(To be filled in by all tenderers)

Item	Chapter	Paragraph	Sub-paragraph	Details of the alternative offer
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

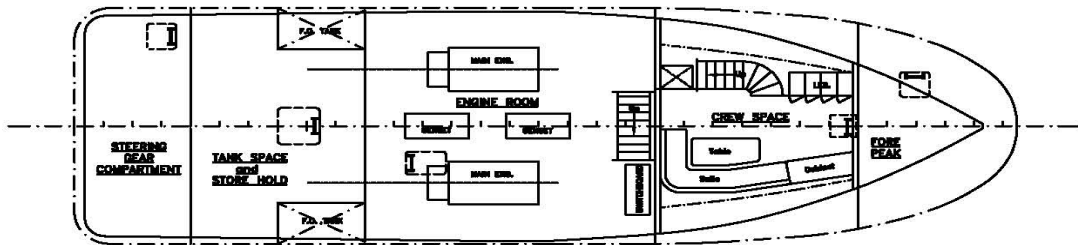
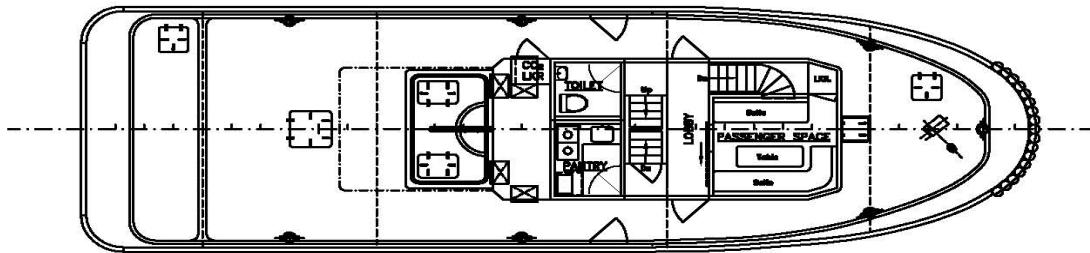
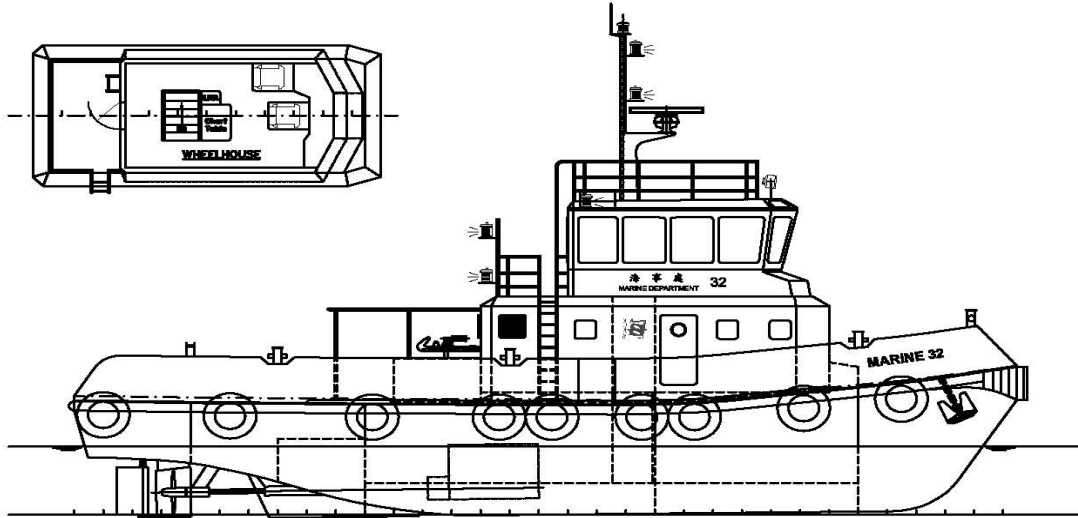
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APPENDIX 12

DEFINITIONS OF SEA CONDITIONS: WAVE AND SEA

Sea-General		Wind				Sea								
Sea State	Description	Beaufort Wind Force	Description	Range (knots)	Wind Velocity (knots)	Wave Height			Significant Range periods [sec.]	Periods of maximum energy of spectra $T_{max}=T_c$	Average period T_z	Average wave-length L_w [ft unless otherwise indicated]	Minimum Fetch (nautical miles)	Minimum Duration [hr unless otherwise indicated]
						Average	Significant	Average of one-tenth Highest						
	Sea like a mirror	U	Calm	1	0	0	0	0	--	--	--	--	--	--
0	Ripples with the appearance of scales are formed but without foam crests.	1	Light airs	1-3	2	0.04	0.01	0.09	1.2	0.75	0.5	10 in	5	18 min
1	Small wavelets; short but pronounced crests have a glossy appearance, but do not break.	2	Light breeze	4-6	5	0.3	0.5	0.6	0.4-2.8	1.9	1.3	6.7	8	39 min
2	Large wavelets; crests begin to break. Foam of glossy appearance. Perhaps scattered with horses.	3	Gentle Breeze	7-10	8.5	0.8	1.3	1.6	0.8-5.0	3.2	2.3	20	9.8	1.7
					10	1.1	1.8	2.3	1.0-6.0	3.2	2.7	27	10	2.4
3	Small waves, becoming larger; fairly frequent white horses.	4	Moderate breeze	11-16	13.5	2.1	3.3	4.2	1.4-7.6	5.1	3.6	52	24	4.8
					14	2.3	3.6	4.6	1.5-7.8	5.3	3.8	59	28	5.2
					16	2.9	4.7	6.0	2.0-8.8	6.0	4.3	71	40	6.6
4	Moderate waves, taking a more pronounced long form; many white horses are formed (chance of some spray)	5	Fresh breeze	17-21	18	3.7	5.9	7.5	2.5-10.0	6.8	4.8	90	55	8.3
					19	4.1	6.6	8.4	2.8-10.6	7.2	5.1	99	65	9.2
					20	4.6	7.3	9.3	3.0-11.1	7.5	5.4	111	75	10
5	Large waves begin to form; white crests are more extensive everywhere (probably some spray).	6	Strong breeze	22-27	22	5.5	8.8	11.2	3.4-12.2	8.3	5.9	134	100	12
					24	6.6	10.5	13.3	3.7-13.5	9.0	6.4	160	130	14
					24.5	6.8	10.9	13.8	3.8-13.6	9.2	6.6	164	140	15
6	Sea heaps up, and white foam from breaking waves being to be blown in streaks along the direction of the wind (spindrift begins to be seen)	7	Moderate Gale	28-33	28	8.9	14.3	18.2	4.5-15.5	10.6	7.5	212	230	20
					30	10.3	16.4	20.8	4.7-16.7	11.3	8.0	250	280	23
					30.5	10.6	16.9	21.5	4.8-17.0	11.5	8.2	258	290	24
					32	11.6	18.6	23.6	5.0-17.5	12.1	8.6	285	240	27
7	Moderate high waves of greater length; edges of crests break into spindrift. The form is blown in well-marked streaks along the direction of the wind. Spray affects visibility	8	Fresh Gale	34-40	34	13.1	21.0	26.7	5.5-18.5	12.8	9.1	322	420	30
					36	14.8	23.6	30.0	5.8-19.7	13.6	9.6	363	500	34
					37	15.6	24.9	31.6	6-20.5	13.9	9.9	376	530	37
					38	16.4	26.3	33.4	6.2-20.8	14.3	10.2	392	600	38
					40	18.2	29.1	37.0	6.5-21.7	15.1	10.7	444	710	42
8	High waves. Dense streaks of foam along the direction of the wind. Sea begins to roll. Visibility affected. Very high waves with long over-hanging crests. The resulting foam is in great patches and is blown in dense white streaks along the along the direction of the wind. On the whole, the surface of the sea takes on a white appearance. The rolling of the sea becomes heavy and shocklike. Visibility is affected	9	Strong gale	41-47	42	20.1	32.1	40.8	7-23	15.8	11.3	492	830	47
					44	22.0	35.2	44.7	7-24.2	16.6	11.8	534	960	52
					46	24.1	38.5	48.9	7-25	17.3	12.3	590	1110	57
					48	26.2	41.9	53.2	7.5-26	18.1	12.9	650	1250	63
		10	Whole gale	48-55	50	28.4	45.5	57.8	7.5-27	18.8	13.4	700	1420	69
					51.1	30.2	48.3	61.3	8-28.2	19.4	13.8	736	1560	73
					52	30.8	49.2	62.5	8-28.5	19.6	13.9	750	1610	75
					54	33.2	53.1	67.4	8-29.5	20.4	14.5	810	1800	81
9	Exceptionally high waves. Sea completely covered with long white patches of foam lying in direction of wind. Everywhere edges of wave crests are blown into froth. Visibility affected.	11	Storm	56-63	56	35.7	57.1	72.5	8.5-31	21.1	15	910	2100	88
					59.5	40.3	64.4	81.8	10-32	22.4	15.9	985	2500	101
10	Air filled with foam and spray. Sea white with driving spray. Visibility very seriously affected	12	Hurricane	>64	>64	>46.6	74.5	94.6	10-35	24.1	17.2	--	--	--
				64-71										

APPENDIX 13 GUIDANCE GENERAL ARRANGEMENT PLAN



PRINCIPAL DIMENSIONS	
LENGTH OVERALL	17.5M
BREADTH MLD.	5.2M
DEPTH MLD.	2.2M

MARINE DEPARTMENT GOVERNMENT NEW CONSTRUCTION HONG KONG			
REF			
PROJECT	REPLACEMENT OF MARINE 32		
TITLE	GUIDANCE GENERAL ARRANGEMENT		
DATE	FEB 2009	SCALE	N.T.S
DRAWING NO.	P 687		