

## **Part VII – Technical Specifications**

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## Chapter 1 – General Provisions

### 1.1 Introduction

- 1.1.1 This document or “Technical Specifications” (TS) sets out the requirements of the Government of the Hong Kong Special Administrative Region (HKSAR) of the People’s Republic of China (“Government”) in relation to **five (5) High Speed Interceptors (HSI)** (viz., “Vessel”) for use by the Hong Kong Police Force (“HKPF”).
- 1.1.2 The primary and overriding aim of this procurement exercise is to provide the HKPF with five (5) fit-for-purpose high performance vessels that are fully capable of effective deployment in Hong Kong Waters as high-speed interceptors, opposed boarding and multi-role support vessels dealing with a wide range of non-compliant suspect craft year round. This mission will entail operating safely in these roles in adverse sea and weather conditions up to and including World Meteorological Organisation (WMO) Sea State 5 and surviving at WMO Sea State 6 at speeds well in excess of what might be expected from standard enforcement craft. For details of the WMO Sea State Code, please see Annex 10 of this Part VII. Robustness of construction, ergonomics, seakeeping, high-speed response, stable and predictable manoeuvrability at high speeds in close proximity to both suspect and bystander craft, soft riding and directional stability are all of fundamental importance.
- 1.1.3 The Vessel to be proposed by the Tenderer shall be either an aluminium deep V monohull interceptor with fully immersed propellers providing steerable thrust which model is commercially available for sale as at the Tender Closing Date, or a tailor-made, fit for purpose interceptor with aluminium deep V monohull, fully immersed propellers providing steerable thrust. Either one shall meet all requirements of the Contract including those contained in this Part VII and is fit for the user department’s operational purpose.
- 1.1.4 Unless otherwise specified in the TS, all the specifications stated in this Part VII of the Tender Documents are classified and labelled as follows:
- (a) Essential Requirements [E];
  - (b) Those specifications which are without any label (viz., [E] or [D]) shall equally form part of the Contract like the specifications labelled as [E], but the Government will not conduct checks at the tendering stage whether the products offered comply with those specifications not labelled with [E]; and
  - (c) Desirable Specifications [D].
- 1.1.5 All this Part VII shall form part of the Contract. As part of the tender evaluation during the tendering stage (viz., completeness check), the Tenderer shall submit all the information in sufficient detail to substantiate that the product and the services offered meet the Essential Requirements as stipulated in Annex C to Part II, failing which its tender will **not** be considered further.
- 1.1.6 The whole of this Part VII, including all Essential Requirements, those without any label (viz., [E] or [D]) and the Desirable Specifications labelled with [D] (if and to the extent the Contractor has indicated compliance in its tender), shall also form part of the Contract and be of equal materiality and importance upon the award of the Contract. The non-compliance with any specifications set out in these TS shall have the same consequences as specified in the Contract. Save during the tendering stage in the manner as mentioned in Paragraph 1.1.4 (b) above, no differentiation shall be made based on the classification unless otherwise expressly specified.
- 1.1.7 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.

- 1.1.8 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.
- 1.1.9 As mentioned in the definition of “Vessel” in Clause 1.1 of Part IV, unless otherwise expressly stated, references to “the Vessel” shall mean each of the five (5) Vessels. References to “a Vessel” shall mean any such Vessel. Unless otherwise specified, all requirements specified in this Part VII shall apply to each of the five (5) Vessels to be supplied.
- 1.1.10 For the avoidance of doubt, references to “tests” throughout the Tender Documents and the Contract shall include all inspections, surveys, assessments, trials and experiments.

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

- 1.2.1 The Vessel shall be safe, fit and suitable for the operational purposes by HKPF for which it is intended, namely to be navigated by the HKPF anywhere within Hong Kong Waters, for the purposes of preserving the integrity of the HKSAR Boundary of Administration, preventing and detecting crime, undertaking independent or radar-vectored target interception to perform law enforcement and observation duties, and undertaking search-and-rescue operations. These roles involve considerably more than mere navigation and will include hard and sharp manoeuvring during high-speed chases (60 knots or more), multiple heavy impacts on bow and/or Vessel sides at different angles of heel during opposed and/or non-compliant underway interceptions, and such other actions as are required for enforcement purposes. These purposes are hereinafter referred to as “operational purposes”.
- 1.2.2 The Tenderer shall provide a vessel of the specifications stipulated at Paragraph 1.3 of Annex 8 to Part VII (“Sample Vessel”) for the purposes of the Tender Evaluation Stage Sea Trial/Handling Assessment as described in Annex 8 to Part VII (“HA”). The Sample Vessel to be assessed shall also comply with all of the Essential Requirements labelled [E] contained in this Part VII including Paragraphs 2.5, 3.1.1, 3.1.5, 3.1.6, 3.2.1(a), 3.2.1(b), 3.2.1(c), 3.8.1, 4.2.5 and 4.4.1 of this Part VII. [E]
- 1.2.3 The Tenderer shall arrange the Sample Vessel to be assessed to undergo the Tender Evaluation Stage Sea Trial/Handling Assessment (“HA”) in the manner as specified at Annex 8 to Part VII. This HA shall be conducted by the Tenderer in accordance with Annex 8 to Part VII and be observed by the Government Representative and the HKPF either in Hong Kong or at a place proposed by the Tenderer and agreed by the Government. The Government shall not consider a Tenderer’s tender further under any of the circumstances stipulated in Paragraphs 1.9 and 1.10 of Annex 8 to this Part VII.
- 1.2.4 When configured in accordance with these TS, the Vessel shall meet or exceed the following key performance parameters (“KPP”) under load conditions described in Paragraph 1.7.7 of this Part VII:
- (a) **KPP 1: Sea Keeping**
- The Vessel shall be designed, engineered and constructed to conduct missions without substantial damage through sea states up to WMO Sea State 5. For these purposes, substantial damage is defined as any damage or structural failure that adversely affects the structural strength, performance, or integrity of the Vessel, thereby rendering it inoperable for HKPF missions. The Vessel shall also be able to survive at WMO Sea State 6 if so required.
- (b) **KPP 2: Patrol Speed**
- The Vessel shall be capable of performing patrol duties under Full Operational Load Condition (as per Paragraph 1.7.7 of this Part VII) maintaining speeds of at least forty five (45) knots in WMO Sea State 3.

(c) KPP 3: Interception Speed

The Vessel shall be capable of transitioning from patrol to interception speeds of at least sixty two (62) knots in Full Operational Load Condition (as per Paragraph 1.7.7 of this Part VII) in WMO Sea State 2.

(d) KPP 4: Manoeuvrability

The Vessel shall be capable of safe, stable, predictable high-speed manoeuvrability in interdiction missions which involve the engagement of hostile, highly manoeuvrable and recklessly evasive watercraft.

- 1.2.5 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 requirements of the Contract including without limitation the Warranties, this Part VII and the Schedules. The Contractor further warrants that it will alter, modify or otherwise change aspects of the Vessel's fittings, fixtures, user interface as required by the Government within the scope of the requirements of the Contract in order to ensure the ultimate fitness for purpose of the Vessel before the Acceptance Certificate is issued.

### **1.3 Authorities**

- 1.3.1 The Government New Construction Section (GNC) of the Marine Department (MD) is the section responsible for the procurement of the Vessel for the Government.
- 1.3.2 Communications Branch (COMMS) is the technical section within the HKPF, which will oversee the Work to be provided by the Contractor in connection with the Communication Equipment and Electronic Navigational Equipment ("ENE") and carry out Technical Acceptance (under the second part as well as the fourth part, as mentioned in Paragraph 1.7.1 of this Part VII) in relation to the Communication Equipment and ENE on behalf of the Government.
- 1.3.3 The HKPF is the ultimate user of the Vessel and in conjunction with GNC will carry out the Technical Acceptance of the Vessel on behalf of the Government.

### **1.4 Shipyard**

- 1.4.1 The Contractor's nominated shipyard building the Vessel must have the essential shipbuilding and workshop facilities such as lifting gear, hull construction and calibration equipment, machinery installation, 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 Design of the Vessel**

- (a) The intention of this procurement exercise is for the Government to obtain from the Contractor the Vessel that would be safe for Hong Kong police personnel to use in their daily duties for the operational purposes whilst at the same time providing high operational reliability.
- (b) The design of the proposed Vessel submitted by the Tenderer in Schedule 7 of Part V (viz., Item (1)) shall show that it has adopted the same principles in structural design as the reference vessel referred to by the Tenderer for proving compliance with Item 1(c) of Annex C to Part II, i.e. the proposed Vessel's structural design as used in another reference vessel shall be, for a period of 8 years, free from fatigue and structural failure whilst it was used continually (i.e. not less than 20 hours a week) in military or law-enforcement operations or exercises. The reference vessel must have been in use for not less than 8 months in every year within the 8 year period.

- 1.5.2 The Vessel shall be designed and constructed for a service life of not less than fifteen (15) years under reasonable maintenance.
- 1.5.3 It is the **sole** responsibility of the Contractor to supply the Vessel which is safe, fit and suitable for the intended operational purposes of the HKPF as set out in Paragraph 1.2.1 above and which meets all laws and regulations and all specifications in this Part VII, 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.
- 1.5.4 The Vessel shall be designed and constructed in accordance with the latest edition of the rules and regulations of the Recognised Organisation (RO), or a standard covering hull structure and propulsion machinery acceptable to the RO, as specified in Schedule 9. Unless otherwise expressly stipulated in this Part VII, **(a) references to “RO” in this Part VII shall mean the RO as specified in Schedule 9; and (b) references to “RO Requirements” shall mean the requirement of the rules and regulations of the RO as specified in Schedule 9.** Notwithstanding the foregoing, where it is expressly permitted in this Part VII that in relation to a particular requirement, instead of the RO specified in Schedule 9, another RO which is any one of the ROs listed in Paragraph 2.3.4 (a) to (i) may be designated for compliance with the relevant requirement, references to “RO” shall mean such other RO.
- 1.5.5 The Vessel is required to be issued with a certificate of class with notations, or a product certificate, by the RO as specified in Schedule 9. All plans, particulars and documentation which are required for the classification of the Vessel, or for issuance of a product certificate for the Vessel, by the RO, in addition to those listed in Annex 3 to this Part VII shall be approved by the RO before submission to MD for endorsement and final approval prior to commencement of work. Any subsequent modifications or additions shall be treated in the same manner. Those drawings which are not required for approval by the RO shall be submitted to MD for approval before work is carried out.
- 1.5.6 Notwithstanding the submission of the preliminary plans and drawings by the Contractor 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 the RO and GNC for approval before completion of the Vessel design. The design stresses and scantling including internal structural members shall be determined according to the RO Requirements.
- 1.5.7 The Contractor shall design, build and supply the Vessel in full compliance with all requirements of the Contract including without limitation the Warranties, this Part VII and the Schedules; and even if any of them 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, this Part VII shall prevail unless GNC stipulates or agrees otherwise.

## **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 installation shall be approved and inspected by COMMS or COMMS representatives as part of the Technical Acceptance.
- 1.6.3 Subject to Paragraph 1.6.7 of this Part VII, an advance written notice of not less than five (5) working days (if the Vessel is located in Asia), and ten (10) working days (if the Vessel is located other than Asia) must be given to GNC before the representatives of GNC and other Government officers are invited to conduct a survey visit of the Vessel. The Contractor shall be fully responsible for any delay if the Contractor fails to give adequate notice as aforesaid.

- 1.6.4 The Contactor shall provide:
- (a) an Implementation Timetable, in the form set out in Annex 2 to this Part VII, setting out the major milestones and their scheduled completion dates and incorporating the Delivery Dates specified in Schedule 2 of Part V;
  - (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 upon commencement of the Contract Period.

The Delivery Date(s) for the Vessel and the date by which the Vessel shall be Ready for Use 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 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 photographs evidencing the progress with sufficient details agreed by MD is required to be submitted to MD during the construction of the Vessel. The weekly report shall be submitted before noon of every Monday.
- 1.6.6 MD may designate consultant(s) from the private sector who will be authorised to represent the GNC in all technical matters including plan approval related to the construction of the Vessel. The Contractor shall cooperate with the consultant(s) and afford unhindered access to the Vessel at all times during working hours, and shall furnish current copies of all 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 the MD officer / consultant considers 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 expense. The Government shall not be responsible for any delay arising from any postponement in conducting the survey visit due to any safety issues as specified in this Paragraph.
- 1.6.8 Where any fee charge and associated expenses 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 for paying 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 officers or consultants and representatives of the HKPF 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, four (4) chairs, one (1) telephone, one (1) conference table for six (6) 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 every working day.
- 1.6.10 The hours of work of MD officers or consultants and representatives of the HKPF 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 officers and consultants and representatives of the HKPF can be carried out with a maximum of efficiency and a minimum of interference with the Contractor's work.
- 1.6.11 There shall be a survey, inspection and testing before delivery to the Delivery Location for each of the Vessels which is known as the Pre-Shipment Construction and Handling Inspection (or "Pre-shipment Inspection") as specified in Paragraph 1.6.12 of this Part VII, the purpose of which will be for the Government to satisfy itself that the Vessel is Ready for Use and ready for shipment to

Hong Kong (if constructed in a place outside the HKSAR). The Contractor shall provide GNC with one (1) month's advanced written notice of its readiness to invite the Government to conduct the Pre-shipment Construction and Handling Inspection or, otherwise, as agreed by the Government.

#### 1.6.12 Pre-shipment Inspection

As part of the Technical Acceptance as mentioned in Paragraph 1.7 of this Part VII, the Contractor shall perform the Pre-shipment Inspection (PSI). The PSI shall be applicable to all five Vessels and shall be conducted at the shipyard in which the Vessels were manufactured and its nearby sea (a) to confirm that the construction of the Vessel conforms with the requirements of Clause 2.5 of Part IV; (b) to conduct tests and inspections for ensuring that any modifications required under Clause 2.7 of Part IV have been properly implemented; (c) to conduct tests and inspections to ensure that the Vessel does not exhibit any of the characteristics specified in Paragraph 2.10.3 of this Part VII; and (d) to conduct tests and inspections to ensure that the Vessel is in full accordance with all terms and conditions of the Contract including without limitation the Warranties, the Technical Specifications and the Schedules.

### 1.7 Technical Acceptance

- 1.7.1 There are four parts of the Technical Acceptance, viz., (a) the Pre-shipment Inspection as specified in paragraph 1.6.12 ("first part"), (b) the Verification of Operational Performance as specified in Annex 9 to this Part VII ("second part"), (c) the hull structural tests as specified in paragraph 3.1.14 of this Part VII and the inclining experiment as specified in paragraph 3.2.4 ("third part"); and (d) all other tests and trials as stated in this Part VII including those as specified in paragraphs 1.7.8 and 1.7.9 below and those for the ENE as stated in Chapter 7 of this Part VII ("fourth part"). Reference to "each part of the Technical Acceptance" shall mean each of these four parts.
- 1.7.2 After completing the Pre-shipment Inspection, the first of the five Vessels ("first-built vessel" or "first vessel" or "lead vessel") shall be submitted to the Verification of Operational Performance as stated in Annex 9 to this Part VII at the shipyard in which the Vessel was manufactured and its nearby sea. In addition, after completing the Pre-shipment Inspection and the Verification of Operational Performance, or at other stage of the construction process agreed by MD, the first-built vessel shall be submitted to the hull structural tests, and such first-built vessel and such other Vessel(s) as mentioned in paragraph 3.2.4(d) of this Part VII shall be submitted to the inclining experiment, both at the shipyard in which the Vessels were constructed. After passing of these tests, all five Vessels shall be submitted to all remaining parts of the Technical Acceptance (viz., the fourth part) after their shipment to Hong Kong, or at other stage of the construction process agreed by MD, but before delivery to the Delivery Location and these remaining parts of the Technical Acceptance shall be conducted within Hong Kong waters.
- 1.7.3 Before the conduct any of the four major parts of the Technical Acceptance as mentioned in paragraph 1.7.1 above, the Contractor shall submit a test programme for MD's approval not less than fourteen (14) working days in advance of the commencement of that relevant part of the Technical Acceptance except in the case of the second part of the Technical Acceptance, the applicable period shall be as stated in Annex 9 to this Part VII. In the case of the programme for the fourth part as mentioned paragraph 1.7.1(d) above, the programme shall include details of proposed procedures for carrying out the Official Speed Trial, endurance, ship handling at sea and performance tests, manoeuvring test, crash stop test, astern running test / emergency steering test and other tests for each of the five (5) Vessels. This submission shall include the RO approved inclining experiment report as mentioned in Paragraph 3.2.4 of this Part VII and other documentary evidence acceptable to the Government showing that the Vessel is safe to go to sea for the Official Sea Trial.

- 1.7.4 The Contractor is required to carry out all tests required as part of the Technical Acceptance at the place as specified in paragraph 1.7.2 above at its own expense (including the expense of fuel, lubrication oil, crew and other necessary expenses), in the presence of MD officers or consultant and HKPF representatives. Before conducting the Technical Acceptance, the Contractor shall observe and obtain the certificate of competency as appropriate and fulfil all applicable third party insurance requirements under the laws of the place in which the relevant part of the Technical Acceptance is to be conducted.
- 1.7.5 To ensure that each part of the Technical Acceptance can be conducted safely and in accordance with the law, the Contractor shall provide the MD with appropriate details about each one of the Contractor's staff who will be on board. These details shall include the name, post, duty, experience and certificate(s) of competency and are to be submitted at the same time as the programme for each part of the Technical Acceptance is submitted. The number of persons on board during a particular test or trial shall be agreed by the MD officers and HKPF representative. The location of each person on board (which can affect the centre of gravity of the Vessel under trial) shall also be first agreed by the MD officers and HKPF representative.
- 1.7.6 In addition to those information and data required in Annex 9 to this Part VII (which is applicable to the second part of the Technical Acceptance), for each part of the Technical Acceptance, the Contractor shall provide a trial report to GNC after completion of that part. The report shall contain information regarding the method of test, engines' running condition, sea, weather and wind conditions, 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 GNC appointed consultant ; and such information shall be prepared in a format agreed by GNC.

1.7.7 Loading Conditions

	Operational Load Condition		
	Light	Intermediate	Full
Fuel (minimum)	50%	50%	100%
Crew	3	5	5
Additional Officers	Nil	Nil	3
Equipment & Kit	0 kg	150 kg	250 kg
Seats for Crew	4	6	8

1.7.8 Official Speed Trial (to be conducted as part of the fourth part of the Technical Acceptance)

- (a) The Official Speed Trial shall be carried out in Hong Kong Waters.
- (b) As part of the Technical Acceptance, the Contractor shall carry out the Official Speed Trial to determine whether the Contract Speed can be achieved. This Official Speed Trial shall be carried out in the presence of GNC officers and HKPF representatives 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 calculated by measuring the time which the Vessel takes to cover one nautical mile between two poles or other measuring method acceptable to MD and the HKPF.
- (e) The Contract Speed is considered not having been achieved if the Contract Speed cannot be attained during the Official Speed Trial after a total of FIVE runs in each direction.
- (f) The Contract Speed stated in Paragraph 2.4.1 shall be achieved by the Vessel in the Official Speed Trial with the engine power at the declared maximum (rated) power specified by the

manufacturer under the Full Operational Load Conditions as specified in Paragraph 1.7.7 of this Part VII. If the Vessel fails to achieve the minimum Contract Speed stated in Paragraph 2.4.1, the Government will deem that the Vessel has failed to pass the Official Speed Trial and therefore Technical Acceptance .

- (e) The instruments used in measuring the Contract Speed for the Official Speed Trial shall be provided either by:
  - (i) the Contractor, provided that the instrument has been calibrated by a certified body in Hong Kong acceptable to GNC and the HKPF; 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 and the HKPF; or other speed measuring methods acceptable to GNC and the HKPF.

- (f) All Equipment shall also be in operation during the Official Sea Trial unless explicitly exempted by MD or the HKPF. This Equipment shall have passed the Technical Acceptance .
- (g) The information including but not limited to the speed, time of the day, engine running conditions and sea condition shall be properly recorded by the Contractor, and signed as witnessed by the GNC surveyor (or the GNC representatives) and the HKPF during the Official Sea Trial and shall form part of the Official Sea Trial Report. A copy of the Official Sea Trial Report as required in Paragraph 1.7.9 below shall be given to GNC before Delivery Acceptance.
- (h) Upon successful completion of the Official Speed Trial in Hong Kong, the Contractor shall arrange GNC officers to carry out a hull bottom inspection on the Vessel to check for any hull damage before delivery.

1.7.9 The following tests shall be conducted in Hong Kong Waters as part of fourth part of the Technical Acceptance and the testing results shall be recorded and form part of the Official Sea Trial Report:

(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 engines operating within the manufacturer's 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 engines' 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:

- (i) all engines running;
- (ii) any one engine stalled;
- (iii) any two engines stalled; and
- (iv) any three engines stalled if the Vessel is designed to be propelled by four (4) engines or more.

The minimum time for turning to both sides at 15°, 90°, 180°, 270° and 360° shall be recorded.

(c) Crash Stop Test

The minimum time and distance achievable by the Vessel when running from full ahead to stop, and then to full astern shall be determined at the Crash Stop Test without damage to the engines and risk for the crew.

(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 can still be steered satisfactorily when the electrical power supply to the steering system has been disabled.

(f) Vertical Acceleration Measurement

The magnitude of vertical acceleration at the Primary Console together with the sea conditions at which the measurement was taken shall be recorded during the sea trials.

## **1.8 Delivery Acceptance**

### **1.8.1 Delivery Acceptance**

- (a) The Vessel, after its successful completion of Technical Acceptance shall be delivered at the Contractor's expense to the Government Dockyard.
- (b) The RO's certificate of class with notations or product certificate for the Vessel as specified in Schedule 9 of Part V shall be required before the Acceptance Certificate can be issued by the Government.
- (c) The Contractor must demonstrate to 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 MD in brand new and Ready to Use condition.
- (d) Not later than six (6) weeks before the Delivery Acceptance of the Vessel, the Contractor is required to submit to GNC four (4) copies of the Inventory List covering all items of or relating to the Vessel including all Equipment, Spare Parts, Deliverables, manuals, documentation, stores, and equipment for testing in respect of the entire Vessel. The Inventory List shall be approved by MD seven (7) days before the day of Delivery Acceptance and shall cover 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 MD in a satisfactory state. Details of each inventory item shall include: item name, description, type, quantity, manufacturer's name, manufacturer's part reference number and/or serial number, and the item's location in the Vessel.
- (e) The items specified in Paragraph 8.2 of Chapter 8 of this Part VII, and all items set out in the Inventory List in the form as approved or stipulated by the Government shall be delivered to MD at the Delivery Acceptance of the Vessel. The Contractor must provide fourteen (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.
- (f) On delivery, the Vessel must be in a clean, tidy and fully fitted and operational condition.
- (g) 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 The Contractor shall either be a Government Recognised Servicing Shipyard, i.e., an approved contractor on the list of Government Dockyard Contractors under “Group/ Category: Hull, Deck & Tailshaft Group II” or, before the signing of the Contract, the Contractor shall have entered into a binding sub-contract with a Government Dockyard Contractor (Group/ Category: Hull, Deck & Tailshaft Group II), which shall provide and is capable of providing the Warranty Services for the Vessel throughout the Warranty Period. The prevailing list of Government Dockyard Contractor (Group/ Category: Hull, Deck & Tailshaft Group II) is at Annex 6 for reference.
- 1.9.2 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 twelve (12) months from the date of Acceptance Certificate of the Vessel, shall be delivered to MD upon Delivery Acceptance.
- 1.9.3 The full scope of the Warranty Services is set out in Annex 1 to this Part.
- 1.9.4 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 the 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 to be provided as part of the Guarantee Slipping is set out in Annex 1 to this Part.

## **1.10 Support Services**

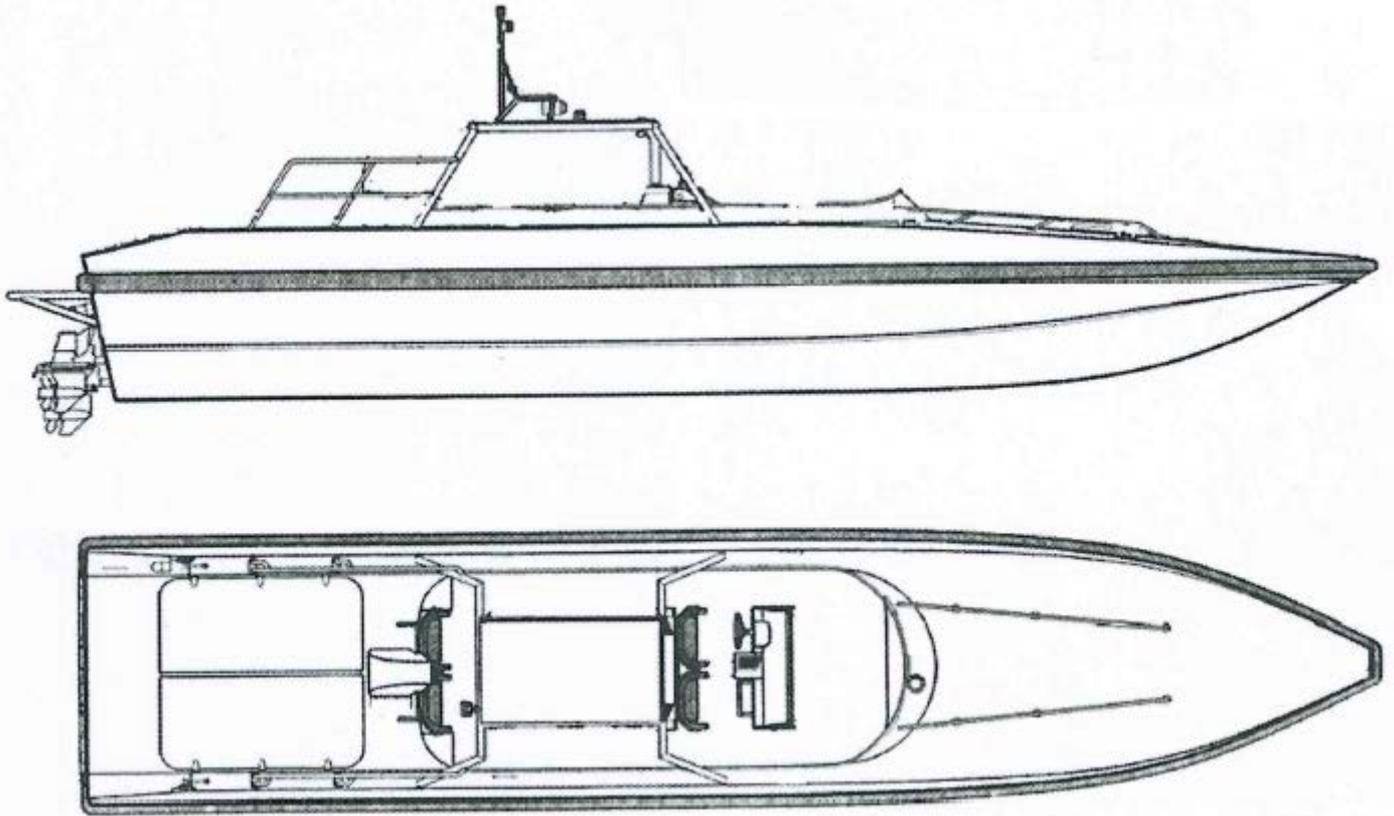
- 1.10.1 The Vessel must be designed for through life support and easy maintenance in Hong Kong based on an operation profile (i.e., the operational purposes) and minimum serviceable life as mentioned in this Part VII (i.e., a minimum serviceable life of 15 years).
- 1.10.2 Paragraph 1.10.1 above applies not only to inboard engines and sterndrives or outboard 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 the 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 an independent contractor approved by one of the RO as listed in Paragraph 2.3.4 (a) to (i) of this Part VII to verify that there is no asbestos on the Vessel. An asbestos free certificate or a statement of compliance issued by the independent contractor to this effect shall be provided upon delivery of the Vessel.

## Chapter 2 - General Technical Requirements

### 2.1 Conceptual General Arrangement Plan



## **2.2 General Provisions**

- 2.2.1 Without prejudice to the generality of Chapter 1 of this Part, this Chapter contains the more particular technical specification for the Vessel. The significance of Essential Requirements is explained in Paragraphs 1.1 of this Part VII.
- 2.2.2 The work to be done under this Contract consists of the design, construction, outfit, testing and delivery of five (5) High Speed Interceptors (HSI) for the HKPF. Workmanship, functions, characteristics and performance shall be in accordance with this Part VII, best marine construction practices, and the regulatory standards herein specified or otherwise applicable.
- 2.2.3 The Contractor 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 Plan shown in Paragraph 2.1 of this Part VII only serves as a guidance and reference drawing to help explaining the requirements stated in this Part VII.
- 2.2.1 ALL the machinery, equipment and facilities, furniture (if applicable), fixtures and fittings, including outfitting of the Vessel that are described in this Part VII, together with their requirements for design and installation standards that are stipulated in this Chapter and in any other parts of this Part VII, are the items that must be included in the complete “As-built” Vessel delivered to the Government.
- 2.2.2 The Vessel will be required to take part in security, anti-terrorism, counter-terrorism and other confidential operations involving specialist kit and equipment, details of which cannot be made public. Therefore, detailed information pertaining to the design requirements for certain storage, mounting and/or installation of such specialist equipment will only be made known to the Contractor at the kick-off meeting. Such specialist equipment will not influence ship lines, hull form nor unduly alter centre of gravity.

## **2.3 Rules and Regulations**

- 2.3.1 The Vessel shall be designed and constructed in accordance with the latest edition of the rules and regulations or a standard covering the hull structure and propulsion machinery acceptable to the RO. The design approval and survey during construction of the Vessel shall be carried out by the RO, and examinations and tests shall be witnessed by the RO. Classification certificate with class notations or product certificate for hull structure and propulsion machinery shall be provided for the Vessel on delivery. [E]
- 2.3.2 With reference to machinery, systems and fire protection, the Vessel shall be provided with specific equipment for managing the fire risks.
- 2.3.3 Service and navigation notations assigned to the Vessel as listed in the certificate of class, or similar service restrictions as listed in the product certificate, shall be in line with the operational requirements stated in this Part VII.
- 2.3.4 Without prejudice to the general requirement that the Contractor shall perform all Work in full compliance with all applicable laws and regulations, and in full compliance with the requirements of the Contract including this Part VII, the construction of the Vessel must comply with the requirements of the RO specified in Schedule 9 or the requirements of any of the RO listed below (where it is expressly specified in this Part VII in relation to a particular requirement, another RO which is any one of the ROs listed in sub-Paragraphs (a) to (i) below may be designated for compliance with the relevant requirement), and also the requirements further specified in sub-Paragraphs (j) to (o) below:

- |     |                                       |       |
|-----|---------------------------------------|-------|
| (a) | American Bureau of Shipping           | ABS   |
| (b) | Bureau Veritas                        | BV    |
| (c) | China Classification Society          | CCS   |
| (d) | Det Norske Veritas Germanischer Lloyd | DNVGL |
| (e) | Korean Register of Shipping           | KR    |
| (f) | Lloyd's Register                      | LR    |
| (g) | Nippon Kaiji Kyokai                   | NK    |
| (h) | Registro Italiano Navale              | RINA  |
| (i) | Russian Maritime Register of Shipping | RS    |

and other entities as specified below:

- (j) International Electrotechnical Commission (IEC) Regulations for the Electrical and Electronic Equipment.
- (k) International Telecommunications Union recommendations in the International Radio Regulations (ITU-R).
- (l) Quality and standards of the welding shall comply with the rules of one of the ROs listed in sub-Paragraphs (a) to (i) above or American Welding Society (AWS) or other applicable international standards or rules.
- (m) International Regulations for Preventing Collisions at Sea 1972, as amended by International Maritime Organization (IMO) Resolution A464(XII) and A626(XV).
- (n) ISO 12215-4 “Small craft – Hull construction and scantlings – Part 4 Workshop and manufacturing”.
- (o) All equipment/fittings shall be designed and manufactured to at least the standards as specified in these Technical Specifications. If none of the rules and regulations in Paragraphs 2.3.4(j) to (n) above are applicable, then the applicable standards specified by the applicable organisations 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

In the event of any inconsistency amongst the above requirements, rules and standards, those mentioned in sub-Paragraphs (j) to (o) shall prevail over the requirements of the relevant RO as listed in sub-Paragraphs (a) to (i) above.

## 2.4 Contract Speed

- 2.4.1 When all of the engines are running at their declared maximum (rated) power, the guaranteed minimum highest achievable speed shall be 66 knots in WMO Sea States 0 to 2 under the Light Operational Load Condition specified in Paragraph 1.7.7 of this Part VII (“Contract Speed”). [E]
- 2.4.2 The Contract Speed prescribed above shall be achieved without porpoising, or other dynamic instabilities. The propellers selected shall match the engine profile and avoid cavitations as far as possible.

## 2.5 Principal Dimensions

Length Overall (LOA):	14.0 – 16.0 metres (to be measured from the foremost part of the Vessel to the aftmost part of the Vessel including the fender as described in Paragraph 3.8 of this Part VII)	[E]
Breadth:	Approximately 3 metres and design to suit	[E]
Draft	Design to suit	[E]
Air Draft (Maximum)	Not more than 3.5 metres (from the waterline of the Vessel at Light Operational Load Condition as stipulated in Paragraph 1.7.7 of this Part VII to the highest point of any fixed structure including antenna)	[E]
Deadrise Angle at Transom:	Not less than 25 degrees	[E]

## 2.6 Material of the Structure

- 2.6.1 Material for the hull, deck, and the superstructure shall be marine grade aluminium alloy. [E]
- 2.6.2 Plate material shall meet the requirement of EN AW 5083 or equivalent.
- 2.6.3 Profile material shall meet the requirement of EN AW 6082 or equivalent.

## 2.7 Vessel Operating Profile and Environment

- 2.7.1 The Vessel shall be designed to have sufficient space for carrying eight (8) seated officers. [E]
- 2.7.2 The Vessel shall be designed for deployment by the HKPF on at least 340 days per year including both day and night time operational deployment. The Vessel shall be designed and built to operate in Hong Kong Waters.

### Summary of Operational Hours / Range:

- (a) Number of hours/day: 10 hours engine running time per day
- (b) Number of days/year: 340 days/year
- (c) Endurance for fuel capacity: Sufficient fuel for 2.0 hours at Contract Speed and 3.0 hours at patrol speeds (as per Paragraph 1.2.4(b) of this Part VII) at the Light Operational Load Condition (as per Paragraph 1.7.7 of this Part VII) without refuelling [E]

- 2.7.3 The Vessel shall be able to operate (fulfil its operational roles) safely within Hong Kong Waters, including in swamps and in rough sea conditions up to and including WMO Sea State 5 and to survive WMO Sea State 6 while returning to base.

## **2.8 Markings and Colour Scheme**

- 2.8.1 (a) The Contractor shall provide the markings and colour scheme for the Vessel. The painting colour scheme for the Vessel and fittings shall be approved by GNC before application.
- (b) Draft marks, names, insignia and other colour markings should be in a colour contrasting with the hull and console's colour. [D]
- 2.8.2 All labelling shall be in both traditional Chinese and English and as per applicable rules and regulations.
- 2.8.3 The Vessel's name shall be marked permanently on both sides of the console of the Vessel. Details of the size and calligraphy shall be confirmed by the HKPF.
- 2.8.4 Draft marks shall be permanently provided at the port and starboard of stem and stern. Draft 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 draft mark plan shall be produced by the Contractor and agreed by GNC before the draft marks are permanently marked onto the hull surface.
- 2.8.5 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.
- 2.8.6 Safety markings designed to prevent persons from tripping on board the Vessel shall be provided where necessary.

## **2.9 Tally Plates**

- 2.9.1 The following information shall be displayed on the builder's plate:
- (a) Builder's name;
- (b) Vessel's name;
- (c) Year of build; and
- (d) Maximum number of persons including the crew that the Vessel is designed to carry.
- 2.9.2 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 tanks;
- (d) All valves, equipment on deck;
- (e) Control panels, switchboards, distribution boxes and electrical circuits; and
- (f) Any other equipment/fitting as required.

Information engraved on the tally plates shall include: service, function, mode of operation, source of power, fuse rating, voltage, warning and other information as required by MD.

- 2.9.3 Tally plates exposed to weather shall be made of durable and weatherproof material and be fastened securely.
- 2.9.4 All cable termination shall be identified clearly for disconnection and reconnection.

## **2.10 Other Design Features**

- 2.10.1 The berthing requirements of the Vessel shall match the designated points of berth at the Government Dockyard and the Marine Police operational bases.
- 2.10.2 Permanent ballast can only be used as agreed by GNC.
- 2.10.3 The Vessel shall perform at all speeds up to the Contract Speed in WMO Sea States 0 to 2 without the following characteristics:
- (a) chine walking;
  - (b) porpoising;
  - (c) loss of horizon (meaning that the view of the horizon forward of the bow of both the coxswain and the commander both in the seated and standing positions at the primary console shall not be obstructed by the bow of the Vessel at any time when underway or making way);
  - (d) loss of directional control;
  - (e) permanent list; and
  - (f) engine strain and/or cavitation manifested by engine overspeeding.
- 2.10.4 The Vessel's deck shall be of a flush design free of trip and snag hazards for both seated positions and areas where officers may be required to move around during the execution of their duties. Where seats and other fixtures and fittings are removable, the requirement for a design which is free of trip and snag hazards shall apply whether the seats and other items are fitted to the Vessel or not.

## Chapter 3 - Hull

### 3.1 Hull Construction and Scantlings

- 3.1.1 The hull shall be a continuous deep “V” and have chines and spray strips (rails) which shall be built-on with continuous shell underneath. The forward bottom part of the hull shall be a deep “V” configuration designed to withstand heavy pounding and slamming. The remainder of the bottom part of the hull shall then reduce to a constant deadrise angle towards the stern. The contractor shall determine the appropriate deadrise angle and its variation along the bottom length of the hull but this shall not be less than 25 degrees at the transom and the hull. The hull shall be equipped with suitable appendages or other design features to minimise potential “side-kick” or “skidding” effects during high-speed manoeuvring during operational deployment. Stepped hull designs will not be accepted. At the tendering stage, the Tenderer shall provide a written technical justification for the choice of the hull form with respect to high sea performance. The Tenderer must provide all information (technical and otherwise) for evaluation purposes. Any information submitted will be treated with commercial confidence by the Government and will only be used for evaluation purposes. [E]
- 3.1.2 The entire Vessel including hull structures shall be designed and constructed for a serviceable life of 15 years.
- (a) The Tenderer shall confirm in Schedule 5 of Part V that the entire Vessel including hull structures will achieve 15 years of serviceable life. [E]
- (b) Finite element analysis calculations performed by one of the Classification Societies listed in Paragraph 2.3.4 (a) to (i) of this Part VII in supporting the design in achieving this objective shall be submitted together with the main hull structure drawings when approval from the RO is sought. Boundary limits, including but not limited to sea state and the associated wave heights, loading conditions, operating hours, and speed of Vessel, to be used in performing such calculations are given in this Part VII.
- 3.1.3 The structure shall be based on longitudinal stiffening, supported by transverse webs and bulkheads.
- 3.1.4 While fulfilling the Contract Speed specified in Paragraph 2.4.1 of this Part VII, the hull construction shall be designed for high speed of up to 70 knots with up to 6.0 g accelerations. The design pressure for longitudinal and plating shall be determined for fulfilling performance characteristics of the Vessel, including but not limited to speed and maximum weight of the Vessel, and the sea states and wave height in which the Vessel is operating. [E]
- 3.1.5 The structural design of the Vessel shall be based on the results of the calculations performed in the manner specified in Paragraph 3.1.2(b) of this Part VII, and demonstrate that the Vessel meets or exceeds the following top speed requirements under the following sea state and significant wave height data: [E]

<u>Speed in Knots</u>	<u>WMO Sea state</u>	<u>Significant Wave Height in Metres</u>
66	0-2	0 – 0.5
40	3	1.25
20	4	2.5

- 3.1.6 The horizontal trim of the Vessel shall be controllable by trim flaps and/or tilted sterndrive units and/or other means in all conditions. The horizontal trim angle of the Vessel at any speed between rest and full speed shall be such that forward visibility is maintained for the coxswain and the commander from their normal navigating positions. [E]
- 3.1.7 The design stresses and scantling including internal structural members shall be determined according to the RO Requirements.
- 3.1.8 The Contractor's quality control personnel shall carry out quality control throughout the construction of the Vessel. Inspection shall be carried out by the RO's surveyors and MD assigned personnel or consultants.
- 3.1.9 Any openings in the hull and the deck shall comply with the applicable RO's rules for watertight integrity if not otherwise specified by MD or the HKPF at or prior to the kick-off meeting.
- 3.1.10 The hull design shall incorporate a self-bailing deck with scuppers capable of draining the cockpit in accordance with the ISO 11812:2001 Small Craft – Watertight Cockpits and Quick-Draining Cockpits requirements for Design Category B or as per the RO Requirements.
- 3.1.11 The hull shall be fitted with appropriate sacrificial anodes.
- 3.1.12 The hull construction material shall be new and of a type which has been certificated by the RO in accordance with the RO Requirements. Mill certificates shall be obtained and records shall be strictly maintained to match them with the various sections produced during Vessel's manufacture.
- 3.1.13 Welding and Fabrication
- (a) All welding and fabrication shall be implemented according to the applicable requirements of any one of the Classification Societies listed in Paragraph 2.3.4 (a) to (i) of this Part VII.
  - (b) Welded joints shall be designed and constructed carefully to conform to the latest established standards to prevent fatigue failure. Cutting for edge preparation shall be performed by qualified persons to achieve the correct angle, shape and smooth finish of the edges. Only qualified welders shall perform the welding work.
  - (c) The Contractor shall submit certification of the qualifications of each individual welder and inspector. Welds installed using unqualified procedures or welding performed by non-certified welders shall be subject to removal by the Contractor at its own expense.
  - (d) The structure fabrication and quality control regime shall include but not be limited to the following:
    - (i) Inventory of incoming material, consumables, components and machinery;
    - (ii) Traceability procedures for materials together with traceability identification codes which shall be serial and indexed to the controlled manufacturing procedures;
    - (iii) Lofting, cutting, fit up, welding, forming and dimensions of structural components;
    - (iv) Welding and inspection procedures identifying clearly the type and extent of NDT inspection carried out on the Vessels' structure. Normally, not less than 10% of the structure shall be subjected to Ultrasonic Test (UT) and Radioactive Test (RT);
    - (v) Machining, measuring and inspection equipment maintenance and calibration;
    - (vi) Finish surfaces and bolting;
    - (vii) Procedures for non-conformance reporting and rectification of defects; and
    - (viii) Design and manufacturing drawing control and procedures for revisions, updates and reissue of drawings.
- 3.1.14 Hull Structural Tests
- (a) All hull and deck structures shall be capable of withstanding the impact forces mentioned below (Paragraphs 3.1.15 to 3.1.18).
  - (b) Each vessel shall go through these tests in the presence of the RO and officers from GNC.

- (c) The vessel shall only be accepted after it has passed through the following tests to the satisfaction of the Government.

#### 3.1.15 Bow Impact Test

- (a) The hull of the proposed vessel shall be constructed so that it is capable of sustaining frequent impacts during the interception and boarding of other vessels in the sea conditions specified in the TS.
- (b) The adequacy of the bow structures to fulfil the above mentioned purpose shall be tested, with the vessel in its fully loaded condition, to ascertain whether or not any permanent deformation and/or cracking of the hull structures (including the bow and deck) will result from the impacts mentioned in (a) above.
- (c) This test shall be carried out at a suitable stage during construction of the hull either on land or in water. It shall be carried out prior to the installation of other equipment and machinery etc. to avoid damage to this equipment/machinery. The method and procedure for conducting this test shall be proposed by the Contractor and agreed by GNC.
- (d) Inspections of the vessel after this test will include all parts of the hull and all deck structures.

#### 3.1.16 Requirements for bow strengthening

- (a) The bow shall be reinforced to withstand impact forces associated with frequent interception and boarding operations.
- (b) The bow strengthening structural design and construction shall, in addition to RO requirements, be acceptable to and approved by GNC.
- (c) The bow structure (together with the bow fender) shall be capable of withstanding a head-on impact at the bow with a vertical seawall at a speed of not less than 5 knots.

#### 3.1.17 Drop Test for Structures

- (a) The Vessel's hull and deck structures in its fully loaded condition (simulated by using suitable portable weights) shall be able to withstand the impact force when the vessel is dropped into flat calm water from a height of 2 metres with the hull bottom and keel roughly parallel to the water's surface.
- (b) This structural test shall be carried out before the fitting out stage of the vessel to ensure that no machinery or equipment is damaged during the test.

#### 3.1.18 Side Impact Test for Structures

- (a) The Vessel's hull and deck structures in its fully loaded condition (simulated by using suitable portable weights) shall be tested to withstand a broadside impact with a beam-on velocity of 3.5 metres per second.
- (b) This structural test shall be carried out before the fitting out stage of the Vessel to ensure that no machinery or equipment is damaged during the test.

#### 3.1.19 Test Reporting

- (a) After the Bow Impact Test, Drop Test and Side Impact Test, inspections shall be carried out by the RO and the result of this test shall be given to GNC within 2 weeks of the test.
- (b) Any defect found shall be rectified to the satisfaction of GNC along with any modifications to the structures that are proposed by the Contractor and agreed by GNC.

## 3.2 Stability

3.2.1 The Vessel shall meet the following requirements:

- (a) IMO's Intact Stability Code given in MSC.267(85) (in the latest version as at the date of signing of Contract) or as per stability requirements of the RO, and Paragraph 3.2 of this Part VII; [E]
- (b) The initial metacentric height GM of the Vessel, when loaded in all anticipated loading conditions given in Paragraph 3.2.5 (c) of this Part VII shall not be less than 0.35 metre; and [E]
- (c) Whilst in any of the loading conditions stipulated in this Part VII, the Vessel shall not heel more than seven (7) degrees to one side when all persons onboard, weighing 82.5 kg each, are sitting at or near the amidships area on that side of the Vessel. Under the same crowding of persons on one side of the Vessel, there shall be a minimum freeboard of not less than 150 mm at any point along the length of the Vessel. This requirement applies to both the port and starboard side of the Vessel. [E]

The lines plan with offset table and the preliminary stability information of the Vessel shall be submitted with the tender before the Tender Closing Date. All calculations and drawings must be in metric units.

3.2.2 The Vessel is required to comply with the intact and damaged stability requirements stated in this Part VII.

3.2.3 Final stability calculations of the sea trial loading condition using final lightship data shall be delivered to MD prior to the Official Sea Trial mentioned in Paragraph 1.7 of this Part VII.

3.2.4 Inclining Experiment

- (a) An inclining experiment shall be carried out with the attendance of RO surveyor and MD officer(s) and/or appointed consultant.
- (b) At least 14 working days in advance of the inclining experiment specified in Paragraph 3.2.4(a) above, the Contractor shall submit a "Scheme of Inclining Experiment" which includes:
  - (i) the Vessel's 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;
  - (v) hydrostatic table and tank capacity tables. The increment of draft shall be every 5 mm in the hydrostatic table and the increment of sounding shall be every 5 mm in the capacity tables; and
  - (vi) the list of data to be measured (i.e. drafts, specific gravity of floating water).
- (c) The inclining experiment shall only be conducted:
  - (i) after the "Scheme of Inclining Experiment" 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.

A request for attendance shall be made at least five (5) working days in advance. The lightship weight and centres of gravity shall be calculated and presented in the inclining experiment report. The GM of the Vessel after each and every shift of inclining weights shall be determined. Free surface of liquids remaining on board shall be taken into account.

- (d) This inclining experiment report shall be submitted to the RO for approval. The report must include a statement from the Contractor stating that the Vessel shall be safe to go to sea for the intended sea trials specified in the Contract. No sea trials shall be conducted until MD, based on the information given in the inclining experiment report, agrees that it is safe to carry out sea trials.
- (d) The first (1st) and the third (3rd) Vessels shall be inclined to determine the final lightship data by carrying out the inclining experiment. For other Vessels, i.e. the second (2nd), the fourth (4th) and the fifth (5th) Vessels, lightship weight measurement shall be carried out to determine the lightship weight and LCG. If the lightship weight and LCG so measured deviate from those of either Vessel of which inclining experiment have been carried out by more than 2% of weight or 1% of LCG, inclining experiments for such other Vessels shall be carried out.

### 3.2.5 Stability Information Booklet

- (a) The Contractor shall supply to MD three (3) copies of the Stability Information Booklet. The Stability Information Booklet must be submitted 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 – IS Code). In addition to the requirements stated above, the booklet in its final version shall include:
- (i) the Vessel's particulars, a sketch of the general arrangement drawing showing different compartments and tank positions, hydrostatic curves and cross curves;
  - (ii) tank calibration/sounding tables, including but not limited to the fuel oil tank(s). These tables shall consist of the locations of tanks (in terms of frame numbers), the levels from tank bottom, the capacities, the VCG/LCG/TCG and free surface moments, and the location of sounding points. The trim and heel of the Vessel where these tables are applicable shall be stated;
  - (iii) a stability calculation for each loading condition which 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, statistical stability curve, and area under the curve;
  - (iv) any other information as reasonably required by the RO and/or MD;
  - (v) the inclining experiment report, if applicable, approved by MD and the RO; and
  - (vi) the lightship weight measurement report as approved by MD and the RO.
- (c) Loading Conditions in Stability Information Booklet
- (i) The maximum free surface moments shall be used for calculating the stability of the Vessel in all of the following conditions.

Loading conditions		No. of persons	Equipment and Effects	No. of Jockey Seats	Fuel oil
(1)	Lightship	Nil	Nil	Nil	Nil
(2)	Full Load 8 persons (Dep)	8	250 kg	4	98%
(3)	Full Load 8 persons (Arr)	8	250 kg	4	10%
(4)	Full Load 4 persons (Dep)	4	250 kg	4	98%
(5)	Full Load 4 persons (Arr)	4	250 kg	4	10%
(6)	Full Load 2 persons (Dep)	2	250 kg	4	98%
(7)	Full Load 2 persons (Arr)	2	250 kg	4	10%
(8)	Half Load 8 persons (Dep)	8	150 kg	4	98%
(9)	Half Load 8 persons (Arr)	8	150 kg	4	10%

(10)	Half Load 4 persons (Dep)	4	150 kg	2	98%
(11)	Half Load 4 persons (Arr)	4	150 kg	2	10%
(12)	Half Load 2 persons (Dep)	2	150 kg	0	98%
(13)	Half Load 2 persons (Arr)	2	150 kg	0	10%
(14)	Light Load 8 persons (Dep)	8	0 kg	4	98%
(15)	Light Load 8 persons (Arr)	8	0 kg	4	10%
(16)	Light Load 4 persons (Dep)	4	0 kg	2	98%
(17)	Light Load 4 persons (Arr)	4	0 kg	2	10%
(18)	Light Load 2 persons (Dep)	2	0 kg	0	98%
(19)	Light Load 2 persons (Arr)	2	0 kg	0	10%

- (ii) The weight of each person shall be assumed to be 82.5 kg.
- (iii) 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.
- (iv) The weight of equipment and effects as stipulated in Paragraph 3.2.5(c)(i) above shall be evenly distributed along the deck and the VCG of the additional payload shall be assumed to be 400 mm above deck.
- (v) The Vessel shall be capable of operating safely at WMO Sea State 5 and when the No. 3 typhoon cyclone signal is hoisted in Hong Kong.
- (vi) The Vessel shall be capable of surviving at WMO Sea State 6 while returning to base.

### 3.2.6 Intact Stability Criteria

- (a) Stability will be considered satisfactory for the loading conditions set out in Paragraph 3.2.5(c)(i) above if, after taking free surface effects and the wind moment at the No. 3 tropical cyclone signal specified in Paragraph 3.2.5(c)(v) above into account, the following criteria are complied with:
  - (i) The intact stability criteria stated in Chapter 2 of Part A of the Intact Stability Code as specified in MSC.267(85), as amended; or
  - (ii) As per stability requirements of the RO.
- (b) Provided that the Vessel complies with the RO's rules and regulations governing stability, the Vessel shall be deemed to have met the requirement stipulated in Paragraph 3.2.6(a) above.

### 3.2.7 Damaged Stability Criteria

- (a) Transverse bulkheads shall be arranged to contain flooding of any one watertight compartment between the adjacent watertight transverse bulkheads, and asymmetric flooding due to damage of any smaller watertight spaces located within the compartment between the adjacent watertight transverse bulkheads. The residual stability shall be sufficient to maintain the Vessel afloat when the Vessel is loaded as per loading conditions stipulated in Paragraph 3.2.5(c)(i) above in case of damage.
- (b) At the final stage of flooding upon damage, and taking progressive flooding (if any) into account, the Vessel shall remain afloat without excessive trim or list.
- (c) Irrespective of whether the RO has requirements for damage stability or not, the Contractor shall obtain the agreement of the RO and GNC on the opening(s) to be used to determine the down flooding angle before submitting the results of the calculations to GNC and RO for approval.

### 3.2.8 Dynamic Stability Requirements

- (a) Theoretical dynamic stability calculations shall be carried out by a qualified competent naval architect who is a corporate member of an internationally recognised professional institution such as the Royal Institution of Naval Architects or equivalent.
- (b) The basis of and the methods employed in the theoretical analysis that lead to the calculated results must be clearly identified by the Contractor's naval architect and be acceptable to GNC/MD before the start of the analysis.
- (c) A list of literature, technical papers, empirical formulae and experimental data that are to be employed for the analytical calculations mentioned above shall be given to GNC/MD. Hard copies (or soft copies) of the contents of the list shall also be given to GNC/MD if so requested.
- (d) The Contractor shall provide GNC/MD with a preliminary Dynamic Stability Report (Report) of the dynamic stability analysis within three (3) months of the kick-off meeting.
- (e) One (1) separate Report shall be produced by the Contractor for each Vessel.
- (f) The Report produced by the Contractor shall include a statement confirming that the vessel is dynamically stable and safe to operate in any one of:
  - (i) the vessel load conditions as specified in Paragraph 1.7.7 of this Part VII;
  - (ii) the sea and wave environments; and
  - (iii) wind force and weather conditions stipulated in the TS for the normal operation of the vessel.
- (g) The Report shall provide a descriptive or numerical account of the analytical results for, but not limited to, the following information of the vessel :
  - (i) The confidence level (statistical) of preventing porpoising instability. An empirical formulae approach will be acceptable.
  - (ii) An estimation of the probability of chine-walking occurring at critical speeds with beam-on waves and following waves (taking into account any hull bottom features fitted to counteract chine-walking). Information obtained from either tank tests or from full scale experimental data are acceptable. Alternatively, a theoretical estimation is also acceptable.
  - (iii) An estimation of the position of peak lifting pressure at the hull bottom;
  - (iv) An estimation of the position of the hull bottom with peak slamming pressure at specific wave characteristics.
  - (v) The anticipated peak slamming pressure in (iii) and an analytical calculation to confirm the hull bottom structure is capable of withstanding the force of such an impact.
  - (vi) An estimation of the free body (i.e. without the use of trim flaps or the tilting of the propellers etc.) running trim angles of the vessel at different speeds from stationary through to maximum speed.
  - (vii) The actual anticipated realistic running trim angle of the vessel (with trim angle reduced by trim flaps or other means) at different speeds from stationary through to maximum speed.
  - (viii) The effect of the addition of mass on the calculations mentioned in (vi) and (vii) above i.e. calculations are performed at lightship conditions and at half loading and full loading conditions.

- (ix) The effect of a change in the longitudinal centre of gravity from the lightship condition until the vessel is fully loaded for the calculations in (vi) and (vii) above.
- (x) Any other dynamic stability calculations or analysis that may come to light and become a concern to GNC/MD during the design and construction stages of the vessel. (For example, when certain shortcomings in vessel performance are discovered in the delivered vessels).
- (xi) Acceptance of the data in the Report by GNC/MD will only be preliminary. During the sea trials, the vessel will still have to demonstrate that it has fulfilled the performance requirements stipulated in the TS.

### **3.3 Painting**

- 3.3.1 Paints shall be of a fire-retardant marine quality and be applied in accordance with the manufacturer's specification.
- 3.3.2 The volatile organic compound (VOC) content limits of the paints shall comply with the Hong Kong Air Pollution Control (Volatile Organic Compounds) Regulations CAP 311W.
- 3.3.3 The 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.
- 3.3.4 The Contractor shall guarantee all painting work for one (1) year against defects in material and workmanship. At Delivery Acceptance the Contractor shall provide MD with a letter of certification from the paint manufacturer signed by coating inspectors certified to NACE Level 2 or FROSIO Level III standards, to certify that the paint was applied under the paint manufacturer's quality control and in accordance with the manufacturer's requirements including but not limited to the surface preparation (blasting profile and water soluble salt content), surface temperature of the metal surfaces above dew point, atmospheric conditions, (temperature and relative humidity), dry film thickness and method of application.
- 3.3.5 A Tributyltin (TBT) free fouling-release/anti-fouling paint shall be applied on the exterior of the hull below the water line to provide at least two years' protection against marine growth. A TBT free certificate issued by the paint manufacturer shall be submitted before the Delivery Acceptance. The fluoropolymer foul release coating / antifouling paint shall comply with the International Convention on the Control of Harmful Anti-Fouling Systems on Ships.
- 3.3.6 All deck areas shall be covered with hard wearing and anti-slip epoxy paint.
- 3.3.7 A painting report shall be submitted to MD upon completion of work.
- 3.3.8 Surfaces that require painting shall be fully prepared and holes to be pre drilled prior to painting.
- 3.3.9 All fastening preparation and other penetrations shall be complete before painting of any surface.
- 3.3.10 All surfaces and any parts of the hull, deck or machinery, fittings that may cause glare or reflection must be matte powder-coated.

### **3.4 Primary and Secondary Consoles**

- 3.4.1 The offered vessels shall have an open cockpit surrounded by a coaming for protection of the crew. Height of the coaming at the front console shall be designed up to the chest height of an Asian statue. Details of the design shall be discussed during the kick-off meeting and the drawings shall be submitted to the government for approval.
- 3.4.2 The Vessel shall have two (2) consoles, a forward or Primary Console and a rear or Secondary Console. The layout of both consoles 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 both the Primary and Secondary consoles, full size mock-up consoles complete with deckplate, seats, mounting systems and any other fixtures that may influence the final design of the consoles are to be manufactured for inspection, modification (if necessary) and confirmation by MD and the HKPF. The mock-up consoles may also be used for the purposes specified in Paragraph 7.1.4 of this Part VII. The consoles of an existing craft may be used as the basis for initial discussions.

### 3.4.3 Primary Console

- (a) The Primary Console shall preferably be located near to or slightly forward of amidships and shall be situated on the vessel centreline. The Primary Console shall be designed to deflect wind and seawater spray to over the heads of the commander and the coxswain in both the seated and standing position without the use of any windscreen or other device breaking the operator's line of sight to the bow of the Vessel.
- (b) The Primary Console shall be positioned at an appropriate location for the best line of sight at all speeds (low to maximum) with the commander position being on the starboard side and the coxswain position being on the port side. The engine throttle control head is to be provided on the right hand side of the helm.
- (c) The Primary console's design shall be optimised ergonomically so that a coxswain of an Asian stature (approximately 1.64 metres in height) can operate the controls and displays for extended periods from both the seated and standing positions without incurring unnecessary physical strain.
- (d) 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.
- (e) Sufficient safety and grip rails shall be provided for each console operator position and details in these will be discussed at the kick-off meeting
- (f) The controls or displays of following equipment shall be installed in the Primary console and located in front of the coxswain in natural positions, with the highest priority devices being located in prime positions. Controls shall ideally be positioned between elbow and shoulder height. Instrument panels and display screens shall be located at or below sitting eye height. All controls and displays shall be operable when wearing normal Marine Police uniform with foul weather gear, bullet resistant vest and lifejacket.
  - (i) Helm;
  - (ii) Engine throttle/Waterjet control head;
  - (iii) Gear control levers;
  - (iv) Trim control and display;
  - (v) A magnetic compass fitted with an independent dimmer switch, installed on the top of the Primary Console in line with the coxswain's line of sight dead ahead;
  - (vi) Engine start control;
  - (vii) Tachometer
  - (viii) GPS receiver;
  - (ix) Navigation lights, search lights and flood lights switch panel;
  - (x) Electric horn;

- (xi) Siren and flashing beacon control panel;
- (xii) Fuel tanks level gauge;

#### 3.4.4 Secondary Console

- (a) The Secondary Console shall be designed to house the following equipment:
  - (i) Radar, chartplotter control and displays;
  - (ii) Radio communication controls and microphone;
  - (iii) EQ-HKPF equipment and related display;
  - (iv) Engine monitoring display panel;
  - (v) Tachometer;
  - (vi) Fire Control Panel;
  - (vii) Fuel Shut Off;
  - (viii) Bilge Pumps Control Panel;
  - (ix) Alarm Panel (Exhaust Temp., Bilge etc.);
  - (x) Loudhailer Control Unit and Microphone.
- (b) The controls and displays installed in the Secondary Console shall be located in front of the operators in natural positions, with the highest priority devices being located in prime positions.

#### 3.4.5 The controls, displays and equipment

In respect of both the Primary and Secondary Consoles:

- (a) All the controls, displays and equipment shall be waterproof, shockproof and suitable for external marine use.
- (b) All indication lights, illumination of instrumentation gauges and panel lighting shall be fitted with dimmers for day and night operation.
- (c) The flat surfaces between controls, displays and equipment shall be coated in a rubberised, matt black coating suitable for the marine environment. Details of the rubberised coating required will be discussed at the kick-off meeting.
- (d) Lockers shall be provided as far as possible, if space permits, to allow for the watertight storage of items of police equipment. The console and locker(s) shall be designed to ensure easy access for the maintenance and repair of equipment mounted, installed or stored therein.
- (e) The arrangement shall be designed to protect the crew and persons on board from injury inflicted by the console and the equipment installed in it.
- (f) Sufficient legroom shall be provided to obviate the risk of impact injury during rough weather or violent manoeuvres in both the seated and standing positions.
- (g) Durable waterproof and sunproof black/grey covers shall be provided to cover each console and the Vessel's seats down to deck level when the Vessel is not in use. Details to be discussed at the kick-off meeting.
- (h) Vibration absorbing mats shall be provided on the deck for at least the coxswain, the commander and the two Secondary Console crew positions, when in the standing position.
- (i) The two crew positions at the Primary Console and the two crew positions at the Secondary Console shall each have direct access to the internal communications system via fixed plug-in points positioned to avoid injury or cable tangle during high-speed or violent manoeuvring. Fixed plug-in points shall also be provided on the Secondary Console to provide additional access to four additional seating positions behind the Secondary Console crew seats.

### **3.5 Canopy and the Canopy Support Frame and Mast**

- 3.5.1 A strong marine aluminium alloy constructed canopy shall be provided and shall be of a fixed tube construction. This structure shall be affixed to the craft by means of bolts/screws or other non-permanent mechanical means to facilitate convenient repair and maintenance. Throughout the lifecycle of the vessel, such fittings shall avoid galvanic corrosion, stress and vibration induced fatigue. Details of these requirements shall be discussed and decided at the kick-off meeting.
- 3.5.2 The tubular mounting structure shall be positioned above the 2nd and 3rd rows of seats. It will serve as a mast structure and support and house the navigation lights, blue flashing light, lightning arrestor, thermal imager, radar scanner, radio antennae, DGPS antenna, public address system speaker and the automatic vessel location (AIS system) transmitter.
- 3.5.3 The mast is an integral part of the vessel design. The canopy and its supporting structures shall be designed to the RO's requirements and must be able to withstand vibrations produced by the motion of the vessel at sea in its operational profile as well as vibrations emanating from machinery and other sources. Furthermore, the structure and its attachment to the hull and deck shall be designed and built against fatigue failure and the methods used to fit equipment, lighting and other fittings to the structure shall be free from galvanic corrosion. A certificate or statement from the RO to the effect that the whole structure (including the mast) is, in their opinion, adequate for the vessel's operation in accordance with the TS requirements shall be obtained by the Contractor and given to GNC at (or before) the Acceptance Delivery.
- 3.5.4 The mast shall be provided with all the necessary fittings including brackets for all navigational lights, searchlight, radar scanner, antennas, lightning arrestor and other communication and navigational equipment etc.
- 3.5.5 The canopy, canopy frame (together with the mast) and its supporting brackets and bases shall be designed and constructed in light weight marine grade strong aluminium alloy.
- 3.5.6 Furthermore, the design of the mast configuration including its equipment and fitting layout must be submitted to GNC for final acceptance.
- 3.5.7 The structures of the canopy, canopy frame supports and mast shall be of a proven design for military vessels or craft of this type and be acceptable to MD. All the construction drawings of the mast foundation structures must be approved by the RO before submission to MD for comment.
- 3.5.8 All hardware such as screws, hooks, hasps, hinges, handles, sliding bolts etc. shall be made of stainless steel or another suitably strong alloy material compatible with the aluminium alloy material (i.e. to safeguard against galvanic corrosion) used for the hull and deck construction. Suitable isolation against galvanic corrosion shall be properly designed and fitted to the entire satisfaction of MD.
- 3.5.9 The mast and its supporting structures shall be properly tested for their safe operation and adequacy of strength. This shall be achieved by applying a dummy load (3 times the total weight of all the items to be carried by the mast) at the highest point of the mast whilst the mast is inclined at 45 degrees from vertical in all directions (fore and aft as well as port and starboard). This test shall be carried out ashore to the satisfaction of the RO or GNC before the mast, the canopy and the canopy frame structures are welded onto the vessel.

### **3.6 Lockers/Void Spaces**

- 3.6.1 Lockers /Void Spaces  
Suitable spaces/lockers shall be provided onboard the vessel for storing equipment. All lockers shall be:
- (a) Watertight and be fitted with a watertight means of closing;
  - (b) Lined with absorbent material which can be easily detached for cleaning and replacement;

- (c) Without any locking device and readily accessible;
  - (d) Positioned so as not to obstruct legroom or crew movement.
- 3.6.2 Equipment lockers, storage spaces or storage boxes with water proof covers shall be provided inside the space of the console, under the forward raised deck and inside the space of the seats etc. All recesses / void spaces inside and along the gunwale shall be lined with strong durable elastic web, serving as temporary storage spaces.
- 3.6.3 Air pipes of adequate size (e.g. to ISO requirements) shall be fitted to all tanks, cofferdams, void spaces, tunnels and any other compartments and spaces which are not fitted with alternative ventilation arrangements.
- 3.6.4 There shall be adequate space/lockers to accommodate the following items:
- (a) One arms and ammunition locker / box (40cm x 30cm x 20cm) shall be provided and located at the fore and aft consoles;
  - (b) An open bucket for a riot gun near the aft console (10cm in diameter x 50cm in height);
  - (c) Five (5) bullet resistant vests (60cm x 45cm x 5cm each);
  - (d) Bullet resistant helmet bag (60cm x 38cm x 30cm) located in the crew compartment;
  - (e) Submachine gun (32cm x 60cm x 8cm) located between the two shock mitigation seats immediately behind the aft console;
  - (f) Long barrelled weapon (23cm x 105cm x 9cm) located in the crew compartment;
  - (g) Spare ammunition bag (65cm x 45cm x 20cm) located in the crew compartment;
  - (h) Equipment lockers (with key lock) for storing the following items:
    - First aid box (40cm x 50cm x 20cm);
    - Watertight box (30cm x 35cm x 15cm);
    - Storage bag (60cm x 40cm x 8cm);
  - (i) Personal belongings locker for 5 crewmen, which can accommodate 5 waterproof bags (65cm x 30cm x 30cm) each.
  - (j) A pyrotechnics well for six pyrotechnics flares shall be provided, which shall be of approximately 8 inches depth on the console

For security reasons, the above information is for guidance only. Exact specifications of operational equipment will be provided at the kick-off meeting at which point detailed design criteria will also be discussed.

### **3.7 Deck, Seating and Attachment Systems**

- 3.7.1 There shall be seating for six (6) crew and two (2) other officers. The Tenderer shall provide in the tender submission comprehensive information regarding seats and seating arrangements. [E]
- 3.7.2 High quality shock-mitigating seats, anti-vibration and anti-slip deck covering and handrails shall be provided to reduce the risk of impact injury and long-term health damage to both crew and boarding officers resulting from the harsh maritime environment in which the Vessel will operate.
- 3.7.3 The seats shall be designed to prevent occupants from falling or being thrown onto the deck or overboard, to optimise body posture thereby minimising the potential for spinal or other injuries and to mitigate the potentially harmful forces to which the Vessel and crew conducting the type of operations specified in Paragraph 1.2.1 according to the operational profile specified in Paragraph 2.7 of this Part VII may be subjected. The seating arrangements will also allow sufficient legroom for the occupant whether in the standing and seated positions.

- 3.7.4 Basic requirements of the seats:
- (a) Specifically designed for use aboard small, high-speed marine craft at 60 knots and above;
  - (b) Material of the structure: Titanium, stainless steel and/or aluminium alloy;
  - (c) Materials of upholstery: Water resistance materials such as fire retardant foam/reinforced nylon laminated neoprene/heavy duty cordura laminate.
  - (d) Protective covers: Covers shall be supplied to protect all of the seats from rain and ultraviolet radiation when not in use.
- 3.7.5 Two (2) dampened seats each with a drop-down seat cushion shall be provided immediately aft of the Primary console for the coxswain and the commander. These seats shall be designed with progressive damping. The seats shall be fitted with adjustable shock absorbers for light or heavy personnel, a five (5) point harness, a headrest, pistol grips and a drop-down seat base. An adjustable height footrest, with a foot actuated switch, attached to the Primary console shall also be provided in front of each seat. The seats shall be proprietary made, supplied by a market leader, compatible with the design of the vessel, and shall be acceptable by the HKPF. Details will be discussed at the kick-off meeting.
- 3.7.6 Two (2) dampened seats each with a drop-down seat cushion shall be provided immediately aft of the Secondary Console for the engineer and the crewmember. These seats shall be designed with progressive damping. The seats shall be fitted with adjustable shock absorbers for light or heavy personnel, a five (5) point harness, a headrest, pistol grips and a drop-down seat base. An adjustable height footrest, with a foot actuated switch, attached to the Secondary console shall also be provided in front of each seat. The seats shall be proprietary made, supplied by a market leader, compatible with the design of the vessel, and shall be acceptable by the HKPF. Details will be discussed at the kick-off meeting.
- 3.7.7 The seats mentioned in Paragraphs 3.7.5 and 3.7.6 above shall have a minimum of ten (10) inches of progressive damping travel, eight (8) inches of height adjustment, eight and a half (8.5) inches of fore and aft adjustment and be mounted in a manner which will enable them to be removed, repositioned or replaced.
- 3.7.8 The aft deck behind the Secondary Console shall be fitted with a recessed track railing attachment system designed to enable dampened shock-mitigating seats of the design specified at Paragraphs 3.7.5 and 3.7.6 above to be installed. This recessed track railing system shall be capable of accommodating mountings to support dampened shock-mitigating twin jockey seat combinations, in which each jockey seat comprises a front handhold, foldable foot pegs, a drop-down seat base, a drop-down back rest and an adjustable shock absorber for light or heavy personnel. The seats shall be proprietary made, supplied by a market leader, compatible with the design of the vessel, and shall be acceptable by the HKPF. The purpose is to enable the HKPF to make flexible use of the aft deck area for the carriage of specialist equipment utilising tie-down points temporarily attached to the track system or for the seating of a minimum of four (4) officers (in addition to the four officers utilising the four (4) seats mentioned in Paragraphs 3.7.5 and 3.7.6 above). This recessed track railing system shall consist of two (2) longitudinal tracks (each consisting of two rails) running from immediately aft of the Secondary Console to the beginning of the engine compartment. All seats and track systems must be interchangeable and fully compatible to allow for efficient removal, replacement, repositioning, reconfiguration or adjustment by no more than two people without the use of tools. The recessed track railing attachment system shall meet the strength requirements of the RO or other international standard. The Contractor shall supply rain/UV light covers to protect all of the seats when not in use. Details will be discussed at the kick-off meeting.
- 3.7.9 A recessed track railing attachment system consisting of two (2) pairs of flush fitting seat mounting rails identical to those mentioned in Paragraph 3.7.8 above shall be fitted, if space permits, on the foredeck immediately in front of the Primary Console and extend forwards as far as the raised forward deck to allow for the temporary installation of seating and stores tie-down points if required.

- 3.7.10 All areas of the deck shall be covered by High Performance Energy Absorbing Flooring System (HPEAFS) or equivalent shock/vibration mitigating material in such a manner that the removal of any of the shock-mitigating seating specified at Paragraphs 3.7.5, 3.7.6, 3.7.8 and 3.7.9 above will result in a flush surface free of trip or snag hazards.
- 3.7.11 Suitable handrails and grips, coated with appropriate anti-slip material, shall be provided at both the Primary and Secondary consoles and at other locations around the Vessel to enable operators to move safely around the Vessel at all times.
- 3.7.12 All flat, horizontal surfaces above deck level where personnel may step such as gunwales, bow boarding platform and other exposed areas shall, if practicable, be coated with an appropriate anti-slip material.
- 3.7.13 The designs of the fixtures, fittings and finishing specified in Paragraphs 3.7 shall be discussed during the kick-off meeting and drawings shall be submitted to GNC and HKPF within one month from the date of the kick-off meeting for approval.

### **3.8 Fitted Fender**

- 3.8.1 A lightweight resilient solid closed cell polyethylene foam fender shall be fitted to cover the full length of the port and the starboard sides and around each corner of the transom (but not across the transom). The fender's primary purpose will be that of hull protection. The fender shall possess a compression set of 3% at 25% compression and 14% at 50% compression or better, a tensile strength of 40 psi (275.79 kPa) or better and a tear strength of 14 lb/in<sup>2</sup> (2.45 N/mm<sup>2</sup>) or better as determined by the ASTM D3575-14 "Standard Test Methods for Flexible Cellular Materials Made from Olefin Polymers" or equivalent standard. The collar shall not contain any inflatable portion. [E]
- 3.8.2 The fender shall be detachable but tightly affixed to the hull and flush with the sheerline. The method of attachment may be by any means proposed by the Tenderer and agreed by MD and HKPF. The design shall ensure that the collar cannot become detached or slide aft as a result of wave action or other unintended external influences.
- 3.8.3 The fender shall be resistant to impact, abrasion, outdoor temperature extremes, degradation caused by ultraviolet radiation, ozone and contact with seawater, oil, petrol, diesel, lubricating oil or chemicals. The testing of the foam-filled material shall comply with ISO 6185-4 or other international standards or rules acceptable to the MD and the RO.
- 3.8.4 The closed cell polyethylene foam collar specified at Paragraph 3.8.1 shall be sheathed in a marinised polyurethane outer membrane with rubbing strake designed to minimise abrasion.

### **3.9 Anchor, Chains, Mooring Ropes and Strong Points**

- 3.9.1 The vessel shall be equipped with one hot dip galvanised anchor with certificate issued by the RO and suitable swivel, shackles and secured stowage shall be provided by the Contractor. The anchor shall be secured in the forward compartment when not in use.
- 3.9.2 Two (2) 55 m long 20 mm diameter braided nylon wraps for anchoring and towing shall be provided by the Contractor in a suitable stowage.
- 3.9.3 There shall be four (4) lengths of at least 8 metres long heavy-duty double braid mooring ropes provided by the Contractor in a suitable stowage.
- 3.9.4 The strong points shall be designed and installed with a sufficient safety factor to prevent material yield of the strong points or surrounding structures to which they are attached in a welded condition. Calculation of the horizontal load shall be in accordance with the requirements of ISO 15084 or other equivalent international standards. The following strong points shall be provided:

- (a) There shall be stainless steel or strong light weight alloy material bitts at the bow and stern on both port and starboard sides of the vessel. The towing points fore and aft shall be capable of withstanding the forces involved when towing a sister vessel or other craft of similar size and the towing gear and its arrangement shall be approved by the RO.
- (b) Details of the design shall be discussed at the kick-off meeting and submitted to the MD for approval before the completion date stipulated in Annex 2 to this Part VII;
- (c) Mooring point aft (port and starboard);
- (d) Specialist equipment mounting points shall be provided at the centreline forward and aft and on both sides aft of the Secondary console. Each point shall be secured by at least four (4) bolts and be designed for an applied pull-tested load of at least 680 kg at the installed height. Details to be discussed in kick-off meeting; and
- (e) Lifting strong points for a four-point lift.

#### 3.9.5 Devices for Lifting the Vessel

- (a) The Vessel shall be provided with two (2) means of lifting for docking, storage, inspection and maintenance purposes, designed for use with fixed jib cranes, telescopic cranes, travel hoists and truck mounted cranes:
  - (i) Four-Point Lifting method  
The Vessel shall be designed with strong point lifting attachments permanently fitted to the hull. A spreader shall be provided if the bending stress induced during lifting exceeds the Vessel's permissible tolerance or if the lifting wires/strops would otherwise foul the radar frame or equipment fitted thereto. The design of the lifting attachments, wires/strops and spreader, if any, shall be approved by the RO and shall match, where practical, the lifting facilities at the HKPF's operational bases.
  - (ii) Lifting Slings Method  
The Vessel shall be designed to allow the Vessel to be hoisted ashore by means of lifting slings around the hull. The hull structure shall, if it is necessary, be strengthened appropriately and the locations at which the slings are to be positioned shall be marked clearly.
- (b) The lifting points and locations shall be designed and installed with sufficient safety factor to prevent material yield of the strong point or surrounding structure in a welded condition. Detail drawings of lifting attachments and related equipment shall be approved by the RO.

3.9.6 Strong points for mounting a cradle shall be provided on both sides of the Vessel. The arrangement shall be designed so that the cradle can be rolled into the sea and used to haul a person inside the cradle back into the Vessel. The mounting arrangement shall be discussed at the kick off meeting and agreed by MD and the HKPF.

3.9.7 All the lifting devices/accessories shall be designed to withstand at least six (6) times the mass of the Vessel with all the equipment. All devices and accessories shall be certified by the RO in accordance with the laws of Hong Kong prior to delivery. The four-point lifting and lifting sling method designs shall be discussed at the kick-off meeting and agreed by MD and the HKPF. To avoid the need for costly and unnecessary alteration or modification of existing equipment, the Contractor shall, prior to any construction, submit detailed drawings of both methods so that the HKPF can check dimensional compatibility with its existing lifting facilities.

### **3.10 Cradles**

- 3.10.1 The Contractor shall provide for each of the five (5) Vessels with one (1) suitably designed metal slipping cradle with appropriate safety features on which the Vessel can be slipped ashore and tied down during tropical cyclones. The cradle shall have stoppered wheels and shall be designed to be towed by plant within the HKPF's operational base compounds and be steerable for manual positioning. This cradle is not required for use on public roads. The design shall be submitted to the MD for approval.

## **Chapter 4 – Machinery**

### **4.1 General Requirements**

- 4.1.1 The Vessel is for use in Hong Kong and it is desirable that the main engines, gearboxes, electric generator set and any other machinery offered are 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.
- 4.1.2 The Vessel shall be equipped and fitted with all machinery each complying with the specifications set out in this Chapter for such machinery. The critical 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.
- 4.1.3 The machinery, associated piping systems and fittings relating to the main engines shall be of a design and construction adequate for the service for which they are intended and shall be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. The design shall have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

### **4.2 Propulsion System**

- 4.2.1 The Vessel shall be powered by a propulsion system. The number of the engines and propellers comprised in the propulsion system shall be determined by the Contractor, provided that it shall be of adequate power and thrust to deliver the Contract Speed as stated in Paragraph 2.4 of this Part VII. Each individual propulsion system shall comprise the requisite number of propulsion engine (petrol or diesel engine), power transmission devices, and the requisite number of fully immersed propeller providing steerable thrust. If the driving shaft is not an integrated part of an individual propulsion system, torsional vibration calculations and test report for the shafting system shall be approved by the RO as part of the detailed design for the Vessel to be submitted to MD after approval by the RO upon commencement of the Contract. Regardless of the number of the engines and propellers in the propulsion system to be used, the outer propellers (one port propeller and one starboard propeller for two engines or three engines, and two port propellers and two starboard propellers for 4-engine configuration) shall be counter-rotating. [E]
- 4.2.2 The Contractor shall be responsible for ensuring the correct installation and setting up of the engines including the choice of propellers, in accordance with the manufacturer's recommendations so as to avoid ventilation and cavitation, and determination of the immersion depth of propellers to prevent metal fatigue as a result of the frequent in-and-out of water when taking into account the speed requirement as stated in Paragraph 3.1.5 of this Part VII. The declared (rated) power of an engine model or propulsion system 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 International Council of Marine Industry Associations (ICOMIA) 28/83 requirements.
- 4.2.3 If petrol engines are used, the engines shall have a three-star rating (ultra-low emission) or higher as per the California Air Resources Board star system that describes exhaust emissions of both two-stroke and four-stroke outboard engines, or equivalent standard for non-outboard engines. [E]
- 4.2.4 If diesel engines are used, the engines shall be electrically started, and fresh water cooled marine diesel engines. The diesel engines shall be of the common-rail electronically controlled type and shall meet IMO Tier 2 or above emission requirements. The diesel engines shall be capable of:  
Engine operation hours and rating per day of

- (i) Not less than twelve (12) hours with 80% MCR and
- (ii) Not less than two (2) hour with 100% MCR [E]

Type approval certificates issued by any one of the RO listed in Paragraph 2.3.4(a) to (i) of this Part VII or other entity acceptable to MD shall be provided to demonstrate that the engines comply with IMO Tier 2 or above emission requirements.

4.2.5 The Vessel shall be capable of navigating at low speeds on any propulsion system by using one engine. [E]

4.2.6 In view of the demanding power requirements for such a high speed vessel and the operational loading of the vessel, it is accepted that the propulsion engine(s) and the propulsion units and gears may not be able to achieve the 15 year lifecycle requirement. In this respect, the Tenderer must state clearly whether the proposed design can meet this 15 years lifecycle requirement and if it cannot, the Tenderer must state the realistic minimum life cycle of each component of the driving train. If the lifecycle expectancy is less than 15 years, the Contractor (upon signing the Contract) shall undertake to arrange the continuous supply of critical spare parts of the driving train for at least 5 years from the Acceptance Delivery of the vessels.

### **4.3 Main Propulsion Engine Control**

4.3.1 The controls and instrumentation of the main engines shall be designed for one (1) man operation at the forward console. They shall be laid out ergonomically and grouped around the steering position at the console. The engine throttle control shall be provided on the right hand side of the steering wheel. [E]

4.3.2 The reversing and steering systems shall be electro-hydraulically powered under normal condition, with an emergency manual steering capability in the case of power failure.

4.3.3 The control of the engine throttle, gearbox and the reversing mechanism for each propulsion system shall be designed by using one single control lever.

4.3.4 The engine throttle/levers shall be designed/approved by the engine manufacturers. If three or more engines are used, the throttle system shall be equipped with a facility selectable by the coxswain to enable all three or more engines to be operated by a single throttle/lever.

4.3.5 The engines shall be installed in such a location that they shall be easily accessible for maintenance, routine checking and troubleshooting when safe to do so.

4.3.6 The electrical cables, fuel oil piping and hydraulic oil lines run between the console, fuel tanks and the stern shall be suitably designed for ease of maintenance. They shall be supported properly to prevent chafing and unnecessary tension.

4.3.7 The Contractor shall supply the Vessel with a comprehensive vessel information system which shall be integrated with the Vessel's GPS and other systems, generate recorded data in NMEA 2000 format, and display on the displays located at the Primary and Secondary Consoles information including but not limited to the following:

- (a) Engine rpm;
- (b) Engine running hours;
- (c) Oil temperature and pressure;
- (d) Fuel level and range until the fuel tank is empty;
- (e) Battery voltage;
- (f) Steering and trim (if applicable) data;

- (g) Course and speed;
- (h) Engine faults and notification alarms;
- (i) Trip history; and
- (j) Any other data which the supplied system and engines are capable of generating.

- 4.3.8 The vessel information system specified at Paragraph 4.3.7 above shall generate an audible notification alarm over the Vessel's IC system as specified at Paragraph 7.4 of this Part VII in respect of the notification alarms specified at Paragraph 4.3.7(h) above.
- 4.3.9 The data captured by the vessel information system specified at Paragraph 4.3.7 above shall be stored for seventy-two (72) hours locally on the Vessel on an appropriate storage medium provided by the Contractor and be transmitted over the Government data network as specified at Paragraph 7.6 of this Part VII to remote sites for review.
- 4.3.10 The Contractor shall supply three (3) computer terminals and the software (with any necessary perpetual licences for use) required for reviewing and analysing the data generated by the vessel information system. To enable both MD and the HKPF to exploit fully the potential of the information generated by the vessel information system specified at Paragraph 4.3.7 above for fleet management and predictive maintenance purposes, this data shall be transmitted directly from the Vessel via the Government data network as specified at Paragraph 7.6 of this Part VII to these terminals.
- 4.3.11 Details of the arrangements specified at Paragraph 4.3.1 to 4.3.10 above are to be discussed and agreed during the kick-off meeting.

#### **4.4 Propellers**

- 4.4.1 All propellers shall be fully immersed and providing steerable thrust. [E]

#### **4.5 Steering System**

- 4.5.1 The electro-hydraulic steering system shall be designed and approved by the engine manufacturer and approved by the RO. It shall incorporate two (2) or three (3) hydraulic cylinders operating in parallel. The steering capability must be maintained even if one cylinder malfunctions. Two or more hydraulic power pumps shall be provided with sufficient capacity to fulfil the steering requirements for the number of engines installed and the number of helm revolutions from lock to lock selected as per Paragraph 4.5.15 below. Under normal running conditions, all of the hydraulic power pumps shall operate. However, should one or more hydraulic power pump(s) fail, even a single hydraulic power pump shall be capable of continuing to provide assisted hydraulic steering for the Vessel to return safely to base under the conditions specified in Paragraph 2.7.3 of this Part VII.
- 4.5.2 If the electrical power supply of the hydraulic power pump system fails, the steering system shall continue to function in emergency manual steering mode.
- 4.5.3 A redundant system with independent power supply shall be provided to maintain the Vessel's steering capability in the case of main power supply failure.
- 4.5.4 The hydraulic fluid tank shall be easily accessible for routine checking of fluid levels.
- 4.5.5 The engines shall be installed in such a way that, even with any combination of engine turn and tilt, the engines shall not interfere with each other or any other part of the Vessel.

- 4.5.6 Connections, fittings, oil fill openings and air bleeders shall be accessible with all engines and systems fitted and installed.
- 4.5.7 Components in the system shall be protected externally against corrosion. The complete hydraulic steering system shall be designed to be without failure or leakage, maintaining the pressure, minimizing vibration, with shock and movement expected in a Vessel conducting the type of operations specified in Paragraph 1.2.1 of this Part VII.
- 4.5.8 Materials used in the hydraulic steering systems shall be resistant to deterioration caused by contamination by liquids or compounds with which the material may come in contact under normal marine service, e.g. grease, lubricating oil, hydraulic fluid, fuels, common bilge solvents, salt and fresh water.
- 4.5.9 The type of hydraulic fluid used in the hydraulic steering system shall be specified by the steering system's manufacturer and shall be stated in the owner's manual. The hydraulic fluid shall be non-flammable which means its flash point shall be higher than 150° C.
- 4.5.10 Hydraulic lines 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 materials.
- 4.5.11 A flexible section shall be installed between rigid piping and the hydraulic cylinder(s).
- 4.5.12 The position of the helm shall be optimised ergonomically so that a coxswain of an Asian stature (approximately 1.64 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 the MD and HKPF. 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.
- 4.5.13 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 leakage.
- 4.5.14 A redundant system with an independent power supply shall be installed to provide the vessel with emergency steering in the event that the main power supply fails.
- 4.5.15 The steering system shall be capable of turning the sterndrive or outboard engine (at their trimmed position) from the maximum starboard helm angle to the maximum port helm angle (and vice versa), within no more than 5 complete turns of the steering wheel. (i.e. lock to lock).

## **4.6 Fuel Tank**

### **4.6.1 Fuel Tanks**

- (a) General requirements
- (i) Two under deck fuel tanks with sufficient capacity to fulfil the endurance requirements specified at Paragraph 2.7.2(c) of this Part VII shall be provided. The design and tests shall comply with the RO's rules.
- (ii) The tanks shall not be integral with the hull and shall be installed so that the loads due to the mass of the full tank are safely induced into the structure, with due consideration given to the effects of vertical acceleration due to the Vessel's movements at maximum speed at sea.

- (iii) In respect of Paragraph 4.6.1 (a)(ii) above, continuous flexible supports which spread the loads shall be provided instead of rigid supports. [D]
- (b) The tanks shall be of rubberised fabric bladder cells, filled with foam baffling for explosion suppression. The tanks shall have outstanding resistance to: Petrol, Diesel, Bio-Diesel, and a tolerance for continuous temperatures of 100°C.
- (c) All seals such as gaskets, O-rings and joint-rings shall be of a non-wicking, i.e. non-fuel absorbent, material. All materials used shall be resistant to deterioration by the fuel for which the system is designed and to other liquids or compounds with which the material may come into contact as installed under normal operating conditions, e.g. grease, lubricating oil, bilge solvents, fresh water and sea water.
- (d) Internal surfaces of the fuel tanks shall be unpainted and cleaned thoroughly to the satisfaction of the MD.
- (e) Provisions to the fuel tanks
  - (i) A tank content gauge and low level alarm shall be fitted on the Primary Console for each tank. A sounding rod calibrated in litres shall be supplied for each tank;
  - (ii) The material of which the fuel tanks are constructed shall comply with the requirements of the RO's rules. They shall be resistant to corrosion and 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;
  - (iii) Metallic filling pipes may be connected to the sides or ends of metal fuel tanks, provided that they are welded to the tank and reach above the top of the tank. All other fittings and openings shall be on the top of the fuel tanks;
  - (iv) Rigid fuel suction tubes and fill pipes which extend to near the tank bottom shall have sufficient clearance to prevent contact with the bottom during normal operation of the Vessel;
  - (v) For each of the two fuel tanks, an inspection manhole, air vent with flame trap on deck and fuel tank outlet valve with a quick closing device shall be provided. The quick closing devices shall be positioned between the fuel tanks and the engines. The triggers for these quick closing devices shall be installed at a position which is easily accessible to the coxswain and the commander at the Primary Console;
  - (vi) 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;
  - (vii) An easily removable coarse strainer with water detector shall be built into the filling line;
  - (viii) The tanks shall be designed and installed to prevent water from being trapped on the exterior surface;
  - (ix) Tank drains are not permitted on the petrol fuel tanks (if applicable); and

- (x) A water separator incorporating a drain valve shall be installed between the fuel tank outlet valves and the engines. It shall be positioned at the transom and shall be easily accessible for inspection and operation.

## **4.7 Fuel Tank Tests**

### **4.7.1 Leakage Test**

The tank with all of its accessories fitted shall be tested internally by hydraulic pressure. The test pressure shall be the greater of 20 kPa or 1.5 times the highest hydrostatic pressure to which the tank may be subjected in service (i.e. maximum fill-up height above tank top). The static test pressure shall be applied for five minutes without a pressure drop or rise. After the test, the test fuel tank shall not show any leakage when using a leak detection method other than the pressure-drop method.

## **4.8 Bilge System**

4.8.1 Electric bilge pumps with manual back up shall be provided by the Contractor. Details of the design shall be discussed at the kick-off meeting and submitted to the MD for approval before the completion date stipulated in Annex 2 to this Part.

4.8.2 The Vessel shall be designed and constructed to minimise the potential for the accidental overboard discharge of pollutants (oil, fuel).

4.8.3 Bilge alarm system shall be provided for watertight compartments. Details to be discussed at the kick-off meeting

## **Chapter 5 Electrical System**

### **5.1.1 General Requirements**

- 5.1.1 All the electrical equipment and installation on the Vessel shall comply with the requirements of the RO.
- 5.1.2 All electrical equipment, fittings, instruments, switches, cables, insulation, sheathing, circuit breakers, rating standards and their installations shall comply with the latest Regulations of the International Electro-technical Commission (hereinafter referred to as IEC), Electrical Installations in Ships. The electrical system shall be an insulated two-wire Direct Current (DC) system. The hull shall not be used as a current-carrying conductor.
- 5.1.3 Protective devices such as circuit breakers or fuses shall be provided at the source of power, e.g. the switchboard, to interrupt any overload current in the circuit conductors before heat can damage the conductor insulation, connections or wiring-system terminals.
- 5.1.4 All DC equipment shall function over a voltage range at the battery terminals as follows:  
(a) 12-volt system: 10.5V to 15.5V  
(b) 24-volt system: 21.0V to 31.0V
- 5.1.5 The length and cross-sectional area of conductors in each circuit shall be such that the calculated voltage drop shall not exceed 10% of the nominal battery voltage for any appliance when every appliance in the circuit is switched on at full load.
- 5.1.6 Switches and controls shall be marked to indicate their purpose. Each cable shall be labelled clearly and bear its own unique identification code.
- 5.1.7 The Contractor shall submit a layout plan showing the exact locations of the Equipment. All Equipment shall be easily and safely accessible for inspection and maintenance.
- 5.1.8 Essential drawings and detailed particulars (such as the rating and capacity, type of all electrical equipment as well as the wiring, circuit breakers, lighting and sockets) shall be submitted for the MD's approval before the completion date stipulated in Annex 2 to this Part VII.
- 5.1.9 Detailed wiring diagrams of the complete supply and distribution network, including wire size, insulation and sheathing shall be approved by the RO when required by the rules and submitted for the MD's approval before the completion date stipulated in Annex 2 to this Part VII.
- 5.1.10 All Equipment installed shall be accompanied by operation and maintenance manuals.
- 5.1.11 The Equipment's installation standards shall serve to enhance safety and not present hazards to the operators, 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 traditional Chinese, or with universally recognisable labels.

### **5.2 Batteries**

- 5.2.1 Two groups of 12-volt maintenance-free batteries shall be provided, one for starting the engines and the other for shipboard services. These two groups of batteries shall be connected to two independent DC circuits with a crossover network. They shall be interchangeable to back up each other, and be capable of being charged individually by any of the engine-driven alternators. Batteries connected in parallel are not allowed.
- 5.2.2 The capacities of the two groups of batteries shall be sufficient to provide at least six (6) consecutive starts of the engines from cold without recharging and maintain an uninterrupted power supply to the shipboard services (e.g. navigation lights, general lights, alarm).

- 5.2.3 A separate battery shall be dedicated to the emergency services (e.g. radio communications and signalling, emergency and navigation lights) is required and conform to the requirements of the RO specified in Schedule 9.
- 5.2.4 The engine-driven alternators shall be able to charge the batteries and to provide 12/24V DC power to the shipboard services.
- 5.2.5 Batteries shall be permanently installed in a dry, ventilated location above the anticipated bilge water level.
- 5.2.6 In consideration of the intended operational role of the Vessel, the batteries shall be installed in a manner that restricts their movement horizontally and vertically. A battery, as installed, shall not move more than 10 mm in any direction when exposed to a force corresponding to twice the battery's weight.
- 5.2.7 Batteries shall be installed, designed or protected so that metallic objects cannot come into unintentional contact with any battery terminal.
- 5.2.8 Batteries, as installed, shall be protected against mechanical damage at their location or within their enclosure.
- 5.2.9 Batteries shall not be installed directly above or below a fuel tank or fuel filter.
- 5.2.10 Any metallic component of the fuel system within 300 mm above the battery top, as installed, shall be insulated electrically.
- 5.2.11 Battery cable terminals shall not depend upon spring tension for mechanical connection.
- 5.2.12 All circuits (with the exception of those required for starting the engines and powering navigation lighting, electronic devices with protected memory and protective devices such as bilge pumps and alarms, which are to be protected individually with a circuit breaker or fuse as close as practical to the battery terminal) will be connected to the supply system voltage in a readily accessible location through a master battery disconnection switch, installed at or as close as possible to the positive conductor from the battery, or group of batteries.

### **5.3 Distribution Network**

- 5.3.1 12/24V DC services shall be supplied from the switchboard in the Primary Console through a 2-wire insulated system to the following items:
  - (a) Navigation light control panel and navigation lights;
  - (b) Horn;
  - (c) General lighting;
  - (d) Compass light;
  - (e) Instrument panel in the Primary and Secondary Consoles;
  - (f) Content gauges for the petrol tanks;
  - (g) Four (4) hand-held searchlights;
  - (h) Siren;
  - (i) Blue flashing light;
  - (j) Electric bilge pumps; and
  - (k) All other navigational and electronic equipment (as applicable).

## **5.4 Cables**

- 5.4.1 No electrical equipment, components or cables shall run through or be installed inside the petrol tanks' compartments.
- 5.4.2 Cables that are not sheathed shall be supported throughout their length in conduits, cable trunking, or trays, or by individual supports at maximum intervals of 300 mm.
- 5.4.3 Sheathed cables and battery cables to the battery disconnection switch shall be supported at maximum intervals of 300 mm, with the first support not more than one metre from the terminal. Other sheathed cables shall be supported at maximum intervals of 450 mm.
- 5.4.4 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.
- 5.4.5 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.
- 5.4.6 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.

## **5.5 Overcurrent Protection**

- 5.5.1 A manually reset trip-free circuit-breaker, or a fuse, shall be installed within 200 mm of the source of power for each circuit or conductor in the system or, if impractical, each conductor shall be contained within a protective covering, such as a sheathing conduit or cable trunking, for its entire length from the source of power to the circuit-breaker or fuse.
- 5.5.2 The voltage rating of each fuse or circuit-breaker shall not be less than the nominal circuit voltage. The current rating shall not exceed the value for the conductor of smallest diameter in the circuit.

## **5.6 Switchboard (Panel Board)**

- 5.6.1 Switchboards or panel boards shall be installed in such a way that the control elements, indicating instruments, circuit-breakers and fuses are readily accessible. The terminal side shall be accessible.
- 5.6.2 Connections and components on panel-boards shall be in locations protected from the expected conditions in conformity with IEC 60529:
  - (a) IP 67 as a minimum, if exposed to short-term immersion; IP 55 as a minimum, if exposed to splashing water;
  - (b) IP 20 as a minimum, if located in protected locations inside the Vessel.
- 5.6.3 Panel-boards (switchboards) shall be marked permanently with the nominal system voltage.

## **5.7 Receptacles/Socket**

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

## **5.8 Lighting**

- 5.8.1 All lighting, including the navigation lights, shall be equipped with LED bulbs and digital switching.
- 5.8.2 Independently controlled dimmable red/white walkway lights shall be supplied to cover the fore and aft decks and walkways on both sides of the Vessel.
- 5.8.3 An overhead red/white light shall be fitted in the bow cuddy.
- 5.8.4 Independently controlled high-powered white floodlights shall be supplied to cover the fore and aft decks and Vessel's sides.
- 5.8.5 The arrangements and positioning of the lighting shall be discussed at the kick-off meeting and shall be agreed by the HKPF.

## **5.9 Ignition Protection**

- 5.9.1 Electrical components installed in compartments which may contain explosive vapour and gases shall be ignition-protected in accordance with IEC or other equivalent international standard acceptable to MD and the RO.
- 5.9.2 Compartments which may contain explosive gases are those which contain or which have open connections with compartments containing such items as:
  - (a) A fuel tank;
  - (b) Joints or fittings in fuel lines connecting spark-ignition engines with their fuel tanks.

## **5.10 Navigational and Signalling Equipment**

### **5.10.1 Navigation Lights**

- (a) One (1) set of LED navigation lights according to international standard is fitted. Two (2) halogen work lights are fitted on the gantry.
- (b) Navigation lights shall comply with the requirement specified in the International Regulations for Preventing Collisions at Sea 1972 (as amended by IMO Resolution A. 464 (XII) and A. 626 (XV)).
- (c) 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. A dimmer switch(es) 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 (2) separate power supply systems to the distribution board.
- (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.

5.10.2 Type Approval Certificates for all navigational lights shall be submitted prior to Delivery Acceptance.

5.10.3 The Contractor shall provide the following signalling equipment of a type approved by the HKPF:

- (a) one (1) all-round blue flashing light;
- (b) one (1) siren; and
- (c) one (1) horn.

The detail specifications of the blue flash light, siren and horn shall be provided by the HKPF at the kick-off meeting.

## **5.11 Lightning Protection**

5.11.1 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 for submission to MD by the completion date stipulated in Annex 3 to this Part VII for endorsement.

## **5.12 Searchlights**

5.12.1 Five (5) high-power (not less than 200W) marine hand-held type searchlights shall be provided. These searchlights shall not be LED type.

5.12.2 Each searchlight shall be equipped with an extension cable and plug which can be plugged into any one of the six (6) auxiliary electrical sockets onboard.

5.12.3 Sockets for portable searchlights shall be installed at the specified locations to be determined at the kick-off meeting. There shall be at least six (6) sockets for portable searchlights (one for each portable searchlight plus one extra).

5.12.4 One fixed search light (not less than 200W) shall be mounted at a position to be decided by HKPF at the kick-off meeting.

## **Chapter 6 Lifesaving Appliances (LSA) and Fire-fighting Equipment**

### **6.1 General Provisions**

6.1.1 The lifesaving appliances and fire-fighting equipment shall comply with the RO requirements.

### **6.2 Lifesaving Appliances (LSA)**

6.2.1 One (1) lifebuoy with floating lifeline shall be provided and stowed in a suitable position to be decided by the HKPF.

6.2.2 Two (2) floating rescue lines shall be provided. The type and size of these lines shall be decided at the kick-off meeting.

6.2.3 A rescue quoit with line attached shall be provided.

### **6.3 Portable Fire Fighting Equipment**

6.3.1 Two (2) 2.5-kg dry powder fire extinguishers shall be provided with holding racks. The locations of these extinguishers shall be determined at the kick-off meeting.

6.3.2 Compact CO<sub>2</sub> fixed fire-fighting system shall be installed in the engine compartment, with release button on the Primary console.

6.3.3 Fuel tanks compartment, and engine compartment (if applicable), shall be provided with gas detectors suitable for detecting low flash point fuel leakage.

## **Chapter 7 Electronic Navigational Equipment**

### **7.1 Electronic Navigational Equipment**

- 7.1.1 Except for the equipment which is listed in Paragraph 7.7 of this Part VII, the Contractor shall supply, deliver, install, commission, conduct trial test and provide warranty services for all of the Electronic Navigational Equipment and systems, intercommunication system, public address system, siren and external broadcasting system, international VHF radio, lightning protection, helmet compatible headgear, antennae and instruments and controls specified in this Chapter 7 on the Vessel's consoles (collectively, "Electronic Navigational Equipment" or "ENE") and in accordance with all requirements specified in this Chapter 7.
- 7.1.2 Some existing police equipment/systems (the EQ-HKPF) will be supplied separately or redeployed from within the HKPF and are listed in Paragraph 7.7 of this Part VII. The Contractor shall reserve equipment space, carry out installation, supply and install cables and connectors, undertake power point provision/connection and assist the HKPF in the testing.
- 7.1.3 Main units of the ENE and the EQ-HKPF shall be installed inside an equipment compartment(s) suitably protected from the weather, environment and sea spray while the associated control panels and displays will be flush mounted and/or recessed in console panels with appropriate watertight sealing. All designs and installation/mounting proposals shall be approved by the HKPF prior to the commencement of any such work.
- 7.1.4 In addition to the submission of a layout plan to the MD and COMMS, to facilitate the optimal ergonomic design, user-friendliness, effectiveness and easy accessibility for inspection and maintenance of the Primary and Secondary Consoles, the Contractor shall build full size mock-up consoles as specified at Paragraph 3.4.1 of this Part VII for approval and comments from the MD and COMMS. These mock-up consoles shall show the positions and arrangement of the actual ENE components, EQ-HKPF and other equipment and controls on the console panels before construction and installation. The dimensions of EQ-HKPF equipment shall be provided at the kick-off meeting.
- 7.1.5 The Contractor shall upon COMMS's request submit a block diagram showing the conceptual connections between the ENE and EQ-HKPF as specified at Paragraph 7.7.1 of this Part VII for evaluation.
- 7.1.6 In addition to all the electronic equipment that the Contractor is required to provide for each Vessel under Paragraph 7 to this Part VII, the Contractor shall also provide free of charge to the Government one complete set comprising the ENE as stated in Paragraphs 7.3, 7.4, 7.5 and 7.6 of this Part VII designated for one Vessel upon the delivery of the first built Vessel as Contract spare parts, including cabling, control panel, and gauges.

### **7.2 General Requirements**

- 7.2.1 All the ENE shall be marine type and comply with the relevant regulations of the Safety of Life at Sea Convention (SOLAS), International Electrotechnical Commission (IEC) and the International Telecommunications Union recommendations in the International Radio Regulations (ITU-R), unless explicitly stated otherwise. They shall comply with all relevant International Maritime

Organization (IMO) recommendations on performance standards and operational features. The ENE shall perform effectively even under the most adverse weather conditions. All radio communications equipment, including radars and radios, shall also comply with the requirements of the Office of the Communications Authority (OFCA) of the HKSAR.

- 7.2.2 The Contractor shall observe and adopt the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines [formerly International Radiological Protection Association (IRPA) Guidelines] and the Code of Practice issued by OFCA of the HKSAR on the limits of exposure to radio frequency electromagnetic fields in the frequency range from 100 kHz to 300 GHz for the protection of operators, workers and the public against Non-Ionizing Radiation (NIR) hazards so as to provide a safe and healthy working or living environment under all normal conditions. In case of multiple simultaneous exposures, the combined effect of such exposure shall also be assessed in accordance with the ICNIRP Guidelines.
- 7.2.3 The Contractor shall warrant that all the ENE and materials used, irrespective of whether they are in operation or not, shall comply with the health and safety standards adopted by the World Health Organisation in particular in relation to all harmful radiation. The Contractor shall also disclose in writing the existence of any radio frequency radiation hazard emitted from the Equipment, which is harmful to human beings under normal operating conditions, by the safety standards adopted by ICNIRP, American National Standards Institution (ANSI), or other equivalent national or international standards.
- 7.2.4 All ENE shall be suitable for round-the-clock operation on the Vessel. Equipment displays shall have adjustable brightness levels and be suitable for viewing under different brightness conditions at sea, including under direct sunlight, day time, dusk, dawn and dark night, without causing eye-stress, glaring and/or discomfort. Equipment control keys and buttons shall be suitably back-lit with adjustable brightness levels to aid operation in the dark without causing eye-stress, glaring and/or discomfort.
- 7.2.5 Design Standards
- (a) Environmental Conditions
- (i) All ENE shall be capable of operating continuously to the specifications throughout its normal life span in the HKSAR climate and environment. The following parameters shall apply unless otherwise stated:
1. Ambient temperature between 0 °C and 40 °C; and between -5 °C and +50 °C if the equipment (including display units and antennae) is exposed to the open air.
  2. Relative humidity up to 95%, non-condensing.
  3. Salt and chemical corrosion as found in a tropical coastal atmosphere.
  4. Materials that promote mould growth shall not be used.
- (ii) ENE shall be capable of withstanding the knocks and jolts likely to occur during repair work or rough handling.
- (b) Power Supplies
- (i) The power supply for all ENE shall be protected by appropriate circuit-breakers.
- (ii) All the ENE shall be capable of working normally when powered by the Vessel's battery-backed DC supply system. A DC/DC converter shall be provided if the equipment cannot operate at this voltage.
- (iii) All EQ-HKPF shall require a negative earth and be connected to a designated 12 Volt DC (nominal) battery-backed power supply to maintain communications. The battery shall be charged up when an engine generator is working.

- (iv) There is a possibility of DC leakage through the negative grounding to the DC battery power bank on the supplied Equipment if it is not connected properly. The Contractor shall take precautions to prevent this type of leakage, e.g. by using an isolation converter.
- (v) The ENE's power supply shall be compatible with the Vessel's electrical system. If necessary, a voltage stabiliser or regulator shall be provided and installed to maintain the ENE in proper working condition when connected to the unsteady DC voltage from the generator.
- (vi) Adequate provision shall be made to protect the ENE from the adverse effects of excessive voltage, current spikes and surges.
- (vii) Suitable devices shall be incorporated for protecting the ENE and its accessories against damage due to lightning and unregulated DC power supply on board.

(c) Safety

- (i) All ENE supplied shall be of a safe design and shall be installed in a safe manner as approved by the MD and HKPF. The standard of installation shall enhance the Equipment's safety features and not present any hazards to the user.
- (ii) All ENE shall be properly grounded to an electrical earth. The installation shall not present hazards to the user in any way, e.g. grounding of all metal parts exposed to the user.
- (iii) Electrical contacts and PCBs shall also be protected in an appropriate manner that does not impair their electrical characteristics.
- (iv) Lightning protection devices (e.g. lightning surge arrestors) are required, particularly for antennae installed outside the protection zone of the Vessel's own lightning protection device.
- (v) The lightning surge arrestors of each feeder cable shall be grouped and concentrated in a "lightning arrestor panel" to be located inside the console for ease of maintenance.
- (vi) Warning of any potential hazards associated with the ENE shall be displayed in traditional Chinese characters, English and universally recognised labels in easily seen and prominent positions.

(d) Design Practice

- (i) All systems shall be designed for prolonged, continuous and reliable operation, i.e. 24 hours per day and 365 days per year.
- (ii) The normal serviceable life of the ENE shall be a minimum of five years operation on board the Vessel. During the lifetime of the ENE, it shall be possible with reasonable repair and setting up to maintain its performance as defined in this Part VII.
- (iii) The design and construction shall be performed to a standard of engineering acceptable to COMMS and the ENE shall withstand handling and transportation without degradation of performance.
- (iv) The display digits in the ENE control panel shall be easily legible.
- (v) To facilitate night time operations, ENE control panels shall have a dimming function enabling the light emitted from the ENE display to be regulated progressively.
- (vi) All units, sub-assemblies, components and adjustable controls of the same type shall be both mechanically and electrically interchangeable without the need for changing connections or wiring. They shall be readily accessible for maintenance purposes.
- (vii) Correct impedance matching shall be maintained at all interfaces between any items of any equipment (e.g. audio at 600 ohms or RF at 50 ohms).
- (viii) Adequate testing points and other testing facilities, e.g. extension boards, testing probes, shall be provided to permit ease of maintenance.
- (ix) Any equipment installed in an external position and exposed to the maritime environment shall have the level of IP protection appropriate to its function and position.

#### 7.2.6 Appearance and Protective Finish

- (a) Metal surfaces shall be either corrosion resistant or protected against corrosion for a period of at least three years by high grade enamel painting, plating, galvanising, anodising, or any other suitable surface treatment.
- (b) Any such protective layer shall be smooth, continuous, and free from blemishes and scratches.

#### 7.2.7 Installation Standards

- (a) All ENE, except portable ENE, shall be fixed firmly in place. Fastenings and supports shall support their loads with a safety factor of at least three.
- (b) The ENE shall be supplied with all auxiliary items required including but not limited to the following for normal operation:
  - (i) connectors;
  - (ii) circuit-breakers;
  - (iii) lightning arrestors;
  - (iv) power sockets;
  - (v) plugs; and
  - (vi) cables.
- (c) RF connectors (of suitable impedance) shall be provided and used for connections of the RF cables, antennae and radio equipment.
- (d) All exposed connectors shall be protected by weatherproof material to prevent water ingress.
- (e) Special attention shall be paid to the compass safe distance [Marine Guidance Note MGN 57 (M+F) and IMO Resolution A.694 (17)] of the ENE and the Radiation Hazard Zone of the radar scanner in the Vessel's design. Positioning of the ENE and the associated accessories shall be planned carefully in respect of their relative distances to eliminate any chance of radio interference that might occur in service.
- (f) Installation shall be to the highest standard to ensure:
  - (i) The latest version of the relevant Merchant Shipping Notices ('M' Notices) published by the Department of Transport (London) in respect of setting and installing the compass, VHF radio and sounding devices are observed.
  - (ii) Satisfactory performance of the ENE.
  - (iii) Protection from mechanical and water damage.
  - (iv) Ease of accessibility for maintenance and repair.
  - (v) Manufacturers' recommendations are followed strictly.
  - (vi) Precautions and measures shall be taken and adopted in the installation of the ENE and the EQ-HKPF to ensure that the g-forces and vibration encountered by the Vessel travelling at high speed in rough seas will not affect the operation of the ENE and the EQ-HKPF.
  - (vii) The installation in the external environment shall withstand the conditions stated in Paragraph 7.2.5(a) (i) above.
- (g) Adequate measures to prevent interference between the electronic equipment shall also be provided, which for receiving apparatus and other electronic equipment which may be affected by frequency induced voltage shall include being earthed, screened and protected efficiently according to the rules, regulations and recommended practices regarding screening of electric wiring.

- (h) The Vessel is an open deck vessel. All precautions and provisions shall be taken and made to minimise the effect of sea spray and exposure to weather on the console panels, equipment control and display units, and to protect the Equipment in such conditions. Suitable weather protection covers, which do not obstruct users from operating the equipment, shall be provided as necessary.

#### 7.2.8 Cable Laying

(a) General Cable Requirements:

- (i) All cables shall be rated and sized properly.
  - (ii) The signal cables shall be screened properly to reduce the cross-talk level as necessary.
  - (iii) All feeder cables shall be of one length, without joints, from antennae to the Equipment and from equipment to equipment, unless such joints are necessary under the specific installation conditions encountered or for ease of maintenance. All joints if provided shall be reliable and durable.
- (b) Cables shall be laid in concealed cable trunks and trays inside consoles or other compartments or under the deck floor unless approved otherwise by the MD and HKPF, with due consideration given to the ease of maintenance of the Vessel as a whole. Solutions adopted shall not pose occupational safety and health risks such trip, snag or impact hazards to the Vessel's crew during operations.
  - (c) Watertight rubber grommets, insulated bushes or cable glands shall be used to protect the cables when passing through the metal covers of distribution boards, boxes, or any other metal work or exposed structure.
  - (d) The Contractor shall be responsible for the supply, installation and inter-connection of all cables and all related installation materials within the system, and the final connection between the power supply and the ENE and EQ-HKPF.
  - (e) Wires and cables shall be as short as practicable with sufficient slack:
    - (i) To enable parts to be removed and replaced during servicing without disconnecting other parts.
    - (ii) To facilitate field repair on broken or cut wires.
    - (iii) To facilitate movement of the Equipment for maintenance purposes.
  - (f) All wiring terminations shall be finished in a neat and approved manner and shall be identified separately by a unique identification wiring code number.

#### 7.2.9 Labelling and Marking

- (a) All ENE supplied shall carry the name, trademark or other means of identifying the manufacturer.
- (b) Major ENE units and sub-units shall carry a permanent label with serial numbers for identification purposes.
- (c) All panels, sub-assemblies of ENE and internal and external cables shall be marked or labelled clearly with their own unique identification codes, in English, in a permanent manner so as to identify each individual function. Such labels shall be recorded and organised properly in a document and handed over to COMMS through MD prior to Delivery Acceptance.

- (d) All switches, connectors, jacks or receptacles shall be marked clearly, logically and permanently during installation. All wires and cables shall be identified at every termination and connection point with permanent type markers.
- (e) The DC circuit-breakers controlling the Equipment shall be labelled clearly.

#### 7.2.10 Acceptance Tests

- (a) The acceptance tests for the ENE shall comprise of three parts: bench tests, factory acceptance trials (FAT) and on-site commissioning tests as follows:
  - (i) Bench tests shall be performed on the ENE to demonstrate their technical compliance with the published specifications. The bench test, if not carried out in the HKSAR in the presence of COMMS representatives, may be accepted in the form of a test report from the original equipment manufacturers certifying that the tests have been conducted and passed satisfactorily before the Equipment left the factory.
  - (ii) The Contractor shall carry out the FAT in the presence of MD and HKPF representatives to demonstrate that each ENE item individually and that all ENE as a whole were installed and implemented properly. If the Vessel is not constructed in the HKSAR, the Equipment FAT shall be conducted at the manufacturer's shipyard before the shipping of the Vessel to the HKSAR in accordance with the procedures specified at Paragraph 1.6.12 of Part VII.
  - (iii) The on-site commissioning tests shall be carried out by the Contractor as part of the Technical Acceptance in the presence of MD and HKPF officers after completion of installation of all ENE and EQ-HKPF.
  - (iv) The on-site commissioning tests shall include an inventory check, an NIR hazard test, an inspection of ENE and EQ-HKPF installation and thorough technical, functional and integration tests of individual ENE items and all ENE together with the EQ-HKPF as a whole and a sea trial to verify that the ENE and the EQ-HKPF have been commissioned properly and are ready to be put into service on the Vessel.
- (b) The Contractor shall ensure and demonstrate, as part of the on-site commissioning tests, that the electric and magnetic fields as well as the power density radiated from all installed ENE and EQ-HKPF do not expose occupational personnel and members of the general public to radiation in excess of the limits contained in the 1988 IRPA Guidelines specified in Paragraph 7.2.2 of this Part VII. Prior to the issuance of the Acceptance Certificate, the Contractor shall provide a full written report stating that the installation of the ENE and EQ-HKPF complies with the stated NIR safety standards.
- (c) At least two months prior to the bench tests, the FAT and the on-site commissioning tests, the Contractor shall submit details of the schedules and test procedures of all ENE and where applicable EQ-HKPF for COMMS' approval. When all of the test procedures have been established and agreed by the HKPF, they shall be followed during the relevant tests. Any delay in the submission of these procedures may lead to a corresponding delay in their agreement and, hence, in the commissioning of the Equipment for which the Contractor will assume the financial liability.

#### 7.2.11 Documentation

- (a) At least two (2) months prior to equipment delivery, for each individual item of Equipment, the Contractor shall supply to COMMS, through MD, four (4) sets of operational manuals and maintenance manuals in English (at least one (1) original). For the avoidance of doubt, these four (4) sets of operation and maintenance manuals are in addition to those required as part of the documentation for each Vessel set out in Paragraph 8.2.2 of this Part. The manuals shall provide the information listed below:

- (i) Description of the principle of operation.
  - (ii) Details of installation and setting up procedures.
  - (iii) Maintenance instructions including mechanical assembling and disassembling procedures.
  - (iv) Schematic diagrams and block diagrams with their respective descriptions.
  - (v) Fault finding and calibration procedures.
- (b) Drawings showing the proposed design of conduit/trunking route for the Equipment and EQ-HKPF installed on board, including future maintenance considerations shall be submitted to MD and COMMS for approval before installation.
- (c) At Delivery Acceptance, the Contractor shall supply:
- (i) Operational manuals and maintenance manuals specified in Paragraph 7.2.11(a) above.
  - (ii) Properly organised individual Equipment testing results including details of test and calibration procedures.
  - (iii) On-site commissioning and sea trial reports of all Equipment as witnessed by COMMS.
  - (iv) The initial parameter settings and readings of all Equipment at the time of the on-site commissioning.
  - (v) "As installed" drawings showing the positions of all individual items of the Equipment installed and the routing of the interconnecting cables between equipment.
  - (vi) A block diagram showing the interconnections between all equipment units complete with their technical protocols and the wiring schedule.
  - (vii) "As fitted" diagram showing the locations and positions of all circuit-breakers controlling the power to the Equipment.
  - (viii) The completed NIR Report as required by Paragraph 7.2.10(b) above.
- (d) The documents specified at Paragraphs 7.2.11(a) to (c) above and the training materials specified in Paragraph 9.1.7 of this Part shall be supplied in both paper copy and in DVD format or other format acceptable to COMMS.
- (e) The Contractor shall not use confidentiality as a reason for withholding the supply of relevant documentation as required by the MD and HKPF. Any charges for such material supplied shall be included in the Contract price.

#### 7.2.12 Electronic Components/ Spares Parts/ Spare Units / Maintenance

- (a) The Contractor shall provide spare parts for all Equipment for the whole working life of the Equipment. Thus, the Contractor shall commit to provide spare parts for the Equipment for a period not less than five (5) years from the date of the successful commissioning of the last Vessel.

#### 7.2.13 Warranty Services

- (a) The Contractor shall provide a one (1) year free Warranty Period without any qualification for all ENE with effect from the date the Acceptance Certificate in respect of that Vessel was issued.
- (b) The Contractor shall warrant that the ENE shall be capable of functioning without breakdown throughout the Warranty Period and shall rectify any fault within seven (7) days of first being requested by COMMS in writing to do so. The Contractor shall extend the Warranty Period for any item of ENE which has broken down and required repair for a period equal to the period between the date of breakdown and the resumption of operation and service.

### 7.3 Electronic Navigational Equipment Specifications

#### 7.3.1 Radar/GPS/DGPS and Electronic Chart System: Multifunction for Radar, Echo, GPS/DGPS Chart System functions:

- (a) The radar shall be used as the primary radar. Its operational range shall be equal to or better than 0.125 to 36 nautical miles (minimum). It shall be a frequency modulated continuous wave solid state X-band radar.
- (b) The radar shall provide a clear display even with severe sea and rain clutter at all ranges without missing small, elusive targets.
- (c) The radar images shall remain at a constant brightness during each PPI sweep.
- (d) The radar shall be fitted with an auto-track function which provides acquisition and tracking of at least six targets in a way similar to ARPA. The radar shall provide data on any chosen target. Such ARPA-like auto-track function shall support CPA and TCPA features for the tracked targets.
- (e) The radar display unit shall incorporate control keys and processor equipment to integrate, control, operate and display all radar and chartplotter functions and AIS information from the AIS transceiver. The electronic chart system shall be capable of both connecting to and being accessed remotely from the Government router through an Ethernet interface.
- (f) The radar shall have at least the following operational controls/features:
  - (i) Operator selection of north up, head up, course up;
  - (ii) Transmit (TM) and receive (RM) modes;
  - (iii) At least three different brightness levels;
  - (iv) Information displaying Vessel's own latitude/longitude, position and speed;
  - (v) Trails;
  - (vi) Fixed and variable range ring;
  - (vii) Variable Range Marker (VRM);
  - (viii) Electronic Range and Bearing Line (ERBL);
  - (ix) Manual rain and sea clutter suppression;
  - (x) Gain control;
  - (xi) Autoclutter Sea control;
  - (xii) Range Up;
  - (xiii) Range Down;
  - (xiv) Vectors;
  - (xv) Centre Picture;
  - (xvi) Acknowledge Alarm; and
  - (xvii) Panel Brilliance.
- (g) The radar display unit shall comprise a flush-mounted Liquid Crystal Display (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.

- (h) The radar transceiver will be a low radiation emission broadband type and shall be housed in a marine type radome antenna/scanner unit. It shall be designed for mounting aloft and be capable of operating satisfactorily when subjected to the g-forces, vibration and high relative wind speeds of not less than 70 knots encountered when the Vessel is operating at high speeds in the maritime environment.
- (i) The antenna/scanner shall, as far as practicable, be installed well clear of any obstruction to minimise undue interference and NIR hazards.
- (j) The radar shall be aligned with the heading of the Vessel.
- (k) The Contractor shall ensure at the design stage that unnecessary radar blind zones are not created. The Contractor shall, in particular, ensure that equipment installed before the radar scanner such as navigation lights, floodlights, horn speakers and the like do not obstruct the radar scanner's emissions. If such obstruction becomes apparent after installation, the Contractor shall rectify it.
- (l) The radar shall have standard NMEA 0183 interface ports capable of accepting navigational data from a wide selection of GPS/DGPS receivers and electronic compasses, and of providing comprehensive data on all tracked targets in the form of a track table to a wide selection of electronic chartplotters. However, connection of the radar system to the GPS system and satellite compass system supplied under this Contract via other standard or proprietary interface types is acceptable.
- (m) 10 Hz GPS/GLONASS-WAAS, EGNOS, SBAS antenna (integrated).
- (n) Performance (radar):
  - (i) Reference: Magnetic and True North
  - (ii) Warm-up Time: < 120 seconds
  - (iii) Distance Accuracy: <1% of the range
  - (iv) Bearing Accuracy: <1°
  - (v) Operational Maximum Wind Speed: At least 70 knots
  - (vi) Scanner Size: ≥600 mm (24 inches nominal)
  - (vii) Scanner Rotation: 24 rpm and 48 rpm or greater rotation speed
  - (viii) Beam Width H/V: < 4°/25°
  - (ix) Transceiver Output Power: At least 4kW with 0.08-0.25-0.8 μs pulse
  - (x) Display: 12-inch or larger LCD colour display; resolution 800 x 600 pixels or better for 4:3 aspect ratio. Other aspect ratios of equivalent size and resolution are acceptable. Brightness of 900 cd/m<sup>2</sup> or greater.
  - (xi) Operating Temperatures: Better than -5°C to +55°C for the antenna/scanner unit. Better than -5°C to +45°C for the display unit.
  - (xii) Waterproofing: Radome antenna: IPX6, Display unit: IPX6
- (o) The crew operator shall be able to select the following modes of presentation at the radar display:
  - (i) radar image only;
  - (ii) plotter image only; and
  - (iii) plotter image overlaid with radar image.

- (p) The radar system's in-built chartplotter shall support the following functions:
  - (i) Operator selectable North Up or Course Up presentation;
  - (ii) Operator selectable TM or RM presentation;
  - (iii) Waypoints and routes;
  - (iv) Seamless and smooth zoom in and zoom out;
  - (v) Seamless and smooth chart panning;
  - (vi) Layers of chart details;
  - (vii) Monitor own Vessel position and heading;
  - (viii) View information of charted objects;
  - (ix) Own Vessel vector;
  - (x) Man-Over-Board (MOB);
  - (xi) One plug-in chart card shall be used for providing detailed navigational sea charts covering the entirety of Hong Kong Waters using S-57 or equivalent format digital sea chart or with tools for converting S-57 format sea charts and future updates into a format readable by the chartplotter;
  - (xii) The chart card shall be supplied with the latest version of sea charts covering the entirety of Hong Kong Waters with perpetual licence for use and ownership. The purpose is to ensure that the HKPF shall not be required to pay any periodic fees and charges for using the chart card with its contents, as the HKPF will thereafter obtain S-57 format chart updates and install them into the chartplotter.
- (q) The radar system shall be interconnected with the GPS and satellite compass systems so that real-time data from these two systems shall be available at adequate data update rates to support the smooth and seamless operation of the radar system's various functions (including its in-built chartplotter functions). The satellite compass' connection to the radar shall have a data update rate of at least ten times per second. The satellite compass shall provide GPS location data to the radar system for resilience purposes.
- (r) The system at the radar display shall be able to display the own vessel's heading (in degrees north) and position (in latitude and longitude).
- (s) The radar radome antenna/scanner unit shall comply with relevant requirements of the European Parliament and Council Directive 1999/5/EC and IEC 60945:2002.
- (t) The radar display system/unit shall comply with relevant requirements of the European Parliament and Council Directive 2004/108/EC and IEC 60945:2002.
- (u) The radar shall be capable of providing external (land-based) radar extractors and trackers with information which as a minimum includes, but is not limited to, analogue video signal, trigger, azimuth count pulse and azimuth reset pulse through the Government data network. COMMS will provide the Contractor with a full list of the information which the radar shall be required to provide.
- (v) The radar shall have Ethernet interface connected to the Government Mobile Data Equipment as specified in paragraph 7.6 and the IP address of this Ethernet interface of the radar and other units shall be set by setting the IP address directly on the equipment or using Dynamic Host Configuration Protocol (DHCP) from the Government Mobile Data Equipment as specified in paragraph 7.6.
- (w) The radar shall provide with interface for controlling and retrieving radar information through the Ethernet interface as specified in the paragraph (v) above using an external application programming interface with the following requirements and functions:
  - (i) Turn on and off the radar units;
  - (ii) Turn on and off the transmission of the radar;

- (iii) Setting the gain of the radar;
  - (iv) Setting the range of the radar;
  - (v) Setting the sea clutter of the radar;
  - (vi) Setting the rain clutter of the radar; and
  - (vii) Setting the interference level of the radar.
- (x) The Contractor shall provide with license software and application programming interface to access the functions of paragraph (v) and (w) above

#### 7.3.2 Satellite Compass

- (a) The Contractor shall supply and install one satellite compass set. The satellite compass shall consist of at least a sensor unit and an electronic digital display unit and be both compact and easy to operate. It shall be connected directly to the radar.
- (b) The display unit shall be positioned so that the coxswain can view the information displayed on it easily.
- (c) The sensor unit shall incorporate two or more satellite receivers.
- (d) The satellite compass shall incorporate integrated 3-axis rate gyro and acceleration sensors to deliver fast start-up times and provide heading updates even during temporary loss of satellite signals (i.e. during navigation under bridges).
- (e) The maximum heading update rate for ARPA targets shall be 20 Hz for ARPA targets as specified in Paragraph 7.3.1 of this Part VII.
- (f) The satellite compass shall provide the GPS source for the GMDSS function used by the IMM VHF radio specified at Paragraph 7.5 of this Part VII.
- (g) Performance:
  - (i) Reference: Either Magnetic North or True North
  - (ii) Warm-up Time: Less than one second
  - (iii) Accuracy: +1.0° typical
  - (iv) Resolution: 0.1°
  - (v) Deviation Compensation: Automatic
  - (vi) Operating Temperatures: Sensor unit: 0°C to 50°C; Display unit: 0°C to 55°C
  - (vii) Waterproofing: Sensor unit: IPX5, Display unit: IPX6.

#### 7.3.3 Global Positioning System (GPS System) integrated with Radar/GPS/DGPS and Electronic Chart System

- (a) The Contractor shall supply and install a GPS system which fulfils the following general requirements:
  - (i) The GPS system shall consist of a GPS receiver integrated with the GPS antenna and be suitable for mounting in the open air;
  - (ii) The GPS antenna/receiver shall be connected to the radar for the provision of GPS-related data, such as position fix, time, speed over ground and course over ground;
  - (iii) The GPS system shall be fully compatible with the radar;
  - (iv) The GPS system shall support Serial Lemo, Serial 26-pin D-sub, Serial 5-wire RS232, Serial 3-wire RS232, USB and Ethernet interfaces. The Ethernet interface shall connect to the encryption mobile router as specified in Paragraph 7.6.2 of this Part VII; and

- (v) The GPS system shall support at least the following data displayed either at the GPS display unit or the radar display:
  - (1) Position (latitude/longitude): to at least four decimal points
  - (2) Course: 1° resolution
  - (3) Speed: 0.1 knot or 0.1 km/hour resolutions with at least three digits
  - (4) Date and time: selectable as GMT or local mode
  - (5) Satellite status information
  
- (b) The GPS system's antenna/receiver shall fulfill the following technical requirements:
  - (i) Receiver Type: 8 or more channel parallel receiver
  - (ii) Receiving Frequency and Code: 1,575.42 MHz (C/A code)
  - (iii) Position Accuracy: Within + or - 30 metres rms or better 95% of the time
  - (iv) Warm Start Time: Less than 30 seconds
  - (v) Ambient temperature: 0°C to 55°C or better
  - (vi) Waterproofing: IPX6 or better

#### 7.3.4 Public Address (PA)/Siren, Loudhailer/External Broadcasting System

- (a) The PA/siren, loudhailer/external broadcasting system shall be an off-the-shelf product.
- (b) The system shall function as a siren and powerful loudhailing 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.
- (c) 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.
- (d) The master control unit shall be recessed into the Primary Console with the user control panel flush-mounted on the console and positioned within reach of the coxswain. The user control panel shall incorporate “Power ON/OFF”, “Hail Volume Control” and “Function Control” controls.
- (e) Verbal messages shall be broadcast through a fist microphone mounted on the Primary Console within easy reach of the coxswain.
- (f) The loudspeakers shall have a power rating of twenty (20) watts minimum and an impedance which shall match the amplifier.
- (g) The system shall be waterproofed to IPX5 standard or better.
- (h) 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 will enable messages to be heard 0.2 km away.
- (i) The positions of all the system's main components shall be discussed at the kick-off meeting.

## **7.4 Intercommunication (IC) System**

7.4.1 The Contractor shall supply and install a robust IP-based digital IC voice communication and data distribution system with an Ethernet backbone of at least 100Mb designed for use on open deck speedboats being used as specified in Paragraph 1.2.1 of this Part VII. The IC system shall be compliant with the latest version of the CE Electrical and Mil Std 461 EMC and Mil Std 810E standards. The IC system shall provide the Vessel's crewmembers and boarding officers with a modular and expandable platform on which they can communicate via on board intercom talkgroups and with others both on their own vessel and elsewhere via radio, mobile telephone networks and the Government data network. The IC system shall also be capable of integration with the vessel information system as specified at Paragraph 4.1.12 of this Part VII, radar or other data systems so that operators may receive audio notification alarms as required. The IC system shall also be capable of receiving both remote voice communications and remote digital system configuration and programming instructions through the Government data network.

7.4.2 The main components of the IC system shall comprise the Ethernet backbone, the RIUs, AIUs, PCUs and wireless extensions.

7.4.3 The Ethernet backbone shall be able to be:

- (a) powered by the Vessel's DC supply via an appropriate interface unit which will distribute power to the other components of the IC system;
- (b) connected to at least three (3) radio transceivers, including one (1) HKPF TETRA radio system as specified in Paragraph 7.7.1(a) of this Part VII, one (1) International Maritime Mobile VHF portable radio as specified at Paragraph 7.5 below and one (1) HKPF 3G/LTE commercial radio or mobile telephone;
- (c) connected to the vessel information system as specified at Paragraph 4.1.12 of this Part VII;
- (d) connected to the Vessel's radar notification alarms as specified at Paragraph 7.3.1(f)(xvi) of this Part VII;
- (e) connected to the Vessel's PA system as specified at Paragraph 7.3.5 of this Part VII;
- (f) capable of routing system software configuration to each AIU, RIU, PCU and wireless extension as appropriate.

7.4.4 The RIUs shall be:

- (a) fixed nodes, the purpose of which shall be to integrate on board radio systems (including the portable wireless extensions), mobile telephones, the vessel information system notification alarms as specified at Paragraph 4.1.12(h) of this Part VII and radar alarms as specified at Paragraph 7.3.1(f)(xvi) of this Part VII and other data devices into the system.
- (b) connected to the Vessel's DC power supply and the AIUs via the Ethernet backbone.

7.4.5 The AIUs shall:

- (a) be fixed nodes connected to the Ethernet backbone and which, together, form the basic infrastructure of the IC system;
- (b) integrate the operator(s) with the IC system via extension cables;
- (c) be installed in designated crew locations to be discussed at the kick-off meeting;
- (d) connect to the PCUs via waterproof plugs and sockets;
- (e) receive and distribute communications; and
- (f) have a full duplex intercom capability.

7.4.6 The PCUs shall:

- (a) be the operator's primary gateway to the IC system;
- (b) be connected to both the operators' audio head gear and the AIUs;
- (c) incorporate a voice-prompted menu selection control, a PTT for the intercom system and PTTs for at least two assigned radios;
- (d) enable the operator to select whether to mute the communications systems or to transmit on the IC system using PTT, VOX or live microphone.

7.4.7 The wireless extension(s) shall:

- (a) comprise a pair of wireless radios operating on the 2.4 GHz or 5.8 GHz bands or other radio frequency band acceptable to both OFCA and the HKPF, one of which is carried by the operator, whilst the second is connected to the Ethernet backbone via an appropriate interface unit;
- (b) enable an operator who is no longer connected to the IC system by extension cable, such as a boarding officer who has left the Vessel to carry out enforcement operations on another craft, to have full duplex access to the IC system; and
- (c) not require the operator to carry any additional equipment other than a small belt-mounted wireless radio which shall connect to his PCU.

7.4.8 The audio headgear shall:

- (a) be compatible for use with both ballistic and impact protection helmets;
- (b) consist of a microphone and two speaker ear cups connected by a comfortable and ergonomic strap system;
- (c) incorporate noise cancellation technology designed to reduce environmental noise such as engine noise, wind noise and the noise of gunshots or explosions to a maximum of 82db or below;
- (d) be immersible in salt water of one (1) metre depth for thirty (30) minutes without losing level dependent performance.

7.4.9 For each Vessel delivered under this Contract, the Contractor shall supply:

- (a) Sufficient RIUs for the devices listed at Paragraph 7.4.3(b) of this Part VII and other systems as provided for in this TS and five (5) wireless extensions;
- (b) Sufficient AIUs with plug-in points for seven (7) operators as specified at Paragraph 3.4.4(j) of this Part VII and for the five (5) wireless extension users specified at Paragraph 7.4.9(a) above if required;
- (c) Twelve (12) PCUs;
- (d) Five (5) wireless extensions, each consisting of a pair of radios;
- (e) Twelve (12) sets of audio headgear as specified at Paragraph 7.4.8 of this Part VII;
- (f) Ten (10) waterproof connection cables capable of connecting to the HKPF's existing Gecko Marine Safety Helmet Mk10 audio headgear to the PCU; and
- (g) All other components required to enable the IC system to operate.

7.4.10 The system administrator shall be able to configure the system by computer either on site in the Vessel or remotely via the Government network to permit or deny individual operators or groups of operators to listen to or transmit on any of the communications to which the system is capable of being connected. The PCU shall enable an operator to interface with the system within the limitations imposed by the configuration programmed in by the system administrator.

- 7.4.11 The Contractor shall, in respect of all of the Vessel(s) delivered under this Contract, supply two (2) sets of system administrator hardware and software with which the IC system can be configured, programmed and troubleshot.
- 7.4.12 The IC system shall be suitable for continuous operation in the Hong Kong climate and maritime environment throughout its life span in accordance with the specifications in this Chapter. It shall:
- (a) be capable of operation in temperatures ranging from -5°C to 50°C;
  - (b) be capable of withstanding the knocks and jolts likely to occur during repair work or rough handling on a workbench;
  - (c) be protected to IP67 standard or be enclosed in an IP67 watertight box;
- 7.4.13 The IC system shall include an audio recorder unit capable of recording seventy-two (72) hours of all of the audio traffic on the IC system before being overwritten. Each stream of audio traffic shall be recorded separately for playback. The recorded audio traffic shall be time stamped. Also, the audio recorder shall be capable of being connected and disconnected from the IC system using simple connectors. The details of storage medium and installation location shall be discussed at the kick-off meeting.

## **7.5 International Maritime Mobile (IMM) VHF Portable Radio**

- 7.5.1 The Contractor shall supply one (1) IMM VHF portable radio per Vessel. It shall:
- (a) be an off-the-shelf portable product for marine application;
  - (b) measure no more than 160 mm x 70 mm x 60 mm (excluding the antenna but including the battery) and weigh no more than 0.7 kg;
  - (c) comply with relevant requirements of the European Parliament and Council Directive 1999/5/EC;
  - (d) be fully compatible with the GMDSS;
  - (e) be equipped with a lithium battery with a minimum five (5) year lifetime;
  - (f) be equipped with the full range of IMM VHF voice channels, all of which shall be selectable;
  - (g) be delivered complete with all components, features and functions necessary for full functionality;
  - (h) be capable of operating in temperatures ranging from -5°C to +55°C and be protected to IPX7 or better;
  - (i) be supplied complete with antenna and two (2) re-chargeable batteries;
  - (j) be supplied with a belt clip and a shoulder carrying case;
  - (k) be supplied with one (1) 220V AC battery charger suitable for use ashore;
  - (l) be supplied with one (1) charger unit suitable for use on board the Vessel when the radio is required to be charged at sea. It shall be directly connectable to the Vessel's own DC power supply; and
  - (m) Specific Features and Requirements:
    - (i) Power ON/OFF;
    - (ii) "Transmit" indicator, volume and squelch controls;
    - (iii) Channel number indicator;
    - (iv) Quick selection of Channel 16 (156.8 MHz);
    - (v) Dual watch and triple watch on Channel 16 and selected channel(s);
    - (vi) Channel scanning between Channel 16 and selected channels; and
    - (vii) The spacing between the channels shall be 25 kHz or better.

7.5.2 Transmitter:

- (a) Frequency Range: 156.025 MHz to 157.425 MHz, or better
- (b) Frequency Deviation: Frequency modulation with max frequency deviation of +5 kHz
- (c) Spurious Emission: -60 dB or better
- (d) RF Output Power: Transmission power selector for: (a) High at five (5) watts nominal and (b) Low at one (1) watt nominal.

7.5.3 Receiver:

- (a) Frequency Range: 156.050 MHz to 163.27 MHz or better
- (b) Sensitivity: Less than 1  $\mu$ V for 12dB SINAD
- (c) Inter-modulation Rejection: 65 dB or better
- (d) Adjacent Channel Selectivity: 65 dB or better
- (e) Squelch: Adjustable squelch control
- (f) Adjacent Channel Selectivity: 65 dB or better
- (g) Spurious Rejection: 65 dB or better
- (h) Audio Output Distortion: At least 0.2 watt at rated output with less than 10%

**7.6 Government Mobile Data Equipment and Antennae**

7.6.1 The Government Mobile Data Equipment and Antennae shall include the following equipment:

- (a) Encryption mobile router;
- (b) Antennae; and
- (c) Ethernet switch(es).

7.6.2 The encryption mobile router shall meet the following specifications:

- (a) WAN Interface:
  - 2 x Embedded 4G FD-LTE Modem with MIMO antennae
  - 1 x Embedded 4G TD-LTE Modem with MIMO antennae (FD-LTE Band: 1,3,7,8; TD-LTE Band: 38, 39, 40 and 41)
  - 1 x Embedded 4G TD-LTE Modem with MIMO antennae (TD-LTE with operating frequency band between 1.785 GHz to 1.805 GHz)
  - 1 x 10/100BaseTX Gigabit Ethernet
  - 1 x 802.11a/b/g/n WAN interface with MIMO antennae
- (b) Ethernet interface:
  - 8 x 10/100BaseTX Fixed port
  - 1 x 802.11a/b/g/n interface with MIMO antennae
- (c) Requirement:
  - Load Balancing
  - IPv4 and IPv6 support
  - USB LTE/3G Modem support (3G Band: 1, 2, 4, 5 and 8)
  - WAN / Mobile Bandwidth Bonding which is compatible

with the Multi-Wan Bonding router

IPsec VPN

256-bit AES Encryption

PPTP VPN Server

QoS for VoIP

Speed Fusion connections to existing HKPF router (Peplink380)

- (d) Environmental: The mobile router specified at Paragraph 7.6.1(a) above shall be contained within a housing protected to IP67 and securely locked to the Vessel. The whole housing shall be easily detachable for maintenance purposes.

Operation temperature at least between -20°C and +65°C

Humidity: 15% – 95% (non-condensing)

- 7.6.3 The Contractor shall provide the six (6) pairs of weatherproof MIMO antennae specified in Paragraph 7.6.2(a) and 7.6.2(b) above:
- 7.6.4 The Vessel's electronic equipment including the radar/GPS/DGPS and electronic chart system specified at Paragraph 7.3 above, the IC system specified at Paragraph 7.4 above and/or other systems shall be connected to the Government data network by means of the encryption mobile router specified at Paragraph 7.6.1(a) above.
- 7.6.5 The Contractor shall provide one (1) Ethernet switch port each to both the Primary and the Secondary Consoles specified at Paragraph 3.4 of this Part VII. They shall be connected by IP67 protected plugs, jacks and cables. If, owing to the requirement to connect the Vessel's electronic systems to the Government data network specified at Paragraph 7.6.4 above, the number of Ethernet connections to the system exceeds the eight (8) Ethernet interface connections available as specified at Paragraph 7.6.2(b) above, the Contractor shall provide additional waterproof Ethernet switches as specified at Paragraph 7.6.1(d) above to meet the requirement.

## **7.7 Installation/Space/Cabling for the Existing HKPF Equipment**

- 7.7.1 The Contractor shall, at no cost to Government, install onto each Vessel one (1) unit of each of the following equipment (EQ-HKPF), which shall be provided by the HKPF:
- (a) HKPF Marine Radio Communications System (MRCS Radio "A") TETRA mobile radio. The present equipment type is the EADS TETRA TMR880i mobile radio with separate control panel and speaker box. The TMR880i is a wide-band version with a frequency range of 380 MHz to 430 MHz. The radio is powered by a +12V DC nominal supply. The HKPF reserves the right to use other radio types in place of the present TMR880i. Provided that the Government notifies the Contractor at least three months in advance of the on-site installation of the MRCS Radio "A", no additional costs associated with the installation of a radio of a different type shall be chargeable to the Government.
  - (b) Automatic Vessel Location System (AVLS) of the MRCS. The present AVLS mainly comprises of a Nokia TETRA TMR420 mobile radio (MRCS Radio "C"), a Trimble DGPS Receiver and VPU equipment all packed inside a water-resistant black box and a separate Trimble DSM212 DGPS antenna. This equipment is powered by a +12V DC nominal supply. The Contractor shall install the black box in a location not exposed to the elements and mount the DGPS antenna at a suitably elevated position on the Vessel. The HKPF reserves the right to use other DGPS antennae and AVLS equipment packed in a similar box. Provided that the Government notifies the Contractor at least three months in advance

of the on-site installation of the AVLS, no additional costs associated with the installation of AVLS equipment of a different type shall be chargeable to the Government.

- (c) A tablet or smartphone with a display of no more than 13 inches. The Contractor shall provide a mounting location at a console to be discussed at the kick-off meeting. The mounting shall include a mounting frame and shock-absorbing cushions for securely mounting the device onto the Vessel using flexible, self-adhesive Velcro tape. The Contractor shall provide two sets of flexible self-adhesive Velcro tape for each Vessel.

7.7.2 The Contractor shall:

- (a) coordinate and finalise the positions of all the radio, radar equipment and antennae systems during the detailed system design stage.
- (b) reserve sufficient space for the installation of the EQ-HKPF, including for flush mounted panels.
- (c) note that the TMR880i radio and its accessories are not intended to be mounted in a position exposed to the elements. Consequently, the Contractor shall provide suitable protection from the elements for the control panel, speaker box and microphone.
- (d) supply and install all RF signal, power and grounding cables and wires. COMMS will provide the specifications of all the RF cables and connectors to the Contractor.
- (e) supply and install all power converters and power supply terminals necessary for the EQ-HKPF's installation.
- (f) supply and install two UHF antennae, one for the MRCS Radio "A" and the other for MRCS Radio "C". The UHF antennae shall have an impedance of 50 ohms, unity gain and a frequency range of 380 MHz to 430 MHz at a VSWR of 1.5 or less. The Contractor shall provide and install suitable co-axial cable surge suppressors to these UHF antennae to protect the radio equipment from lightning surges.
- (g) design, rig and suitably mount the antennae to ensure EMC and avoid interference.
- (h) fit and install the EQ-HKPF in the HKSAR in the positions that were finalised during the detailed design stage, subject to any subsequent EMC-necessitated alteration.
- (i) provide all necessary cables, materials, labour and transportation for the equipment installation.

7.7.3 COMMS shall:

- (a) connect up the EQ-HKPF using the connectors, cables and wires installed by the Contractor;
- (b) test the VSWR of the RF cables and UHF antennae to confirm that neither exceeds 1.5; and
- (c) commission the EQ-HKPF.

## **Chapter 8 - Services Support**

### **8.1 General Philosophy**

- 8.1.1 In determining the appropriate design for the Vessel, all of the following factors shall be taken equally into account:
- (a) Vessel performance (e.g. engine rating, size).
  - (b) Initial cost.
  - (c) On-going cost (e.g. maintenance cost, petrol consumption, spare parts).
  - (d) Reliability (frequency and time to repair breakdown).
  - (e) Time between maintenance periods.
  - (f) Time to undertake scheduled maintenance (downtime); and
  - (g) All machinery and Equipment installed in the Vessel shall be serviceable in the HKSAR.
- 8.1.2 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; and
  - (b) Ease of access for in-situ servicing and maintenance in the HKSAR.

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

- 8.2.1 Prior to Delivery Acceptance, the Contractor shall supply to the MD for approval a detailed inventory list for the whole Vessel covering all discrete items down to major component/unit level. The details supplied for each major component/unit shall include:
- (a) Item number on the inventory list;
  - (b) Name and Description;
  - (c) Type or model (if applicable);
  - (d) Serial number(s);
  - (e) Quantity;
  - (f) Manufacturer;
  - (g) Manufacturer's reference number;
  - (h) Location in Vessel;
  - (i) Local agent/supplier address, telephone and facsimile numbers and email address;
  - (j) Order lead time;
  - (k) Shelf life; and
  - (l) Unit cost.
- 8.2.2 At Delivery Acceptance, the Contractor shall provide the MD with the following:
- (a) Four (4) paper copies and one (1) soft copy of the approved inventory list;
  - (b) Four (4) complete sets of paper print “as fitted” drawings of the Vessel and two (2) soft copies on DVDs;

- (c) Four (4) complete sets of paper print “as fitted” electrical schematic, cabling, wiring and single line diagrams for electrical equipment installed on board and conduit / trunk route diagrams and two (2) soft copies in DVDs as per the Vessel delivered;
- (d) Four (4) copies of a list of all bought-in machinery and electrical equipment installed on the Vessel, where the list shall include:
  - (i) Description,
  - (ii) Type or model (if applicable),
  - (iii) Makers part number or equivalent (if applicable),
  - (iv) Location,
  - (v) Quantity,
  - (vi) Supplier or agents name and contact details,
  - (vii) Order lead time,
  - (viii) Shelf life, and
  - (ix) Unit cost;
- (e) Four (4) copies (at least one (1) original) of manufacturers’ operation, maintenance and workshop manuals in English for all machinery and Equipment, including spares and stores, special tools and test equipment;
- (f) Four (4) paper copies and two (2) soft copies in DVDs of the Contractor’s “Docking Plan”, which shall include the profile, plan and sections as per the Vessel delivered;
- (g) Four (4) copies of the On Board Operator’s Manual (English and traditional Chinese) for the Vessels delivered covering:
  - (i) Daily user check and operation procedure,
  - (ii) Operating detail of each system, and
  - (iii) Emergency operation procedure.

(The precise format and detail required shall be subject to the Government’s approval when the configuration of the Vessel and outfitting is decided.)
- (h) One (1) set of the operational manuals and maintenance manuals in English as specified in Paragraph 7.2.11 of this Part VII for each individual item of ENE. For the avoidance of doubt, this set of operation and maintenance manuals is in addition to the sets which are required to be supplied in accordance with Paragraph 7.2.11 of this Part VII; and
- (i) One (1) soft copy on DVD of the entry for the Vessel in the Marine Police Manual in the approved format. The HKPF will provide sample entries for current craft for reference purposes at the kick-off meeting. The draft entry shall be provided to the HKPF for comment and approval at least two (2) months prior to Delivery Acceptance.

8.2.3 The first draft of the On Board Operator’s Manual (in both English and traditional Chinese) stipulated in Paragraph 8.2.2(g) of this Part VII shall be submitted to GNC for approval not less than one (1) month before Delivery Acceptance.

#### 8.2.4 Tools and Test Equipment for Electronics

All tools and testing equipment for the Vessel’s electronic equipment shall be delivered directly to COMMS. All items shall be documented, preserved and packed properly.

### 8.2.5 Photographs

The Contractor shall at Delivery Acceptance provide the following:

- (a) As-Fitted Photographs
  - (i) Two (2) sets of colour prints (130 mm x 90 mm) from different viewing angles to give an overall picture of the various parts and areas of the Vessel; and
  - (ii) Each set of prints shall be presented in a suitable album, indexed and labelled appropriately to ensure that the position from which the picture was taken and the position of the subject in the picture are clearly identifiable.
- (b) Official Photographs
  - (i) Four (4) framed colour photographs of picture size not less than 350 mm x 270 mm and a frame size not less than 510 mm x 400 mm showing the profile of the Vessel in Hong Kong Waters;
  - (ii) Four (4) 200 mm x 150 mm colour photographs showing the profile of the Vessel in Hong Kong Waters; and
  - (iii) Four (4) 150 mm x 100 mm colour photographs showing the profile of the Vessel in Hong Kong Waters.
- (c) Softcopy of Photographs
  - (i) All of the photographs specified at Paragraphs 8.2.5(a) and (b) of this Part VII shall be taken using a digital camera with a resolution of at least twelve (12) megapixels and be forwarded to the HKPF on a DVD in RAW and JPEG formats at Delivery Acceptance.

### 8.2.6 Certificates and Reports

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

- (a) Associated test certificates;
- (b) Certificates of Class or Product Certificate of the Vessel;
- (c) Test performance certificates of Equipment (e.g. electronics, switchboards);
- (d) Main engine performance test certificates;
- (e) Engine International Air Pollution Prevention Certificate and Supplement for the main engines (if applicable);
- (f) Type approval certificate of the sterndrives or alternative propulsors as installed on the Vessel;
- (g) Complete record of the Official Sea Trial commissioning tests;
- (h) Warranty certificates of all machinery, Equipment and apparatus of the Vessel (valid for twelve (12) months from the date of Acceptance Certificate of the Vessel);
- (i) Certificates of light and sound signalling Equipment;
- (j) Builder certificates;
- (k) Certificates of building material;
- (l) Deviation card for compass (after adjustment in the HKSAR);
- (m) Hull construction material certificates issued by one of the Classification Societies listed in Paragraph 2.3.4 (a) to (i) of this Part VII;

- (n) Undertaking duly signed and sealed by the Contractor's (or its sub-contractor's) shipyard to provide Warranty Services in relation to all aspects of the Vessel during the Warranty Period in the HKSAR as stipulated in Annex 1 of this Part VII;
- (o) Asbestos free certificate or statement of compliance; and
- (p) Any other certificates as appropriate.

#### 8.2.7 Ship Model

The Contractor shall provide the Government with four (4) ship models (scale 1:25) for display, briefing and training purposes. The models shall include all major external fittings above and below the waterline such as the collar, console, skeg, appendages, propulsion system, mast, mast fittings and navigation lights, lifesaving equipment, fire-fighting equipment, bollards and cleats as agreed by the Government. The ship model shall be made to an overall exact scale standard relevant to model making.

## **Chapter 9 – Training**

### **9.1 Training on Electronic Navigational Equipment**

- 9.1.1 Unless otherwise specified, the Contractor shall provide all facilities, venues, and materials necessary for the training courses specified in Paragraph 9.1 of this Part VII. All training courses shall be held in the HKSAR 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 DVD format.
- 9.1.2 The Contractor shall provide the HKPF's operational and technical and maintenance staff with both classroom and vessel-based training to familiarise them with the operation and maintenance of the ENE. The trainer(s) shall be able to communicate with local trainees effectively in English and Cantonese.
- 9.1.3 It is anticipated that two (2) distinct types of training shall be required, namely:
- (a) Operator training; and
  - (b) Equipment maintenance training.
- 9.1.4 The Contractor shall submit a detailed course syllabus and a schedule for conducting the training courses for approval at least two (2) months prior to the commencement of training.
- 9.1.5 Operator Training Course
- (a) This course shall be a train-the-trainer course;
  - (b) The course shall impart a detailed knowledge and appreciation of the day-to-day operation of all Equipment and shall include “hands on” demonstrations, the operation of all Equipment and routine cleansing requirements.
  - (c) The course shall be held twice immediately before Delivery Acceptance.
  - (d) The first operator training course shall cater for thirty (30) trainees and the second operator training course for ten (10) trainees.
- 9.1.6 Equipment Maintenance Training Course
- (a) The course shall provide the COMMS technical and maintenance staff with a detailed knowledge and appreciation of all aspects of the design considerations, day-to-day operation, interconnected system operation, fault breakdown, routine maintenance, fault-finding and repair procedures of the Equipment and it shall include both practical demonstrations and tests.
  - (b) This course shall equip the COMMS technical and maintenance staff with sufficient expertise to enable them to maintain the Equipment after the expiry of the Warranty Period effectively.
  - (c) The course shall be held immediately before the commissioning of the Vessel to be delivered.
  - (d) This course shall cater for fifteen (15) trainees.
- 9.1.7 The Contractor shall provide one (1) copy of the comprehensive training documents prepared by the Contractor to each of the trainees attending the courses specified at Paragraphs 9.1.5 and 9.1.6 above before the commencement of the courses. The HKPF shall have the right to reproduce all training documents for internal use.
- 9.1.8 The Contractor shall, upon successful completion of the entire course, issue each training course participant with a certificate as evidence of his/her attendance.

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

- 9.2.1 Unless otherwise specified, the Contractor shall provide all facilities, venues, and materials necessary for the training courses specified in Paragraph 9.2 of this Part VII. All training courses shall be held in the HKSAR 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 DVD format.
- 9.2.2 The Contractor shall provide the HKPF's operational and both the HKPF's and Government Dockyard Maintenance Section's technical and maintenance staff with both classroom-based and vessel-based training to familiarise them with the operation and maintenance of the Vessel. The trainer(s) shall be able to communicate with trainees effectively in English and Cantonese.
- 9.2.3 In respect of the operation and maintenance of the Vessel, the Contractor shall provide the following training:
- (a) Vessel operator's training to the HKPF's operational staff; and
  - (b) Engine and on board Equipment maintenance training to the technical and maintenance staff of both the HKPF and the Government Dockyard Maintenance Section.
- 9.2.4 In respect of the vessel operator's training course, the Contractor shall, not less than two (2) months prior to Delivery Acceptance, submit for the HKPF and MD's approval a draft vessel operator's training syllabus, which shall cover on board Equipment, systems, first level maintenance and troubleshooting as well as all aspects of boat handling which shall include, but not be limited to, trim, turning and operating in rough water. The draft shall include details of the depth, duration and scheduling of the proposed training course and the qualifications possessed by the proposed training instructor(s).
- 9.2.5 **Vessel Operator's Training**
- Upon Delivery Acceptance, the Contractor shall then deliver the vessel operator's training course according to the approved syllabus to thirty (30) HKPF operational staff.
- 9.2.6 In respect of the engine and on board Equipment maintenance training course, the Contractor shall, not less than two (2) months prior to Delivery Acceptance, submit for the HKPF's and MD's approval a draft engine and on board Equipment maintenance train-the-trainer training syllabus, which shall include, but not be limited to, all aspects of the designs, day-to-day operation, breakdown, routine maintenance and fault diagnosis of the engine/electrical distribution system and hull structural repair. The draft shall include details of the depth, duration and scheduling of the proposed training course and the qualifications possessed by the proposed training instructor(s).
- 9.2.7 **Engine and On Board Equipment Maintenance Training**
- The Contractor shall then deliver the engine and on board Equipment maintenance training course according to the approved syllabus to ten (10) HKPF and ten (10) Government Dockyard Maintenance Section technical and maintenance staff in the HKSAR or overseas.
- 9.2.8 The Contractor shall provide one (1) copy of the comprehensive training documents prepared by the Contractor to each of the trainees attending the courses specified at Paragraphs 9.2.5 and 9.2.7 above before the course. The HKPF shall have the right to reproduce all training documents for internal use.
- 9.2.9 The Contractor shall, upon successful completion of either of the courses specified at Paragraphs 9.2.5 and 9.2.7 above, issue each training course participant with a certificate as evidence of his/her attendance on the training course and the standards of competence achieved.

## Chapter 10 – Abbreviations

3G	3 <sup>rd</sup> Generation
4G	4 <sup>th</sup> Generation
A/C	Alternating Current
AES	Advanced Encryption Standard
AIU	Audio Gear Interface Unit
ANSI	American National Standards Institute
ARPA	Automatic Radar Plotting Aid
AWS	American Welding Society
C/A	Course/Acquisition
cd/m <sup>2</sup>	Candela per metre squared
cm	Centimetre
CO <sub>2</sub>	Carbon Dioxide
COMMS	Communications Branch of HKPF
CPA	Closest Point of Approach
dB	Decibel
DC	Direct Current
DGPS	Differential Global Positioning System
DHCP	Dynamic Host Configuration Protocol
DVD	Digital Video Disk
EGNOS	European Geostationary Navigation Overlay Service
EMC	Electromagnetic Compatibility
ENE	Electronic Navigational Equipment
ERBL	Electronic Range and Bearing Lines
FAT	Factory Acceptance Trials
FD	Frequency Division
GHz	Gigahertz
GLONASS	Global Navigation Satellite System
GM	Metacentric Height
GMDSS	Global Maritime Distress and Safety System
GMT	Greenwich Mean Time
GPS	Global Positioning System
HPEAFS	High Performance Energy Absorbing Flooring System
H/V	Horizontal/Vertical
Hz	Hertz
IC	Intercommunications
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICOMIA	The International Council of Marine Industry Associations
IMM	International Maritime Mobile
IMO	International Maritime Organisation
IEC	International Electrotechnical Commission
IP	Internet Protocol
IPsec	Internet Protocol Security
IRPA	International Radiological Protection Association
ISO	International Organization for Standardization
ITU-R	International Telecommunication Union – Radiocommunication Sector
JPEG	Joint Photographic Experts Group
kg	Kilogram
kHz	Kilohertz
km	Kilometre
kPa	kilo Pascal
kW	Kilowatt
LCD	Liquid Crystal Display
LCG	Longitudinal Centre of Gravity

LED	Light-emitting Diode
LSA	Lifesaving Appliance
LTE	Long Term Evolution
MCR	Maximum Continuous Rating
MOB	Man Overboard
MHz	Megahertz
MIMO	Multi Input Multi Output
mm	Millimetre
NDT	Non-Destructive Test
NIR	Non-Ionizing Radiation
NMEA	National Marine Electronics Association
NORSOK	Norsk Sokkels Konkuranseposisjon
ohm	Unit of Electrical Resistance
OFCA	Office of the Communications Authority
PA	Public Address System
PCB	Printed Circuit Board
PCU	Personal Communications Unit
PPI	Plan Position Indicator
PPTP	Point-to-Point Tunnelling Protocol
PVC	Polyvinyl Chloride
QoS	Quality of Service
RAW	A file format that captures all image data recorded by the sensor when a photograph is taken
RF	Radio Frequency
rms	Root mean square
rpm	Revolutions per minute
RM	Relative Motion
RT	Radioactive Test
SBAS	Satellite -based Augmentation System
SINAD	Signal-to-noise and Distortion Ratio
SOLAS	Safety of Life at Sea
TBT	Tributyltin
TCG	Transverse Centre of Gravity
TCPA	Time-based Closest Point of Approach
TD	Time Division
TM	True Motion
TS	Technical Specifications
UHF	Ultra High Frequency
USB	Universal Serial Bus
UT	Ultrasonic Test
V	Volt
VCG	Vertical Centre of Gravity
VHF	Very High Frequency
VOC	Volatile Organic Compounds
VoIP	Voice Over Internet Protocol
VOX	Voice Operated Switch
VPN	Virtual Private Network
VRM	Variable Range Marker
WAAS	Wide Area Augmentation System
WAN	Wide Area Network
µs	Microsecond
µV	Microvolt

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

### **1. Warranty Services**

- 1.1 The Contractor is required to be a Government Recognised Servicing Shipyard (“GRSS”) or to appoint a GRSS in Hong Kong to provide Warranty Services in relation to all aspects of the Vessel during the Warranty Period, including Guarantee Slipping as stipulated in this Annex. If the Contractor appoints a GRSS to perform the Warranty Services, the Contractor shall ensure that the GRSS 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 as if references to the Contractor mean such GRSS.
- 1.2 The purpose of requiring a GRSS to provide the Warranty Services is to facilitate rectification of defects without causing inconvenience to the Vessel's operation. As such, if the GRSS is a third party but not the Contractor, the Contractor shall give, and shall be deemed to have given, full authorisation to that GRSS in the HKSAR to make decisions in relation to all matters arising out of any warranty claims submitted by the Government, but 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 ensure that the GRSS will 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 GRSS 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 to the GRSS 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 the GRSS 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 Schedule 6 in Part V and ENE), 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/manufacturers' warranty extending beyond the one year total Vessel warranty must be assigned to the Government as appropriate.
- 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 or the GRSS appointed by it 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 or of the GRSS appointed by the Contractor should be avoided unless absolutely necessary.
- 1.6.4 Rectification of defects must have a minimum effect on the operation of the Vessel by the provision of on loan equipment if the anticipated repair time exceeds the time frame as specified in Paragraph 1.7.1 below.
- 1.7 Throughout the Warranty Period, the Contractor shall be responsible for the provision of free of charge corrective maintenance and rectification of all defects in all and any of the Warranty Items including repair and replacement as necessary. This shall, at no cost to the Government, include Warranty Services to be performed by the Contractor described in the following sub-paragraphs:
- 1.7.1 To attend to the Vessel for inspection and repair within 24 hours (excluding Hong Kong public holidays) of receiving the report of a fault (“fault report”) and to take immediate action to rectify the defect after inspection. Unless otherwise agreed by the Government, all corrective maintenance and rectification must be effected within 48 hours after the fault report is first issued. The MD must be informed of what corrective maintenance and rectification actions have been taken within 72 hours of receiving the relevant fault report.
- 1.7.2 To provide all necessary transport, replacement Equipment, spare parts, labour and materials, tools and testing instruments required for the corrective maintenance and rectification.
- 1.7.3 Any replacement item or part to be used shall originate from the manufacturer of the original Warranty Item to be repaired and must be able to be found in the latest spare parts list issued by such manufacturer. Alternative components shall not be used without the prior approval in writing of the MD.
- If the Contractor fails to respond to any reported warranty claims within 48 hours, the MD may arrange corrective maintenance and rectification of the defect either on its own or by deploying a third party contractor as deemed appropriate with a view to minimising any downtime incurred. In such case, the Contractor shall compensate the Government for the full cost of such repairs plus 10% as and for liquidated damages but not as a penalty no later than 10 working days after a written demand has been served on the Contractor by MD.
- 1.8 Extension of Warranty
- 1.8.1 The Warranty Period for any Warranty Item shall be suspended whilst and if the Contractor fails to repair and correct satisfactorily the defects in such Warranty Item within seven working days counting from the date when the relevant fault report was first issued.
- 1.8.2 Warranty Items which are electronic equipment sub-assemblies, modules or components and which are replaced during the Warranty Period shall have a new warranty period of one year commencing from the date of replacement.
- 1.8.3 In relation to a Warranty Item, references to Warranty Period shall be construed to include such extended warranty period as mentioned in Paragraph 1.8.1 and/or 1.8.2 above, depending on whichever is applicable.
- 1.8.4 Equipment which is found to be defective during the trials at the Guarantee Slipping as mentioned in Paragraph 2.2.3 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 Schedule 6 in Part V and in the same quantity in the shipyard of the Contractor or of the GRSS appointed by it and which the Contractor (or its GRSS) shall use for performing the Warranty Services. The Government will not provide its own inventory of the Spare Parts listed in Part 2 of Schedule 1 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 Paragraphs 7.1.1 and 7.2.13 in Chapter 7 of the TS.

## **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 Engines and Gearboxes**

- (a) Renew the lubricating oil and replace the filters for the main engines and gearboxes as per the manufacturer's recommendations;
- (b) Clean all the engine air filters and change the filter elements as necessary;
- (c) Clean the coolers of the engines and renew all zinc anodes if provided;
- (d) Check all the engines' belts and adjust if necessary;
- (e) Check tappet clearances for the inlet and exhaust valves, ignition timing and idle speed and adjust if necessary;
- (f) Conduct function tests for the engines' protection system and their associated sensors, gauges and other measuring devices; and
- (g) Any other work required or recommended by the engine manufacturer.

All of the work listed at Paragraphs 2.2.1(a) to (g) shall be carried out by the manufacturer's authorised agent. All the work procedures and the spare parts used shall comply with the manufacturer's specifications and requirements.

### **2.2.2 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 two years' protection against marine growth;
  - (ii) The hull shall be cleaned;
  - (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 2.2.2(a)(iii) above, two coats of touch up primer and one coat of touch up shall be applied; and
  - (v) One full coat of finishing paint shall be applied to the hull below the water line.
- (b) Paint Above the Water Line
  - (i) Damaged paint on the hull above the water line shall be repaired properly. After repair, two coats of touch up primer and one coat of touch up 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, clean and polish propellers.
- (d) 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.
- (e) Renew all zinc anodes.

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

- (a) Engine control and steering system;
- (b) Engine alarm and shut down function (including emergency stopping of engines);
- (c) Navigational equipment, lights and sound signals;
- (d) Ahead and astern running and crash stop test;
- (e) Steering trial;
- (f) Speed measurement;
- (g) Other trials as required by the Government Representative; and
- (h) Any item or component found defective shall be repaired or replaced.

Milestones		Completion Dates
1	Issuance of "Notification of Conditional Acceptance"	To be advised after Tender Evaluation
2	Contract Date (the date when the Articles of Agreement is duly signed)	The date when the Articles of Agreement is duly signed by both the Contractor and the Government. 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 to be 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, as to be directed by the Government.
4	Completion of hull structures	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 engines, propellers and steering gear	
6	Completion of installation of electronic navigation equipment	
7	Pre-shipment Construction and Handling Inspection	
8	Shipment to Hong Kong	
9	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

Drawings Approval	Completion Date
General Arrangement Plan	<p data-bbox="1016 783 1995 852" style="text-align: center;"><i>All the drawings are required to be submitted within two (2) months after the signing of Articles of Agreement for GNC's approval / reference.</i></p>
Lines Plan	
Structural Construction Plan in Mid-Ship and Bulkhead Section	
Construction Profile and Deck Plan	
Shell Expansion Plan	
Tank Capacity Plan	
Engine Mounting Arrangement	
Power / Speed Estimation and Curve	
Intact and Damaged Stability Plan	
Details of Electronic Navigational / Communication Equipment	
Details of Deck Equipment, Outfitting, Furniture, etc.	
Details of Engines' Arrangement	
Consoles Arrangement and Schematic Diagram	
Instrumentation and Control System	
Calculation of Fuel Capacity	
Details of Electrical and Electronic Equipment	
Electrical Load Calculations	
Schematic Layout of Electrical Circuits	
Paint Schedule	
Lightning Protection Arrangement	
Torsional Vibration Calculation	
Others as required	

## Part VII Annex 4 – Main Items Inspection Timetable

Item No.	Items to be Inspected	Completion Date	
		1 <sup>st</sup> Vessel	Remaining Vessels
	<b>Hull Structure, Layout and Outfitting Inspection</b>		
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 (Primary and Secondary)		
H-20	Lifesaving appliance		
H21	Fire fighting appliance		
H-22	Inclining experiment and/or lightship weight measurement		
H-23	Sea trials including operation test of outfitting equipment		
H-24	Towing test static bollard pull test		
H-25	Site towing demonstration trial		
H-26	Cleanliness inspection before acceptance		
H-27	Inventory check in the HKSAR		
H-28	Acceptance and delivery		
	<b>Electrical and Machinery Installation</b>		
EM-1	General inspection on installation of machinery:		
(a)	General inspection on installation of main engines		
(b)	General inspection on installation of waterjet or sterndrive system		
EM-2	Main engines:		
(a)	Test of engine safety devices and alarms		
EM-3	Fuel 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)	Main switchboard & panels - high voltage injection test		
(b)	Cable size checking of electrical switchboard installations		
(c)	Inspection of DC distribution panel		
(d)	Megger test of the electrical system		
(e)	Earthing test of the electrical system		
EM-9	Control consoles (Primary and Secondary):		
(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 COMMS		
EM-14	Test of noise level during sea trial		

## 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 and Performance Tests

Date of Test:		Place of Test:	
Vessel's Identification:		Vessel's Name:	
<b>Conditions at Endurance and Performance Test</b>			
No. of Person On Board		Dummy Weight (kg)	
Amount of fuel in percentage of Fuel Tank Capacity (Petrol / Diesel <sup>(1)</sup> )		Weight of Other Equipment (kg)	
Sea Conditions	<b>WMO Sea State 0 to 2</b>		
<b>Engines<sup>(2)</sup>:</b>		<b>Propeller<sup>(2)</sup>:</b>	
	<b>Port Side</b>	<b>Starboard Side</b>	<b>Port Side</b>
Maker			Maker
Type			Type
Serial Number			Diameter
Rated Power			Pitch
Rated Speed			Direction of Rotation
	<b>Engine</b>	<b>Vessel</b>	<b>Time</b>
<b>Engine Load</b>	<b>Speed (rpm)</b>	<b>Speed (Knots)</b>	<b>(Start)</b>
			<b>(Finish)</b>
			<b>Fuel Consumption (litres/minutes)</b>
			<b>Engine Oil Pressure (Bar)</b>
			<b>Engine (in) CW Temp. (°C)</b>
			<b>Others</b>
			<b>Others</b>
___% of rated Power	At Minimum Cruising Speed	Not less 15 minutes	
50% of Rated Power/rpm		Not less 15 minutes	
60% of Rated Power/rpm		Not less 15 minutes	
70% of Rated Power/rpm		Not less 15 minutes	
80% of Rated Power/rpm		Not less 15 minutes	
90% of Rated Power/rpm		Not less 15 minutes	
100% of Rated Power (Endurance Test)		Not less 120 minutes	
Remarks:			
Witnessed by:	MD's Representative		Shipyard's Representative

Note: (1) Delete as appropriate;

(2) If Vessel is propelled by more than 2 engines and/or 2 propellers, description of each item shall be provided.

**Part VII - Annex 6 List of Government Dockyard Contractors (Item III – Hull, Deck & Tailshaft Group II)**

	<b>Name of Contractors &amp; Address</b>	<b>Telephone No.</b>	<b>Fax No.</b>
1	Cheoy Lee Shipyards, Ltd. 89 & 91 Hing Wah Street West, Lai Chi Kok, Kowloon, Hong Kong	852 2307 6333	852 2307 5577
2	Chu Kong Group Shipyard Co. Ltd. Chu Kong Group Shipyard Building, 93 Hing Wah Street West, Lai Chi Kok, Kowloon, Hong Kong	852 2815 0333	852 2815 2188
3	Discovery Bay Enterprises Ltd., Unit 101, Discovery Bay Office Centre, No. 2, Plaza Lane, Discovery Bay, Lantau Island, Hong Kong	852 2436 4883	852 2987 5246 852 2914 0918
4	Fat Kee Marine Repairing & Engineering Co. Ltd., P.O. BOX 78638, Mongkok Post Office, Kowloon, Hong Kong	852 9224 0044 852 2743 8866	852 2768 8811 852 2435 3344
5	Hop Kee Engineering Work Ltd. SHX-1321, 45 Ap Lei Chau Praya Road, Hong Kong	852 2785 9221	852 2785 9236
6	Kwong Sang Engineering Co. Ltd. Ground Floor, 13 Hop Kwan Street, Tai Kok Tsui, Kowloon, Hong Kong	852 2785 7879 852 2785 7550 852 9037 4890	852 2786 2510
7	Leung Wan Kee Shipyard Ltd. Lot 11, Tam Kon Shan Road, Tsing Yi (N), New Territories, Hong Kong	852 2495 1103 852 9424 5112	852 2433 0119
8	The Chans' Shipyard Ltd. Lot 22-23 Tam Kon Shan Road, North Tsing Yi Island, New Territories, Hong Kong	852 2744 9113 852 2310 8272 852 9053 1211	852 2744 9283
9	The Hong Kong Shipyard Ltd. 98 Tam Kon Shan Road, Ngau Kok Wan, North Tsing Yi, New Territories, Hong Kong	852 2436 7188	852 2436 2011
10	Tung Hing Ship Builder & Engineering Works Ltd. Ground Floor, 9 Wai On Street, Tai Kok Tsui, Kowloon, Hong Kong	852 9195 8155 852 9196 0117 852 2307 2533 852 2307 1629	852 2307 2637
11	Tung Wo Engineering Co. Ltd. Room 2705, 27th Floor, New Treasure Centre, 10 Ng Fong Street, San Po Kong, Kowloon, Hong Kong	852 2328 3363 852 2391 3191	852 2328 3989
12	Wang Tak Engineering & Shipbuilding Co. Ltd. 3rd Floor, Wang Tak Building, 85 Hing Wah Street West, Lai Chi Kok, Kowloon, Hong Kong	852 2742 2726 852 2746 2888	852 2307 5500
13	Wing Yip Engineering Works Ltd. Lot 145, 64 Tam Kon Shan Road, Tsing Yi, New Territories, Hong Kong	852 2781 2626 852 9238 0502 852 9238 0505	852 2332 2511
14	Woo Cheng Mechanical Engineering Factory Ltd. Ground Floor, 195 Tai Kok Tsui Road, Kowloon, Hong Kong	852 2744 4113 852 2307 6131 852 9016 4527	852 2744 4632 852 2310 4884
15	Yiu Lian Dockyards Ltd. No. 1-7 Sai Tso Wan Road Tsing Yi Island, New Territories, Hong Kong	852 2436 7728 852 2436 7800	852 2436 0712 852 2436 0590



## **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 dwg. 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.
  - 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 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 and the electrical system.
  - 1.2.26 Main engines and generator sets arrangement and setting plans and drawings of their fuel lines and exhaust gas piping and arrangement.
  - 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 Lifesaving appliance arrangement plan and fire safety plan (if applicable).
  - 1.2.30 Distress signals, alarm systems, and internal/external communication arrangement and system plan (if applicable).
  - 1.2.31 Navigation lights, sound and signal diagrams and any other external lighting arrangement plan.
  - 1.2.32 Vessel overall lighting arrangement and light control plan.
  - 1.2.33 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 – Tender Evaluation Stage Sea Trial/Handling Assessment (“HA”)**

### **1. General**

1.1 The objectives of the HA are to:

- (a) ensure that the Tenderer has in the past designed and built high performance vessels which have performance characteristics similar to those required by the Government in this invitation to tender; and
- (b) mitigate the commercial risk associated with potential rejection of a constructed Vessel at the Delivery Acceptance stage by confirming as far as reasonably practicable during tender evaluation that the offered Vessel will achieve the required standard of mission-critical performance characteristics.

1.2 The Tenderer shall within fourteen (14) working days of being so required in writing by the Government, or within such a period as is subsequently proposed by the Tenderer and agreed by the Government (but in any case no later than forty (40) working days after being so required by the Government), the Tenderer shall arrange for a HA of the Sample Vessel to be assessed as specified in Paragraph 1.2.2 of Part VII to be conducted by the Tenderer either in Hong Kong or at a place proposed by the Tenderer and agreed by the Government. The HA shall be conducted and completed within two days. At least ten (10) working days in advance of the HA, the Tenderer shall submit for MD’s approval a HA programme proposal which includes details of the procedures under which the HA is to be conducted and the formats in which the Tenderer proposes to capture and present the data recorded by the device(s) in accordance with Paragraph 1.4 and the digital video footage recorded in accordance with Paragraphs 1.5 and 1.6 during the HA. For the avoidance of doubt, this data and video footage shall be able to be copied, moved, deleted and played using Microsoft Windows’ built-in software. Otherwise, the Tenderer shall supply appropriate computer software that is compatible with Microsoft Windows for the reviewing of this data and the video footage at no extra cost to the Government. The HA shall be observed by the Government Representative and the HKPF. At least one (1) of the HKPF’s representatives shall be aboard the Sample Vessel to be assessed to monitor and verify the conduct and results of each attempt at an assessment.

1.3 The vessel to be assessed (“Sample Vessel”) shall be:

- (a) a high performance interceptor which was designed and constructed by the Tenderer for a military or government law enforcement agent and is in service as at the date of the HA, and which has a design speed of 60 knots or more or another vessel which is the same model as such higher performance interceptor; and the design speed shall be confirmed by submitting a copy of the Speed Trial Report to the Government Representatives for review at the test site;
- (b) aluminium deep-V hulled, with fully immersed propellers providing steerable thrust and propelled by either outboard or inboard engines sufficient to enable the Sample Vessel to achieve a speed of at least fifty-two (52) knots with three (3) people on board and full fuel during the HA; and
- (c) comply with the essential requirements specified in Paragraph 1.2.2 of Part VII. Details of the Sample Vessel in complying with Paragraph 1.2.2 of Part VII shall be submitted as part of the HA Programme mentioned in Paragraph 1.2 of this Annex 8 for the approval of the GNC. Failure to submit or failure to obtain such approval will result as failing this HA.

In addition to the above-mentioned HA Programme and Speed Trial Report, at least seven days prior to the commencement of the HA, the Tenderer shall provide all other documentary evidence to prove compliance by the Sample Vessel with the above-mentioned specifications as the Government may request and to the satisfaction of the Government.

- 1.4 The Tenderer shall ensure that an objective record (which can be reviewed by the HKPF, GNC, the Tenderer or, if necessary, an independent third party such as an RO) of the time, position, speed, course, roll, pitch, yaw, trim, running angle and three-dimensional linear acceleration data generated during the HA conducted in accordance with the assessment protocols stipulated in Paragraphs 2.1 to 2.9 of this Annex is captured using a suitable device or devices which has/have been properly calibrated and, if required by the Government, with supporting calibration documents issued by the manufacturer or calibration laboratory. Without prejudice to the generality of the foregoing, the instruments used in measuring the speed for the applicable tests specified in Paragraphs 2.1 to 2.9 below shall be provided either by:
- (a) the Tenderer, provided that the instrument has been calibrated by a certified body in Hong Kong acceptable to GNC and the HKPF; or
  - (b) Global Positioning System (GPS) supplied by the Government; or
  - (c) GPS or Differential Global Positioning System (DGPS) which is properly calibrated (with supporting calibration documents) and installed on board the Sample vessel; or
  - (d) other speed measuring methods acceptable to GNC and the HKPF.
- 1.5 The Tenderer shall, throughout the HA, record date and time stamped aerial digital video footage of the Sample Vessel to be assessed specified at Paragraph 1.3 above undergoing the HA and, using digital video recording equipment affixed at appropriate locations as agreed by the HKPF on the Sample Vessel to be assessed, record digital video footage of the:
- (a) field of vision from the control console right forward over the bow to the horizon. For the avoidance of doubt, the camera shall be mounted on the longitudinal centre line at a height and distance from the bow which shall correspond with the eye position of a coxswain 1.64 metres tall seated at the helm of the Sample Vessel (“Internal Position 1”);
  - (b) position of the helm and throttle controls at all times (“Internal Position 2”); and
  - (c) view facing right astern with the field of vision as close as possible to the centre line of the Sample Vessel (“Internal Position 3”).
- 1.6 In addition to the required video footage specified in Paragraph 1.5 above, the Tenderer shall at its own cost, provide another suitable logistics vessel (which shall not be the Sample Vessel to be assessed) from which the Tenderer shall record digital video footage of the Sample Vessel to be assessed undergoing the HA (“External Position”). To ensure both that the Tenderer can record this digital video footage to the HKPF’s and the Government Representative’s satisfaction and that the HKPF and the Government Representative can adequately observe the performance of the Sample Vessel to be assessed at high speed, the logistics vessel shall be capable of having a comparable speed and be piloted at a distance and position from the Sample Vessel to be assessed appropriate to the purposes of the HA.

- 1.7 The Tenderer shall, immediately after the HA, provide to the Government Representative the following:
- (a) both an electronic and a printed record of the data recorded during the HA in a format(s) approved by MD in accordance with Paragraph 1.2 above by the device or devices stipulated at Paragraph 1.4 of this Annex which include both:
    - (i) the raw data captured in respect of each assessment protocol specified in Paragraphs 2.1 to 2.9 of this Annex; and
    - (ii) a graphical depiction of each assessment showing the position and the track of the Sample Vessel to be assessed throughout the assessment and, separately on one chart, the speed in knots and the roll and the pitch in degrees;
  - (b) a digital copy of the aerial digital video footage, fixed digital video footage and digital video footage captured from the logistics vessel as stipulated in Paragraphs 1.5 and 1.6 of this Annex stored on a digital storage medium and in a digital recording format approved by MD in accordance with Paragraph 1.2 above; and
  - (c) a certificate, signed by both the Tenderer and the Government Representative which records accurately the actual Loading Condition of the Sample Vessel during each assessment of the HA.
- 1.8 The assessment protocols listed in Paragraphs 2.1 to 2.9 below shall be conducted in sea states conforming to WMO Sea States 0 to 2 as specified at Annex 9 of Part VII, unless otherwise agreed with the Government Representative.
- 1.9 The Sample Vessel to be assessed is required to complete and pass each of the assessments set out in Paragraphs 2.1 to 2.9 below. The Tenderer shall have no more than five (5) attempts in total to complete and pass each of these assessments. Notwithstanding this, if at any time during an assessment, an HKPF or GNC representative considers that it is unsafe to continue that assessment, the assessment shall be terminated immediately and that assessment shall be deemed to have been failed.
- 1.10 A Tenderer's tender will not be considered further if:
- (a) the Tenderer fails to arrange the HA within the period stipulated in Paragraph 1.2 above; or
  - (b) before the scheduled commencement of the HA, it is determined that the Sample Vessel to be assessed fails to meet all of the specifications set out in Paragraph 1.3 above ; or
  - (c) the Tenderer fails to record the results of the HA with properly calibrated device(s) as required by Paragraph 1.4 above; or
  - (d) the Tenderer fails to capture the aerial digital video footage, the fixed digital video footage and the digital video footage captured from the logistics vessel as required by Paragraphs 1.5 and 1.6 above in the format(s) approved by MD in accordance with Paragraph 1.2 above and deliver it to the Government Representative immediately after the HA; or
  - (e) the Tenderer fails to provide a logistics vessel during the HA as required in Paragraph 1.6 above; or

- (f) the Tenderer fails to provide the Government Representative immediately after the HA with all the information and documentation stipulated in Paragraphs 1.4 and 1.7(a) above in the format(s) approved by MD in accordance with Paragraph 1.2 above; or
  - (g) the Sample Vessel to be assessed does not complete and pass all assessments as required in Paragraph 1.9 above.
- 1.11 The HA including the associated items set out in Paragraphs 1.2 to 1.7 and 2.1 to 2.9 of this Annex shall be set up and conducted by the Tenderer at the Tenderer's own cost. The Government shall not bear any associated costs or expenses except the Government Representative's travel and accommodation costs.
- 1.12 The Tenderer acknowledges that:
- (a) the Government shall, at its sole discretion, determine whether a HA is required; and
  - (b) requiring a Tenderer to conduct a HA does not imply that the Government will award a Contract.

## 2. Assessment Protocols

### 2.1 Straight Line Assessment (Light Operational Load Condition)

- 2.1.1 The following assessment shall be conducted at Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII:
- (a) Accelerate from stationary to fifty (50) knots within thirty-five (35) seconds. If the Sample Vessel to be assessed does not achieve fifty (50) knots within thirty-five (35) seconds, it shall be deemed to have failed the assessment.
  - (b) Upon reaching fifty (50) knots, the coxswain shall within four (4) seconds optimise his trim and throttle settings to achieve maximum possible speed. If the Sample Vessel on the same course and with these settings does not achieve a speed continuously of at least fifty (50) knots for a period of no less than one (1) minute, the Sample Vessel shall be deemed to have failed this assessment.
  - (c) During the assessments stated in Paragraphs 2.1.1(a) and 2.1.1(b) above, the horizontal line of vision as determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme shall not be obstructed at any one time throughout the assessments, otherwise it shall deem to have failed the assessment.

### 2.2 Straight Line Assessment (Full Operational Load Condition)

- 2.2.1 The following assessment shall be conducted at Full Operational Load Condition as specified at Paragraph 1.7.7 of Part VII:
- (a) Accelerate from stationary to fifty (50) knots within thirty-eight (38) seconds. If the Sample Vessel to be assessed does not achieve fifty (50) knots within thirty-eight (38) seconds, it shall be deemed to have failed the assessment.

- (b) The coxswain shall then accelerate to maximum achievable speed at maximum trim limit and maintain course and settings for a period of no less than one (1) minute. If the Sample Vessel does not achieve a speed continuously of at least fifty (50) knots throughout the aforesaid one (1) minute, it shall be deemed to have failed this assessment.
- (c) During the assessment stated in Paragraphs 2.2.1(a) and 2.2.1(b) above the horizontal line of vision as determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme shall not be obstructed for a consecutive period of two (2) seconds and the time between any such temporary loss of horizontal vision shall be not less than ten (10) seconds, otherwise it shall deem to have failed the assessment.

### 2.3 Speed Transition Assessment (Light Operational Load Condition)

- 2.3.1 At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall accelerate from stationary to five (5) knots and, once the Sample Vessel to be assessed reaches 5 knots, maintain course and settings for a period of no less than one (1) minute. The coxswain shall then accelerate from five (5) knots to ten (10) knots and, again, maintain course and settings for a period of no less than one (1) minute. This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached. If at each successive speed increment, the Sample Vessel is unable to hold that speed within a range of  $\pm 10\%$  for any of the aforesaid one (1) minute assessments, the Sample Vessel shall be deemed to have failed this assessment.
- 2.3.2 During the assessment stated in Paragraphs 2.3.1 above, the horizontal line of vision as determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme shall not be obstructed for a consecutive period of five (5) seconds and the time between any such temporary loss of horizontal vision shall be not less than fifteen (15) seconds, otherwise it shall deem to have failed this assessment.

### 2.4 Speed Transition Assessment (Full Operational Load Condition)

- 2.4.1 At Full Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall accelerate from stationary to five (5) knots and, once the Sample Vessel to be assessed reaches five (5) knots, maintain course and settings for a period of no less than one (1) minute. The coxswain shall then accelerate from five (5) knots to ten (10) knots and, again, maintain course and settings for a period of no less than one (1) minute. This assessment protocol shall be repeated incrementally at successive 5 knot intervals until the maximum achievable speed has been reached. If at each successive speed increment, the Sample Vessel is unable to hold that speed within a range of  $\pm 10\%$  at any of the aforesaid one (1) minute assessments, the Sample Vessel shall be deemed to have failed this assessment.
- 2.4.2 Whilst at Full Operational Load Condition, the Sample Vessel shall transition successfully from stationary to hydrodynamic planing mode within ten (10) seconds. If the Sample Vessel is unable to transition successfully from stationary to hydrodynamic planing mode within ten (10) seconds, it shall be deemed to have failed this assessment.
- 2.4.3 The performance of the Sample Vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme.

## 2.5 Directional Control Assessment

- 2.5.1 At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the Sample Vessel to be assessed to a speed of thirty-five (35) knots and navigate a course which places the prevailing wind and waves abeam. At this juncture the coxswain shall remove his hands from the controls. Without human interference in respect of helm, throttle or trim the Sample Vessel shall not deviate from its base heading by more than ten (10) degrees within a period of twenty (20) seconds. If, without human interference in respect of helm, throttle or trim, the Sample Vessel deviates from its base heading by more than ten (10) degrees within a period of twenty (20) seconds, the Sample Vessel shall be deemed to have failed this assessment. Any attempt to provide helm or control input during this twenty (20) second period shall also be deemed as a failure in this assessment.
- 2.5.2 The performance of the Sample Vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme.

## 2.6 Maximal Manoeuvring Speed Assessment

- 2.6.1 For the purposes of this assessment, the maximal manoeuvring speed shall be as determined by a quick turn test or avoidance line test conducted in accordance with the test procedures as specified in ISO 6185-4, except for the loading condition. For the load condition, the Sample Vessel to be assessed shall undertake the test(s) at the Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII. The Sample Vessel shall be required to demonstrate a maximal manoeuvring speed as determined during the aforesaid quick turn test or line avoidance test of no less than fifty (50) knots. If the Sample Vessel is unable to demonstrate a maximal manoeuvring speed of no less than fifty (50) knots, it shall be deemed to have failed this assessment.
- 2.6.2 The performance of the Sample Vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Technical Acceptance programme.

## 2.7 Slalom Assessment

- 2.7.1 This assessment shall be conducted along a straight line of five (5) buoys, each positioned four (4) boat lengths apart. For the avoidance of doubt “boat length” shall mean the length of the Sample Vessel to be assessed measured from the bow to the aft most part of the outboard engine(s) or other aft most part of any fixed structure or propeller(s), if the case of inboard engines, as appropriate. At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the vessel to be assessed to thirty-five (35) knots and manoeuvre alternately to port and starboard in a slalom in and out of the buoy line, maintaining the same speed. The Sample Vessel shall at all times remain within a maximum of one (1) boat length from the buoy line and shall not touch any of the buoys. This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached.
- 2.7.2 If at any time and at any speed during this assessment, the Sample Vessel does not remain within one (1) boat length of the buoy line or touches a buoy for the requisite speed is not reached during the relevant incremental assessment, it shall be deemed to have failed this assessment.

2.7.3 The performance of the Sample Vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme.

## 2.8 Figure of Eight Assessment

2.8.1 This assessment shall be conducted around two (2) buoys positioned three hundred fifty (350) metres apart. At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the Sample Vessel to be assessed to thirty-five (35) knots and manoeuvre in a “figure of eight” pattern three (3) times around the two buoys, maintaining a minimum speed of thirty-five (35) knots at all times. The Sample Vessel shall turn around each buoy as close as possible without touching the buoy and make the passage between the buoys by the shortest route.

2.8.2 If the Sample Vessel’s speed drops below thirty-five (35) knots at any stage or the Sample Vessel either passes a buoy at a distance greater than six (6) boat lengths, the Sample Vessel shall be deemed to have failed this assessment. For the avoidance of doubt “boat length” shall mean the length of the Sample Vessel to be assessed measured from the bow to the aft most part of the outboard engine(s) or other aft most part of any fixed structure or propeller(s), if the case of inboard engines, as appropriate.

2.8.3 The performance of the Sample Vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme.

## 2.9 180 Degree Turn Assessment

2.9.1 The ability to make 180 degree turns safely at high speed and then to resume a pursuit swiftly is a mission-critical performance characteristic essential to the HKPF’s law enforcement operations. To gauge the Sample Vessel’s ability to perform such manoeuvres safely, a 180 Degree Turn Assessment shall be carried out in the manner specified in Paragraph 2.9.2 below.

2.9.2 At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the Sample Vessel to be assessed to a speed of thirty-five (35) knots on a straight line course aiming to pass a single marker buoy as close as possible without touching it. As the Sample Vessel passes the buoy to port, the coxswain shall make a full lock turn with the buoy remaining on the port side and shall resume a reciprocal course at thirty-five (35) knots. The coxswain may adjust the throttle and trim settings as he sees fit during a turn. This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached on both the approach to the buoy and exiting from the turn. The assessments shall then be repeated for the starboard side.

2.9.3 If the Sample Vessel to be assessed fails to perform the assessment mentioned in Paragraph 2.9.2 at any speed or at any side (port side or starboard side), or the requisite speed is not reached during the relevant incremental assessment, it shall be deemed to have failed this assessment.

2.9.4 The performance of the Sample Vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved HA programme.

## **Part VII - Annex 9 – Verification of Operational Performance**

### **1. General**

- 1.1 The objectives of the Verification of Operational Performance as specified in this Annex 9 are to:
- (a) examine if the Vessel being Item 1 as referred to in Schedule 2 of Part V ( “first-built vessel”), which is built according to the Contractor’s design, is capable of exhibiting performance characteristics which are fully compatible with the HKPF’s operational role; and
  - (b) within the time permitted and on and subject to the provisions set out in Part IV – Conditions of Contract and other applicable provisions of the Contract, early identify if any dangerous or unsuitable handling characteristics are exhibited during the sea handling assessment and allow the Contractor to make addition/modification/alteration in her shipyard .
- 1.2 The Contractor shall inform the Government when the first-built vessel is ready for the Verification of Operational Performance. Such notification shall be given to the Government in writing and at least fourteen (14) working days before the proposed date of the Verification of Operational Performance. Subject to the agreement of the Government, the Contractor shall arrange for the Verification of Operational Performance of the first-built vessel to be conducted by the Contractor at the shipyard at which the first-built vessel was constructed or at a place to be agreed by the Government. The Verification of Operational Performance shall be conducted and completed within two days. At least ten (10) working days in advance of the Operation Acceptance, the Contractor shall submit, for MD’s approval, a Verification of Operational Performance proposed programme which includes details of the procedures under which the Verification of Operational Performance is to be conducted and the formats in which the Contractor proposes to capture and present the data recorded by the device(s) in accordance with Paragraph 1.4 and the digital video footage recorded in accordance with Paragraphs 1.5 and 1.6 during the Verification of Operational Performance. For the avoidance of doubt, this data and video footage shall be able to be copied, moved, deleted and played using Microsoft Windows’ built-in software. Otherwise, the Contractor shall supply appropriate computer software that is compatible with Microsoft Windows for the reviewing of this data and the video footage at no extra cost to the Government. The Verification of Operational Performance shall be observed by at least two representatives from the Government, one (1) from the GNC and one (1) from the HKPF. In addition, at least one (1) representative from the HKPF shall aboard the first-built vessel to monitor and verify the conduct and results of each attempt at an assessment.
- 1.3 The Contractor shall ensure that an objective record (which can be reviewed by the HKPF, GNC, the Contractor or, if necessary, an independent third party such as an RO) of the time, position, speed, course, roll, pitch, yaw, trim, running angle and three-dimensional linear acceleration data generated during the Verification of Operational Performance conducted in accordance with the assessment protocols stipulated in Paragraphs 2.1 to 2.9 of this Annex is captured using a suitable device or devices which has/have been properly calibrated and, if required by the Government, with supporting calibration documents issued by the manufacturer or calibration laboratory. Without prejudice to the generality of the foregoing, the instruments used in measuring the speed for the tests specified in Paragraphs 2.1 to 2.9 below shall be provided either by:

- (a) the Contractor, provided that the instrument has been calibrated by a certified body in Hong Kong acceptable to GNC and the HKPF; or
  - (b) Global Positioning System (GPS) supplied by the Government; or
  - (c) GPS or Differential Global Positioning System (DGPS) which is properly calibrated (with supporting calibration documents) and installed on board the first-built vessel, and acceptable to GNC and the HKPF; or
  - (d) other speed measuring methods acceptable to GNC and the HKPF.
- 1.4 The Contractor shall, throughout the Verification of Operational Performance, record date and time stamped aerial digital video footage of the first-built vessel undergoing the Verification of Operational Performance and, using digital video recording equipment affixed at appropriate locations as agreed by the HKPF on the first-built vessel, record digital video footage of the:
- (a) field of vision from the control console right forward over the bow to the horizon. For the avoidance of doubt, the camera shall be mounted on the longitudinal centre line at a height and distance from the bow which shall correspond with the eye position of a coxswain 1.64 metres tall seated at the helm of the first-built vessel (“Internal Position 1”);
  - (b) position of the helm and throttle controls at all times (“Internal Position 2”); and
  - (c) view facing right astern with the field of vision as close as possible to the centre line of the first-built vessel (“Internal Position 3”).
- 1.5 In addition to the video footages at three Internal Positions required in Paragraph 1.4 above, the Contractor shall at its own cost, provide a suitable logistics vessel (which shall not be the first-built vessel) from which the Contractor shall record digital video footage of the first-built vessel undergoing the Verification of Operational Performance (“External Position”). To ensure both that the Contractor can record this digital video footage to the HKPF’s and the Government Representative’s satisfaction and that the HKPF and the Government Representative can adequately observe the performance of the first-built vessel at high speed, the logistics vessel shall be capable of having a comparable speed and be piloted at a distance and position from the first-built vessel appropriate to the purposes of the Verification of Operational Performance.
- 1.6 The Contractor shall, immediately after the Verification of Operational Performance, provide to the Government Representative the following:
- (a) both an electronic and a printed record of the data recorded during the Verification of Operational Performance in a format(s) approved by MD in accordance with Paragraph 1.2 above by the device or devices stipulated at Paragraph 1.3 of this Annex which include both:
    - (i) the raw data captured in respect of each assessment protocol specified in Paragraphs 2.1 to 2.9 of this Annex; and
    - (ii) a graphical depiction of each assessment showing the position and the track of the first-built vessel throughout the assessment and, separately on one chart, the speed in knots and the roll and the pitch in degrees;

- (b) a digital copy of the aerial digital video footage, fixed digital video footage and digital video footage captured from the logistics vessel as stipulated in Paragraphs 1.4 and 1.5 of this Annex stored on a digital storage medium and in a digital recording format approved by MD in accordance with Paragraph 1.2 above; and
  - (c) a certificate, signed by both the Contractor and the Government Representative which records accurately the actual Loading Condition of the first-built vessel during each assessment of the Verification of Operational Performance.
- 1.7 The assessment protocols listed in Paragraphs 2.1 to 2.9 below shall be conducted in sea states conforming to WMO Sea States 0 to 2 as specified at Annex 10 of Part VII, unless otherwise agreed with the Government Representative.
- 1.8 Under this Verification of Operational Performance, the first-built vessel is required to complete and pass each of the assessments set out in Paragraphs 2.1 to 2.9 below as well as the tests for the Communication Equipment and ENE as specified in Chapter 7 of Part VII. The Contractor shall have no more than five (5) attempts in total to complete and pass each of the assessments set out in Paragraphs 2.1 to 2.9 below. Notwithstanding, if at any time during an assessment, an HKPF or GNC representative considers that it is unsafe to continue that assessment, the assessment shall be terminated immediately and that assessment shall be deemed to have been failed.
- 1.9 The first-built vessel shall not be considered as having passed the Verification of Operational Performance if:
  - (a) the Contractor fails to conduct the Verification of Operational Performance in accordance with this Annex; or
  - (b) the Contractor fails to record the results of the Verification of Operational Performance with properly calibrated device(s) as required by Paragraph 1.3 above; or
  - (c) the Contractor fails to capture the aerial digital video footage, the fixed digital video footage and the digital video footage captured from the logistics vessel as required by Paragraphs 1.4 and 1.5 above in the format(s) approved by MD in accordance with Paragraph 1.2 above and deliver it to the Government Representative immediately after the Verification of Operational Performance; or
  - (d) the Contractor fails to provide a logistics vessel during the Verification of Operational Performance as required in Paragraph 1.6 above; or
  - (e) the Contractor fails to provide the Government Representative immediately after the Verification of Operational Performance with all the information and documentation stipulated in Paragraphs 1.3 and 1.6(a) above in the format(s) approved by MD in accordance with Paragraph 1.2 above; or
  - (f) the first-built vessel does not complete and pass all assessments and tests as required in Paragraph 1.8 above.
- 1.10 The Verification of Operational Performance including the associated items set out in Paragraphs 1.3 to 1.8 and 2.1 to 2.9 of this Annex shall be set up and conducted by the Contractor at the Contractor's own cost. The Government shall not bear any associated costs or expenses except the Government Representative's travel and accommodation costs.

- 1.11 For the avoidance of doubt, the Verification of Operational Performance is applicable to the first-built vessel only.
- 1.12 All Equipment shall have been properly installed on the first-built Vessel prior to the commencement of the Verification of Operational Performance.

## **2. Assessment Protocols**

### **2.1 Straight Line Assessment (Light Operational Load Condition)**

- 2.1.1 The following assessment shall be conducted at Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII:
- (a) Accelerate from stationary to fifty (50) knots within thirty-five (35) seconds. If the first-built vessel does not achieve fifty (50) knots within thirty-five (35) seconds, it shall be deemed to have failed the assessment.
  - (b) Upon reaching fifty (50) knots, the coxswain shall within four (4) seconds optimise his trim and throttle settings to achieve maximum possible speed. If the Vessel on the same course and with these settings does not achieve a speed continuously of at least fifty (50) knots for a period of no less than one (1) minute, the Vessel shall be deemed to have failed this assessment.
  - (c) During the assessments stated in Paragraphs 2.1.1(a) and 2.1.1(b) above, the horizontal line of vision as determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme shall not be obstructed at any one time throughout the assessments, otherwise it shall deem to have failed the assessment.

### **2.2 Straight Line Assessment (Full Operational Load Condition)**

- 2.2.1 The following assessment shall be conducted at Full Operational Load Condition as specified at Paragraph 1.7.7 of Part VII:
- (a) Accelerate from stationary to fifty (50) knots within thirty-eight (38) seconds. If the first built vessel does not achieve fifty (50) knots within thirty-eight (38) seconds, it shall be deemed to have failed the assessment.
  - (b) The coxswain shall then accelerate to maximum achievable speed at maximum trim limit and maintain course and settings for a period of no less than one (1) minute. If the first built vessel does not achieve a speed continuously of at least fifty (50) knots throughout the aforesaid one (1) minute, it shall be deemed to have failed this assessment.
  - (c) During the assessment stated in Paragraphs 2.2.1(a) and 2.2.1(b) above the horizontal line of vision as determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme shall not be obstructed for a consecutive period of two (2) seconds and the time between any such temporary loss of horizontal vision shall be not less than ten (10) seconds, otherwise the first-built vessel shall be deemed to have failed the assessment.

### 2.3 Speed Transition Assessment (Light Operational Load Condition)

- 2.3.1 At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall accelerate from stationary to five (5) knots and, once the first-built vessel reaches five (5) knots, maintain course and settings for a period of no less than one (1) minute. The coxswain shall then accelerate from five (5) knots to ten (10) knots and, again, maintain course and settings for a period of no less than one (1) minute. This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached. If at each successive speed increment, the first-built vessel is unable to hold that speed within a range of  $\pm 10\%$  at any of the aforesaid one (1) minute assessments, the first-built vessel shall be deemed to have failed this assessment.
- 2.3.2 During the assessment stated in Paragraphs 2.3.1 above, the horizontal line of vision as determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme shall not be obstructed for a consecutive period of five (5) seconds and the time between any such temporary loss of horizontal vision shall be not less than fifteen (15) seconds, otherwise it shall deem to have failed this assessment.

### 2.4 Speed Transition Assessment (Full Operational Load Condition)

- 2.4.1 At Full Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall accelerate from stationary to five (5) knots and, once the first-built vessel reaches 5 knots, maintain course and settings for a period of no less than one (1) minute. The coxswain shall then accelerate from five (5) knots to ten (10) knots and, again, maintain course and settings for a period of no less than one (1) minute. This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached. If at each successive speed increment, the first-built vessel is unable to hold that speed within a range of  $\pm 10\%$  at any of the aforesaid one (1) minute assessments, the first-built vessel shall be deemed to have failed this assessment.
- 2.4.2 Whilst at Full Operational Load Condition, the first-built vessel shall transition successfully from stationary to hydrodynamic planing mode within ten (10) seconds. If the first-built vessel is unable to transition successfully from stationary to hydrodynamic planing mode within ten (10) seconds, it shall be deemed to have failed this assessment.
- 2.4.3 The performance of the first-built vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme.

### 2.5 Directional Control Assessment

- 2.5.1 At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the first-built vessel to a speed of thirty-five (35) knots and navigate a course which places the prevailing wind and waves abeam. At this juncture the coxswain shall remove his hands from the controls. Without human interference in respect of helm, throttle or trim the first-built vessel shall not deviate from its base heading by more than ten (10) degrees for a period of twenty (20) seconds. If, without human interference in respect of helm, throttle or trim, the first-built vessel deviates from its base heading by more than ten (10) degrees within a period of twenty (20) seconds, the first-built vessel shall be deemed

to have failed this assessment. Any attempt to provide helm or control input during this twenty (20) second period shall also be deemed as a failure in this assessment.

2.5.2 The performance of the first-built vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme.

## 2.6 Maximal Manoeuvring Speed Assessment

2.6.1 For the purposes of this assessment, the maximal manoeuvring speed shall be as determined by a quick turn test or avoidance line test conducted in accordance with the test procedures as specified in ISO 6185-4, except for the loading condition. For the loading condition, the first-built vessel shall undertake the test(s) at the Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII. The first-built vessel shall be required to demonstrate a maximal manoeuvring speed as determined during the aforesaid quick turn test or avoidance line test of no less than fifty (50) knots. If the first-built vessel is unable to demonstrate a maximal manoeuvring speed of no less than fifty (50) knots, it shall be deemed to have failed this assessment.

2.6.2 The performance of the first-built vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme.

## 2.7 Slalom Assessment

2.7.1 This assessment shall be conducted along a straight line of five (5) buoys, each positioned four (4) boat lengths apart. For the avoidance of doubt “boat length” shall mean the length of the first-built vessel measured from the bow to the aft most part of the outboard engine(s) or other aft most part of any fixed structure or propeller(s), if the case of inboard engines, as appropriate. At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the first-built vessel to thirty-five (35) knots and manoeuvre alternately to port and starboard in a slalom in and out of the buoy line, maintaining the same speed. The first-built vessel shall at all times remain within a maximum of one (1) boat length from the buoy line and shall not touch any of the buoys. This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached.

2.7.2 If at any time and at any speed during this assessment, the first-built vessel does not remain within one (1) boat length of the buoy line or touches a buoy or the requisite speed is not reached during the relevant incremental assessment, it shall be deemed to have failed this assessment.

2.7.3 The performance of the first-built vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme.

## 2.8 Figure of Eight Assessment

- 2.8.1 This assessment shall be conducted around two (2) buoys positioned three hundred fifty (350) metres apart. At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the first-built vessel to thirty-five (35) knots and manoeuvre in a “figure of eight” pattern three (3) times around the two buoys, maintaining a minimum speed of thirty-five (35) knots at all times. The first-built vessel shall turn around each buoy as close as possible without touching the buoy and make the passage between the buoys by the shortest route.
- 2.8.2 If the first-built vessel’s speed drops below thirty-five (35) knots at any stage or the first-built vessel either passes a buoy at a distance greater than six (6) boat lengths, the first-built vessel shall be deemed to have failed this assessment. For the avoidance of doubt “boat length” shall mean the length of the first-built vessel measured from the bow to the aft most part of the outboard engine(s) or other aft most part of any fixed structure or propeller(s), if the case of inboard engines, as appropriate.
- 2.8.3 The performance of the first-built vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme.

## 2.9 180 Degree Turn Assessment

- 2.9.1 The ability to make 180 degree turns safely at high speed and then to resume a pursuit swiftly is a mission-critical performance characteristic essential to the HKPF’s law enforcement operations. To gauge the Vessel’s ability to perform such manoeuvres safely, a 180 Degree Turn Assessment shall be carried out in the manner specified in Paragraph 2.9.2 below.
- 2.9.2 At Light Operational Load Condition as specified at Paragraph 1.7.7 of Part VII, the coxswain shall bring the first-built vessel to a speed of thirty-five (35) knots on a straight line course aiming to pass a single marker buoy as close as possible without touching it. As the first-built vessel passes the buoy to port, the coxswain shall make a full lock turn with the buoy remaining on the port side and shall resume a reciprocal course at thirty-five (35) knots. The coxswain may adjust the throttle and trim settings as he sees fit during a turn. This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached on both the approach to the buoy and exiting from the turn. The assessments shall then be repeated for the starboard side.
- 2.9.3 If the first-built vessel fails to perform the assessment mentioned in Paragraph 2.9.2 at any speed or at any side (port side or starboard side) or the requisite speed is not reached during the relevant incremental assessment, it shall be deemed to have failed this assessment.
- 2.9.4 The performance of the first-built vessel during this assessment shall be determined from the footage of the digital video recording at Internal Position 1, Internal Position 2, Internal Position 3, External Position and those included in the approved Verification of Operational Performance programme.

**Part VII – Annex 10 World Meteorological Organization (WMO) - State of the Sea**

**State of the Sea**

<b>Sea State</b>	<b>Descriptive Terms</b>	<b>Wave Height (in metres)</b>
<b>0</b>	<b>Calm (glassy)</b>	<b>0</b>
<b>1</b>	<b>Calm (rippled)</b>	<b>0 – 0.1</b>
<b>2</b>	<b>Smooth (wavelets)</b>	<b>0.1 – 0.5</b>
<b>3</b>	<b>Slight</b>	<b>0.5 – 1.25</b>
<b>4</b>	<b>Moderate</b>	<b>1.25 – 2.5</b>
<b>5</b>	<b>Rough</b>	<b>2.5 – 4</b>
<b>6</b>	<b>Very Rough</b>	<b>4 – 6</b>
<b>7</b>	<b>High</b>	<b>6 – 9</b>
<b>8</b>	<b>Very High</b>	<b>9 – 14</b>
<b>9</b>	<b>Phenomenal</b>	<b>Over 14</b>

Notes:

- (1) Refer to the WMO Technical Regulations (Manual on Codes (Publication No.306), Volume I.1, State of the Sea (Code table 3700).
- (2) The exact bounding height shall be assigned for the lower code figure; e.g. wave height of four (4) metres is coded as Sea State 5.