

Part VII – Technical Specifications

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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 of the Hong Kong Special Administrative Region (“HKSAR”) of the People’s Republic of China (hereinafter referred to as “the Government”) in relation to **six (6) Aluminium Alloy Speed Boats (“Vessel”)** for use by the **Agriculture, Fisheries and Conservation Department (“AFCD”)** of Hong Kong as the “**user department**”. References to “Vessel” shall mean each of the six (6) aluminium alloy speed boats.
- 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]; and
 - (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 the Part IV – Conditions of Contract, the following interpretation principles shall apply when interpreting the Tender Documents and the Contract including this Part VII – Technical Specifications:
- (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 north-eastern marine parks, namely Hoi Hai Wan Marine Park, Yan Chau Tong Marine Park and Tung Ping Chau Marine Park as well as other Hong Kong waters and in fish culture zones designated under the Marine Fish Culture Ordinance, Cap. 353 and the marine parks related to the Third Runway System. High speed is required for these vessels 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.
- 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, sub-division 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 “RO” and “RO Requirements” shall mean, in the case of the Daughter Boat, the Recognised Organisation and the rules and regulation of such Recognised Organisations as specified in Schedule 9 of Part V - Schedules for the Daughter Boat. References to “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 requirement 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 Type Approval Certificate or 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 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 Chapter, 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. 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 of the Contract 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 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/GNC officers 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/GNC officers 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/GNC officers 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/GNC officers and consultants can be carried out with a maximum of efficiency and a minimum of interference with the Contractor's work.

1.7 Official Sea Trial and Speed Requirements

- 1.7.1 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, manoeuvrability 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 stated in Paragraph 1.7.7 below, 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). This programme must be submitted to MD in not less than 14 working days before the trials commence. 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 2.6.5 of this Part and approved by the RO).
- 1.7.2 Like all other tests and trials to be conducted as part of the Technical Acceptance, the Contractor is required to 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.
- 1.7.3 The Contractor shall provide to MD officers, 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 officers. The location of each person on board, which can affect the centre of gravity of the Vessel under trial, will need to be first agreed by the GNC.
- 1.7.4 The Contractor shall provide a trial report to GNC after completion of the above tests. The report shall contain information regarding the method of test, engine(s) running condition, sea condition, weather condition and wind condition, vessel loading condition, 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 GNC appointed consultant during the tests; and such information shall be prepared in a format agreed by GNC.

1.7.5 Official Speed Trial Condition

	Operation Conditions
Sea Conditions	World Meteorological Organisation (“WMO”) sea state 0 – 2
Fuel (diesel and petrol)	100%
Crew	2
Boarding Officers	10
Kit	30 kg

1.7.6 Official Speed Trial

- (a) The Official Speed Trial shall be carried out in the Hong Kong Waters under the conditions as specified in Annex 5 to this Part VII.
- (b) As part of the Technical Acceptance as specified in Paragraph 1.8.1 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 continuous runs, i.e. TWO 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 30 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 1.7.5 of 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.

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 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 1.7.7 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.

1.7.7 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. 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) Manoeuvrability 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 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 Engine and Electric Generator Engine.

(g) Anchoring Test according to the RO Requirements.

(h) Noise Level Test according to the requirement stipulated in Paragraph 5.4.3 of this Part VII.

1.8 Acceptance and Delivery

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

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

1.8.1 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 1.7.6 of this Part VII, all of those tests and trials as specified Paragraph 1.7.7 of this Part VII, the bench acceptance test and on-site commissioning test for ENE as mentioned in Chapter 11 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 11 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 the Conditions of Contract and other applicable provisions of the Contract.

1.8.2 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. 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 shall be issued by the RO as specified in Schedule 9 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 GNC/MD 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 is required to 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 is required to 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 12.2 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 as part of 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.

1.9 Warranty Services During the Warranty Period

- 1.9.1 Notwithstanding and without prejudice to the Contractor's obligation to provide the Warranty Services for the Vessel under the 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.
- 1.9.2 The full scope of the Warranty Services is set out in Annex 1 to this Part VII.
- 1.9.3 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 may be required to 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.

1.10 Support Services

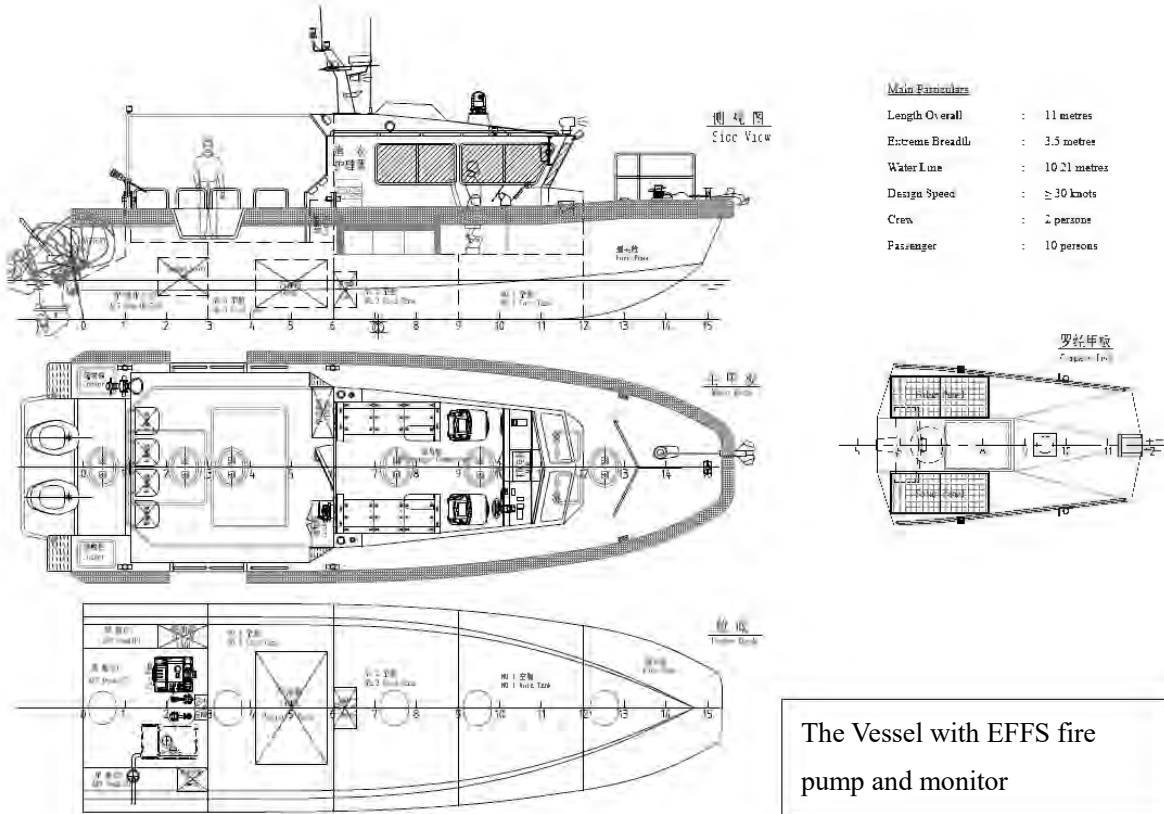
- 1.10.1 The Vessel must be designed for through life support and easy maintenance in the HKSAR based on an operation profile and minimum life expectancy as mentioned in this Part VII.
- 1.10.2 The above applies not only to main engines but also to all other equipment installed in the Vessel. Support 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.

1.11 Asbestos Free

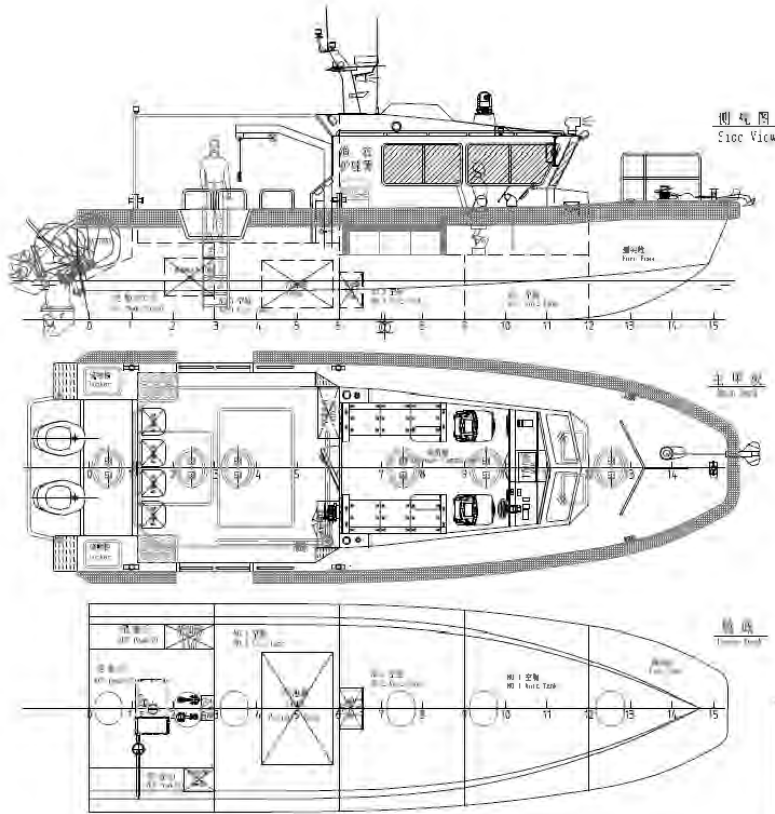
- 1.11.1 The Vessel must not contain any asbestos or asbestos containing materials. The Contractor must comply with the Hong Kong Air Pollution Control Ordinance (Cap. 311), Part X. The Contractor shall engage a service supplier approved by one of the RO or other entities acceptable by MD to verify that 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.

Chapter 2 General Technical Requirements

2.1 Conceptual General Arrangement Plan

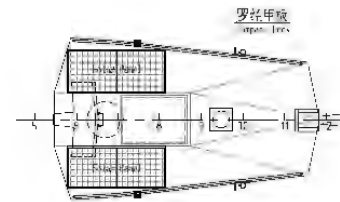


The Vessel with EFFF fire pump and monitor

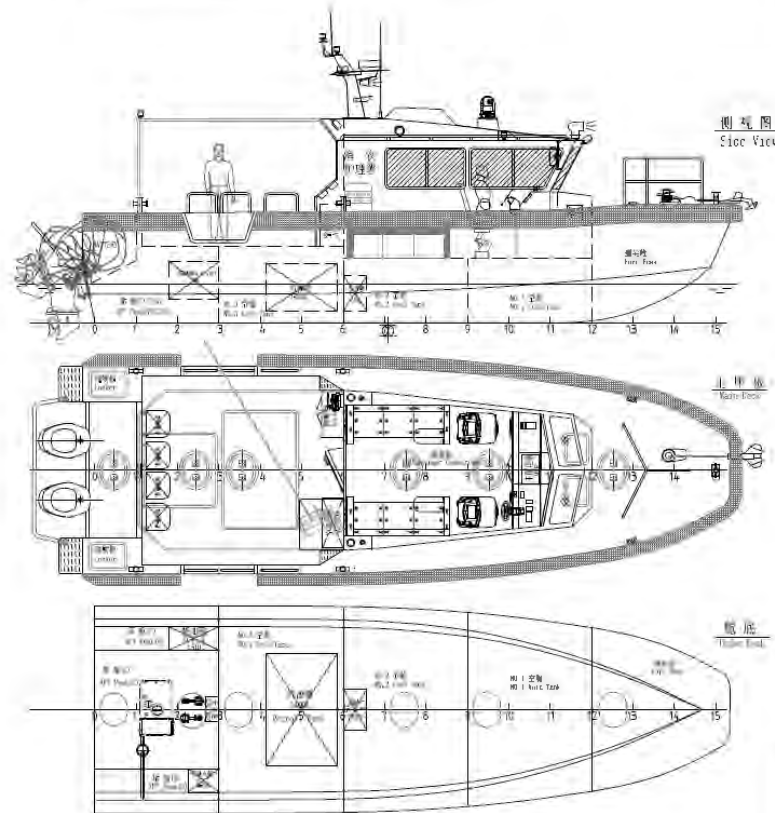


Main Particulars

Length Overall	: 11 metres
Extreme Breadth	: 3.5 metres
Water Line	: 10.21 metres
Design Speed	: ≥ 30 knots
Crew	: 2 persons
Passenger	: 10 persons

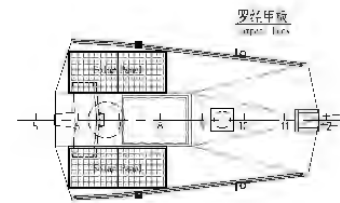


The Vessel with lifting davit and diver equipment



Main Particulars

Length Overall	: 11 metres
Extreme Breadth	: 3.5 metres
Water Line	: 10.21 metres
Design Speed	: ≥ 30 knots
Crew	: 2 persons
Passenger	: 10 persons



The Vessel with towing winch

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 above.
- 2.2.2 The work to be done under this contract consists of the design, construction, outfit, testing and delivery of **six (6) Aluminium Alloy Speed Boats for AFCD**. Workmanship, functions, characteristics and performance shall be in accordance with the TS, best marine construction practices, and the regulatory standards herein specified or otherwise applicable.
- 2.2.3 The Contractor is required to 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 Plans shown above (“Conceptual General Arrangement Plans”) is a reference drawing to help to explain the tender requirements. The Contractor is required to submit its own design in details for MD’s approval.
- 2.2.4 During the design and construction of the Vessel, the Contractor is required to submit a detailed General Arrangement Plans (“GA Plan”) and all relevant construction drawings for GNC’s approval and acceptance. As for the preliminary General Arrangement Plans which has to be submitted during the tendering stage in Schedule 7 (“Preliminary General Arrangement Plans”), 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 Plans. Requirements in these Technical Specifications that the General Arrangement Plans shall follow the “Conceptual General Arrangement Plans” in these Technical Specification shall be changed to follow the Preliminary General Arrangement Plans instead if in the opinion of the Government, the relevant aspect of the Preliminary General Arrangement Plans submitted by the Contractor is better than the Conceptual General Arrangement Plans, 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 the TS, together with their requirements for design and installation standards that are stipulated in this Chapter and in any other parts of the TS, 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 Plans to be submitted by the Tenderer shows improvements over the Conceptual General Arrangement Plans over such functional aspects (Part A(I)), operational aspects (Part A(II)) and environmental aspects (Part A(III)) as mentioned in the Marking Scheme in Part II – Conditions of Tender.

[D]

2.3 Principal Dimensions

- 2.3.1 The Principal Dimensions of the proposed Vessel shall be:

Length Overall: 10 metres to 11 metres _____ [E]

Extreme Breadth: 3.5 metres (Fenders 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 30 knots at World Meteorological Organisation Sea States 0 to 2 set out in Annex 8 to this Part VII when the engine as defined in Paragraph 7.2.1 of this Part VII, being adopted running at 100% maximum continuous rating (“MCR”) under Official Speed Trial Condition as stated in Paragraph 1.7.5 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 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 which RO (to be selected from the definition of “Recognised Organisation” in Clause 1.1 of Part IV) 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 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 the TS, 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) ISO 12215-4 “Small craft – Hull construction and scantlings – Part 4 Workshop and manufacturing” or other applicable international standards or rules acceptable by MD.
- (e) All equipment/fittings shall be designed and manufactured to at least the standards as specified in these Technical Specifications. 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 Stability Requirement

- 2.6.1 The proposed Vessel shall meet the Intact Stability Criteria and other requirements specified in Paragraphs 2.6.4 and 2.6.6 of this Part VII. [E]

2.6.2 All calculations and drawings must be in metric units.

2.6.3 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 1.7.6 of the TS.

2.6.4 Intact Stability Criteria

Stability shall only be considered satisfactory for the loading conditions set out in Paragraph 2.6.6 (h) 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 2.6.5 of this Part VII, and requirements of Stability Information Booklet as specified in Paragraph 2.6.6 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.

2.6.5 Inclining Experiment

- (a) An inclining experiment shall be carried out with the attendance of MD officer(s)/appointed consultant.
- (b) At least 10 working days in advance of the inclining experiment specified at Paragraph 2.6.5 (a), 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:
- (i) after the Scheme has been approved by the RO surveyors and the MD officers; and
 - (ii) in the presence of RO surveyors and MD officer(s) and/or appointed consultant.

The lightship weight and centres of gravity shall be calculated and presented in the inclining experiment report. The GM of the Vessel after each and every shift of inclining weight shall be preliminarily determined. Free surface effects of all liquids on board shall be taken into account in all calculations.

- (e) 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.
- (f) The Vessel must not carry any operational limitations with respect to its stability capability within the operational requirements stipulated in this Part VII.

2.6.6 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 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 drawings 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 2.6.1 of this Part VII:

Loading Conditions		Fuel & petrol oil and Fresh water	Payload	Persons
1	Full Load Departure Condition	100%	30 kg	900 kg (10 persons + 2 crew)
2	Full Load Arrival Condition	10%	30 kg	900 kg (10 persons + 2 crew)
3	Light Load Departure Condition	50%	10 kg	150 kg (2 crew)
4	Light Load Arrival Condition	10%	10 kg	150 kg (2 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 2.6.6 (h) 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 States 0-3.
- (i) The Stability Information Booklet shall be approved by the RO before submitting to MD for comments.

2.7 Vessel Operating Profile and Environment

- 2.7.1 The Vessel shall be designed to provide sufficient space for carrying two (2) crews and ten (10) persons. Shock mitigating seats for two crew at steering console shall be provided. Detailed provisions regarding the mounting of shock mitigation seats are specified in Paragraph 5.2.1 of this Part VII. [E]
- 2.7.2 The Vessel shall be designed for deployment by AFCD on at least 300 days per year. The Vessel shall be designed and built to operate in Hong Kong Waters.

Summary of Operational Hours/Range:

Number of hours/day:	8 hours/day
Number of days/year:	300 days/year
Endurance for fuel capacity :	12 hours at the 20 knots cruising speed of the Vessel with full fuel oil tank(s)

- 2.7.3 The Vessel shall have good manoeuvrability and quick response throughout its speed range and capable to operate in open water. The vessel shall be capable of operating safely at WMO Sea States 0-3.

2.8 Other Design Features

- 2.8.1 Berthing requirement of the Vessel shall match with the designated point of berth at the Government Dockyard and AFCD.
- 2.8.2 Permanent list 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.
- 2.8.3 Permanent ballasts can only be used as agreed by GNC. The Contractor should note that it shall be under a very exceptional case that GNC would agree for the Vessel to have ballast installed.
- 2.8.4 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)

- 2.8.5 Loss of directional control, and other dynamic instabilities
- 2.8.6 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 calculated details shall be issued by the RO, and submitted by the Contractor to GNC for records.

Chapter 3 Hull

3.1 Material

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

3.2 Structures of the Hull and Scantlings

- 3.2.1 The Vessel shall be designed and built with a mono hull form, with a structural system combined with longitudinal stiffener and transverse frames. There are at least four (4) transversal watertight bulkheads to form the different watertight compartments.
- 3.2.2 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.
- 3.2.3 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 to be in accordance with good shipbuilding practice.
- 3.2.4 The fore deck geometry of the Vessel shall be designed to facilitate safe boarding/mooring to MD's satisfaction.
- 3.2.5 Deck walkway at side shall be with width of not less than 400 mm.
- 3.2.6 The design of hull structure shall be in conjunction consideration with all outfitting position and reinforcement, such as mooring bits, strong lifting points, lockers boundaries etc. to avoid repeat/cluster of structures.
- 3.2.7 Bulwark top plate at aft open deck shall be minimized to give as large open deck area as possible.
- 3.2.8 Drainage holes on aft open deck shall be in sufficient size to enable fast and quick drainage.
- 3.2.9 Profiles and extruding plate shall be used as far as possible instead of use fabricated scantlings to reduce welding deformations.
- 3.2.10 Thicker transom plate on outboard engine area shall be increased for bolting of propulsion engine instead of fabricated transom.
- 3.2.11 The keel structure shall be arranged to accommodate Vessel's dry docking and lifting requirements in the Government Dockyard and relevant dockyard in Hong Kong.
- 3.2.12 All materials and build processes for aluminium alloy construction shall comply with an approved standard. Their selection shall recognise the craft through life cycle and service conditions for ease of repair in the event of hull damage.

- 3.2.13 Major penetrations or access openings through the transverse hull bulkheads below the main weather deck level shall be avoided as far as possible. Cable penetrations shall be located as high and as far inboard as possible. Any and all penetrations through bulkheads below the main deck shall be fitted with RO approved devices and be so arranged to ensure the bulkhead to be entirely watertight and strength maintained.

3.3 Weld and Fabrication

- 3.3.1 All welding and fabrication shall be implemented according to the applicable requirements stipulated in Paragraphs 1.5.4 and of this Part VII.
- 3.3.2 All welder shall be qualified and certified as per ISO-EN 9606-2 standards.
- 3.3.3 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.
- 3.3.4 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. Cutting for edge preparation shall be performed by qualified persons to achieve the correct angle, shape and smooth finish of the edges, and to be inspected by RO. Only qualified welders shall perform the welding work. Certification of the qualifications of each individual welder shall be submitted to MD by the Contractor. Welds installed using unqualified procedures or welding performed by non-certified welders shall be subject to removal by the Contractor at its own expense.
- 3.3.5 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) Welding and inspection procedures identifying clearly the type and extent of non-destructive testing (NDT) inspection carried out on the Vessels' structure and to comply with RO requirement.
 - (e) Machining, measuring and inspection equipment maintenance and calibration;
 - (f) Finish surfaces and bolting;
 - (g) Procedures for non-conformance reporting and rectification of defects; and
 - (h) Design and manufacturing drawing control and procedures for revisions, updates and reissue of drawings.

Chapter 4 Deck Fittings & Equipment

4.1 Hatches

- 4.1.1 Removal hatches shall be provided for engine compartment and fuel oil tank compartment. The hatches could be either factory-made or products fabricated by contractor.
- 4.1.2 Removal hatches for engine compartment and fuel tanks space shall be with size sufficient enough to be able to remove equipment and tank inside the space easily, meanwhile keep 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.
- 4.1.3 Hatches shall be flush deck type, mounted by bolts or by hinge. A hold back device should be fitted for hatches mounted by hinge. The design and the arrangement of the flushed type watertight manhole shall be submitted to GNC for approval.

4.2 Manholes

- 4.2.1 Manholes shall be fitted to provide access to all void space/compartment below main deck and should be watertight, flushed and quick closing type, type approved by RO and in material similar to hull structure where it fitted with. These manholes to be has minimum clear opening of 400x600 mm.
- 4.2.2 The manhole/inspection hole fitted on liquid tanks such as petrol fuel tanks, fresh water tank, diesel oil tank and bilge tank shall be bolted type, in material same as the tank construction and in size suitable to the size of the tank it fitted.
- 4.2.3 The arrangement of the manhole shall be submitted to GNC for approval.

4.3 Doors

- 4.3.1 One door shall be located at the aft bulkhead of deck cabin.
- 4.3.2 The doors shall be RO approved outwardly opening weather tight type and in aluminium fabricated, with a window on top in size as much as possible that it could be accommodated.
- 4.3.3 The doors shall be starboard side open, fitted with manual means of stainless steel 316 locking accessories; and shall be able to be quick open from both inside and outside of the compartments.
- 4.3.4 The clear opening of the doors shall to be 700 mm in width. The clear height of upper door frame to be 1800 mm measured from aft open deck and with door sill as low as possible as RO accepted.
- 4.3.5 Stainless steel 316 grade hooks or other means to hold them in the fully open position shall be provided.
- 4.3.6 The exterior doors shall be fitted with high quality commercial-grade marine lever-type locksets. Three sets of key shall be provided.

4.4 Windows

- 4.4.1 Two fixed windows shall be fixed at forward of steering console. Two (2) large sliding windows shall be fitted at port and starboard side to facilitate direct downward viewing to the side of the Vessel.
- 4.4.2 Window shall be fabricated with frame of marine aluminium material complied with requirement of 3.1 of this Part VII, toughened glass of suitable thickness correspondent to

- the size of the windows and working environment of the vessel, built according to international norms and to be RO certified.
- 4.4.3 The glass on fixed window at front of cabin and on sliding type window at side shall be clear glazed type.
- 4.4.4 Window frame shall be as small as possible, and glue fitted to cabin structure.
- 4.4.5 The location and size of window shall be cope with position of the structure framing system. Deck cabin structure shall be so designed to enable the distance between window as small as possible.
- 4.4.6 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.
- 4.4.7 The window wiper on front window shall be swing type and the wiper on 1st sliding glass at side to be horizontal travel type.
- 4.4.8 The fresh water tank for window washing system shall be located in a dedicate locker arranged forward of the deck cabin and segregate from control consoles.
- 4.4.9 Wipers shall have an interval operation and adjustment functions. These wipers shall be capable of operating independently of each other. The type and make of wiper shall be submitted to GNC for acceptance before they are fitted.
- 4.4.10 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.
- 4.4.11 Retractable transparent solar UV roller blinds shall be installed on all front and side sliding 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.
- 4.4.12 All forward facing windows of superstructure shall be inclined forward and provide visibility free of any glare under all operating condition. The superstructure front windows shall be inclined from a vertical plane topside out to reduce unwanted reflection, at an angle of not less than 10° and not more than 25°.
- 4.4.13 Details of the all windows shall be submitted to GNC for approval and window glass thickness shall be verified in accordance with the submitted information before installation.

4.5 Air, Filling and Sounding

- 4.5.1 All void space and tank space shall be fitted with air vent for natural ventilation.
- 4.5.2 Petrol tank, fresh water tank, diesel oil tank and oily bilge tank shall be fitted with air vent leads up to open deck.
- 4.5.3 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.
- 4.5.4 Vent pipe shall be aluminium alloy material that shall comply with Paragraph 3.1 of this Part VII.
- 4.5.5 Filling pipe for fuel and water shall extrude above deck and not flashed to the deck.
- 4.5.6 Sounding cap / pipe shall be arranged on petrol oil tank to enable manually measure the fuel content in emergency situations.
- 4.5.7 Vents and filling pipes shall be recessed into the deckhouse side to give clear walk way on deck at side.

4.6 Fender

- 4.6.1 Fixed polyurethane (“PUR”) fender with a diameter of approx. 200 width x 300 height mm shall be fitted to cover the full length of the port and the starboard sides except the diver doors. The type of the fender to be agreed with GNC.
- 4.6.2 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.
- 4.6.3 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.
- 4.6.4 Total four (4) portable fenders shall be provided at port and starboard side with proper provisions for attachment to the Vessel.

4.7 Bitt & Cleat

- 4.7.1 The Vessel shall be provided with 6 sturdy mooring bitts arranged as per GA plan of this Part VII. The type of the mooring bitts shall be agreed and approved by GNC prior to installation.
- 4.7.2 Two cleats shall be arranged at collision bulkhead locations of the port and the starboard sides.
- 4.7.3 The forward and aft bits shall be used as towing or anchor bitts, with structure in vicinity to be suitable designed or reinforced to give sufficient safe coefficient for this function. Towing means to tow or to be towed by a sister vessel or other craft of similar size.
- 4.7.4 Bitt’s foundation and reinforcement structure shall utilize hull structure (transverse frame) as much as possible, with size of related scantling to be increased properly to comply with the local reinforced strength requirement other than the hull structure requirement.
- 4.7.5 Calculation of the horizontal load shall be in accordance with the requirements of ISO 15084 or other equivalent international standards.

4.8 Mast

- 4.8.1 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.
- 4.8.2 The mast shall be fold-up or detachable type to be able to accommodate all the navigation lights and lights indicating types of operation.
- 4.8.3 The mast height shall be as low as possible provided to comply with signal lights fitting heights requirement.
- 4.8.4 The total air draught shall be maximum 2.95 m.
- 4.8.5 The masthead light shall be carried at least 1 m higher than the sidelights in accordance with the requirement of Paragraph 2(d) in Annex I to “Merchant Shipping (Safety) (Signals of Distress and Prevention of Collisions) Regulations” (Cap. 369N).
- 4.8.6 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.
- 4.8.7 Method and working principle of lightning protection shall be submitted to GNC for approval before the installation.

4.9 Handrails and Ladders

- 4.9.1 Hand rails shall be provided on deck cabin roof around the open deck at side, deck at bow, top of bulwark on aft open deck as indicated in GA plan of this Part VII.
- 4.9.2 Two (2) Grab rails shall be positioned internally inside deck cabin and in longitudinal directions. The grab rails inside deck cabin to be firmly fixed and attached to the roof structure.
- 4.9.3 The hand rails on external shall be in marine aluminium alloy welded to the hull structure, and internally shall be in stainless steel of 316L grade bolted to the hull structure.
- 4.9.4 Handrail shall be made of pipe with suitable size as agreed by GNC. Hand rail on foredeck to be in Y or T shape with the height to be 1,000 mm from the deck. Horizontal section of the foredeck handrail shall be in stainless steel chain form in order to increase less obstruction view from the coxswain.
- 4.9.5 The arrangement of these handrails and grab rails shall be submitted to GNC and AFCD for approval.
- 4.9.6 Vertical ladders, if provided, shall be constructed with non-slip purpose with suitable step space intervals including but not limited to adequate footsteps and handholds for safe access to the compartments and locations of equipment.

4.10 Aft Open Deck Area

- 4.10.1 A removable awning structure with durable canvas or equivalent material to cover the aft open deck area to be provided. The contractor is required to submit the canvas or equivalent sample material and the colours sample of the material to GNC for approval prior to installation.
- 4.10.2 All exterior deck areas shall be covered by an appropriate anti-slip surface for boarding / landing and deck covering requirements. The anti-slip paint shall not be made of a mix of paint and added grit material (“sand”) and shall be to GNC’s satisfaction.
- 4.10.3 Four (4) foldable fibreglass reinforce plastic (“FRP”) seats to be provided at the end of the aft deck area. The seats material to be ultraviolet radiation proof type and durable to hot and damped weather condition in Hong Kong waters.

4.11 Survivor Recovery Door (Diving Door)

- 4.11.1 Survivor recovery door shall be arranged on aft open deck at both sides to facilitate a safe and efficient recovery of a person in the water by on board crew or for diving operation.
- 4.11.2 The door shall be simple designed, lift or swing type (180° open angle), and in structure similar-to and consistent with bulwark structures.
- 4.11.3 The width of doorway shall be at least 1,000 mm.
- 4.11.4 Suitable tightness measures shall be arranged to maintain the weather tightness functions to avoid water ingress during vessel sailing.

4.12 Anchor, Chain, and Windlass

- 4.12.1 The Vessel shall be equipped with one hot dip galvanised or stainless-steel anchor and suitable swivel, shackles and secured stowage shall be provided by the Contractor.
- 4.12.2 Two 30 m long 20 mm diameter braided nylon warps for anchoring and towing shall be provided.
- 4.12.3 Two 30 m long 16 mm diameter nylon warps for mooring shall be provided.

- 4.12.4 An electric motor driven mooring windlass shall be equipped.
- 4.12.5 All anchor, mooring rope, chain, windlass shall be certified by either RO (where applicable) or maker (where not applicable).

4.13 Lifting Points

- 4.13.1 The Vessel shall be provided with 4 strong point for lifting the boat for docking, storage, inspection and maintenance purposes by wire and shackle.
- 4.13.2 The strong point shall be designed in suitable locations correspondent to the vessel centre of gravity, with suitable location reinforcement designed integrity to the hull structure.
- 4.13.3 Lifting slings shall also be provided. Any attachments of the lifting slings shall be constructed with stainless steel.
- 4.13.4 The lifting strong points shall be designed with sufficient safety factor to prevent material yield of the strong point or surrounding structure in a welded condition.
- 4.13.5 Detailed drawings of the lifting arrangements shall be approved by the RO or other entities acceptable by GNC.
- 4.13.6 All lifting appliances shall be properly certified by a Registered Professional Engineer (“RPE”) registered in Hong Kong and accepted by MD, and a Registry of Lifting Appliances and Lifting Gear is shall be provided and endorsed by the RPE in accordance with the applicable laws and regulations. (Merchant Shipping (Local Vessels) (Works) Regulation - Cap. 548I)

4.14 External Fire-fighting System (EFFF) (for two vessels only)

- 4.14.1 The EFFF shall be designed solely for marine fire-fighting operation. The performance and functional tests of EFFF shall be included as part of Technical Acceptance.
- 4.14.2 The EFFF shall meet the following requirements:
 - (a) One electric-priming petrol engine driven fire pump rated flow of at least 800L/min at discharge pressure of not less than five (5) bar shall be mounted securely on deck or in engine compartment from bottom sea chest via a sea valve.
 - (b) The water shall be discharged to an underdeck fixed piping and connected to fire-fighting monitor. The design and piping arrangement of the EFFF shall be discussed at the kick-off meeting and submitted to GNC for approval before installation.
 - (c) The petrol engine should equip with her own fuel tank with capacity to support the pump in operation for at least 1 hour.
 - (d) The fire main pipes shall be generally constructed with marine grade stainless steel 316 pipe unless certain portion shall be connected with aluminium deck.
- 4.14.3 Fire Pump
 - (a) The fire pump shall be fitted and connected to an independent sea suction as per Paragraph 7.9.3 of this Part VII. Suction and discharge pressure gauges, safety valves and any other gauges and fittings fitted shall be provided and fitted.
 - (b) Fire pump shall be with copper alloy casing, copper alloy impeller, stainless steel leaf wheel shaft, has good corrosion resistance.
 - (c) The fire pump shall be equipped with a key rotates on and off.
- 4.14.4 Water Suction, Discharge and Sea Chest
 - (a) The piping system of water suction shall be designed to avoid cavitation.

- (b) The suction arrangement for the fire pump shall include a sea chest with screened inlet. The sea chest shall only be used solely for fire-fighting purpose. A valve shall be provided at suction inlet of the fire pump to enable the cleaning of debris from sea in vessel afloat condition.
- (c) Sea water inlet and sea chest shall be arranged and located at position as low as practical to avoid clogging due to debris from sea. The sea water inlet suction shall not be impeded by ship motions or water flow from the outboard engines.
- (d) The sea water inlet at sea chest shall be fitted with strainer the Vessel's shell. The strainer plates shall possess a clear area at least twice that of the sea valves. The edges of strainer plate slots or holes shall be rounded to prevent the cavitation.
- (e) Sea water pipe at suction end of fire pump could be copper nickel pipe or stainless steel 316 pipe.

4.14.5 Fire-fighting Monitor

- (a) The manual operated fire-fighting monitor shall be installed at the stern open deck of the Vessel to allow an unobstructed range of operation in preventing monitor jets from impinging on Vessel structures and equipment.
- (b) 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. Calculations demonstrating adequacy of the design, including water jet reactions specified by the monitor's manufacturer, shall be submitted to GNC before installation for consideration.
- (c) The monitor shall be constructed with corrosion-resistant material. It shall be capable of achieving (i) at least 135° vertical travel (-45° to +90°) controlled by lever and twist lock mechanisms and (ii) not less than 240° horizontal rotation.
- (d) The monitor shall be fitted with waterjet spray nozzle.

4.15 Lifting Davit (for two vessels only)

- 4.15.1 A marine grade aluminium alloy davit boom with electric winch hoisting capacity of lifting at least 150 kg shall be installed at the starboard side aft of the stern area.
- 4.15.2 The davit shall be rested on aft bulkhead of deck cabin when not in use and suitable fastened to avoid strike on deck cabin due to slack.
- 4.15.3 The davit working range shall be 180 degrees from aft bulkhead of deck cabin to outboard of stbd. The slewing out shall be operated by suitable designed manually operated gear, and shall be fixed safely at any position within the operating range.
- 4.15.4 The boom shall be effectively connected to the adjacent deck cabin structure.
- 4.15.5 The davit shall be load tested and certificate or test statement to be issued by RO or other entities accepted by GNC.
- 4.15.6 All lifting appliances shall be properly certified by a RPE registered in Hong Kong and accepted by MD, and a Registry of Lifting Appliances and Lifting Gear shall be provided and endorsed by the RPE in accordance with the applicable laws and regulations. (Merchant Shipping (Local Vessels) (Works) Regulation - Cap. 548I).

4.16 Diver Equipment (for two vessels equipped with lifting davit only)

- 4.16.1 Diving ladders and 10 foldable racks of 210 mm for diving air bottles shall be provided.
- 4.16.2 Ladder shall be installed at diver door at both sides when in use, the lowest rung of the ladder shall be a minimum of 500 mm below the waterline. Ladder/stairs rungs and steps shall be of an anti-slip type.

- 4.16.3 Foldable rack for air bottle shall be fastened on aft open deck via suitable designed lashing point prefabricated into deck structure.
- 4.16.4 The details of diver ladder, bottle rack and positions shall be submitted to GNC and AFCD for approval prior commence of fabrication.

4.17 Towing Winch (for two vessels only)

- 4.17.1 Two (2) of the six (6) vessels shall be equipped with towing winch, either hydraulic or electric type, for the purpose of towing fish nets found at seas.
- 4.17.2 The towing winch with minimum 250 kg driven power and 2,000 kg holding power, shall be made of stainless steel or other similar material that is suitable to be used on small vessel.
- 4.17.3 The winch shall be installed at one side of aft open deck close to the aft bulkhead of deck cabin, towing the fish nets via the diving doors when opened. Details of the towing winch and the towing line protective device shall be discussed on kick off meeting with GNC.
- 4.17.4 The design and calculation of the towing winch shall be approved by RO or other entities accepted by GNC. All lifting appliances shall be properly certified by a Registered Professional Engineer (“RPE”) registered in Hong Kong and accepted by MD, and a Registry of Lifting Appliances and Lifting Gear is to be provided and endorsed by the RPE in accordance with the applicable laws and regulations. (Merchant Shipping (Local Vessels) (Works) Regulation - Cap. 548I).

4.18 Interceptor

- 4.18.1 An automated interceptor system should be installed, to include automatic trim control, list control and coordinated turn control. [D]
- 4.18.2 The system shall optimise trim for performance and control roll through turns to help prevent skidding.
- 4.18.3 The system shall be capable of being turned off and there shall be a method of altering the aggressiveness of the system from the console.
- 4.18.4 All control systems shall include a GPS for automatic retract of the blades when the boat slows down.
- 4.18.5 The automated interceptor system shall possess an automatic cleaning function to eliminate problems associated with marine growth ensuring efficiency even after extended time in the water.

4.19 4.19 Cathodic Protection

- 4.19.1 Sacrificial anodes shall be installed on the hull and outboard engine in accordance with engine maker’s recommendation.
- 4.19.2 The hull shall be provided with adequate cathodic anode protection to maintain the vessel against corrosion for not less than one year.
- 4.19.3 Recess space shall be arranged for installation of anode if the anode to be installed on bottom of the vessel as per calculation.

Chapter 5 Deck Cabin & Interior

5.1 Deck Cabin Arrangement

- 5.1.1 The outside configuration of the superstructure shall be of a design that deflect rain and seawater during heavy weather; and to provide practically all-round visibility at the steering/helm position of the console area. Pillars are not allowed to be fitted inside the accommodation area.
- 5.1.2 The deck cabin, including fitting of equipment fixture shall be designed and arranged so as to protect the crews and persons from weather and sea conditions, and aims to minimise risk of injury.
- 5.1.3 A central control console shall be arranged at forward of the cabin to accommodate steering wheel, engine monitor gauge, alarm and signal panels, radio and navigational equipment, etc.
- 5.1.4 The deck cabin shall provide two (2) swivel dampening seats for crew at fwd. of the cabin, one for helm man (at starboard side) and one for deck crew (port side).
- 5.1.5 Two (2) long coach/sofa shall be provided for carry of six (6) passengers.
- 5.1.6 The cabin shall be designed with an arc roof, with a clear headroom of 2.0 m in centre passages.
- 5.1.7 Windows on deck cabin shall comply with the requirements stipulated in Paragraph 4.4 of this Part VII.

5.2 Seating

- 5.2.1 Two damping seats to be provided for the two (2) crews on board and each seat shall comply with the following requirements:
 - (a) Equipped with hydraulic damp, shock reducing type;
 - (b) Fitted with adjustable shock absorbers for light/heavy personnel;
 - (c) Four-point safety belt;
 - (d) A head and arm rest;
 - (e) An adjustable footrest;
 - (f) Able to adjust height, fore, after and turn able; and
 - (g) High density foam cushion covered by water resistant upholstery material.
- 5.2.2 Two settees, each accommodates for three (3) persons shall be provided at each side of the cabin inside the superstructure. A foldable table to be provided for each side settees.
- 5.2.3 The settees shall be fabricated by aluminium alloy plate or other fire retarding composite material. Locker space to accommodate life jackets shall be provided under the settees.
- 5.2.4 The cushion of settees shall be fabricated with high density, fire self-extinguishing type foam core of 100 mm thickness, e.g., urethane foam to BS3379 or equivalent, covered by black colour upholstery of either genuine leather, or fire retarded lamination leather.
- 5.2.5 All seats shall be strongly secured against 45 degrees inclination in all directions when all seats are occupied by sitting persons.

5.3 Steering Console

- 5.3.1 The steering console shall be constructed with marine grade aluminium alloy plate.
- 5.3.2 The layout of the console shall be submitted for MD's approval before any construction work on the consoles commences. To facilitate the efficient visualisation and inspection of the design of the console, full size mock-up consoles complete with deck plate, seats, mounting systems and any other fixtures that may influence the final design of the console shall be manufactured for inspection, modification (if necessary) and confirmation by MD and AFCD. The console of an existing craft may be used as the basis for initial discussions.
- 5.3.3 The console's design shall be optimised ergonomically so that a coxswain of an Asian stature (approximately 1.70 metres in height) can operate the controls and displays for extended periods from both the seated and standing positions without incurring unnecessary physical strain.
- 5.3.4 The layout of the controls and displays shall be designed to ensure that the coxswain's left-to-right viewing angle from both the seated and standing positions does not exceed 190 degrees.
- 5.3.5 The controls or displays of the following equipment shall be installed in the console and located in front of the coxswain in natural positions, with the highest priority devices being located in prime positions:
- (a) Helm;
 - (b) Engine throttle control head;
 - (c) Engine control and monitoring as per Paragraphs 7.2.10 and 7.2.12 of this Part VII;
 - (d) Electric generator control panel as per Paragraph 7.5.8 of this Part VII;
 - (e) Bilge control display panel with alarm;
 - (f) Fire detection system for engine space;
 - (g) Interceptor control unit;
 - (h) Gasoline oily water separator alarm;
 - (i) Loudhailer control unit and microphone;
 - (j) A magnetic compass fitted with an independent dimmer switch, installed on the top of the console in line with the coxswain's line of sight dead ahead;
 - (k) Electric horn;
 - (l) Siren and flashing beacon control panel;
 - (m) Navigation lights, search light and flood lights switch panel;
 - (n) GPS receiver;
 - (o) Level gauge for gas fuel tank, diesel oil tank, fresh water tank and oily bilge tank;
 - (p) CCTV monitor for viewing the stern and aft deck area; one back mirror to be installed outside the side of the two front windows. The exact location to be discussed with GNC and AFCD officers; and
 - (q) Two (2) multi-function radar combined with electronic chart display screen of at least 9 inches.

- 5.3.6 The instrument panels and display screens of the console shall be located at or below sitting eye height. All controls shall be operable when wearing normal uniform with foul weather gear and lifejacket.
- 5.3.7 The console shall be positioned between elbow and shoulder height with the following features:
- (a) All indication lights, illumination of instrumentation gauges and panel lighting shall be fitted with dimmer for day and night operation;
 - (b) The arrangement shall be designed to protect the crew and persons on board from injury inflicted by the console and the equipment installed;
 - (c) Sufficient legroom shall be provided to obviate the risk of impact injury during rough weather or violent manoeuvres in both the seated and standing position; and
 - (d) The surfaces of console tops and instruments shall have dark glare-free colours. Surface finishing and interior linings of the steering console shall be of a matt non-reflecting finish to facilitate night operation.

5.4 Insulation & Lining

- 5.4.1 The floor of deck cabin space shall be covered with non-skid, wear resistance and fire-retardant vinyl PVC sheets that are acceptable to GNC officers. Colour of the floor covering shall be agreed by GNC.
- 5.4.2 Boundaries and ceilings inside the superstructure shall be properly insulated against weather heat and temperature, with not less than 50 mm thick glass-fibre wool; and be lined with protective/decorative panel linings of hard-wearing surface and water sealing.
- 5.4.3 The noise level in the superstructure shall not exceed **80** dB when the Vessel is operating at all speeds. The Contractor shall make all reasonable efforts to minimise noise and vibration in the Vessel.
- 5.4.4 Panels of wall, ceiling panels 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.
- 5.4.5 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.
- 5.4.6 Colour of the lining material shall also be agreed by GNC.

5.5 Misc. Fittings

- 5.5.1 The crew space within the superstructure shall be installed with:
- (a) four (4) 220V AC wall mounted oscillation fans;
 - (b) one set of open shelves for the stowage of log books and files;
 - (c) one dial type inclinometer and one thermometer for marine use;
 - (d) one metal rubbish bin with cover shall be stored inside a cabinet/locker;
 - (e) one metal box for keys shall be provided and fitted inside the superstructure;
 - (f) one electric powered marine wall-mounted clock;
 - (g) two cup holder for two crew;
 - (h) one approved type first aid box;

- (i) twelve (12) coat-hooks;
- (j) one framed safety plan of appropriate size;
- (k) one waterproof and fog proof 7x50 Marine binoculars for day time use shall be provided; and
- (l) a number of storage lockers.

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. 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;
- (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.

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 generator 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 generator 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, generator set, air-con, fuel oil tanks etc. shall be carefully designed to enable their removal from the vessel 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 petrol and diesel oil lines run between the console, fuel tanks and the stern 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 twin electrically started four stroke petrol outboard marine engines of adequate power for the Contract Speed. The engines shall drive stainless steel fixed pitch propellers through the integral gearboxes. [E]
- 7.2.2 The contractor shall be responsible for the ensuring the correct installation and setting up of the engines including the choice of propellers to avoid vitiation and cavitation.
- 7.2.3 The declared (rate) power of propulsion engine shall be the full throttle power at the declared (rated) speed at the final output shaft of the engine or propulsion system as offered for sale by the manufacturer. The power measurements and declarations for the engines and the propulsion system shall comply with the requirements in accordance with international council of marine industry associations (ICOMIA) 28/83.

- 7.2.4 The emission of the engine shall comply with 3 stars (Ultra-low emission) or higher required by the California air research board star system that describes exhaust emission of four stroke outboard engine or equivalent. [E]
- 7.2.5 Each of the engines shall be controlled by one set of throttle/forward/reverse lever. The two levers shall be conveniently placed for one hand simultaneous operation by the coxswain.
- 7.2.6 The engines throttle control head shall be provided on the right-hand side of the steering wheel
- 7.2.7 The engines shall be equipped with power trim. And a switch at the helm that enables the operator to adjust the trim angle on the fly. The engines shall be designed to trim fully in to start, and trimmed out as the boat gains momentum, until it reaches the point just before ventilations begin.
- 7.2.8 The engine located at the transom shall be easily accessed for maintenance and routing checking even underway. Working platform(s) for engine maintenance purpose shall be fitted.
- 7.2.9 The electrical cables, piping for petrol and hydraulic oil run between the console/fuel tanks and the stern shall be suitably designed to ease the maintenance. They shall be properly supported/fastened to prevent chafing and unnecessary tension. These cables and pipes are preferable to be run above cabin deck at side under the sidewalks, and to be run under the open deck at stern to enable a clear open working area.
- 7.2.10 Each engine system shall include the following accessories:
- (a) 12V electrical system c/w alternator and remote starting control;
 - (b) Dead-man switch/emergency cut off;
 - (c) Power trim and tilt system with trim gauge at console;
 - (d) Engine protection system as required by engine manufacturer, with audio and visual warnings at console;
 - (e) Each engine shall incorporate one alternator for battery charging; and
 - (f) Engine tie bar with each pair of engines.
- 7.2.11 The engine shall be installed in accordance with the engine manufacturer's instructions and requirements.
- 7.2.12 The tenderer shall supply the Vessel with a comprehensive vessel information and display on the displays located at the console, the information including but not limited to the following:
- (a) Engine rpm;
 - (b) Engine running hours;
 - (c) Oil temperature and pressure;
 - (d) Fuel tank level gauge;
 - (e) Battery voltage;
 - (f) Course and speed; and
 - (g) Engine faults and notification alarms.

7.3 Propeller

- 7.3.1 All propellers shall be of stainless steel with fixed pitch. Removable propeller shrouds shall be provided for propellers but not be fitted during the official speed trial. Detachable propeller guard for each propeller of outboard engine shall be provided.

7.4 Steering System

- 7.4.1 The electro-hydraulic steering system shall be designed and approved by the engine manufacturer and approved by the RO. One hydraulic power pumps shall be provided with sufficient capacity to fulfil the steering requirements for the number of engines installed. [E]
- 7.4.2 The hydraulic steering system shall be designed with two hydraulic cylinders operating in parallel. The steering capability must be maintained with one cylinder malfunctioned. If the electrical power supply of the hydraulic power pump system fails or the hydraulic oil supply to the hydraulic steering system fails, the steering system shall continue to function in emergency manual steering mode.
- 7.4.3 A redundant system with independent power supply shall be provided to maintain the vessel steering capability in case of main power supply failure.
- 7.4.4 Outboard engines shall be designed so that, with any combination of engine turn and tilt, there shall be no damaging interference between the motor, its accessories, and both the craft-mounted and the engine mounted system.
- 7.4.5 Connections, fittings, oil fill openings and air bleeders shall be accessible with all engines and systems fitted and installed.
- 7.4.6 Component in the system shall be externally protected against corrosion. The complete hydraulic steering system shall be designed to withstand conditions of pressure, vibrations, shock and movement without failure or leakage.
- 7.4.7 Hydraulic system shall be capable of operation throughout an ambient temperature range of -10C to +60C and be capable of withstanding storage at -30C to +60C.
- 7.4.8 Material used in hydraulic steering system shall be resistant to deterioration by liquids or compounds with which the material may come in contact under normal marine service, e.g. grease, lubricating oil, hydraulic fluid, common bilge solvents, salt and fresh water.
- 7.4.9 The type of hydraulic fluid shall 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.
- 7.4.10 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.
- 7.4.11 A flexible section shall be installed between rigid piping and hydraulic cylinder(s).
- 7.4.12 The hydraulic piping shall be in stainless steel 316L in thickness comply with one of the RO requirements as specified in Schedule 9 of Part V for the Vessel. The joint on hydraulic pipe line shall be screw type and shall be kept as low as possible.
- 7.4.13 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.
- 7.4.14 The steering wheel shall be covered with an anti-slip covering material.

- 7.4.15 The position of the helm shall be optimised ergonomically so that a coxswain of an Asian stature (approximately 1.70 metres in height) can use it for extended periods from both the seated and standing positions without incurring unnecessary physical strain. The helm shall be fitted with an anti-slip covering and be of a size acceptable to MD and AFCD. Operation of the throttle levers and other controls by gloved hands shall not be impeded by the size or position of the helm. The helm shall be user-adjustable for rake.

7.5 Generating Set

- 7.5.1 One electrically started, fresh water cooled diesel engine shall be integrated with 220 Voltage (“V”) alternating current (“AC”) single phase alternator to be installed on the Vessel (collectively, “electric generating set” or “electric generator”). This generating set shall be self-excited, brush-less, ventilated type and of proprietary makes with sound shield. The generating set shall be installed in engine compartment. Detection for the fire or smoke in engine compartment shall be provided. [E]
- 7.5.2 The capacity of the electric generating set shall be able to supply all electricity necessary to ensure that normal operational conditions of propulsion and safety can be achieved.
- 7.5.3 The electric generator shall be DC battery started, alternator to be drip proof construction, and its starting/stopping and on-loading shall be manual means.
- 7.5.4 One 220V single phase power supply to the electrical equipment from the distribution board shall be through circuit breakers. The distribution system for 220V AC shall be insulated with two wires.
- 7.5.5 The electric 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 not less than a 15% reserve margin but not less than 6 kW; 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 set is supplying full operational electrical load including air conditioning running at full capacity of the whole Vessel.
- 7.5.6 Electrical load analysis and calculations shall be approved by the RO before submission to GNC.
- 7.5.7 The exhaust of the electric generating set shall be arranged with a water-lock/lift-silencer with a view to reducing its noise levels.
- (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. The generator set exhaust system shall be arranged to provide reasonable access to engine room machinery.
 - (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 to be based on manufacturer / appropriate industrial standard.
- 7.5.8 The design and installation of the electric generator 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 generator 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 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 100% 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 generator 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.
- 7.5.9 The controls and instrumentation of the electric generator set shall be designed for one-man operation in the steering console, the instrumentation and controls in the console shall be comprehensive and shall include:
- (a) Remote start and stop;
 - (b) Tachometer with running hour meter;
 - (c) Cooling water temperature gauge;
 - (d) Lubricating oil pressure gauge;
 - (e) Battery charger voltage meter;
 - (f) Fault indicating alarms;
 - (g) Protective devices such as overspeed, low lubricating oil pressure trip etc. as recommended by the engine manufacturer; and
 - (h) A standard manufacturer’s local control panel to be fitted in the engine compartment.
- 7.5.10 The local control panel of the electric generator set in engine compartment shall contain the following devices:
- (a) Start / stop push buttons to be fitted with guard cover and running / stop indication lamp for the generator set; and
 - (b) Volt-metre for the generator set.
- 7.5.11 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 Air- Conditioning System

- 7.6.1 A Proprietary Make split-type air-conditioner system including indoor and outdoor units for the deck cabin shall be provided.
- 7.6.2 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.

- 7.6.3 The temperature inside the deck cabin shall be maintained at 24°C for 60% relative humidity when the external ambient air temperature is 38°C at 85% relative humidity with full crew and full carrying capacity 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.
- 7.6.4 The supporter rack for outdoor unit shall be provided. Removable covers shall be provided for protection the external unit of air-conditioner from sunlight / rain.
- 7.6.5 The refrigerant shall be CFC and HCFC free and non-flammable.
- 7.6.6 'on' and 'off' switches of the air conditioner system shall be installed in the steering console.
- 7.6.7 Bacteria resistant replaceable filters shall be fitted at air inlets.
- 7.6.8 Sufficient fresh air induced to the air-conditioned area which shall be not less than 25 m³/hour per person so as to keep the carbon dioxide ("CO₂") level low enough for health reasons.
- 7.6.9 Sufficient ventilation fans shall be provided in the deck cabin in case of air-conditioning breakdown.
- 7.6.10 The water drain system of the indoor units shall be designed to prevent water leakage inside the deck cabin.

7.7 Engine Compartment Ventilation

- 7.7.1 Engine compartment shall be naturally vented, with two vent ducts and louver cover system of suitable size to be arranged on aft open deck to ensure the proper operation of the electric generator set and /or fire pump set.
- 7.7.2 Calculation for the capacity of the vent ducts to meet the minimum air changes requirements shall be submitted to the RO for approval.

7.8 Fuel Oil System

- 7.8.1 Fuel piping system for outboard petrol engine for propulsion, and diesel generator for electrical supply shall be provided separately.
- 7.8.2 For vessel equipped with gasoline engine driven fire pump the engine attached gasoline tank shall be sufficient to support engine operation of at least 1hour.
- 7.8.3 The Two outboard engines shall have an independent fuel line come out from the petrol oil tank, with a ball stop valve at tank end which shall have an emergency stop mechanism which allow them to be closed from the aft deck. The emergency stop mechanisms shall be located under a cover that can be locked and shall be clearly marked.
- 7.8.4 Fuel filter and water separator recommended by engine manufacturer shall be provided for each individual fuel supply line and the water separator shall have water alarm device.
- 7.8.5 A refuelling pipe shall be installed for each oil tank on one side of the vessel. The refuelling pipes shall have caps that can be locked.
- 7.8.6 Fuel filling system / pipes shall be designed to avoid blowback of fuel through the fill fitting when filling at a rate of 30 litres/min at between 1/4 and 3/4 full of the tank capacity.

- 7.8.7 The fuel supply and filling pipe shall be of stainless steel 316L or equivalent and 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.
- 7.8.8 Screw type joint shall be applied on fuel lines subject to acceptable and approval by RO.
- 7.8.9 All metal components in fuel system in contact with fuel shall be grounded properly, grounding wires shall not be clamped between a hose and its pipe or spud.
- 7.8.10 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 condition and storage.
- 7.8.11 All materials used in fuel systems shall be resistant to deterioration by its designated fuel and to other liquids or compounds with which it may come into contact under normal operating conditions, e.g., grease, lubricating oil, bilge solvents and sea water.
- 7.8.12 Flexible pipes of approved type shall be used as short joining lengths to the engine where necessary.
- 7.8.13 Electrical component/device/cable shall be avoided to be installed or run through petrol oil tank space as much as possible. In case it is unavoidable, suitable ignition protection measures to be taken to the satisfaction of GNC.
- 7.8.14 The space containing the fuel oil tank shall be fitted with two ventilating pipes of arrangement comply with rules of RO and acceptable by GNC.
- 7.8.15 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.
- 7.8.16 Petrol oil tank
- (a) An independent petrol oil tank shall be located underdeck void compartment and is made of stainless steel grade 316L.
 - (b) The total capacity of the petrol oil tank shall be sufficient to fulfil the endurance requirements as specified in Paragraph 2.7.2 of this Part VII. [E]
 - (c) Air vent with light weight flame trap shall lead to open deck.
 - (d) Inspection hatch shall be arranged with size allow proper inspection of entire tank interior.
 - (e) The tank scantling shall sustain the loads due to the mass of the full tank with consideration given to accelerated force due to vessel operation at all speed at sea, without damage the tank and ship structure. Swash plates shall be installed inside the tank to prevent excess movement of the petrol oil during the operation of the vessel.
 - (f) The tank shall be subject to hydraulic test to at least 2.5m water pressure head above highest point of tank top or to the height of the overflow whichever is higher. The static test pressure shall be applied for 5 minutes without pressure drop.
 - (g) Baffle openings shall be designed so that they do not prevent the petrol oil flow across the bottom or trap vapour across the top of the tank.
 - (h) The petrol oil content gauge of explosion prove type, certified by RO and accepted by GNC shall be arranged and the tank gauge reading shall be available on the control console.
 - (i) A sounding cap shall be arranged to enable sounding and measure of tank level in case the tank level is failure.

- (j) The petrol oil tank shall have a low-level alarm. The alarms will be connected to vessel's alarm centre. The alarm sensor shall be set to give an alarm for either tank when the petrol oil volume in the tank is less than 20%.
- (k) The thickness of the construction material shall be sufficient to sustain the loads due to the mass of the full tank without damaging the integrity of the tanks with due consideration given to the effects of vertical acceleration due to the Vessel's movements at maximum speed at sea.
- (l) The tanks' supports, chocks or hangers shall either be separated from the surface of metal tanks by non-metallic, non-hygroscopic, non-abrasive material or be welded to the tanks.
- (m) The tank shall be designed and installed to prevent water from being trapped on the exterior surface.
- (n) Breather pipes from fuel tanks shall not be a stepping hazard for crew moving about the Vessel.

7.8.17 Diesel oil tank

- (a) An independent diesel oil tank shall be located in engine compartment and is made of stainless steel grade 316L.
- (b) The total capacity of the tank shall be sufficient to fulfil the endurance requirements as specified in Paragraph 2.7.2 of this Part VII.
- (c) Air vent with light weight flame trap comply with RO requirement shall be arranged to lead to open deck.
- (d) A RO approved glass type tank level gauge shall be fitted. A sounding cap shall be arranged to enable sounding and measurement of tank level in case the tank level is failure.
- (e) Inspection hatch shall be arranged with size allow proper inspection of entire tank interior.
- (f) The fuel tank scantling shall sustain the loads due to the mass of the full tank with consideration given to accelerated force due to vessel operation at all speed at sea, without damage the tank and ship structure.
- (g) The tank shall be subject to hydraulic test to at least 2.5m water pressure head above highest point of tank top or to the height of the overflow whichever is higher. The static test pressure shall be applied for 5 minutes without pressure drop.
- (h) Baffle openings shall be designed so that they do not prevent the fuel flow across the bottom or trap vapour across the top of the tank.

7.9 Seawater System

- 7.9.1 Sea water piping / system shall be provided for the electric generator, and the gasoline engine driven fire pump separately. (For the two vessels which equipped with fire monitor).
- 7.9.2 Bottom lead through shall be provided for electric generator for the intake of cooling sea water. The bottom lead through shall have a positive self closing valve connected to the vessel bottom plate. A filter shall be installed between valves on the sea water pipeline which is connected to the electric generator. The discharge of sea water cooling pipe shall be directed to vessel shell plate after passing through a positive closing shell valve with at least 300 mm distance above full loaded water line.
- 7.9.3 For the gasoline fire pump, a sea chest shall be fabricated with positive self closing valve fitted on sea chest, and sea water pipe shall be arranged to lead to the suction end of fire pump.

7.9.4 Strainer shall be provided at sea water suction pipe for electric generator, and fire pump suction sea chest, with clear area sufficient and suitable to the sea suction pipe diameter. A suitable strainer with isolation valves and air vent shall be fitted to each seawater system. Due consideration shall also be given for quick and easy access to the seawater strainers.

7.9.5 Seawater piping shall be constructed of stainless steel 316L or copper nickel pipe. All sea valves shall be compatible with the hull material, connected to the sea chests shall be tested according to RO Requirements.

7.10 Fresh Water System

7.10.1 One independent tank of stainless steel – grade 316L for fresh water with a total capacity of not less than 150 litres shall be arranged in the Vessel for supply fresh water for deck washing.

7.10.2 The fresh water tank shall be designed to easily accessible for maintenance. The tank shall be subject to hydraulic test to at least 2.5 metres height of water pressure above the highest point of tank top or the point of the overflow whichever is higher. The static test pressure shall be applied for at least 5 minutes without pressure drop. 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; and
- (e) A tank content level gauge in liters and low-level alarm shall be fitted on the steering console station.

7.10.3 Piping for fresh water system shall be stainless steel – grade 316L. The screw type joint is acceptable on the domestic fresh water piping. If the welding joints is applied on the domestic fresh water piping, it shall be free from lead. The domestic fresh water from the fresh water tank shall be free from any substance harmful to health and shall comply with the Government requirements for domestic water.

7.10.4 One cock shall be arranged on aft open deck for deck washing purpose.

7.10.5 The freshwater tank shall not be directly adjacent to any other tanks carrying liquid of any kind.

7.10.6 The impressed unit shall be provided with a starter, pressure switch, pressure gauge, relief valve and suction valve. The freshwater pump shall maintain the pressure automatically.

7.11 Bilge System

7.11.1 Individual electrically operated bilge pump shall be installed in each watertight compartment and manually controlled. The capacity of these bilge pump shall comply with RO requirement.

7.11.2 A separate bilge discharge / pumping system shall be arranged in engine compartment as per Paragraph 7.11.7 of this Part VII.

7.11.3 Bilge pump in petrol oil tank spaces shall be intrinsically safe explosive proven type approved by RO that would be able to pump bilge water either overboard or ashore.

7.11.4 The discharge of bilge water shall be directed through shell plate at locations and height accepted by RO. All hull lead through shall have swan necks or non-return valves according to the requirements of RO.

- 7.11.5 Alarm system is equipped with both light and loud alarm signals and indicated on panels arranged on control console.
- 7.11.6 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.
- 7.11.7 A marine grade aluminium alloy bilge water holding tank of capacity according to the requirements of RO shall be provided in engine compartment where the electric generator was arranged.
- 7.11.8 The bilge of the engine compartment shall lead to a bilge water holding tank. An electric motor-driven pump fitted in this compartment with associated piping shall be provided in pumping out bilge water ashore or to the bilge water holding tank. In emergency case, the bilge in engine compartment could be direct discharge to the sea by the bilge pump described in Paragraph 7.11.1 of this Part VII.
- 7.11.9 Bilge piping shall be of mariner grade aluminium alloy with thickness schedule shall comply with RO requirement.
- 7.11.10 A hand pump with capacity accepted by RO shall be provided on board, with hose of sufficient length to enable the pumping out of bilge water in emergency when all bilge pump system mentioned in Paragraph 7.11.1 of this Part VII are failed.

7.12 Piping System General

- 7.12.1 Pipe's connection and bending:
 - (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.
- 7.12.2 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.
- 7.12.3 Suitable provision for expansion shall be made, where necessary, in each range of pipes.
- 7.12.4 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.
- 7.12.5 Watertight bulkheads, decks or structural members having pipeline penetration shall be designed and compensated in accordance with RO Requirements.
- 7.12.6 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.

7.12.7 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:

Fire main	Red
Sea Water	Dark green
Fuel Oil	Dark brown
Lube Oil	Striped black/yellow
Fresh Water	Blue
Hydraulic Oil	Orange

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.
- 8.1.3 Switches and controls shall be marked to indicate their use, unless the purpose of the switch is obvious and its mistaken operation will not cause a hazardous condition. Each cable shall be clearly labelled and carry its own unique identification code.
- 8.1.4 The Contractor shall submit a layout plan showing the exact locations of the Equipment. All Equipment shall be accessed easily and safely for inspection and maintenance.
- 8.1.5 All Equipment installed shall be provided with manuals for operation and maintenance.
- 8.1.6 The standard of installation shall enhance the Equipment's safety features of not presenting any hazards to the operator, e.g. all metal panels exposed to the operator shall be grounded properly. Warnings of any potential hazards shall be displayed in both English and Chinese, or with universally recognised labels.
- 8.1.7 If electrical fittings, not of aluminium, are connected to aluminium, suitable means shall be taken to prevent electrolytic corrosion.
- 8.1.8 The electrical installation to be in accordance with the requirement of RO, the regulation specified in other section and IEC (the International Electro-technical Commission).
- 8.1.9 Wire runs and conductors shall be continuous and easily accessible.
- 8.1.10 Wiring bundles shall be long enough to permit replacement of connectors three times without splicing or replacing the wire bundle.
- 8.1.11 Conductors which may be exposed to physical damage shall be protected by sheaths (armoured cables), conduits or other equivalent means. Cables passing through bulkheads or structural members shall be protected against damage to insulation by chafing.
- 8.1.12 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.
- 8.1.13 Wiring for the AC and DC distribution system shall meet the installation and sizing requirements of NMEA. Any cable/wire that is exposed to the elements and is not inside weather-tight enclosures shall be weather-tight.
- 8.1.14 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.

8.2 Cables

- 8.2.1 All cables installed in the Vessel shall be tinned copper conductor's ethylene propylene rubber ("EPR") insulated and polyvinyl chloride ("PVC") to Classification Requirements. Screened cables shall be fitted where interference with navigation aids or radios likely to occur. Cables shall be fitted neatly on cable trays according to RO requirements.
- 8.2.2 Where cables are exposed to weather and or mechanical damage, galvanized steel wire braided and PVC/polyolefin ("PO") outer sheathed cables shall be provided.

8.3 Electric Power Supply Equipment

8.3.1 Main Alternator

- a) The main electrical AC power supply shall be provided by one electric generator.
- b) The generator 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.
- c) The generator set will maintain an output voltage within $\pm 5\%$ over the entire load range and frequency within ± 1.5 Hz.
- d) The generator starting circuit shall be 12V DC. A separate starting battery shall be installed for the generator. The generator set alternator shall recharge its own starting battery.

8.3.2 Electrical Charger

- (a) One (1) set of charging and discharging board with one charger for Routine and Emergency battery, located in control console of deck cabin. Charging method shall be float-charging type and boosting charge type with manual voltage adjuster.
- (b) The charger is equipped with rectifying device. When the main power supply is normal, the rectifying device provides DC 24V power. When the main power failure, it automatically switches to battery for power supply. The character of battery charger shall be: Input (AC)220V, 2Ph, 50Hz. Output (DC) Max. Voltage: abt. 28V.
- (c) 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 charge shall be tapered to a trickle value.
- (d) The chargers shall be fitted with a pilot lamp, a charging adjustment, a voltmeter and an ammeter indicating charging current.
- (e) Discharge protection shall be provided to prevent a failed charger component from discharging the battery bank.
- (f) Battery charging facilities will be available via the 220V AC generator. Battery chargers shall not be mounted directly over batteries.
- (g) Battery selector/isolator switches shall be provided between battery chargers and the battery banks they serve.
- (h) The charger has protection against overcharge.

8.3.3 Batteries for Main Engines and Electric Generator Set Starting:

- (a) Independent bank of 12V batteries shall be provided for starting of each of the two outboard propulsion engines and the electric generator set.
- (b) Each group of batteries for outboard engine starting shall be connected to independent DC circuits with a crossover network to other groups of batteries. Parallel of batteries is not allowed.
- (c) The capacity of the batteries shall be sufficient to provide at least six consecutive starts of each one of the main engines, and at least three consecutive starts of the electric generator set from cold, without recharging.
- (d) Batteries shall be maintenance-free and vibration resistant designed for marine applications.
- (e) The batteries shall be reliably attached to their individual travel supports, a ventilated enclosure in engine compartment or dedicated lockers.

- (f) The batteries shall be located as close as practicable to the engines in order to minimise the voltage drop. Batteries shall not be installed directly above or below a fuel tank or fuel filter.
- (g) Electrical connections shall be arranged so that the batteries for either of the two outboard engines can be start by the starting battery of others.

8.3.4 Batteries for Routine and Emergency Supply

- (a) 24V battery shall be provided for routine and emergency supply, all emergency equipment shall operate from a dedicated 24V DC power supply.
- (b) In event of main electrical AC power failure, 24V DC batteries shall act as an emergency supply for all communication equipment, navigation and emergency lighting, alarm system, electric bilge pumps, and other vital instrumentation and control systems for the Vessel to return to base.
- (c) 24V DC services shall be supplied from the switchboard in the steering console through a 2-wire insulated system to the following items:
 - (i) Navigation light control panel and navigation lights;
 - (ii) lighting;
 - (iii) Fire detecting system;
 - (iv) Compass light;
 - (v) Instrument panel in control console;
 - (vi) One hand-held searchlight and two fixed floodlights (for fore deck & aft deck);
 - (vii) Alarm system; and
 - (viii) Any other navigational and electronic equipment (if applicable).
- (d) 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 not less than six (6) hours.
- (e) 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.
- (f) The batteries shall be installed in a separate compartment located outside of the engine compartment above main deck. The compartment shall be well ventilated, corrosion protected, and prevent ingress of water.

8.3.5 The solar panel system

- (a) It is desirable that the Tenderer should propose a solar panel system complying with all of the specifications set out below: [D]
 - (i) The solar panel system shall be fitted on the top of the deckhouse. For a maximum solar collection, it should maximize efficient use of the deck space in a manner as practical as possible. The solar battery systems must have the ability to be charged from the solar panels.
 - (ii) The solar panel system shall convert solar energy sufficiently to power shipboard 24V battery. A multipole switch locates in steering console which can send the solar power to charge all the 24V direct current (“DC”) batteries, this multipole switch must interlock with other battery charger.

8.4 Distribution and Equipment

8.4.1 Main Switchboard

- (a) One main switchboard shall be installed in control console, front plate maintenance. The main switchboard shall consist:
 - (i) Sector for electrical alternator;
 - (ii) Sector for single phase supply 220-240V AC; and
 - (iii) sector for 24V DC supply.
- (b) Connections and components on panel-boards shall be in locations protected from the expected conditions in conformity with IEC 60529:
 - (i) IP 67 as a minimum, if exposed to short-term immersion;
 - (ii) IP 55 as a minimum, if exposed to splashing water; and
 - (iii) IP 22 as a minimum, if located in protected locations inside the Vessel.
- (c) Circuit breakers shall be provided for each circuit. Circuit breakers shall be of the proper voltage rating, manual reset type, designed for inverse time delay, instantaneous short circuit protection, and capable of repeatedly opening the circuit in which it shall be used without damage to the circuit breaker. Circuit breakers shall indicate whether they are in the open or closed position.
- (d) All circuit breakers shall have time delay thermal overload trip and instantaneous short circuit current trip. The overload trip shall be set at 110% of the maximum circuit load current. The cable rating shall be in excess of the circuit breaker overload tripping current.
- (e) Circuit breaker shall act as a protective device only and shall not use for switching purposes. An individual on/Off switch shall be installed for each electrical fitting.
- (f) All circuit breakers shall be labelled to identify the circuit being protected.
- (g) 20% of spare circuit breakers or three (3) spare circuit breakers, whichever is the greater, shall be provided in each distribution panel, both AC and DC.

8.4.2 Apart from the spare feeder breakers, the switchboard shall contain but not limited to the following:

- (a) Electric Generator Set Sector with the following:
 - (i) Circuit breaker of adequate capacity with over-current trip and short circuit trip;
 - (ii) Voltmeter, ammeter, wattmeter, and frequency meter;
 - (iii) Indication lights for "Power Available", "Breaker Opened"; and
 - (iv) All necessary fittings and any other protective devices.
- (b) 220V AC Single Phase Sector with the following:
 - (i) Meters or earth lamps to indicate the state of insulation;
 - (ii) Moulded case circuit breakers with over-current and short circuit trips for the distribution of 220V AC power supply to their components; and
 - (iii) Any other necessary fittings and protective devices.
- (c) 24V Feeders Sector with the following:

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

8.5 Sockets Outlet

- 8.5.1 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.
- 8.5.2 Socket outlets for 220V AC, 24V DC and 12V DC shall be provided in the steering console. (With USB charging socket 5V 2A). The arrangements and positioning of the Sockets shall be discussed at the kick-off meeting and shall be agreed by AFCD.
- 8.5.3 Each socket outlet shall be integrated with an 'On/Off' switch to facilitate local switching of the electrical equipment.
- 8.5.4 Sockets for different voltage systems shall be clearly labelled and with different pin sizes so that one system cannot plug into the other.
- 8.5.5 Power sockets on the weather deck and other damp locations shall be watertight and shall 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.

8.6 Lighting

- 8.6.1 All lighting, including the navigation lights, shall be LED type.
- 8.6.2 Independently controlled high-powered white floodlights shall be supplied to cover the fore and aft decks.
- 8.6.3 A search light of electrical control form inside the cabin shall be supplied. The source of the searchlight shall be LED or xenon bulb with high concentration, high light intensity and long illumination distance.
- 8.6.4 The Candlepower of the searchlight is more than 200,000 candelas, the irradiation distance shall be not less than 2000 meters, HID, Halogen or LED bulb power shall be not less than 50W.
- 8.6.5 The location of the searchlight shall provide for a minimum of 360-degree arc of unobstructed illumination.

- 8.6.6 The remote searchlight control switches shall be located on the console enabling the Vessel operator and crew member unobstructed use of the switches.
- 8.6.7 one sets of hand-held searchlights with a minimum power of 55 W shall be provided, fitted with coiled extension cables so that they 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 sets of hand-held searchlights.
- 8.6.8 The arrangements and positioning of the lighting shall be discussed at the kick-off meeting and shall be agreed by AFCD.

8.7 Navigation and Signal Light

- (a) Navigation lights and signalling equipment shall comply with the requirement specified in the International Regulations for Preventing Collisions at Sea 1972 as amended.
- (b) The lights shall be controlled from the control and alarm panel at the primary console. Each navigation light circuit shall be provided with a switch, protection fuse, indicating lamp and alarm.
- (c) A dimmer(s) for the panel indication lights, buzzer stop and lamp test buttons shall be fitted.
- (d) Navigation light circuits shall be independent of any other electrical circuits. There shall be two separate power supply systems (main and emergency) to the distribution board. A means to transfer the power supply systems is to be fitted on the control and alarm panel.
- (e) The following navigation lights shall be provided together with double-pole circuit-breaker:
 - (i) Port side light;
 - (ii) Starboard side light;
 - (iii) Stern light;
 - (iv) Masthead light; and
 - (v) Anchor light.
- (f) LED Flashing red light shall be installed at top of the mast. LED Flashing red light switch shall be separated from all other light switches.
- (g) Type Approval Certificates for all navigation lights shall be submitted prior to Delivery Acceptance.

8.8 Ship Alarm System

- 8.8.1 Fire Alarm in engine compartment shall be provided with one smoke detector and a fire bell in the steering console.
- 8.8.2 Bilge Alarm System shall consist of the following:
 - (a) Bilge pump control and alarm panel;
 - (b) Operating switch for each bilge pump (manual – 0 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.

8.8.3 Engine Compartment Temperature Alarm shall be provided.

8.9 CCTV System

8.9.1 CCTV with zoom camera at bow and stern shall be provided. The CCTV should be with record video mode and High resolutions. Hard disk capacity is not less than 4T.

8.9.2 The locations of the CCTV cameras shall be determined with AFCD either in the kick-off meeting after the Contract is awarded or during the design phase of the Vessel.

8.9.3 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 IP56 or better, inside of up-deck may be IP20 or better, and under-deck may be IP44 or better.

8.9.4 All cameras shall have an image stabilization function to accommodate the rough sea conditions.

8.9.5 One (1) cameras facing forward shall be fitted to view operations on the bow, two (2) cameras at the stern shall be fitted to view operations on the stern deck and the stern view outside the deck.

8.9.6 The control and monitoring of the CCTV system shall be from the steering console.

8.9.7 One back mirror shall be installed at both port and starboard sides of the deck cabin for efficient operation and navigating.

8.10 Lightning Protection

8.10.1 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 to this Part VII for endorsement.

Chapter 9 Fire Safety Equipment

9.1 General Provisions

- 9.1.1 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.
- 9.1.2 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/m² may be used on the exposed surface of such articles.
- 9.1.3 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.
- 9.1.4 All deck finish materials shall comply with the FTP Code.
- 9.1.5 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.
- 9.1.6 When the Vessel is afloat and unmanned, the fire detection system and the bilge alarm system shall continue to function. When the audible and visual alarm is not acknowledged after a time period of five 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 signals of fire detection system and bilge alarm system shall be sent to the shore office or supervisor automatically. This additional protection shall be able to be turned on and off when required.

9.2 Fire Detection System

- 9.2.1 An approved automatic fire detection system shall be provided in the generator compartment. The fire detection system shall comply with the rules of the RO or International Standard acceptable to GNC.
- 9.2.2 The fire detection panel shall be installed in the control console.
- 9.2.3 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.

9.3 Portable Fire Extinguishers

- 9.3.1 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 Hong Kong Marine Department.
- 9.3.2 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.

- 9.3.3 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.

9.4 Fire Pump

- 9.4.1 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. Installation shall 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 Hong Kong Marine Department.

9.5 Fixed Fire Extinguishing System

- 9.5.1 Fire extinguishing system for engine compartments shall be a fixed CO₂ flooding system.
- 9.5.2 The CO₂ bottles with sufficient capacity for the engine compartments shall be stowed preferable at the aft deck and shall be properly protected from weather. [D]

Chapter 10 Life-Saving Appliance (“LSA”) Arrangements

10.1 General Provisions

- 10.1.1 Lifesaving appliances and arrangements shall be provided as per Merchant Shipping (Local Vessel) Ordinance Cap 548G and the Code of Practice issued by the Government regarding the Vessel of this type.
- 10.1.2 Lifesaving appliances 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.
- 10.1.3 Lifesaving appliances 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.
- 10.1.4 Twelve (12) 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.
- 10.1.5 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.
- 10.1.6 Approved LSA Plan by RO in frame shall be posted on the wall inside deck cabin.

Chapter 11 Electronic Navigational Equipment

11.1 Description of Electronic Equipment System

11.1.1 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 (“ENC”) and interface with DGPS
- (d) DGPS Receiver;
- (e) A set of automatic identification system;
- (f) Electronic marine AM/FM radio;
- (g) Marine band Very High Frequency transceiver;
- (h) Electric Horn;
- (i) Magnetic Compass;
- (j) Electronic Chart System (“ECS”); and
- (k) Night Vision System -----[D]

11.1.2 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.

11.1.3 An integrated system is preferred, so that information and also the display monitors of different systems, such as ECS, DGPS receiver, can be shared in order to utilise the limited space available in coxswain operation area and to provide users a better displaying interface. [D]

11.1.4 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.

11.1.5 All components of the ENE 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.

11.1.6 The Contractor shall pay attention to the compass safe distance of the ENE 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.

- 11.1.7 All siting, installation and cabling in respect of compass, etc. shall comply with the relevant rules and regulations of Hong Kong.
- 11.1.8 All electronic equipment and electrical appliances shall have Hong Kong warranty and their on-site maintenance shall be locally available.
- 11.1.9 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, then the calendar generation shall function without any error or manual intervention for all leap years.
- 11.1.10 Lightning protection shall be provided and installed wherever applicable.
- 11.1.11 Equipment supplied shall complete with all standard and/or maker recommended accessories as required for normal operation.

11.2 Loudhailer/Siren and External Broadcasting System

- 11.2.1 The loudhailer/siren and external broadcasting system shall be an off -the-shelf product.
- 11.2.2 The system shall function as a siren and powerful loud hailing system designed especially for hailing other craft in the marine environment. It shall comprise of a master control unit, a control panel, a fist microphone, amplifier, horn type loudspeakers and related components and accessories.
- 11.2.3 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.
- 11.2.4 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.
- 11.2.5 The loudspeakers shall be of marine grade and weatherproofed to IP66, have a power rating of twenty (20) watts minimum and an impedance compatible with the amplifier.
- 11.2.6 The master control unit shall be installed in the wheel house with its front panel waterproofed to IPX6 standard or better.
- 11.2.7 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 0.2 km away.
- 11.2.8 The positions of all the system’s main components shall be discussed at the kick off meeting.

11.3 Echo Sounder and Depth Indicator

- 11.3.1 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.

- 11.3.2 The measuring depth shall be from 3 feet to 250 feet or equivalent in fathom or metre with at least three (3) selectable ranges to indicate shallow, mid and deep ranges. The unit of measurement shall be selected at the front panel of the equipment.
- 11.3.3 Shallow water audible alarms shall be provided. Setting of the alarm depth shall be at the front panel of the equipment.
- 11.3.4 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.

11.4 Marine Radar Incorporating ENC and Interface with DGPS

- 11.4.1 The equipment shall be a relative motion high performance radar suitable for small vessels and comprises a transceiver, an antenna and two (2) colour display unit, suitable for bright daylight and night viewing.
- 11.4.2 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.
- 11.4.3 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.
- 11.4.4 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.
- 11.4.5 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.
- 11.4.6 The radar shall have standard NMEA 0183 interface ports, i.e. National Marine Electronics Association (“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.
- 11.4.7 The power of the equipment shall be supplied from the 24V DC system of the Vessel.
- 11.4.8 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.
- 11.4.9 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.
- 11.4.10 The radar display unit shall incorporate control keys and processor equipment to integrate, control, operate and display all radar and chart plotter functions and AIS information from the AIS receiver.
- 11.4.11 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.

11.4.12 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;
- (f) Variable range marker;
- (g) Range scale selection;
- (h) Display brilliance & illumination;
- (i) Selection of background colour and target colour;
- (j) Tuning; and
- (k) Heading marker ON/OFF.

11.4.13 Performance Requirements

The marine radar shall perform at least the following requirements:

(a) Display Unit

Display:	LCD
Screen size:	9 inch or larger
Resolution:	at least 800 x 480 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 36 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 30m, 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:	6.0 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

11.5 Differential Global Positioning System ("DGPS") Receiver

- 11.5.1 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 ECS. 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.
- 11.5.2 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.
- 11.5.3 The system shall be capable of storing 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 character.
- 11.5.4 On screen annotations / labels shall be in English and desirably with Chinese.
- 11.5.5 Performance requirements

The system shall perform at least the following requirements:

(a) Display

Display unit:	True sunlight readable 640 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:	Equipped with 8 channel parallel receiver 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 3 minutes
Position Accuracy:	15 m or better
Tracking Velocity:	999 kt or better

(c) Differential Beacon Receiver

Frequency range:	283.5-325 kHz
Frequency Step:	500 Hz
Position Accuracy:	5 m or better

(d) Environmental Requirements

Operating temperature:-15°C to +55°C or better

11.6 Automatic Identification System (“AIS”)

- 11.6.1 The equipment shall receive navigation information from local AIS-equipped vessels.
- 11.6.2 The equipment shall include an AIS receiver which shall be able to receive both Class-A and Class-B AIS information.
- 11.6.3 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.
- 11.6.4 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 overlap on its display AIS information given by the AIS receiver.
- 11.6.5 Performance Requirements

The AIS shall perform at least the following requirements:

(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.

11.7 Electronic Marine AM/FM Radio

- 11.7.1 The equipment shall consist of an AM/FM radio receiver and two (2) speakers located at the deck cabin.
- 11.7.2 Language of the user interface shall be in English or Chinese.
- 11.7.3 The positions of the AM/FM radio equipment shall be finalised in the detailed design stage.

11.8 Marine Band Very High Frequency Transceiver

- 11.8.1 The Marine Band Very High Frequency (“VHF”) Transceiver shall be fully compatible to Global Maritime Distress and Safety System (“GMDSS”), and, in particular, capable of being used as a Class A Digital Selective Calling (“DSC”) transceiver fully compatible with the International Maritime Organization (“IMO”) GMDSS carriage requirements.
- 11.8.2 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.
- 11.8.3 The equipment shall incorporate with Channel 12 and shall be able to dual watch on Channel 16 or one of the other channels.
- 11.8.4 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.
- 11.8.5 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).

11.8.6 Performance Requirements

The Marine Band VHF transceiver shall perform at least the following requirements:

(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.

11.9 Electric Horn

11.9.1 The electric horn shall be marine grade and weatherproofed to IP56.

11.9.2 The electric horn shall comply with the requirement specified in the International Regulations for Preventing Collisions at Sea 1972 and its Amendments.

11.9.3 Power source 12 or 24 VDC, sound pressure level at least 100dB at 10m.

11.10 Magnetic Compass

11.10.1 The Contractor shall provide one magnetic compass of at least 70 mm in diameter.

11.10.2 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.

11.11 Electronic Chart System

11.11.1 The ECS shall be able a multi-function display system to show on each of its displays the water depth data provided by the echo sounder, the GPS position of the Vessel and ENC information. The console shall consist of two displays of ECS.

11.11.2 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 electronic chart system shall be capable of the following:
 - (i) The system shall be equipped with navigation sea charts in details 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).

11.11.3 Performance Requirements

The ECS shall perform at least the following requirements:

(a) Navigational Features

Total Waypoints:	2000 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):	9 inch or greater diagonal high resolution colour display, resolution 800x480 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

11.12 Night Vision System

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

11.12.2 Performance Requirements

The system shall perform at least the following requirements:

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:	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

11.13 Installation Requirements

11.13.1 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 must be observed;
 - (iii) Receiving apparatus and other electronic equipment which may be affected by radio frequency induced voltages must be effectively earthed, screened and protected against such voltages; and
 - (iv) Lightning protection devices shall be fitted.
- (g) All siting, 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) shall 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 shall be within an acceptable level and shall not affect the intended operation and functionalities of the equipment.
- (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.

11.14 Acceptance Test

11.14.1 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 to verify that each Equipment complies with all the required performance specification.

(b) On-site commissioning test shall be carried out by the Contractor in the presence of the 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.

11.14.2 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.

11.14.3 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.

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

11.14.5 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.

11.14.6 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.

11.15 Documentation for the Proposed Equipment

11.15.1 The Contractor shall supply with the tenders the following documentation:

(a) Technical and proposed equipment information including integrated system equipment schematic diagram of all these general electronic equipment, in English and sufficiently detailed to enable a technical appraisal of the Equipment in this Chapter to be made.

(b) Lists of marine electronics equipment with unit price.

11.15.2 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.

11.15.3 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 12 Services Support

12.1 General Requirements

12.1.1 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.

12.1.2 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.

12.2 Information to be Provided Prior to and at Delivery Acceptance

12.2.1 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; and
 - (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.

12.2.2 “As Fitted” drawings and other information shall be supplied.

The Contractor shall supply the following items upon Delivery Acceptance of the Vessel:

- (a) FOUR complete sets of paper print drawings of the Vessel and ONE soft copy in Compact Disk (“CD-ROM”).
- (b) FOUR 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 soft copy in CD-ROM as per the Vessel delivered.
- (c) FOUR 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 copies (at least one original) and ONE soft copy in CD-ROM of maker operation, maintenance and workshop manuals for all machineries/equipment in English.
- (e) FOUR paper copies and ONE soft copy in CD-ROM as per the Vessel delivered of “Docking Plan” which shall include the profile, plan and sections shall be prepared by the Contractor.
- (f) FOUR 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 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.

12.2.3 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.

12.2.4 Photographs

The Contractor shall at Delivery Acceptance provide the following:

- (a) As-Fitted Photographs
 - (i) Two 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 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 200 mm x 150 mm colour photographs with specifications of Vessel particulars showing the profile of the Vessel in HKSAR Waters; and
 - (iii) Four 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 Compact Disk ("CD-ROM") and forwarded to GNC.

12.2.5 Certificates and Reports

Copies of the following documents (one original with two copies and one 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 to this Part VII; and

- (l) Any other certificates as appropriate.

12.2.6 Ship Model

- (a) Tenderer is required to quote a separate price in Schedule 1 for the supply of ship model(s) (scale 1:20) 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 13 Training

13.1 Training on Electronic Navigational Equipment (“ENE”)

13.1.1 General requirements

- (a) All training courses shall be held in Hong Kong and delivered by qualified instructors.
- (b) The Contractor shall provide appropriate classroom as well as on board training to the operational and technical staff to familiarize 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.
- (c) It is anticipated that two distinct types of training shall be required, namely:
 - (i) Operator Training; and
 - (ii) Equipment Maintenance Training.
- (d) The Contractor shall submit a detailed course syllabus and a schedule for conducting the training course.
- (e) Each trainee shall receive one copy of comprehensive training documents before the start of each course.
- (f) Training manual in Chinese and English shall be provided and submitted to MD and EMSD for approval at least one month prior to commencement of the aforementioned two types of training respectively.

13.1.2 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.

13.1.3 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 will attend the course. The training course shall accommodate the specified number of trainees.

13.2 Training on Operation and Maintenance of the Vessel

- 13.2.1 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.
- 13.2.2 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, etc., the Contractor shall provide an appropriate training course for 22 officers of the MD 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.
- 13.2.3 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.
- 13.2.4 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 materials to be supplied by the Contractor. The training materials shall be provided before the training, in both paper and CD-ROM format.

Chapter 14 b Abbreviations

AC	Alternating Current
AIS	Automatic Identification System
AWS	American Welding Society
BS	British Standards
CD	compact disc
CD-ROM	Compact Disc Read-Only Memory
CH	Channel
cm	centimetre
CO ₂	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
kW	Kilowatt
LCD	Liquid Crystal Display
LCG	Longitudinal Centre of Gravity
LED	Light-emitting Diode
LSA	Life-Saving Appliance
LSA Code	International Life-Saving Appliance Code
L/min	Litre per minute
m	Metre
m/s	Metre per Second
m ³ /hour	Cubic Metre per Hour
MCR	Maximum Continuous Rating
MHz	Megahertz
MJ/m ²	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
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
T	ton
TS	Technical Specifications
UTC	coordinated universal time
uV	nano 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 Organisation
WVGA	Wide Video Graphics Array

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 of Annex 1 to this Part VII.
- 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 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) 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), 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).

(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. WT (water tight) 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.

Milestones		Completion Dates
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 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

Item No.	Drawings Approval	Completion Date
1	General Arrangement Plan	All the drawings are required to be submitted in two months after Signing of Articles of Agreement for GNC's approval / reference.
2	Lines Plan	
3	Structural Construction Plan in Mid-Ship and Bulkhead Section	
4	Construction Profile and Deck Plan	
5	Shell Expansion Plan	
6	Tank Capacity Plan	
7	Engine Mounting Arrangement	
8	Power / Speed Estimation and Curve	
9	Intact and Damaged Stability Plan	
10	Details of Navigational / Communication Equipment	
11	Details of Deck Equipment, Outfitting, Furniture, etc.	
12	Details of Engines' Arrangement	
13	Control Console Arrangement and Schematic Diagram	
14	Instrumentation and Control System	
15	Calculation of Fuel Capacity	
16	Details of Electrical and Electronic Equipment	
17	Electrical Load Calculations	
18	Schematic Layout of Electrical Circuits	
19	Paint Schedule	
20	Lightning Protection Arrangement	
21	External Fire-fighting System (EFFS)	
22	Davit foundation and arrangement	
23	Deck winch foundation and arrangement	
24	Others as required	

Part VII Annex 4 – Main Items Inspection Timetable

Item No.	Items to be Inspected	Completion Date	
	Hull Structure, Layout and Outfitting Inspection		
H-1	Mould lofting		
H-2	Construction materials – Aluminium plate mark checking for hull and superstructure		
	(a) Aluminium plate mark checking for hull and superstructure		
	(b) Material certificates verification		
H-3	Welding consumables & welders certificates		
H-4	Keel laying for hull		
H-5	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) NDT (X-ray) of welds		
	(g) Hull internal work inspection		
	(h) Plating thickness gauging		
H-6	Engine bearers fabrication / welding		
H-7	Superstructure scantling & welding checking		
H-8	Welding construction and pressure tests of tanks		
	(a) Fuel oil tank		
	(i) Tank construction (internal/external/fitting)		
	(ii) Tank pressure test		
H-9	Hose test for hull & superstructure		
H-10	Mock up inspection		
H-11	Installation of various outfitting items		
	(a) Anchor and chain		
	(b) Windlass		
	(c) Seating of heavy equipment and masts		
H-12	Function tests of various outfitting items		
H-13	Watertightness or weathertightness of openings		
	(a) Manholes		
	(b) Hatches		
	(c) Air pipes		
H-14	Painting inspection of different layers		
H-15	Draught marks and vessel dimensions verifications		
H-16	Arrangement of consoles		
H-17	Zinc anodes and lightning system		
	(a) Installation of zinc anodes		
H-18	Inspection of fire, heat and sound insulation		
	(a) Fire insulation		
	(b) Heat insulation		
	(c) Sound insulation		

H-19	Interior furnishings		
	(a) Console area and seating area		
H-20	Life-Saving Appliances		
H-21	External Fire-fighting System equipment		
H-22	Inclining experiment and/or lightship weight measurement		
H-23	Sea trials including operation test of outfitting equipment		
H-24	Winch towing test		
H-25	Davit lifting test		
H-26	Cleanliness inspection before acceptance		
H-27	Inventory check in the HKSAR		
H-28	Acceptance and delivery		
	Electrical and Machinery Installation		
EM-1	General inspection on installation of machinery:		
(a)	General inspection on installation of main engines		
(b)	General inspection on installation of generator set		
(c)	General inspection on installation of fire pump set		
(d)	General inspection on installation of deck winch set		
(e)	General inspection on installation of davit		
EM-2	Main engines:		
(a)	Test of engine safety devices and alarms		
EM-3	Fuel (petrol & diesel) oil system:		
(a)	General inspection & dimension checking of fuel oil system		
(b)	Fuel oil tank low level alarm test		
(c)	Fuel oil tank final cleaning/internal inspection before filling		
(d)	Fuel oil tank high level alarm test		
(e)	Fuel oil tank content gauge calibration and test		
(f)	Inspection of piping penetration of bulkhead and deck		
(g)	Hydraulic test of fuel oil piping		
EM-4	Bilge system:		
(a)	General inspection & dimension checking of bilge system		
(b)	Bilge tank high and low level alarms test		
(c)	Inspection of piping penetration of bulkhead and deck		
(d)	Hydraulic test of piping		
(e)	Functional test of bilge system		
EM-5	Functional test of drainage system		
EM-6	Batteries:		
(a)	Inspection of battery connectors and housing boxes		
(b)	Inspection of battery charger		
(c)	Operational test of battery charger Test of main engines and generator consecutive starting by each group of battery (start/stop at remote and local		

	control)		
EM-7	Electrical installation:		
(a)	Inspection of lightning conductor		
(b)	General inspection of cable layout & checking of cable sizes		
(c)	Inspection of cable penetrations of bulkhead and deck		
(d)	Inspection of transformers		
(e)	Inspection of tally plates		
EM-8	Main switchboard & panels:		
(a)	Cable size checking of electrical switchboard installations		
(b)	Inspection of DC distribution panel		
EM-9	Control console:		
(a)	Inspection of control console		
(b)	Functional test of console controls		
(c)	Inspection of navigation equipment control panel		
EM-10	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-11	Navigational lights and signals		
(a)	Inspection and functional test of navigational lights		
(b)	Test of horn/whistle/siren		
EM-12	Inspection of lightning conductor		
EM-13	Electronic equipment tested by EMSD		

Note:

These 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 – Endurance Performance – Diesel Propulsion

Date of Test:		Place of Test:							
Vessel's Identification:		Vessel's Name:							
Conditions at Endurance and Performance Test									
Person On board	2 crews +10 other persons		Dummy Weight 75 kg						
Fuel (diesel oil)		Other Equipment	30 kg kit on board						
Sea Conditions	Calm sea condition at wind speed 6 knots, wave height ≤ 0.5 metres and water depth ≥ 5 metres								
Engines:	Port Side	Starboard Side	Propellers:	Port Side	Starboard Side				
Maker			Maker/type						
Type			No. of blades						
Serial Number			Diameter						
Rated Power			RPM						
Rated Speed			Direction of Rotation						
Engine Load	Engine Speed (rpm)	Vessel Speed (Knots)	Time (Start)	Time (Finish)	Fuel Consumption (litres/minutes)	Engine Oil Pressure (Bar)	Engine (in) CW Temp. (°C)	Others	Others
___% 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. Starboard	rpm
Engine R.P.M. Port	rpm
Max heeling angle	degree

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

Witness by:	MD Representative	Shipyard Representative

Part VII - Annex 6 – List of Recognized Organisations

Acronym	Name
ABS	American Bureau of Shipping
BV	Bureau Veritas
CCS	China Classification Society
DNV	Det Norske Veritas
KR	Korean Register of Shipping
LR	Lloyd's Register
NK	Nippon Kaiji Kyokai
RINA	Registro Italiano Navale
RS	Russian Maritime Register of Shipping

Part VII - Annex 7 - As-fitted Drawings and Machinery/Equipment documents and information literature to be delivered to the Government at 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 drawing formats of the following plans and drawings that contain the technical information of the Vessel and its machinery and equipment as they are on the day when the Vessel is accepted by the MD. These are termed the final version of the “As-fitted” Plans and Drawings, and they shall consist of the following plans and drawings as well as any other plans and drawings 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 in the professional manner, scale, size and style normally required in the ship design and construction business sector. All plans and drawings shall show and be clearly marked with the profile, plan, and section views of the layout, arrangement details, and construction details in the manner required by GNC.
 - 1.2.1 General Arrangement Plan.
 - 1.2.2 Lines plan and offsets data and table.
 - 1.2.3 Stability information booklet and the inclining experiment report (if applicable).
 - 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 (if applicable).
 - 1.2.8 Detailed arrangement and layout plan showing the disposition of all of the main equipment, fittings and fixtures, furniture, hatches, manholes and access openings. The down-flooding openings (points) shall be indicated clearly 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 bulkhead construction plan.
 - 1.2.12 Hull shell expansion plan.
 - 1.2.13 Keel construction plan.
 - 1.2.14 Steering system and steering arrangement diagrams (if applicable).
 - 1.2.15 Superstructure and deck structural and construction plan (if applicable).
 - 1.2.16 Hull watertight bulkheads’ construction plan.
 - 1.2.17 Superstructure to deck connection detailed construction plan (if applicable)
 - 1.2.18 Engine casing to deck connection detailed construction plan.
 - 1.2.19 Deck edge and bulwark (if any) details and construction plan, including detailed structural arrangement drawings of hull to deck connection.
 - 1.2.20 Detailed cathodic corrosion prevention and arrangement plans and drawings for the Vessel throughout.
 - 1.2.21 Mast structural and construction plan and mast equipment arrangement plan.
 - 1.2.22 Anchoring arrangement plan.
 - 1.2.23 Piping diagrams for fuel oil, lubrication oil, bilge, firefighting, scuppers and drains system.
 - 1.2.24 Fire prevention, fire control and firefighting system drawings.
 - 1.2.25 Drawings of the main switchboard and all other switchboards (if applicable) and the electrical system.
 - 1.2.26 Outboard engines arrangement and setting plans and drawings of their fuel lines.

- 1.2.27 Main fuel oil tank drawing and its associated piping and manifold(s), and filling, overflow and ventilation system.
 - 1.2.28 Drawings of the anchor, and the anchoring system.
 - 1.2.29 Deck winch foundation and arrangement.
 - 1.2.30 Davit foundation and arrangement.
 - 1.2.31 Lifesaving appliance arrangement plan and fire safety plan (if applicable).
 - 1.2.32 External fire-fighting system Equipment plan.
 - 1.2.33 Distress signals, alarm systems, and internal/external communication arrangement and system plan (if applicable).
 - 1.2.34 Navigation lights, sound and signal diagrams and any other external lighting arrangement plan.
 - 1.2.35 Vessel overall lighting arrangement and light control plan.
 - 1.2.36 Vessel alarm and signals, internal communication systems and public address systems plan.
- 1.3 Documents to be provided by the Contractor

Not less than one (1) month before the Delivery Acceptance of the Vessel, the Contractor shall provide for GNC's acceptance a list of all documents to be provided.

When the Vessel is delivered to the Government Dockyard, the Contractor shall deliver to the Government all the 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 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	0–1 ft		
		1–3 knot			
		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	1–2 ft		
		4–6 knot			
		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	2–3.5 ft		
		7–10 knot			
		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	3.5–6 ft		
		11–16 knot			
		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	6–9 ft		
		17–21 knot			
		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	9–13 ft		
		22–27 knot			
		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	13–19 ft		
		28–33 knot			
		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	18–25 ft		
		34–40 knot			
		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	23–32 ft		
		41–47 knot			
		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	≥ 118 km/h (≥ 32.8 m/s)	≥ 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.
		≥ 74 mph			
		≥ 64 knot	≥ 46 ft		
		≥ 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	
Low	1. Short or average 2. Long	
Moderate	3. Short 4. Average 5. Long	
Heavy	6. Short 7. Average 8. Long	
	9. Confused	