

1. GENERAL

To build One (1) unit 23.5M Twin Screw Tug. It is classed under BKI and will be registered in Indonesia and will comply with the regulations of the GOVERNMENT of Indonesia. All the hull's structure and size shall be constructed in accordance with the drawings provided by Wang Sang & Associates Sdn Bhd., Sibu with BKI Class approval.

1.1 General Description

The Vessel is to be welded steel construction with twin diesel engines, twin fixed pitch propellers. The vessel's accommodation is to be located on the main and under the main deck.

The main hull shall have the following compartments:-

- a) Forepeak ballast tank / chain locker
- b) Under deck accommodation with FW double bottom tanks
- c) Fuel oil Fwd tanks, P, S & Centre
- d) Fuel oil Aft tank, P, S & Centre
- e) Steering Gear compartment

The deck accommodation is to be consisted of:-

- a) Wheelhouse
- b) Galley
- c) Wash place
- d) Captain's cabin
- e) Chief Engineer's cabin
- f) Under deck accommodation

1.2 Principal Particulars

L.O.A	:	23.500M
L.B.P	:	21.505M
Beam Mld	:	7.315M
Depth Mld	:	3.100M
Design Draft	:	2.500M
Complement	:	10 person(s)
Main Engine	:	2 x Yanmar 6AYM-WST Marine Engine at 650BHP @ 1900rpm
Gearbox	:	2 x Reintjes WAF364L, Ratio: 6.048:1
Generator	:	2 x 24kw, Cummins
Design Speed	:	10 knots (Free Running)
Designed B.P	:	10 Tonnes (Approximate)

1.3 Tests

Prior to the delivery, the hull, all machinery, electrical, piping and other equipment installed, machinery and deck fittings are to be tested.

1.4 Inclining Experiment

All inclining experiment which will ascertain the lightship weight and vertical center of gravity at lightship conditions is to be carried out by the Builder with the presence of Classification's surveyor. Basing on these results, a stability report is to be prepared by the designer.

All costs incurred shall be borne by Builder.

1.5 Yard Trial

Upon completion of the Vessel, the following trials to be carried out:-

- a) All piping systems are to be fully tested
- b) Electrical power plants together with all lights
- c) Auxiliary machinery.
- d) Ventilation, refrigeration
- e) Firefighting equipment
- f) All deck machinery

All costs incurred shall be borne by Builder.

1.6 Drawings, Classification & Registration

On completion, One (1) set of drawings as approved by the Classification are to be supplied. Purchaser is responsible for the fee of drawings. However, if the Purchaser wish to amend the drawing before, during or after the construction, all amended fees will be at Purchaser own cost. Classification fees and Registration fees shall be borne by Purchaser.

1.7 Manuals of Machinery & Equipment

One (1) set of operation, manufacture and spare parts manuals of main machinery and equipment in English language are to be supplied by the Builder.

2. STRUCTURAL – General

The steel hull and deck erections are to be of all welded construction. Transverse framing system is to be used throughout.

2.1 Bottom Construction

The bottom is to be single bottom except in crew's cabin where double bottom construction is to be adopted.

2.2 Shell Plating

a) Keel	:	12.00mm
b) Bottom	:	9.00mm
c) Side	:	9.00mm
d) Deck	:	9.00mm
e) Bulkhead	:	8.00mm
f) Wheelhouse	:	6.00mm
g) Bulwark	:	8.00mm

2.3 Size of Angle bar, Flat bar & Pipe

The size of Angle bar, flat bar & pipe are according to the drawings.

3 ACCOMMODATION, WHEELHOUSE, STORE – General

The accommodation is to be arranged and fitted out in accordance with the General Arrangement drawing. All internal doors are to be made of aluminum and hung on hinges and fitted with louvers at the bottom for air ventilation.

3.1 Deck Coverings

Steel decks are to be thoroughly cleaned before the installation of deck coverings which are to be laid under all furniture.

Schedule of Deck Coverings

- | | | |
|---------------------------------|---|--|
| a) Main Deck | : | Paint c/w Gum |
| b) Living Room | : | 8mm fire protection board on ceiling or wall |
| c) Washroom, Galley & Mess Room | : | Ceramic tiles on cement |
| d) Engine Room | : | Steel chequered plate on top of floors. |

3.2 Insulation

The wheelhouse top is to be insulated on the inside with glass wool

3.3 Windows & Scuttles

All windows are to be aluminum framed type with tempered glass to suit classification's requirements. Side scuttles are to be case aluminum type with deadlight.

3.4 Steel Watertight Doors

All external doors on the main and wheelhouse deck to be of steel with coating heights according to the rules.

3.5 Carpenter's Work

All internal doors provided with device hold back hooks to retain the doors in open position. All fire proof board to be impregnated against rot and free from odour. Ceiling in accommodation to be fitted with fire proof board and navigational spaces fitted with plywood with polyester coatings. Sufficient shelves and cabinets to be provided.

3.6 Wheelhouse

- a) The wheelhouse is to be located on bridge deck as per GA and to be fitted with all navigation, communication and control equipment as specified below. The helmsman's position is to be at the center and directly behind the console fitted at forward of the wheelhouse. The

compass is to be located at the forward steering position. The wheelhouse control console is to be fitted with:-

- i.) 1 set x Main engine morse control cable
- ii.) 1 set x Main engine alarms
- iii.) 1 no x Marco horn
- iv.) 1 no x Steering wheel
- v.) 1(One) clear view screen, 250mm to be fitted in the FWD centre window
- vi.) 1 Unit x 18000 BTU/HP (1.5HP) Panasonic wall mounted wired remote control split type Air-conditioner
- vii.) 1 no x 5" Brass Barometer
- viii.) 1 no x 5" Clock
- ix.) 1 no x 5" Clinometers
- x.) 13 nos x Navigation light bulb
- xi.) 1 no x Engine telegraph
- xii.) 1 Unit x Intercom
- xiii.) 1 no x Rudder Indicator
- xiv.) 1 no x Radio & chart table with drawers under
- xv.) 1 Unit x High steering wooden chair

b) Other equipment in wheelhouse to be fitted out as follows:-

Navigation Equipment

- 1. 1 set x Furuno GPS Navigator GP-32
- 2. 1 set x Furuno Radar 1715 MKII(24NM) c/w AC/DC converter
- 3. 1 set x Furuno Echo Sounder FCV-620
- 4. 1 set x ICOM SSB Radio IC-M710 c/w AC/DC converter
- 5. 1 set x SAMYUNG EPIRB SEP-406 MHz
- 6. 1 set x ICOM VHF Radio IC-M304 c/w AC/DC Converter
- 7. 1 set x SART ACR Pathfinder 3
- 8. 2 nos x Walkie Talkie

3.7 Wash place

The wash place is fitted out as follows:-

- a) One (1) x WC pedestal with seat
- b) One (1) x Shower set
- c) One (1) x Washbasin
- d) Non-skid quarry tiles on cement are fitted on the floor.

3.8 Galley

The Galley situated on deck is to be fitted out as follows:-

- a) Two (2) x spare point, 240/1/50
- b) One (1) x 8" Ventilation Fan
- c) One (1) x Stainless steel 2-door fridge
- d) One (1) x wall sink tap
- e) Non skid quarry tiles on cement with Scuppers and an attached cupboard.

3.9 Mess Room

- a) The mess room to be fitted with a dining table Formica surface, accompanied with long benches.
- b) One (1) x 12000 BTU/HP (1.5HP) Panasonic wall mounted wired remote control split type Air-conditioner.

3.10 Captain & Chief Engineer Cabin (Each)

- a) One (1) x 1 berth with drawer under
- b) One (1) x table c/w chair and desk lamp
- c) One (1) x wardrobe / cabinet
- d) Two (2) x Spare power points, 240/1/50
- e) One (1) x 9000 BTU Panasonic Air Conditioner
- f) Bed c/w 3" mattress, pillow and blanket

3.11 Accommodation Crew Cabin

- a) Four(4) x 2 built upper and lower berths
- b) Two (2) x Spare power points (220V)
- c) Eight (8) x wardrobes / cabinet
- d) One (1) x drawer's table c/w chair
- e) Eight (8) sets x Crew's beds c/w 3" mattresses, pillows and blankets
- f) One (1) x 9000 BTU/HP Panasonic Air-conditioner

3.12 Engine Room

The engine room is to be house all machinery and equipment at convenient location. Steel chequered plates will be used for flooring.

- | | | | |
|----|---------|---|---------------------------------|
| a) | One (1) | x | Intercom telephone to be fitted |
| b) | Two (2) | x | Twin Racor Fuel Filter |
| c) | One (1) | x | Flat type glass Level Gauge |
| d) | Two (2) | x | 15" Ventilation Fan |

4 PAINTING – General

All steel surfaces are to be shot blasted and primed before fabrication with One (1) coat primer. After construction, steel surface and welding seams should be properly clean up and power brushed One (1) coat of epoxy primer to be coated.

4.1 Painting Scheme

Underwater

- 1st Jotamastic 80 AL
- 2nd Penguard Primer Red
- 3rd Safe Guard Universal Es. Grey
- 4th A/F Seaforce 30

Above Waterline

- 1st Jotamastic 80 AL
- 2nd Penguard Primer Red
- 3rd Penguard Topcoat

Deck Area

- 1st Jotamastic 80 AL
- 3rd Penguard Topcoat Green 257

Engine Room

- 1st Penguard Primer Red
- 2nd Pilot II White / Grey
- 3rd Pilot II White / Grey / Green

4.2 Pipework colouring

All exposed piping systems is to be identified with colour bands in accordance with the following colour schemes

a) Bilge & Ballast	:	Black
b) Fireman	:	Bright Red
c) F.W. System	:	Blue
d) Fuel Oil	:	Brown
e) Lub. Oil	:	Yellow
f) Hydraulic Oil	:	Purple
g) Sea Suction	:	Green
h) Seawater Cooling	:	Light Green

4.3 Cathodic Protection

Appropriate numbers and sizes of zinc anodes are to be bolted to the immersed loaded hull and rudders, and inside of the sea-chests. Total number of S-9 Zinc Anode is approximately 22 pieces.

5 PUMPS PLUMBING AND PIPING:-

All pumps and pipes are to be arranged according to Good Marine Practice and to meet Classification Requirements.

Main piping material used shall be as follows:-

a) Bilge and Ballast Piping	:	Galvanized Steel SCH80
b) Fuel Oil Piping	:	Seamless Black Mild Steel SCH40
c) Lube Oil Piping	:	Seamless Black Mild Steel SCH40
d) Raw Water Cooling Piping	:	Galvanized Steel SCH80
e) Fresh Water Piping	:	Galvanized Steel SCH40
f) Sea Water Piping	:	Galvanized Steel SCH80

5.2 Pumps and Piping:-

Bilge & Ballast System, Fuel Oil System, Lub Oil System, Engine Cooling System, Freshwater System, F.W. Sanitary System, Sanitary Fittings are fitted according to the drawings.

5.3 Exhaust pipes

Exhaust pipes from main & auxiliary engines to be led to top of the funnel.
Exhaust pipes to be well insulated and covered with ceramic wool sheet.

6 DECK MACHINERY & EQUIPMENT – General

All deck machinery and equipment are to be supplied and installed to meet Classification's approval.

6.2 Anchors & Chain Cable

The anchors and chain cables and mooring lines are to be supplied in accordance with Classification's requirements. For guidance, they are as follows:-

- | | | |
|-----------------|---|--|
| a) Anchors | : | Two (2) x 300kg stockless bower anchors |
| b) Chain Cables | : | Nine (9) x 17.5mm of Grade U2 chains to Class requirement. |

6.3 Anchor Windlass

Local-made Hydraulic Electric 17.5mm anchor windlass c/w Two (2) warping drums is to be provided. The cable lifters and warping drums are to be independently clutched. It is to be securely mounted on fabricated steel seating on forward forecastle deck above the chain lockers. Chain pipes, cable stoppers and hawse pipes are to be arranged to suit.

6.4 Mast (Collapsible Type)

The navigation mast is to be completely fitted out with necessary brackets and stays for navigation lights and shapes.

6.5 Manholes

All manholes are to elongated shape with:-

Stainless steel studs and nuts : F.P.T., Chain locker, B.W.T. (P&S)

Steel Studs and nuts : F.W.T. (P&S), Coff.tank, All F.O.T.

6.6 Draft Marks

Draft marks are to be in Metric P & S fwd and aft.

6.7 Escape hatches

- a) Engine Room
- b) Crew Accommodation

6.8 Towing Hook

One (1) x 15 Tons Towing Hook with quick mechanical release. Pending bollard pull test to be carried out by the Owner. (Made in Malaysia)

6.9 Ventilation

- a) Two (2) x dia. 15" axial flow fans of adequate capacity are to be provided for ventilation of engine room
- b) One (1) x extractor is to be provided with 8" axial flow fan in Galley
- c) One (1) x blower fan is to be provided in Wash Place.

6.10 Floodlights

Four (4) x 500W: 2 forward and 2 aft

6.11 Searchlight

One (1) x 1000W searchlight c/w under deck control.

6.12 Mooring Bollards

- a) Bollards : Two (2) x 8" pipe double bollards are to be fitted on aft deck
- b) Mooring pipes: Two (2) x mooring pipes for the above bollards are to be fitted to the bulwark as shown in the drawing

6.13 Fenders

The Vessel to be fitted with 30pcs tyre as fender. Steel fenders made of 14mm x 9.5" to be fitted at both sides of the Vessel.

7 SAFETY & NAVIGATIONAL EQUIPMENT

Life rafts, Lifebuoys, Lifejackets, Pyrotechnics and other life saving equipment to be provided.

7.2 Fire Fighting & Safety Equipment

Firefighting equipment (i.e Fireman's outfit, Portable Fire Extinguishers, Fire Buckets, Axe, Portable Fire Pump are to be provided.

1. 3 nos	x	PVC Fire Box
2. 6 nos	x	9kg ABC Fire Extinguishers
3. 1 no	x	45 Litre "FOAM" Fire Extinguishers c/w Trolley
4. 1 no	x	36" Long hand fire axe
5. 2 nos	x	10 persons inflatable Life Raft
6. 8 nos	x	30" Solas approved life buoy
7. 14 nos	x	Solas approved life jackets c/w Whistles & Life Jacket life
8. 12 nos	x	Parachute Distress Rocket
9. 1 no	x	10 person First Aid Box
10. 2 coils	x	30 Meter heaving line
11. 1 no	x	300mm Brass ship bell
12. 4 nos	x	Self-ignition light (china)
13. 2 nos	x	1.5" x 15 meter rubber lining fire hose c/w Ins. Coupling & Instant Jet Nozzle
14. 1 no	x	1.5" x 15 meter rubber lining fire hose c/w Ins. Coupling & Instant Spray Nozzle
15. 3 nos	x	24" Black anchor ball
16. 1 no	x	24" Black Diamond ball
17. 1 no	x	7 x 50 Binocular
18. 3 nos	x	Steel Fire bucket
19. 1 set	x	Fireman Suit. Fireman Axe, BA Spare Cylinder. Fire Proof Line. Explosion Proof Torch Light. Air Breathing Apparatus.
20. 1 set	x	1.5" x 2" x 40pcs International Code Flag
21. 1 no	x	Spare Compass
22. 1 no	x	2' x 3' Malaysia flag
23. 1 no	x	2 x 3' Indonesia flag
24. 1 no	x	Life saving & Fire Fighting plan
25. 1 no	x	2 Meter Embarkation Ladder

8 ELECTRICAL** – System of Supply

- a) 1 x Engine Room Main Switch Board
- b) 1 x Navigation Panel
- c) 1 x DC 24V Charging Loading Panel
- d) 1 x DC 12V Charging Loading Panel
- e) 1 x Wheelhouse DB
- f) 1 x Steering Panel

Electrical apparatus and wiring system are to comply with Classification Society's requirements. All electrical fittings used are to be good quality and suitable for tropical and marine environment.

8.2 Navigation Light

The navigation lights are to be consisted of the following:-

- a) Three (3) x masthead lights
- b) One (1) x port light
- c) One (1) x stern light
- d) One (1) x starboard light
- e) Three (3) x NUC light
- f) One (1) x anchor light
- g) One (1) x towing light
- h) Two (2) x Immigration light

8.3 Fire & General Alarm

Fire and general alarm supply system is to be taken from 24V DC distribution board. Alarm pushers are to be fitted in wheelhouse and engine room.

9 MACHINERY

Two (2) Units x New Yanmar Marine Diesel Engine

Model : Yanmar Marine Engine 6AYM-WST rated 650hp x 1900 rpm
coupled with Reintjes Marine Reduction Gearbox WAF364L with
Rating Ratio 6.048:1

9.2 Steering Gear

- a) One (1) x 2.0 Tons – Electric Hydraulic Steering Gear System (Joystick Type + Emergency Helm)
- b) One (1) x intercom telephone to be fitted

9.3 Bilge & Ballast Pump

One (1) x KEM pump 4KW x 3000 RPM

9.4 GS & Fire Pump

One (1) x KEM pump 4KW x 3000 RPM

9.5 Fuel Oil Transfer Pump

One (1) 1-1/2" China Made Gear Pump c/w Motor

9.6 Fresh Water Pressure Pump & Sea Water Pressure Pump

One (1) x 1" Everbush Auto Pressure Pump

9.7 Emergency Fire Pump

One (1) x 2" ETQ Power DP2C-4

9.8 Stern Tubes & Shafting

Stern tubes are to be fabricated from mild steel pipe and water lubricated stern tubes with cutlass bearings. Two (2) x 316 Stainless Steel Shafts

9.9 Propellers

Two (2) x solid propellers, 4-bladed fixed pitch manganese bronze (Open Type)

9.10 Rudders

Two (2) x single plate rudders, made from mild steel, are to be fitted

9.11 Engine Exhaust

All diesel engines are to be fitted with suitable silencers and well insulated and covered with ceramic wool sheet.

9.12 Generator Sets

Two (2) x Cummins Diesel Engine – 24KW

9.13 Drainage

All places where water can be collected, to have drainage to bilge well and overboard. Separate drainage from top of funnel directly overboard.

9.14 Engine Alarm System

Alarm system to be arranged according to class and engine makers requirements

9.15 Lub Oil System

Lub oil system to be arranged according to class and main engine makers requirements. Lub oil store tank to be arranged in engine room

9.16 Cooling System

Two (2) x Sea chests to be arranged in engine room, high and low section. Cooling system to be arranged according to class and engine makers requirements.

9.17 Sludge

Sludge tank to be arranged in engine room. China made 0.25 m³/hr Oily Water Separator to be installed.

9.18 Modification of drawings

The Owner, who may request for modification on drawings and ongoing construction work, should bear all the additional cost including but not limited to the fees on class survey, drawings modification and additional

construction work. Delays due to additional works required by the Owner will be excluded when calculating the actual delivery day.