1. General Description
A modern twin screw tug boat of modern standard design suitable for a wide range of marine operations especially for line towing, pushing, handling and mooring duties in both sheltered and coastal harbour waters.

Maximum speed – not less than 12 knots
Minimum bollard pull – not less than 17 tones

Boat will be built with Bureau Veritas approved drawings to Class standards. Vessel will be built with class approved steel plates and scantlings.

Vessels will be built as notation will be I ● Hull ● Mach Tug, Coastal Area.

Vessel is to be designed twin screw shaft drive tugboat boat built in accordance with general arrangement plan that complies with this specification. Hull will be steel and wheelhouse is to be welded steel construction. Wheelhouse doors will be built from steel will have two windows on it.

Main engines, Gearboxes and Generator will to be of Marine type and type approved by IACS Member Classification society.

2. Main dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Length overall</td>
<td>15.20 meters</td>
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<tr>
<td>Beam overall</td>
<td>6.12 meters</td>
</tr>
<tr>
<td>Draft (scantling/maximum)</td>
<td>1.75 / 2.55 meter</td>
</tr>
<tr>
<td>Cruise speed</td>
<td>10 knots</td>
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<tr>
<td>Maximum speed</td>
<td>12 knots</td>
</tr>
<tr>
<td>Light weight (Apx.)</td>
<td>65 tones</td>
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<tr>
<td>Gross tonnage (Apx.)</td>
<td>27.7 tones</td>
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</tbody>
</table>

3. Construction
Hull and wheelhouse are to be constructed from IACS class approved marine steel plates and profiles. Hull is to be divided into four watertight compartments: forepeak, cabin, engine room and steering gear room. Underwater area will be protected with zinc anodes, 3 years system.

4. Construction details
Steel plates are to be grade “A” minimum. Manufacturers’ certificates with class approval will be provided. All external bolts, nuts, clamps, gauze and sounding caps etc. to be constructed of stainless steel or bronze.
5. Welding
All frames inside the tanks will be completed with fillet weld.
Bottom and side plating                According to the approved drawings
Deck plating                           According to the approved drawings
Superstructure plating                 According to the approved drawings
Bulkheads plating                     According to the approved drawings

6. Tank capacities
Fuel Oil                                15.90 m³
Fresh water                            2.3 m³
Bilge tank                             0.9 m³
Sewage Tank                            0.9 m³

7. Superstructure
Wheelhouse layout has to offer an unobstructed view in all direction as much as possible. Wheelhouse has to be designed to prevent damage when go alongside vessels or berth. Superstructure will be build according to GA PLAN.
Steel Weatherproof access door is installed in the wheelhouse aft bulkhead. There will be two window in the access door and equipped with 6 point locking system.

8. Hatches
-Hull will have following hatches with suitable dimensions and sealing;
-Front Peak will have and access through bolted Manhole
-Wheelhouse escape hatch at the front top of the wheelhouse.
-Engine room hatch cover – located on the aft of the wheelhouse. Bolted Hatch cover with appropriate sealing is to be installed at the middle of the engine room deck access to lift in/out engines.
-Steering room access hatch Coaming hatch according to Transport of Canada Requirements.

9. Fenders
160cmX160cm Special heavy duty rubber fenders will be fitted all around the hull. There will be 250mm Diameter D-Type fender at the bow of the vessel.

10. Hand rails and Safety Rails
Hand rails, made of steel will be provided all around accommodation as per GA plan of steel will be provided all around accommodation as per GA plan.
Safety rails for ropes will be fitted on the top of the wheelhouse.

11. Bollards & Towing Bitts
Four pieces double mooring bollards to the fitted, two pieces each side, and towing bollard will be fitted to the aft of the vessel. Main deck will be reinforced in way of towing bollard, accordingly. There will be min SWL 15/30 Ton Disc Type Towing hook (Data Hidrolik) with releasing mechanism. Emergency release using stainless steel wire operable from the aft of wheel house to be installed.
12. **Lifting lugs**
Four lifting lugs with appropriate SWL are to be welded to the hull structure fore and aft of the vessel in order to allow safety lifting of the vessel for dry-docking and shipping purposes.

13. **Shipping Cradle**
Shipping Cradle will be built from steel there will be wooden protectors on the top and aft part of the cradle. There will be four lifting points for transporting the cradle with the boat.

14. **Manhole**
All tanks have to be accessible through a manhole with approved dimensions and closed by watertight cover secured by galvanized steel bolts and nuts.

15. **Mast**
A mast for navigation lights, flags and antenna are to be fitted at the wheelhouse top deck. Mast is to be manual folding type.

16. **Windows**
All superstructure windows are to be of tempered glass. All front windows are to be fitted with electrical 24V pantograph screen wipers and electric demisting filaments. Switches for each wiper/demister are to be situated in the dashboard.
At least 2 opening windows (one on each side) are to be provided for additional ventilation.

17. **Wheelhouse**
Wheelhouse will be fabricated from steel with min 2000 mm free height after low maintenance panels surface and insulation. Windows sizes as shown on plan will ensure good view of aft and fore decks.
Weatherproof Steel access door will have 6 point locking system with two window will be installed in the wheelhouse aft bulkhead.

Adjustable Captain Chair is to be fitted at conning position. Total 8 Person seating will be available by two L-shape bench seating on each side of the wheelhouse according to the GA plan. Seats will have good quality synthetic leather finish.

Wheel house will be properly insulated with marine certificated insulation metal panels with low maintenance surface and also provided with heating to ensure comfortable operating environment and minimize noise levels. There will be air-cooled air-condition unit with 18,000 BTU capacity with heating capability.
Shipyard will install webasto or similar type diesel or electrical heating system for heating of wheelhouse and cabin area. The Webasto Air Top air heaters provide continuous heating power output via stepless modulation, ensuring constant cabin temperatures. The heater operates quietly and consumes very little electrical power and fuel. A robust composite casing protects the unit against high temperatures or salt. Moreover sealed control electronics and connectors withstand the marine environment.

Flooring will be from marine certificated non-slip marine mat.
18. Cabin Area
It will be situated under main deck level and it will consist of following:
Cabin area will be covered with marine type insulation. The wall panels will be marine certificated type metal panels with insulation for heat.
Storage area, electric panels and WC.

19. WC
Toilet will be design according to GA plan. We will have installed:
Toilet bowl – one piece
Cold and hot water tap and sink – one piece. Sink capacity will not be less than with 6.9 liters.
Mirror – one piece
Soap holder – one piece
Toilet paper holder – one piece
Stainless steel garbage bin with cover – one piece
Flooring will be from nonslip materials (ceramic, etc.)
Exhaust fan will be fitted in the WC with 129 sq cm capacity.
Hot water supplied by electrical boiler. Temperature of hot water will be more than 49°C degree.
Boiler will be marine type and will have overload protections.
Vessel will be equipped with sewage tank. Transfer pump (Macerator pump) will transfer the sewage to collector by international flange located on main deck.

20. Forepeak
A watertight compartment arranged to provide stowage for anchor cable or chain. Access to the space is to be via a bolted manhole cover on the main deck.

21. Bilge system
All spaces under main deck (steering gear, engine room, and forepeak) will be fitted with bilge level float switches which will sound an alarm and light a mimic panel in the wheelhouse in the event of high bilge level.
Each machinery compartment is provided with a remotely operated electric bilge pump. In addition, a manually operated bilge pump shall be provided as back up for each engine compartment.

22. Fuel System
The fuel tanks are to be integral with the hull structure. The tanks are to be fitted with lids to allow access and cleaning as well as the necessary fuel system fittings. The tanks are to be fitted with wheelhouse mounted level indicators.
Fillers are to be fitted to port starboard side aft deck. Vents are to terminate above the main deck and are to be fitted with flame traps.
All fuel tanks will be with level gauge and level alarms connected to displays on wheelhouse dashboard.

23. Painting system
Paint application will be updated and will apply for 3 years specification as per manufacturer (International or Jotun Paints). Color scheme is to be provided by Buyers.
24. Engine room, Propulsion and Steering Gear

Main engines are to drive the propellers through gearbox and stainless steel shafts with dimensions according to the BV Class Rules. Each propeller shaft has to be fitted with aft and fore bearings, stern tube bracket and seal. Shaft bearings are stuffing box type. Propellers will be made of CUNIAL Bronze material.

Main engines (2 off) will be:
Make: VOLVO D16 Marine diesel Engines
Engines: Power 750hp@1900rpm
Total Power: 1500 hp

In order to meet the requirements for intended operational area, Engines will be provided cooling circuit filled up with maker recommended anti–freeze. Engines will be equipped with pre-heater. (Jacked water heater).

Engines to be provided with displays and top mount controls and panel (start/stop and alarms) installed on the wheelhouse. Tachometer, Oil Pressure Gauge, Boost pressure, Water temperature gauge, battery voltmeter. Manufacturer’s sirens and warning lights for low level/ temp and pressure alarms are to be fitted.

Each engine has to be able to be removed from the engine room lift through the engine room hatchway one piece easily. Engines will be installed on flexible mountings.

Each engine is to be coupled to a reverse gearbox with flexible coupling. Each engine has to be fitted with an electric starter, one battery bank and 24V alternator to charge the starting batteries.

Engines are to be Keel cooled and the water is to be piped through flexible hose to Keel Coolers.

There will be silencer installed at exhaust line with suitable insulation. Exhaust outlet will be fitted at the aft part of the wheelhouse.

All piping arrangements to be constructed and fitted in accordance with classification society standards.

All exposed hot surfaces are to be lagged with suitable mineral wool, or similar, insulation.

Engine room floor will be covered with aluminum chequered plate or composite plates. Hand rails will be fitted in engine room for safer operation. Engine room sides will be insulated with foil mineral wool to the sides and on the ceiling.

Rudders (2 off each propeller) are to be single plate with a powered/servo hydraulic steering gear. Rudders controls (normal and emergency mode) rudder angle indicator will be located on the wheelhouse. Rudder indicator will have fault alarm.

Propulsion units will be controlled by appropriate marine driving handles – (throttle and clutch control) installed on the wheelhouse.

Steel pipe Guard from hull to nozzles’ lowest point will be fitted. This guard will help the cables, ropers pass through the nozzles.

Vessels Propulsion system will be done according to Bureau Veritas Classification Steel Ships Rules, Under 500GRT Vessels Rules.
25. Electrical Installation
24VDC system consisting of four batteries banks will be charged by the alternators installed on the main engines. Electrical installation and equipment will be built according to BV classification rules. Cable colors and labels will be done according to Transport of Canada regulations.

One battery bank will be provided for each engine.
One battery bank will be provided for service energy (lights, wipers, horns) and
One bank (fitted in the wheelhouse) for emergency energy (operation radio, deck lights, emergency navigation lights, emergency internal lights.)

All batteries will be Heavy Duty, Deep Cycle Low maintenance marine batteries and will be stored in boxes.

24 VDC main equipment: Internal white and red lights, deck lights, aft deck floodlights, emergency lights, portable hand light, screen wipers, searchlights, horn, navigation equipment, engine room fans, WC extract fans.

There will be One (1) Cummins Onan Marine Generator Model 27/32 BDKBU 120/240 V 50HZ/60HZ set with capacity of 27 kw 50Hz 220V or 32 kw 60Hz 120V capable of taking full electrical load of the vessel.
Provision for shore electrical power will be fitted.

Both 24VDC will be provided with proper distribution boxes and breakers according to classification rules.

All electrical installation and cabling will be undertaken in accordance with relevant IEC and Class standards. Class approved drawings will be sent to buyers naval architect for approval.

Vessels electrical equipment and electrical works will be done according to Bureau Veritas Classification Steel Ships Rules, Under 500GRT Vessels Rules.

Addition to Classification rules all watertight doors will be fitted with sensors with indication panel at wheelhouse. There will be shaft monitoring sensor on each shaft of the vessel and both sensors will have the gauge that indicates the shaft turning direction or rpm at the wheelhouse control panel.

Buyers will have 5 days to approve the drawings. If changes needed different than classification, shipyard will discuss with classification. If classification approves the modification, shipyard will make the modification with extra charge.

26. Lighting System
The mast on the roof of the wheelhouse will be fitted with navigation lights.
Masthead light – 1 piece
All round white anchor light – 1 piece

The following navigation lights will be fitted atop the wheelhouse structure.
Port sidelight – 1 piece
Starboard sidelight – 1 piece
Stern light – 1 piece
Floodlights (2 off) will be provided to illuminate the aft deck.
Search light (2 off) will have electric control system from wheelhouse.
There will be LED Bar Work lights at front and aft section of the wheelhouse to have comfortable night operations on deck of the vessel.
27. **Navigation & Communications Equipment**

The following navigation and communication aids are to be installed:

- Magnetic Compass
- Multi-Function Displays (MFD) 9 inch with crossover searTalk switch
- Radar Type 48NM Radome Type scanner, integrated with MFD’s.
- Chart Plotter – integrated with MFD’s
- VHF 1 unit for Dashboard
- AIS Type Class B
- Echo sounder – integrated with MFD’s
- GPS received
- CD/Radio Inc. 2 x Loudspeakers
- VHF Aerials
- Transducer
- General Alarm System
- Clock
- Barometer
- GPS repeater
- 4 zone Interior Communication device with loud hailer at the top of wheelhouse

Aerials will be installed on the wheelhouse top railings.

28. **Anchor & Windlass**

An anchor is to be located in hawse pipe the forward deck. The anchor chain is to be connected to a deck plate with a lanyard.

The following equipment will also be supplied:

- **Mooring lines:** 25mm diameter : 4 lengths at 30m each
- **Anchor Windlass:** Electrical Windlass (DATA HIDROLIK) capable to work -20C degree
- **Anchor:** 1 piece with class approved weight
- **Anchor chain:** 100m short link with 10mm diameter Grade 80
- **Boathook:** 1 piece

29. **Life Saving Equipment**

The vessel is to be fitted with the following equipment:

- **Lifebuoy with Light:** 2 piece
- **Lifebuoy with 18m line:** 2 piece
- **6 man RFD life raft:** 2 piece with SOLAS Pack B (Flat Type)
- **Cradle and HRU for life raft:** 2 piece
- **Inflatable lifejackets:** 12 pieces
- **Set of rocket parachute flares:** 1 piece (6 pieces)
- **First aid kit:** 1 piece
30. Fire Protection
A fire suppression system (STAT-X) will be fitted to the engine space, manually operated from the wheelhouse. The system is to be sized to suit the engine room capacity.

A fire alarm and detection system is to be fitted. Visual and light alarm will be in wheelhouse control panel according to class requirement.

The following firefighting equipment is to be fitted:
- 2 x 6 kg dry powder extinguishers in wheelhouse/accommodation
- 2 x 9 liter foam extinguishers in engine room

31. Engine Room Ventilation, Boat Ventilation
Intake air is to be partly by natural flow and supply fans will provide combustion air to the engines.

All ventilators are to be fitted with manual shutoffs.

32. Air conditioning
Vessel will have 18.000 BTU Air-cooled Air-condition fitted on the top of the wheelhouse with heating and cooling capacity.

33. Sea Trials
The boat has to complete a full set of sea trials prior to shipment. Trials will include the following:
- Maneuvering trials
- Performance trial
- Operational tests of all equipment.
- Operational test of all alarms
- Draft Survey

When the boat has reached completion an inclining experiment will be carried out to determine the “as-built” lightship weight and center of gravity.

34. Markings
Draft mark, vessel name and registry to be steel plate welded
Owner shall provide details of Company Name, Vessel’s name and Port of Registry. The following marks shall be used:
- Company Name
- Vessel Name
- Port of Registry
- Draft marks in meters
- The Port of Registry marking on stern

All hull marks to be plate welded
All engraved plates markings in wheelhouse, engine room and valves to be in English.
35. Documentation
Following to be provided upon delivery in three sets of hard copy and 1 set electronic format:

- General arrangement drawing
- General construction drawings
- Paint list and documentation
- Paint inspection report
- Machineries operating manuals
- Machineries maintenance and spare parts manuals
- Stability information books
- Inventory list
- Dock and sea test reports

3 copies of all documents, instruction manuals and drawings are required and are to be provided in English.

36. Warranty
Builders warrant to the Buyer that the boat will be of satisfactory quality and fit for the purpose(s) made described on page 1 for which the Boat is supplied and will correspond with the Specification and any variation, addition or modification subsequently agreed between the Builder and the Buyer.

The Builders further warrant that the Boat will be free from defects in materials and workmanship for a period of 12 months from the time of delivery.
## MAKER LIST 15M TUGBOAT 1506

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<tr>
<th>ITEM</th>
<th>MAKER</th>
<th>ORIGIN</th>
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<td>2. MAIN ENGINES</td>
<td>VOLVO PENTA</td>
<td>SWEDEN</td>
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<td>3. MAIN ENGINES GEAR BOXES</td>
<td>TWINDISC OR ZF</td>
<td>USA - BE - UK</td>
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<td>5. FPP PROPELLERS</td>
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<td>6. NOZZLE</td>
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<td>8. RUDDERS</td>
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<td>9. E/ROOM SYSTEM PUMPS</td>
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<td>10. DECK MACHINERY (WINDLASS, CAPSTAIN)</td>
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<td>11. COATING</td>
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<td>12. E/ROOM AUTOMATION, MONITORING</td>
<td>PRAXIS OR SCHNEIDER</td>
<td>GERMANY - NETHERLANDS</td>
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<td>13. AIR-CONDITION &amp; HEATER</td>
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<td>IZZET CAKAN</td>
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<td>19. E/ROOM TANK LEVEL GAUGES</td>
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<td>20. INTERIOR PANELLING AND DOORS</td>
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<td>21. WET UNITS</td>
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<td>22. WIPPERS</td>
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<td>24. RUBBER FENDERS</td>
<td>ERMASKAN</td>
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<td>25. NAVIGATION LIGHTS</td>
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<td>26. SEARCH LIGHTS</td>
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<tr>
<td>29. BRIDGE ELECTRONICS FOR COMM.</td>
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