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1.1、 PREFACE

It is the intent of the Specifications to give technical descriptions to hull construction, out-fittings, machinery, and electric installation of the 7200HP Supply Vessel.

The following plans are to be associated with and to form an integral part of the Specifications.

Drawing No. : BT607-100-02 Drawing No. : BT607-400-01 Drawing No. : BT607-110-02 General Arrangement Machinery Arrangement in Engine Room Midship Section

It is to be understood that the descriptions in the General Part are to be applied to the whole of the subsequent parts viz. Hull, Outfitting, Machinery and Electrical parts, whereas those in the subsequent parts are to be primarily applied only to the relevant part in which they appear and to have no effect elsewhere.

Anything twice or more mentioned in the Specifications is to be only once supplied or executed.

If there should be any inconsistencies or contradictions between the Specifications and plans, the former is to be given priority.

Details of the design and construction not covered by the specification are to be carried out according to international shipbuilding practice/ standard.

Except noted otherwise, Metric units shall be used as measurement to Hull, Outfitting, Machinery and electrical installation.

The following abbreviations shall be on behalf of the organizations as below: RINA: Italian Classification Society CCS: China Classification Society IMO: International Maritime Organization

1.2 General Descriptions

The vessel is to be all welded steel construction with twin diesel engine and equipped with two(2) Controllable Pitch nozzle Propellers. The vessel's engine room is to be located in the middle, accommodation forward is to be located on and above the main deck with bow thruster compartment under.

The Vessel is to be designed in such a way that the following roles can be obtained:

- (1) Transport liquid cargo, stores, materials & equipment
- (2) External fire fighting
- (3) Move men and materials between platforms
- (4) Anchor Handling operation and towing service for offshore engineering

(5) Operation to be 24 hours/day continuous operation, capable of remaining on station for a minimum of 30 days.

The climatic conditions, which the Vessel shall be operated, are to be at the maximum

of:

- Sea water temperature 32° C
- Ambient air temperature -15°C~45°C
- Relative air humidity 85%
- Wind velocity 18 m/sec
- Significant wave height 2.5M
- Current velocity 1.0M/sec
- Wave period 10 sec

These climatic conditions shall be considered in the design of the Vessel including its equipment.

1.3 Main Particulars

1.3.1, Pricipal Dimensions

| Length Overall L _{OA} | .58.800m |
|---|----------|
| Length Between Waterline L _{WL} | .56.870m |
| Length Between Perpendiculars L _{BP} | .51.560m |
| Breadth Moulded B | 14.00m |
| Depth Moulded D | 6.50m |
| Design Draught T _{Design} | 5.35m |
| Scantling Draught T _{Scantling} | 5.525m |
| Deck height between main deck and F'cle | 2.80m |
| Deck height between F'cle and upper F'cle | 2.85m |
| Height between upper F'cle and Wheelhouse | 2.80m |
| Height between Wheelhouse and Compass | 2.75m |
| Frame Spacing | 600 mm |
| | |

1.3.2、Complement

| 4×1 Man Cabins | |
|-------------------------|--------|
| 2×2 Man Cabins | 4 Men |
| 2×4 Man Cabins | 8 Men |
| Total | 16 Men |
| Emergency accommodation | |
| 1×2 Man Cabins | 2 Men |
| 2×4 Man Cabins | 8 Men |
| Total | 10 Men |
| Grand Total | 26 Men |

1.3.3 Performance

| Deadweight at draft 5.35m | Abt.1350 t |
|---------------------------|---------------------|
| Deck load | 6.0 t/m^2 |
| Clear deck area | 300 m ² |

1.3.4 Machinery

Main Engine Type .6G32 from Guangzhou Diesel Plant

| Main Engine Output | |
|----------------------------|--------|
| Main Engine Revolution | 600Rpm |
| Main Generator Output | |
| Harbor Generator Output | 150kW |
| Emergency Generator Output | 64kW |

1.3.5 Deck Machinery

| Main Towing Winch | |
|-------------------|---------------|
| Tugger winch | 10tx10m/minx2 |
| Capstan | |
| Deck Crane | 2.5tx8.5m |
| Shark Jaw | 150t |

1.4、 Class, Rules, Regulations and Certificates

1.4.1、Classification

The Vessel including its hull, machinery and outfitting equipment shall be constructed in accordance with the latest International Rules and Regulations and under the survey of RINA for Unrestricted Service for Class Notation:

RINA ★HULL Supply Vessel, Anchor Handling Tug, Assist, Unrestricted Navigation ★MACH

1.4.2 Nules and Regulations

The vessel is to be registered in Liberia/Bahamas/Panama or similar country at the owner's option on condition that specification is not to be changed.

The Vessel and its equipment shall be designed and built in accordance with International Shipbuilding Standards in respect of general hull, marine engineering and electrical equipment and International Rules and Regulations which are in force at signing of Contract and mentioned below:

- 1. RINA 《Rules for Classification of Ships》 2011
- 2. Marine Laws and Regulations of government of the ship's Flag
- 3. The International Convention for the Safety of Life at Sea (SOLAS) 1974 for cargo Ships, Consolidated Edition 2009, including all amendments
- 4. International Load Line convention (ILLC), 1966 and amendment.
- 5. International Regulation for Prevention of Collision at Sea, 1972 and amendments.
- 6. International convention for prevention of Pollution from ships, 1973 and protocol of 1978 with latest amendments.
- 7. Protocol for Marpol 73/78 annex VI; regulation for prevention of Air pollution from ships Nox emission control.
- 8. Compliance with Marpol for Air Pollution Prevention
- 9. International Regulations for Tonnage Measurement of Ship, 1969
- 10. ISO 6954-1984 (E), Guidelines for Overall Evaluation of Vibration in Merchant ship
- 11. IMO Resolution A468 (XII), Code on Noise Levels on Board Ships
- 12. IMO Resolution MSC.267 (85) Adoption of The International Code on Intact

Stability,2008

- 13. IMO Resolution MSC.235(82)-Adoption of the guidance for the design and construction of the offshore supply Vessel 2006.
- 14. Wireless Safety Requirements (GMDSS)
- 15. Radio Communication Regulation to International regulations.
- 16. CSQS Shipbuilding Quality Standards.

1.4.3、Certificates

The full term certificates or provisional certificates indicated in this clause are to be furnished to the Owner at the delivery of the vessel.

If full term certificates cannot be obtained at the ship's delivery, the Builder is to furnish provisional certificate(s) to the Owner, which substitutes for the full term certificate(s). However, Builder to provide Owner with all full term certificates as soon as they are received but within three months of delivery.

The following is to be issued by the Classification Society (without any "condition of class").

- 1) Classification Certificate issued by the Classification Society
- 2) Builder's Certificate issued by the Builder
- 3) International Load Line Certificate for the international voyage issued by the Classification Society
- 4) Certificate of International Tonnage Measurement 1969 issued by the registered government or the Classification Society.
- 5) Cargo Ship Safety Equipment Certificate issued by the Classification Society
- 6) Cargo Ship Safety Construction Certificate issued by the Classification Society
- 7) Safety Certificate as required by SOLAS 1974 and all amendments
- 8) Certificate as required by MARPOL 73/78.
- 9) IOPP Certificate issued by the Classification Society
- 10) Cargo Ship Safety Radio Certificate issued by the Classification Society
- 11) Test certificate for Anchor and Chain Cable issued by the Classification Society
- 12) Other usual certificates including those for navigation light and magnetic compass issued by the assigned authority, and magnetic compass adjustment and direction finder calibration issued by recognized Authority.
- 13) SOPEP Manual
- 14) Cargo Securing Manual
- 15) De-ratization Certificate
- 16) Launching Certificate
- 17) Asbestos-Free Certificate
- 18) Spark-Free Certificate
- 19) Machinery Certificate Classification certificate of hull and machinery
- 20) PSPC Certificate issued by Classification Society

Other necessary certificate deemed by Class, which is not listed above shall be also provided to owner.

1.5 Tank Arrangement and Capacities

1.5.1 Tank Arrangement

The vessel is to be constructed with double skin in way of engine room and one complete continuous freeboard deck with two tired forecastle deck. Double bottom to be fitted in way of engine room and bow thruster room, The six(6) watertight transverse bulkheads, two(2) longitudinal bulkheads and some minor bulkheads together with double bottom shall divide the vessel into the following internal compartments:

Fore Peak Ballast Tank; Chain Locker; Void; Store Locker; No.1 Water Ballast Tank(P/S); No.2 Water Ballast Tank(P/S); No.1 Fresh Water Tank(P/S); Bow Thruster Tank(P/S); Engine Room; No.1~No.4 Fuel oil Tanks; No.3 Water Ballast Tank(P/S); No.2~No.3 Fresh Water Tank; Steering Gear room and Aft water ballast tanks.

Fuel oil service tank, Lube oil store tank, Hydraulic oil tank etc to be fitted in double side tanks in way of engine room.

Lube oil Circulation tanks, Bilge Tank, Dirty oil tank, Sewage holding tank etc to be fitted in double bottom.

1.5.2 Tank Capacities

Fresh Water Tanks

| Total | 469.062m ³ |
|---------------------------------|-------------------------------------|
| No.3 Fresh Water Tk(C)FR4~14 | 122.908m ³ |
| No.2 Fresh Water Tk(P/S)FR16~22 | 2×51.386m ³ |
| No.1 Fresh Water Tk(P/S)FR59~70 | $\dots 2 \times 121.691 \text{m}^3$ |

Fuel Oil Tanks

| Total | 590.229m ³ |
|------------------------------------|---------------------------------|
| Fuel Oil Service Tank (P/S) FR28~3 | 9 $2 \times 18.078 \text{m}^3$ |
| No.4 Fuel Oil Tank (C) FR16~22 | 101.471m ³ |
| No.3 Fuel Oil Tank (C) FR22~33 | 41.287m ³ |
| No.3 Fuel Oil Tank (P/S) FR28~39 | $2 \times 45.123 \text{m}^3$ |
| No.2 Fuel Oil Tank (P/S) FR39~44 | 2 \times 35.371m ³ |
| No.1 Fuel Oil Tank (C) FR44~58 | 69.139m ³ |
| No.1 Fuel Oil Tank (P/S) FR44~58 | $2 \times 90.594 \text{m}^3$ |

Lubricated Oil Tank

| <i>Total</i> |
|---|
| Hydraulic Oil Tank (P) FR24 \sim 2711.803m ³ |
| Lube Oil Circulation Tank (P/S) FR34 \sim 382×4.128m ³ |
| Lube Oil Storage Tank (S) $FR24 \sim 27$ 11.803m ³ |

Special Purpose Tanks

| Dirty Oil Tank (P) FR41~44 | . 5.208m ³ |
|---------------------------------|-----------------------|
| Bilge Tank (S) FR39~44 | 12.541m ³ |
| Sewage Holding Tank (C) FR58~64 | 13.588m ³ |

Water Ballast Tanks

| Total | | m^3 |
|----------------------------|-------------------------------------|-----------------|
| No.4 Water Ballast Tank (C | C) FR-4~Aft 20.462 | 2m ³ |
| No.4 Water Ballast Tank (P | P/S) FR-1~Aft2×24.682 | m ³ |
| No.3 Water Ballast Tank (P | P/S) FR4∼162×70.585 | m ³ |
| No.2 Water Ballast Tank (P | P/S) FR58∼702×42.141 | m ³ |
| No.1Water Ballast Tank (P/ | /S) FR70 \sim 792 \times 53.424 | -m ³ |
| Fore Water Ballast Tank FR | 79~Fore 62.417 | m ³ |

1.6, Tonnage

The gross tonnage is about 1594, the net tonnage is about 478.

1.7、Speed、Bollard Pull Force、Endurance and Maneuverability

1.7.1、Speed

The ship speed to be about 13.5kn with a clean the hull, in deep water under calm sea and wind force of Beaufort scale not beyond 2, no tidal current and on the design draft of 5.35m, at the MCR of the main engine.

The ship speed to be about 12.5kn under design draft of 5.35m, at the MCR of the main engine with 10 % sea margin.

1.7.2 Bollard Pull Force

Under MCR of the main engine, The static bollard pull force is greater than 68t and bollard

drag force is greater than 60t.

1.7.3 Endurance

The Endurance to be not less than 6000 sea mile based on the design draft of 5.35m, ship speed of 13.0km and at the CSR of the main engine with 10 % sea margin.

Approximately 30 days endurance of fresh water, foods, provisions etc shall be guaranteed.

1.7.4 Maneuvability

One (1) transverse bow thrusters to be supplied and installed, Thrust should be approximately 8.0 tones, The unit to be driven by a electric motor and complete with controllable pitch propeller.

Control of the thruster shall be from all control positions in wheelhouse.

1.7、 Freeboard and Stability

1.7.1 Freeboard

The vessel is to comply with the requirements for type "B" ships defined by the International Convention on Load Lines, 1966.

1.7.2 Intact Stability

The intact stability for offshore supply vessel shall be carried out in accordance with IMO Res MSC267(85) "2008 IS Code".

The intact stability for towing service and fire-fighting operation shall be complied with RINA steel vessel rules Part E Chapter 14 Section 2.

The lightship weight distribution with trim and stability calculation for the loaded conditions for typical transit and operation of the vessel including following with the provisional information of capacities of tanks:

- [≫] Light ship
- ※ Full Loaded Departure/Arrival
- X Full Loaded Liquid Cargo Departure/Arrival
- ※ Full Loaded Deck Cargo Departure/Arrival
- ※ Ballast Conditions Departure/Arrival
- ※ Ice Accretion Correction
- ※ Towing Services Departure/Arrival
- ※ Fire-Fighting Operation Departure/Arrival

For each calculation, bunker and other consumable supplies are presumed as follows:

At departure : Full supplies

At arrival : Approx. 10 % supplies

Capacity of ballast tanks is to be sufficient to obtain full immersion of propeller at light ballast draft forward as required by classification.

1.7.3, Damage Stability

The damage stability to be conducted as per requirements of 《Adoption of the guidance for the design and construction of the offshore supply Vessel 2006》 IMO Res A235(82).

1.8、Propeller

Two (2) sets of controllable pitch Nozzle propeller.

Material : nickel aluminum bronze or equivalent No. of Blade : Four (4), Type is NCP76 Diameter of propeller: 2700mm Revolution of propeller: 202RPM

One spare blade for left and right propeller shall be provided on board.

1.9, Noise and Vibration

1.9.1 Noise

The Builder is to make their best effort to keep the noise level in the accommodation space and engine room within the following values, which are based upon IMO Resolution A.468 (XII) "Code on Noise Levels on Board Ships". (Tolerance margin of 3 dB (A) is to be allowed in addition to the following values.)

| Engine room | 110 dB (A) |
|---------------------|------------|
| Engine control room | 75 dB (A) |
| Workshop | 85 dB (A) |
| Wheelhouse | 65 dB (A) |
| Cabin and Hospital | 60 dB (A) |
| Offices | 65 dB (A) |
| Mess room | 65 dB (A) |
| Galley | 85 dB (A) |

Noise level measurement is to be carried out during the on board test when running at the continuous service output of the main generators at normal operating condition and all fans running.

Noise level is to be measured for one (1) point per room at the near center and 1.2 meters above floor in general.

Measuring methods are to be in accordance with the Builder's practice and the measuring equipment is to be in accordance with GB (Chinese Standard)

The test procedure of noise level measurement is to be submitted to the Owner for approval.

If the measured noise level exceeds the above values, the necessary improvement is to be made to a practical extent mutually agreed between the Owner and the Builder before delivery. All engine room alarms are to be clearly audible above the noise of the running engine room machinery.

1.9.2 Vibration

Special attention is to be paid in design and construction of the vessel to prevent undue vibration.

The design target of vibration level in the accommodation space including wheelhouse is to be within the "COMMONLY ACCEPTED ZONE" (shaded zone) of ISO 6954 -2000"Guidelines for Overall Evaluation of Vibration in Merchant Ships".

The vibration measurement is to be carried out in accordance with the Builder's practice when the vessel is running at the following of revolution output of the main engine:

30%; 50%; 75% and 100%

Adequate measures are to be taken to prevent local vibration in engine room (compressor, pumps, seats of equipment, engine control room).

1.10, Inspection & Quality Control

The Vessel shall be constructed and equipped in accordance to this specification and under the supervision of the Classification Society's Surveyor and the Owner's representative in compliance with the Builder's construction schedule.

Shipyard shall always ensure and maintain permanent cleanliness and safety on board throughout the construction period. Spill oil shall be removed promptly. Garbage shall be removed daily. Smoking shall not be permitted on board. Lighted access shall be provided throughout.

The items of inspections are to be submitted by the Builder to the Owner's representatives for approval before commencement of project. The Builder is to provide schedule of test, inspections for attendance of the Owner's representatives. All works are to be carried out to the satisfaction of Owners representatives.

In case that opinion about the results of supervisions cannot come to an agreement between the Owner's representative and the Builder's Inspector, they shall confer together with the Classification Society's Surveyor and the designer.

The Chinese Shipbuilding Standard(CSQS-2005) and Builder's standards, which shall be

approved by class and owner shall be used as building standards.

1.11、 Materials and Workmanship

Type, sizes and materials of fittings, equipment and machinery are to be in accordance with Chinese Industrial Standard(GBM) and / or other equivalent foreign Industrial Standards.

The structural steel materials of main hull shall be of quality in accordance with

specification, requirements of class and approval comments.

Any item accidentally and physically damaged is to be removed and renewed in its entirety.

Associated instruments, gauges or metering devices must be of good quality, fit for the intended purpose, non-corrodible and delineated in metric or S.I. units.

Asbestos shall not be used and "asbestos free certificate" to be provided.

All workmanship for the vessel is to comply with the Builder's standard and good

international shipbuilding practices. The Builder is to submit Builder's workmanship

/ standard for Owner's approval.

1.12, Plan

1.12.1 Approval Drawing

All plans required by Class due to changes in Class rules and IMO under this specification will be submitted for approval to Class and Owners.

Prior to starting work, the Designer shall submit the specified working plans to the Owner and Class for approval in due time of design and construction schedules.

The list of the plans for approval shall be mutually agreed between the Owner and the Designer.

One (1) copy of all approval drawing will be sent by e-mail in electronic-format to owner. If designer does not receive the Owner's reply to the plan within 7 days including mailing time by courier mail, they are to be regarded as approved by the Owner without any comments.

The designer will amend/incorporate the owner's and builder's comments into the drawings and thereafter, submit to the class for approval.

Electronic-format approval to Class shall be conducted.

1.12.2 Shop Drawings

Shop drawings shall be prepared by designer and suitable for builder's building procedures and workmanship.

The Builder's standard plans and the subcontractor's or the manufacturer's plans may be used as working plans for approval.

1.12.3 As-Built Plan

At the time of delivery of the Vessel, the designer shall furnish to the Owner with three (3) copies of each finished plan and three (3) copies of each instruction book.

The lists of finished plans shall be mutually agreed upon owner.

1.12.4, Framed Drawings

Following plans, one (1) copy each, mounted in the frames with glass shall be installed abroad the Vessel in location designated by the Owner's representative:

- General Arrangement
- Capacity Plan
- Fire Control Plan
- Diagram of Pipeline System for ballast, bilge fire extinguishing etc.
- Damage Control Plan

1.13, Test and Trial

1.13.1 General

Tests and trials shall be conducted in accordance with the requirements of the Classification Society and other regulatory bodies and the marine practice.

The Builder shall submit to the Owner and/or Class the detailed schedule or memorandum for the test items mentioned hereinafter in due time prior to those tests.

The Owner's representative shall attend the inspections and tests as necessary if the Owner's representative is unable to attend, such inspections and tests shall be performed in the presence of the Builder's inspector and/or Classification Society's Surveyor if required.

All results to be recorded and presented to the owner and Class surveyors.

1.13.2、Tightness test

All steel structure to be inspected and tightness to be tested for tanks, bulkheads and superstructure deck and other wet space etc. as required by the Class Rules.

Tightness of windows, doors, access hatches, etc. are to be tested by water hose. In general, the leak test is to be carried out by air using detergent soapy water on the building berth except shop fillet joints and erection butt joints where on-block air test and vacuum test can be done respectively.

1.13.3 Shop test

The Vessel's machinery, equipment, fittings, construction and so on shall be tested or checked before installation on board the Vessel at the Builder's yard or the sub-contractor's shops or the manufacturers' factories, etc., according to the requirements of the Classification Society and/or the Builder's Protocol for testing and commissioning and/or the manufacturer's and/or the sub-contractor's standard test schedules.

Detail descriptions except for minor equipment of shop tests to be referred to respective Specifications.

1.13.4, On-Board Test

After the necessary tests are carried out at the Builder's yard, sub-contractor's shops or manufacturers' factories, etc., the Vessel shall be constructed and equipped with machinery, apparatus and fittings on board.

The construction, machinery, apparatus and fitting shall be checked and examined on

board the Vessel to ensure that these are satisfactory for the purpose intended.

The items for which construction tests or onboard tests are necessary shall be inspected and/or tested according to the requirements of the Class and the Builder's Practice.

The Owner's representative and the Builder shall determine the scope of tests or inspections to be attended by the Owner's representative on the basis of the Builder's Protocol for testing and commissioning schedule.

After the main generator and electrical equipment are install on board the Vessel and necessary piping and wiring are fitted, these may be operated prior to sea trials to confirm their satisfactory running.

1.13.5、 Light ship Measurement and Inclining Experiment

The "light ship weight" consists of

- Weight from steel hull
- All machinery and associated fittings
- All electric equipment and associated fittings
- Accommodation including internal fittings
- All safety items
- Water and oil in the pipe lines of main generator systems
- Spares and tools recommended by the classification essential for main generators

The light ship weight does not include following

- Water and oil in the tanks including main engine circulating tank
- Spares and tools over and above that listed above
- Owner's supply items

Upon completion except for minor items of work, light weight measurement and inclining test of the Vessel shall be carried out by the Builder at the present of class surveyor and owner.

The light weight measurement shall be carried out by reading the draft of the Vessel, measuring the specific gravity of sea water and by investigation of weight to be added or to be deducted, in the presence of Class surveyor and Owner's representative.

The draft of the Vessel shall be measured at both sides of stem, stern and midship draft marks.

Displacement of the Vessel at this light weight measurement shall be determined by reading the draft-displacement table on the corresponding draft obtained from the measured draft. The correction for trim, heel and deflection of the Vessel and the specific gravity of seawater at the measurement shall be made also.

If any superfluous weight is on board the Vessel or any item belonging to be light weight is not on board the Vessel at the time of the light weight measurement, such a weight shall be corrected by calculation.

The calculation of the light weight and deadweight shall be made by the Builder and verified by the Owner and then "light weight" and "deadweight" shall be determined.

The inclining test shall be carried out, after the light weight measurement, in the presence of the Owner and the Classification Society's Surveyor, and then the position of the centre of gravity of the Vessel in light condition shall be determined by the Builder's calculation based on the test results.

The inclining test shall be conducted by shifting weight and by appropriate means.

The test may be carried out in the Builder's dock, or in sheltered water near the Builder's yard.

Two times light ship measurement and inclining experiments shall be conducted which is before/after crane installation, through two times tests, the weight and center of gravity of the crane shall be decided.

The report of inclining experiment shall be approved by class and owner.

1.13.6 Bollard Pull Trial

The bollard pull trials to be conducted as per CB/T3430-92, "Recommendation Trail Methods of Bollard Pull for seagoing Tug".

During the bollard pull trials, adequate propeller immersion is to be ensured. The depth of water below keel is not to be less than three times the maximum draught of the vessel. The tow rope's length, clear of the stern, shall be at least two times the length of the vessel.

The test procedure and requirement shall be approved by owner and class surveyor at least 5 days before test.

During trial, The output of main engine shall be 50% \ 85% \ 100%, ahead revolution and stern revolution shall be used in order to measure pull force and drag force.

1.14, Sea trial

1.14.1 General

When the vessel is substantially completed, sea trial is to be carried out as described below.

Before Builder request for sea trial, construction and testing of all hull, machinery and electric part has to be completed including all machinery, equipment and systems, all electrical equipment and systems, hull equipment and system including accommodation. Painting work shall be in the final coat stage only on exposed decks, with all other areas complete.

The sea trial to be carried out in calm and deep water with wind/sea state not worse than Beaufort 3, otherwise to be specially agreed.

The sea trial is to be carried out on the ballast condition draught and identical as far as practical with the ballast condition of draught at about 4.30m.

Two(2) Weeks before conducting sea trial, the test procedure shall be sent to Class and owner for approval.

The trial trip is to be used to verify the ship's and machinery's performances.

A complete report of the official sea trial including all data and results is to be furnished to the Owner together with the notice to the Owner of the completion of the sea trials.

1.14.2 Progressive Speed Trial

The progressive speed test shall be executed under the following machinery load, on the measured course by post-sighting method or using electrical instrument (DGPS).

Main engine load:75% load of maximum output – one (1) double run:90% load of maximum output – one (1) double run:Maximum output – three (3) double run

The main engine load shall be determined by fuel rack and scavenging air pressure based on the figures recorded at shop test or as recommended by manufacturer. Record on fuel oil consumption at designated loads shall be submitted to Owner for record.

All main engine data are to be recorded at all conditions during progressive Speed and Endurance test.

1.14.3 Endurance test

The endurance test shall be carried out under the following conditions:

Main engine load: Maximum output (uninterrupted) Duration : 4 hours

Fuel consumption of main engine shall be measured for reference during the endurance test.

The time required for progressive speed test at maximum output shall be included in the above mentioned time for endurance test.

1.14.4 Manoeuvring Test

Following tests shall be carried out to check the maneuvering of the Vessel under CSR of the main engine:

(1) Crash stop astern and ahead test

(2) Turning test with helm angle of not less than 35 degrees port and starboard

(3) Stopping inertia test

1.14.5 \, Other Test at Sea

The following tests shall be conducted according to the agreed testing and commissioning protocol at a proper time during the sea trial or in port, on a suitable trim and displacement:

(1) Steering test

To be performed at maximum output of main engine by steering control from the wheelhouse.

Manoeuvring time to bring the rudder from:

Midship to 35 degree starboard

35 degree starboard to 35 degree port

35 degree port to 35 degree starboard

35 degree starboard to midship

Time taken for the above trials shall meet Classification Society requirement for the supply vessel notation.

(2) Anchor test

Each anchor is lowered up to five shackles of chain cable under control of hand brake and hoisted by windlass.

Hoisting speed, electric current shall be measured.

(3) Gyro / Autopilot test

(4) Adjustment of gyro and magnetic compasses

(5) Tests or adjustment of other electrical navigation equipment and instruments

(6) Functioning test of bow thruster

(7) Functioning test of firefighting equipment

(8) Noise and Vibration Measurement

Part II: HULL STRUCTURE

2.1 General

The hull including the deckhouse shall be built of mild steel, of best commercial shipbuilding quality. The steel shall be according to Specification and furnished with test certificate as required by Classification Society. The scantlings shall be designed in accordance with a draft of 5.525 m.

The hull is to be built with combination of transverse frame system.

The vessel to be designed as supply vessel service in offshore area; the hull has sufficient strength, rigidity and certain safety margin.

All materials required by class shall be have certificate and The steel materials for the hull structure which are not specified by the Classification Society are to be in compliance with the Chinese Industrial Standard (GB) or reputed national standard.

Structural steel, other than grade A, shall have proper identification marking. This marking shall be transferred to all elements after cutting.

Non-tight structural members are to be provided with adequate access/lightening holes in accordance with the shipbuilding practice, where necessary or practical, unless they are detrimental to the structural strength of the members.

The structural details such as drain hole, air hole, cutout and slots etc shall follow the Typical Construction Detail (BT607-110-10) and meet Classification Society requirements.

The Class rules for structural design and evaluation shall be as per "RINA and CCS steel vessel rules".

2.2 Welding

The welding to be carried out according to the Builder's standard, according to the welding procedure and normal practice approved by the Classification Society. The welding materials (e.g. the welding rod) shall be approved by the Classification Society.

CO2 welding shall be applied as far as possible. Use of manual welding is to be kept to a minimum.

The radiographic inspection and ultrasonic inspection is to be carried out for the cross joints of seam and butt of the upper deck, sheer strake, bilge strake, bottom plate, tank top, top strake and bottom of top side tank to the satisfaction of the Classification surveyors.

Double continuous fillet welding shall be applied to all areas below and including the Upper deck and all wet/exposed areas. Double continuous welding is to be applied to connections in exposed areas, tanks, in wet spaces, bathrooms and toilets of built-in steel plate, bulkheads in galley and pantries, steering gear room, chain lockers and structural members for upper deck and below. The other connections may be welded with intermittent welding in accordance with Builder's standard and class Rules.

The preparations of edges for welding and root gap are to be in accordance with approved procedure. All contaminants such as water, rust, oil, slag, dust, paint, etc. impairing the quality of the welding are to be removed before welding and may be subject to Class

inspection before welding.

All welding is to be of best practice in accordance with the Builder's standard. Welding is also to be carried out round the ends of all collars at scallops on webs for frames, longitudinals, stiffeners, etc. Where structural members pass through the boundary of tanks, generally a small scallop of suitable shape is to be cut in the member close to the boundary on both sides the compartment and carefully welded all round.

All care to be taken to ensure sufficient pre-heating and use of portable heating arrangement for the welding rods.

2.3 Keel

A flat plate keel 14 mm thick, 1200mm wide is to be arranged throughout the length, and to be tapered at the forward end to the stem.

2.4 Shell plate

The thickness of plating is to be in accordance with the requirements by the Classification Society and it is to be gradually tapered from the midship to the ends according to the requirements by the Classification Society.

The shell plating with a large opening such as sea chest, etc. is to be elliptical opening or equivalent.

Bilge keel is to be provided along the ship length in bilge area.

All shell plates to be welded, with bottom plates 12mm, bilge plates 20mm, side plates and sheer-strake 11mm, transom plating 12mm and stem post 14mm.

All shell plates to be grade "B" Class.

2.5 Main Deck

Plating of decks is to be according to Classification Society's regulations and strengthened where necessary in way of windlass, winches, mooring bitts, shark hawk etc. Stanchions of steel pipe shall be arranged for supporting decks only where necessary.

The uniform main deck load for cargo loading is 6.0t/m2. Deck plates shall be arranged longitudinally, transverse framing without camber and sheer.

The thickness of cargo loading area is 12mm, the thickness for other area is 10mm.

2.6 Bulkheads

The six(6) watertight transverse bulkheads, two(2) longitudinal bulkheads and some minor bulkheads shall be fitted.

All bulkheads shall be fitted according to Classification Society rules and stiffened with profiles.

2.7 Bottom Construction

Engine room and bow thruster room shall have full double bottom tanks for fuel oil, lube oil, dirty oil, bilge water storage except seating areas for gear boxes, where is single bottom

structure. In order to give continuity in the double bottom structure, engine girders are run from one end of engine room to the other end.

The height of double bottom is 1600mm, thickness are 10mm,12mm and 14mm depending upon the different locations.

Solid floors shall be fitted at every frame.

The single bottom structure shall be fitted except Engine room and bow thruster room.

Inner floors and longitudinal girders of bottom construction with sufficient lightening holes (also for good access), limber and air holes are to be provided except where watertight or oil tight construction is required.

2.8 Bow Section

The fore body shall have raked stem and be built of steel plates with thick steel bar stem in way of waterline. The fore body including stem shall be well stiffened.

Wash bulkhead with lightening holes shall be provided in part of the fore peak on the centre line. Chain locker in fore body is to be provided into two compartments by a non-watertight bulkhead on the centre line with cut-in-steps.

Loose gratings of galvanized perforated steel plates of abt 25mm thick shall be arranged inside of the chain lockers and to have a minimum height of abt 500 mm above the bottom of the chain locker for good drainage.

The Chain lockers shall be arranged with bilge pipe and piping arrangement.

2.9 Superstructure And Deckhouse

Superstructure and deckhouse shall be of fully welded steel construction with transverse framing. Pillars and girders are to be provided where necessary according to Classification Society regulations. Interior and exterior walls are to be well stiffened by profiles. For the inside structure, intermittent welding shall be applied.

2.10 Bulwark

Bulwarks, reinforced in way of mooring fittings, are to be fitted extending from corners of transom to aft of forecastle and on forecastle deck to be made of 8mm and 9mm thick steel plates with bulb plate or angle bar welded on top of bulwark. Vertical stiffening of bulwark is to be provided by profiles welded on deck with doublers.

Height of bulwark is to be not less than 1000 mm.

Cargo-rails aft to be carefully faired down to main deck.

Stowage fittings are to be arranged for the rig discharge hoses as required.

Freeing ports shall be arranged in main deck bulwarks with area to Classification requirements. All transitions in the bulwark top are to be made as smooth as possible to avoid snagging the tow line.

Freeing ports shall be lined with round bars.

2.11 Bilge Keel

The intermediate flat plate of 12mm in thickness shall be fitted and weld to bilge strake.

The bilge keel, comprising of 12mm keel plate welding with diameter 25mm round bar, shall be welded to intermediate flat plate for approximately one third length of vessel.

The ends of bilge keel and intermediate flat plate shall be sniped at an angle of not greater than 15 degree.

2.12 Foundation

The main engine foundation shall be welded structures with enough strength and rigidity in accordance with the recommendation of main engine maker and the requirement of the rules.

The foundation of the shaft bearings, auxiliary machinery shall be strong enough and easily to be access for cleaning, draining and maintaining.

Suitable reinforcement is to be provided under the winch seating, towing and mooring fittings. Foundations of welded steel construction to be fitted for deck machinery.

Crane column shall be inserted into transverse bulkhead.

2.13 Kort Nozzles & Shaft Brackets

Two (2) fixed mild steel Kort nozzles, with diameter suitable for Controllable Pitch Propeller, are to be fitted. Each nozzle is to be supported by streamlined central column above and by shaft bracket below. The bottom structure of the hull in way of the nozzles will be stiffened by additional transverse and longitudinal members. Width of the wear ring shall be 25% in excess of propeller sweep width at full pitch.

Propeller shaft brackets are to be the "Y" type, of fabricated casting construction, upper part of support shaft aft bossing and lower part to prevent wires entering nozzle thus protecting propellers.

2.14 Fenders

Half round steel pipe of diameter 245mm $\times 10$ mm in thickness to be welded to the forecastle plating between the deckline fenders as shown on the General Arrangement Plan.

'W' shaped vertical hollow rubber fender to be fitted at the bow and stern as per the General Arrangement drawing.

About forty-four (44) numbers used aeroplane tyres (Dia. 1350mm x 450mm wide) are to be installed on ship sides. Lugs for installing the fenders to be fitted.

25mm diameter (min.) galvanised chain to be used to hold the tyres in position. Cut opening in the tyres to be reinforced with pipe of approximate size which to be held in to position by collar welded on both sides.

2.15 Skeg

A double plate box shaped skeg is to be fitted on the centreline aft. The thickness of side shell and bottom plating of skeg is 12mm, internal structures is 10mm, The skeg shall be with

internal drainage to the drain plugs.

Skeg is to be provided with a float coat by filling & draining of bitumen solution.