

## **Part VII – Technical Specifications**

## **Table of Contents**

### **Chapter 1      General Provisions**

- 1.1      Introduction
- 1.2      Statement of Purposes of the Vessel
- 1.3      Authorities
- 1.4      Shipyard
- 1.5      Design and Construction Responsibility
- 1.6      Survey and Inspection
- 1.7      Acceptance and Delivery
- 1.8      Warranty Services During the Warranty Period
- 1.9      Support Services
- 1.10     Asbestos Free

### **Chapter 2      General Technical Requirements**

- 2.1      Conceptual General Arrangement Plan
- 2.2      General Provisions
- 2.3      Principal Dimensions
- 2.4      Contract Speed
- 2.5      Rules and Regulations
- 2.6      Certifications
- 2.7      Vessel Operating Profile and Environment
- 2.8      Lightweight Measurement and Inclining Test
- 2.9      Stability Requirement
- 2.10     Sea Trial
- 2.11     Vibration and Noise
- 2.12     Material, Workmanship and Standard
- 2.13     Inspection and Supervision
- 2.14     Other Design Features

### **Chapter 3      General Arrangement**

- 3.1      General Provision
- 3.2      Wheelhouse

- 3.3 Deck Cabin
- 3.4 Fore peak
- 3.5 Crew space
- 3.6 Tank space
- 3.7 Engine room
- 3.8 Steering gear room
- 3.9 Awning on top of deck cabin and aft main deck
- 3.10 Open Deck

**Chapter 4 Hull and Deck Outfitting**

- 4.1 Material
- 4.2 Hull Structure and Scantlings
- 4.3 Welding and Fittings
- 4.4 Fendering
- 4.5 Mast
- 4.6 Doors, Hatches and Windows
- 4.7 Handrails and Ladders
- 4.8 Air, Filling and Sounding
- 4.9 Corrosion Protection and Anodes

**Chapter 5 Deck Equipment**

- 5.1 Anchor and Windlass
- 5.2 Mooring Equipment
- 5.3 Lifting Davit
- 5.4 Steering Gear System
- 5.5 Rudder and Rudder Stocks

**Chapter 6 Painting, Marking and Colour Scheme**

- 6.1 Painting
- 6.2 Markings and Colour Scheme
- 6.3 Tally Plates

**Chapter 7 Machinery**

- 7.1 General Requirements

- 7.2 Main Propulsion Engine
- 7.3 Propeller Shaft, Stern Tube and Propeller
- 7.4 Reduction Gearbox
- 7.5 Electric Generator Engine
- 7.6 Ventilation
- 7.7 Air- Conditioning System
- 7.8 Piping System
- 7.9 Fuel Oil System
- 7.10 Seawater System
- 7.11 Fresh Water System
- 7.12 Bilge System
- 7.13 Sanitary, Grey and Black Water System

**Chapter 8 Electrical System**

- 8.1 General Requirements
- 8.2 Alternator
- 8.3 DC Batteries
- 8.4 The Solar Panel System
- 8.5 Main Switchboard
- 8.6 Electrical Charger Board of 24V
- 8.7 Sockets Outlet
- 8.8 Lighting
- 8.9 Navigation and Signal Light
- 8.10 Vessel Alarm System
- 8.11 Closed-Circuit Television System
- 8.12 Lightning Protection

**Chapter 9 External Firefighting System**

- 9.1 General
- 9.2 Fire Pump
- 9.3 Water Suction, Discharge and Sea Chest
- 9.4 Fire-fighting Monitor

**Chapter 10 Fire Safety Equipment**

- 10.1 General Provisions
- 10.2 Fire Detection System
- 10.3 Fixed Firefighting System
- 10.4 Portable Fire Extinguishers

**Chapter 11 Life-Saving Appliance Arrangements**

- 11.1 General Provisions

**Chapter 12 Electronic Navigational Equipment**

- 12.1 Description of Electronic Equipment System
- 12.2 Loudhailer/Siren and External Broadcasting System with USB Player
- 12.3 Echo Sounder and Depth Indicator
- 12.4 Marine Radar Incorporating Electronic Charts and Interface with DGPS
- 12.5 DGPS Receiver
- 12.6 Automatic Identification System
- 12.7 Electronic Marine AM/FM radio
- 12.8 Marine Band VHF transceiver
- 12.9 Electric Horn
- 12.10 Magnetic Compass
- 12.11 Electronic Chart System
- 12.12 Night Vision System
- 12.13 Installation Requirements
- 12.14 Acceptance Test
- 12.15 Documentation for the Proposed Equipment

**Chapter 13 Services Support**

- 13.1 General Requirements
- 13.2 Information to be Provided Prior to and at Delivery Acceptance

**Chapter 14 Training**

- 14.1 Training on Electronic Navigational Equipment
- 14.2 Training on Operation and Maintenance of the Vessel

**Chapter 15      Abbreviations**

**Annexes**

- Annex 1 –      Warranty Services and Guarantee Slipping
- Annex 2 –      Implementation Timetable
- Annex 3 –      Drawing Submission Timetable
- Annex 4 –      Main Items Inspection Timetable
- Annex 5 –      Vessel Condition During Respective Sea Trial
- Annex 6 –      Endurance Performance – Diesel Propulsion
- Annex 7 –      As Fitted Drawings and Documents
- Annex 8 –      Definition of Waves and Sea

## Chapter 1 General Provisions

### 1.1 Introduction

- 1.1.1 This document (or “Technical Specifications” or “TS” or “Part VII”) sets out the requirements of the Government in relation to three (3) Aluminium Vessels for use by the Agriculture, Fisheries and Conservation Department (“AFCD”) of the Hong Kong Special Administrative Region (“HKSAR”) as the “user department”. Reference to “Vessel” shall mean each of the three vessels.
- 1.1.2 Unless otherwise specified in the Technical Specifications, all the specifications stated in this Part VII of the Tender Documents are classified and labelled as follows:
- (a) Essential Requirements [E];
  - (b) Those specifications that are not labelled with [E] or [D] shall equally form part of the Contract like the specifications labelled as [E] (“Specifications without Label”); and
  - (c) Desirable Specifications [D].
- 1.1.3 All Essential Requirements and Specifications without Label shall form part of the Contract. For Desirable Specifications, to the extent the Contractor has committed to comply with them in its tender, they shall also form part of the Contract. As part of the tender evaluation during the tendering stage (viz. Stage 1 of the evaluation – completeness check), the Tenderer shall submit all the information sufficiently detailed to substantiate that the product and the services offered meet the Essential Requirements as stipulated in this Part VII (viz., specifications with [E] label) and repeated in Annex C to Part II - Conditions of Tender, failing which its tender will not be considered further. For those Specifications without Label, where there is any proposal or evidence to show that the tender does not comply with these specifications, the Tenderer’s tender will not be considered further. Commitment to comply with the Desirable Specifications will equally form part of the Contract.
- 1.1.4 Neither the Essential Requirements nor the Specifications without any Label may be counter-proposed by the Tenderer. Any contravening counter-proposal shall be dealt with in accordance with Clause 17 of Part II – Conditions of Tender.
- 1.1.5 All specifications forming part of the Contract in the aforesaid manner shall be of equal materiality and importance upon the award of the Contract. The non-compliance with any specifications set out in these Technical Specifications shall have the same consequences as specified in the Contract. Save during the tendering stage in the manner as mentioned above, no differentiation shall be made based on the classification unless otherwise expressly specified.
- 1.1.6 The Vessel shall be Ready for Use before the Delivery Date and delivered by the Delivery Date as per the schedule stipulated under Schedule 2 – Delivery Schedule of Part V - Schedules.
- 1.1.7 Unless otherwise expressly defined in the Contract, all technical terms and expressions used in this Part VII shall be interpreted in accordance with the professional or common usage in naval architecture, marine engineering, nautical navigation and the shipbuilding industry. Where design specifications of the Vessel or any Equipment are required to be approved by the specified Recognised Organisation (“RO”), they must be approved by the RO as well as by the Government New Construction Section (“GNC”) of the Marine Department (“MD”) prior to the construction of the Vessel or installation of that Equipment on the Vessel.

- 1.1.8 Where design specifications of the Vessel or Equipment are not required to be approved by the RO, they must be approved by GNC prior to the construction of the Vessel and installation of the Equipment on the Vessel. This applies regardless of whether this is stated to be the case in the relevant individual provisions.
- 1.1.9 For the avoidance of doubt, references to “tests” throughout the Tender Documents and the Contract shall include all inspections, surveys, assessments, trials and experiments.
- 1.1.10 Without prejudice and in addition to the interpretation principles set out in Clause 1.2 of Part IV - Conditions of Contract, the following interpretation principles shall apply when interpreting the Tender Documents and the Contract including this Part VII:
- (a) references to “Chapter” or “Paragraph” or “Annex” refer to the chapter of or the paragraph of or the Annex to this Part VII;
  - (b) quotation marks may or may not be added for each defined term whether with or without brackets; a defined term may be identified with quotation marks and brackets, or just quotation marks, or just brackets;
  - (c) the use of article “the” may or may not appear before a defined term or an abbreviated term; there shall be no difference whether the term is preceded with or without the article;
  - (d) a defined term may have two or more versions (typically a longer version and an abbreviated version) (e.g. “Factory Acceptance Tests” or “FAT”); or may still be referred to by the original description of the subject matter based on which the term is defined; the original description, or the longer version of the defined term, or the shorter version of the defined term may be used interchangeably. For clarity’s sake, the original description, or the longer version may be used for more self-explanatory purpose; however, there shall be no difference;
  - (e) where a subject matter has been defined with two or more alternative terms of reference, any one of these terms of reference may be used interchangeably;
  - (f) a defined term may appear earlier than the provision in which it is defined; a term defined will have the same meaning throughout the document;
  - (g) there shall be no difference between a term with a hyphen and the same term without a hyphen (e.g. “sub-system” or “subsystem”);
  - (h) titles and headings may appear in lower case or upper case throughout or only in upper case with the first word at the beginning; there shall be no difference in meaning;
  - (i) headings and titles do not affect the construction of the Tender Documents and the Contract;
  - (j) a sub-Section of this Part (at whichever sub-level and regardless of the numbering system adopted) may begin in upper or lower case and may be ended with semi-colon or full stop; these differences do not have any interpretation significance on their own;
  - (k) figures may be expressed in Arabic numerals or in words; or both; there shall be no difference; three zeros in a figure may or may not be separated by any space or comma; there shall be no difference;

- (l) where more than one unit of a subject matter is to be supplied as part of the Work, all requirements stated to be applicable to that subject matter shall apply to each such unit of that subject matter. This is regardless of whether the term “each of” or other cognate expression is used preceding that subject matter.

## **1.2 Statement of Purposes of the Vessel**

- 1.2.1 The Vessel shall be used by AFCD to conduct marine parks patrol law enforcement and monitoring duties.
- 1.2.2 The Vessel will be deployed for taking up patrol duties in Hong Kong waters including eastern marine parks, namely Hoi Hai Wan Marine Park, Yan Chau Tong Marine Park and Tung Ping Chau Marine Park as well as Sha Chau and Lung Kwu Chau Marine Park in western waters. High speed is required for the Vessel to perform patrol, law enforcement and monitoring duties in these areas.
- 1.2.3 The Contractor acknowledges and agrees that the Government relies on the professional judgment and skill of the Contractor to ensure that the Vessel is compliant with all of the aforementioned requirements and warrants that it will alter, modify or otherwise change aspects of the Vessel’s fittings, fixtures, user interface as required by the Government in order to ensure the ultimate fitness for purpose of the Vessel before the Acceptance Certificate is issued.

## **1.3 Authorities**

- 1.3.1 GNC of MD is the section responsible for the procurement of the Vessel for the Government of the HKSAR of the People’s Republic of China (hereinafter referred to as the Government).
- 1.3.2 GNC may delegate the site supervision work including plan reviewing work during the construction stage to private consultancy firms to act on behalf of the Government.
- 1.3.3 The Electrical and Mechanical Services Department (“EMSD”) is the Department which will oversee the Communication Equipment and Electronic Navigational Equipment (“ENE”) technical acceptance.

## **1.4 Shipyard**

- 1.4.1 The Contractor’s nominated shipyard building the Vessels must have the essential shipbuilding and workshop facilities such as lifting gears, hull construction and calibration equipment, machinery installation and calibration equipment and vessel launching or slipping facilities.
- 1.4.2 The Contractor shall employ a team of professional staff to carry out the design of the Vessel and also carry out supervision and quality control work in the course of Vessel construction.

## **1.5 Design and Construction Responsibility**

- 1.5.1 The Vessel shall be designed and constructed for a service life of at least **15** years under reasonable maintenance.
- 1.5.2 It is the SOLE responsibility of the Contractor to supply the Vessel which is safe, fit and suitable for the operation of the user department and which meets all the relevant regulations and the specifications in this Part VII including the desirable requirements (if and to the extent the Contractor has indicated compliance in its tender), which include without

limitation requirements for safety, health, environmental protection, hull form design features, structure, method and materials for construction and fitting out, stability, subdivision and operational efficiency.

- 1.5.3 Unless otherwise expressly specified in this Part VII, references to “RO” in this Part VII shall mean, in the case of the Vessel, the Recognised Organisation as specified in Schedule 9 of Part V - Schedules for the Vessel. References to “RO Requirements” (in upper or lower case) shall mean, in the case of the Vessel, the requirements of the rules and regulations of the aforesaid RO as specified in Schedule 9 of Part V. References to the International Maritime Organization requirements (“IMO requirements”) shall mean the latest and as amended requirements published by the International Maritime Organization (“IMO”) and available on its website and applicable to the relevant subject matter in the relevant paragraph where it is required that IMO requirements shall be complied with provided that where the IMO requirements are of any convention or resolution or other multilateral treaty of the IMO (including any amendment thereto), Hong Kong has joined in as a party to such IMO requirements.
- 1.5.4 The vessel shall be issued with a Certificate of Classification with notations by the RO specified in Paragraph 2.5.2 of this Part VII.
- 1.5.5 Notwithstanding the submission of the preliminary plans and drawings by the Contractor then as part of its tender for the Contract, all plans, and drawings of the Vessel except the design stresses and scantling, shall be submitted to GNC for approval before completion of the Vessel design. The design stresses and scantling including internal structural members shall be approved by the RO.
- 1.5.6 The Contractor shall design, build and supply the Vessel in full compliance with the requirements given in this Part VII which, to that extent, may be over and above what is normally required by any statutory and RO’s rules and regulations. Should there be any contradiction between the rules and regulations of the RO and this Part VII, the Part VII shall prevail unless GNC stipulates or agrees otherwise.
- 1.5.7 Even if the Contractor may appoint a Sub-contractor to design the Vessel with the prior written consent of the Government, the Contractor shall not be relieved of its obligations under the Contract through such appointment, and the Contractor shall be responsible for all acts, defaults, and omissions of the sub-contractor as if they were its own.

## **1.6 Survey and Inspection**

- 1.6.1 Tenderers shall note that the unit price per Vessel quoted in Schedule 1 – Price Schedule in Part V - Schedules shall be deemed to have included the cost of surveys to be carried out by the relevant RO in respect of that Vessel (if required to be arranged by the Contractor under the Contract).
- 1.6.2 All electronic items and their installations shall be approved and inspected by EMSD representatives as part of the Technical Acceptance.
- 1.6.3 Subject to Paragraph 1.6.7 of this Part VII, an advance written notice of not less than five (5) working days (if the Vessel is located in Asia), and ten (10) working days (if the Vessel is located other than Asia) must be given to GNC before the representatives of GNC and other Government officers are invited to conduct a survey visit of the Vessel. The Contractor shall be fully responsible for any delay if the Contractor fails to give adequate notice as aforesaid.

1.6.4 The Contactor shall provide:

- (a) an Implementation Timetable, in the form set out in Annex 2 to this Part VII, setting out the major milestones and their scheduled completion dates and incorporating the Delivery Dates specified in Schedule 2.
- (b) the Drawing Submissions Timetable in the form set out in Annex 3 to this Part VII; and
- (c) the Main Items Inspection Timetable in the form set out in Annex 4 to this Part VII.

Each one of the above shall be submitted to GNC for approval by the respective deadlines specified in Clause 11 of Part IV - Conditions of Contract.

The Delivery Date for the Vessel as stated in the Implementation Timetable shall be no later than those set out in Schedule 2 of Part V - Schedules. Notwithstanding anything in the Contract to the contrary, the Government may suspend payment of any of the instalment specified in Schedule 3 of Part V - Schedules if any of the timetables required herein has not been submitted for GNC's approval or GNC does not approve any of them or if the progress of work does not comply with any of them as approved by GNC.

- 1.6.5 A weekly work progress report with photos evidencing the progress and material/equipment procurement status shall be submitted to GNC during the construction of the Vessel. The weekly report shall be submitted before noon of every Monday.
- 1.6.6 GNC may designate consultant(s) from private sector who will be authorised to represent the GNC in all technical matters including site supervision and plan approval related to the construction of the Vessel. The Contractor shall cooperate with the consultant(s) and afford them unhindered access to the Vessel at all times during working hours, and shall furnish them with current copies of all approved drawings, sketches, correspondence, change notices, change orders, test agendas, schedules, and other necessary documents where applicable.
- 1.6.7 After arriving at the site for a survey visit, if MD officer(s) consider it is unsafe to carry out the test or inspection, the test/inspection will not be carried out. The Contractor shall arrange another additional survey visit at the Contractor's expenses. The Government shall not be responsible for any delay arising from any postponement in conducting the survey visit due to any safety issue as specified in this paragraph.
- 1.6.8 Where any fee charge and associated expense are payable for the services of an RO which are necessary in order to fulfil any obligation of the Contractor under the Contract, the Contractor is responsible to pay the RO all such fees, charges and associated expenses. Such fees shall include charges for drawing approval, surveys (if deemed necessary), issue of certificates, and any other expenses payable to the RO.
- 1.6.9 The Contractor shall provide office space for MD officer(s) and AFCD officers during their survey visits and construction progress visits to the Vessel at the shipyard where the Vessel is constructed. The office space shall include, but not be limited to, two (2) desks, six (6) chairs, one (1) telephone, one (1) conference table for 10 persons, drinking facilities, power supply and one (1) cupboard for storage of documents and working clothes. The space provided by the Contractor shall also be fitted with air conditioning, have Internet access, a copying and a printer machine. Cleaning of the space shall be carried out in each working day.

- 1.6.10 The hours of work of MD officer(s) or AFCD officers will be arranged to coincide with those of the shipyard, in so far as it is practicable to do so. It is intended that all reasonable steps be taken so that the duties of the MD officer(s) and consultants can be carried out with a maximum of efficiency and a minimum of interference with the Contractor's work.

## **1.7 Acceptance and Delivery**

Acceptance of the Vessel (including all Equipment) shall be carried out in two (2) parts:

- (a) Technical Acceptance
- (b) Delivery Acceptance

### **1.7.1 Technical Acceptance**

- (a) This includes the satisfactory inspection of all items as listed in Annex 4 to this Part VII in the version as completed by the Contractor and approved by the Government in accordance with Paragraph 1.6.4(c) of this Part VII;
- (b) This includes all the hull construction, mechanical and electrical tests and trials as required in this Part VII and those considered necessary by the Government (and all of which shall be conducted in Hong Kong waters unless otherwise specified) and the Contractor shall be responsible for all costs in keeping the Vessel in Hong Kong whilst the Technical Acceptance is conducted. These tests and trials shall include without limitation equipment tests, anchoring tests, inclining experiment, the bottom survey in Hong Kong on the slipway, the Official Speed Trial as mentioned in Paragraph 2.10.5 of this Part VII, all of those tests and trials as specified Paragraph 2.10.6 of this Part VII, the bench acceptance test and on-site commissioning test for ENE as mentioned in Chapter 12 of this Part VII and all other tests whether as specified in this Part VII or otherwise necessary to determine whether or not the Vessel including the Equipment has been supplied in accordance with all the specifications set out in these Technical Specifications;
- (c) All unit of all ENE items and their installations shall be approved and inspected by EMSD as part of the technical acceptance including the bench acceptance test and on-site commissioning test for all units of all ENE items as mentioned in Chapter 12 of this Part VII.
- (d) The Contractor shall supply all necessary equipment and labor at its own cost for carrying out the tests and trials comprised in the Technical Acceptance.
- (e) If the Vessel cannot pass all of the tests comprised in the Technical Acceptance by the Delivery Date specified in the Contract, the options available to the Government are set out in Clause 12 of Part IV - Conditions of Contract and other applicable provisions of the Contract.

### **1.7.2 Delivery Acceptance**

- (a) The Vessel, after its successful completion of Technical Acceptance, and the Spare Parts as specified in Schedule 1 of Part V – Schedules shall be delivered at the Contractor's expense to the Government Dockyard, in accordance with the applicable Delivery Date as specified in Schedule 2 of Part V - Schedules. If the delivery of the Vessel in Ready to Use condition is 120 days later than the Delivery Date specified in Schedule 2, at the discretion of Government, the Contract may be terminated according to the applicable terms stipulated in the Contract.

- (b) Type Approval Certificate or a certificate of classification with such class notations by the RO all for the Vessel as specified in Schedule 9 of Part V - Schedules shall be issued by the RO as specified in Schedule 9 of Part V - Schedules before the Acceptance Certificate is issued by the Government.
- (c) The Delivery Acceptance of the Vessel shall be carried out by GNC in accordance with the terms stipulated in the Contract. The Delivery Acceptance is only completed when the Acceptance Certificate is issued by the Director of Marine.
- (d) The Contractor must demonstrate to MD officer(s) that all hull construction, outfitting, vessel stability, machinery, electrical and electronic equipment are in good working order; and must hand over the Vessel, its fixtures and Equipment to GNC in good and complete condition.
- (e) Not later than **two (2) months** before the Delivery Acceptance of the Vessel, the Contractor shall submit to GNC four copies of the Inventory List covering all items of or relating to the Vessel including all engines, on board equipment, manuals, documentation, spares, stores, and equipment for testing in respect of the entire Vessel. The Inventory List shall be approved by GNC **seven (7) days** before the day of Delivery Acceptance and covers everything which the Contractor shall deliver under the Contract. At the Delivery Acceptance of the Vessel, the approved Inventory List will be used to check that all the items have been delivered to GNC in a satisfactory state. Details of each inventory item shall include item name, description, type, quantity, manufacturer's name and contact details, part reference number and/or serial number, and the items' locations in the Vessel.
- (f) The items specified in Paragraph 13.2 of this Part VII, all items listed in Annex 7 to this Part VII, all items set out in the Inventory List in the form as approved or stipulated by the Government, and all other items which are required to be delivered under this Part VII as part of the Delivery Acceptance shall be delivered to GNC at the Delivery Acceptance of the Vessel. 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 Use and to be delivered for the Delivery Acceptance. The Government will not accept delivery if after undergoing the tests and trials in the Technical Acceptance, the Government does not consider that the Vessel is in Ready to Use condition.
- (g) On delivery, the Vessel must be in a clean, tidy, and fully fitted and operational condition.
- (h) The delivery acceptance of the vessel shall be carried out by GNC in accordance with the terms stipulated in the contract. The delivery acceptance is only completed once the director of marine has issued the acceptance certificate.

## **1.8 Warranty Services During the Warranty Period**

- 1.8.1 Notwithstanding and without prejudice to the Contractor's obligation to provide the Warranty Services for the Vessel under Part IV - Conditions of Contract, the original copy of the manufacturer's warranty certificates and all related manuals and documents in respect of all the Equipment valid for 12 months from the date of Acceptance Certificate of the Vessel, shall be delivered to MD upon Delivery Acceptance.
- 1.8.2 The full scope of the Warranty Services is set out in Annex 1 to this Part VII.

- 1.8.3 The Contractor is responsible for arranging the Vessel for Guarantee Slipping at the end of the 12-month Warranty Period. In addition to any defects which the Contractor shall fix under Clause 18 of Part IV - Conditions of Contract, the Contractor shall also be responsible for the rectification of any defects found in the course of Guarantee Slipping. The full scope of the Services shall be provided as part of the Guarantee Slipping is set out in Annex 1 to this Part VII.

## **1.9 Support Services**

- 1.9.1 The Vessel must be designed for through life support and easy maintenance in the HKSAR based on an operation profile and minimum life expectancy as mentioned in this Part VII.
- 1.9.2 The above applies not only to main engines but also to all other equipment installed in the Vessel. Support and maintenance services must be available (i.e., serviceable) in Hong Kong in respect of all equipment installed in the Vessel and return of the whole or part of the Equipment to the original place of manufacturer or supplier shall not be necessary in order to carry out any repair work.

## **1.10 Asbestos Free**

- 1.10.1 The Vessel must not contain any asbestos or asbestos containing materials. The Contractor must comply with the Hong Kong Air Pollution Control Ordinance (Cap. 311), Part X. The Contractor shall engage a service supplier approved by one of the RO or other entities acceptable by MD to verify that there is no asbestos on the Vessel. An asbestos free certificate or a statement of compliance issued by the service supplier to this effect shall be provided upon delivery of the Vessel.



## 2.2 General Provisions

- 2.2.1 Without prejudice to the generality of Chapter 1, this Chapter contains the more particular technical specifications for the Vessel. The significance of Essential Requirements is explained in Paragraph 1.1 of Chapter 1 of this Part VII above.
- 2.2.2 The work to be done under this contract consists of the design, construction, outfit, testing and delivery of three (3) Aluminium Vessels for AFCD. Workmanship, functions, characteristics, and performance shall be in accordance with this Part VII, best marine construction practices, and the regulatory standards herein specified or otherwise applicable.
- 2.2.3 The Contractor shall exercise its professional expertise and knowledge to come up with an appropriate design for the Vessel which can comply with all requirements of the Contract. The Conceptual General Arrangement Plan shown above (“Conceptual General Arrangement Plan”) is a reference drawing to help to explain the tender requirements. The Contractor shall submit its own design in details for MD’s approval.
- 2.2.4 During the design and construction of the Vessel, the Contractor shall submit a detailed General Arrangement Plan (“GA Plan”) and all relevant construction drawings for GNC’s approval and acceptance. As for the preliminary General Arrangement Plan which has to be submitted during the tendering stage in Schedule 7 (“Preliminary General Arrangement Plan”), unless the Government otherwise directs, the GA Plan to be submitted after the Contract award shall incorporate those features set out in the Preliminary General Arrangement Plan. Requirements in these Technical Specifications that the General Arrangement Plan shall follow the “Conceptual General Arrangement Plan” in this Part VII shall be changed to follow the Preliminary General Arrangement Plan instead if in the opinion of the Government, the relevant aspect of the Preliminary General Arrangement Plan submitted by the Contractor is better than the Conceptual General Arrangement Plan, but not otherwise.
- 2.2.5 All the machinery, equipment and facilities, furniture, fixtures, and fittings, including outfitting of the Vessel that are described in this Part VII, together with their requirements for design and installation standards that are stipulated in this Chapter and in any other parts of this Part VII, are the items that must be included in the complete “As-built” Vessel delivered to the Government.
- 2.2.6 It is desirable that the Preliminary General Arrangement Plan to be submitted by the Tenderer shows improvements over the Conceptual General Arrangement Plan over such functional aspects in Assessment Criterion in Part (A)(I)(a) of Annex D - Marking Scheme to Part II – Conditions of Tender. [D]

## 2.3 Principal Dimensions

- 2.3.1 The Principal Dimensions of the Vessel shall be:

Length Overall (maximum):	not greater than 16.5 metre (“m”) -----[E]
Length Overall (minimum):	at least 16.0 m
Extreme breadth:	4.5 m (fenders figures excluded)

“Length Overall” means the distance between the foreside of the foremost fixed permanent structure (included fender) and the aft side of the aftermost fixed permanent structure of the Vessel, outboard motors, and motor brackets, handles and other fittings, attachment and extensions are not included in the measurement. The Tenderer shall indicate the length overall of the Vessel in Dimension scale in General Arrangement Plan submitted according to Schedule 7 of Part V.

## **2.4 Contract Speed**

- 2.4.1 The Contract Speed of the Vessel shall not be less than **20** knots at Beaufort Wind Force Scale Number **2** when marine diesel engines running at **100%** maximum continuous rating (“MCR”) under Official Speed Trial Conditions specified in Paragraph 2.10.5 of this Part VII and whilst observing the requirements further specified in Paragraph 2.4.2 of this Part VII. [E]
- 2.4.2 The Contract Speed prescribed above shall be achieved in following conditions:
- (a) Wind maximum 5 m/s
  - (b) Wave height maximum 0.5 m
  - (c) Deep water
  - (d) The Vessel equipped with all material in this specification
  - (e) Fuel and water tank condition as per Paragraph 1 of Annex 5 to this Part VII
  - (f) 4 crew and 16 passengers
  - (g) Other cargo of weight of inventory and spare part that normally to be carried during vessel in operation
- 2.4.3 Endurance for fuel capacity shall be 12 hours at 18 knots cruising speed of the Vessel with full load departure condition as mentioned in Paragraph 2.9.6(h) of this Part VII. [E]
- 2.4.4 The Contract Speed prescribed above shall be achieved without chine walking, proposing, or other dynamic instabilities. The propeller propulsion system selected shall match the engine profile and avoid cavitation as far as possible.

## **2.5 Rules and Regulations**

- 2.5.1 The Vessel shall be designed and constructed in accordance with the latest edition of the rules and regulations of the Recognised Organisation as specified in Schedule 9 of Part V. By latest edition, it is meant the latest edition as at the keel laying date of the Vessel. The Tenderer shall state in Schedule 9 of Part V - Schedules which RO (to be selected from the definition of “Recognised Organisation” in Clause 1.1 of Part IV - Conditions of Contract) and its rules and regulations that shall be used in the design and construction of the Vessel.
- 2.5.2 The Vessel is required to be issued with certificate of classification (without conditions) or type approval certificate as in Schedule 9 of Part V - Schedules by the RO. All plans, particulars and documentations which are required for the classification of the Vessel, in addition to those listed in Annex 3 to this Part VII shall be approved by the RO before submission to GNC for endorsement and final approval prior to commencement of work. Any subsequent modifications or additions are to be treated in the same manner
- 2.5.3 Without prejudice to the general requirements that the Contractor shall perform all Work in full compliance with all applicable laws and regulations, and in full compliance with the requirements of the Contract including this Part VII, the construction of the Vessel must comply with the rules, regulations, standards, and recommendations of the entities as specified below:
- (a) International Electro-technical Commission (“IEC”) Regulations for the Electrical and Electronic Equipment.
  - (b) International Telecommunications Union recommendations in the International Radio Regulations (“ITU-R”).

- (c) Quality and standards of the welding shall comply with the rules of an RO or American Welding Society (“AWS”) or other applicable international standards or rules acceptable by MD.
- (d) International Regulations for Preventing Collisions at Sea 1972, as amended by IMO.
- (e) ISO 12215-4 “Small craft – Hull construction and scantlings – Part 4 Workshop and manufacturing” or other applicable international standards or rules acceptable by MD.
- (f) All equipment/fittings shall be designed and manufactured to at least the standards as specified in these Technical Specifications.
- (g) When none of the rules and regulations in Paragraphs 2.5.3 (a) to (e) of this Part VII are applicable, then the applicable standards specified by the applicable organizations below shall be complied with:
  - BSI British Standards Institute
  - GB Standardization Administration of the People’s Republic of China
  - IEEE Institute of Electrical and Electronic Engineers
  - ISO International Organization for Standardization
  - JIS Japanese Industrial Standards

2.5.4 The Contractor shall design, build and supply the Vessel in full compliance with the requirements given in this Part VII which, to that extent, may be over and above what is normally required by any statutory and RO’s rules and regulations. Should there be any contradiction between the rules and regulations of the RO and this Part VII, Part VII shall prevail unless GNC stipulates or agrees otherwise.

## **2.6 Certifications**

- 2.6.1 The Vessel shall be issued with following certificates:
- (a) Certificate of Classification with notations by the RO;
  - (b) An ASBESTON FREE Certificate or compliance statement in accordance with the Hong Kong Air Pollution Control Ordinance (Cap. 311), Part X;
  - (c) Trim and stability booklet (approved);
  - (d) Damage stability booklet; and
  - (e) Builder’s Certificate.

## **2.7 Vessel Operating Profile and Environment**

- 2.7.1 The Vessel shall be designed for deployment by the AFCD on at least 8 hours / day and 330 days per year. The Vessel shall be designed and built to operate in Hong Kong Waters.
- 2.7.2 The Vessel shall have good manoeuvrability and quick response throughout its speed range and capable to operate in open water. The scantling and stability capability to be designed for safe operation in weather conditions up to and including the conditions equivalent to Beaufort Wind Force Scale Number 6.
- 2.7.3 Total carry capacity shall include 4 crew and 16 passengers [E]

2.7.4 All machinery, equipment and systems at full rated power shall be capable of operating at their full design performance under the following environmental conditions, unless otherwise required by RO:

- (a) Ambient air temperature +40°C
- (b) Internal air +20°C
- (c) Sea water temperature +30°C
- (d) Temperature in engine room +45°C

## **2.8 Lightweight Measurement and Inclining Test**

### **2.8.1 Inclining Experiment**

- (a) An inclining experiment shall be carried out with the attendance of MD officer(s)/appointed consultant at the stage of nearly completed.
- (b) At least 10 working days in advance of the inclining experiment, the “Scheme of Inclining Experiment” (“Scheme”) shall be approved by the RO and submit to MD for reference.
- (c) The Scheme shall include:
  - (i) the Vessels’ intended condition during the inclining experiment with intact stability results, including surplus and missing weights, and their centre of gravity;
  - (ii) the proposed locations and movements of inclining weights;
  - (iii) the calculation of estimated metacentric height, heel, and trim of the Vessel before and during the inclining experiment;
  - (iv) the proposed number, location and lengths of pendulum used or other methods of measuring heel angles;
  - (v) hydrostatic table, and tank capacity tables; and
  - (vi) the list of data to be measured (i.e., draughts, specific gravity of floating water).
- (d) The inclining experiment shall only be conducted after the Scheme detailed in Paragraph 2.8.1 (c) of this Part VII has been approved by the RO surveyors and the MD officer(s) and in the presence of RO surveyors and MD officer(s) and/or appointed consultant.
- (e) The lightship weight and centres of gravity shall be calculated and presented in the inclining experiment report. The GM of the Vessel after each shift of inclining weight shall be preliminarily determined. Free surface effects of all liquids on board shall be considered in all calculations.
- (f) The inclining experiment report shall be produced and has obtained the RO’s approval before submitting to MD for further comments. The report shall include a statement from the Contractor stating that the Vessel is safe to go to sea for the intended tests and trials specified in the Contract.
- (g) The Vessel must not carry any operational limitations with respect to its stability capability within the operational requirements stipulated in this Part VII.

## **2.9 Stability Requirement**

2.9.1 The Vessel shall meet the Intact Stability Criteria and other requirements specified in Paragraphs 2.9.4 and 2.9.5 of this Part VII.

2.9.2 All calculations and drawings must be in metric units.

2.9.3 A final stability assessment of the sea trial loading condition using final lightship data shall be delivered to MD prior to the Official Speed Trial mentioned in Paragraph 2.10.5 of this Part VII.

### **2.9.4 Intact Stability Criteria**

Stability shall only be considered satisfactory for the loading conditions set out in Paragraph 2.9.6 (h) of this Part VII if, the following criteria are complied with either:

- (a) The Intact Stability Code as specified in MSC.267(85) as amended, with compliance of the conduct of Inclining Experiment as specified in Paragraph 2.8.1 of this Part VII, and requirements of Stability Information Booklet as specified in Paragraph 2.9.6 of this Part VII; or
- (b) The criteria specified in ISO 12217-1 for Category B vessels, or
- (c) As per stability requirements of the RO.

### **2.9.5 Damage Stability Criteria**

(a) Suitable watertight transverse bulkheads shall be arranged to maintain the stability of the Vessel when flooding of any one under-deck compartment occurs, and when there is asymmetric flooding to any one of the under-deck compartments. The residual stability of the Vessel shall be considered satisfactory if the following criteria are complied with, after taking into account of free surface effects and wind moment at Beaufort Wind Force Scale Number 6, for loading conditions set out in Paragraph 2.9.6 (h) of this Part VII.

- (i) The residual transverse metacentric height shall not be less than 0.05 meter;
- (ii) The inclination angle shall not exceed 10 degrees; and
- (iii) The final water line is located below any inlet opening. The inlet opening means an opening through which progressive flooding may take place is immersed. This would not be an opening closed by a watertight manhole cover or a vent fitted with an automatic closure.

(b) The opening(s) to determine the down-flooding angle(s) shall first be agreed by GNC before carrying out the damaged stability calculations. The permeability of each flooded compartment for the stability calculations shall first be agreed by GNC.

(c) The damage stability calculation shall be produced and has obtained the RO's approval before submitting to GNC for further comments.

### **2.9.6 Stability Information Booklet**

(a) The Contractor shall supply to MD four (4) copies of the Stability Information Booklet. The Stability Information Booklet must be given to MD at the time of Delivery Acceptance.

- (b) The Vessel shall comply with the stability criteria mentioned in this Part VII or other applicable IMO regulations (International Code on Intact Stability, 2008 - 2008 IS Code) or 12217-1 for Category B vessels, as from time to time revised or amended by any revision or amendment that applies to Hong Kong) (“latest and as amended IMO Resolution”).
- (c) The stability due to wind and ship rolling shall be calculated for the operational sea and weather conditions stipulated in this Part VII. These calculations shall be submitted to GNC for approval.
- (d) The Stability Information Booklet and the Inclining Experiment Report shall be approved by the RO before they are submitted to GNC for the final acceptance. These documents shall only be considered as acceptable when they are accepted in writing by GNC.
- (e) A Preliminary Stability Information Booklet based on the estimated centre of gravity (“CG”) positions of the Vessel shall be submitted to GNC during the design stage and within four months after the kick-off meeting, to show that the Vessel can fulfil this Part VII required Vessel stability as well as any other stability requirements required by GNC to be considered, during the design and construction stage.
- (f) The FINAL Stability Information Booklet and the Inclining Experiment Report shall be delivered to GNC at least 14 days before the Delivery Acceptance.
- (g) **For the avoidance of doubt, in addition to the above requirements,** the Stability Information Booklet in its final version shall include (but not limited to):
  - (i) The Vessel’s particulars, sketch of general arrangement drawing showing different compartment and tank positions, hydrostatic curves, and cross curves of stability;
  - (ii) Tank calibration/sounding tables include but not limited to fuel oil tank and freshwater tank. These tables shall consist of the locations of tanks (in terms of frame numbers), levels from tank bottom, capacity, VCG/LCG/TCG and free surface moments, and the location of the sounding points. The trim and heel of the Vessel for which these tables are applicable shall be stated clearly;
  - (iii) Stability calculations for each loading condition shall include but not be limited to a profile drawing of the Vessel and items of deadweight, lightship, displacement, drafts, trim, VCG, GM (solid & fluid), LCG, down-flooding angle and maximum static stability - GZ curves;
  - (iv) Any other information as reasonably required by the RO and/or GNC; and
  - (v) The inclining experiment report shall be approved by the RO.
- (h) In the preliminary stability information booklet and in the final stability calculations, 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 other applicable standard as mentioned in Paragraph 2.9.1 of this Part VII:

Loading Conditions		Fuel and Water	Payload	Persons
1	Full Load Departure Condition	100%	100 kg	1500 kg (16 persons + 4 crew)
2	Full Load Arrival Condition	10%	100 kg	1500 kg (16 persons + 4 crew)
3	Light Load Departure Condition	50%	20 kg	300 kg (4 crew)
4	Light Load Arrival Condition	10%	20 kg	300 kg (4 crew)

- (i) The weight of each person shall be assumed to be 75 kg, and effects per crew to be 5 kg.
  - (ii) The weight of additional payload shall be as stipulated in Paragraph 2.9.6 (h) of this Part VII to be evenly distributed along the deck and the VCG of the additional payload shall be assumed as 500 mm above deck.
  - (iii) The maximum free surface moments shall be used for calculating the stability of the Vessel in all the above conditions.
  - (iv) The VCG of each person shall be assumed to be 300 mm above the seat when seated, and 1000 mm above the deck when standing. The seated or standing position, and LCG of each person, shall be in their most likely position on board.
  - (v) The vessel shall be capable of operating safely at WMO Sea State 0-5.
- (i) The Stability Information Booklet shall be approved by the RO before submitting to MD for comments.

## 2.10 Sea Trial

- 2.10.1 The Contractor shall submit for MD approval, an Official Sea Trial programme 14 working days in advance of the Official Sea Trial, which shall include details of proposed procedures for carrying out the Official Speed Trial, endurance test, manoeuvring test, crash stop test, astern running test, emergency steering test, starting tests for main engine and electric generator engine, anchoring tests and other tests as specified in Paragraph 2.10.6 of this Part VII, bottom survey on the slipway and all other tests as stated in this Part VII, all of which shall be required to be performed as part of the Official Seal Trial and therefore part of the Technical Acceptance (if not earlier). The notification for Official Sea Trial shall be included evidence that the Vessel is safe to go to sea for the intended tests and trials specified in the Contract (including the inclining experiment report as mentioned in Paragraph 2.8 of this Part VII and approved by the RO).
- 2.10.2 Like all other tests and trials to be conducted as part of the Technical Acceptance, the Contractor shall carry out the full Official Sea Trial in Hong Kong at its own expense (including the expense of fuel, lubrication oil, crew, and other necessary expenses), in the presence of MD officer(s), user department officers and the consultants. The Contractor shall observe the local requirements on navigation before the sea trial, including the third parties insurance in accordance with the laws of Hong Kong.

- 2.10.3 The Contractor shall provide to MD officer(s), the name, post, duty, and experience of each one of the Contractor's staff on board the Vessel during the Official Sea Trial to ensure the safe operation of the trial. The number of persons on board during a particular test or trial has to be agreed by the MD officer(s). The location of each person on board, which can affect the centre of gravity of the Vessel under trial, shall be first agreed by GNC.
- 2.10.4 The Contractor shall provide a trial report in an agreed format to GNC after completion of the above tests. The report shall contain information regarding the methods of tests, engine(s) running condition, sea condition, weather condition and wind condition, loading condition of the Vessel, the heeling angles (steady or varying as the case may be) during each forward turning manoeuvre, and any other relevant information as required by GNC or the consultants during the tests.
- 2.10.5 Official Speed Trial
- (a) The Official Speed Trial shall be carried out in Hong Kong Waters under the conditions as specified in Paragraph 1 of Annex 5 to this Part VII.
  - (b) As part of the Technical Acceptance as specified in Paragraph 1.7.1 of this Part VII, the Contractor shall carry out the Official Speed Trial in the presence of GNC officers or their appointed agents.
  - (c) The actual mean speed of the Vessel (i.e., NOT theoretical) shall be measured during the Official Speed Trial runs to determine if the Contract Speed can be achieved. The speed calculations must NOT be corrected by wind, wave, tidal current, shallow water effects, and weather condition.
  - (d) The actual mean speed shall be calculated as the arithmetic mean of not less than FOUR (4) continuous runs, i.e., TWO (2) runs in each direction. The speed for each run shall be taken by measuring the time of the Vessel running for one nautical mile between two poles or other measuring method acceptable to MD.
  - (e) The Contract Speed is considered not achieved if the Contract Speed cannot be attained once during the Official Speed Trial after a total of two attempts each attempt to be measured in the manner specified in (d) above.
  - (f) The Contract Speed to be achieved by the Vessel in the Official Speed Trial shall be the minimum highest achievable speed of 20 knots as specified in Paragraph 2.4.1 of this Part VII, with the engine power at declared maximum (rated) power and the Vessel under Official Speed Trial Conditions as stated in Paragraph 1 of Annex 5 to this Part VII. If the Vessel fails to achieve the minimum highest achievable speed under the aforesaid conditions, the Government will deem that the Vessel has failed to pass the Official Speed Trial and therefore Technical Acceptance.
  - (g) The instruments used in measuring the Contract Speed for the Official Speed Trial shall be provided either by:
    - (i) The Contractor provided that the speed measuring device has been calibrated by a certified body in Hong Kong acceptable to GNC; or
    - (ii) Global Positioning System ("GPS") supplied by the Government.
    - (iii) The GPS or Differential Global Positioning System ("DGPS"), which is properly calibrated (with supporting calibration documents) and installed on board the Vessel, is acceptable to GNC; or other speed measuring methods that are acceptable to GNC.

- (h) The Vessel must be in the trial conditions (see Paragraph 1 of Annex 5 to this Part VII for the conditions of the trials) during the Official Speed Trial. All Equipment shall also have passed the Technical Acceptance and which operation shall not be affected during the Official Sea Trial.
- (i) The speed, time of the day, engine running conditions, sea condition, etc., shall be properly recorded by the Contractor, and signed as witnessed by GNC surveyor (or GNC representatives) during the Official Sea Trial. A copy of the Official Sea Trial Report as required in Paragraph 2.10.6 of this Part VII shall be given to GNC before Delivery Acceptance.
- (j) Upon successful completion of the Official Speed Trial in Hong Kong, the Contractor shall arrange GNC officers to carry out hull bottom inspection on the Vessel to check for any hull damage before delivery.

2.10.6 The following tests shall be conducted by the Contractor as part of the Technical Acceptance and the testing results shall be recorded and form part of the Official Sea Trial Report. The applicable conditions under which each of the tests specified below shall be conducted are further set out in the relevant paragraph of Annex 5 to this Part VII:

(a) Endurance Test

The Endurance Test shall be carried out for different engine loading and speeds to obtain the speed/fuel consumption curves (or data) for the Vessel, with the engine(s) operating within the manufacturer recommended engine operating conditions. The test results shall be recorded in accordance with the requirements stipulated in Annex 5 to this Part VII. The report submitted shall include a curve or curves showing ship speed versus propulsion engine(s) rpm and power, with particulars of the vessel loading and displacement in the test(s).

(b) Maneuverability Test

Forward turning circle tests to port and starboard sides shall be carried out with main engine running. The minimum time for turning to both sides at 15°, 90°, 180°, 270° and 360° shall be recorded.

(c) Crash Stop Test

The minimum time and distance achievable by the Vessel when running from full ahead to stop, and then to full astern shall be determined at the Crash Stop Test.

(d) Astern Running Test

The maximum astern running speed achievable by the Vessel shall be determined by the test.

(e) Emergency Steering Test

An emergency steering test shall be carried out to ascertain that the Vessel shall be steered satisfactorily when the electrical power supply to the steering system has been disabled.

(f) Starting Tests for Main Engines and Electric Generator Engine.

(g) Anchoring Test according to the RO Requirements.

(h) Vibration and Noise Level Tests according to the requirements stipulated in Paragraphs 2.11.2 and 2.11.7 of this Part VII.

## **2.11 Vibration and Noise**

- 2.11.1 Special attention shall be paid in the design and construction of the Vessel including the installation of the propulsion and other machinery. The shafting system and associated systems of the Vessel shall be free from excessive vibration.
- 2.11.2 The vibration levels in all relevant speed conditions shall be assessed against the ISO Guide 6954 1984(E) Standard.
- 2.11.3 Vibrations observed in machinery shall be below the level acceptable by the machinery maker recommendations or the Standards of Evaluation for Mechanical Vibrations of Machines (“VDI 2056”) criteria for assessment of mechanical vibrations in machines, whichever is lower.
- 2.11.4 Torsional vibrations of the shafting shall be within the limits prescribed by the classification society rules. Margin against whirling vibration of shaft line shall meet the rule’s requirement.
- 2.11.5 Noise levels in the deck house shall not be more than 83 dB(A) when vessel at cruising speed.
- 2.11.6 Sound insulation and isolation treatment shall be provided as necessary to meet the noise level requirements.
- 2.11.7 Noise level shall be measured and reported in accordance with the Code on noise levels on board ships by the builder during the sea trial at MCR. Any exhibited excessive noise shall be investigated and rectified.

## **2.12 Material, Workmanship and Standard**

- 2.12.1 All materials used shall be of high quality certified in accordance with the RO requirements, and shall comply with, where applicable, the appropriate Standards and Code of Practice, together with any amendments made thereto, suitable for installation in the Vessel.
- 2.12.2 All workmanship shall be in accordance with the recognized shipbuilding standard and practice as well as the rules and regulations of the RO and where applicable the regulatory authorities.
- 2.12.3 Damaged material during installation shall be replaced or repaired with MD’s approval.
- 2.12.4 Construction arrangement and details shall be developed with due consideration for easy access and future maintenance.
- 2.12.5 Design and layout of machinery, equipment, piping, electrical cables and ventilation trunks shall be able to ensure that the ship and entire engine room are functional and convenient for routing inspection, maintenance, dismantling, and repair as required in normal service without unnecessary restrictions according to the recognised shipbuilding standard and practice.

## **2.13 Inspection and Supervision**

- 2.13.1 The Contractor shall submit to the GNC and/or their appointed representative the construction schedule prior to construction of the Vessel. The following schedules and programs shall be submitted:
  - (a) design schedule, updated monthly;
  - (b) procurement schedule, updated monthly;
  - (c) construction schedule, updated monthly;

- (d) other builder's standard plan schedules; and
  - (e) inspection and test programs.
- 2.13.2 The Vessel shall be constructed and fitted out in all respects according to the RO requirements and this Part VII.
- 2.13.3 Inspections shall be so arranged as to enable the owner and/or their appointed representative to spend sufficient time in careful inspection. Drawings and information that may be required for the inspections shall be made available.

## **2.14 Other Design Features**

- 2.14.1 Berthing requirement of the Vessel shall match with the designated point of berth at Government Dockyard and AFCD.
- 2.14.2 Permanent list of the Vessel is not allowed, and where it is not practical to achieve this requirement, the maximum permanent list of the Vessel in its lightship condition must not be greater than 0.5 degree.
- 2.14.3 Permanent ballasts can only be used as agreed by GNC. The Contractor shall note that it shall be under a very exceptional case that GNC would agree for the Vessel to have ballast installed.
- 2.14.4 The Contractor shall request the RO to carry out the measurement of the Vessel's Gross Tonnage ("GT") and Net Tonnage ("NT"). A statement of compliance for the Vessel stating the measured GT and NT together with the calculation details shall be issued by the RO, and submitted by the Contractor to GNC for records.
- 2.14.5 The Vessel shall perform at all speeds in WMO sea states 0 - 3 without the following characteristics:
- (a) Chine walking;
  - (b) Porpoising;
  - (c) Loss of horizon (meaning that the view of the horizon forward of the bow in the seated and standing positions at the console shall not be obstructed by the bow of the vessel at any time when underway or making way); and
  - (d) Loss of directional control and other dynamic instabilities.

## Chapter 3 General Arrangement

### 3.1 General Provision

3.1.1 Unless otherwise specified in this Part VII, the conceptual general arrangement plan in Paragraph 2.1 of this Part VII only serves as guidance and is a reference drawing to help to explain the tender requirements. It shows a desirable layout of the accommodation and compartment arrangement of the Vessel with following desirable dimensional guidance considered:

(a)	Minimum heights of deck cabin above main deck aft	2.05 m
(b)	Minimum height of wheelhouse above main deck forward	1.95 m
(c)	Deck cabin recess to main deck	250 mm
(d)	Raise of wheelhouse deck to deck cabin	500 mm
(e)	Side deck walkway width	650 mm
(f)	Minimum headroom for deck cabin, wheelhouse and crew space	1.95 m
(g)	Camber of deck cabin and wheelhouse deck	Nil

3.1.2 During the design and construction of the Vessel, the Contractor shall submit a detailed General Arrangement Plan complying with the particulars mentioned in the above for GNC's approval and acceptance.

3.1.3 The Deckhouse shall comprise of two sections:

- (a) Wheelhouse; and
- (b) Deck cabin.

3.1.4 Subject to full compliance with the requirements of stability and subdivision, the under deck shall be divided by transverse watertight bulkheads into 5 compartments as follows:

- (a) Fore Peak;
- (b) Crew Space;
- (c) Tank Space;
- (d) Engine Room; and
- (e) Steering Gear Room.

3.1.5 Equipment on board shall be properly fitted to avoid injury to persons on board during normal or failure-mode operation, especially when the Vessel moves off quickly or at emergency crash stops and ship manoeuvring.

3.1.6 All controls, electrical equipment, high-temperature parts and pipelines, rotating assemblies or any other items in cabins and compartments shall be properly placed not to cause injury.

3.1.7 Furniture and Fittings

- (a) Built-in furniture shall be adequately secured against ship impacts in case of ship collision or bad weather and sea conditions. All seats shall be strongly secured against 45 degrees of inclination in all directions when all seats are occupied by seated persons.
- (b) All furniture, flooring and seats shall be lightweight, tough, and robust. Upholstery such as seat cushion, back rests and settees shall be fire retarding material, e.g., urethane foam to BS 3379 or equivalent, and be of thickness not less than 100 mm; and be covered with imitation leather.

- (c) Lockers located on the fwd. crew space shall be provided with built-in locks and keys. They shall be designed and fitted to the satisfaction of MD officer(s).
- (d) All hardware including screws, hooks, hasps, hinges, handles, sliding bolts, etc. shall be made of stainless steel of Grade SAE 316.
- (e) All fittings and hardware fitted on board the Vessel (such as coat hooks, ceiling lights, bulkhead mounted lights, etc.) shall be of a high-quality chrome finish. They shall be properly fitted in the accommodation spaces and any other spaces as appropriate and as directed by GNC officers.
- (f) Colour and decoration schemes (or a furnishing sample board showing materials and colour to be used) for furniture and fittings shall be submitted to MD for approval before installation/fitting.
- (g) Access space for maintenance of the structure behind the interior lining panels shall be provided as far as possible.

#### 3.1.8 Insulation

- (a) Boundaries and ceilings around the inside of the wheelhouse, ship office and crew space shall be insulated against heat and change of weather temperature, by not less than 50mm thickness of glass-fibre wool and protective/decorative panel linings of hard-wearing surface.
- (b) Engine Room and machinery space bulkheads and crown shall be effectively fire and sound insulated with asbestos-free materials of adequate thickness, pinned and/or wire-mesh secured, and lined with incombustible sheathing in accordance with RO Requirements and acceptable to GNC.

#### 3.1.9 Lining

- (a) Panels for wall, ceiling and their joint materials shall be readily removable. The joining method shall provide long-lasting firm and strong attachments between the adjoining members and parts against excessive vibration, and withstand temperature changes and wear and tear within the life expectancy of the Vessel.
- (b) Colour of the lining material shall also be agreed by MD.
- (c) The floor of deck cabin space shall be covered with non-skid, wear resistance and fire-retardant polyvinyl chloride vinyl sheets that are acceptable to GNC officers. Colour of the floor covering shall be agreed by GNC.
- (d) The panels shall be fitted to avoid noise generation due to its own vibration or in resonance response to the overall vibratory mode of the Vessel. This requirement applies to all operational speeds of the Vessel.

#### 3.1.10 Lighting

- (a) Natural light shall be allowed to the maximum extent in the crew space.
- (b) Adequate lighting intensity and lighting arrangement shall be provided inside the wheelhouse, ship office, crew space, and other compartments.

### 3.1.11 Seating and Settees

- (a) Four upholstery seats with dampen capability shall be provided in of the wheelhouse control console for the crew. Requirements of the seats shall be:
  - (i) Designed for protection of crew while the Vessel is operating at its maximum speed;
  - (ii) Seats shall be of a hydraulically damped, shock absorbing type;
  - (iii) Adjustable seat height with foot rest;
  - (iv) Backrest angle, fore and aft adjustable
  - (v) Safety belt to be provided;
  - (vi) Adjustable armrests and lumbar support; and
  - (vii) Turntable/Mounting pedestal 0° - 180°.
- (b) Settees with backrest shall be provided in the crew space and deck office as indicated in conceptual GA plan. The seat and the attachment system shall be acceptable by MD.
- (c) Seat materials of upholstery shall be of water-resistant materials such as Fire Retardant Foam/Reinforced Nylon Laminated Neoprene/Heavy Duty Cardura Laminate.

## 3.2 Wheelhouse

- 3.2.1 The wheelhouse shall be designed with a wheelhouse control station for one-man operation comprising controls and instruments for navigation, manoeuvring, communication, and machinery operation.
- 3.2.2 It is desirable that the preliminary control console plan to be submitted by the Tenderer shows improvements over the Wheelhouse Arrangement Plan over such operational aspects in Assessment Criterion in Part (A) (II) (a) of Annex D - Marking Scheme to Part II – Conditions of Tender. [D]
- 3.2.3 The Contractor shall build a mock-up of the wheelhouse including the equipment arrangement, seats and other fittings as required under this Part VII. The mock-up shall be inspected and agreed by GNC and AFCD.
- 3.2.4 The equipment and means for navigation, manoeuvring, control, communication, and other essential instruments shall be located sufficiently close together to enable the coxswain and the assisting officer to read/receive all the necessary information, and be able to use the equipment and controls while they are seated.
- 3.2.5 Instruments, instrument panels and controls shall be permanently mounted in the control consoles, considering operational, maintenance and environmental needs.
- 3.2.6 All instruments shall be logically grouped according to their functions. In order to reduce to a minimum, the risk of confusion, instruments shall not be rationalised by sharing functions or by inter-switching except the Radar/Electronic Chart System. Radar and electronic charts information of the Radar/Electronic Chart System can be independently displayed on three 15-inch screens, and the control of radar range, gain, etc. shall be dominated by the screen at the captain's position.
- 3.2.7 The instruments and controls shall be provided with screen and dimming facilities to minimise glare and reflections and prevent them from being obscured by strong light.
- 3.2.8 The surfaces of control console tops and instruments shall have dark glare-free colours.

3.2.9 The following controls, displays and equipment shall be incorporated into the wheelhouse steering control station so that all relevant controls can be reached from a fixed working position (e.g., sitting, standing or both):

- (a) Steering wheel and remote-control handle (joystick);
- (b) Rudder or steering angle indicators;
- (c) Steering gear indicator control panel;
- (d) Engine throttle and clutch controls;
- (e) Main engine monitoring indicator;
- (f) Generator engine monitoring indicator;
- (g) Bilge control display panel and alarm;
- (h) Fire alarm for engine space and deck cabin;
- (i) External firefighting pump control panel;
- (j) External firefighting monitor control panel;
- (k) Navigation lights, search light and flood light switch panel;
- (l) CCTV monitor for viewing the stern area, aft deck area and engine room;
- (m) Meter / gauge indicating the quantity of fuel remained in the fuel tank;
- (n) Emergency stop for main engine, generator, engine room fan and air conditioner;
- (o) Electronic Navigational Equipment and displays including:
  - (i) Automatic Identification System (“AIS”);
  - (ii) Echo sounder;
  - (iii) Public address system/loudhailer;
  - (iv) VHF;
  - (v) Electric horn, siren, and flashing beacon control panel;
  - (vi) Magnetic compass;
  - (vii) DGPS;
  - (viii) Radar/Electronic Chart System consist of three 15-inch screen; and
- (p) Any others as required by GNC.

3.2.10 Visibility

- (a) The visibility from the wheelhouse shall not be obstructed.
- (b) Side mirrors shall be provided at locations to allow the coxswain to safely manoeuvre the craft to a berth and have a clear rear view during operation.
- (c) One each large sliding window shall be fitted at port and starboard side to facilitate direct downward viewing to the side of the Vessel.
- (d) Vision blind spots or sectors shall be as few and small as possible, and in any case, they must not adversely affect the keeping of a safe look-out from the helm position in the Wheelhouse.
- (e) Where practical, depending on the design of the wheelhouse configuration, more windows and larger ones are preferred to provide a wider clear view. [D]

3.2.11 The following fittings and equipment shall be provided in the wheelhouse:

- (a) Two wall mounted fans with diameter 300 mm;
- (b) One set of pigeon holes for stowage of international code flags;
- (c) One set of international code flags suitable for the mast;
- (d) One shelf for the stowage of log books and files;
- (e) One marine chart table with lamp and dimmer over, with four drawers below for storing of nautical charts;
- (f) One dial type inclinometer and one thermometer for marine use;
- (g) One electric powered marine wall-mounted clock;
- (h) Four cup holders;
- (i) One rubbish bin with cover shall be stored inside a cabinet/locker;
- (j) One metal box for keys shall be provided and fitted inside the wheelhouse;
- (k) One wooden box with locks for the storage of binoculars, and it shall be fitted within the vicinity of the forward high seats. One waterproof and fog proof 7x50 Marine binoculars for day time use shall be provided;
- (l) Four coat-hooks;
- (m) Non-skid handholds at suitable locations for crew movement in rough sea conditions;
- (n) Access to be provided at the wheelhouse aft end with a dark curtain;
- (o) Surface finishing and interior linings of the wheelhouse shall be of a matt non-reflecting finish to facilitate night operation;
- (p) Pillars are not allowed to be fitted inside the wheelhouse; and
- (q) Air condition unit.

### **3.3 Deck Cabin**

3.3.1 The Deck Cabin shall be located at the aft of the wheelhouse on the main deck.

3.3.2 Notwithstanding requirements specified in other sections, the deck cabin shall have the following features:

- (a) One Settee of dimensions suitable for five persons at each side;
- (b) One large table (about 1.6 x 0.4 m) to be provided at each side;
- (c) One electric powered marine wall-mounted clock;
- (d) Four wall mounted fans with diameter 300 mm;
- (e) One display board for posting plans, maps, notices, etc.;
- (f) Stairways located at forward of the deck cabin leading access to the wheelhouse and to the crew space below;
- (g) Wall-mounted electrical sockets shall be provided. The number and the location of sockets shall be proposed by the Contractor and be subject to MD approval;
- (h) Air conditioning units; and
- (i) Large windows on both sides should be provided for easy monitoring.

### **3.4 Fore peak**

- 3.4.1 A Fore Peak shall be arranged at the foremost of the hull. The position of the collision bulkhead and its construction shall be complied with the RO Requirements.
- 3.4.2 An electrical driven mooring windlass shall be arranged in this space with the electrical motor to be install inside the tank side to give clear upper deck.
- 3.4.3 An anchor of type and weight comply with RO requirement shall be fitted, with hawser pipe to be fitted on one side of the shell plate.
- 3.4.4 A flush type watertight manhole and cover shall be provided on the main deck for access to the Fore Peak. Access ladder shall be provided.
- 3.4.5 Sparred wooden racks for stowage of mooring ropes and navigational equipment shall be provided inside this compartment.
- 3.4.6 Racks for shapes and spare fire extinguishers shall be provided inside the Fore Peak.

### **3.5 Crew space**

- 3.5.1 The Crew Space shall be located partially under deck at the aft of the Fore Peak.
- 3.5.2 Settee of 10 person shall be arranged within crew space.
- 3.5.3 Built in locker of sufficient numbers shall be arranged within crew space.
- 3.5.4 One (1) toilet shall be arranged at starboard side of the crew space.
- 3.5.5 One (1) storage space shall be arrange at port side of the crew space, used for store of ship store, life-saving equipment etc.
- 3.5.6 A mess preparation area shall be provided along the transverse bulkhead to include:
  - (a) a refrigerator of size that could be store within base cabinet;
  - (b) a wash basin and tap of fresh water;
  - (c) a rack and micro-oven mounted on the wall;
  - (d) an induction cooker;
  - (e) wall cabinet of suitable size; and
  - (f) sockets of 220V of quantity and location accepted by MD officer(s).
- 3.5.7 Toilet in crew space
  - (a) Toilet shall be well ventilated. One electric exhaust fan of sufficient capacity shall be provided and the exhaust air shall be routed to outside of the Vessel.
  - (b) Flush toilet and sewage flushed from toilet shall be stored in black water holding tank.
  - (c) Following installations and fittings shall be provided in toilet:
    - (i) One (1) stainless steel wash basin with a cold and hot fresh water supply tap;
    - (ii) One (1) shower with hot and cold fresh water supply;
    - (iii) One (1) electrical heater of storage type with capacity of 30 litres for crew to take shower;
    - (iv) One (1) water delivery point under basin with a plastic hose for toilet cleaning;
    - (v) One (1) cabinet with mirror with vanity lights;
    - (vi) One (1) toilet paper holder;
    - (vii) Sufficient lighting;

- (viii) One (1) liquid soap dispenser;
- (ix) Drain(s) to be provided to avoid water accumulation on the toilet floor and floor covering shall pitch to a floor drain piped to the grey water collection tank;
- (x) One (1) water closet of powered comminuted type;
- (xi) Stainless steel hand rails as appropriate to allow safe use of the facilities while at sea; and
- (xii) Five (5) coat hooks.

### **3.6 Tank space**

3.6.1 The Tank Space shall be designed to accommodate:

- (a) Two (2) independent fuel oil tank(s);
- (b) One (1) independent fresh water tank; and
- (c) One (1) independent grey water tank.

3.6.2 A manhole shall be provided for access to this compartment.

3.6.3 The external firefighting pump and the driven diesel generator shall be arranged within this space together with sea water suction.

3.6.4 Aluminium chequer plate floor shall be fitted within the space

3.6.5 Natural ventilation with vent duct shall be provided in this space in accordance with RO Requirements.

3.6.6 One hatch for lifting the fire pump engine shall be arranged on main deck within the deck cabin.

### **3.7 Engine room**

3.7.1 Two (2) main propulsion engines coupled with gear box shall be installed in engine room.

3.7.2 Two (2) electric generator engines shall be installed in engine room.

3.7.3 The engine starting battery shall be arranged in side engine room, or in dedicated lockers on main deck area.

3.7.4 Two (2) hatches shall be arranged on aft main deck for maintenance of main engine.

3.7.5 One (1) hatch for lifting the electric generator engine shall be arranged on aft main deck.

3.7.6 The engine room should have enough space for easy moving of staff while checking the engines.

3.7.7 Alarm system should be set for high temperature of engine room.

### **3.8 Steering gear room**

3.8.1 Hydraulic steering gear and the hydraulic power pack shall be arranged within steering gear room.

3.8.2 The hydraulic power pack for the deck crane shall also to be arranged within steering gear room.

3.8.3 The layout of steering gear room shall be arranged for easy and convenient installing, operating and access for maintenance/repairs to the steering gear system.

3.8.4 Flush access manhole shall be provided for access to steering gear room.

3.8.5 The floor of steering gear room shall be covered with unpainted aluminium chequer plate.

- 3.8.6 Steering gear room shall be properly ventilated as per RO required.
- 3.8.7 Steering gear room should be provided with a telephone for communication, visual compass readings and block diagram.

### **3.9 Awning on top of deck cabin and aft main deck**

- 3.9.1 Removable awning structure with durable canvas or equivalent material shall be provided for covering the top of deck cabin and upper deck. The awning canvas shall be electrically powered. The Contractor shall submit the canvas or equivalent sample material and the colour sample of the material to GNC for approval prior to installation.

### **3.10 Open Deck**

- 3.10.1 Sufficient illumination flood lights shall be provided at each side, forward deck and aft deck. Illumination lights shall not obstruct the movement of personnel.
- 3.10.2 Air vents, pipes etc. preferably be recessed into the deckhouse side, and in any case avoid excessive protrusion to prevent obstructions. [D]
- 3.10.3 All hand rails shall be secured to provide support for persons on board, to prevent them from falling or being thrown on deck or overboard in deteriorated weather and sea conditions.
- 3.10.4 A ladder shall be located at the aft starboard side of deck cabin for access to the upper open deck from the main deck. Suitable guard rails shall also be provided at the upper deck. The upper deck shall be covered with non-slip material or paint.
- 3.10.5 The ladder shall be detachable for opening the deck cover allowing removal of the driven diesel generator and fire pump from engine room.
- 3.10.6 Three settees of 3 person each shall be arranged on upper deck. The seat back of the settee shall be adjustable in fore and aft direction. Awning of light weight design shall be fitted above the upper deck and cover the settee area.
- 3.10.7 Step ladder and handrail shall be provided at the stern platform as shown in the Conceptual General Arrangement plan. The stern platform shall be of durable and anti-corrosive marine grade aluminium mesh material or stainless steel of Grade SAE 316L.

## **Chapter 4 Hull and Deck Outfitting**

### **4.1 Material**

- 4.1.1 Material of hull structure including deck house shall be of class approved marine grade aluminium. [E]
- 4.1.2 Plate material shall meet the requirement of EN AW 5083 or equivalent. [E]
- 4.1.3 Profile and pipe material shall meet the requirement of EN AW 6082 or equivalent. [E]

### **4.2 Hull Structure and Scantlings**

- 4.2.1 The strength of the hull structure, design stresses and load (wave height versus speed), maximum acceleration considered and scantlings calculation including internal structural members shall be fulfilling the Contract Speed specified in Paragraph 2.4.1 of this Part VII and be approved by RO.
- 4.2.2 The configuration, dimensions and construction of structural members requiring Class approval shall be approved by classification society before construction is commenced. Scantlings not specified by classification rules shall be in accordance with good shipbuilding practice.
- 4.2.3 The fore deck geometry of the Vessel shall be designed to facilitate safe boarding/mooring to MD's satisfaction.
- 4.2.4 The aft deck of the vessel shall be as large, flat, and unobstructed to facilitate easy and safe working.
- 4.2.5 Thicker deck plating and/or under deck stiffening shall be fitted in way of bits and fair leads, davit foundation, fire monitor foundation etc. as necessary.
- 4.2.6 The structure design shall be considered with all the local reinforcement for deck equipment, opening for doors and windows etc. to avoid redundancies of structure.

### **4.3 Welding and Fittings**

- 4.3.1 Welding procedures shall be certified and approved by RO. All welder shall be qualified and certified as per ISO-EN 9606-2 standards by RO.
- 4.3.2 The welding quality shall comply with ISO-EN 1011-4, recommendations for welding of metallic materials, Part 3, ARC WELDING OF ALUMINIUM AND ALUMINIUM ALLOYS - ISO-EN 10042, or equivalent standard.
- 4.3.3 Welding joints shall be carefully designed and constructed and inspected to conform to the latest established standards and shipbuilding practice by RO to prevent fatigue failures.
- 4.3.4 Only qualified welders shall perform the welding work. Certification of the qualifications of each individual welder shall be submitted to MD by the Contractor.
- 4.3.5 Welds installed using unqualified procedures or welding performed by non-certified welders shall be subject to removal by the Contractor at its own expense.
- 4.3.6 Welding and inspection procedures identifying clearly the type and extent of non-destructive testing ("NDT") inspection on the Vessels' structure shall be submitted for approval by the RO.
- 4.3.7 The quality of finished welds shall be checked by X-rays in the scope and number of spots on shell and upper deck as required by RO requirements.

- 4.3.8 Magnetic particle, dye penetrant or other approved non-destructive testing processes as required by RO shall be carried out on welded x-joints in high stress areas. Selected random checks shall also be made as requested by GNC appointed representative.
- 4.3.9 Structure details shall be in accordance with the builder's standards approved by the RO.
- 4.3.10 Fairing methods and structure stress relieving procedures shall be approved by the RO.
- 4.3.11 The structure fabrication and quality control regime shall include but not be limited to the following:
- (a) Inventory of incoming material, consumables components and machinery;
  - (b) Traceability procedures for materials together with traceability identification codes which shall be serial and indexed to the controlled manufacturing procedures;
  - (c) Lofting, cutting, fit up, welding, forming and dimensions of structural components;
  - (d) Machining, measuring and inspection equipment maintenance and calibration;
  - (e) Finish surfaces and bolting;
  - (f) Procedures for non-conformance reporting and rectification of defects; and
  - (g) Design and manufacturing drawing control and procedures for revisions, updates and reissue of drawings.

#### **4.4 Fendering**

- 4.4.1 Fixed Polyurethane ("PUR") fender with a diameter of approximate 250 width x 400 height mm shall be fitted to cover the full length of the port and the starboard sides. The type of the fender to be agreed with GNC.
- 4.4.2 The fender shall be tightly affixed to the hull. The method of attachment may be by recessed belts, a track system, bolting or other non-adhesive mechanical means agreed with GNC. The design shall ensure that the fender cannot become detached or slide aft as a result of wave action or other unintended external influences.
- 4.4.3 The fender shall be high resistant to impact, abrasion, outdoor temperature extremes, degradation caused by ultraviolet radiation, ozone and contact with seawater, oil, petrol, diesel, lubricating oil or chemicals.
- 4.4.4 Six (6) portable fenders size 900 x 300, attached with suitable length of mooring ropes and accessories shall be provided at port and starboard sides of the Vessel as designated by GNC.

#### **4.5 Mast**

- 4.5.1 One mast shall be fitted on the wheelhouse top with all navigation lights, sound signals, radar scanner and other electronic navigational equipment as required by GNC. The mast shall be constructed such that no vibration is experienced in any operating condition. The mast design shall be of appropriate size/strength to suit its purpose.
- 4.5.2 All equipment and their cables, conduits, connectors, junction boxes, glands, and fittings etc., shall be waterproof and be able to function in all weather conditions at sea.
- 4.5.3 The Vessel shall be fitted with a proven lightning protection system as per relevant appropriate requirements to protect the Vessel, persons on board and the electronic equipment installed.
- 4.5.4 Method and working principle of lightning protection shall be submitted to GNC for approval before the installation.

## **4.6 Doors, Hatches and Windows**

### **4.6.1 Access Doors and Hatches**

- (a) Design of all outfitting including, but not limited to, doors and hatches shall be of approved type by RO for the Vessel, or other entities acceptable to GNC.
- (b) The coaming heights shall comply with RO requirement.
- (c) Where the hatches and doors are used for the purpose of escape, they shall be operable from both sides.
- (d) All hatches and doors shall be fitted with a hold back device of stainless steel of Grade SAE 316.
- (e) Doors opening to the side deck shall be of a sliding type with clear width of not less than 700 mm and with integrated lock/padlock of stainless steel of Grade SAE 316 with hasp and three sets of keys shall be provided. The sliding door at both sides shall be installed with comparatively large glass.
- (f) Door to aft deck shall be RO approved type of outwardly opening aluminium weather-tight and shall be fitted with hooks or other means to hold them in the fully open position. The deck cabin aft door shall be installed with comparatively large glass.
- (g) Manholes shall be fitted to provide access to all void space/compartments below main deck and shall be watertight, flushed and quick closing type approved by RO and in material similar to hull structure where it is fitted with. These manholes to be has minimum clear opening of 400x600 mm. A hold back device shall be fitted for hatches mounted by hinge. The design and the arrangement of the flushed type watertight manhole shall be acceptable to GNC.
- (h) Removal hatches for engine room and tank space shall be with size sufficient enough to be able to remove equipment and tank inside the space easily, meanwhile shall be as small as possible to maintain structure rigidity with consideration of the hull structure element arrangement such as longitudinal and web frames to minimize the structure duplication and clusters.
- (i) Removal hatches of RO approved type shall be provided for engine compartment and fuel oil tank compartment. The hatches could be either factory-made or products fabricated by Contractor.

### **4.6.2 Windows**

- (a) All windows shall be manufactured from clear toughened safety glass and shall be secured to the structure and shall be of a type suitable and safe for marine use. Frames of window separations shall be kept to a minimum, and they shall be of adequate structural strength and stiffness. Throughout the Vessel polarised and tinted windows shall not be fitted.
- (b) The wheelhouse front windows shall be inclined forward from a vertical plane topside out to reduce unwanted reflection, at an angle of not less than 10° and not more than 25°.
- (c) Details of the all windows shall be submitted to GNC for approval and window glass thickness shall be RO approved type.
- (d) The glass on fixed window at front of cabin and on sliding type window at side shall be clear glazed type.

- (e) Heavy-duty marine type wide span and large area electric wiper(s) (covering not less than 60% of the window glass plane area) with fresh water window washing systems shall be fitted to all steering console front windows as well as the first sliding glass on front window at side.
- (f) The window wiper on front window and the wiper on first sliding glass at side shall be pendulum type.
- (g) Anti-fogging device or similar design shall be applied on the window.
- (h) The fresh water tank for window washing system shall be in a dedicate locker arranged forward of the deck cabin and segregate from control consoles.
- (i) Wipers shall have an interval operation and adjustment functions. These wipers shall be capable of operating independently of each other and acceptance to GNC.
- (j) Two sets of spare wiper blades shall be provided for each window wiper installed for the Vessel. One spare unit of wiper for the coxswain front window shall also be provided.
- (k) Retractable transparent solar UV roller blinds shall be installed on all front and side windows. The blinds shall be capable of being retained in position either partially lowered or fully lowered, without swinging due to vessel motions at sea.

#### **4.7 Handrails and Ladders**

- 4.7.1 Stairway slopes shall be acceptable to MD and shall be fitted with handrails on each side. A minimum width of 600 mm shall be provided between the handrails. Ladder/stairs rungs and steps shall be of an anti-slip type and be acceptable to GNC.
- 4.7.2 All handrails on external open deck shall be of aluminium alloy pipe with diameter of 34 mm extending to a height of minimum 1,000 mm from the deck, welded to the hull structure to provide support for persons on board. Where guard rails are fitted, the opening below the lowest course of the rails shall not exceed 230mm and all the other courses shall not be more than 380mm apart.
- 4.7.3 Vertical ladders for going down to compartment below main deck, shall be constructed with non-slip purpose including but not limited to suitable step space intervals, adequate footsteps, and handholds for safe access to the compartments and locations of equipment etc.
- 4.7.4 The Engine Room and crew space spaces shall be provided with two separated means of access/escape.
- 4.7.5 Grab rails shall be positioned internally inside the deck office and wheelhouse with arrangement to be submitted to GNC for approval. The grab rails inside deck cabin shall be firmly fixed and attached to the roof structure. The grab rails inside deck house space shall be in stainless steel of Grade SAE 316L.

#### **4.8 Air, Filling and Sounding**

- 4.8.1 All void space and tank space shall be fitted with air vent for natural ventilation leading to open deck.
- 4.8.2 Vent head to be self-closing type or goose neck type as per RO requirement for the specific tank / space, at a height above of deck shall comply with RO requirement.
- 4.8.3 Vent pipe shall be aluminium alloy material that shall comply with Paragraph 4.1 of this Part VII.

- 4.8.4 Filling pipe for fuel and water shall extrude above deck and not flashed to the deck.
- 4.8.5 Sounding cap / pipe of stainless steel of Grade SAE 316L with gasket shall be arranged on fuel oil tank to enable manually measure the fuel content in emergency situations.
- 4.8.6 Vents and filling pipes shall be recessed into the deckhouse side to give clear walk way on deck at side.

#### **4.9 Corrosion Protection and Anodes**

- 4.9.1 Sacrificial anodes shall be installed on the hull with adequate protection to the Vessel against corrosion for not less than one year.
- 4.9.2 Recess shall be arranged for installation of anode if the anode to be installed on bottom of the Vessel as per calculation.

## **Chapter 5 Deck Equipment**

### **5.1 Anchor and Windlass**

#### 5.1.1 Anchor

- (a) At least one high holding power type anchor certified by RO for this type of vessel and acceptable to MD shall be provided with its associated swivel, shackles, stowage cable or cable and warp and means of recovery.
- (b) The means of release shall be capable of safe operation even when the anchor cable or warp is under load.
- (c) Adequate means and arrangements shall be provided to secure the anchor under all operational conditions.
- (d) The anchor shall be handled by use of an electric windlass and associated fittings.

#### 5.1.2 Windlass

- (a) An electric windlass with its associated gypsy and warping drum, cable stopper, hawse pipe, bollards and fairleads shall be provided to give an easy run for anchor cables and mooring lines. The windlass shall be fitted with an emergency manual operating mechanism.
- (b) Control of the windlass shall be in the vicinity of the windlass through a starter control unit enclosed in the watertight cabinet.
- (c) Emergency stop button for the windlass shall be provided at the wheelhouse control station and at location close to windlass.

5.1.3 All anchor, mooring rope, cable, windlass shall be certified by either RO (where applicable) or maker (where not applicable). The Vessel shall be protected to minimize the possibility of the anchor and cable damaging the hull structure during operation (including in bad weather and sea conditions).

5.1.4 The size of chain locker shall be suitable for self-stowing of cable by gravity in all sea conditions. The chain locker shall be fitted with bilge pumping and a hard wood grating not less than 50 mm thick on the bottom.

5.1.8 Two stainless steel boat hooks with 3-metre staves and stowage arrangement shall be provided.

### **5.2 Mooring Equipment**

5.2.1 The length and size of the mooring rope shall meet the RO requirements.

5.2.2 Sufficient deck cleats and mooring bits, bollard shall be arranged and accepted by GNC. Mooring plan shall be prepared and submit to GNC for acceptance.

5.2.3 Berthing arrangement of the Vessel shall match with the designated berthing point positions and arrangement to AFCD and GNC's satisfaction.

5.2.4 Bitt's foundation/reinforcement structure shall utilize hull structure (transverse frame) as much as possible.

5.2.5 Calculation of the horizontal load shall be in accordance with the requirements of ISO 15084 or other equivalent international standards.

### **5.3 Lifting Davit**

5.3.1 A telescope jib crane with hydraulic boom and electric winch shall be arranged at port side of stern open deck, the boom shall be retractable and fully pulling down to minimize the space occupation on deck, with technical requirement as follow:

- |                                |                                   |
|--------------------------------|-----------------------------------|
| (a) Maximum loading moment     | 1.4 metric ton                    |
| (b) Maximum lifting capacity   | 900 kg                            |
| (c) Maximum hydraulic outreach | 3 m                               |
| (d) Maximum manual outreach    | 4 m                               |
| (e) Capacity - Outreach range  | 900 kg at 1.2 m and 250 kg at 4 m |
| (f) Minimum slewing angle      | 300 degree                        |
| (g) Minimum slewing torque     | 0.20 metric ton                   |
| (h) Width folded               | 0.7 m                             |

5.3.2 Control console to the crane shall be provided locally to the crane, a handheld remote control shall also be provided.

### **5.4 Steering Gear System**

5.4.1 The Steering Gear System shall be twin rudders arrangement and shall comply with the RO requirements.

5.4.2 Electro-hydraulic steering system with two independent power units, each running unit shall provide the maximum torque operating on twin rudders.

5.4.3 The system shall include motor driven pumps, reservoir/filter units, emergency manual helm pump, rudder transmitter limit switch, rudder angle indicators, actuating cylinders, master helm control and one non-follow-up controller.

5.4.4 Rudders shall be controlled by steering wheel and joystick in the control station of the wheelhouse. The power hydraulic pump shall be started and stopped both in the wheelhouse and in Steering Gear Room. Steering wheel type shall be non-skid type of appropriate size acceptable to GNC.

5.4.5 The control of the rudder shall be switched from electro-hydraulic steering to emergency hydraulic helming via a change-over switch in the wheelhouse. The steering of the emergency manual helm pump shall be within acceptable range of number of turns in case of emergency steering function. The helm pump capability shall be agreed by GNC prior to purchase.

5.4.6 Separately illuminated rudder angle indicator with dimmer switch, running and overload alarm shall be provided in the wheelhouse.

5.4.7 Emergency steering system shall be provided.

5.4.8 The type of hydraulic fluid to be used in a hydraulic steering system shall be specified by the manufacturer of the steering system and shall be stated in the owner's manual. The hydraulic fluid shall be non-flammable or have a flash point of 150°C or above.

5.4.9 Hydraulic line shall be supported by clips, straps, or other means to prevent chafing or vibration damage. The clips, straps or other devices shall be corrosion resistant and shall be designed to prevent cutting, abrading or damage to the lines and shall be compatible with hydraulic line material.

5.4.10 A flexible section shall be installed between rigid piping and cylinder(s).

- 5.4.11 The design strength of the hydraulic steering systems shall be tested in accordance with the requirements of the RO. All the fittings (hoses and piping) shall withstand the system test pressure without leaks.

## **5.5 Rudder and Rudder Stocks**

- 5.5.1 The rudders shall be spade streamline type fabricated by corrosion resistant material such as ASTM 316L stainless steel or equivalent.
- 5.5.2 Rudder angle indicators shall be provided in the Steering Gear. The port and starboard degree markings in intervals not greater than one degree shall be permanently marked and distinguished by red (port) and green (starboard) in English and Chinese.
- 5.5.3 Strength of each rudder and rudder stock shall be in accordance with the requirement of RO based on the contracted speed as stated in Paragraph 2.4.1 of this Part VII.
- 5.5.4 Extremes of rudder travel shall be provided by mechanical stoppers.
- 5.5.5 Welded jumping stopper piece shall be provided on top of the rudder with about 2 mm clearance for preventing rudder from undue lifting.
- 5.5.6 The design of rudder shall be such that propeller shaft to be removed without dismantling the rudder
- 5.5.7 The rudder stock shall be made by corrosion resistant material, such as ASTM 316L stainless steel or equivalent material.
- 5.5.8 Two bearing for the rudder shall be arranged, with the lower bearing to be water lube type and the upper bearing to be grease lube type above water line.
- 5.5.9 The rudder weight shall be supported directly by a carrier bearing incorporated in the steering gear, or by roller thrust bearing separated from the steering gear.

## **Chapter 6 Painting, Marking and Colour Scheme**

### **6.1 Painting**

- 6.1.1 Paints shall be of a fire-retardant marine quality in areas where required.
- 6.1.2 Volatile Organic Compounds (“VOC”) content limits of the paints shall comply with the Controls and Requirements of the VOC Regulation (VOC content limits for regulated vessel paints and regulated pleasure craft paints) of the Regulation of Hong Kong Air Pollution Control Ordinance.
- 6.1.3 Tributyltin (“TBT”) free anti fouling paint complies with actual operating profiles of these speed boats shall be applied on the exterior of hull below water line, sea chest, sea chest grate.
- 6.1.4 All deck areas shall be covered with hard wearing and anti-slip paint with suitable anti-slip sand proposed by paint manufacturer.
- 6.1.5 Painting schedule shall be submitted for MD approval before commencement of work. The proposal shall contain a list and the detailed specification of the paint intended to be used. Thickness of each coating shall be specified.
- 6.1.6 Surface that requires painting shall be fully prepared by suitable method and reach required standard as per paint manufacturer requirement and relevant international standard.
- 6.1.7 Painting and surface preparation shall be carried out in accordance with this Part VII and under paint maker’s and owner’s supervision.
- 6.1.8 All painting work shall carry a one-year guarantee provided by the paint maker or Contractor against defects in material and workmanship.
- 6.1.9 The Contractor shall provide MD at Delivery Acceptance a letter of certification from the paint manufacturer to certify the application of the paint is under the paint manufacturer’s quality control and in accordance with the manufacturer’s requirements including but not limited to the surface preparation, control of the temperature of the metal surfaces, atmospheric conditions, paint thickness, and method of application.

### **6.2 Markings and Colour Scheme**

- 6.2.1 The Contractor shall provide the markings and colour scheme for the Vessel. All painting colour scheme for the Vessel and fittings shall be approved by GNC before application.
- 6.2.2 Draught marks, names, insignia and other colour markings shall be in a colour contrasting with the hull and consoles’ colour.
- 6.2.3 All labelling shall be both in Chinese and English and as per applicable rules and regulations. The AFCD logo shall be displayed on both sides of the Vessel or elsewhere as directed by MD and AFCD.
- 6.2.4 The Vessel’s name shall be marked permanently on both sides shell plate of the Vessel at bow and on top of the Vessel. Details of the size and calligraphy shall be directed and agreed by the MD and AFCD.

- 6.2.5 Draught marks shall be provided permanently at the port and starboard of stem and stern. Draught marks shall be in Arabic numerals 100 mm high and shall be measured from the underside of the keel to the underside of the number markings. A draught mark plan shall be produced by the Contractor and agreed by GNC before the draught marks are marked permanently onto the hull surface.
- 6.2.6 All labelling, stencilling and marking (not limited to the hull but including all aspects of the Vessel) shall be made on separate plaques, boards or labels attached to the structure. By default, all displays, control actuators, electric switches, valves, and other equipment shall be labelled to indicate their type and function as appropriate.
- 6.2.7 Safety markings for the prevention of person tripping in the Vessel shall be provided where necessary.

### **6.3 Tally Plates**

- 6.3.1 The following information shall be displayed on the builder's plate.
  - (a) Builder's name;
  - (b) Vessel's name;
  - (c) Year of build; and
  - (d) Maximum number of persons including the crew that the Vessel is designed to carry.
- 6.3.2 Tally plates in both English and traditional Chinese characters shall be fitted for all spaces and all equipment as required by MD including but not limited to:
  - (a) Equipment in the console;
  - (b) Electrical and communication equipment;
  - (c) Air vents and filling pipes for the fuel oil tank;
  - (d) All valves and equipment on deck;
  - (e) Control panels, switchboards, distribution boxes and electrical circuits; and
  - (f) Any other equipment and fitting as required.
- 6.3.3 Information engraved on the tally plates shall include: service, function, mode of operation, source of power, fuse rating, voltage and warning and other information as required by MD. Tally plates exposed to weather shall be made of durable and weatherproof material and be securely fastened.
- 6.3.4 Tally plates exposed to weather shall be made of durable and weatherproof material and be securely fastened.
- 6.3.5 List of tally plates shall be provided as directed by MD.
- 6.3.6 All cable termination shall be identified clearly for disconnection and reconnection.

## **Chapter 7 Machinery**

### **7.1 General Requirements**

- 7.1.1 All equipment on board offered by the Contractor, the main propulsion engine, electric generating set and any other machinery shall be those at present commonly used by ships operating in Hong Kong Waters, and that they have good support for spare parts and after sale services locally in Hong Kong.
- 7.1.2 The supports of local agents should include supplying brand new proposed main engine, gearbox, electric generating set and other machineries for five years after vessel delivery. [D]
- 7.1.3 The Vessel shall be equipped and fitted with all machineries described in this Chapter each complying with the specifications set out in this Chapter for such machinery. The Spare Parts to be provided shall be of the same model as supplied for the Vessel and shall equally comply with all specifications set out in this Chapter.
- 7.1.4 Sufficient space in the vicinity of the machinery for the local operation, inspection and routine maintenance for all the machinery shall be provided. Procedures and sequences for complete removal of the major items such as the propulsion engines, electric generating set, air-con, fuel oil tanks etc. shall be carefully designed to enable their removal from boat for maintenance without need to cut the deck or shell plate.
- 7.1.5 All parts of machinery, piping, control and other system and their associated fittings which are under internal pressure shall be appropriate testes including a pressure test before being put into service for the first time.
- 7.1.6 The electrical cables, piping for diesel oil lines run between the console, fuel tanks and the equipment of the vessel shall be suitably designed for ease maintenance. They shall be proper supported to prevent unnecessary tension and chafing.
- 7.1.7 All emergency stops shall be fitted with protective guards to prevent inadvertent use.
- 7.1.8 The monitoring and control, including automatic fire detection system, bilge alarm system, remote machinery instrumentation and alarm system shall be centralised in the steering console.

### **7.2 Main Propulsion Engine**

- 7.2.1 The Vessel shall be equipped with two 24V electrically started, fresh water-cooled marine diesel engines for driving directly each of the two fixed pitch propellers via reduction gearboxes. The rating of the main propulsion engines shall be required for the Vessel on the contract speed with annual operation of not less than 3,000 hours. The two marine diesel engines shall at least meet IMO tier II emission requirement. [E]
- 7.2.2 Type approval certificate issued by an RO or another classification society listed in the definition of “Recognised Organisations” in Clause 1.1 of Part IV - Conditions of Contract certifying compliance with the emission level as specified in Paragraph 7.2.1 of this Part VII shall be provided.
- 7.2.3 It is desirable that emission level of the two marine diesel engines in whichever the proposed propulsion system being adopted should meet IMO Tier III emission requirement with or without NOx treatment which can reduce the NOx content. [D]
- 7.2.4 The aggregate propulsive power of the main propulsion engines shall be not more than 750kW. [E]

- 7.2.5 The main propulsion engine shall be resilient-mounted to the ship's structure.
- 7.2.6 The main engine's exhausts and silencers shall be protected according the requirements of RO to avoid the hot surface danger to the personnel and minimise the heat transfer into the machinery space. All components of exhaust system shall be mounted or suspended by the hangers which will not transmit heat, noise, or vibration to the Vessel's structure. The exhaust outlets designed on the shell shall be positioned above the fully loaded waterline.
- 7.2.7 The controls and instrumentation of each main engine are to be integrated into one monitor screen located on control console of the wheelhouse, controls for main engine shall be include:
- (a) Starting and stopping of main engines from the wheelhouse;
  - (b) Emergency stop button with guard cover;
  - (c) Wheelhouse /local control change over switch and indicator;
  - (d) Engine tachometers with running hours;
  - (e) Coolant water temperature;
  - (f) Engine lubricating oil pressure;
  - (g) Boost pressure;
  - (h) Boost temperature;
  - (i) Throttle control device;
  - (j) Engine lubricating oil pressure;
  - (k) Starting battery voltage;
  - (l) Engine exhaust gas pyrometer;
  - (m) Coolant temperature high alarm and shutdown;
  - (n) Oil pressure low alarm and shutdown;
  - (o) Overspeed alarm and shutdown;
  - (p) Main engine expansion tank low level alarm;
  - (q) Central illumination dimmer for all light in control console;
  - (r) Alarm test and reset;
  - (s) Gear box operating oil pressure;
  - (t) Gear box lubricating oil temperature;
  - (u) Gear box operating oil pressure low alarm;
  - (v) Gear box lubricating oil temperature high alarm;
  - (w) Gear box operating oil pressure gauge (local indication);
  - (x) Gear box lubricating oil temperature gauge (local indication); and
  - (y) Any other instrumentation recommended by the engine maker and GNC.

### **7.3 Propeller Shaft, Stern Tube and Propeller**

- 7.3.1 All the components of the shafting system design and installation shall follow the RO Requirements such as Torsional Vibration Calculation.
- 7.3.2 All the components of the shafting system shall be of adequate strength and stiffness to enable it to withstand the most adverse combination of the loads without exceeding acceptable stretch levels for the material concerned.
- 7.3.3 Stern tube bearings shall be RO approved water-lubricated cutlass rubber/composite type. Forward and after ends of stern tubes shall be bored for bearings and a dripless shaft seal system shall be fitted to the inboard side of each stern tube. The material of the stern tube shall be marine grade aluminium alloy with antifouling paint.

- 7.3.4 Shaft torque measuring device or similar arrangement shall be fitted at the tail shafts for measuring the output power of main engines in case there no power indication on engine monitor panel, to enable client to check the engine power after the Vessel in service.
- 7.3.5 The propeller shafts shall be made of corrosion resistant and high yield stress material, such as stainless steel of Grade 316L (austenitic) or equivalent.
- 7.3.6 The two propellers shall be of a fixed pitch type with the design to minimize the vibration cause to the hull. The propellers shall be turned outboard when the Vessel is in moving forward motion.
- 7.3.7 The propeller shaft brackets shall be of aluminium alloy construction. The materials for shaft brackets, shafts, keys, locking nuts, etc. shall be compatible for use with the propeller material.
- 7.3.8 Rope cutting device shall be fitted nearby the propellers.
- 7.3.9 The propellers and stern tubes shall be protected by a cathodic protection system for 2 years' service life.
- 7.3.10 Grease or packing containing graphite shall not be used with these shafts.

#### **7.4 Reduction Gearbox**

- 7.4.1 The reversing reduction gearboxes shall be resilient-mounted to the ship's structure. Gearboxes shall be provided with clutches, alarm senders, and switches.
  - (a) Gear oil heat exchangers shall be piped to the engine cooling circuits as specified by the manufacturer. Gearbox oil coolers shall be sized to accommodate the heat generated by the clutches at less than full engagement.
  - (b) Reduction gearboxes shall be sized to provide both low and high-speed performance, shafts shall rotate outboard when the Vessel is moving forward.
  - (c) In order to operate at the loitering speed of maximum 5 knots, repeated cycling of the clutches in and out of gear is not permitted in any case to obtain low speed operation. If required the Vessel shall be fitted with a gearboxes configured with a trolling clutch to permit low-speed operation.
- 7.4.2 The gearboxes shall be provided with alarms for low oil level and oil temperature. Alarms shall be repeated both locally and at the wheelhouse.
- 7.4.3 Sufficient engine side space for maintenance and repair shall be required. Design of installation arrangement shall be confirmed either using vertical offset or horizontal offset gearboxes.

#### **7.5 Electric Generator Engine**

- 7.5.1 Two (2) electrically started, fresh water-cooled diesel engines of same manufacturer, integral with alternating current alternator of self-excited, brushless, and ventilated type, shall be installed on the Vessel (collectively, "electric generating sets" or "electric generators"). [E]
- 7.5.2 The capacity of these generating sets shall be such that either one of the two generating sets shall be able to supply all electricity necessary to ensure that normal operational conditions of propulsion and safety can be achieved. Synchronization of the electric generators are not required.

- 7.5.3 Each generating set at its continuous service rating, shall have sufficient capacity for:
- (a) supplying all full operational electrical load of the whole Vessel including air conditioning running at full capacity plus major electrical consumers such as engine room fans, davit, steering gear, radio and navigation system, kitchen facilities etc. with not less than a 15% reserve margin; and
  - (b) permitting the starting of the largest motor without causing any motor to stall or any other device to fail due to excessive voltage drop of the system when the electric generating sets is supplying full operational electrical load including air conditioning running at full capacity of the whole Vessel.
- 7.5.4 Electrical load analysis and calculations shall be approved by the RO before submission to GNC.
- 7.5.5 The exhaust of the electric generating set shall be arranged with a water-lock/lift-silencer with a view to reducing its noise levels. These shall be configured with a hose running from the gen-set (wet outlet) and a wet hose outlet:
- (a) The exhaust outlet leading to side on shell plate shall be positioned above the waterline and be as high as practicable to prevent standing waves sealing the outlet. Exhaust pipe outlets shall be at a minimum of 300 mm vertical distance above loaded waterline and can be arranged via goose-neck type expansion bellow to the exhaust outlet fitted to shell above waterline for discharge.
  - (b) The exhaust system shall be designed appropriately to comply with the gen-set and exhaust manufacturers' requirements.
  - (c) RO approved high temperature exhaust pipe (for example the goose-neck type in both dry and wet side) shall be used.
  - (d) All exhaust components shall be mounted or suspended using spring-type hangers which will not transmit heat, noise or vibration to the Vessel's structure.
  - (e) Lagging / Noise control requirements: Flexible sound reduction wrap for exhaust piping works shall be based on manufacturer / appropriate industrial standard.
- 7.5.6 The design and installation of the generating set, switchboard and the associated wiring shall follow the RO Requirements. For the avoidance of doubt the following requirements shall also be met:
- (a) The electric generating set shall be provided with a type approval certificate issued by the any classification society listed in the definition of "Recognised Organisation" in Clause 1.1 of Part IV - Conditions of Contract but not necessarily the RO for the Vessel specified in Schedule 9 of Part V.
  - (b) The rating of diesel engine shall be capable of developing for a short period (15 minutes) a power of not less than 110% of the alternator's continuous service rating.
  - (c) The Vessel's main electrical supply shall be generated and distributed at 220V, 50 Hertz, single phase system.
  - (d) The resilient-mounted generating set designed for marine application shall be of a proprietary make. The arrangement of the electrical and piping systems shall enable the quick dismantling and easy replacement of the unit.

- 7.5.7 The monitoring of the electric generator shall be integrated into one monitor screen located on the steering console in the wheelhouse. The monitor and control shall include:
- (a) Remote start and stop.
  - (b) Tachometer with running hour meter.
  - (c) Cooling water temperature gauge.
  - (d) Exhaust gas temperature gauge.
  - (e) Lubricating oil pressure gauge.
  - (f) Battery charger voltage meter
  - (g) Fault indicating alarms.
  - (h) Protective devices such as overspeed, low lubricating oil pressure trip etc. as recommended by the engine builder.
  - (i) A standard manufacturer's local control panel to be fitted in the engine room.
  - (j) The local control panel in engine room shall contain the following devices:
    - (i) Start/stop push buttons to be fitted with guard cover and running/stop indication lamp for the electric generating set; and
    - (ii) Volt-metre for the electric generating set.
- 7.5.8 The Contractor shall provide copies of the type approval certificates or the manufacturer's certificate to GNC on or before the Delivery Acceptance.

## **7.6 Ventilation**

- 7.6.1 Mechanical ventilation consists of two (2) forced in type fans shall be provided to engine room. The ventilation fans capacity shall be adequately to ensure full power operation of all machinery in all weather conditions, including heavy weather, an adequate supply of air shall be maintained to the compartment for the safety of personnel and the operation of the machinery.
- 7.6.2 The engine room ventilation fan capacity shall be able to maintain engine room temperature below 45°C at all weather conditions and ambient temperature, at the contract cruising speed of 18 knots as per this Part VII.
- 7.6.3 The air supply inlet vents shall be connected to louvres of efficient design in preventing ingress of water during extreme weather conditions.
- 7.6.4 All vents shall be provided with weather-tight covers, with coamings of adequate height.
- 7.6.5 Engine Room compartment ventilation ducts, intakes, and outlets shall be sized to minimise pressure drops and flow noise. For design purpose, air flow rates in ducting shall be kept at 10 m/s or less. Airflow rates at vents and louvres shall be as low as is required to avoid flow noise (Typically 5 m/s depending on vent or louvre design).
- 7.6.6 Steering Gear Compartment and Tank Space shall be natural vented with ventilation facility of vent duct and air pipe comply with the RO requirements.
- 7.6.7 Air pipes shall be fitted to all tanks, void spaces, and all spaces and compartments which are not fitted with other types of ventilation arrangement).

## **7.7 Air- Conditioning System**

- 7.7.1 A Proprietary Make split-type air-conditioner system for marine application including indoor and outdoor units for each of the following compartments shall be provided. The Contractor shall propose specific equipment for approval by GNC prior to purchasing:
- (a) Wheelhouse 1 unit
  - (b) Deck cabin 1 unit
  - (c) Crew space & pantry 1 unit
- 7.7.2 The air-conditioner shall be dual purpose with heating and cooling functions. The Contractor shall propose specific equipment for approval by GNC prior to purchasing.
- 7.7.3 The temperature of the compartments shall be able to maintained at 22°C for 60% relative humidity when the external ambient air temperature is 38°C at 90% relative humidity with full complement and passengers on board. An acceptance test of the complete air-conditioning system of the Vessel shall be carried out by GNC to verify the system is effective and complying to the requirements given here. The Contractor shall provide GNC a copy of this test report upon completion of the test.
- 7.7.4 The refrigerant shall be non-Ozone depletion substances and CFC and HCFC free. The use of refrigerants under Class 2 and Class 2L (such as R717, R32 and R1234yf) shall be avoided as far as possible. If it is unavoidable to use refrigerants under Class 2 and Class 2L, the refrigerants shall fulfil the relevant restrictions as specified by the manufacturers, agents or suppliers, such as requirements on minimum room area and minimum installation. Reference shall be made to the “Guidance Note on Household Air-Conditioners Using Mildly Flammable Refrigerant” issued by EMSD.)
- 7.7.5 ‘on’ and ‘off’ switches shall be installed in the steering console. Emergency stop switches of the air conditioning system in addition to the normal power ‘on’ and ‘off’ switches shall be installed in the wheelhouse control station.
- 7.7.6 Sufficient fresh air induced to the air-conditioned area which shall be not less than 25 m<sup>3</sup>/hour per person to keep the carbon dioxide (“CO<sub>2</sub>”) level low enough for health reasons.
- 7.7.7 Sufficient ventilation fans shall be provided in the deck cabin in case of air-conditioning breakdown.
- 7.7.8 The water drain system of the indoor units shall be designed to prevent water leakage inside the deck cabin.
- 7.7.9 Sufficient fresh air induced to the air-conditioned area shall be based on ISO 7547 “Standard for Shipbuilding - Air-conditioning and ventilation of accommodation spaces”, all compartment; and there shall be not less than 25 m<sup>3</sup>/h per person so as to keep the CO<sub>2</sub> level low enough for health reasons.
- 7.7.10 Bacteria resistant replaceable filters shall be fitted at air inlets.

## **7.8 Piping System**

- 7.8.1 Pipe’s connection and bending shall meet the follows:
- (a) Piping connections and joints shall be constructed and designed in accordance with the rules and regulations of the RO.
  - (b) Pipe bends shall be kept to a minimum and have sufficient radius to facilitate smoothness of flow.
- 7.8.2 All pipes for essential services shall be secured in position to prevent chafing or lateral movement. Long or heavy lengths of pipe shall be supported by bearers so that no undue load is carried by pipe connections or pumps and fittings to which they are attached.

- 7.8.3 Suitable provision for expansion shall be made, where necessary, in each range of pipes.
- 7.8.4 Where flexible pipe is fitted, arrangements shall be provided to protect against over extension and compression. The adjoining pipes shall be suitably aligned, supported, guided, and anchored, where necessary, expansion pieces of the bellows type shall be protected against mechanical damage.
- 7.8.5 As far as practicable, pipelines, including exhaust pipes from engines, shall not to be routed in the vicinity of switchboards or other electrical appliances in positions where the drip or escape of fluids or gas from joints or fittings could cause damage to the electrical installation.
- 7.8.6 Watertight bulkheads, decks or structural members having pipeline penetration shall be designed and compensated in accordance with RO Requirements.
- 7.8.7 The material of the gaskets shall be capable of resisting chemical attack of the fluid being conveyed. Galvanic corrosion shall be avoided if different materials used in the system.
- 7.8.8 Machinery and piping designation and marking:
- (a) All piping and equipment shall be labelled and colour-coded. And each pipe running through each compartment shall be colour coded, labelled, and have the direction of flow marked in at least two places.
  - (b) Colour coding of machinery and piping shall be in accordance with the following:
    - i. Fire main Red
    - ii. Sea Water Dark green
    - iii. Fuel Oil Dark brown
    - iv. Lube Oil Striped black/yellow
    - v. Fresh Water Blue
    - vi. Hydraulic Oil Orange

## 7.9 Fuel Oil System

- 7.9.1 As Government vessels are committed to utilise sustainable / renewable fuel blends. The fresh water cooled marine diesel engines for the proposed propulsion system and separately for the electric generating sets of the Vessel shall be able to use ASTM D975-08a B5 blends diesel fuel (5% biodiesel, 95% diesel labelled B5) and approved by the engine makers.
- 7.9.2 The fuel oil of the fresh water cooled marine diesel engines for the proposed propulsion system and separately for the electric generating sets shall be supplied from one or more fuel oil tanks. Endurance for fuel capacity shall be as stated in Paragraph 2.4.3 of this Part VII with 10% margin in litres. [E]
- 7.9.3 The incapable pumping capacity of each tank shall not be more than 10% of the capacity of that tank.
- 7.9.4 The Vessel shall be built with two (2) stainless steel Grade 316 independent fuel tanks to service the Vessel's main propulsion engines and ship service electric generators, actual location shall be designed and approved by the RO and accepted by GNC. Individual components of the system, and the system as a whole, shall be designed to withstand the combined conditions of pressure, vibration, shocks, corrosion and movement encountered under normal operating conditions and storage. The fuel oil tanks shall be symmetrical (one at portside and the other at starboard) to minimize the tank beam and to reduce free surface effect.

- 7.9.5 The fuel oil tanks shall be installed so that the loads due to the mass of the full tank are safely induced into the structure, with due consideration given to upward and downward acceleration due to the Vessel's movements at maximum speed in the sea.
- 7.9.6 The fuel oil tanks shall be interconnected to permit fuel transfer between the tanks. Stop valve shall be arranged at both ends of the interconnecting pipe if fitted.
- 7.9.7 Internal surfaces of the fuel oil tank shall be left unpainted and shall be cleaned thoroughly to the satisfaction of MD.
- 7.9.8 The fuel oil tanks shall be hydrostatically tested as required by an approved standard and connections shall be proven tight.
- 7.9.9 Fuel oil supply pipe shall be stainless steel Grade 316L in dimension and thickness which comply with RO requirements.
- 7.9.10 The filling pipe shall be of metallic construction as specified in Paragraph 4.1 of this Part VII, and be a permanent fixture led from the deck and secured to the tank by an approved connection. A screwed cap and name plate inscribed 'Fuel Oil' shall be provided at the filling point. Flexible hoses are not permitted as filling pipes.
- 7.9.11 Manually quick closing valves with control from above the main deck shall be fitted to the fuel oil tanks outlets.
- 7.9.12 Fuel supply to each main engine, the electric generator engine, and the fire pump engine shall come from a manifold designed in engine room after the fuel tank mounting valve.
- 7.9.13 Two duplex filters shall be fitted in the oil fuel supply lines to the main and auxiliary engines, and the arrangements shall be such that any filter can be cleaned without interrupting the supply of filtered fuel oil to the engines. Water separators shall be fitted in the oil fuel supply line to the main engines and the auxiliary engines with stop valve to be arranged on the fuel line fore and after of the separators.
- 7.9.14 Where necessary, a short section of metallic tubing or hose or a short loop of annealed copper tubing should be installed at the fuel supply section to the engine. Flexible pipes of approved type should be used as short joining lengths to the engine. [D]
- 7.9.15 The Contractor shall provide the initial fills of fuel oil, lube oil, coolant, and hydraulic fluids using fluids and additives prescribed by engine manufacturer. The Contractor shall provide a summary listing of all fluids and quantities used.
- 7.9.16 Provisions of the fuel oil tank
- (a) A tank content gauge and low level alarm shall be fitted on the console. A level gauge in litres shall be provided for each tank;
  - (b) Baffle openings shall be designed so that they do not prevent the fuel flow across the bottom or trap vapor across the top of the tank;
  - (c) The compartment or space containing the fuel oil tank shall be fitted with two ventilating pipes of arrangement acceptable to GNC;
  - (d) Rigid fuel suction pipes near the tank bottom shall be provided;
  - (e) Air vent with flame trap shall be fitted on main deck;
  - (f) Inspection opening with sufficient size shall be provided to allow proper inspection of the entire tank interior. The inspection hatch shall have gasket covers secured by stainless steel bolts and self-locking nuts;
  - (g) Suitable provision such as drip trap shall be made for collecting the oil discharge;
  - (h) Baffles shall be provided, the total open area provided in the baffles shall be not greater than 30% of the tank cross section in the plane of the baffle;

- (i) Sounding pipes with chained cap shall be provided; and
- (j) Tank drain shall be provided.

## **7.10 Seawater System**

- 7.10.1 Sea chests shall be provided for the main propulsion engines and electric generator engines cooling purpose, in the vicinity of their respective seawater pump suction but with adequate distance between each other to avoid water flow disturbance.
- 7.10.2 Each of the main propulsion engines as well as the electric generator engines shall have their own sea water cooling pipe connected from the sea chest via a sea valve which are directly fitted on the sea chest, followed by a strainer and an isolation valve, to enable the cleaning of the strainer / filter on afloat conditions.
- 7.10.3 Air pipe shall be provided to the sea chest and shall be led to space above open deck. Air pipe shall be connected to sea chest via a ball valve directly connected to sea chest.
- 7.10.4 All sea valves shall be compatible with the hull material, connected to the sea chests shall be tested according to the RO Requirements.
- 7.10.5 The discharge of sea water cooling pipe for main engine and electric generator engine shall be arranged within engine room directly to shell plate with at least 300 mm above water line.
- 7.10.6 Seawater piping shall be constructed of copper nickel pipe of 90/10. Short flexible hose shall be used at the end of the sea water pipe connection to engine.
- 7.10.7 Seawater piping shall be joint by welding throughout the system on the Vessel, flange connection shall be avoided and reduced as much as possible to limit only those locations connecting with valves or pumps etc.
- 7.10.8 Pipe diameter and wall thickness shall comply with engine maker and the RO requirements.

## **7.11 Fresh Water System**

- 7.11.1 One independent stainless steel of Grade 316L fresh water tank with a total capacity of not less than 500 litres shall be arranged in the tank space for supply fresh water to toilet, washing basin, mess preparation area, shower, and deck washing.
- 7.11.2 The fresh water tank shall not be directly adjacent to any other tanks carrying liquid of any kind.
- 7.11.3 A pressurised unit shall be provided with a water pump, starter, pressure switch, pressure gauge, relief valve and suction valves, in accordance with the RO requirements. The unit shall maintain the pressure automatically to maintain pressure at the tap located at Main Deck, Underdeck and crew space to GNC's satisfaction. This system acts as the potable fresh water system and a hose which freely reaches all parts of the Vessel shall also be provided.
- 7.11.4 The fresh water tank shall be designed to easily accessible for maintenance. The freshwater tank shall be fitted with the following:
  - (a) Inspection / cleaning access cover;
  - (b) Inductance or pressure type level gauge on tank body;
  - (c) Filling / sounding pipe;
  - (d) Air pipe with gauze;
  - (e) A tank content level gauge in litres; and
  - (f) low-level alarm shall be fitted on the wheelhouse control console.

- 7.11.5 The fresh water tank shall be tested without leakage by a head of water equal to the maximum to which the tank may be subject, but not less than 2.5 m above the top of the tank. The static test pressure shall be applied for 5 minutes without pressure drop.
- 7.11.6 Fresh water piping shall be made of stainless steel of Grade 316L or aluminium alloy as specified in Paragraph 4.1 of this Part VII, screw type joint shall be applied on fresh water piping system.
- 7.11.7 Cold fresh water taps completed with polyvinyl chloride braided / reinforced transparent hoses shall be fitted on the main deck aft and forehead for cleansing purposes. One cock shall be arranged on aft open deck for deck washing purpose.

## **7.12 Bilge System**

- 7.12.1 Individual electrically operated bilge pump shall be installed in each watertight compartment to pump the bilge of each compartment for oily-free water discharge overboard and easily accessible for maintenance. The capacity of these bilge pump shall comply with RO requirement. All hull lead through shall have swan necks or non-return valves to comply with RO requirement.
- 7.12.2 A bilge water holding tank of capacity according to the RO requirements shall be provided in engine room.
- 7.12.3 For the engine room and steering gear room, the bilge discharge pump and pipe as described in 7.12.1 are used for emergency only. A separate bilge system consists of pump and pipe to pumping the bilge into the bilge holding tank and thereafter shall pump the bilge water inside the bilge holding tank to shore reception facility.
- 7.12.4 Bilge alarm shall be arranged for each compartment. Alarm system is equipped with both light and loud alarm signals and indication on the bilge control panel fitted on the wheelhouse control console.
- 7.12.5 When the Vessel is afloat and unmanned, the bilge audible and visual alarm system shall continue to function. When the audible and visual alarm is not acknowledged after a time period such as 5 minutes (can be adjusted), the audible and visual alarm shall be extended externally to an audible and visual alarm fitted on the top of the deckhouse to bring the attention of the persons ashore or the guard of the Government Dockyard. The additional protection shall be able to be turned on and off when required.
- 7.12.6 The discharge of bilge water shall be manually controlled through the bilge control panel fitted on the wheelhouse, a pumping diagram shall be available beside the bilge control panel to clearly indicate the “emergency” and “normal” pumping procedure as described in Paragraphs 7.12.1 and 7.12.3 of this Part VII for pumping of bilge in engine room.
- 7.12.7 Bilge piping shall be of marine aluminium alloy as specified in Paragraph 4.1 of this Part VII with thickness schedule to comply with the RO requirements.
- 7.12.8 A hand pump with capacity accepted by the RO shall be provided on board, with hose of sufficient length to enable the pumping out of bilge water in emergency when the bilge pump system mentioned in Paragraph 7.12.1 of this Part VII are failed.

## **7.13 Sanitary, Grey and Black Water System**

- 7.13.1 One black water holding tank of stainless steel of Grade 316L with capacity of not less than 300 Litres shall be installed in the Tank Space.
- 7.13.2 The flushing of toilet shall be directly discharged into black water holding tank.
- 7.13.3 The black water holding tank shall be fitted with a level gauge and a “Tank Full” indicator installed in a highly visible location in the wheelhouse.

- 7.13.4 A discharge macerator electric pump shall be provided and effectively pumping out the contents of the holding tank
- 7.13.5 Sanitary, Grey and Black Water Piping shall be aluminium alloy or polyvinyl chloride (“PVC”) material.
- 7.13.6 A grey water holding tank of about 10 litres shall be provided within toilet or underneath the crew cabin deck. Wash basin water and floor drain water for shower shall be discharged into grey water holding tank, and the grey water shall be discharged directly overboard through a non-return shipside valve via an automatically starting pump when the water rising to activate the float switch.
- 7.13.7 It is desirable that an additional equipment and/or system on top of those required in Paragraphs 7.12 and 7.13 of this Part VII to further mitigate the discharge all (but not just one or two) of the following: oily water, black water and grey water from the Vessel in Hong Kong waters (“Additional Discharge System”). [D]

## Chapter 8 Electrical System

### 8.1 General Requirements

- 8.1.1 The whole electrical works shall be carried out in accordance with this specification and good shipbuilding practical
- 8.1.2 The type and construction of electrical equipment shall be in accordance with the manufacturer's standards unless specially described.
- 8.1.3 In general, cable terminals shall be solderless type, each cable shall be clearly labelled and carry its own unique identification code. Caution plates and name plates of the electrical equipment shall be written in English and Chinese and metric system.
- 8.1.4 All electrical systems and equipment, cable running etc. shall be easily accessible and shall be installed in well ventilated positions, clear of inflammable materials and properly grounded. The Contractor shall submit a layout plan showing the exact locations of the equipment
- 8.1.5 The electrical installation shall be in accordance with the RO requirements and the latest Regulations of the IEC, Electrical Installations in Ships.
- 8.1.6 Electrical equipment shall be inspected and tested in accordance with the RO regulations and the quality standard of the Contractor. All the test schedules shall be submitted to the GNC for approval.
- 8.1.7 All Equipment installed shall be provided with manuals for operation and maintenance.
- 8.1.8 Wiring bundles shall be long enough to permit replacement of connectors three times without splicing or replacing the wire bundle.
- 8.1.9 Twenty percent of spare wiring penetrations or two spare wiring penetrations, whichever is the greater, shall be provided through each bulkhead except the forward collision bulkhead.
- 8.1.10 Wiring for the AC and DC distribution systems shall meet the installation and sizing requirements of National Marine Electronics Association ("NMEA").
- 8.1.11 Wiring shall run along conduits with watertight openings and be secured in such a manner as to allow easy maintenance. Type approved cable penetrations shall be provided at the openings of watertight compartments or deck penetrations.
- 8.1.12 All cables installed in the Vessel shall be tinned copper conductor with ethylene propylene rubber insulation and PVC sheath to meet the RO Requirements. Screened cables to be fitted where interference with navigation aids or radios likely to occur.
- 8.1.13 Where cables are exposed to weather and or mechanical damage, galvanized steel wire braided and PVC or polyolefin ("PO") outer sheathed cables shall be provided. Alternatively, cables shall be supported throughout their length in conduits, cable trunking, or trays, at maximum intervals of 300 mm.
- 8.1.14 The metallic sheathing, armour or braid of cable shall be earthed properly at both ends. All bare terminals shall be insulated properly with approved cable insulators. Sheathed cables and battery cables to the battery disconnect switch shall be supported at maximum intervals of 300 mm, with the first support not more than 1 m from the terminal. Other sheathed conductors shall be supported at maximum intervals of 450 mm. Sheathed engine starter conductors constitute an exception to this requirement.
- 8.1.15 Wire runs and conductors shall be continuous and easily accessible.

8.1.16 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.

8.1.17 In general, voltage and frequency shall be as follow:

- |                                    |               |
|------------------------------------|---------------|
| (a) Alternator                     | 220V, 50Hz, 1 |
| (b) Power equipment                | AC220V/DC24V  |
| (c) Galley and kitchen             | AC220V        |
| (d) Main light                     | DC24V         |
| (e) Emergency light                | DC24V         |
| (f) Navigation and radio equipment | AC220V/DC24V  |
| (g) Control and monitoring         | AC220V/DC24V  |

8.1.18 Application of Electrical Equipment

- (a) The air circuit breaker shall be used for protection of the generator.
- (b) Moulded circuit breaker shall be used for protection of feeder circuits and shall be plug in type, to be fitted with magnetic instant trip, thermal trip if necessary and/or trip shut coil or under voltage trip depending on each application.
- (c) Fuses shall be used for protection of control circuits, alarm circuits, indicating circuits etc.
- (d) The meters fitted on main switchboard, motor control gears, etc. shall be of manufactures standard type and size.
- (e) Cable terminals shall be of solderless type.

8.1.19 Colour Scheme and Painting

In general, the electrical equipment shall be painted and finished in accordance with makers standard. Standard of indicating lamps:

- |              |        |
|--------------|--------|
| (a) Power    | White  |
| (b) Running  | Green  |
| (c) Stand by | Yellow |
| (d) Stop     | Blue   |
| (e) Alarm    | Red    |

## 8.2 Alternator

8.2.1 The main electrical AC power supply shall be provided by two alternators. The alternators shall have unrestricted continuous rating and shall be fitted in the Engine Room.

8.2.2 Each alternator shall be sized based on a 15% growth margin above the predicted maximum load condition. The Vessel's electrical load calculation shall include static and transient, loads on AC, DC, and ship service systems. The Vessel's electrical load calculation shall be approved by the RO and accepted by GNC.

8.2.3 The alternator shall maintain an output voltage within a range of plus or minus 5% over the entire load range and frequency within a range of plus or minus 1.5 Hz.

8.2.4 Starting and normal shutdown controls shall be mounted on the electric generating set.

8.2.5 The alternators shall be protected against short-circuits and overloads by multipole circuit-breakers (overload protector).

- 8.2.6 The distribution of the electricity to the equipment shall go through circuit breakers fitted on a main electrical distribution board as described in Paragraph 8.5 of this Part VII.

### **8.3 DC Batteries**

#### **8.3.1 Batteries for Main Engines Starting**

- (a) Independent bank of 24V batteries shall be provided for starting of each of the main engines. The capacity of the batteries shall be sufficient to provide at least six consecutive starts of each one of the main engines,
- (b) Batteries shall be maintenance-free and vibration resistant, and shall be designed for marine applications.
- (c) The batteries shall be in a ventilated enclosure in engine compartment or dedicated lockers.
- (d) Electrical connections shall be arranged so that the batteries for either of the two main engines can be started by the starting battery of the others via manual change-over switch in the engine room.
- (e) Each main engine shall have their own attached alternator. The batteries for starting the main engines shall be charged by the engine it served.

#### **8.3.2 Batteries for Electric Generating Set Starting**

- (a) Independent bank of 12V batteries shall be provided for starting of generator engine. The capacity of the batteries shall be sufficient to provide at least three consecutive starts of the electric generating set from cold, without recharging
- (b) Batteries to be maintenance-free and vibration resistant, and shall be designed for marine applications.
- (c) The batteries shall be in a ventilated enclosure in engine compartment or dedicated lockers.
- (d) The batteries for starting the generator engine shall be charged by the generator engine itself.

#### **8.3.3 Batteries for the starting of diesel engine driving the external firefighting pump**

- (a) The diesel engine for driving the external firefighting pump shall be equipped with her own attached starting batteries, and the batteries shall be charged by the engine itself during operation.
- (b) A wire circuit with manual switch shall be arranged to connect these batteries to one of the battery banks for main engine or generator engine starting, to enable the diesel engine to be started by the battery bank for starting of the main engine or generator engine.

#### **8.3.4 Batteries for Routine and Emergency Supply**

- (a) 24V batteries shall be provided for routine and emergency supply, These batteries shall be connected to electric charger board as specified in Paragraph 8.6 of this Part VII.
- (b) In event of main electrical AC power failure, 24V DC batteries shall act as an emergency supply for the following vital equipment and systems on board:
  - (i) Navigation light control panel and navigation lights;
  - (ii) Emergency lighting;
  - (iii) Fire detecting system;
  - (iv) Magnetic Compass light;

- (v) Very High Frequency Radio;
  - (vi) Instrument panel in control console;
  - (vii) One hand-held searchlight, two search lights (each for fore deck & aft deck) and four fixed floodlights (each two for port and starboard side deck);
  - (viii) Alarm system (bilge, CO<sub>2</sub> release, tank level); and
  - (ix) Any other vital instrumentation and control systems for the Vessel to return to base as maybe required by GNC or the RO.
- (c) This emergency supply shall come into operation automatically in the event of main electrical power supply failure. The capacities of these sets of batteries shall be sufficient to maintain the emergency supply for a period of at least 6 hours according to the RO Requirements.
- (d) The batteries shall be subjected to continuous trickle charge under normal operation of the Vessel by an automatic battery charger. Under the battery fully discharged condition, the charger shall be able to perform a quick charge function.
- (e) The batteries shall be installed in a separate compartment located outside of the engine compartment above main deck. or in a separate GRP or GRP lined storage box of well vented, if the compartment is shared with other equipment or function. The compartment shall be well ventilated and prevent ingress of water.

#### **8.4 The Solar Panel System**

- 8.4.1 The Vessel should be equipped with a solar panel system connecting to the 24V charger board as specified on Paragraph 8.6 of this Part VII. [D]
- 8.4.2 The solar panel system shall convert solar energy to power shipboard 24V routing and emergency batteries as specified in Paragraph 8.3.4 of this Part VII.
- 8.4.3 A multipole switch that has interlock with other battery charger shall be located in steering console which can send the solar power to charge the 24V DC batteries for routing and emergency use as specified in Paragraph 8.3.4 of this Part VII.

#### **8.5 Main Switchboard**

- 8.5.1 One main switchboard shall be provided and installed inside the locker on the port side aft bulkhead of deck cabin. The main switchboard shall consist:
- (a) Sector for electrical alternator;
  - (b) Sector for single phase 220V AC supply; and
  - (c) Switch for 24V DC supply.
- 8.5.2 The protection standard for the MSB shall be IP 22 as per international standard IEC 60529 to be located in a protected location inside the Vessel.
- 8.5.3 Moulded case circuit breakers shall be provided for alternator.
- 8.5.4 Minareted circuit breakers shall be provided for all other circuit other than alternator.
- 8.5.5 All circuit breakers shall be of the proper voltage rating, manual reset type, instantaneous short circuit protection, and shall be designed for inverse time delay and capable of repeatedly opening the circuit without damage. Circuit breakers shall indicate whether they are in the open or closed position.
- 8.5.6 All circuit breakers shall be of plug-in type, so that the breakers shall be removed from panel front without de energising the main bus.
- 8.5.7 The cable rating shall be in excess of the circuit breaker overload tripping current.

- 8.5.8 Circuit breaker shall act as a protective device only and shall not be used for switching purposes. An individual on/Off switch shall be installed for each electrical fitting.
- 8.5.9 Name plate indicating service of panels and feeders shall be provided on panel. All circuit breakers shall be labelled to identify the circuit being protected.
- 8.5.10 Twenty (20) percent of spare circuit breakers or three space circuit breakers, whichever is the greater, shall be provided in each distribution panel, both AC and DC.
- 8.5.11 Voltmeter, ammeter, wattmeter, and frequency meter, and insulation and earth indication light shall be provided on the main switchboard.
- 8.5.12 Electric Generating Set Sector of the main switchboard shall have the following:
  - (a) Circuit breaker of adequate capacity with over-current trip and short circuit trip; and
  - (b) Indication lights for "Power Available" and "Breaker Opened".

## **8.6 Electrical Charger Board of 24V**

- 8.6.1 One (1) set of 24V electrical charger board shall be equipped with one charger for routine and emergency batteries as specified in Paragraph 8.3.4 of this Part VII, located in control console of the wheelhouse.
- 8.6.2 The charger shall be equipped with rectifying device in a way that when the main power supply is normal, the rectifying device provides DC 24V power, and when the main power fails, it automatically switches to battery for power supply. The character of electrical charger shall be: Input (AC)220V, single phase, 50Hz and Output (DC) 28V.
- 8.6.3 The chargers shall be sized such that a completely discharged battery bank can be recharged to 80% capacity within 8 hours (100% at 10 hours). At the end of the charge, the chargers shall be tapered to a trickle value.
- 8.6.4 The chargers shall be fitted with a pilot lamp, a charging adjustment, a voltmeter, and an ammeter indicating charging current.
- 8.6.5 Discharge protection shall be provided to prevent a failed charger component from discharging the battery bank.
- 8.6.6 Battery charging facilities shall be available via the alternator of 220V.
- 8.6.7 The chargers shall be protected against overcharge.
- 8.6.8 The chargers shall be operating when the alternator generator set is running. The chargers shall be set to ensure that the alternator to be used as the primary charging system while the generator is running.
- 8.6.9 The chargers shall be used to supply 24V to all DC consumers directly.
- 8.6.10 The 24V consumers shall be grouped into two, and in emergency condition, only those equipment as listed in Paragraph 8.3.4 (b) of the Part VII shall be supplied with power via the routing and emergency batteries.
- 8.6.11 Circuit breakers shall be provided for each circuit. Circuit breakers shall be of the proper voltage rating, manual reset type, instantaneous short circuit protection, and shall be designed for inverse time delay and capable of repeatedly opening the circuit without damage. Circuit breakers shall indicate whether they are in the open or closed position. All circuit breakers shall be labelled to identify the circuit being protected.
- 8.6.12 Twenty percent of spare circuit breakers or three space circuit breakers, whichever is the greater, shall be provided in each distribution panel, both AC and DC. The Vessel's ENE shall be supplied from an independent distribution panel, which shall in turn be supplied from a single breaker in the main distribution panel of DC.

8.6.13 An instruction plate with a schematic wiring diagram illustrating the operating 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.

## **8.7 Sockets Outlet**

8.7.1 Receptacles/sockets installed in locations subjected to rain, spray or splashing shall have a minimum protection of IP 55, in accordance with IEC 60529 or equivalent when not in use, e.g., protected by a cover with an effective weatherproof seal.

8.7.2 A system of 220V AC, 13A and 24V DC 5A socket outlets shall be provided in the engine room, fore and aft ends of the Vessel on the main deck and in the fore peak of the Vessel.

8.7.3 Socket outlets for 220V AC (with USB charging socket 5V 2A), 24V DC shall be provided in the wheelhouse. The arrangements and positioning of the Sockets shall be discussed at the kick-off meeting and shall be agreed by the AFCD.

8.7.4 The crew space and mess preparation area shall require 220V AC power sockets (with USB charging socket 5V 2A) for the equipment including but not limited to portable apparatus and the domestic equipment.

8.7.5 Each socket outlet shall be integrated with an 'On/Off' switch to facilitate local switching of the electrical equipment. The 220V AC socket outlets shall be supplied with 13A 3-square-pin fused plugs. The 24V DC socket outlets shall be supplied with fused plugs.

8.7.6 Sockets for different voltage systems shall be clearly labelled and with different pin sizes so that one system cannot plug into the other.

8.7.7 Power sockets on the weather deck, in the engine room and other damp locations shall be watertight 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.

## **8.8 Lighting**

8.8.1 General lighting shall be provided for all compartments and shall be arranged to give sufficient illumination to all working areas for normal operation. All lighting, including the navigation lights, shall be LED type.

8.8.2 All lighting in the wheelhouse shall be fitted with a dimmer control. Red lighting with dimmers and switches shall be provided for operation at night. Emergency lighting of 24V DC supply shall be provided for all compartments, emergency embarkation stations, open decks as per the RO Requirements.

8.8.3 Emergency exit routes shall be identified and illuminated as required by the RO Requirements.

8.8.4 Independently controlled high-powered white floodlights shall be supplied to cover the exterior of the Vessel at side.

8.8.5 Two (2) search lights of electrical control form inside the cabin shall be supplied to cover the fore & aft decks. The source of the searchlight shall be LED, halogen or xenon bulb with high concentration, high light intensity and long illumination distance. The Candlepower of the searchlight shall be more than 460,000 candelas, the irradiation distance shall be not less than 2000 meters, HID or LED bulb power shall be not less than 50W.

- 8.8.6 The location of the searchlight shall provide for a minimum of 360-degree arc of unobstructed illumination.
- 8.8.7 The remote searchlight control switches shall be located on the console enabling the Vessel operator and crew member unobstructed use of the switches.
- 8.8.8 One set of hand-held searchlight with a minimum power of 55 W shall be provided, fitted with coiled extension cables so that it can be fitted to sockets. Sockets at command console and at port & starboard side crew seats shall be provided, as well as facilities for storing the one set of hand-held searchlight.
- 8.8.9 The arrangements and positioning of the lighting shall be discussed at the kick-off meeting and shall be agreed by the AFCD.

## **8.9 Navigation and Signal Light**

- 8.9.1 Navigation lights and signalling equipment shall be in compliance with the International Regulations for Preventing Collisions at Sea 1972 as amended by IMO.
- 8.9.2 The lights shall be controlled from the control and alarm panel at the control console in the wheelhouse. Each navigation light circuit shall be provided with a switch, protection fuse, indicating lamp and alarm. A dimmer for the panel indication lights, buzzer stop and lamp test buttons shall be fitted.
- 8.9.3 Navigation light circuits shall be independent of any other electrical circuits. There shall be two separate power supply systems to the distribution board: one from the main AC power source and one from the emergency DC power source.
- 8.9.4 LED Flashing red light of 3 miles range shall be installed at top of the mast. LED Flashing red light switch shall be separated from all other light switches.
- 8.9.5 Type approved certificate in respect of each model of the navigational and signal lights issued by RO shall be provided on or before the Delivery Acceptance at the latest.

## **8.10 Vessel Alarm System**

- 8.10.1 When the Vessel is afloat and unmanned, if the bilge-alarm or fire detecting system trigger, nobody acknowledged after 5 minutes (can be adjusted), the audible and visual alarm shall be extended to an audible and visual alarm. This alarm shall be fitted on the top of the deckhouse to bring the attention of the persons ashore or the guard of the Government Dockyard. The additional protection shall be able to be turned on and off when required.
- 8.10.2 Fire Alarm System shall be provided to detect fire in engine compartment and shall be provided with one smoke detector and a fire bell in the wheelhouse
- 8.10.3 Bilge Alarm System for all hull compartments shall consist of:
  - (a) Bilge pump control and alarm panel;
  - (b) Operating switch for each bilge pump (manual – automatic);
  - (c) Water level monitoring with splash delay for each watertight compartment;
  - (d) Alarm signal lights for each watertight compartment in the panel;
  - (e) Loud alarm signal; and
  - (f) Acknowledgement bottom for the alarm signal.
- 8.10.4 Engine Compartment Temperature Alarm shall be provided.

### **8.11 Closed-Circuit Television System**

- 8.11.1 Closed-Circuit Television (“CCTV”) with four (4) zoom cameras at bow, stern, and engine room shall be provided. The CCTV shall be with record video mode and High resolutions. Hard disk capacity shall be not less than 4 terabyte.
- 8.11.2 The locations of the CCTV cameras shall be determined with the AFCD either in the kick-off meeting after the Contract is awarded or during the design phase of the Vessel.
- 8.11.3 All cameras shall be IP based, high-definition camera (1920 x 1080p), water-proof, vandal-resistant type, Infrared Cut Filter (“ICR”) day and night dome pan-tilt-zoom cameras. They shall be marine type and shall be suitable for operation in a rough sea environment. Ingress protection: Outside door must be IP56 or better, inside of up-deck shall be IP20 or better, and under-deck shall be IP44 or better.
- 8.11.4 All cameras shall have an image stabilization function to accommodate the rough sea conditions.

### **8.12 Lightning Protection**

- 8.12.1 The Vessel shall be fitted with a proven lightning protection system to protect the personnel on board and the electronic equipment installed. The method and working principle of protection shall be approved by the RO or other entities acceptable by GNC before submission to MD by the completion date stipulated in Annex 3 of this Part VII for endorsement.

## **Chapter 9 External Firefighting System**

### **9.1 General**

- 9.1.1 The External Firefighting System (“EFFS”) shall be designed solely for marine fire-fighting operation. The performance and functional tests of EFFS shall be included as part of Technical Acceptance.
- 9.1.2 One electric-priming diesel engine driven fire pump rated flow of at least 2,000 litres per minute at discharge pressure of not less than seven (7) bar shall be mounted inside tank space.
- 9.1.3 The water shall be discharged through underdeck fixed piping to fire-fighting monitor.
- 9.1.4 The fire pump engine shall be equipped with her own fuel tank. Separate piping shall be arranged from the fuel tank to enable the fire pump engine operating on diesel oil on board as well.
- 9.1.5 The fire main pipes shall be constructed with stainless steel of Grade 316L or copper nickel pipe.

### **9.2 Fire Pump**

- 9.2.1 The fire pump shall be fitted and connected to an independent sea suction located within the tank space. Suction and discharge pressure gauges, safety valves and any other gauges and fittings fitted shall be provided and the operational readings shall be shown on control console in the wheelhouse.
- 9.2.2 Fire pump shall be with copper pump shell, copper alloy impeller, stainless steel leaf wheel shaft, and shall have good corrosion resistance.
- 9.2.3 The fire pump shall be equipped with a key rotates on and off.
- 9.2.4 The fire pump shall be controlled locally and in the wheelhouse.
- 9.2.5 The fire pump shall be equipped with an emergency shutdown function. The design and arrangement of the fire pump shall meet the RO Requirements and to the satisfaction of GNC before installation.

### **9.3 Water Suction, Discharge and Sea Chest**

- 9.3.1 The fire pump sea chest shall be provided with inlet grating, solely for fire-fighting purpose. A butterfly type stop valve shall be provided at suction inlet of the fire pump to enable the cleaning of debris from sea at afloat condition.

### **9.4 Fire-fighting Monitor**

- 9.4.1 The fire-fighting monitor shall be installed next to the 3 persons bench at the port side of the compass deck.
- 9.4.2 Monitor foundations and structural supports shall be designed for all modes of operation, with particular attention given to loadings at maximum output and water jet reactions.
- 9.4.3 The monitor shall be remote control type fitted with waterjet spray nozzle.
- 9.4.4 The monitor shall be constructed with corrosion-resistant material. It shall be capable of achieving (i) at least 135° vertical travel controlled by lever and twist lock mechanisms and (ii) not less than 240° horizontal rotation.

## **Chapter 10 Fire Safety Equipment**

### **10.1 General Provisions**

- 10.1.1 The hull, structural stiffeners, bulkheads, decks, superstructure, and pillars shall be constructed of approved non-combustible materials as required in the International Code for Application of Fire Test Procedures (FTP Code) and having adequate structural properties.
- 10.1.2 All furniture shall be constructed entirely of approved non-combustible or fire-restricting materials, except that a combustible veneer with a calorific value not exceeding 45 MJ/m<sup>2</sup> may be used on the exposed surface of such articles.
- 10.1.3 All upholstered furniture, draperies, curtains, suspended textile materials, ceiling panels and wall panels shall have the qualities of resistance to the propagation of flame in accordance with the FTP Code.
- 10.1.4 All deck finish materials shall comply with the FTP Code.
- 10.1.5 Any thermal and acoustic insulation shall be of non-combustible or of fire-restricting material. Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems need not be non-combustible or fire restricting, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.

### **10.2 Fire Detection System**

- 10.2.1 An approved automatic fire detection system shall be provided in the engine compartment. The fire detection system shall in accordance with IMO Requirements and the RO Requirements and to the satisfaction of GNC.
- 10.2.2 The fire detection panel shall be installed in the control console.
- 10.2.3 The detection system shall initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the control station.

### **10.3 Fixed Firefighting System**

- 10.3.1 Engine Room fire extinguishing system shall be a fixed CO<sub>2</sub> flooding system complying with the RO requirement for engine room protection. Activation of the fixed CO<sub>2</sub> flooding system shall cause an audio and visual warning alarm in the wheelhouse.
- 10.3.2 An electrical motor driven fire pump located outside of the engine room shall be arranged with capacity and fire main line to meet the RO requirement. The fire pump shall be controlled from the wheelhouse.
- 10.3.3 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/nozzle. The hose and nozzle shall be stowed inside a fire box located in the vicinity of the hydrant.
- 10.3.4 A semi-rotary hand pump of brass casing shall be provided on deck for fire-fighting purpose. The pump shall be able to produce a flow jet of at least 6 metres distance. The suction sea-chest of the hand pump shall be fitted outside the engine room and the suction valve shall be operated by an extended spindle on main deck.

#### **10.4 Portable Fire Extinguishers**

- 10.4.1 Adequate number of portable fire extinguishers shall be provided to serve all compartments in the Vessel and so positioned, as to be readily available for immediate use. The quantity and position of portable fire extinguishers shall also comply with relevant requirements as said in the Code of Practice - Safety Standards for Class II Vessels as amended version issued by Local Vessels Safety Section of MD.
- 10.4.2 Fire extinguishers shall be type-approved by the RO or other international standards acceptable to GNC. Certificates shall be submitted to GNC before Delivery Acceptance.
- 10.4.3 Fire extinguishers shall be ready for use and located in easily visible places such that they can be reached quickly and easily at any time in the event of a fire. Portable fire extinguishers shall be properly secured in place.

## **Chapter 11 Life-Saving Appliance and Arrangements**

### **11.1 General Provisions**

- 11.1.1 Life-Saving Appliances (“LSA”) and arrangements shall be provided as per Cap 548G “Merchant Shipping (Local Vessels) (Safety and Survey) Regulation” and the Code of Practice issued by Local Vessels Safety Section of MD regarding the Vessel of this type.
- 11.1.2 LSA shall be provided in the Vessel at appropriate locations in accordance with the RO Requirements. All the required life jackets shall be inflatable life jackets.
- 11.1.3 LSA shall be of approved types conforming to the latest International Life-Saving Appliance Code (“LSA Code”) adopted by the Maritime Safety Committee of the Organization and approved by the RO.
- 11.1.4 Twenty (20) self-inflatable Life jackets shall be provided and placed as to be readily accessible and their positions shall be clearly indicated. Donning instructions shall be posted at suitable positions in the Vessel.
- 11.1.5 Adequate number of lifebuoys shall be provided, relevant requirements as said in the Code of Practice - Safety Standards for Class II Vessels as amended version issued by Local Vessels Safety Section of MD. Lifebuoys shall be marked with ship names on both sides.
- 11.1.6 A life ring buoy with self-igniting light and rescuer quoit with buoyant lifeline attached shall be provided. The name of the Vessel shall be painted on both life ring buoy and rescue quoit.
- 11.1.7 Approved LSA Plan by the RO in frame shall be posted on the wall inside deckhouse.

## Chapter 12 Electronic Navigational Equipment

### 12.1 Description of Electronic Equipment System

- 12.1.1 Contractor shall be responsible for the supply, delivery, testing, installation, commissioning and a 12-month warranty from the date of the Acceptance Certificate and provision of operational and maintenance service manual and training for the following equipment/systems to be fitted on board the Vessel:
- (a) Loudhailer/Siren system with adjustable volume, with USB player for broadcasting;
  - (b) Echo sounder and Depth Indicator;
  - (c) A set of radar incorporating Electronic Charts and interface with DGPS;
  - (d) DGPS Receiver;
  - (e) A set of automatic identification system;
  - (f) Electronic marine AM/FM radio;
  - (g) Marine band VHF transceiver;
  - (h) Electric Horn;
  - (i) Magnetic Compass; and
  - (j) Electronic Chart System.
- 12.1.2 The Contractor shall provide all labour, material, transportation, installation calibration, testing and commissioning, Warranty Services in Warranty Period, and test equipment etc. which are necessary to complete the work required in this chapter.
- 12.1.3 An integrated system shall be provided, so that information and also the display monitors of different systems, such as Electronic Chart System, DGPS receiver, shall be shared in order to utilise the limited space available in coxswain operation area and to provide users a better displaying interface.
- 12.1.4 All equipment offered shall be designed for marine applications and shall allow effective operation under most arduous condition i.e. poor weather, strong winds and heavy rains, severe vibration etc. Exposed components shall be weather-proof and adequate protection against splash and water shall be provided for all electronic equipment fitted on board.
- 12.1.5 All components of the Equipment exposed to the weather shall be sea water resistance. Internal components shall be fully enclosed with heavy duty seals and sufficient heat dissipation mechanism (e.g. ventilation, conduction, etc.) to protect the Equipment.
- 12.1.6 The Contractor shall pay attention to the compass safe distance of the Equipment and the radiation hazard zone of the radar scanner in the Vessel design. All radar and radio equipment shall meet both the applicable requirements of the International Maritime Organization and the licensing requirements of the Office of the Communications Authority.
- 12.1.7 All sitting, installation and cabling in respect of compass, etc. shall comply with the relevant rules and regulations of Hong Kong.
- 12.1.8 All electronic equipment and electrical appliances shall have Hong Kong warranty and their on-site maintenance shall be locally available.

- 12.1.9 When the generation/use of calendars are employed for logging of reports, activation of equipment, or as any essential part of logic for the proper functioning of the system, the calendar generation shall function without any error or manual intervention for all leap years.
- 12.1.10 Lightning protection shall be provided and installed wherever applicable.
- 12.1.11 Equipment supplied shall complete with all standard and/or maker recommended accessories as required for normal operation.

## **12.2 Loudhailer/Siren and External Broadcasting System with USB Player**

- 12.2.1 The system shall function as a loudhailer/siren system for external broadcast designed for maritime purpose. The system shall also consist of a public address system for internal broadcast in the crew area.
- 12.2.2 The system shall comprise one master control units in the wheelhouse and two weather proof horn type loudspeakers, in conformance to IP 66 or better, have a power rating of twenty (20) watts minimum and an impedance compatible with amplifier, located at forward and aft ward of the vessel respectively.
- 12.2.3 The master control unit shall be installed in the wheelhouse with its front panel waterproofed to IPX6 standard or better.
- 12.2.4 In manual mode, the system shall be capable of generating both a “yelp” siren and a horn signal sound. In automatic mode, the system shall have a selection of at least six (6) warning signal sounds for general marine navigational use.
- 12.2.5 The master control unit, which shall be completed with fist microphone and microphone hanger, shall be recessed mounted in the control console with the following facilities provided at the front panel:
  - (a) power on/off;
  - (b) hail volume control; and
  - (c) function control.
- 12.2.6 A USB player shall be provided with the system in a configuration that the audio signal from the USB player can be broadcasted through the loudhailer system.
- 12.2.7 The loudspeakers shall be equipped with a volume control system with which the volume can be adjusted to a minimum for night operations and to a maximum level which shall enable messages to be heard 0.5 km away.

## **12.3 Echo Sounder and Depth Indicator**

- 12.3.1 The equipment shall consist of a transducer and display on the multi-function display, which is recessed mounted at the steering console and capable of providing readout of sea depth in feet, fathoms, and metres.
- 12.3.2 The measuring depth shall be from 3 feet to 250 feet or equivalent in fathom or metre with at least 3 selectable ranges to indicate shallow, mid and deep ranges. The unit of measurement shall be selected at the front panel of the equipment.
- 12.3.3 Shallow water audible alarms shall be provided. Setting of the alarm depth shall be at the front panel of the equipment.
- 12.3.4 The peak to peak transmitting pulse power of the transducer shall not be less than 100 watts and the nominal operating frequency shall be around 200 kHz.

## **12.4 Marine Radar Incorporating Electronic Charts and Interface with DGPS**

- 12.4.1 The equipment shall be a relative motion high performance radar suitable for small vessels and comprises a transceiver, an antenna and three (3) colour display unit of 15 inches, suitable for bright daylight and night viewing.
- 12.4.2 The transceiver shall be housed in the scanner unit and shall be designed for aloft mounted construction and capable of satisfactory operation at high wind speeds. The scanner assembly shall be housed in a weatherproof housing.
- 12.4.3 The radar scanner unit shall be installed well clear of obstruction to minimise undue interference and Non-Ionizing Radiation (NIR hazards). Care shall also be taken to ensure the scanner mounting does not give excessive shadow sectors for navigation lights.
- 12.4.4 Complete interface kit shall be provided to interface the GPS/DGPS to the radar. The radar shall have interface to accept and display navigation data such as latitude and longitude positions of the Vessel given by the GPS/DGPS receiver.
- 12.4.5 The Contractor shall pay special attention to any possible radar blind zone, and address this during the design stage and verify it after installation, and rectify it if required. Special attention shall be paid to the equipment installed before the radar scanner like flood lights and/or horn speakers. Care shall also be taken to ensure the mounting does not obstruct the navigation lights.
- 12.4.6 The radar shall have standard NMEA 0183 interface ports, i.e. NMEA Standard, capable of accepting navigational data from a wide selection of GPS/DGPS Receivers, and to output comprehensive data on all tracked targets in the form of a track table to a wide selection of electronic chart plotters. However, connection of the radar system to the other systems supplied under this Contract via other standard interface types equivalent to NMEA 0183 is acceptable.
- 12.4.7 The power of the equipment shall be supplied from the 24 V DC system of the Vessel.
- 12.4.8 The radar transceiver shall be housed in a radome antenna/scanner unit of maritime type. It shall be designed for aloft mounted construction and capable of satisfactory operation at relative wind speeds of not less than 70 knots.
- 12.4.9 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.
- 12.4.10 The radar display unit shall incorporate control keys and processor equipment to integrate, control, operate and display all radar and chartplotter functions and AIS information from the AIS receiver.
- 12.4.11 The radar display unit shall comprise a flush-mounted LCD colour display of a type suitable for use on an open deck vessel. The display unit shall provide a clear and clutter free picture in all weather conditions and be suitable for viewing in direct sunlight without the need for a viewing hood or the like. The display shall indicate clearly the important parameters such as radar targets, range marker, bearing line, heading marker and range rings, guard zone and background etc.
- 12.4.12 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) Bearing cursor rotation;
  - (e) Variable range marker;

- (f) Range scale selection;
- (g) Display brilliance & illumination;
- (h) Selection of background colour and target colour;
- (i) Tuning; and
- (j) Heading marker ON/OFF.

12.4.13 Performance Requirements shall be as follows:

The marine radar shall perform at least the following requirements.

(a) Display Unit

Display:	LCD
Screen size:	15.4 inches or larger
Resolution:	at least 1920 x 1080 pixels
Display mode:	Head up, Course up, North up and True Bearing Modes (with inputs of compass and speed data)
Range scale:	0.125 nm to 48 nm
Range units:	Selectable from nautical miles, kilometres, and kilo yards
Minimum range:	30 m or less
Range ring accuracy:	1.5% or better of the maximum range of the scale in use; or 30 m, whichever is the greater
Radar bearing accuracy:	1.5 degree or better
Display language:	English and desirably with Chinese
Others:	With Adjustable electronic bearing lines and variable range markers features
Operating temperature:	-10°C to +55°C or better
Waterproofing:	IPX6 or better

(b) Transceiver

Overall noise figure:	6 dB or better
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(c) Antenna

Operating frequency:	compatible with the transceiver
Aerial Type:	Radome radar antenna (24" or less)
Horizontal beam width:	4.9 degrees or less
Vertical beam width:	25.0 degrees or less
Polarization:	Horizontal
Rotation Speed:	Not less than 24 rpm within satisfactory operation at relative wind speed up to 70 knots. Manual and automatic selection of antenna rotation speed (for example, 24 rpm, 36 rpm or 48 rpm) shall be available according to detection range.
Operating temperature:	-10°C to +55°C or better
Relative humidity:	90% or better
Waterproofing:	IPX6 or better

## 12.5 DGPS Receiver

- 12.5.1 The information received by the GPS/DGPS receiver shall be input to the marine radar and display on the marine radar and the screen of the Electronic Chart System. The output of the receiver shall give the vessel position in a format compatible to marine radar in the NMEA 0183 format. However, connection of the radar system to the other systems supplied under this Contract via other standard interface types equivalent to NMEA 0183 is acceptable.
- 12.5.2 The system shall be provided with "speed logs and electronic compass interface" or "gyro and its interface" to support the "dead reckoning" mode operation, if GPS satellite signal is absent for a period greater than 10 minutes.
- 12.5.3 The system shall be capable of sorting not less than 20 user-definable routes each of up to 100 user-definable waypoints, each waypoint with a user-editable label/comment that consists of up to 20 alphanumeric characters.
- 12.5.4 On-screen annotations/labels shall be in English and desirably with Chinese.
- 12.5.5 Performance requirements shall be as follows:

(a) Display

Display unit:	True sunlight readable 800 x 480 pixel (or better) back-lit LCD Display
Position indication:	Latitude/Longitude, Universal Transverse Mercator
Position resolution:	4 decimal places
Others:	Readout of Navigation data, 3-D panorama display

(b) GPS Receiver

GPS Receiver Type:	270 or better
Frequency Range:	1575.42 ± 1MHz (C/A code), L1
Sensitivity:	-130 dBm or better
Dynamic Range:	25 dB or better
Warm start fix time:	Less than 30 seconds
Cold start fix time:	Less than 1 minutes
Position Accuracy:	15 m or better
Tracking Velocity:	999 knots or better

(c) Differential Beacon Receiver

Frequency range:	283.5-325 kHz
Frequency Step:	500 Hz
Position Accuracy:	1 m or better

(d) Environmental Requirements

Operating temperature:	-15°C to +55°C or better
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## 12.6 Automatic Identification System

- 12.6.1 The equipment shall receive navigation information from local AIS-equipped vessels.
- 12.6.2 The equipment shall include an AIS receiver which shall be able to receive both Class-A and Class-B AIS information.

- 12.6.3 The AIS receiver shall be able to receive AIS information to and from AIS-equipped vessel nearby such as dynamic data (vessel position, coordinated universal time (“UTC”), course over ground (“COG”), speed over ground (“SOG”), rate of turn (“ROT”), heading), static data (maritime mobile service identity (“MMSI”), vessel names, type of ship, call signs, length and beam, heading, destination, latitude, and longitude, location of position-fixing antenna on the ship), short safety-related messages and other navigation data, from vessel nearby.
- 12.6.4 The AIS receiver supplied shall be equipped with interface connecting to display including the display of the radar system. The AIS shall allow the radar to overlay on its display AIS information given by the AIS receiver.
- 12.6.5 Performance Requirements shall be as follows:
- (a) Receiver Characteristic
    - Frequency range: 161.975 MHz and 162.025 MHz
    - Channel interval: 25 kHz
    - Receiver sensitivity: -105 dBm or better
    - Others: Dual parallel channel receiver
  - (b) Aerial and Feeder
    - (i) The aerial provided shall be marine type aerial with at least 3 dBi gain, vertically polarized, omni-directional, and suitable for mounting on the launch.
    - (ii) The V.S.W.R. of the aerial installed shall be less than 1.5 : 1.
    - (iii) The aerial feeder shall be RG58U type or equivalent.
    - (iv) Coaxial cable lightning suppresser with appropriate earthing connection shall be provided for protecting the radio equipment. All outdoor connector joint shall be properly covered by waterproof tape or material.

## **12.7 Electronic Marine AM/FM radio**

- 12.7.1 The equipment shall consist of an AM/FM radio receiver with Radio Data System (“RDS”) and two speakers located at the deck cabin. RDS shall at least be able to:
- (a) switch to a stronger transmitter automatically in poor reception area;
  - (b) search for program categories, such as program type or traffic information; and
  - (c) receive text messages related to current radio programs
- 12.7.2 Language of the user interface shall be in English or Chinese.
- 12.7.3 The positions of the AM/FM radio equipment shall be finalised in the detailed design stage.

## **12.8 Marine Band VHF transceiver**

- 12.8.1 The Marine Band VHF Transceiver shall be fully compatible to GMDSS, and, in particular, capable of being used as a Class A Digital Selective Calling (“DSC”) transceiver fully compatible with IMO GMDSS carriage requirements.
- 12.8.2 The equipment shall be equipped with all the entire international maritime VHF channels complete with a fist microphone with press-to-talk switch or telephone handset, mic/handset hanger, mounting bracket and loud speaker.
- 12.8.3 The equipment shall incorporate with Channel 12 and shall be able to dual watch on Channel 16 or one of the other channels.

12.8.4 The equipment shall complete with antenna and integrated microphone, loudspeaker, control knobs/keys, display screen, etc., necessary for a stand-alone operation. The main unit shall be installed in the coxswain operation area.

12.8.5 The following facilities shall be provided at the front panel of the equipment:

- (a) Power ON/OFF;
- (b) “Transmit” indicator, volume and squelch controls;
- (c) Socket for plug for microphone and external speaker;
- (d) Quick selection of Channel 16 (156.8 MHz);
- (e) Channel selection and indicator;
- (f) Dual watch mode selection; and
- (g) Transmission power selector for HIGH and LOW Power (5W/1W).

12.8.6 Performance Requirements shall be as follows:

(a) Transmitter Characteristics

Frequency Range:	156.025 MHz to 157.425 MHz, or better
Frequency Deviation:	Frequency modulation with maximum frequency deviation of +5 kHz
Spurious and harmonics emissions:	-65 dB or better
RF Output Power:	25/1W (High/Low)

(b) Receiver Characteristics

Frequency Range:	156.050 MHz to 161.425 MHz, or better
Sensitivity:	Less than 1 uV for 20 dB SINAD or equivalent
Adjacent Channel Selectivity:	60 dB or better
Spurious Image Rejection:	65 dB or better
Intermodulation:	65 dB or better
Audio output:	Not less than 1 Watt at rated audio power output with less than 10% distortion

(c) Aerial and Feeder

- (i) The aerial provided shall be marine type aerial with at least 3 dBi gain, vertically polarized, omni-directional and suitable for mounting on the launch.
- (ii) The V.S.W.R. of the aerial installed shall be less than 1.5 : 1.
- (iii) The aerial feeder shall be RG58U type or equivalent.
- (iv) Coaxial cable lightning suppresser with appropriate earthing connection shall be provided for protecting the radio equipment. All outdoor connector joint shall be properly covered by waterproof tape or material.

## **12.9 Electric Horn**

- 12.9.1 The Contractor shall supply and install one (1) set of maritime type electric horn fitted on the radar mast. One (1) set of horn controller fitted on navigation watching console shall be capable of operating horns. The Electric Horn shall be separated from Loudhailer/Siren and External Broadcasting System as required in Paragraph 12.2 of this Part VII.
- 12.9.2 The electric horn shall be marine grade and weatherproofed to IP56.
- 12.9.3 The electric horn shall comply with the requirement specified in the International Regulations for Preventing Collisions at Sea 1972 and its Amendments.
- 12.9.4 Power source shall be 12 or 24 VDC, sound pressure level shall be at least 100dB at 10m.

## **12.10 Magnetic Compass**

- 12.10.1 The Contractor shall provide one magnetic compass of at least 70 mm in diameter.
- 12.10.2 The magnetic compass shall be suitable for marine use and shall include the following:
  - (a) Heeling angle affordable to at least 30° and pitch angle affordable at least 30°;
  - (b) Compensator adjuster; and
  - (c) Mounting bracket and mounting kit.

## **12.11 Electronic Chart System**

- 12.11.1 The Electronic Chart System (“ECS”) shall be a multi-function display system being able to show on each of its displays the water depth data provided by the echo sounder, the GPS position of the vessel and Electronic Charts information. The console shall consist of three displays of ECS.
- 12.11.2 General Requirements
  - (a) One set of ECS shall be provided with the following function:
    - (i) Navigational calculation;
    - (ii) Chart updating;
    - (iii) Piloting; and
    - (iv) Voyage monitoring.
  - (b) In particular, the ECS shall be capable of:
    - (i) The system shall be equipped with navigation sea charts in details (IHO S-57) ENC) covering the entire Hong Kong Water area;
    - (ii) Working with GPS/DGPS receiver (connected via NMEA 0183 bus);
    - (iii) Automatic loading of charts depending on vessel’s own position and display scale; and
    - (iv) Display in north-up or head-up mode (both possible).

12.11.3 Performance Requirements shall be as follows:

(a) Navigational Features

Total Waypoints:	2,000 or more
Routes:	50 route plans or more
Alarms:	Including but not limited to, proximity alert, cross-track error and arrival/anchor watch

(b) Electrical and Physical

Power Source:	12 or 24V DC (external)
Display (Screen Type):	15.4 inches diagonal high resolution colour display, resolution 1900x1080 WVGA or better
Waterproof Rating:	IPX6 or better

(c) Environment

Operating Temperature:	-10°C to +50°C or better
Storage Temperature:	-20°C to +60°C or better

## 12.12 Night Vision System

12.12.1 A night vision system should be provided and consist of high-definition low light camera and thermal imaging cores, gyro stabilized. [D]

12.12.2 Performance Requirements shall be as follows:

Video Refresh Rate:	9 Hz
Field of View:	24 ° x 18 °
Focal Length:	18mm
Zoom	30 x optical zoom
E-Zoom:	4x Continuous
Gyro Stabilized:	Yes
Pan/Tilt Adjustment Range:	360° Continuous Pan, +/- 90° Tilt
Analog Video Output:	National Television Standards Committee (“NTSC”)
Network Video Output:	Dual H.264 IP Network Video Stream
Power Requirements:	12 to 24VDC
Sand/Dust Ingress:	Mil-Std-810E or IP6X
Water Ingress:	IPX6 (heavy seas, power jets of water)
Operating temperature range:	- 25 to + 55 degrees
Shock:	15g vertical, 9g horizontal
Vibration:	IEC60945
Salt Mist:	IEC60945
Wind:	100 knots

## 12.13 Installation Requirements

### 12.13.1 General

- (a) The control panel of all Equipment shall be installed and flush-mounted in the coxswain operation area unless otherwise specified. The mounting screw shall be detachable from the front of the Equipment and the Equipment shall be taken out at the front for further checking or replacement. The Contractor shall submit a layout plan showing the exact locations of the Equipment.
- (b) Equipment supplied shall be completed with all standard and/or maker recommended accessories as required for normal operation.
- (c) The Equipment supplied shall be completed with all the auxiliary items required for normal operation including connectors, circuit breakers, power sockets, interface device, plugs and cables with conduits. Additional power conditioners, filtering devices, power stabilizer or regulator shall be provided and installed at no extra cost if required.
- (d) RF connectors of suitable impedance shall be provided and used for connections of the RF cables, antennae and other equipment. Connectors between the feeder cables and antennae shall be protected by weatherproof material to avoid water seepage.
- (e) All wiring shall be finished in a neat and appropriate manner approved by the Government.
- (f) Adequate measures to prevent interference between the electronic equipment shall be taken which include:
  - (i) Separate screened conduits or trunkings shall be provided;
  - (ii) Rules, regulations and recommended practices regarding screening of electric wiring shall be observed;
  - (iii) Receiving apparatus and other electronic equipment which may be affected by radio frequency induced voltages shall be effectively earthed, screened and protected against such voltages; and
  - (iv) Lightning protection devices shall be fitted.
- (g) All sitting, installation and cabling work shall be undertaken to the highest standard to ensure:
  - (i) Satisfactory performance of the Equipment;
  - (ii) Protection from mechanical and water damages;
  - (iii) Ease of accessibility for maintenance and repair; and
  - (iv) Manufacturers' recommendations shall be strictly observed.
- (h) The power, signal and control cables connecting to the flush-mounted equipment shall be long enough to let the equipment wholly place on a safe place like on the panel, table, etc. with valid cable connections for fault finding and equipment testing. These extended cables shall be properly managed and resided inside the console.
- (i) EMC (electromagnetic compatibility) should be achieved through careful design and layout of the equipment and installations and the proper application of EMC measures, including but not limited to shielding. Any mutual interference between equipment / cabling should be within an acceptable level and should not affect the intended operation and functionalities of the equipment. [D]

- (j) Installation location
  - (i) Installation location of the Equipment shall be easily accessible for inspection and maintenance. Exact location shall be subject to the approval of the Government.
  - (ii) Installation location of the Equipment shall not cause interference to other Equipment by way of the emitted interference.
- (k) Material and Workmanship
  - (i) Material and Equipment shall be of high quality, and shall comply with, where applicable, the appropriate Standards and Code of Practice, together with any amendments made thereto, suitable for installation in the Vessel.
  - (ii) All the designs shall be subject to the approval of the Government and the respective works shall be carried out in a first-class workman-like manner.
  - (iii) The Government reserves the right to reject any part of the installation not comply to this Specification. The Contractor shall carry out the necessary remedial work or replacement at its own cost and expense and without delay.
  - (iv) The Contractor shall provide all installation materials including cables, casing, mounting accessories and etc. which are durable and fire retarding. Where it is impracticable for signal cables for data to be run inside conduits, PVC insulated and sheathed with armoured cable shall be used.
- (l) Equipment Fixing and Interconnection
  - (i) All switches, connectors, jacks and receptacles shall be clearly, logically and permanently marked during installation. All wires and cables shall be identified at every termination and connection point with permanent type markers suitable for installation in the Vessel.
  - (ii) Interconnection of various items of Equipment shall be mechanically and electrically connected by multi-pin connectors or terminals.
  - (iii) All cables shall be joined by properly designed connectors or inside joint boxes. Where terminal blocks are used for connection cables, the tip of each conductor shall be crimped with a suitable terminal pin before it is inserted into the terminal block.
  - (iv) The Contractor shall be responsible for providing and installing properly rated power cables from the power points to its own equipment.
- (m) Electricity
  - (i) The power supply shall be compatible with Vessel's DC electrical system.
  - (ii) The Equipment shall be protected by appropriately rated fuses. The fuses shall be contained in independent fuse holders which are easily accessible.
- (n) Cable
  - (i) All exposed cables and wiring shall be sheathed or protected by metal conduits.
  - (ii) Watertight cable glands shall be provided by way of watertight bulkhead or deck penetration.
  - (iii) Signal wiring shall be separated from power supply cables and housed in separate screened conduits or cable trunks.

- (iv) Cables and wirings shall run behind the compartment lining. Where electric cables are necessary to be fitted on the decorative surface of bulkheads, they shall be enclosed in proper metal conduits.
- (o) Labelling and Marking
  - (i) Each cable shall be clearly labelled and carry its own unique identification code.
  - (ii) Polarity of power cables shall be labelled.

## **12.14 Acceptance Test**

12.14.1 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 shall 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 (“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.

12.14.2 The Contractor shall submit test reports on the performance of the Equipment and deliver the test reports to the EMSD representatives prior to the installation.

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

12.14.4 The Contractor shall provide all the necessary test equipment and tools for carrying out the acceptance tests at no extra cost to Government.

12.14.5 At least one month before the end of the Warranty Period, the Contractor shall arrange and perform final acceptance test in the presence of the representatives from EMSD. Should any defects be found during the final acceptance test, the Contractor shall fix the defects as soon as possible, and in any event no later than the time prescribed by the EMSD representatives. The Warranty Period shall be extended if the defects are not cleared or fixed by the Contractor.

12.14.6 For significant defects (e.g., involving the replacement of Equipment etc.) found during the final acceptance test, the Warranty Period of the Equipment shall be properly extended as determined by EMSD.

## **12.15 Documentation for the Proposed Equipment**

12.15.1 The Contractor shall supply the following documentation:

- (a) Technical and proposed equipment information including integrated system equipment schematic diagram of all the ENE, in English and sufficiently detailed to enable a technical appraisal of the Equipment in this Chapter to be made.
- (b) Lists of all the ENE with unit price.

12.15.2 The Contractor shall within one month after delivery of the Vessel, supply three sets of Operation Manual, Service Manual and integrated system/equipment schematic diagram in English (at least two sets of which shall be original), giving full details on:

- (a) Operations and working principals;
- (b) Equipment functional description;
- (c) Equipment specifications;
- (d) Schematic block diagrams and circuit diagrams with sufficient information and details for Equipment maintenance and repairing;
- (e) Calibration procedures;
- (f) Equipment (adjustment/mounting procedure) and parameter settings;
- (g) Part list with part numbers and locations (the adjustment/calibration tools/kit/program shall also be included);
- (h) Maintenance and troubleshooting instructions;
- (i) Equipment interfacing with wiring diagram with clear signal labelling;
- (j) Software operation manual for Equipment driven by application software;
- (k) As fitted conduit/trunking route diagrams for the electronic equipment installed onboard for the purpose of future maintenance; and
- (l) The design conduit/trunking route diagrams submitted to MD and EMSD for approval during construction stage.

12.15.3 In addition, the Contractor shall submit a list to show the unit price and the installation cost for each proposed Equipment and the accessories and recommended maintenance spares for the first year following the Warranty Period. The name of the manufacturer and model/type shall also be included in the above list for MD and EMSD's consideration/evaluation.

## **Chapter 13 Services Support**

### **13.1 General Requirements**

- 13.1.1 In determining the appropriate design for the Vessel, all of the following factors shall equally be taken into account without one outweighing another:
- (a) Vessel performance (e.g. engine rating, size, etc.).
  - (b) Initial cost.
  - (c) On-going cost (e.g. maintenance cost, petrol consumption, etc.).
  - (d) Reliability (frequency and time to repair breakdown).
  - (e) Time between maintenance periods.
  - (f) Time to undertake scheduled maintenance (downtime).
  - (g) All machineries and equipment installed in the Vessel shall be serviceable in the HKSAR.
- 13.1.2 Maintainability - the Vessel shall be easy to maintain by ensuring that there shall be:
- (a) good access to all installed items for monitoring, service and overhaul.
  - (b) ease access to in-situ service and maintenance in the HKSAR.

### **13.2 Information to be Provided Prior to and at Delivery Acceptance**

- 13.2.1 Information provided prior to Delivery Acceptance:
- (a) Detailed Inventory List for the whole Vessel shall be submitted to the Government for approval.
  - (b) The Inventory List shall cover all discrete items down to major component/unit level.
  - (c) Full details of each item shall include:
    - (i) Item number.
    - (ii) Description.
    - (iii) Type/model.
    - (iv) Quantity.
    - (v) Manufacturer.
    - (vi) Manufacturer's reference number.
    - (vii) Location in Vessel.
    - (viii) Local agent/supplier address, telephone and fax numbers.
  - (d) FOUR (4) paper copies and ONE (1) soft copy of the Inventory List shall be provided to GNC.

13.2.2 “As Fitted” drawings and other information shall be supplied. The Contractor shall supply the following items upon Delivery Acceptance of the Vessel:

- (a) FOUR (4) complete sets of paper print drawings of the Vessel and ONE (1) soft copy in Compact Disk (“CD-ROM”).
- (b) FOUR (4) complete sets of paper print as fitted electrical schematic, cabling, wiring and single line diagrams for electrical equipment installed on board and conduit/trunk route diagram and ONE (1) soft copy in CD-ROM as per the Vessel delivered.
- (c) FOUR (4) copies of ship equipment list for all bought-in machineries and electrical equipment. The list shall include:
  - (i) Description.
  - (ii) Type/model.
  - (iii) Makers part no. or equivalent.
  - (iv) Location.
  - (v) Quantity.
  - (vi) Supplier or agents name and contact address.
- (d) FOUR (4) copies (at least one original) and One (1) soft copy in CD-ROM of maker operation, maintenance and workshop manuals for all machineries/equipment in English.
- (e) FOUR (4) paper copies and ONE (1) soft copy in CD-ROM as per the Vessel delivered of “Docking Plan” which shall include the profile, plan and sections.
- (f) FOUR (4) copies of On board Operator’s Manual (English and Chinese) covering:
  - (i) Daily user check and operation procedure.
  - (ii) Operating detail of each system.
  - (iii) Emergency operation procedure.

(The precise format and detail required will have to be subject to the GNC’s approval when the configuration of the Vessel and outfitting is decided.)
- (g) The first draft of the On-board Operator’s Manual (in both English and Chinese) shall be submitted to GNC for approval one month before documentation acceptance.
- (h) The documentation for all Equipment, spares and stores, special tools and test equipment shall be provided at the Delivery Acceptance of the Vessel.

13.2.3 Tools & Test Equipment for Electronics

- (a) All test and tool equipment for the electronics equipment of the Vessel shall be delivered directly to EMSD.
- (b) All items shall be properly documented, preserved and packed.

#### 13.2.4 Photographs

The Contractor shall at Delivery Acceptance provide the following:

- (a) As-Fitted Photographs
  - (i) Two (2) sets of colour prints (130 mm x 90 mm) from different aspects to give an overall picture of the 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 Photographs
  - (i) Four (4) framed colour photographs of picture size not less than 350 mm x 270 mm and frame size not less than 510 mm x 400 mm showing the profile of the Vessel in Hong Kong Waters;
  - (ii) Four (4) 200 mm x 150 mm colour photographs with specifications of Vessel particulars showing the profile of the Vessel in HKSAR Waters; and
  - (iii) Four (4) 150 mm x 100 mm colour photographs showing the profile of the Vessel in Hong Kong Waters.
- (c) Softcopy of Photographs

All photographs as required in the sub-paragraphs (a) and (b) above shall be taken by way of digital camera in JPEG format at a resolution of not less than 5.0 Mega pixel. The photographs shall be stored in CD-ROM and forwarded to GNC.

#### 13.2.5 Certificates and Reports

Copies of the following documents (one (1) original with two (2) copies and one (1) softcopy stored in CD-ROM), filed in clear folders, shall be forwarded to GNC at the time of Delivery Acceptance:

- (a) Associated test certificates;
- (b) Test performance certificates of equipment (e.g. electronics, switchboards, etc.);
- (c) Main engines performance test certificates;
- (d) Complete record of the trial commissioning tests;
- (e) Original copy of the warranty certificates of all machineries, equipment and apparatus of the Vessel (valid for 12 months from the date of Acceptance Certificate of the Vessel);
- (f) Certificates of light and sound signaling equipment;
- (g) Builder certificates;
- (h) Certificates of building material;
- (i) Deviation card for compass (after adjustment in the HKSAR);
- (j) Hull construction material issued by RO;

- (k) Undertaking duly signed and sealed by the Contractor's (or its sub-contractor's) shipyard for providing Warranty Services in relation to all aspects of the Vessel during the Warranty Period in the HKSAR as stipulated in Annex 1 of this Part VII; and
- (l) Any other certificates as appropriate.

#### 13.2.6 Ship Model

- (a) Tenderer shall quote a separate price in Schedule 1 of Part V – Schedules for the supply of ship model(s) (scale 1:30) for display and training purpose. The ship model(s) shall be provided upon Delivery Acceptance.
- (b) The ship model shall be provided with a reasonable realistic appreciation to the viewer (who cannot see the actual vessel) about the shape, scale, construction of the Vessel and the machinery installations and fittings therein. Hence the model shall include the position and look of the major external fittings, including but not limiting to the skeg, appendages, shafts, waterjet propulsion units, rudders, mast, mast fittings and navigation lights and any other external above and under water items; and the Vessel shall be made to an overall exact scale standard relevant to model making.

## **Chapter 14 Training**

### **14.1 Training on Electronic Navigational Equipment**

#### 14.1.1 General requirements

- (a) The Contractor shall provide classroom-based and vessel-based training as specified in Paragraphs 14.1.2, 14.1.3 and 14.2 as appropriate before Delivery Acceptance of the first (1st) Vessel to the MD in Hong Kong, to the operational and technical staff to familiarise officers with the operation and maintenance of the Equipment being supplied and installed. The trainer shall be able to communicate with the local trainees effectively.
- (b) Coronavirus Disease-2019 (“COVID-19”) was declared as a pandemic by World Health Organisation on 11 March 2020. COVID-19 pandemic shall be regarded as a pre-existing condition, and shall not be considered as a reason for not to provide the mentioned training in person by the trainers in HKSAR.
- (c) All training courses shall be held in the venue to be provided by GNC in HKSAR and delivered by qualified instructors. The training shall be conducted in Cantonese and/or English with relevant training manual in both Traditional Chinese and English supplied by the Contractor to each trainee in both paper and CD-ROM format before the start of each course.
- (d) Any engineering/operational systems upgrade that have been implemented during the construction of the preceding Vessel shall be supplemented to and reflected in the training notes/ operator’s manual.
- (e) The Contractor shall submit a detailed course syllabus and a schedule for conducting the training course for acceptance one (1) month prior to Delivery Acceptance of the first (1st) Vessel to the MD and EMSD as appropriate.
- (f) Training manual in both Traditional Chinese and English shall be provided and submitted to MD and EMSD as appropriate for approval at least one (1) month prior to commencement of the Training on Electronic Navigational Equipment that include Operator Training and Equipment Maintenance Training, and the Training on Operation and Maintenance of the Vessel respectively.

#### 14.1.2 Operator Training Course

- (a) This course shall provide training for trainers.
- (b) The course shall provide a full knowledge and appreciation of the day-to-day operation of all Equipment. This shall include hands-on demonstrations and operation of all Equipment including the necessary routine cleansing requirement.
- (c) The course shall be held immediately before the commissioning of the Equipment on the Vessel.
- (d) A total of up to 10 trainees will attend the course. The training course shall accommodate the specified number of trainees.

#### 14.1.3 Equipment Maintenance Training Course

- (a) The equipment maintenance training course shall enable the maintenance staff to:

- (i) acquire full knowledge and appreciation of all aspects of the design considerations, day-to-day operation, inter-connected system operation, fault breakdown, routine maintenance and fault finding/repairing procedures of the ENE being offered; and
  - (ii) effectively maintain the ENE. This shall include practical demonstrations and tests.
- (b) The maintenance training shall include, but not limited to the following items:
  - (i) Introduction of the Equipment locations;
  - (iii) Equipment operational, working principle and functional descriptions;
  - (iv) Equipment blocks and schematic functional descriptions;
  - (v) Equipment adjustment/calibration procedure and parameter settings;
  - (vi) Equipment construction and mounting;
  - (vii) Equipment interfacing and signal interfacing; and
  - (viii) Preventive maintenance and trouble-shooting.
- (c) The course shall enable technical staff to effectively maintain the Equipment.
- (d) The course shall be held immediately after the commissioning of the Equipment on the Vessel.
- (e) A total of up to 15 trainees of both MD and AFCD will attend the course. The training course shall accommodate the specified number of trainees.

## **14.2 Training on Operation and Maintenance of the Vessel**

- 14.2.1 In addition to the training to be provided for the ENE, the Contractor shall provide training in relation to the operation of the Vessel for the operational staff of the user department, training in relation to maintenance of engine and equipment on board for the technical staff of the user department and for the Maintenance Section of Government Dockyard.
- 14.2.2 In order to ensure the navigational work-up team of the MD acquires full knowledge and appreciation of all aspects of the manoeuvrability, vessel handling, turning characteristics, engines, drills for the steering gear system, etc., the Contractor shall provide an appropriate training course for 22 officers of the MD and AFCD in the HKSAR upon the Delivery Acceptance of the Vessel. An operation training programme shall be proposed for consideration by GNC which shall include details of depth and duration of the training course. The training instructors must possess suitable qualifications acceptable to MD. A certificate shall also be issued to the trainees by the training instructor or his organisation upon completion of the training course for proof of competence and satisfactory completion of the course.
- 14.2.3 In order to ensure the engineering work-up team and the front-line maintenance teams of the MD and the maintenance personnel of the Government Dockyard acquire full knowledge and appreciation of all aspects of the designs, day to day operation, breakdown, routine maintenance and fault diagnosis of the engine/electrical distribution system, hull structural repair, etc., the Contractor shall therefore provide appropriate train-the-trainer courses for a total of 10 engine operators and 15 maintenance personnel from the Government Dockyard in the HKSAR or overseas at the delivery of the Vessel. A certificate shall also be issued

to the trainees by the training instructor or his organisation upon completion of the training course for proof of competence and satisfactory completion of the course.

- 14.2.4 All facilities, venue, and materials necessary for the above-mentioned training courses and otherwise required in these Technical Specifications shall be provided by the Contractor unless otherwise specified. The training shall also be conducted in Chinese and/or English with relevant training manual to be supplied by the Contractor.

## **Chapter 15 Abbreviations**

ABS	American Bureau of Shipping
AC	Alternating Current
AIS	Automatic Identification System
AM/FM	Amplitude Modulation / Frequency Modulation
AWS	American Welding Society
BS	British Standards
CD	compact disc
CD-ROM	Compact Disc Read-Only Memory
CH	Channel
cm	centimetre
CO <sub>2</sub>	Carbon Dioxide
COG	course over ground
dB	Decibel
dBi	decibel isotropic
dBm	Decibel-milliwatts
DC	Direct Current
DGPS	Differential Global Positioning System
DSC	Digital Selective Calling
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
ENC	Electronic Navigational Charts
ENE	Electronic Navigational Equipment
GB	Gigabyte
GM	Metacentric Height
GMDSS	Global Maritime Distress Safety System
GPS	Global Positioning System
GZ	Righting Lever
Hz	Hertz
IHO	International Hydrographic Organization
IMM	International Maritime Mobile

IMO	International Maritime Organization
IEC	International Electro-technical Commission
IP	Ingress Protection
IPX	Internetwork Packet Exchange
IS	Intact Stability
ISO	International Organization for Standardization
ITU-R	International Telecommunication Union – Radiocommunication Sector
K	Kilo
kg	Kilogram
kHz	Kilohertz
km	Kilometer
kt	Knot
kW	Kilowatt
LCD	Liquid Crystal Display
LCG	Longitudinal Centre of Gravity
LED	Light-emitting Diode
L/min	Litre per minute
LSA	Life-Saving Appliance
LSA Code	International Life-Saving Appliance Code
m	Metre
m/s	Metre per Second
m <sup>3</sup> /h	Cubic Metres per Hour
MCR	Maximum Continuous Rating
MHz	Megahertz
MJ/m <sup>2</sup>	Megajoule per square metre
mm	Millimetre
MMSI	maritime mobile service identity
MSC	Maritime Safety Committee
NIR	Non-Ionizing Radiation
Nm	Nanometre
NMEA	National Marine Electronics Association

NTSC	National Television Standards Committee
PVC	Polyvinyl Chloride
RF	Radio Frequency
RG58U	RG58U Type Coaxial Cable
ROT	rate of turn
rpm	revolutions per minute
RT	Radioactive Test
SINAD	Signal-to-noise and Distortion Ratio
SOG	speed over ground
SOLAS	Safety of Life at Sea
TCG	Transverse Centre of Gravity
TS	Technical Specifications
UTC	coordinated universal time
uV	nano voltage
V	Voltage
VCG	Vertical Centre of Gravity
VDC	Voltage of Direct Current
VHF	Very High Frequency
V.S.W.R.	Voltage Standing Wave Ratio
W	Watt
WMO	World Meteorological Organization
WVGA	Wide Video Graphics Array
°C	degrees celsius

## **Part VII - Annex 1 - Warranty Services and Guarantee Slipping**

### **1. Warranty Services**

- 1.1 The Contractor shall provide Warranty Services in relation to all aspects of the Vessel during the Warranty Period, including Guarantee Slipping as stipulated in this Annex. Both the Warranty Services and Guarantee Slipping shall be carried out locally in Hong Kong. If the Contractor appoints an authorised agent to perform the Warranty Services, the Contractor shall ensure that the authorised agent appointed will perform the Warranty Services and Guarantee Slipping in full compliance with the requirements of the Contract including those as set out in this Annex 1.
- 1.2 The Government reserves all rights and claims against the Contractor in the event that any warranty claim has not been handled in accordance with the terms of the Contract.
- 1.3 For the Equipment in respect of which the manufacturer/supplier does not offer a one-year free warranty on such equipment, the Contractor shall provide the Warranty Services throughout the Warranty Period at the Contractor's own cost. For other loose equipment and installations, such as life-saving and firefighting equipment, etc., which are required to be serviced, inspected or renewed annually, the Contractor shall provide the servicing, inspection and renewal as per the manufacturer's requirements of that equipment or installation in the Warranty Period applicable to such items.
- 1.4 During the Warranty Period, when the Vessel is handed over for the Warranty Services 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 of the Vessel or any Warranty Item (as defined in Paragraph 1.5 below) caused by any reason whatsoever while the Vessel is in the possession or control of the Contractor (including even when the Vessel is at the Government Dockyard or a maintenance base of the user department) or at the shipyard of the Contractor or an authorised agent appointed by it, the Contractor shall pay for the cost for the loss or damage plus 20% as and for liquidated damages but not as a penalty. Throughout the Warranty Period, notwithstanding anything to the contrary in the Contract, the Vessel and all Warranty Items are deemed to be at the Contractor's risks, and the Contractor shall insure and keep insured, at his own expense, a property insurance with the Government to be named as the sole payee, for an indemnity amount of not less than the purchase price of the Vessel plus 20% to protect the Government property against all risks. The Certificate of Insurance and evidence showing that the premium has been paid shall be available for inspection in advance. The Contractor shall provide this insurance policy before the commencement of the Warranty Services and/or Guarantee Slipping. Any excess payable under the insurance policy shall be borne by the Contractor.
- 1.5 **Total Vessel Warranty**
- It is required that the Vessel is covered by free of charge Warranty Services for one year after the date of the issue of the Acceptance Certificate in respect of the Vessel. The Warranty Services shall cover the entire Vessel and all its Equipment (including all major Equipment specified in Schedules 6 and 7 in Part V and electronic navigational equipment), fittings and outfit (including spare parts, and documentation) (collectively, "Warranty Items") against defects of design, construction, workmanship or materials and against any non-compliance with any of the Product Warranties. The Warranty Services may be backed up by the Contractor using individual equipment suppliers/manufacturers' warranties but the Contractor shall remain solely liable to MD as a primary obligor to provide the Warranty Services. Notwithstanding and without prejudice to the Contract on warranty obligations for the total Vessel, any individual equipment supplier/manufacturer's warranty extending beyond the one year total Vessel warranty must be assigned to the Government as appropriate.
- In order not to violate the warranty of main propulsion engine(s), gearbox(es), diesel generator(s) and fire pump petrol engine(s) of External Fire-fighting System, the Contractor shall also provide the corresponding periodic maintenance services based on the manufacturer(s)' recommendations within the Warranty Period at no extra cost to the Government.

1.6 Procedures for Warranty Claim

Without prejudice to the provisions of the Contract, a detailed procedure for dealing with warranty claims must be proposed by the Contractor and agreed by MD before the issuance of the Acceptance Certificate of the Vessel. This shall be based on the following principles:

- 1.6.1 Any notification of claimed defect shall be sent from MD to the Contractor through a defined route.
- 1.6.2 There shall be a joint inspection to examine the defect and the Contractor shall propose the appropriate and necessary remedial action to the satisfaction of MD.
- 1.6.3 The Contractor shall undertake on-site Warranty Services (including provision of all replacement Warranty Items, spare parts, labour, materials, test equipment, and transportation) wherever, at the option of the Government, the Vessel is berthed in the Government Dockyard or maintenance bases of the user department. Taking the Vessel to the shipyard of the Contractor should be avoided unless absolutely necessary.
- 1.6.4 Rectification of defects must have a minimum effect on the operation of the Vessel by the provision of on loan equipment if the anticipated repair time exceeds the time frame as specified in Paragraph 1.7.1 below.

1.7 Throughout the Warranty Period, the Contractor shall be responsible for the provision of free of charge corrective maintenance and rectification of all defects in all and any of the Warranty Items including repair and replacement as necessary. This shall, at no cost to the Government, include Warranty Services to be performed by the Contractor described in the following sub-paragraphs:

- 1.7.1 To attend to the Vessel for inspection and repair within 24 hours (excluding Hong Kong public holidays) of receiving the report of a fault (“fault report”) and to take immediate action to rectify the defect after inspection. Unless otherwise agreed by the Government, all corrective maintenance and rectification must be effected within 48 hours after the fault report is first issued. The MD must be informed of what corrective maintenance and rectification actions have been taken within 72 hours of receiving the relevant fault report.
- 1.7.2 To provide all necessary transport, replacement Equipment, spare parts, labour and materials, tools and testing instruments required for the corrective maintenance and rectification.
- 1.7.3 Any replacement item or part to be used shall originate from the manufacturer of the original Warranty Item to be repaired and must be able to be found in the latest spare parts list issued by such manufacturer. Alternative components shall not be used without the prior approval in writing of the MD.

If the Contractor fails to respond to any reported warranty claims within 48 hours, the MD may arrange corrective maintenance and rectification of the defect either on its own or by deploying a third party contractor as deemed appropriate with a view to minimising any downtime incurred. In such case, the Contractor shall compensate the Government for the full cost of such repairs plus 10% as and for liquidated damages but not as a penalty no later than 10 working days after a written demand has been served on the Contractor by MD.

1.8 Extension of Warranty

- 1.8.1 The Warranty Period for any Warranty Item shall be suspended whilst and if the Contractor fails to repair and correct satisfactorily the defects in such Warranty Item within seven working days counting from the date when the relevant fault report was first issued.
- 1.8.2 Warranty Items which are electronic equipment sub-assemblies, modules or components and which are replaced during the Warranty Period shall have a new warranty period of one year commencing from the date of replacement.
- 1.8.3 In relation to a Warranty Item, references to Warranty Period shall be construed to include such extended warranty period as mentioned in Paragraph 1.8.1 and/or 1.8.2 above, depending on whichever is applicable.
- 1.8.4 Equipment which is found to be defective during the trials at the Guarantee Slipping as mentioned in Paragraph 2.2.5 below shall have an extension of warranty of one year.

1.9 Recurrent Defects

During the Warranty Period, should a second and similar defect arise in relation to a Warranty Item, this shall be construed as conclusive evidence of the Warranty Item'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 the MD's option and the Contractor's expense, procure and deliver another replacement Warranty Item with a new design suitable for the purpose intended to replace the original defective Warranty Item.

1.10 In the event that the Contractor proposes to modify any Warranty Item or any part of the Vessel in order to repair or replace the same or another Warranty Item, the Contractor shall obtain the Government's advance written consent to the proposed modification.

1.11 Throughout the Warranty Period, the Contractor shall maintain an inventory of spare parts, which shall be the same items as listed in Schedules 6 and 7 in Part V and in the same quantity in the shipyard of the Contractor which the Contractor shall use for performing the Warranty Services. The Government will not provide its own inventory of the Spare Parts to the Contractor for the provision of the Warranty Services.

1.12 Updated/Upgraded Information

It is expected that during the Warranty Period certain Warranty Items may be modified or changed. All documentation affected by this change must be updated to reflect the new situation. All the support documentation such as the Vessel inventory list, job information and maintenance scheduling in relation to these modifications and changes shall be provided at the expiry of the Warranty Period.

1.13 Warranty of Electronic Navigational Equipment

Please refer to the Chapter 8 of this Part VII.

## 2. Guarantee Slipping

2.1 As stated in the section "Warranty" above, Guarantee Slipping shall be carried out at the end of the original Warranty Period regardless of any subsequent extension in relation to any Warranty Item under the terms of the Contract.

2.2 At the Guarantee Slipping, the Contractor shall carry out the following work and provide all necessary materials, spare parts, labour and equipment in order to carry out such work:

2.2.1 Pre-guarantee slipping inspection and trial

- (a) Joint inspection with trial to confirm the list of guarantee slipping items; and
- (b) Collect vessel performance information beforehand for comparing when guarantee slipping completion.

2.2.2 Engines and Gearboxes

- (a) Renew the lubricating oil and replace the filters for the main engines and gearboxes and top up the engine coolant as per the manufacturer's recommendations;
- (b) Clean all the engine air filters and change the filter elements;
- (c) Change all fuel/water separators elements and fuel filters for all engines;
- (d) Clean the coolers of the engines and gearboxes and renew all zinc anodes if provided;
- (e) Check all the engines' belts and adjust or renew if necessary;
- (f) Check tappet clearances for the inlet and exhaust valves, ignition timing and idle speed and adjust if necessary;
- (g) Conduct function tests for the engines' protection system and their associated sensors, gauges and other measuring devices;
- (h) Disconnect and remove all engines and gearboxes sea water pipes (suction & discharge) for inspection, and clear off marine growth and obstructive materials in all pipes and fittings;
- (i) Repair all damages and leakages in the metal and fibreglass pipelines; and

- (j) Any other work required or recommended by the engine manufacturer.

All of the work listed at Paragraphs 2.2.2(a) to (j) of this Part VII shall be carried out by the manufacturer's authorised agent/dealer. All the work procedures and the spare parts used shall comply with the manufacturer's specifications and requirements.

### 2.2.3 Hull and Deck Items (where applicable)

#### (a) Paint Under the Water Line

- (i) Paint under the water line shall be checked by the paint manufacturer's representative for the effectiveness of one year's protection against marine growth;
- (ii) The hull shall be cleaned and readily for inspection of paint damage;
- (iii) Damaged paint shall be repaired according to the paint manufacturer's procedures;
- (iv) After the repair of the damaged paint as specified at Paragraph 2.2.3(a)(iii) of this Part VII, two coats of touch up primer and one coat of touch up shall be applied; and
- (v) One touch up anti-fouling paint of finishing coat shall be applied to the damaged paint as specified at Paragraph 2.2.3(a)(iii) of this Part VII.

#### (b) Paint Above the Water Line

- (i) Damaged paint on the hull above the water line and deckhouse shall be repaired properly. After repair, two coats of touch up primer and one coat of touch up (finishing) shall be applied;
- (ii) Two coats of paint shall be applied on the Vessel's name, draft marks and insignia; and
- (iii) One full coat of anti-slip paint shall be applied to the open and side deck.

#### (c) Inspect and clean and polish propellers.

#### (d) Inspect, clean and remove obstructed object on the propeller shaft.

#### (e) Water jet tunnel and impeller(s) inspection and cleaning (if applicable).

#### (f) Free, clean, grease and recondition all moving parts of the deck fittings, i.e. water tight ("WT") hatches, vent covers, rollers and fairleads and anchor chain stoppers, etc.

#### (g) Renew all zinc anodes on hull, rudder(s) and tail shaft(s).

#### (h) Life-saving appliances ("LSA") and Fire-fighting appliances ("FFA") must be serviced and re-certified as required. (Free, clean, grease and recondition all fire control valves, hydrants and bilge suction and control valves).

#### (i) Free, clean and repaint the anchor chain and swivel set.

### 2.2.4 Mechanical, Electrical & Air-conditioning

#### (a) Dismantle all overboard valves for inspection and renew the defective parts;

#### (b) Check and clean the sea water system (including the grating, sea chest internal, sea suction and strainers) complete with renew their zinc anodes;

#### (c) Each of the compartment bilge suction to be checked and free of rubbish;

#### (d) Generator megger test and electrical circuit earth leak test; and

#### (e) Batteries condition check and switch over test.

### 2.2.5 The following shall be tested at the dock trial / sea trials as part of the Guarantee Slipping:

#### (a) Engine control and steering system including emergency/alternative method;

#### (b) Engine alarm and shut down function (including emergency stopping of engines at wheelhouse);

#### (c) Hybrid System;

#### (d) Battery Generator;

#### (e) Navigational equipment, lights and sound signals;

- (f) Ahead and astern running and crash stop test;
- (g) Steering trial;
- (h) Speed Measurement;
- (i) Bilge system function (including high level bilge alarm system);
- (j) Fire pump(s) function (including fire detection system, alarms, ventilation fans /fuel pump remote shutdown);
- (k) The Dock Trial and Sea Trial Safety Checklist items, as listed below;

### Dock Trial Check List

<i>General items will be checked during dock trial</i>	
1.	Engines start and stop testing
2.	Engines emergency stop check
3.	Engines speed and clutch unit testing
4.	Engines speed high and low idle speed testing
5.	Engines gauges and alarm check
6.	Propulsion system testing
7.	Anchor windlass testing
8.	Navigation lights testing
9.	Wheelhouse horn and windows screen wipers testing
10.	Fire protection system alarm check
11.	Portable fire extinguishers inspection
12.	Life-saving equipment inspection
13.	Engine room ventilation fans testing
14.	Air compressor and air conditioning system testing
15.	Cabin lights testing
16.	Bilge system in each compartment testing.
17.	Floor plate inspection
18.	Fuel tanks quick closing valves testing
19.	G.S. pumps testing
20.	Bilge pumps testing
21.	A/C cooling water pumps testing
22.	Tailshaft cooling water pumps testing
23.	Fire pumps testing
24.	Fuel oil pumps testing
25.	Sanitary pumps testing
26.	Sewage pumps testing
27.	Fresh water pumps testing
28.	Waste water pumps testing

29.	Steering system power assisted and manual operation testing
30.	Emergency rudder operation check
31.	Rudder indicator check

### Sea Trial Safety Check List

<i>General items will be checked during sea trial</i>	
1.	Engines start and stop testing
2.	Engines emergency stop check
3.	Engines speed and clutch unit testing
4.	Wheelhouse horn and windows screen wipers testing
5.	Portable fire extinguishers are in place
6.	Life jackets and life buoys are in place
7.	Sea trial navigation flag hoisted
8.	Telecommunication system function check
9.	Approved coxswains are in control
10.	Sufficient fuel oil to perform the full course of sea trial
11.	Water tank is full

- (l) Other trials or testing of equipment as required by the Government Representative; and
- (m) Any item or component found defective shall be repaired or replaced.

2.3 After Guarantee Slipping, the Contractor shall submit the above works completion report (including engines trial/testing report completed with engines parameters) to the Government Representative.

**Part VII - Annex 2 - Implementation Timetable**

<b>Milestones</b>		<b>Completion Dates</b>
1	Issuance of "Notification of Conditional Acceptance"	To be advised after Tender Evaluation.
2	Contract Date (the date of the last party signing the Articles of Agreement)	The date when the last party signs the Articles of Agreement. The Government will not sign the Articles of Agreement until and unless the Contractor fulfils all of the conditions precedent as specified in Clause 25.2 of Part II - Conditions of Tender (save to the extent waived by the Government, if any).
3	Kick-Off Meeting	To be held within two (2) months after the Contract Date at the Government Dockyard or the Contractor's Shipyard.
4	Completion of hull and superstructure of the Vessel	The Contractor shall propose the completion dates of Milestones 4-8 for GNC's approval within two (2) months after the Contract Date.
5	Completion of installation of engine propulsion system, propellers and steering system	
6	Completion of design with GNC approval and installation of ENE Systems	
7	Launching of the Vessel	
8	Conduct of all tests, inspections and trials as part of the Technical Acceptance including the Yard Trial	
9	Shipment to Hong Kong	
10	Delivery Date	The Delivery Date for the Vessel shall be no later than the date set out in Schedule 2 (Delivery Schedule) of Part V.

**Part VII - Annex 3 - Drawing Submission Timetable**

<b>Item No.</b>	<b>Drawings Approval</b>	<b>Completion Date</b>
1	General Arrangement Plan	<i>All the drawings shall be submitted in two months after Signing of Articles of Agreement for GNC's approval / reference.</i>
2	Lines Plan	
3	Stability Information	
4	Inclining Experiment Report	
5	Midship Section	
6	Stern Construction	
7	Frames and Bulkhead Sections	
8	Construction Profile and Deck Plan	
9	Shell Expansion Plan	
10	Bow Construction & Bow ramp Details	
11	Deckhouse Construction Plan	
12	Fuel Oil tank Construction	
13	Paint Schedule	
14	Tank Capacity Plan	
15	Main Engine & Gearbox Mounting Arrangement	
16	Power / Speed Estimation and Curve	
17	Deck Cabin Arrangement & Details	
18	Crew Cabin Arrangement & Details	
19	Engine Room Arrangement	
20	Shafting Arrangement	
21	Propeller Drawing	
22	Steering Arrangement & Rudders & Rudder Stock	
23	Mast Structure	
24	Details of Diesel Generator Arrangement	
25	Details of ENE Equipment System	
26	Control Console Arrangement and Schematic Diagram	
27	Instrumentation and Control System	
28	Calculation of Fuel Oil Capacity	
29	Details of Main Engines /Generators Alarms & Sensors	
30	Engine Room Piping Diagrams including sea water system, bilge system, fresh water system, black water system, HVAC	
31	Engine Room Ventilation and Exhaust & Calculation	
32	Details of the Air-Conditioning System & Calculation	
33	Ship's Ventilation Arrangement & Details	
34	Fire Detection System	



**Part VII - Annex 4 – Main Items Inspection Timetable**

VESSEL NAME : “MP6, MP 14 & MP15 ”		Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected		
	<b>Hull Structure, Layout and Outfitting Inspection</b>		
H-1	Hull Lofting		
H-2	Construction materials –Aluminium plate mark checking for hull		
	a) Aluminium plate mark checking for hull		
	b) Material certification verification		
H-3	Construction materials – aluminium plate mark checking for deckhouse		
	a) Aluminium plate mark checking for deckhouse		
	b) Material certification verification		
H-4	Welding consumables and welders' certificates verification		
H-5	Keel lay inspection		
H-6	Fabrication of hull up to main deck in stages of work including		
	a) Alignment		
	b) Edge preparation		
	c) Welding		
	d) Workmanship		
	e) Compliance with approved plans		
	f) Non-destructive tests NDT (X rays) of welds		
	g) Hull internal work inspection		
	h) Plating thickness gauging		
H-7	Engine girder fabrication and welding		
H-8	Deckhouse scantling and welding check		
H-9	Inspection and weld check of connection between deckhouse and main deck		
H-10	Welding construction and pressure test of tanks		
	Fuel oil tank(s)		
	a) Tank construction (internal/external/fitting)		
	b) Tank pressure test		
	Fresh water tank(s)		
	a) Tank construction (internal/external/fitting)		
	b) Tank pressure test		

VESSEL NAME : “MP6, MP 14 & MP15”		Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected		
	<b>Hull Structure, Layout and Outfitting Inspection</b>		
H-11	Hose test for hull and deckhouse		
H-12	Mock-up inspection for the wheelhouse		
H-13	Deckhouse console mock up		
H-14	Installation of the various outfitting items		
	a) Anchor and chain		
	b) Windlass		
	c) Hand pump		
	d) Hatches		
	e) Doors		
	f) Windows		
	g) Ventilators		
	h) Seating of heavy equipment and mast		
H-15	Function test of various outfitting items		
H-16	Water-tightness or weathertightness of openings		
	a) Manholes		
	b) Hatches		
	c) Doors		
	d) Windows		
	e) Ventilators and Air pipes		
	f) Cable glands		
H-17	Painting inspection of different layers		
H-18	Zinc anodes and lightning protection		
	a) Installation of zinc anodes		
H-19	Vessel dimension verification		
H-20	Draught marks verification		
H-21	Hull completion survey		
H-22	Arrangement of deckhouse, wheelhouse and accommodation		
H-23	Inspection of fire, heat and sound insulation		
	a) Fire Insulation		
	b) Heat Insulation		
	c) Sound Insulation		
	Cabin		

VESSEL NAME : “MP6, MP 14 & MP15 ”			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected			
	<b>Hull Structure, Layout and Outfitting Inspection</b>			
H-24	Lifesaving appliances and firefighting appliances			
	a) Lifesaving appliances			
	b) Firefighting appliances			
H-25	Inspection of sea chest and grating			
	a) Sea chest			
	b) Grating			
H-26	Inclining experiment			
H-27	Sea Trials including operation of outfitting			
H-28	Trial of anchor & mooring arrangement			
H-29	Cleanliness inspection before acceptance			
H-30	Inventory check in HKSAR			
H-31	Acceptance and delivery			
H-32	Acceptance of As-Fitted drawings and Engine/Equipment manuals and Documentation			

VESSEL NAME : “MP6, MP14 & MP15”			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected			
	<b>Machinery and Electrical Installation</b>			
EM-1	General inspection and function tests on installation of machinery:			
	a) General inspection of the main propulsion engine			
	b) General inspection of the generator set			
	c) General inspection of the shafting			
	i. Propeller taper bedding test			
	ii. Coupling taper bedding test			
	iii. Coupling and rudder bolts fitting			
	d) General inspection of propeller			
EM-2	Main Engine:			
	a) Test of engine safety devices and alarms			
	b) Test of emergency stop			
	c) Inspection of exhaust pipe before lagging			
EM-3	Hydraulic test of sea valve			
EM-4	Inspection of the sea water suction strainers			

VESSEL NAME : “MP6, MP14& MP15”			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected			
<b>Machinery and Electrical Installation</b>				
EM-5	Fresh water system:			
	a) General inspection and dimension checking of the fresh water system			
	b) Fresh water tank low level alarm test			
	c) Fresh water tank final cleaning/internal inspection before filling			
	d) Fresh water tank high level alarm test			
	e) Fresh water tank content gauge calibration and test			
	f) Inspection of piping penetration of bulkhead and deck			
	g) Hydraulic test of fresh water system piping			
	h) Functional test of fresh water system			
EM-6	Fuel oil system:			
	a) General inspection and dimension checking of the fuel oil system			
	b) Fuel oil tank(s) low level alarm test			
	c) Fuel oil tank(s) final cleaning/internal inspection before filling			
	d) Fuel oil tank(s) high level alarm test			
	e) Fuel oil tank(s) content gauge calibration and test			
	f) Inspection of piping penetration of bulkhead and deck			
	g) Hydraulic test of oil fuel system piping			
	h) Functional test of oil fuel system			
EM-7	Bilge system:			
	a) General inspection and dimension checking of the bilge system			
	b) Bilge tank low level alarm test			
	c) Bilge tank high level alarm test			
	d) Bilge tank content gauge calibration and test			
	e) Inspection of piping penetration of bulkhead and deck			
	f) Hydraulic test of bilge system piping			
	g) Functional test of bilge system			
EM-8	a) Inspection of piping penetration of bulkhead and deck			
	b) Hydraulic test of black water/sanitary system piping			
	c) Functional test of black water/sanitary system			

VESSEL NAME : “MP6, MP14 & MP15”			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected			
	<b>Machinery and Electrical Installation</b>			
EM-9	Firefighting system:			
	a) General inspection and dimension checking of the firefighting system			
	b) Inspection of piping penetration of bulkhead and deck			
	c) Hydraulic test of firefighting system piping			
	d) Functional test of firefighting system			
EM-10	Fire extinguishing systems:			
	a) General inspection and dimension checking of the fire extinguishing system			
	b) Inspection of piping penetration of bulkhead and deck			
	c) Hydraulic test of fire extinguishing system piping			
	d) Functional test of fire extinguishing system			
	e) Test of fixed fire extinguishing alarm system			
	f) Test of fire detection (smoke and heat detection) alarm system			
EM-11	Hydraulic test of sea valve			
EM-12	Hydraulic system:			
	a) General inspection and dimension checking of the hydraulic system			
	b) Inspection of piping penetration of bulkhead and deck			
	c) Hydraulic test of hydraulic system piping			
	d) Functional test of hydraulic system			
EM-13	Engine room ventilation:			
	a) Inspection of E/R ventilation fan installation			
	b) Function test of start/stop at remote and local control for E/R ventilation fans			
EM-14	Air conditioning system:			
	a) General inspection and dimension checking of the air conditioning system			
	b) Inspection and hydraulic test of cooling water system(if applicable)			
	c) Functional test of air conditioning system			
	d) Full test of air conditioning during sea trial			
EM-15	Batteries:			
	a) Inspection and dimension checking of the batteries spaces including ventilation.			
	b) Inspection of battery connectors and battery boxes			
	c) Inspection of battery charger			
	d) Operational test of battery charger			
	e) Test of main engines and generators consecutive starting by each group of battery (start/stop at remote and local control)			

VESSEL NAME : “MP6, MP14 & MP15”			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected			
	<b>Machinery and Electrical Installation</b>			
EM-16	Electrical installation:			
	a) Inspection of lightening conductor			
	b) General inspection of cable layout and checking of cable sizes			
	c) Inspection of cable penetration of bulkhead and deck			
	d) Inspection of transformers			
	e) Inspection of tally plates			
EM-17	Main and emergency switchboard and panels:			
	a) Main switchboard and panels – high voltage primary injection test			
	b) Cable size checking of electrical switchboard installations			
	c) Inspection of AC distribution panel			
	d) Inspection of DC distribution panel			
	e) Megger test of the electrical system			
	f) Earth test of the electrical system			
EM-18	Control console(s):			
	a) Inspection of control console			
	b) Functional test of console controls			
	c) Inspection of navigation equipment control panel			
EM-19	Lighting:			
	a) Inspection and functional test of general lighting			
	b) Inspection and functional test of emergency lighting			
	c) Inspection and functional test of floodlight installation			
	d) Inspection and functional test of searchlight installation			
EM-20	Navigation Lights and Signals:			
	a) Inspection and functional test of navigation lights			
	b) Test of horn /whistle			
EM-21	Shafting (tailshaft and coupling) system:			
	a) Marking/Stamping and material check			
	b) Dimension check and taper bedding test			
	c) Shaft line checking of stern tube/shaft bracket and alignment of main engines and tail shaft			
EM-22	Steering system installation and testing:			
	a) Inspection and dimensional check of rudders			
	b) Inspection and dimensional check of steering gear system			
	c) Steering system functional test			

VESSEL NAME : “MP6, MP14 & MP15”			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be inspected			
	<b>Machinery and Electrical Installation</b>			
EM-23	Electronic Navigational Equipment installation and testing by EMSD			
EM-24	Test of window wipers			
EM-25	Test of noise levels throughout the vessel during the sea trial			
	<b>Operational System</b>			
OS-1	Installation inspection and functional test for ENE Systems			
OS-2	Inspection of tally plate and cable label			
OS-3	Inspection of main engine/genset safety alarms on W/H console table			
OS-4	Function and performance test during Sea Trial			

Note:

The inspection items are preliminary and not exhaustive, any items found necessary to be included at a later stage will be added to this list.

**Part VII - Annex 5 – Vessel Condition During Respective Sea Trial****1) Official Speed Trial**

Conditions at Speed-Trial		
1	Person on board	20 Persons (at 75 kg per person)
2	Fuel oil tanks	not less than 90% fuel tank capacity
3	Fresh water tank	not less than 90% tank capacity
4	Grey water tank	not less than 10% tank capacity
5	Store/Utilities	100 kg
6	Sea Conditions	Sea state 2 : wave height 0.2 - 0.5 metres

**2) Endurance and Performance Test**

Conditions at Endurance and Performance Test		
1	Person on board	20 Persons (at 75 kg per person)
2	Fuel oil tanks	not less than 85% fuel tank capacity
3	Fresh water tank	not less than 85% tank capacity
4	Grey water tank	not less than 10% tank capacity
5	Store/Utilities	100 kg
6	Sea Conditions	Sea state 2 : wave height 0.2 - 0.5 metres

**3) Manoeuvrability Test**

Conditions at Forward Turning Circle Test		
1	Person on board	20 Persons (at 75 kg per person)
2	Fuel oil tanks	not less than 80% fuel tank capacity
3	Fresh water tank	not less than 85% tank capacity
4	Grey water tank	not less than 50% tank capacity
5	Store/Utilities	100 kg
6	Sea Conditions	Sea state 2 : wave height 0.2 - 0.5 metres

**4) Crash Stop Test / Astern Running Test / Emergency Steering Test**

Conditions at Crash Stop Test / Astern Running Test / Emergency Steering Test		
1	Person on board	20 Persons (at 75 kg per person)
2	Fuel oil tanks	not less than 80% fuel tank capacity
3	Fresh water tank	not less than 85% tank capacity
4	Grey water tank	not less than 50% tank capacity
5	Store/Utilities	100 kg
6	Sea Conditions	Sea state 2 : wave height 0.2 - 0.5 metres

**Part VII - Annex 6 – Endurance Performance – Diesel Propulsion**

Date of Test:		Place of Test:							
Vessel's Identification:		Vessel's Name:							
<b>Conditions at Endurance and Performance Test</b>									
Person On board	<b>4 crews +16 other persons</b>		Dummy Weight <b>75 kg per person</b>						
Fuel (diesel oil)	<b>Refer to Annex 5</b>		Other Equipment						
Sea Conditions	<b>WMO Sea State 2</b> wave height $\leq 0.5$ metres and water depth $\geq 5$ metres								
<b>Engines:</b>	<b>Port Side</b>	<b>Starboard Side</b>	<b>Propellers:</b>	<b>Port Side</b>	<b>Starboard Side</b>				
Maker			Maker						
Type			Type						
Serial Number			Diameter						
Rated Power			Pitch						
Rated Speed			Direction of Rotation						
<b>Engine Load</b>	<b>Engine Speed (rpm)</b>	<b>Vessel Speed (Knots)</b>	<b>Time (Start)</b>	<b>Time (Finish)</b>	<b>Fuel Consumption (litres/minutes)</b>	<b>Engine Oil Pressure (Bar)</b>	<b>Engine (in) CW Temp. (°C)</b>	<b>Others</b>	<b>Others</b>
__% of rated Power	At Minimum Crushing Speed		>15 min						
50% of Rated Power/rpm			>15 min						
60% of Rated Power/rpm			>15 min						
70% of Rated Power/rpm			>15 min						
80% of Rated Power/rpm			>30 min						
90% of Rated Power/rpm			>30 min						
100% of Rated Power (Endurance Test)			>90 min						
Remarks:									
Witness by:		MD Representative				Shipyard Representative			

Course	0	45	90	135	180	225	270	315	360
Time Taken Ahead turning to starboard									
Course	0	45	90	135	180	225	270	315	360
Time Taken Ahead turning to port									

Turning diameter: Ahead turning to starboard	Ship length
Engine R.P.M.	rpm
Max heeling angle	degree

Turning diameter: Ahead turning to port	Ship length
Engine R.P.M.	rpm
Max heeling angle	degree

Witness by:	MD Representative	Shipyard Representative

## **Part VII - Annex 7 – As Fitted Drawings and Documents**

As-fitted Drawings and Machinery/Equipment documents and information literature to be delivered to the Government upon Delivery Acceptance

### **1. As-Fitted Drawings**

- 1.1 Upon delivery of the Vessel, the Contractor shall deliver to the Government four (4) hard copies and two (2) soft-copies in .pdf and .dwg (where applicable) files of the following plans and drawings that contain the technical information of the Vessel and its machinery and equipment as they are when the Vessel is on the day accepted by GNC/MD. These are termed the final version of the “As-Fitted” Plans and Drawings, and they must consist of the following ones as well as any other additional ones that may be required by GNC/MD during the design and construction of the Vessel and before the Vessel is accepted by the Government.
- 1.2 The As-Fitted Plans and Drawings shall be prepared by professional ship draughtsmen and they shall be prepared in a professional manner, scale, size and style normally required of in the ship design and construction business sector. All plans and drawings shall show and be clearly marked for the profile, plan, and section views of the layout, arrangement details, and construction details in a manner required by GNC officer.
  - 1.2.1 General Arrangement Plan.
  - 1.2.2 Lines plan and offsets data and table.
  - 1.2.3 Final stability information booklet and the final inclining experiment report.
  - 1.2.4 Hydrostatics, cross curves and intact and damage stability calculations for all ship loading conditions specified in the Technical Specifications.
  - 1.2.5 Vessel subdivision drawings and stability calculations.
  - 1.2.6 Painting scheme of the whole Vessel.
  - 1.2.7 Vessel draught marking diagram.
  - 1.2.8 Detailed arrangement and layout plan of the deckhouse, accommodation, decks showing the disposition of all main equipment, fittings and fixtures, furniture, doors, windows, hatches, manholes and access openings. The down-flooding openings (points) shall be clearing indicated on the drawings.
  - 1.2.9 Equipment layout diagram.
  - 1.2.10 Hull structural construction and hull scantlings drawings.
  - 1.2.11 Hull shell and frames and the framings arrangement and construction plan.
  - 1.2.12 Hull shell expansion plan.
  - 1.2.13 Bow construction plan.
  - 1.2.14 Steering gear system and steering arrangement diagrams.
  - 1.2.15 Deckhouse and deck structural and construction plan.
  - 1.2.16 Hull watertight bulkheads construction plan.
  - 1.2.17 Deckhouse to deck connection detailed construction plan.
  - 1.2.18 Deck edge details and construction plan, including detailed structural arrangement drawings of hull to deck connection.
  - 1.2.19 Detailed cathodic corrosion prevention and arrangement plans and drawings for the Vessel throughout.
  - 1.2.20 Mast structural and construction plan and mast equipment arrangement plan.
  - 1.2.21 Anchoring & mooring arrangement plan.
  - 1.2.22 Piping diagrams for fuel oil, freshwater, lubrication oil, bilge, firefighting, scuppers and drains, sewage system.
  - 1.2.23 Fire firefighting system drawings.
  - 1.2.24 Drawings of the main switchboard and all other switchboards and the electrical system.

- 1.2.25 Electrical Load Calculation.
- 1.2.26 Electrical installation drawings.
- 1.2.27 Details of the Operational Systems.
- 1.2.28 Operational Systems equipment installation and location drawings, including ENE, communications, radio terminal, and CCTV system.
- 1.2.29 Operational Systems connection drawings.
- 1.2.30 Engine Room arrangement.
- 1.2.31 Shaft line arrangement.
- 1.2.32 Propeller details and drawings.
- 1.2.33 Main fuel oil tank drawing and its associated piping and manifold(s), and filling, overflow and ventilation system.
- 1.2.34 Freshwater tank construction plan and its associated piping arrangement.
- 1.2.35 Fuel oil tank(s) construction plan and its associated piping system.
- 1.2.36 Black water tank construction plan and its associated piping system.
- 1.2.37 Grey water tank construction plan and its associated piping system.
- 1.2.38 Drawings for anchor, windlass and the anchoring system.
- 1.2.39 Lifesaving appliance arrangement plan and fire safety plan.
- 1.2.40 Navigation lights, sound and signal diagrams.
- 1.2.41 Vessel overall lighting arrangement and light control plan.
- 1.2.42 Vessel alarm and signals, internal communication systems and public address systems plan.
- 1.2.43 General layout and arrangement drawing of the air-conditioning system.
- 1.2.44 Piping layout drawing of the air-conditioning system (if any).
- 1.2.45 Air-conditioning load calculation.
- 1.2.46 CCTV system arrangement.
- 1.2.47 Solar panel system.

The lists are not exhaustive, additional as fitted drawings may be added if required.

1.3 Documents shall be provided by the Contractor:

- 1.3.1 In not less than one (1) month before the Delivery Acceptance of the Vessel, the Contractor shall provide for GNC acceptance a list of all documents to be provided.
- 1.3.2 When the Vessel is delivered to the Government Dockyard, the Contractor shall deliver to the Government all of the documents as listed above and those specified in Chapter 14 of this Part VII which required to be delivered upon delivery acceptance and all other technical information, leaflets, literature, manuals and booklets etc. and whatsoever items that are necessary for the operation, handling, services, maintenance, spare parts, repairs and the technical understanding of any one of all the engines, machinery, motors, pumps, equipment, fittings and outfitting items of the Vessel.

**Part VII - Annex 8 – Definition of Waves and Sea**

Beaufort scale number	Description	Wind speed	Wave height	Sea conditions	Land conditions
0	Calm	< 1 km/h (< 0.3 m/s)	0 m	Flat.	Calm. Smoke rises vertically.
		< 1 mph			
		< 1 knot	0 ft		
		< 0.3 m/s			
1	Light air	1.1–5.5 km/h (0.3–2 m/s)	0–0.2 m	Ripples without crests.	Smoke drift indicates wind direction. Leaves and wind vanes are stationary.
		1–3 mph			
		1–3 knot	0–1 ft		
		0.3–1.5 m/s			
2	Light breeze	5.6–11 km/h (2–3 m/s)	0.2–0.5 m	Small wavelets. Crests of glassy appearance, not breaking	Wind felt on exposed skin. Leaves rustle. Wind vanes begin to move.
		4–7 mph			
		4–6 knot	1–2 ft		
		1.6–3.4 m/s			
3	Gentle breeze	12–19 km/h (3–5 m/s)	0.5–1 m	Large wavelets. Crests begin to break; scattered whitecaps	Leaves and small twigs constantly moving, light flags extended.
		8–12 mph			
		7–10 knot	2–3.5 ft		
		3.5–5.4 m/s			
4	Moderate breeze	20–28 km/h (6–8 m/s)	1–2 m	Small waves with breaking crests. Fairly frequent whitecaps.	Dust and loose paper raised. Small branches begin to move.
		13–17 mph			
		11–16 knot	3.5–6 ft		
		5.5–7.9 m/s			
5	Fresh breeze	29–38 km/h (8.1–10.6 m/s)	2–3 m	Moderate waves of some length. Many whitecaps. Small amounts of spray.	Branches of a moderate size move. Small trees in leaf begin to sway.
		18–24 mph			
		17–21 knot	6–9 ft		
		8.0–10.7 m/s			
6	Strong breeze	39–49 km/h (10.8–13.6 m/s)	3–4 m	Long waves begin to form. White foam crests are very frequent. Some airborne spray is present.	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic bins tip over.
		25–30 mph			
		22–27 knot	9–13 ft		
		10.8–13.8 m/s			
7	High wind, moderate gale, near gale	50–61 km/h (13.9–16.9 m/s)	4–5.5 m	Sea heaps up. Some foam from breaking waves is blown into streaks along wind direction. Moderate amounts of airborne spray.	Whole trees in motion. Effort needed to walk against the wind.
		31–38 mph			
		28–33 knot	13–19 ft		
		13.9–17.1 m/s			
8	Gale, fresh gale	62–74 km/h (17.2–20.6 m/s)	5.5–7.5 m	Moderately high waves with breaking crests forming spindrift. Well-marked streaks of foam are blown along wind direction. Considerable airborne spray.	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
		39–46 mph			
		34–40 knot	18–25 ft		
		17.2–20.7 m/s			
9	Strong gale	75–88 km/h (20.8–24.4 m/s)	7–10 m	High waves whose crests sometimes roll over. Dense foam is blown along wind direction. Large amounts of airborne spray may begin to reduce visibility.	Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over.
		47–54 mph			
		41–47 knot	23–32 ft		
		20.8–24.4 m/s			

10	Storm, whole gale	89–102 km/h (24.7–28.3 m/s)	9–12.5 m	Very high waves with overhanging crests. Large patches of foam from wave crests give the sea a white appearance. Considerable tumbling of waves with heavy impact. Large amounts of airborne spray reduce visibility.	Trees are broken off or uprooted, saplings bent and deformed. Poorly attached asphalt shingles and shingles in poor condition peel off roofs.
		55–63 mph			
		48–55 knot	29–41 ft		
		24.5–28.4 m/s			
11	Violent storm	103–117 km/h (28.6–32.5 m/s)	11.5–16 m	Exceptionally high waves. Very large patches of foam, driven before the wind, cover much of the sea surface. Very large amounts of airborne spray severely reduce visibility.	Widespread damage to vegetation. Many roofing surfaces are damaged; asphalt tiles that have curled up and/or fractured due to age may break away completely.
		64–73 mph			
		56–63 knot	37–52 ft		
		28.5–32.6 m/s			
12	Hurricane	$\geq 118$ km/h ( $\geq 32.8$ m/s)	$\geq 14$ m	Huge waves. Sea is completely white with foam and spray. Air is filled with driving spray, greatly reducing visibility.	Very widespread damage to vegetation. Some windows may break; mobile homes and poorly constructed sheds and barns are damaged. Debris and unsecured objects are hurled about.
		$\geq 74$ mph			
		$\geq 64$ knot	$\geq 46$ ft		
		$\geq 32.7$ m/s			

World Meteorological Organization (WMO) Sea State Code		
Sea State Code	Wave Height (meters)	Characteristics
0	0	Calm (glassy)
1	0 to 0.1	Calm (rippled)
2	0.1 to 0.5	Smooth (wavelets)
3	0.5 to 1.25	Slight
4	1.25 to 2.5	Moderate
5	2.5 to 4	Rough
6	4 to 6	Very rough
7	6 to 9	High
8	9 to 14	Very high
9	Over 14	Phenomenal
Character of the Sea Swell		
	0. None	
<b>Low</b>	1. Short or average 2. Long	
<b>Moderate</b>	3. Short 4. Average 5. Long	
<b>Heavy</b>	6. Short 7. Average 8. Long	
	9. Confused	