

25.0m MTUG OUTLINE SPECIFICATION OF
DESCRIPTION OF NEW BUILDING MULTI PURPOSE VESSEL
(Supply-Utility, Work Boat, Research Vessel)

| | |
|----------|--|
| 25.00 | Length overall, m |
| 24.80 | Length between perpendiculars, m |
| 8.00 | Breadth overall, m |
| 8.00 | Breadth, m |
| 4.50 | Depth, m |
| 3.50 | Middle Depth, m |
| 1.90 | Draught, m |
| 17.00 | Overall height from BL, m |
| 2×800 | Maximum continuous power of ME, kW |
| 10.0±0.3 | Tug speed in full load condition 2.9 m and 90% MCR, knots. On deep silent water for the recently painted case without biofouling. (N = 1600×0.9 = 1440 kW). |
| 5.0±0.3 | Tug speed with barge in full load condition at sea 2.9 m and 90% MCR, knots. On deep silent water for the recently painted case without biofouling. (N = 1600×0.9 = 1440 кВт). |
| >200 | GT* |

BV* Ice2 AUT3-C + HULL + TUG/ COASTAL AREA SERVICE

TABLE OF CONTENTS

| | PAGE |
|--|-------|
| SECTION 1 – GENERAL | 4 |
| 1.1 General Description | 4 |
| 1.2 Principal Particulars | 4 |
| 1.3 Capacities (nominal) | 4 |
| 1.4 Performans | 4 |
| 1.5 Service Conditions | 5 |
| 1.6 Classification | 5 |
| SECTION 2 – STRUCTURE | 5 |
| 2.1 General | 5 |
| 2.2 Main Deck | 5 |
| 2.3 Shell Plating | 5 |
| 2.4 Bulkheads | 5 |
| 2.5 Pillars, Girders, Floors | 5 |
| 2.6 Hawse Pipe and Anchor Pocket | 6 |
| 2.7 Chain Lockers | 6 |
| 2.8 Bulwarks | 6 |
| 2.9 Deckhouse | 6 |
| 2.10 Wheelhouse | 6 |
| 2.11 Materials and Workmanship | 7 |
| 2.12 Welding | 7 |
| SECTION 3 – OUTFIT & FURNISHINGS | 7 |
| 3.1 General | 7 |
| 3.2 Access,Lights and Closures | 7-8 |
| 3.3 Linings and Partitions | 8 |
| 3.4 Insulation | 8 |
| 3.5 Deck Coverings | 8 |
| 3.6 Domestic Outfitting | 8-10 |
| 3.7 Galley Outfitting | 10 |
| 3.8 Wheelhouse Outfitting | 10 |
| 3.9 Fenders Outfitting | 10 |
| SECTION 4 – PAINTING & CATHODIC PROTECTION | 11 |
| 4.1 General | 11 |
| 4.2 Painting Schemes | 11-12 |
| 4.3 Cathodic Protection | 12 |
| 4.4 Exterior Signs and Markings | 12 |
| SECTION 5 – DECK MACHINERY EQUIPMENT | 12 |
| 5.1 Anchoring System | 12 |
| 5.2 Towing System | 11-12 |
| 5.3 Deck Crane | 13 |
| SECTION 6 – PROPULSION MACHINERY EQUIPMENT | 13 |
| 6.1 Main Engine | 13-14 |
| 6.2 Propulsion Equipments | 14 |
| SECTION 7 – ELECTRICAL SYSTEMS | 14 |
| 7.1 System Description | 14 |
| 7.2 Generator Sets | 14-15 |
| 7.3 Batteries and Chargers | 15 |
| 7.4 Main Switchboard | 15 |
| 7.5 Distribution Panels | 16 |

| | | |
|---|--|-------|
| 7.6 | Transformers..... | 16 |
| 7.7 | Lighting | 16 |
| 7.8 | Navigation Lighting | 16 |
| SECTION 8 – SHIPS SERVICES..... | | 16 |
| 8.1 | Piping System General | 16 |
| 8.2 | Fill, Vent and Sounding | 17 |
| 8.3 | Fuel System | 17 |
| 8.4 | Bilge, Ballast, Fire & G.S System | 17 |
| 8.5 | Oily Water System | 18 |
| 8.6 | Compressed Air System..... | 18 |
| 8.7 | Hydraulic System..... | 18 |
| 8.8 | General & Wash Deck System..... | 18 |
| 8.9 | Fresh Water System | 19 |
| SECTION 9 - FIRE, SAFETY & LIFE SAVING EQUIPMENT..... | | 19 |
| 9.1 | Fire - Safety Equipment..... | 19 |
| 9.2 | Life Saving Equipment..... | 19-20 |
| SECTION 10 - DOMESTIC SYSTEMS | | 20 |
| 10.1 | Accommodation Air Conditioning System..... | 20 |
| 10.2 | Accommodation Ventilation System | 21 |
| 10.3 | Machinery Spaces Ventilation System | 21 |
| 10.4 | Potable Water System | 21 |
| 10.5 | Black Water System..... | 21 |
| SECTION 11 - CONTROL, COMM.& NAVIGATION SYSTEM..... | | 21 |
| 11.1 | General..... | 21 |
| 11.2 | Steering System..... | 22 |
| 11.3 | Machinery Controls / Instrumentation | 22 |
| 11.4 | Alarm Systems..... | 22-23 |
| 11.5 | Navigation and Communication Systems..... | 23 |
| SECTION 12 - EXTERNAL FIRE FIGHTING SYSTEM | | 23 |

PoSeiDoN Maritime Engineering Co.

SECTION 1 – GENERAL

1.1 General Description

The vessel designed by **PoSeiDoN** Maritime Engineering Co / Turkey and described by this outline specification is a triple-screw, ship assist and general purpose tug with steel hull.

Propulsion is by three identical high-speed marine diesel engines, each driving through a reverse-reduction gearbox to solid propeller located in a thrust-augmenting nozzle aft. Steering is by three sets of high aspect ratio rudders, one set located abaft each nozzle.

The vessel completely outfitted and equipped for assisting in docking, ships in berthing in port, pushing, fire-fighting and dock facilities.

1.2 Principal Particulars

Length O.A extreme : 25,00 Mt.
Breadth moulded : 8,00 Mt.
Depth moulded : 4,50 Mt.
Draught -light operating- : 1,90 Mt.
Draught -deep operating-: 2,50 Mt.

1.3 Capacities (nominal)

Fuel Oil : Appr. 150.00 tonnes
Fresh Water : Appr. 50.00 tonnes
Complement : 11 persons

1.4 Performance

Bollard pull : 20 Tons (ahead at % 100 MCR)
Speed : 10 Knots free running

1.5 Service Conditions

The vessel is designed for operation in international waters, ambient conditions shall be:

SUMMER

Max. air temperature : + 35 °C
Humidity : 70 %
Sea water temperature : + 32 °C

WINTER

Max. air temperature :-10°C
Humidity : 70 %
Sea water temperature:+ 5 °C

1.6 Classification

The vessel is to be constructed, machinery installed and equipment in accordance with Rus register maritime:

BV* Ice2 AUT3-C + HULL + TUG + COASTAL AREA SERVICE

SECTION 2 – STRUCTURE

2.1 General

The hull of vessel to be of all welded steel construction. Transverse framing system is to be used throughout. The following scantlings and construction to approval of classification society. Scantling to be as shown on plans, with the following nominal incremental increases above class rule minimums. All welding to class standards as minimum.

| | |
|------------------|--|
| Side Structure | : 35 % |
| Bottom Structure | : 25 % |
| Hull | : All welded mild steel, grade A or equal. |
| Deckhouse | : All welded mild steel, grade A or equal. |
| Wheelhouse | : All welded mild steel, grade A or equal. |

2.2 Main Deck

Deck plating shall comply with class requirements. Deck construction in way of deck machinery shall be reinforced with insert plates of increased thickness.

Deck machinery seating shall be arranged in accordance with class / machinery manufacturer's requirements and shall have sufficient clearances to facilitate deck maintenance.

2.3 Shell Plating

The stern shall be built of rolled steel plate sufficiently stiffened with closely spaced breast hooks and a centerline girder. The bow and stern shall be sufficiently stiffened for pushing operation. Side shall and bottom plating not less than 8 mm thick.

2.4 Bulkheads

Steel watertight / oil tight bulkheads shall be of welded flat plate construction and shall be suitably tested after erection. Where girders or other members are stopped at each side of the bulkhead and bracketed off, proper alignment of the brackets on each side shall be taken to maintain the continuity of strength. Where cables and pipes pass through bulkheads approved watertight penetrations shall be fitted.

2.5 Pillars, Girders, Floors

Pillars shall be erected at appropriate positions, which shall not obstruct access at passage-ways. Engine girders plate with riders plate shall be extended for and aft beyond the engine compartment. Inter-costal and transverse floors shall be fitted with flange. Engine foundations to be rigid and integrated in to the hull structure.

2.6 Hawse Pipe and Anchor Pocket

Shell plating shall be recessed to house anchor flukes in line with the vessel's side. The anchors shall be able to stored tight in the hawse pipes and must not protrude from hull perimeter. Plating at the recess shall be thicker.

Hawse pipes of rolled steel plates or seamless pipes shall be fitted port and starboard to suit specified anchors. The diameter shall be adequate to take the shank of the anchors. Water-jets shall be incorporated for washing.

2.7 Chain Lockers

Chain lockers shall extend to raised deck level and shall be sufficient capacity for the stowage of required length of cable.

The chain lockers shall be watertight. They shall be fitted with heavy perforated steel plates to form a false bottom and bilge suction from hand pump shall be arranged. Access manhole shall be provided.

2.8 Bulwarks

Steel plate bulwark extending for the full length of the vessel shall be welded to the deck and stiffened by SCH 40 full pipe, 20 solid. Bulwark plating at the bow and stern regions shall be reinforced.

Bulwarks shall be supported by stays spaced every two frames. They shall be sufficiently strengthened for pushing by bow. Bulwarks shall have a tumble home not less than 200 mm to prevent damage to them when the vessel is rolling alongside other vessels. Bulwark on aft deck sides to be vertical in line with raised deck side shell. The bulwarks shall incorporate freeing ports and mooring holes or other openings are made, doubler rings of round bar shall be inserted.

2.9 Deckhouse

Deckhouse shall have plating all round of 6 mm thickness. Vertical stiffeners shall be fitted. Corners of deckhouse shall be rounded to give a pleasing appearance and the construction shall be that the spaces are lit and aired to statutory requirements, as shown on the G.A drawing.

2.10 Wheelhouse

The wheelhouse shall have plating all round of 6 mm thickness. The wheelhouse window arrangement shall be such that maximum upwards and all round vision is possible consistent with the strength of the structure. The false ceiling to be maximum sloped to minimize obstruction to upward vision.

2.11 Materials and Workmanship

All materials and workmanship are to be of the good quality. All steel and aluminum plates, sections, hull forging and castings are to meet class requirements and supplied with mill certificates where required by classification.

All woods used to be suitable for the intended purpose and of good quality. All timber to be free from knots. All smith work or fabricated fittings to be of neat design, strong, smooth & free from defects.

All castings to be of good quality close grained and free from all cracks, blowholes and other defects.

2.12 Welding

The vessel to be of all welded construction, in accordance with plans, specifications and classification. In general, double continuous welding to be adopted for all fresh water, ballast, oily bilge tanks and machinery bilges.

Welding to be in accordance with class requirements. All steel used to be of good welding quality, free from laminations or other harmful defects and be class approved. Electrodes to be selected from classification approved lists. Welding schedules to meet classification requirement / standard. High standards of up-to-date welding practice and procedures are to be applied, associated with accurate alignment, fairness, edge preparation and gap widths.

SECTION 3 – OUTFIT AND FURNISHINGS

3.1 General

The accommodation is to be arranged and fitted out in accordance with the General Arrangement drawing. Ship office, captain cabin and galley starboard side on the main deck and mess room is port side on the main deck provided. One officer cabin and two double berth crew cabin starboard side, also one officer cabin and two double berth crew cabin port side on the below deck. Accommodation spaces isolated from the main deck with floating floor and 60 mm foil acoustic and fire insulation A-60 standards. A smoke detecting alarm system should be installed in accommodation of cabins, wheelhouse, mess, engine room, propulsion room, etc. Full height windows fore and aft and chopped of exhaust casings offer superb good all-round visibility from the raised wheelhouse.

3.2 Access, Light and Closures

ENGINE ROOM ESCAPE

- steel coamings, 100 x 1000 mm coaming.

MAIN DECK WINDOWS

- Steel frames with welded to plate, square type, deadlight ,8 mm glass.

BRIDGE WINDOWS

- Forward, aft and side wheelhouse windows of 12 mm safety glass in steel frames with welded to plate, fixed type.
- All overhead windows of 10 mm polarized glass in steel frames with welded to plate, fixed type.
- All windows are tempered glass to suit the class requirements.
- Forward windows have electrical heated glass.

EXTERNAL DOORS

- All external doors on the main deck to be of steel with coaming heights according to the Load Line requirements. Six dogs workable both sides are to be fitted with clips and grease fittings. The doors to be channel-framed tightened to gaskets of soft neoprene or similar. Wheelhouse door to be spray GRP type.

MANHOLES

- Tank and compartments manholes are 400 x 600 mm raised type, deck manholes are 600 x 600 mm flush type., BOW TH. ROOM

3.3 Linings and Partitions

Coordinated 25 – 50 mm steel sandwich panel joiner system with Rockwool insulation and decorative finish. System complete with ground bars, overhead retainers, joint and corner connections, joint and corner mouldings, door frames and doors. All materials to class and SOLAS requirements.

3.4 Insulation

Accommodation spaces, wheelhouse , isolated 60 mm foil faced Rockwool acoustic and fire insulation to A-60 standards.

3.5 Deck Coverings

Crew rooms, mess, corridors : Commercial grade, non skid vinyl.
Wheelhouse : Commercial grade, non skid vinyl.
Toilet-lavatories : Ceramic.
Machinery, propulsion rooms : Aluminum floor plates, screwed to angel bars.

3.6 Domestic Outfitting

CAPTAIN / ENG. Cabin – BOAT DECK –

- Single berth with drawers under
- Bed clothes
- Desk
- Wardrobe locker
- Key locker
- Book shelf
- Waste basket
- Lifejacket rack
- Wet unit (washbasin, shower and toilet)
- Table
- TV

CEREW MESS ROOM – MAIN DECK –

- .

OFF. MESS ROOM – MAIN DECK –

- .

3.7 Galley Outfitting

Galley to be equipped to good commercial standards. Provide full outfit of appliances and furnish as follows:

- Hot top electric range/oven
- Refrigerator
- Freezer
- Microwave oven
- Tea maker
- Sink counter
- Cupboards
- Waste basket
- Fire blanket
- Exhaust fan

3.8 Wheelhouse Outfitting

- Control console – fwd –
- Radio watch clock & clock
- Helm chair
- Flag locker & book shelf
- Barometer
- Binocular boxes – 2 pcs –
- Emergency lighting panel
- Fire detection panel
- General alarm panel
- Miscellaneous electrical panels

3.9 Fenders Outfitting

SECTION 4 – PAINTING and CATHODIC PROTECTION

4.1 General

All steel surfaces are to be shot blasted and primed with epoxy type shop primer paints. After fabrication all external welding, mechanical damage and deterioration of shop primer to be blasted to SA 2.5 standard and paint control of supplier representative. Paint system lifespan is 36 months.

4.2 Painting Schemes

As guidance only the following painting scheme or equal may be used to be developed further in association with the INTERNATIONAL paint supplier. Paint system to be suitable for 3 years protection.

| <u>PAINT AREA</u> | <u>INTERNATIONAL</u> |
|--|--------------------------|
| <u>UNDER WATER AREA</u> | |
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |
| Epoxy sealer | Intergrad 263 Light Grey |
| Tin free hydrolysing spc af | Intersmooth 465 D.Red |
| Tin free hydrolysing spc af | Intersmooth 465 Brown |
| Tin free hydrolysing spc af | Intersmooth 365 D.Red |
| <u>ABOVE WATER LINE AREA</u> | |
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |
| Arcylic topcoat (final colour) | Intersheen 579 |
| <u>MAIN DECK AREA</u> | |
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |
| Arcylic topcoat (final colour) | Intersheen 579 |
| <u>SUPER STRUCTURE AREA</u> | |
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |
| Arcylic topcoat (final colour) | Intersheen 579 |
| <u>BEHIND LININGS AND INSULATION AREA</u> | |
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| <u>WITHOUT LININGS AND INSULATION AREA</u> | |
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Alkyd finish (final colour) | Intersheen 579 |

ENGINE ROOM, PROPULSION ROOM AND STORES AREA

| | |
|-------------------------------|------------------------|
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Alkyd finish (final colour) | Intersheen 579 |

ENGINE ROOM UNDER FLOOR AREA

| | |
|-------------------------------|------------------------|
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |

CHAIN LOCKERS

| | |
|-------------------------------|------------------------|
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |

BALLAST AND POTABLE F. W TANKS

| | |
|-------------------------------|------------------------|
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |

SEWAGE, SLUDGE AND BILGE TANKS

| | |
|-------------------------------|------------------------|
| Pure epoxy abrasion resistant | Intershield 300 Bronze |
| Pure epoxy abrasion resistant | Intershield 300 Grey |

4.3 Cathodic Protection

All anods material low iron zinc and weld-on type. Anodes to be fitted around hull, including sea chests, nozzles and in way of propellers. The number, size and disposition of the anodes shall be in accordance with the supplier's for three (3) years protection.

4.4 Exterior Signs and Markings

Permanent markings shall be made on the exterior of the hull or superstructure in the form of raised letters cut of 5 or 6 mm steel plate continuously welded indicating:

- Draft marks at fwd. and aft
- Load line marks at port and starboard
- Vessel's name on bow sides or bulwark, port and starboard
- Vessel's name and port of registry at transom
- Logo on funnel casing

SECTION - 5 DECK MACHINERY EQUIPMENT

5.1 Anchoring System

- 2 pcs spek type stockless bower anchors, 300 kg/each, incl. crown-schakle.
- 300 mt. stud link chain cables, dia 18 mm, grade U2, with all fittings.
- All equipments have class approved.

5.2 Towing System Equipments

HYDRAULIC ANCHOR WINDLASS

| | |
|--------------------|-------------------------------|
| Wildcat | : 2 pcs. 18 mm. Q2 Stud-link |
| Warping Head | : 2 pcs. |
| Working Axis | : Horizontal |
| Max. Pulling Force | : 1300 kg. |
| Pulling Speed | : 12 m/min. |
| Control | : Local control on main deck. |

CAPSTAN

| | |
|--------------------|-------------|
| Diameter | : 320 mm |
| Working Axis | : Vertical |
| Max. Pulling Force | : 1000 kg. |
| Pulling Speed | : 12 m/min. |

5.3 Deck Crane

One hydraulic pump directly driven by main engine via clutchable power take off. The crane will be manufactured and tested at the max. continuous rating in manufacturer workshop in accordance with the requirements of the classification society.

| | |
|------------------|--|
| Type | : Hydraulic, knuckle boom |
| Lifting capacity | : 29,5 tonnes at 5,6 mt, and 8.85 ton at 16,30 mt. |
| Slewing angle | : 340° |
| Lifting speed | : 1.25 m |

SECTION - 6 PROPULSION MACHINERY EQUIPMENT

6.1 Main Engine

Three (3) high speed, four stroke, turbo charged, intercooled, marine diesel engines. The standart engine complies with the max. permissible NOx emission according to MARPOL 73 / 78 ANNEX VI. The engine will be tested at the max. continuous rating in manufacturer workshop in accordance with the requirements of the classification society. Alarm, safety and control system parameters and sensors according to class requirements.

Main particulars

| | |
|---------------------------|--|
| Max. continuous rating | : 720 BHP |
| Speed | : 1800 rpm |
| Configuration | : In - line type diesel engine |
| Number of cylinders | : 6 cyl. |
| Ambient air temperature | : + 50 °C |
| Cooling water temperature | : + 38 °C |
| Lube oil system | : Direct driven lub.oil pump, wet sump |
| Cooling system | : Combined HT / LT sea water tube cooler type. |
| Starting system | : Electrical, 24 VDC. |
| Exhaust system | : Gas silencer with spark arrestor approx. 25 dbA. |
| Gear ratio | : 5 / 1 |

6.2 Propulsion Equipments

- C-45 shafting system with bronze liners in way of water lubricated bearings and stuffing box.
- Steel stern tube, water lubricated bearing at aft end, bronze stuffing box at forward end.
- Taper fit type shaft couplings.
- Water lubricated stern bearing in steel boss supported by A brackets.
- All water lubricated cutlass bronze bearings inserted inside 15 mm wall thickness bronze sleeves which are carefully inside chockfast.

SECTION - 7 ELECTRICAL SYSTEMS

7.1 System Description

Vessel to be equipped with an up to date marine power generation system. Shore power connection for 100 Amp. service.

7.2 Generator Set

Provide two (2) marine diesel driven generator sets. Diesel engine and alternator is mounted on a common marine bed frame, manufactured of electro welded steel profiles and also mounted on vibration damper, which is mounted between the set and bed frame. The standard engine complies with the max. permissible NOx emission according to MARPOL 73 / 78 ANNEX VI. The engine will be tested at the max. continuous rating in manufacturer workshop in accordance with the requirements of the classification society.

Alarm, safety and control system parameters and sensors according to class requirements.

Main particulars

ENGINE ROOM GENERATOR

Power : 150 kW DOOSAN (ADI136T+ECP34+2L)
Voltage, frequency : 3 x 400 Volt, 50 Hz, 3 ph
Speed : 1500 rpm
Ambient air temperature : + 50 °C
Cooling water temperature : + 32 °C
Number of cylinders : 4
Configuration : In – line engine
Enclosure : IP 23
Exhaust system : Gas silencer with spark arrestor appr. 25 dbA.
Cooling system : Combined HT / LT sea water tube cooler type.
Starting system : Electrical, 24 VDC.

EMERGENCY GENERATOR

Power : 55 kW / 55Kw 50Hz DOOSAN
Voltage, frequency : 3 x 400 Volt, 50 Hz, 3 ph
Speed : 1500 rpm
Ambient air temperature : + 50 °C
Cooling water temperature : + 32 °C
Number of cylinders :
Configuration : In – line engine
Enclosure : IP 23
Exhaust system : Gas silencer with spark arrestor appr. 25 dbA.
Cooling system :
Starting system : Electrical, 24 VDC.

7.3 Batteries and Chargers

Provide heavy duty, marine batteries fitted with premium separators for the following duties :

Main engine starting : 24 V DC
Generator starting : 24 V DC
Essential services : 24 V DC
Navigational aids : 24 V DC
Radio systems : 12 V DC

Provide marine type battery chargers for each battery systems.

- 220 / 1 / 50 power supply.
- 24 V or 12 V DC output as required.
- Recharge fully depleted battery with in 6 hours.
- Engine driven charging alternator with sufficient capacity to recharge the auxiliary engine starting batteries from a dead state to normal starting requirements with in 6 hours.
- Emergency main engine starting battery charger with one output capable of charging both sets of main engine starting batteries from a dead state to normal starting requirements with in 6 hours.

7.4 Main Switchboard

- Marine type, compact, free standing, front access main switchboard.
- Located in engine room.
- Instruments to indicate voltage, frequency, shore power.
- Incorporate main 400 volt power distribution.
- Circuit protection by approved circuit breakers.

The main switchboard will be tested at the max. continuous rating in manufacturer workshop in accordance with the requirements of the classification society. All switchboard equipments are according to class requirements.

7.5 Distribution Panels

- Distribution panel for engine room, accommodation and wheelhouse.
- Circuit protection by approved circuit breakers.
- Space for minimum of 10 % spare breakers in each distribution panel.
- Panels installed flush with wall surfaces.

7.6 Transformers

- Transformers supplied for converting from 380 volt to 220 volt.
- Capacity to be determined by electrical load analysis.
- Located in well-ventilated area of machinery space.

7.7 Lighting

INTERIOR LIGHTING

- Standard fluorescent fixtures in accommodation.
- Vapour tight fluorescent fixtures in machinery spaces.
- Emergency lighting to SOLAS.

EXTERIOR LIGHTING

- Water proof fluorescent fixtures in main deck and bridge deck.
- 2 x 500 Watt floodlight fore castle deck.
- 1 x 1000 Watt remote control searchlight fore castle deck.
- 2 x 1000 Watt floodlight aft main deck.

- 1 x 1000 Watt remote control searchlight aft main deck.
- Emergency lighting to SOLAS.

7.8 Navigation Lighting

- Marine type, dual lamp type main lights, single lamp type NUC lights.
- To meet IMO and COLREG requirements.
- Navigation light panel mounted in wheelhouse, with individual circuit for each lamp, visual status indication, visual lamp failure alarm.

SECTION - 8 SHIP'S SERVICES

8.1 Piping System General

All pipes are to be arranged according to good marine practice with sufficient bore and thickness for the purpose intended. They are to be well clamped to the ships structure and to have minimum number of bends. Approved type of bulkhead fitting is to be used where piping penetrates a watertight or oil tight bulkhead, deck or tank top. Expansion bends are to be fitted where necessary to avoid damaged due to expansion or movement of the structure. Mud boxes, strainers, filters and valves are to be arranged according to class requirements. All seawater pipes are to be SCH 80 and galvanized. All fittings are to be flanged or butt welded. All tanks to be fitted with air vent pipes and suitable vent heads.

8.2 Fill, Vent and Sounding

- Provide tanks and compartments with fill, vent and sounding arrangements in accordance with class requirements.
- Striker plates at bottom of sounding pipes.
- Sea chests to be vented and fitted with air purge connection.

8.3 Fuel System

Fuel oil pipes of seamless black mild steel of Sch-40 are to be arranged with valves, filters, manifolds, pumps and tanks in accordance with the piping drawing and to meet class requirements. Sounding and air pipes are to be fitted each tank.

Fuel filters on suction line, all fittings are to be flanged or butt welded. M / E fuel returns to fuel service tanks.

FUEL TRANSFER PUMP

- Horizontal, mech. seal, gear pump
- 5 m³ / h, 20 m. head, cast iron casing and valve, F-114 shaft
- 400 V, 50 Hz, 3 ph

8.4 Bilge, Ballast, Fire & G.S System

Bilge-ballast pipes of galvanized steel of Sch 65 are to be arranged with valves, strainers, mud boxes, manifolds and pumps in accordance with the piping drawing and to meet class requirements. Filling, suction and sounding pipes are to be fitted each tank. Pumping capacities and pipe sized in accordance with classification rules. Fire & G.S pump to supply flow and pressure required by class, also be selected and arranged to serve as back up bilge pump.

BILGE – BALLAST-FIRE PUMP

- Single stage, horizontal, self priming, centrifugal pump.
- 30 m³ / h, 25 m. head, cover-housing-impeller bronze, shaft st. steel.
- 400 V, 50 Hz, 3 ph.
- Pump to be selected and arranged to serve as back-up fire & g.s pump.

8.5 Oily Water System

Separate oily bilge system with discharge pump and oily water storage tank. Deck discharge for oily water using oily water discharge pump.

OILY WATER DISCHARGE PUMP

- Single stage, horizontal, self priming, centrifugal pump.
- 2 m³ / h, 20 m. head, cast iron casing, bronze impeller, st. steel shaft .
- 400 V, 50 Hz, 3 ph

8.6 Compressed Air System

To serve towing hook, whistle and utility services. Sea chests fitted with non-corroding air connection. The compressor, receiver and other equipments will be tested at the max. continuous rating in manufacturer workshop in accordance with the requirements of the classification society. All equipments according to class requirements.

AIR COMPRESSOR

Type : Two stage, two cylinder, V line, air cooled, electric motor driven.
Capacity : 246 lt / min.
Quantity : 1 pc.
Working press: 15 bar
Max. press : 20 bar

AIR RECEIVER

Type : Vertical.
Capacity : 150 liter
Quantity : 1 pc.
Design press. : 15 bar
Test press. : 25 bar
Diameter : 450 mm

8.7 Hydraulic System

The hydraulic piping of solid drawn steel for the towing winches and deck cranes to be arranged in accordance with the manufacturers recommendations and class requirements. Adequate strainers to be provided.

8.8 General & Wash Deck System

8.9 Fresh Water System

Fresh water piping system of galvanized pipe of SCH 40. Fresh water tanks are to be arranged as shown on the G.A drawing. Fresh water is to be supplied to the accommodation and engine room through self contained, automatic pressure tanks fitted in engine room.

Hot fresh water is to be draw from the cold fresh water in to an approx. 60 liters electric heater installed in the engine room. Supply points are at the buffet and shower & toilet unit.

SECTION - 9 FIRE, SAFETY and LIFE SAVING EQUIPMENTS

9.1 Fire – Safety Equipments

FIRE DETECTION and ALARM SYSTEM

- Indicated at central display in wheelhouse.
- All equipments according to class requirements and EC type approval certificate.
- All accommodations (cabins and wheelhouse), machinery spaces and propulsion room provided heat and smoke detectors.

PORTABLE FIRE EXTINGUISHERS

- All equipments according to class and flag authority requirements and EC type approval certificate.

Wheelhouse : Portable, ABC powder, 6 kg, 1 pc.
Main Deck : Portable, ABC powder, 6 kg, 2 pcs.
Below Deck : Portable, ABC powder, 6 kg, 2 pcs
Aft Store : Portable, ABC powder, 6 kg, 1 pc.
Steering Room: Portable, ABC powder, 6 kg, 1 pc.
Engine Room : Portable, ABC powder, 6 kg, 4 pcs.
Wheeled, FOAM, 25 litre, 1 pc.

FIXED CO2 EXTINGUISHING SYSTEM

The vessel CO2 high pressure fire extinguishing system is accordance with SOLAS class and flag authority requirements. All equipments have EC type approval certificate. It consist in the system calculation off CO2 cylinders installed in the store. The CO2 cylinders are pneumatic and manual operated including pneumatic operated master valve.

Space Description : Engine room.

9.2 Life Saving Equipments

LIFE RAFT

- Throw overboard, 12 persons, 2 pcs.
- Galvanized deck cradle complete with lashings.
- Hydrostatic release unit for life rafts, w / schakle.
- Emergency pack A,
- SOLAS and EU Marine Directive certificate.

OTHER EQUIPMENTS

All equipments are accordance with SOLAS, class and flag authority requirements and have EC type approval certificate.

- Fire blanket in container 1 pc
- Escape set, air cylinder 3 ltr/200 bar, with brackets 2 pcs
- Life jacket, retro tape, signal whistle 12 pcs
- Survival suit, universal, adult, reflective panels 12 pcs
- Emergency light, fits to any life jacket and immersion suit 12 pcs
- Thermal protective aids with sleeves 12 pcs
- Life buoy ring 2.5 kg with light 6 pcs
- Life buoy ring 4 kg 2 pcs
- Signal ball black, cloth type 3 pcs
- Diamond shape black, cloth type 2 pcs
- Signal cone black, cloth type 2 pcs
- International signal flags, set 1 pc
- Line throwing apparatus 4 pcs
- Parachute rocket 6 pcs
- Hand flare 4 pcs
- MOB 2 pcs

SECTION - 10 DOMESTIC SYSTEMS

10.1 Accommodation Air Conditioning System

A/C unit is self contained marine type. The system is based on 30-70 % return air, which is the maximum obtainable return air volume and allows for 30 m³/h fresh air per hour person. The fresh air-return air inlet, equipped with manual external adjustable dampers. All equipments are accordance with SOLAS, class and flag authority requirements and have EC type approval certificate.

DESIGN CONDITIONS

Cooling Period

Outside : + 40⁰ C DB, 50 % RH
Inside : + 29⁰ C DB, 50 % RH
Cooling water : +32⁰ C (sea water)
Cooling medium : R-404a, direct expansion
Heating medium : Electric heating coil
Regulations : ISO 7547, SOLAS 1974 amendments of 81/83/89/90/2000

Heating Period

Outside : - 15⁰ C
Inside : +20⁰ C

10.2 Accommodation Ventilation System

System is equipped insulated duct pipes and fittings. Separate exhaust fans:

- Accom. : 600 m³/h, duct fan, 2 pcs.
- Galley : 360 m³/h, duct fan.
- Sanitary : 360 m³/h, duct fan.

10.3 Machinery Spaces Ventilation System

ENGINE ROOM

- Type : Supply, axial, reversible.
- Capacity : 10.000 m³/h-each-
- Quantity : 2 pcs
- Natural exhaust through stacks
- Max. engine room temperature + 45⁰ C

PROPULSION ROOM

- Natural exhaust through stack.

STORE ROOM

- Natural supply and exhaust through stacks.

10.4 Potable Water System

- Pressure unit:: 2 pcs, electrical , centrifugal, complete with store 100 ltr. Tank.
- 60 liters hot water tank, 2 pcs.

10.5 Grey Water System

- Separate grey water system with discharge pump and storage tank.
- Deck discharge for grey water using water discharge pump.
- Grey water discharge pump: 5 m³/h, 20 m. head capacity, open impeller.
- International discharge connection.

SECTION - 11 CONTROL, COMM. and NAVIGATION SYSTEM

11.1 General

Provide local and wheelhouse controls suitable in accordance with class requirements. Operations controlled from the wheelhouse include:

- Operation of the main engine.
- Steering control
- Operation of towing hook

11.2 Steering System

- The vessel is steered directly by the multiple rudder system specified herein. An autopilot is provided for simplified control of the vessel on transit voyages.
- Two independent electro hydraulic pump sets driven by main engines, each capable of operating rudders hard over to hard over min. 9 seconds, max 18 seconds.
- Provide high lift, high aspect ratio twin rudders behind each nozzle with :
 - Water lubricated main bearings
 - SKF spherical roller carrier bearing in flanged steel housing
 - Water lubricated pintle bearing
 - Bronze stuffing box
 - Split housing for pintle bearing
- Autopilot interfaced with compass.
- Emergency steering by means of manually operated tackle in steering compartment and wheelhouse.
- Steering system to classification society requirements.
-

11.3 Machinery Controls / Instrumentation

MAIN ENGINE / GEAR BOX

- Provide local and remote (wheelhouse)engine starting / stopping.
- Provide local and remote (wheelhouse)emergency stopping.
- Electronic engine and gear control system at wheelhouse. Emergency control operating in engines and gear box control panels.

DECK MACHINERY

- Provide controls for the towing hook in the wheelhouse console.

11.4 Alarm Systems

ALARM MONITORING SYSTEM

- Provide an electronic based alarm system on wheelhouse and engine room for :
 - machinery functions
 - high bilge level
 - high tank level
 - electrical power functions
- Provide 10% spare alarms in addition to the alarm points required by requirements of class and regulatory authorities.

GENERAL ALARM

- Provide general alarm comply with the all requirements of class and regulatory authorities.
- Provide an audible alarm for this system distinct from all others in high noise areas.

FIRE DETECTION AND ALARM SYSTEM

- Provide a fire detection system for the protection of all machinery spaces, accommodation areas to satisfy the requirements of class and regulatory authorities.
- Detect abnormal air temperatures, rate of temperature rise and abnormal concentration of smoke as required.
- Provide a continuously electrically supervised type system, capable of automatically indicating on the alarm annunciator panel in the wheelhouse, the zone and detector in which the alarm occurs.
- Provide an audible alarm for this system distinct from all others in high noise areas.

11.5 Navigation and Communication Systems

Supply and install a comprehensive a system to comply with requirements for safe navigation of regulatory authorities harbour and coastal service and GMDSS A1.

- Marine radar, colour and LCD screen, 24 mile 1 set
- VHF 2 set
- GPS & chart plotter & echosounder 1 set
- Navtex 1 set
- Autopilot 1 set
- Magnetic compass 1 set
- Batteryless telephone system 1 set
- Talk back system 1 set

SECTION –12 EXTERNAL FIRE FIGHTING SYSTEMS

