

# Specification *20m Pilot Boat* For Pacific Pilotage Authority

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This document is Appendix B to the Request for Proposal issued by the Pacific Pilotage Authority

Prepared for:

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Vancouver, Canada



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**NOTE: THIS SPECIFICATION IS BASED ON A STANDARD NUMERIC FORMAT. NOT ALL NUMBERS ARE NECESSARILY ALLOCATED IN THIS SPECIFICATION, ONLY THOSE LISTED IN THE TABLE OF CONTENTS.**

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# Technical Specification

## *20m Pilot Boat*

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For: Pacific Pilotage Authority  
Vancouver, Canada

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### PART 100 - GENERAL

#### 100.1 Description

This specification describes the requirements for a high performance Pilot Boat for use on the West Coast of Canada.

The vessel will be required to make trips of varying duration in all weather and sea states and therefore must be of robust construction suitable for such service.

The vessel is to be equipped with twin jet drives powered by high speed diesel engines.

The vessel should be designed and constructed with consideration to a 25 years minimum service life expectancy.

#### 101. PARTICULARS

##### 101.1 Dimensions

- Length overall - <20 metres (**including** fenders, stern platform)
- Length waterline - 16.5 metres (approximate)
- Breadth, moulded - 5.6 metres (approximate)
- Draft, navigational - 1.0 metres (approximate)

##### 101.2 Capacities

- Fuel oil - As needed to meet endurance requirements
- Potable water - 0.25 m<sup>3</sup>
- Sewage - 0.25 m<sup>3</sup>

### 101.3 Complement

- Crew - 3 persons
- Pilots - 6 persons

### 101.4 Performance

- Speed - 25 knots at MCT (85% max RPM)
- Endurance - 250 nautical miles at MCT

## 102. DEFINITIONS

### 102.1 Organizations

- Owner - Pacific Pilotage Authority (PPA)
- Owner's representative - A person or organization retained by Owner to represent them in the Shipyard during construction of this vessel
- Administration - The Government of the State whose flag the ship is intended to fly
- Class - Classification Society listed in section 104

### 102.2 Terminology

- Equal - considered equal to the specified materials or equipment in terms of: availability of spare parts/service, efficiency, performance, reliability, service life, size, weight
- Good Shipbuilding Practice - designs, applications, and procedures proven successful through long term in similar vessels engaged in comparable service

#### 102.4 Language and Units

- Drawings, reports, specification, manuals - English
- Labels and nameplates - English
- Units - SI metric units

#### 103. SERVICE CONDITIONS

- The vessel is designed for year around operation in the Victoria and Steveston area within the limits of Home Trade III voyages / Near Coastal Voyage Class 2.
- This Pilot Boat is to provide fast and efficient running at transfer speeds, combined with excellent seakeeping. Particular emphasis will be placed on safety and reliability of all equipment affecting the vessel's function. The vessel is expected to operate reliably 365 days a year, with scheduled down-time for servicing.
- The vessel should be designed and constructed for a 25 year life expectancy
- Ambient air temperature
  - minimum: -10 °C
  - maximum: 35 °C, relative humidity 70%
- Seawater temperature
  - minimum: 0 °C
  - maximum: 32°C
- Accommodation temperature - See section 815 (HVAC)
- Machinery space
  - maximum: 45°C

#### 104. REGULATION AND CLASSIFICATION

- The vessel is to be designed and built under Class inspection and delivered with a valid full-term Class certificate.
- The selected Class Society must be a Recognized Organization (RO) under the Transport Canada Delegated Statutory Inspection Program (DSIP), and is to provide all reviews, inspections, approvals and certificates applicable.
- Obtain all certificates required by law and post same in suitable frames or mark same as directed. Contractor to be responsible for all Survey Inspector and Measurement Fees required by National Authorities.
- IACS Member Classification - ✕ A1 SSC Pilot, ✕ MCH, or equal Society
- Flag State - Canada, Home Trade III / Near Coastal Class 2

- International Standards as applicable, including (but not limited to):
  - Voyages
  - COLREGS - International Regulations for Preventing Collisions at Sea
  - Tonnage - International Convention on Tonnage Measurement of Ships, 1969
- Transport Canada Regulations as applicable, including (but not limited to):
  - TP 14530 E Construction and Inspection of Pilot Vessels
  - TP 11717 Standards for the Construction and Inspection of Small Passenger Vessels (as referenced by TP 14530 E)
  - Hull Construction Regulations (C.R.C., c. 1431) (as referenced by TP 14530 E)
  - Life Saving Equipment Regulations (C.R.C., c. 1436)
  - Marine Machinery Regulations, SOR 90-264 (as referenced by TP 14530 E)
  - Crew Accommodation Standards (C.R.C., c. 1418)
  - TP 7301 Stability, Subdivision and Load Line Standards
  - Vessel Fire Safety Regulations SOR 2017-14
  - TP 127 Ship's Electrical Systems

## 105. REGISTRY AND CERTIFICATES

- Registry
  - Owner to register vessel
- Certificates
  - all Regulatory required certificates including but not limited to:
    - i. International Tonnage Certificate
    - ii. Radio certificate
    - iii. Builder's Certificate
    - iv. Compass Adjustment Certificate
    - v. Classification Certificates for Hull, Machinery, and Electrical Equipment
    - vi. Class Approved Trim and Stability Booklet
    - vii. Fire and Safety Plan
    - viii. GMDSS certificate
    - ix. Anchor and chain certificates
    - x. Canada specific certificates (Inspection Certificate, Record of Safety Equipment)



## 110. HABITABILITY

- General
  - All reasonable and practical measures taken to minimise the effects of noise and vibration throughout the vessel including:
    - i. Vibration isolation of main engines
    - ii. Vibration isolation diesel generator sets
    - iii. Vibration isolation of main engine and generator exhaust systems
    - iv. Vibration isolation of all reciprocating machinery such as air compressors
    - v. Insulation treatment in engine room
    - vi. High attenuation exhaust silencers
    - vii. Resilient mounting of deck house
    - viii. Acoustical insulation in accommodation spaces
    - ix. Linings and partitions isolated from structure
- Sound levels
  - Maximum sound levels (free running in trials condition):

i. Wheelhouse	65 dB(A)
ii. Pilot Seating Area	65 dB(A)
iii. Cabins, lower deck	65 dB(A)
iv. Mess	65 dB(A)

## 115. DOCUMENTS

- As built drawings
  - Shipyard to develop and provide the following drawings, in electronic format, reflecting the “as-built” status of the vessel within 4 weeks of delivery.
    - i. General Arrangement
    - ii. Tank Plan
    - iii. Structural Arrangement and Sections
    - iv. Machinery Arrangement
    - v. Shafting Arrangement
    - vi. Docking Plan
    - vii. Safety Plan
    - viii. Pilot retrieval system
    - ix. Sightlines drawing
    - x. System diagrams:
      - Fuel

- Bilge, ballast and fire
- Oily water and sludge
- Lube oil
- Machinery Cooling
- Electrical one line
- Compressed Air (if fitted)
- HVAC
- Manuals
  - Vendor manuals as provided with equipment
  - Stability book
  - Tests and Trials report

## 120 TESTS AND TRIALS

- During construction
  - tank integrity
  - pressure testing of piping systems
  - electrical, refer to section 600
- Dock trials
  - start up and preliminary testing of machinery and equipment
  - piping and HVAC systems testing
  - regulatory testing
  - generator load cell test
  - inclining experiment
- Sea trials
  - further to Class mandated trials use: ISO 19019 "Sea-going vessels and marine technology -- Instructions for planning, carrying out and reporting sea trials"

## 125. VESSEL DELIVERY

- Delivery
  - Vessel to be delivered to location on the West Coast of Canada determined during contract negotiations.
- Transfer ownership
  - Vessel ownership to be transferred to PPA when vessel is fully certified for operation in Canadian waters and has required Canadian certificates.

## PART 200 - STRUCTURE

### 205. CONSTRUCTION MATERIALS

- Vessel may be constructed of steel, aluminum or FRP, or a combination of the above, as approved by Class and Transport Canada.
- Provide new materials, free from lamination, surface scratches, corrosion or other defects.
- Materials (as applicable)
  - steel: Class grade A, treated with pre-weld primer before fabrication
  - aluminum: 5086-H116 plates, 6061-T6 shapes
  - stainless steel: Grade 304 for interior/dry spaces  
316/316L for exterior/wet spaces
  - bi-metallic joints: Detacouple explosion bonded bi-metallic strip, or equal
- Welding
  - to Class requirements
  - penetration welds in way of:
    - major machinery foundations
    - areas of high stress
  - double continuous welds in way of:
    - areas susceptible to corrosion (exterior, ballast tanks, potable tanks, main machinery space bottom structure)
- Testing
  - non-destructive testing (dye penetrant, X-ray, etc.) per Class

### 210. HULL STRUCTURE

- Design and construct hull in accordance with Class requirements, using Class Rules as a minimum standard.

## 211. HULL STRUCTURAL FITTINGS

- Tanks
  - fitted with:
    - manholes (generally 2 widely spaced except on small tanks)
    - handgrips above manhole and stirrup rungs inside tank for access (where appropriate)
    - vents
    - pipe fittings, sounders, etc. as required for service
- Sea chests
  - located as low as possible, to suit pump/piping arrangement
  - complete with:
    - air vent
    - compressed air blowdown connection
    - locally increased plate thickness
    - hinged galvanised steel inlet gratings with slotted openings and attached by stainless steel fasteners locked by wire
    - anodes
    - piping connection(s) with tailpipe extension.
    - minimum open area of inlet gratings: 4 x open area of sea main for cooling systems
- Chain locker
  - sized to accommodate the specified chain
  - fitted with:
    - bitter end connection
    - watertight manhole
    - galvanised perforated steel baseplate
    - interior structure arranged to minimise chain snagging
    - division bulkhead with hand and foot holes, where appropriate
- Wave break
  - located on foredeck ahead of deckhouse
  - arranged interior of pilot walkway and boarding area

## 220. DECKHOUSE

- Description
  - lightweight construction
  - superstructure to be inset from vessel side to provide clearance for when vessel is rolling along side a large ship
  - compact arrangement with chamfered corners for increased visibility
  - vertical corners rounded to protect personnel and lines
  - window support plating and corner posts offering minimal visual obstruction
  - top reinforced in way of mast foundation and locally searchlights and other equipment
  - wheelhouse forward windows to be forward raked
  - forward overhead windows for visibility when coming alongside ships

## 224. MAST

- Description
  - arranged to satisfy navigation light placement per COLREGS
  - outfitted with brackets and seatings where required for electronic equipment antennae, flag halyards (minimum two), etc.

## PART 300 – OUTFIT AND FURNISHINGS

### 304. DOORS

- Watertight doors
  - located below main deck
  - sliding type where required by Transport Canada
  - steel doors and frames
  - welded to bulkhead
  - single lever, multiple dog
  - stainless steel hardware
  - status indicator (open/closed) in wheelhouse
- Weathertight doors
  - Loadline position 1 or 2 as applicable
  - single lever
  - hinged type
  - stainless steel hardware
- Fire rated doors
  - A-rated
  - pneumatic closers
  - magnetic holdback with central release
- Joiner doors
  - insulated core construction
  - compatible with lining system
  - ventilation grille
- Locks
  - exterior doors can be locked from the inside or with a padlock on the outside
  - cabin doors fitted with privacy locks

### 305. MANHOLES AND HATCHES

- Manholes
  - fitted to tanks, voids
  - bolted plate cover on welded angle frame
  - stainless steel fasteners
- Hatches
  - with single action handwheel central locking device
  - hinged and spring-balanced
  - with stainless steel hardware
- Access panels/bolted removal hatches
  - flat panel construction
  - flush
  - bolted, gasketed

- watertight or weathertight per application

### 306. WINDOWS AND PORTLIGHTS

- Windows
  - The forward, side and overhead windows in the wheelhouse are to be electrically heated for de-misting purposes.
  - Windows shall provide clear, undistorted and unobstructed vision.
  - wheelhouse overhead windows tinted
  - All windows to be tempered glass
  - deadlights to be provided for all windows as required by Administration, marked for each window, and stored in dedicated space on vessel.
- Portlights
  - opaque glass for washrooms
  - complete with hinged deadlight
- Escapes
  - windows/portlights designated as escapes fitted with:
    - 12mm solid bar handgrips over
    - stirrup rungs below to deck level
- Wipers
  - heavy duty straight line horizontal wipers
  - 2 speed/intermittent operation
  - park feature
  - individual and group controls
  - wipers fitted to all front facing wheelhouse windows
- Curtains/screens
  - decorative, lined, blackout curtains on rods fitted to all windows in cabins
  - solar screens on rollers fitted to passenger space and wheelhouse windows

### 307. LADDERS, STAIRS AND RAILINGS

- Stirrup rungs
  - fitted for tank accesses and escapes, as required
  - 300 mm spacing
- Ladders
  - square rungs
  - flat bar stringers
  - bolted in place
- Stairs
  - non-skid treads

- Exterior railings
  - generally around periphery of house
  - on foredeck arranged for use by pilots
  - integral rail for pilot harness system
- Interior railings
  - Accommodation spaces: 32 mm anodized aluminum tubing
  - Machinery spaces: 32 mm steel tube

### 308. FLOORPLATES

- Machinery space floorplates
  - tread (chequer) profiled plates
  - plates secured to frame with stainless steel machine screws
  - flush, hinged, sections where access is necessary
  - plate in easily removable and handled sections

### 310. LININGS AND PARTITIONS

- Linings/partitions
  - vinyl-faced lightweight sandwich type panel system
  - Owner selected colour
  - mounted to welded steel coaming in wet spaces
  - Provide easily removable or hinged, labeled hatches in panels for access to drains, shut-offs, ventilation dampers, access openings, and fire dampers
- Deckhead (ceiling) liners
  - acoustic, linear "plank" style ceiling
  - perforated finish except in washrooms
  - white finish in accommodation areas
  - dark grey, matt, finish in wheelhouse
  - minimum finished ceiling height = 2100 mm
- Carpets
  - Supply floor covering of commercial grade wool carpet flooring.
  - Colour to Owner's approval.
  - Carpet floor covering on the entire interior floor less WC space.
  - Fit a 100 mm matching vinyl cove moulding at all boundaries.



### 315. INSULATION

- Machinery Spaces
  - acoustic and fire barrier insulation
- Accommodation
  - fire barrier insulation where required
  - thermal insulation around periphery of all accommodation areas including wheelhouse
- Hull compartments
  - Anti-condensation treatment, type and extent as per drawings

### 330. ACCOMMODATION OUTFIT

- Cabins
  - three berths in cabins
  - minimum outfit for each berth:
    - berth
    - berth light
    - locker
    - bookshelf
    - coat hook
- Pilot Seating Area
  - six (6) pilots seats to be provided aft of control position
  - pilots seats to be heavy duty fixed type
  - seats are to be fitted with adjustable armrests and lap belts and positioned on a raised plinth to ensure good visibility
  - four (4) seats to be arranged for use with a table
  - reading lights are to be fitted for each of the pilot seats, switchable red or white.
  - overhead stowage for safety gear and equipment is to be fitted in areas of the deckhead outboard of the main passageways.
  - locker doors are to be fitted to the overheads, with gas springs and positive catches.
  - Lifejacket racks
  - Immersion suit racks
  - first aid kit
- Washrooms
  - toilet
  - shower
  - washbasin
  - toilet paper holder
  - towel rack
  - grab rail

- soap dispenser
- cabinet with mirror
- coat hook
- floor drain
- Office Space
  - on lower level near crew cabins
  - desk with office type chair
  - drawers for filing
  - stowage
  - outlets
  - deck lamp

### 335. PANTRY OUTFIT

- Cabinetry
  - stainless steel cabinets, counter and backsplash
  - drawers for utensils, cutlery
- Sink
  - deep bowl, sink
  - mixing faucet
- Appliances
  - stainless steel finish throughout
  - domestic type appliances
  - refrigerator – under counter type
  - microwave
  - chilled water faucet
  - cupholders (10)

### 340. WHEELHOUSE OUTFIT

- Outfit the wheelhouse area with navigation aids, communications and electronic equipment, as described in Part 900.
- Owner's Representative to approve all arrangements and details of furnishings and outfit.
- The wheelhouse is to have a minimum of 6' 7" (2.00m) headroom in the central area.
- Construct a full scale mock-up of the wheelhouse early in the construction program for purposes of siting all equipment. Position all components to be readily visible and accessible from the principal operating station.
- Receive approval of Owner's Representative prior to constructing wheelhouse.
- All switches and controls necessary to the control of the vessel are to be within easy reach of the launch master who will principally control this vessel alone.
- There is to be a single helm control position on the centreline on the console. A further control station with engine/jet controls, steering and rpm gauges for each main engine as

well as fire pump controls will be fitted aft within a watertight enclosure adjacent to the rescue platform.

- Consoles
  - to accommodate electronics, controls, panels, etc.  
see section 900
- Helm chair
  - Provide three (3) crew chairs
  - professional mariner type
  - 360<sup>0</sup> swivel
  - fold up arm rests
  - shock absorber pedestal mount
  - height adjustable
  - fore/aft adjustable
  - hinged arm and foot rests
  - tiller control in left arm rest for launch master at center line
  - one (1) chair to be provided with a small counter space to fit a laptop computer or logbook
- General
  - storm rails
  - cup holders
  - clock and barometer set
  - coat hooks
  - Certificates and notices in enclosed frames
  - storage for:
    - books and manuals
    - flags (section 390)
    - signalling equipment (section 925)
    - safety equipment
    - binoculars

### 345. MACHINERY SPACE OUTFIT

- Lifting arrangements
  - welded eyeplates over major machinery
- General
  - guards provided to protect personnel from hot or rotating equipment
  - parts provided with the vessel secured in machinery space
  - handrails for engineer to move safely through machinery spaces.

### 350. STORAGE SPACE OUTFIT

- Interior spaces - plywood shelves

### 360. FIRE SAFETY SYSTEMS

- Arrangement - per Administration requirements
- Fire detection - constantly monitored system with detectors and annunciation throughout
  - manual call stations at compartment exits
  - smoke detectors in accommodation and machinery spaces
- Engine room fixed fire extinguishing system - Novec 1230 or FM2000 flooding
  - manually controlled
- Other - hydrants with hoses and nozzles
  - dry chemical and CO<sub>2</sub> portable extinguishers
  - EEBD
  - per Administration requirements

### 365. LIFESAVING EQUIPMENT

- Arrangement - per Administration requirements
- MOB Recovery System - Stern mounted, hydraulic actuated MOB recovery scoop
  - Scoop controls mounted aft of deckhouse, adjacent to aft helm station.
- MOB Beacon System - Fit vessel with MOB beacon system, see Section 915
- Liferafts - inflatable liferafts per Administration requirements
- Lifejackets - per Administration requirements
- Immersion suits - per Administration requirements
- Lifebuoys - per Administration requirements
- Line throwing appliance - per Administration requirements
- Flares - See section 925

### 380. PAINTING AND PROTECTION

- Paint system
  - top quality marine paint system
  - topsides and deckhouse painted in PPA livery
  - non-skid system on decks
- Cathodic protection
  - aluminum anodes
  - 36 month protection

### 385. SIGNS AND MARKINGS

- Ship's markings
  - cut from 5 mm steel or aluminium plate
  - seal welded all round
  - painted contrasting colour to background
  - name:
    - port and starboard on hull forward
    - aft on transom
  - port of registry:
    - below name aft
  - draft marks:
    - located in fore/aft, port and starboard
    - 100 mm projected vertical height spaced at 200 mm projected vertical intervals
  - Official Number and Registered Tonnage:
    - located in machinery space on web deck beam
    - size to approval of Regulatory Agency
- Pilot Markings
  - mounted to deckhouse port and starboard
- Nameplate
  - polished stainless steel plaque mounted on wood base engraved with:
    - vessel name
    - owner
    - builder
    - designer
    - hull number
    - year of construction
- Notices
  - framed certificates and display plans as required by Flag State

**390. GENERAL OUTFIT**

- First aid kit
  - per Administration requirements, located in seating area
  - thermal blankets
  - oxygen
- Flags
  - one National flag (country of registry)
  - stainless steel shackles, pulleys and halyards

## **PART 400 – DECK MACHINERY AND FITTINGS**

### **405. ANCHORING SYSTEM**

- Arrangement
  - anchor and equipment to be arranged to minimize clutter on foredeck
  - where possible, equipment to be located / stored under foredeck
- Windlass
  - electrically powered independent windlass as required by Administration
  - local controls
- Anchors and chains
  - two (2) lightweight, high holding power anchors
  - grade 3, stud link
  - anchor and chain sizes per Administration requirements
- Chain stopper/guide
  - located adjacent to windlass
  - manual clamp arrangement

### **410. LINE HANDLING/MOORING EQUIPMENT**

- Bitts
  - bitts; custom fabricated, main deck mounted
  - size, rating as determined by Equipment Number
  - positioned out of way of walkway around deckhouse for ease of transition of crew and pilots
- Mooring lines
  - as determined by Equipment Number

### **450. FENDERING SYSTEM**

- Sheer from bow to stern to either side of MOB scoop
  - “Popsafe” cylindrical fender system, or equal
  - hard polyethylene tube approx. diameter 280mm, located in a recess
  - retained by a stainless steel wire, run round a pulley and be tensioned with a bottlescrew
- Tires
  - Two on each side on forward quarters as determined by owners

## PART 500 – PROPULSION MACHINERY

### 501. GENERAL

- Description
  - twin, steerable, jet drive units powered by diesel engines
  - shafting system between the drive unit and engine complete with all necessary couplings, bearings and seals
- Analysis
  - Dynamic analyses prepared, reviewed and approved by qualified supplier or third party consultants to ensure fitness for purpose of propulsion machinery and shafting arrangements including:
    - Torsional Vibration Analysis (TVA)
    - solid body dynamic analysis
    - shaft whirling analysis

### 510. MAIN ENGINES

- Quantity
  - two
- Type
  - high speed marine diesel engine
- Make/Model
  - Detroit Diesel or equal
- Rated power
  - total installed propulsive power to be less than 2,000 kW to meet Transport Canada Engineer licensing criteria
- Emissions standard
  - IMO Tier III
- Starting
  - electric (battery), see section 605
- Mounting
  - resilient
- Fuel oil
  - marine distillate fuel (ISO 8217:2012 DMA)
  - engine driven fuel pump
  - duplex RACOR filter / water separator units
  - approved flexible hoses
  - see section 710
- Cooling
  - configured for sea water cooling with engine mounted heat exchangers



- engine driven fresh water cooling pumps
  - engine driven sea water cooling pumps
  - electric preheater
  - see section 735
- Lube oil
  - wet sump
  - crankcase relief and breather
  - oil cooler
  - engine driven pump
  - duplex filter
  - filler and dipstick
  - see section 745
- Exhaust
  - Water cooled exhaust manifold and turbo-chargers
  - see section 760
- Controls
  - standard instrument panels locally and wheelhouse
  - remote electronic speed interface for waterjet control system
  - emergency stop local and wheelhouse
- Alarms
  - manufacturer's standard
  - automatic engine shutdown only for overspeed condition
  - see section 915
- Tools and spares
  - per Class and special tools as provided by manufacturer

## 515. REVERSE REDUCTION GEARBOXES

- Quantity
  - two
- Type
  - commercial duty, marine reverse-reduction gears compatible with main engines and jets
  - reduction ratio to suit waterjet input rpm

## 525. SHAFTING SYSTEM

- Shafts
  - two complete shaft lines
- Couplings
  - torsional and misalignment
  - flexible elements at each end
- Seals
  - watertight seals at bulkheads

### 530. PROPULSION UNITS

- Quantity - two
- Type - waterjet units
- Make - Hamilton
- Controls - manufacturer's standard
- Alarms and monitoring - manufacturer's standard, see section 915
- Paint and protection - manufacturers' standard paint scheme and anodes (see also section 380)
- Tools and spares - per Class and special tools as provided by manufacturer

## **PART 600 – ELECTRICAL SYSTEMS**

### **601. FUNCTIONAL REQUIREMENTS**

- Provide a complete self-contained electrical system to suit vessel's requirements.
- Provide a reliable, voltage and frequency stabilized, marine electrical generation and distribution system designed and engineered in accordance with the applicable Regulatory requirements and standards
- Use electrical equipment and materials specifically which are North American standard outfit and are designed for the marine environment and capable of satisfactory and reliable operation under the vibrations to be expected aboard the vessel. Where necessary, provide resilient mounts for equipment located in areas of severe vibration.
- Design the electrical system to achieve maximum equipment reliability and operational simplicity without the need of specialist electrical knowledge.
- Equip vessel with an AC power generation system sufficient to carry all loads during normal vessel operation. Vessel shall also operate from shore power connections where available.
- Electrical power requirements shall be met by one of two shipboard generating sets.
- Direct current systems to be battery powered, with battery chargers powered by AC system.
- Essential services are to be supplied by a dedicated 24VDC battery system with sufficient capacity to supply all connected loads simultaneously for continuous service as required by the Administration.
- Reliability and simplicity of operation of the electrical system is a priority.
- Arrange the electrical system such that the vessel can be started, operated, and shut down without engine room attendance.

## **605. POWER GENERATION**

### **605.1 Ship Service Generator Sets**

- Quantity - two (2)
- Make - Northern Lights or equal, diesel generator set
- Rated power - as confirmed by load analysis
- Starting - electric (battery)
- Mounting - resilient

### **605.5 Batteries and Chargers**

- Type
  - lead acid, heavy duty
  - maintenance free
  - mounted in well ventilated battery boxes
- Services
  - emergency services
  - essential services
  - navigation equipment
  - radios
- Chargers
  - heavy duty marine type
  - one per battery set

## **606. SHORE POWER**

- Description
  - capacity as determined by Load Analysis
  - heavy duty breaker
  - galvanically isolated
- Cable
  - 25 metre shore power cable

## **619. RECEPTACLES (GPOs)**

- Type
  - 120VAC, 15 Amp
  - duplex
  - non- metallic housings
- Exterior/machinery spaces
  - watertight rating

- GFCI (Ground Fault Circuit Interruption)
  - spring closed covers
  - fitted to:
    - exterior outlets (4)
    - engine room outlets (4)
    - drive compartment outlets (2)
    - washroom outlets (1)
- Duplex Receptacles with USB outlet
  - generally as follows:
    - 2 in each cabin
    - 2 in office space
    - 4 in pantry area
    - 4 in wheelhouse
    - 6 in Pilot Seating Area

## 625. LIGHTING

- Type
  - marine rated enclosures throughout
  - watertight in machinery spaces and exterior
  - matched with ceiling system for accommodation and wheelhouse
  - control for all exterior illumination to be from wheelhouse
- Accommodation
  - LED fixtures throughout
  - Lights in wheelhouse and Pilot Seating Area to be red / white switchable
- Machinery spaces
  - watertight LED fixtures
- Emergency lights
  - 24 V DC for exit routes, life raft stations
- Floodlights
  - 4000 lumen LED located fore, aft, port and starboard to illuminate working areas
- Bow lights
  - 2 x 4000 lumen LED located on foredeck trained forward and down, on adjustable brackets
- Decklights
  - LED watertight fixtures arranged to light walking areas on vessel deck
- Searchlights
  - 1 x LED on wheelhouse top, remote controlled
- Navigation lights
  - LED type
  - configured for pilot boat service

## PART 700 – SHIP'S SERVICES

### 701. PIPING SYSTEMS GENERAL

- Pipe materials
  - piping material and thickness to be selected based on type of service, vessel hull material, and Regulatory requirements
  - stainless steel for DEF system
  - stainless steel, for domestic services above DN25, non-ferrous below
- Colour coding/labels
  - pipes marked with adhesive bands
  - colours per ISO 14726
  - flow direction arrows
  - valves fitted with engraved tags

### 705. FILL, VENT AND SOUNDING

- Fills
  - separate fill for each tank
  - fuel, threaded, with spill containment for oil fills
  - DEF, threaded
  - fresh water, threaded, located separate from fuel fills
- Vents
  - common vent for fuel tanks with overflow tank
  - self-closing ball type vent heads
  - P/V (Pressure/Vacuum) vent for DEF tanks
- Sounding
  - remote reading contents system for fuel, potable water, grey water, black water, oily water tanks
  - sounding pipes for tanks in general
  - sight glasses for small tanks

### 710. FUEL OIL SYSTEM

- Tanks
  - integral tanks in hull
  - sized to meet endurance requirements 9ref. Section 101.4)

- Primary filter
  - designed to meet Transport Canada requirements
  - each engine fitted with duplex RACOR fuel filter/water separator

#### **715. BILGE SYSTEM**

- Configuration
  - One dedicated submersible electric bilge pump for each hull watertight compartment per Administration requirements
  - bilge alarms in each watertight compartment
- Bilge/fire/GS pump
  - primary bilge pump
  - backup fire/GS pump
  - electrically driven

#### **725. FIRE/GS SYSTEM**

- Services
  - fire hydrants supply
  - deck wash-down
- Fire/GS/bilge pump
  - primary fire/GS pump, backup bilge pump
  - same as bilge pump

#### **735. MACHINERY COOLING**

- Configuration
  - separate cooling systems for:
    - port and starboard main engine/drive unit
    - each generator set
- Coolers
  - main engines and generators, see 510 and 605
- Pumps
  - engine driven

#### **740. COMPRESSED AIR SYSTEM**

- Service
  - to serve the following (as needed)
    - DEF dosing system

#### **745. LUBE OIL SYSTEM**

- Configuration
  - self-contained systems for engines, gears and drives
  - permanently installed and piped electric pump on each main engine for pumping used oil out of engine and into a portable container
  - auxiliary engines fitted with a permanently installed and piped manual pump for pumping used oil out of engine and into a portable container
- Oil transfer
  - interim top ups with portable container

#### **750. SLUDGE/OILY WATER SYSTEM**

- Configuration
  - Oily water shall be transferred to shore based receptacle by means of a portable shore based pump

#### **755. HYDRAULIC SYSTEM**

- Steering
  - drive unit standard
- MOB Scoop
  - self-contained system for rescue scoop per Administration requirements

#### **760. MACHINERY EXHAUST SYSTEMS**

- Configuration
  - dry/wet exhaust systems for main engines with water injection at exit ports, emitting above waterline
  - wet exhaust for generator engines emitting above the waterline
  - multi ply bellows type flexible connectors for engine connections, elsewhere as required for thermal expansion
- Silencers
  - wet exhaust silencers for main engines
  - waterlift type wet exhaust silencers for auxiliary engines



- Selective Catalytic Reduction
  - fitted to main engines
  - engine manufacturer's standard
- Mounting
  - entire system resiliently mounted

#### **761. DIESEL EXHAUST FLUID SYSTEM**

- Configuration
  - DEF is used in conjunction with a Selective Catalytic Reduction (SCR) system
  - in accordance with ISO 22241
- Dosing equipment
  - independent equipment for each main engine
  - engine manufacturer's standard

## PART 800 – DOMESTIC SYSTEMS

### 811. VENTILATION, ENGINE ROOM

- Supply air
  - two axial flow fans:
    - electrically driven
    - variable speed
    - aluminum fan blades
    - galvanized steel housing
  - fans sized for engine combustion requirements and to provide sufficient cooling to limit maximum engine room air temperature per section 103.
  - fire and weather closures
  - mist eliminating louvres
- Relief air
  - natural exhaust through louvres
  - fire and weather closures as required
- Controls
  - fan on/off and variable speed control via engine room thermostat
  - ventilation shutdown on release of fire extinguishing agent:
    - fan stop
    - supply air fire closure release (shut)

### 815. HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

- Ambient conditions
  - See section 103
- Air conditioned spaces
  - Wheelhouse
  - Pilot's seating area
  - crew accommodations
- Interior conditions
  - summer: 27 °C, 50% RH
  - winter: 22 °C
- Description
  - two top-mounted split type air conditioning units each rated for 75% of maximum load
- Demisting fans
  - arranged to vent wheelhouse windows
  - deckhead mounted
  - local controls

## 825. POTABLE WATER SYSTEM

- Pressure set
  - electrically driven pump
  - diaphragm type hydrophore
  - Use plastic tubing and pipe where permitted, and stainless steel tubing where metal is required.
  - Insulate all hot water lines
- Hot water
  - electric
  - 25L storage tank
- Treatment
  - ultraviolet steriliser
- Watercooler
  - commercial water cooler
  - integrated in Pantry outfit
- Fixtures
  - galley sink: double basin, stainless steel with mixing faucet
  - washbasins: single bowl, stainless steel , mixing faucet
  - hot and cold water hose bib: complete with 10 m of hose and nozzle, located in the engine room

## 830. BLACK WATER SYSTEMS

- Configuration
  - vacuum collection from toilets to holding tank
  - seawater flushing
  - transfer pump with suction from holding tank, discharge to deck outlet or overboard
  - holding tank high level alarm

## 831. GREY WATER SYSTEMS

- Configuration
  - comprises shower, sink, washroom floor and galley sink drains
  - gravity drain to black water tank

## PART 900 – CONTROL, COMMUNICATION, AND NAVIGATION

### 905. STEERING SYSTEMS

- Type
  - controllers in wheelhouse and on aft deck
  - drive manufacturer's standard
- Autopilot
  - single unit integrated with steering system and follow up from the compass

### 910. SHIP CONTROL SYSTEMS

- Wheelhouse controls
  - all necessary controls for operating the vessel including (but not limited to):
    - combined engine/jet/gear controls
    - tiller
    - steering jog lever
    - jet control panels
    - rudder angle indicator
    - bilge and fire alarms
    - searchlights
    - floodlights
    - navigation lights
    - horn
    - window heaters
    - wipers
    - loud hailer controls
- Aft controls
  - dedicated console on the aft end in order to control the pilot launch when the MOB system is utilized.
  - Arranged so the operator standing forward of the controls and facing aft is able to use controls in a manner that is consistent with the orientation of the vessel
    - combined engine/jet/gear controls
    - tiller
    - jet control panels
    - rudder angle indicator
    - stern floodlight switch

- searchlight switch
- fire pump control
- sea valve actuator
- Emergency controls
  - wheelhouse emergency stops for:
    - main engines
    - generator sets
  - FM200 release
  - ventilation shutdowns

## 915. INSTRUMENTATION, MONITORING, AND ALARM SYSTEMS

- Description
  - in accordance with Class and Administration requirements
  - propulsion machinery manufacturer's standard wheelhouse alarm panels
  - central alarm system including:
    - group alarm for equipment
    - bilge alarms
    - tank alarms
    - visual and audible annunciation at each panel
  - independent fire alarm system
- CCTV
  - CCTV cameras:
    - in machinery spaces
    - on exterior decks
  - monitor in the wheelhouse
  - recording capability
- Ship's instruments
  - Barometer
  - clocks located in:
    - wheelhouse
    - Pilot Seating Area

## 920. NAVIGATION AIDS

- Equipment
  - Furuno or equal as approved by Owner
  - 2 x X-band ATA radar
  - 1 x weather station
  - 1 x satellite compass
  - 1 x DGPS
  - 1 x AIS, Class A

- 1 x echo sounder
- 1 x magnetic compass
- 1 x chart plotter (permitted to be integrated with radar)

## 925. SIGNALLING EQUIPMENT

- Whistle (horn)
  - pneumatic
  - supply from 24VDC compressor located near trumpet
  - mounted on wheelhouse top
  - wheelhouse push button control
  - programable for required automated sound signals

## 930. COMMUNICATIONS EQUIPMENT

- Radios
  - 2 x VHF/DSC radio telephone
  - 2 x hand-held VHF
- Distress Signals
  - 1 x float free EPIRB
  - 1 x SART radar transponder
  - 1 x shipset of flares
- Wireless Man Overboard Signalling System
  - Briartek ORCA System or Marine Rescue Technologies Ltd., or equal as approved by Owner
- Internal communications
  - intercom stations in each cabin, mess area, wheelhouse
  - weatherproof intercom stations on working decks, in engine and drive unit rooms

## 940. ANTENNA SYSTEMS

- Location
  - antennae placed to provide best reception and minimise interference
  - generally antennae placed on wheelhouse top and mast