SPECIFICATION: CCGA SAR VESSEL

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Contractor Practices and Standards

1.0 Contractors Proposal: Generally, Bidding will be by Invitation

1.1 This Practices and Standards Information, provides general information on the vessel, and on a wide range of construction practices, standards, vessel shipping and packageing, etc. The Vessel Specifics cover the next layer of vessel description and physical construction and arrangement. Then the Vessel Outfit details cover the vessel equipment such as electronics, specified electrical and engine options which might change by product development.

The Bidders shall submit a proposal to demonstrate that the vessel and its equipment meet all the requirements of this Specification, and shall also provide documentary evidence of capability in the construction of this size and type of vessel. This document will be used as a basis for production and product inspection by the Contracting Agency.

1.2 Proposals will be evaluated on cost and on the degree to which the boat being proposed meets the technical and operational requirements of the specification. The proposal shall address all elements of the specification including sufficient information so that it may be fairly evaluated in relation to the stated requirements. The proposal should as a minimum include the following:

1.2.1 Detailed scale drawings for evaluation, including dimensions and layout of work area.
1.2.2 Hardware and equipment specifications.
1.2.3 Lines plan or similar indication of hull form.
1.2.4 Construction specification and scantlings.
1.2.5 Outfit specifications.
1.2.6 Machinery specifications.
1.2.7 Electrical specification.
1.2.8 Weight control procedures.
1.2.9 Corporate quality assurance.

2.0 Role and Functions:

2.1 Use of Search and Rescue (SAR) craft:

The Canadian Coast Guard Auxiliary - Pacific contracts, manages and operates numerous SAR craft in support of its programs and missions, including Search and Rescue, emergency vessel assist.

2.2 Mission Statement

The Missions of the craft include Search, and Emergency Response duties, including.

- perform searches by visual and electronic means;
- recover able-bodied or incapacitated people from other vessels and from the water;
- tow equipment and other vessels in emergency situations;
- conduct helicopter hoisting operations;
- provide a platform for performing first-aid;

3.0 Design & Construction Practices:

3.1 Ergonomic Design – General

- Hazardous operating conditions shall be prevented by arranging machinery and equipment in a safe manner; providing guards for all electrical, mechanical and thermal hazards to personnel; and providing guards or covers for any controls that might accidentally be activated by contact of personnel.

- Human engineering factors considered in design shall include accessibility, visibility, readability, crew efficiency and comfort for a range of physiques for individuals from approx. 5 ft. to 6' 4" in height, wearing cold weather clothing and equipment which shall be accessible for use, inspection, cleaning and maintenance per ASTM F1166-88.

3.2 Vibration

- The boat and all components shall be free of local vibration that could endanger boat personnel, damage boat structure, machinery or systems, or interfere with the operation or maintenance of boat machinery or systems.

- No component shall rattle. Mounts for movable components, including items moved for stowage, towing or transport shall be provided with resilient material as necessary to prevent rattling.

- Loosening of fasteners under vibration shall be prevented by the use of self locking fasteners, as applicable.

3.3 Equipment Protection

The Contractor is responsible for the care of all equipment. All parts, especially those having working surfaces or passages intended for lubricating oil, shall be kept clean and protected during manufacture, storage, assembly and after installation. Equipment shall at all times be protected against dust, moisture or foreign matter and shall not be subject to rapid temperature changes or extremes in temperature.

3.4 Site Hygiene

During construction, all chips, shavings, refuse, dirt and water shall be removed at the completion of the work shift or sooner. The Contractor shall ensure measures are taken to avoid wear and damage incident to construction, and to prevent corrosion or other deterioration. Equipment subject to freezing shall be kept drained, except during test and trials. Equipment shall be kept clean and protected from the environment prior to installation.

3.5 Facilities (applicable for FRP components only)

The Contractor shall have a shop capable of maintaining temperature and humidity. It should be capable of maintaining temperature between 16^{o}C and 25^{o}C. It should be capable of maintaining relative humidity below 70 percent.

4.0 Warranty and Service Support:

4.1 Components and Equipment Support

All components and all mechanical, auxiliary, electronic and electrical equipment installed on the boat, shall be supportable by parts and service in Canada within 30 days. All components and equipment shall be current production models.

4.2 Spare Parts

To facilitate replacement and inter-changeability of parts, as well as maintenance procedures and operator training wherever practicable: The Contractor shall standardize on selection of equipment, fittings and fabrication methods within all boats supplied.

4.3 Parts and Service Depot(s)

Contractor's parts depots shall be capable of efficiently supplying all spare parts and warranty service for all components of every vessel provided. It is recognized that many equipment items will have their own manufacturer's warranty cards for operater registration. Contractors shall have a factory authorized service representative capable of responding in all regions of the counttry within **24** hours of receiving a service call.

5.0 Documentation:

5.1 Technical Publications General

The Contractor shall provide three (3) complete sets of technical publications that provide a physical and functional description of the craft, its machinery and equipment, as well as pre delivery inspection / testing and sea-trial performance documentation. The technical publications shall include: a Construction and Operation Information section, Technical Manuals, and a Parts and Maintenance List.

5.2 Construction and operation section: This section shall include a description of the arrangement and function of all structures, systems, fittings and accessories that comprise the boat, with illustrations as appropriate, including vessel particulars and serial number, engine, equipment, and electronics serial numbers :

- Operating procedures;

- Basic operating characteristics (such as temperatures, pressures, flow rates, etc.)

- Installation criteria and drawings, assembly and disassembly instructions with comprehensive illustrations showing each step (including instructions necessary for onboard repair of the collar);

- Recommended planned maintenance;

- Complete troubleshooting procedures.

5.3 Technical Manuals: To be available: The technical manuals shall consist of a complete set of detailed operators manuals, drawings, parts lists and supplemental data for all components of the boat (whether acquired from supplier sources (as available) or custom-manufactured), including:

- The list shall include the name, part number and serial number if applicable of the parts, items or components and shall indicate the supplier (name, address, phone number, email address) of this part, equipment or component and in which part of the specification the item appears. A Maintenance Data Sheet format will be developed by the contractor.

- Hull; including hull data, serial or manufacturers numbers, and equipment warranty cards.

- Collar; including tube materails and glue materials, and proceedures.

- Propulsion Engine(s) and equipment: including engine and propulsion serial numbers

- Systems (steering, fuel, electrical, etc.); including equipment model, fuel consumption/range and serial numbers.

- Electronics, (as applicable): including model and serial numbers.

- Stability information: as required per TP 1332, using ISO or TP7301.

5.4 Initial Spare Parts & Maintenance List

- The Technical Manuals shall also include a list of recommended initial onboard spare parts to be stocked for the craft, for periodic maintenance. This list shall include the following items (as applicable):

- Propulsion: Propeller, injectors, filters, water pump impeller, starting battery, belts, throttle and shift cables, any special engine tools.

- Collar: spare collar, air valve, foot pump, pressure gauge, patch kit;

- Electrical: fuses, light bulbs;

- Boat Structures and Fittings: Miscellaneous commonly used fasteners.

6.0 Quality Assurance

The basic reference to ISO 9000x compliance is as per the contract document.

7.0 Test & Trials:

7.1 The Contractor shall inspect and test the following items, as a minimum, for adherence to the contract requirements and proper operation (proper operation means that the equipment can be started, operated, connected together and demonstrated to function in a normal fashion, as applicable). All discrepancies shall be corrected prior to delivery. The required inspections and tests are minimums and are not intended to supplant any controls, examinations, inspections or tests normally employed by the Contractor to assure the quality of the boat:

7.1.1 Weight
7.1.2 Construction Quality
7.1.3 Lifting Gear, if required
7.1.4 Propulsion Engines
7.1.5 Starting System
7.1.6 Propulsion Controls
7.1.7 Fuel System
7.1.8 Steering System
7.1.9 Electrical System
7.1.10 Electronics

7.2 Sea Trials - General

7.2.1 Sea trials shall be conducted by the Contractor to demonstrate the boat and its equipment conform with the requirements as stated in the Contract and the Performance Requirements. Production Sea Trials must be repeated until all systems have been satisfactorily trialed and been accepted by the Contracting Authority or their Agent. All expenses incident to the trials shall be borne by the Contractor, including fuel unless otherwise specified. A crew provided by the Contractor shall operate the vessel during sea trials. Residual fuel, if not drained for shipping, will be delivered in its tank with the boat.

7.2.2 All Sea Trial equipment shall be furnished and operated by the Contractor. Trial instrumentation, where applicable, shall not replace the boat's instruments (e.g., engine tachometer, pressure gauges, thermometers). The Contractor shall furnish all necessary hardware and fittings and shall install the measuring devices. After satisfactory completion of the trials, all instrumentation shall be removed and all systems restored. The Contractor shall provide calibration data certifying the accuracy of the instrumentation for the tests.

7.2.3 The Contractor shall submit a Test & Trials Plan, including a description of all of the acceptance trials to be performed. The Contractor will be responsible to log the required hours for the first engine service interval, preferably prior to sea trials, (the break-in period). As a minimum, the following trials shall be conducted:

7.2.4 Speed Trials - The speed trials shall be done over a course at least one nautical mile in length. Two runs shall be made over the course, one in each direction with the speeds for the two runs averaged. The use of GPS data (averaged) is acceptable.

7.2.5 Endurance Trial -The vessel shall operate in the Normal Loaded Condition, at maximum speed for no more than the maximum time allowed for pre or post break-in period. During the endurance trials, it shall be demonstrated that all parts of the propulsion system are in full operation. All systems shall be operated to check for proper installation. Fuel consumption calculation can use manufacturers' data.

7.2.6 Astern Propulsion - The vessel shall be operated and manoeuvred using astern propulsion to establish the astern performance. During the backing performance tests the throttles shall be set to provide 1/3 of the rated engine horsepower

7.2.7 Steering Gear - Tests shall be conducted on the steering gear to demonstrate the adequacy of the steering system under all operations. Manoeuvring tests shall be performed to ensure that the boat meets the stated requirements. Manoeuvring trials shall be conducted in the Normal Load Condition.

7.2.8 Lifting Gear Load Test, (if any): Vessel and certified bridle may be tested at 150% of Normal Load condition, as specified in the Vessel Specifics; to lift and hold without deformation of the lift points or associated hull. Lift points to be recessed flush with deck, and certified for load.

7.2.9 The Contracting Agency shall be notified no less than 24 hours prior to sea trials. Their Inspection Agent will witness and attend the sea trials. Sea trial results will be submitted to the Contracting Agency prior to departure of the vessel.

7.2.10 At the conclusion of sea trials each boat shall be thoroughly cleaned and inspected. Outboard engine cooling systems shall be flushed through with fresh water. The Contractor shall repair any damage to the vessel or ancillary equipment resulting from sea trials, to the satisfaction of the Inspection Agent.

7.2.11 For the purpose of the trials, Normal Loaded Condition shall be considered to be the basic boat, fitted with all normal equipment, full fuel, with complement and loads per Vessel Specifics, section 10.

7.3 Acceptance for delivery

The boat must be ready for delivery in all respects, except for final preparation for shipment. The Contractor shall provide personnel, as required, to resolve questions and to demonstrate equipment operation maintenance accessibility, removal and installation. A copy of the trial results, and Stability Testing Report shall be shipped with the deliverables for each boat.

7.4 Stability: Stability examination per TP1332 (ref: ISO standard 6185-3, or 6185-1 will require the Contractor to record all stability calculation, capsize testing and trial results and provide three (3) copies to the CCGA inspector. (TP 7301 Stab 6 may be used if applicable.)

7.5 Final Acceptance

Upon delivery, an Agent of the Contracting Agency, will conduct the final acceptance inspection. The Contractor shall repair any damage to the boat or ancillary equipment resulting from shipping, to the satisfaction of the Agency.

7.6 Trial Records: The Contractor shall maintain records of testing for each boat for a minimum of two years. The Contractor shall prepare a testing check sheet that certifies that each test has been completed. The check sheet shall indicate the actual weight of the boat in Light Condition. The check sheet shall also indicate the total loaded weight and the date for the 150% load lifting gear test, if required.

7.7 Deliverables with the completed vessel;

- A detailed operator manual shall be provided for all equipment, fittings and systems.
- Testing, Sea Trial, and Stability Report results.
- Acceptance Certificates, and compliance sheets or certificates distributed with equipment ie. life saving appliances, lifting appliances, engine test reports, calibration certificates, Nav light certificates, Fire suppression material certificates, and flotation foam rating sheets. The initial inspection of the vessels after delivery, by TCMS, will establish TP 1332 compliance.
- Pre-trial shop Testing Check Sheet.

8.0 Fabrication:

8.1 General: Unless stated otherwise, all components, equipment and material shall be Contractor supplied.

8.2 Structural Integrity; hull scantlings to adhere to requirements of recognized Regulatory Agency, for example ABS 'High Speed Craft' Rules, DNV, or Lloyds Rules.

8.3 Materials - General

8.3.1 Environmental Exposure

All materials shall be corrosion resistant and suitable for use in a salt water environment as detailed in the Environmental Conditions portion of the Performance Requirements. All materials normally subjected to sunlight shall resist degradation caused by ultraviolet radiation.

8.3.2 Dissimilar Metals

Direct contact of electrolytically dissimilar metals is not allowed. Electrolytic corrosion shall be prevented by insulating galvanically dissimilar materials from each other with gaskets, washers, sleeves, or bushings of suitable insulating material.

8.3.3 Aluminium

Aluminium alloy types 5086, H 116 / H32, shall be used for plate; aluminium alloy 6061-T6 (anodized grade), suitable for type 5356 filler alloy, shall be used for extruded shapes and welded tubing and pipe. Non-structural items of trim and outfit such as hatch frames, castings, consoles, and hardware items may be of other suitable aluminium alloys such as dual rated 5083 / 86, 5052, or 6063 T54.

8.3.4 Stainless Steel

Stainless steel type 316L or 316 shall be used for all stainless steel applications except as noted. Alloy 316L shall be used in any welded underwater components.

8.3.5 FRP and Resins: for FRP components, if any:

- Minimum laminating material specification shall include fire retardant gelcoats (ISO) and skin-out with vinlyester resins with a barrier coat wash of the skin-out prior to main laminate and coring materials. Vinylester laminating resins are recommended.

- Fibre materials to be standard mat / rovings, or `stitch' combined materials, some of which may use Carbon or Kevlar strands. NO 'chopper' materials to be used.

- Coring materials may be vacuum bagged and to be designed for usage in these specified vessels. Suitable core materials such as 'Termanto', 'Klege-cell', and 'Core-cell' are acceptable and **balsa, plywood**, **and non-structural foam materials** will **not be used**.

8.3.6 Fasteners

8.3.7 All fasteners shall be of type 316 stainless steel.

8.3.8 Cadmium plated parts and fasteners, including washers, shall not be used.

8.3.9 Direct attachment of alloys containing copper to aluminium is not permitted except for an electrical bonding strap.

8.3.10 No fasteners shall be directly threaded into aluminium alloys, except with adequate bolt or insert sizes, minimum ¼" diameter, tapped into a suitable thickness, (1/4") and alloy type such as 6061, with the use of "loctite" type material. Aluminium or Stainless steel washers, inserts, or backing plates must be used with FRP, as appropriate.

8.3.11 Where nuts will become inaccessible after assembly of the vessel, nuts shall be captured to allow reassembly and prevent backing off. Unless otherwise specified, self-locking nuts shall be installed to prevent loosening of fasteners due to shock and vibration.

8.3.12 Fasteners in deck traffic areas shall be flush-mounted to eliminate tripping and snagging hazards.

8.4 Construction Procedures

8.4.1 Hulls shall be fabricated as per the requirements quoted in Construction Standards of the Vessel Specifics.

8.5 Main Hull and Appendages

8.5.1 Hull Form: Hull shape shall not impede water flow to the propulsion units and must direct spray and waves away from onboard personnel.

8.5.2 Watertight and Tank Bulkheads: The hull design shall be such that a sufficient number of watertight compartments, including hull compartments and fire retardant flotation foam or flotation devices will allow for adequate stability and positive buoyancy in a flooded condition. See references to vessel certification, re: ISO or TP7301 testing.

8.5.3 Self-Righting System, if required: Shall be built and installed per the the requirements in the Outfitting Detail section.

8.5.4 Stowage: Weather tight stowage for small items of equipment Including mission-related equipment as well as that defined in the Canada Shipping Act, Small Vessel Regulations, shall be provided in void spaces beneath seats, under bench seats console(s). All Stowage compartments shall be secured by positive means and operable by gloved or insensitive hands. Specified compartments could require locking fasteners.

8.5.5 Painting and Preservation

8.5.6 Fibreglass components shall have a coloured fire retardant gel-coat finish on all exterior surfaces. Gelcoat to be applied at 20-22 mil thickness. Finish colour(s) as per Vessel Particulars.

8.5.7 Aluminium components shall have a painted finish on all specified exterior and interior surfaces, comprised of suitable etch, primers, and topcoats per the Vessel Particulars. Typical single coat paint systems can be applied in the 4 to 5 mil thickness range.

8.5.8 Prior to delivery the Contractor shall ensure that all non-painted exposed aluminium is free of cosmetic blemishes, including all construction marks, scratches, gouges and stains.

8.6 Propulsion Systems

8.6.1 Inboard or Outboard motor installation: - Unless otherwise specified, motor packages shall be Government Standing Offer Pkgs through the CCGA-P , and Contractor installed, per Outfitting Detail.

8.6.2 Run-in operation: The Specified Engine(s) shall be installed and operated in accordance with the engine manufacturer's recommendations. The use of engine manufacturer's approved accessories and equipment is required. Equipment and components shall not be used, nor trials performed on the engines that would, in any way, void the engine manufacturer's warranties.

8.6.3 Warranty: All components of the propulsion system shall be warranted by the original equipment manufacturer for a minimum of two years.

8.6.4 Propellers: Contractor shall inform the Contracting Agency of the pitch and diameter determined by the Contractor for the Performance Requirements. Propellors to be Contractor supplied.

8.7 Steering Systems

- Steering system shall be remote hydraulic with self contained oil reservoir, located in the helm pump and with replaceable seals on the rams.

- Hydraulic hoses shall be of sufficient size and length to prevent pulsing. Hoses must be suitable for use in an exposed marine environment complete with stainless steel fittings.

8.8 Electrical System:

The electrical system design, component selection and installation shall be in accordance with Canadian Standards Association C22.2 NO. 183.2-M1983 (R1999) "Standards for D.C. Electrical Installations on Boats", or ABYC 'E' as referenced by TP1332. All electrical equipment and hardware shall be installed in accordance with the manufacturer's specifications. All fitted electrical equipment shall be capable of operating simultaneously with any other fitted electronics equipment without causing interference to any electronic equipment or to the magnetic compass.

8.8.1 Twelve (12) volt DC distribution system shall be provided to power the engine starting and boat service loads including:

- Navigation, interior, and exterior lighting
- Electrical equipment
- Instrumentation
- Bilge Pumps

8.8.2 Batteries & Switches

- Battery switchs will be 4 postion switches and have a 600 amps rating and shall be recessed mounted to prevent snagging or accidental switching.
- Battery compartment must be watertight and fitted with a suitable means of gas venting.

8.8.3 Power Distribution: Cables for all electrical distribution shall be ample in size for the particular service, and of marine grade tinned boat cable.

8.8.4 Cabling Installation: Cables shall be grouped into wiring harnesses wherever possible. All wiring harnesses shall be routed below deck. All below deck cabling shall be through conduit pipe.

8.8.5 Cabling / conductors passing through watertight boundaries, decks, bulkheads or other exposed surfaces shall be installed to maintain watertight integrity of the structure. Cable entry into watertight enclosures shall be through watertight marine glands of suitable size. All electrical equipment shall be readily accessible for performing maintenance.

8.8.6 Cables and conductors shall be supported with clamps or straps at least every 18 inches on horizontal runs and every 14 inches on vertical runs.

8.8.7 Cabling / conductors passing through structures without watertight glands, shall be protected against chafing by the use of abrasive resistant grommets.

8.8.8 Routing cables through foamed spaces shall be avoided wherever possible. Cables that must be routed through foamed spaces shall be run in PVC conduit pipe. The pipe shall be arranged in a manner that prevents water from becoming entrapped in the pipe.

8.8.9 **120 VAC Shore Power system**: vessels shall be fitted with a 120 VAC shore power system for charging the batteries and operating the jacket water heater.

8.9 Navigation Equipment: (COLREGS) *http://www.tc.gc.ca/Actsregs/csa-lmmc/csa14.html*

8.9.1 Navigation lighting fixtures shall be of such a design as to resist the effects of vibration and moisture and shall be provided with adequate protection from damage.
- The navigation lights shall be mounted so as not to interfere with vision of the operator.
- The navigation lights shall be permanently mounted.
- Particular COLREGS rules to note (vessels under 12 M.); Rules 22, 23, and Annex 1, rules 2, 9, and 10. (note though that the lights should be installed parallel to the "Normal Load" waterline which often may not be parallel to the deck.)

8.9.4 The Contractor shall supply and install an electric horn that meets the requirements of the Collision Regulations, Rule 32 is met with a standard small vessel ‘horn’ audible 0.5 NM.

8.9.5 A Magnetic Compass shall be mounted on the centreline of the helm station, in easy view of the operator when facing forward. Deviation card development is an Owner responsibility.

8.10 Control and Monitoring Systems

8.10.1 Gauges - Dimensions and Ergonomics: Unless otherwise specified, gauges shall be analogue-style, or digital as determined by the TA, approximately 2" diameter. Tachometer gauges shall be approximately 3" diameter. Gauges shall be installed so they are readily visible by the operator while operating the boat.

8.10.2 Gauges – Illumination

All gauges shall be backlit with an adjustable dimmer. Lighting for gauges and lighting for compass must use separate dimmers and cause minimum reflection within the cockpit.

8.10.3 Control Requirements

Propulsion control system installation shall include single-lever engine controls located at the operator's position on the starboard side of the control station with a built in wrist or forearm rest. Controls shall conform with engine manufacturer's recommendations for commercial use.

8.10.4 The Operator's position shall be fitted with a lanyard style emergency shut down switch which is attached to the operator and will shut down the engine if the lanyard is pulled from the switch.

8.10.5 Alarm indicators, or a single panel with multiple inputs, is required to annunciate the various alarms and operating functions of the vessel, indicators to be clearly visible by the operator.

- Bilge operation for each compartment so equipped
- High water alarm for the engine installation space, which could be the 'pod' for outboards.
- Engine space heat rise for inboard installation.
- Allowance for at least one additional input.

8.11 Piping Systems

8.11.1 Flexible Connections

Where flexible connections are required for steering and fuel systems, suitable hose with permanently crimped, detachable reusable type fittings shall be used

8.11.2 Fittings and clamps shall be stainless steel. Bolts used in all fittings shall be Type 316 stainless steel unless used in underwater bronze fittings where silicon bronze will be used.

8.11.3 Bilge pump discharges are to have check valves at the through-hull, to prevent back flow into the hull. Smooth bore hoses and double clamping to be used in bilge discharges.

8.11.4 Through-hull fittings made from UL approved Marelon for through hulls located above the water line for (example) bilge discharges, is allowed.

<u>9.0 Packaging, Shipping and Trailer:</u> Shipping other than Towing on Trailer

9.1 A trailer, IF required for each boat: is to be rated at least 20% over the anticipated 'wet' weight of the boat, and to be compliant with the DOT regulations in the area of service of the boat.

- welded galvanized construction,
- tandem axle, with axle bearing protection;
- brake, turn signal, and backing lighting,
- electric / hydraulic, jurisdiction compliant braking system;

- bow winch assembly with winch strap; and tongue jack, safety chains, wheel and spare tire and carrier

Trailer to have double bunks, brake flush kit,.

9.2 Prior to shipping, the boat shall be cleaned throughout, preserved and covered, secured on the boat trailer if any, or chocked as required, in accordance with this section.

9.3 Bilges shall be dry and free of oil and debris and the fuel tanks shall be drained.

9.4 The propulsion system shall be preserved in accordance with the manufacturer's recommendations for storage of up to one year in an environment that will be subjected to freezing temperatures.

9.5 The battery shall be disconnected.

9.6 A durable warning tag, wire tied to the steering wheel, shall indicate required re-commisioning.

9.7 Contractor shall fit each trailer to the individual boats. Contractor shall record each boat by their serial number and the serial number the of the trailer the boat is being fitted to. The Contractor shall record this information and supply CCGA inspector with three (3) copies.

9.8 A shrink-wrap cover shall be provided, to protect the boat during shipping and storage.

9.9 Towed Delivery on the boats' trailer: - in local short haul trips in non-freezing weather, only the cleaning and covering provisions may be required, with the approval of the Inspector.

SPECIFICATION : VESSEL PARTICULARS

10.0 Vessel Particulars Inboard Diesel or Twin Outboards open RIB with Pilot Cabin and Forward Cuddy.

10.1 Length overall between 8.2 and 8.4 meters.
10.2 Breadth overall between 3.2 and 3.3 meters.
10.3 Minimum interior breadth between tubes 2 to 2.2 meters.
10.4 Maximum draft (outboard motor or outdrive lowered) between 0.80 and 0.90 meters.
10.5 Maximum draft (outboard motor or outdrive raised) between 0.48 and 0.50 meters.
10.6 Maximum freeboard (from top of collar AFT, in normal load condition) 0.76 meters
10.7 Maximum height of collar above deck 0.66 meters
10.8 Displacement (Normal Load Condition) between 3724kg and 3850kg.
10.9 NORMAL LOAD conditions:

- crew of 3 = 300 kg
- Fuel = 727 liters in two tanks , (530 kg)
- Equipment & supplies = 400 kg

11.0 Operational Performance

11.1 Unless otherwise stated, performance shall be for conditions of zero sea state and no wind, in salt water with NORMAL load and complement. The craft shall be designed and constructed for ease of maintenance and repair, long life, and to be easily supportable by local commercial facilities and suppliers. The craft is expected to have a service life of at least 7 years, with an expected usage of between 300 and 500 hours per year.

11.2 Maximum speed: 36 knots - 38 knots.

11.3 Minimum speed: 20 knots in (Beaufort) sea state 6 with 25 knot wind.

11.4 Endurance: 25 knots for 6 hours.

11.5 Range: 100 nautical miles with 10% reserve at 25 knot minimum speed.

11.6 Steering: Beaufort Force 7: 30 to 33 knot winds with 4 to 5.5 M. wave height.

- Capable of steering 15^{o} from heading, Beaufort force 7, with seas from any direction.

- Steer and maneuver effectively at 3 knots in Beaufort force 7.
- Maintain course, made good over ground, when proceeding at 3 knots with relative cross wind of 35 knots.

- Capable of turning in its own length in Beaufort force 7.

- Capable of steering effectively in Beaufort force 7 with winds of 30 knots while holding a 15 tonne (displacement) vessel in position.

11.7 Beaching:

- Capable of beaching on soft (sand, earth or clay) surfaces at a speed of up to 5 knots without damage to the hull.
- Capable of beaching on hard (stone or concrete) surfaces at speeds of up to 3 knots without damage to the hull.

11.8 Depth under Keel**:**

- Operate fully in depths of 1.0 meter with outboard motor or outdrive lowered.
- Basic maneuvering in depths of 0.80 meters with outboard motor or outdrive in the partially raised position.

12.0 Environmental Conditions: Capable of operating in day or night in the following conditions;

12.1 Average ambient air temperature range: $-15^{o}C$ to $+ 30^{o}C$

12.2 Average water temperature: $0^{o}C$ to $+30^{o}C$.

12.3 Wave heights to 5.5 meters (Beaufort force 7).

12.4 Wind speeds of 30 plus knots.

12.5 Operate in freezing spray or freezing rain with accumulations of up to 6.0 mm while maintaining stability to allow for safe transit in Beaufort force 7

12.6 Required to operate safely in ice infested waters, (some minor damage to the craft not affecting stability or buoyancy will be acceptable).

13.0 Cabin and Seating Configuration : INBOARD / OUTBOARD

13.1 General Notes: This RIB shall be a Cabin configuration with pair(s) of suspension seating units (P & S) from the console / operators positions and aft per the arrangement specification.

13.1.1 The Cabin Vessel arrangement is to allow flush deck access from the cockpit aft:

- transom hatches to access the aft bilge, and various machinery installations including batteries, fuel filtering and service valving, and furnaces or towing equipment as specified.
- The cockpit sole shall have deck hatch access over the majority of the engine bay, with ample cockpit drainage via freeing ports with check flaps or valves.
- Cabin; Helm console mounted to Stbd, with Navigation console to Port, a centerline access to the sit up cuddy forward, will separate the forward consoles.
- The seating behind the Pilot seats will be cushioned storage box bench seats.
- The windows shall be watertight.
- There shall be two mushroom vents in the overhead.
- The forward cuddy shall have a bench with cushion over on both P&S. The benches may be filled with additional flotation foam.
- There shall be forward access through a watertight hatch, to the chain locker if any.
- There shall be service access through the forward or inboard faces of the consoles, to the wiring and electronic service areas.

13.2 Seating : The operator seating shall be suspension seating, Bentley Mariner or equal.

- The Operator's position console shall be fitted with Engine panels, controls, Electronic integrated display, and alarm panels and breakers as required.

- The Navigation position console shall be fitted with radio and a large integrated display for Radar, GPS, Chart Plotter, AIS and other inputs..

13.3 Seating aft in Cabin: Shall be cushioned storage box seats aft either side of the cockpit door

13.4 Handholds: Shall be positioned on the console, along both sides of the central walkway at the overhead, and vertically by the aft door as required.

13.5 Consoles

13.5.1 The console(s) to be fabricated to low weight, high strength specifications from aluminium, or FRP.

13.5.2 The Operator's console shall consist of the steering / throttle controls and related equipment. Engine controls shall be situated on the starboard side of the operator's console, and shall be situated in such a manner that the operation of one control, or the steering wheel, shall not inadvertently activate or deactivate any of the other controls.

13.5.3 The operator's console must be sized to be outfitted as follows:

13.5.4 Regulatory equipment

- 2 ¾ inch dia. damped card magnetic compass, lighted and adjustable for deviation.
- Note: Deviation Card, and some Safety Eqpt. to be Owner responsibility, see Outfitting.
- regulatory compliant electric horn

13.5.5 Engine equipment

- Separate Keyed Ignition Switches with emergency stop clip and lanyard if available
- Digital engine monitoring system, with Tachometer for each engine, and alarms
- Cooling water temperature gauge (if displayed),
- Oil pressure gauge for each engine (if displayed),
- Tilt / trim gauge for each propulsion unit,
- An hour meter for each engine
- Fuel gauge for each fuel tank
- Remote oil tank level gauges if required
- Battery Condition Indicator for each battery
- NOTE: Manufacturers' control cables, if any, to be replaced with Morse 33C Red-Jacket cables.

13.5.10 Other

- A digital integrated display as detailed in the electronics section 16.4
- All alarms visual indicators to be mounted in plain view of operators.
- A minimum 10-breaker circuit panel, weather protected.
- Separate waterproof dimmer switches for the compass and engine instruments.
- **NOTE: various labels and notices are required for the vessel per TP 1332,**

14.0 Construction Standards

141 Transport Canada Marine Safety Regulation TP 9247E

http://www.tc.gc.ca/MarineSafety/Directorate/TP/TP9247/TP9247E.htm

be advised this TP is somewhat poorly written, consult your TCMS inspector

14.2 Transport Canada Marine Safety Regulation TP 1332 (2004)

Construction Standards for Small Vessels.

http://www.tc.gc.ca/MarineSafety/Directorate/TP/tp1332/tp1332e.htm

14.3 CSA C22.2 No. 183.2-M1983 (R1999) Standards for DC Electrical Installations on Boats and ABYC 'E' Electrical Regulations.

14.4 Transport Canada Marine Safety Regulation TP 1324 Coated Fabrics.

http://www.tc.gc.ca/MarineSafety/Directorate/TP/tp1324/tp1324e.htm

15.0 Construction Requirements

15.1 Hull and Deck: The hull, and deck, shall be constructed of Aluminium 5086 H32 / H116 alloy. Extrusions shall be of aluminium 6061 T6 or 6063 T54 aluminium alloy. Mil Certificates are required for all aluminium used in the fabrication.

- The deck shall have applied, dark grey or balck non skid and have at least two high capacity, 3" dia. minimum, self draining ports and shall be fitted with mechanical closures for the drains to prevent water ingress.

- Non structural items of trim and outfit such as hatch frames, castings, and hardware items may be of other aluminium alloys suitable for commercial saltwater marine use.

- The deck above the watertight compartments shall have bolted, or dogged, watertight access plates / hatches for easy removal to allow for repair of buoyancy compartments beneath, and separate plates for inspection access to the fuel system components per TP 1332.

- **Buoyancy Foam-** Must be Fire Rated (FR) closed-cell foam installed to perform the required stability functions and isolated from inboard engine and fuel tank spaces by main girders or bulkheads with any foam accesses through these members closed by cover plates.

- **Inboard Engine** spaces to have dampers installed in supply and exhaust ducts to readily close the air supply to the space in the event of fire. Loose plate dampers to be stowed in side sliding guides at the closed damper installation point. The intakes, and exhausts, are to maximize water exclusion into the engine space while permitting adequate air flow.

- **Fuel tank** spaces to have ventilation flow through from bow to stern (ignition protected fan assist on startup for gasoline applications)

- **The Exterior Deck** shall have cleats, anchor arrangements, and arches or masts per 'Outfitting'

15.2 Finish Colour: The collar shall be red and cabin colour shall be Endura – Standard # 4 yellow, interior cabin coated with Zolatone Greystone and the deck with non-skid surface material Consolidated Coating GTI-8T-1075 Gripstick Grey.

15.3 Stowage: Arrangements shall be provided for safe, secure and accessible stowage of an anchor and cable, paddles, and other equipment.

15.4 Bow Eye: A system is to be designed and incorporated into the construction of the stem that allows for the bowline and or trailering hook to be attached to the bow and which must not protrude from the hull. The fitting must be of a non-corrosive material and of sufficient strength to allow for towing the vessel at a speed of 20 knots in calm water in the normal loaded condition, on an even keel without damaging the vessel or causing undue chafing of the towline.

15.5 Towing: The RHIB shall be fitted with aft and fwd towing posts /bollards, for emergency towing.

- Aft Tow post with towing bitts shall be fitted aft, rated for 3000 lb. (1360 kg.), ahead of the thrust point of the craft. At the bow a removable cruciform tow post / cruciform bollard (tow capacity 2,200 lb.minimum, 1000 kg.) is to be fitted at the bow. The tow posts to be stamped with the SWL of each post, paint highlighted.
- A permanently mounted hand cranked tow line recovery reel shall be installed, with 100m of buoyant ¾ inch diameter towline. The hand crank shall be removable and have permanent storage pocket for the handle.

15.6 Collars

15.6.1 Collar shall be an inflatable type with at least 5 separate chambers of approximately equal volume, each fitted with a suitable inflation system and over-pressure relief valves calibrated to 3 psi. (the Halkey Roberts model 690BV inflation valve and the Mirada model B51019 3.5 psi over pressure relief valve, meet this requirement).

15.6.2 Inflatable collars fitted shall be constructed of material that meets the criteria for strength, elasticity, resistance to wear and longevity as defined in TP 1324 - Material Specification for Coated Fabric Used in Inflatable Life rafts. (1880 Decitex Neoprene/Hypalon coated nylon fabric meets this requirement) and shall be Red in Colour. Retro-reflective tape shall be affixed to the collar in an approved manner as required.

15.6.3 Collars shall be interchangeable and have a diameter of between 560 and 600 millimeters so that custom fitting of spare collars is not required.

15.6.4 Inflatable collars shall be attached to the hull using mechanical fasteners and clamping metal battens in such a manner that the collar can be easily removed for repair or replacement. The use of glue-on type collars is not acceptable.

15.6.5 Collar to be supplied with two pair of step treads installed, amidship port and starboard (P&S), DPDM material or equal.

15.6.6 Collar must be supplied with a tensioner.

15.6.7 Inflatable collars shall be provided with protective rub guards all around. At least five extruded neoprene rubber, or equivalent, rubbing strakes (50mm - 75mm wide) shall be glued along the entire length of the outboard side of the collar to provide protection against abrasion and puncture; 'Bombard' or equal.

15.6.8 Grab lines of nylon braided rope construction ½" diameter, shall be fitted along the collar on both the port and starboard sides to provide access from both within the boat and for persons in the water. Grab lines shall be mounted on the centerline of the collar, where possible aft, by means of a lacing cuff (not by D-Ring attachment), and shall hang down 10" -12".

15.6.9 A repair kit shall be provided for inflatable collars.

15.6.10 An easily replaceable collar bow protector to prevent scuffing in the bow area shall be fitted and constructed from hand glued 2-ply 1650 Decitex Neoprene/Hypalon coated nylon fabric. It shall be fastened to the bow collar section with lacing at the top and bolted flange at bottom. It should wrap the bow (collar only) from collar top centerline to collar/hull joint and extend approximately 4' aft down each side of the collar.

15.6.11 All seams are to be hand buffed and glued

15.6.12 Polyurethane sealant should be used on all interior seams and baffle edge.

SPECIFICATION : OUTFITTING DETAIL

16.0 Outfitting & Equipment

16.1 Towing: additional

- A removable, 'sunbrella' or equal cover is to be supplied for the towing reel with a fastening system that would allow for quick removal.

16.3 Electrical:

16.3.1 The electrical system shall be weatherproofed and easily accessible, incorporating a waterproof faced breaker panel with a minimum of 10 circuits fitted. Access to electrical panel spaces shall be via weathertight hatches.

16.3.2 Twelve (12) volt DC distribution system shall be provided to power the engine starting and boat service loads including:

- Navigation lights, compliant with CSA Colregs.
- Navigational equipment, including regulatory requirements: The vessel shall be fitted with a 12 volt electric horn that complies with the requirements of the CSA Collision Regulations. The horn shall be operated by a spring loaded switch located at the operator's console.
- Instrumentation
- Communications

16.3.3 The Contractor shall supply and install, on each Inboard Powered boat, a 120 VAC Marine Grade shore power system for charging the batteries; each unit shall come with an exterior marine plug, panel and breaker. The Contractor shall supply an electronic controlled battery charger such as the Guest 2630 Charge Pro or equivalent. This system is only applicable for boats having the Inboard/Outboard configuration.

16.3.4 The Charger shall have fully automatic operation (float / trickle), has the ability to charge multiple batteries, automatic reset overload protection and shall have an indicator of charging function.

16.3.5 The shore power receptacle shall be a marine-style locking 30 ampere waterproof male receptacle in a location that is accessible with all hatches and covers closed.

16.3.6 The Shore power shall be connected to an A/C distribution panel. This panel will supply the battery charger, engine heater, plus two spare circuits. Each A/C circuit shall have its own breaker. Each breaker shall be wired as double pole, single throw to prevent false ground fault indication when the boat is connected onboard a Coast Guard Vessel.

16.4 Batteries and Cables : All boats shall have a dual-battery system with dual-battery selector switch mounted in a recessed position, that conforms with engine manufacturer's specifications. Guest 2300A dual battery / dual battery selector switch is suitable.

- Batteries shall be marine grade glass mat or gel type maintainence free to eliminate leakage, and a minimum 1000 deep-cycle cranking amps.
- VHF installations may require additional emergency backup power.

16.5 Lighting

16.5.1 Progressive dimmers of marine grade shall be fitted wherever practicable, with the capability of dimming engine monitoring gauges and other indicators separately from compass illumination.

16.5.2 Craft shall be fitted with two (2) marine grade floodlights, on their own breaker, on each side of the arch frame. (The ITT Halogen Floodlight, Model 45900-0000 Bracket Mount, Trapezoidal beam, 12 volt, 15 cm x 10 cm, meets this requirement). *http ://www.jabsco.com/lights.asp*

16.5.3 On each boat there shall be two pairs of 12 VDC Ramco Deck lights model 24074R or equivalent fitted, on their own breakers, that illuminate the forward deck and cockpit area.

16.5.4 A blue flashing light (strobe type) shall be fitted. (The Aqua Signal Corporation, series 40 strobe light meets this requirement)

16.5.5 Navigation lights shall be permanently fitted to the arch and cabinsides with protected wiring and shall be waterproofed. **Note:** that the lights should be installed parallel to the "Normal Load" waterline which may not be parallel to the deck, and in a horizontal plane athwartship.

16.5.6 The navigation light fixtures shall be of such a design as to resist the effects of vibration and shall be provided with adequate protection from damage, which may occur, when lying alongside a vessel or a pier. (The Hella Model #2984 Series of lights, Stock #'s HEL62206 Masthead light, HEL62208 Stern light, HEL62209 Red side light and HEL62210 Green side light meet this requirement.)

16.5.7 Three accessory plugs with screw on watertight caps, (on a separate breaker) will be installed on the boat, one in the cockpit area, one on each of the operators consoles. *(http://www.optronicsinc.com/marine.htm)*

16.5.8 Fixed Searchlights: Lights shall be Model ACR.1930.3 meets the requirement.

16.6 Electronic Equipment: This vessel shall be equipped with the following electronics navigation and communications equipment, with displays located as described for the console, in addition to the regulatory required compass and horn. Equipment provided by societies through CCGA-P.

16.6.1 Antennas**:** Shakespeare 5241-R VHF 3dB shall be mounted on the arch frame or cabintop. All cable penetrations shall pass through plastic marine watertight glands.

16.6.2 Radar**:** Raymarine RD 424 Radome, Radar Scanner 4kw Transmitter 48 nm maximum range

16.6.3 Depth Sounder: Raymarine Digital Sounder Module and Transducer

16.6.4 Networked Navigation System: Two Raymarine E80's

16.6.4 DGPS**:** Raymarine Raystar 125 SDGPS

16.6.5 VHF Radio**:** ICOM IC M502: VHF radio mike clip shall be installed with non-grounding option to prevent the radio from defaulting back to Channel 16 when the mike is placed back in the clip. VHF radio shall be connected to an external speaker mounted on the self-righting frame and shall be connected for use in VHF mode not P.A. Mode.

16.7 Pumping and Drainage: Electric and Manual pumps

16.7.1 An electric bilge pump with 2000 gph capacity shall be fitted in each watertight division as well as a fixed manual operated bilge pump of the diaphragm type in the aft compartment. The bilge pumps shall be located so that it takes suction from the lowest point of the hull. Smooth bore piping shall be installed which will allow the bilge pump to discharge directly overboard.

- An automatic control shall be fitted that turns on the electric bilge pump when water is present in the bilge. (An Ultra JR Float Switch meets this requirement.) The electric bilge pump control switch shall be located on the operator's console, with settings for 'on', 'off', and 'automatic' operation. An indicator light shall be provided at the control that lights when the bilge pump is operating.
- A HIGH level float switch will be used in the engine compartment or engine mounting compartment if a separate 'pod' is used. The HIGH LEVEL switch will activate an audible (cancelable) and visible alarm at the helm, and must be in plain sight of operator.

16.7.2 Hull drainage : A non-corrosive threaded plug shall be provided in the lowest point to drain the hull when out of the water.

16.7.3 Valves shall be stainless steel and shall be located where they are readily accessible for operation, maintenance or removal.

16.8 Radar Arch / Self Righting System(if any):

16.8.1 Radar Arch - shall be installed aft on housetop, to mount antennae, lights and other fittings.

16.8.5 The framework shall be made of 2" Schedule 40 welded aluminium pipe.

16.8.9 Any ancillary equipment such as navigation lights, radar domes or radio antennas fitted to the arch shall not interfere with the operation, visability, or reception of other equipment installed.

16.9 Lifesaving Emergency Equipment: Stowage for Contractors' and GSM Equipment

The following items shall be provided with appropriate stowage / securing arrangements (as appropriate for each item). All fittings, Contractor supplied, shall be heavy duty, corrosion resistant stainless steel or aluminium fittings. All items shall be readily accessible (the foot pump and the repair kits shall be stowed in a stowage locker)

- <u>Contractor Supplied Equipment</u>
  - Anchor (Fortress model 7X or equivalent) and line with chain
  - Hull repair kit
  - one bouyant heaving line
  - one water proof electric flashlight w/ spare batteries and bulb
  - one whistle
  - first aid kit in waterproof container
  - two bouyant rescue quiots attached to 30m of bouyant line
  - thermal protective aids
  - radar reflector (not regulatory requirement on Aluminium vessel)
  - buoyant safety knife
  - Fire extinguisher (Class 5BC, marine type)
  - Boat hook, 8 feet long (retractable)
  - 2 paddles
  - Mooring lines (2)
  - Collar patch kit (for inflatable collar)
  - Foot pump (bellows type, for floatation collar)

17.0 Propulsion:

17.1 General:

- Inboard / outboard motor packages shall be supplied through the Government Standing offer and preferred providers as set out by the CCGA-P.

- Kill Switch - Engine packages shall incorporate an automatic shutdown feature (kill switch) for each engine, if available, to be mounted near the ignition switches.

17.1.1 The maximum horsepower motor for an outboard in this class of vessel is a 200hp four stroke motor. Maximum of 2 motors of 200hp.

17.2 Fuel Systems:

17.2.1 Valves and fittings used in the fuel system shall be stainless steel, or suitably insulated non-corroding material, and all fuel valves should be readily accessible, mounted at the tank supply from the tank space, and labeled .

17.2.2 Each fuel vent shall be fitted with a ball check valve.

17.2.3 Fuel filling pipes shall have a standpipe that stands proud of the deck at least 2 inches to avoid contamination entering. Fill pipe label required denoting type of fuel.

17.2.4 If two tanks are fitted they shall be fitted to a common manifold which allows the engine to use fuel from either, selected, tank. Fuel returns may require tank selection as well.

17.2.5 Each fuel tank supply shall be fitted with a debris and water separating filter system that is accessible for ease of maintenance such as the Racor Series 500MA or equivalent.

17.2.6 There shall be two tanks fitted, each manufactured from roto-moulded cross-linked polyethylene, or marine grade aluminium, with sufficient strapping to prevent any movement of the tank. There shall be inspection hatche(s) in the deck, to allow access to the fuel pick ups, with the required shutoff valve under access hatch or 'demand anti siphon' valve at the tank, vent, and fill connections, and tank level indicators.

18.0: FIRE SUPPRESSION SYSTEM INBOARD/OUTBOARD CONFIGURATION

18.1 The engine space shall be fitted with an approved fire suppression agent designed for the engine space in each inboard powered boat as per section 10 of TP1332. Design criteria, & volume calculations must be presented in writing as part of the boats documentation; Kidde FM200 or equal.

18.2 The fire suppression system shall be manually activated. There may be a second shot capability specified or pricing requested. The second shot may have automatic sensor activation for protection at the dock.

18.3 A heat rise detector shall be installed within the engine compartment in accordance with TP1332, with alarm at the control console.

19.0 Steering and Propulsion Equipment:

19.1 Propulsion Leg Guard: A guard made of welded 2" schedule 40, 6063 alloy aluminium pipe shall extend out and around the engines / drives, to protect the units from impact. This guard shall be fabricated so as to be easily removed to facilitate the removal of the drive unit.

19.2 Steering

- Steering systems must be hydraulic with a maximum of 4 turns from hard over to hard over. (The SeaStar steering system from Telexflex meets this requirement**)**
  (http://www.tfxmarine.com/steering.html)

- All hydraulic steering hoses must be routed below deck and all hoses must be routed so that there are no pinch points on the hoses and selected to prevent system pulsing.

- The wheel / console connection shall be of robust construction, to eliminate fore and aft or lateral movement of wheel / steering shaft fixture.

- The Steering wheel shall be stiff enough that during rough water operations there is no flexing of the wheel and the wheel should be padded to provide a comfortable non-slip surface for the operator to grip. (Momo Marine steering wheels meet these requirements)