

# 73.6 METRE ROPAX CATAMARAN FERRY

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## SPECIFICATION

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SEATRANSPORT

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## DOCUMENT HISTORY

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## DEFINITIONS

ABS	Acrylonitrile Butadiene Styrene Pipe Material
APD	As per Drawing
Builder	TBC
Class	Classification Society
CNC	Computer Numerical Cutting
COLREGS	The International Regulations For Preventing Collisions At Sea
deg	Degrees
Designer	Sea Transport Solutions
DO	Diesel Oil
E/R	Engine Room
EN	Equipment Number
FFE	Fire Fighting Equipment
Flag	Flag Administration
FO	Fuel Oil
FW	Fresh Water
GMDSS	Global Maritime Distress Safety System
HFO	Heavy Fuel Oil
HHP	High Holding Power
HT	High Temperature
HVAC	Heating Ventilation & Air-Conditioning
IACS	International Association Of Classification Societies
IMO	International Maritime Organisation
INEA	Instituto Nacional de los Espacios Acuáticos (Venezuelan Flag Authority)
IP	Ingress Protection
ISO	International Standards Organisation
IWO	In Way Of
LBP	Length Between Perpendiculars
LH	Left Hand
LO	Lubrication Oil
LOA	Length Overall
LSA	Life-Saving Appliances
LT	Low Temperature
LWL	Length Waterline
MARPOL	International Convention For The Prevention Of Pollution From Ships

MDO	Marine Diesel Oil
MES	Marine Evacuation System
MGO	Marine Gas Oil
nm	Nautical Mile
NUC	Not Under Command
Owner	Owner Or Owner's Authorised Representative
PA	Public Address
PEX	Cross Linked High Density Polyethylene Pipe Material
PLC	Programmable Logic Controller
PVC	Polyvinyl Chloride Pipe Material
RAM	Restricted Ability To Manoeuvre
RH	Right Hand
RORO	Roll On Roll Off
RPM	Revolutions Per Minute
S/S	Stainless Steel
SOLAS	Safety Of Life At Sea
SW	Sea Water
SWL	Safe Working Load
TBC	To Be Confirmed

## 000 GENERAL

### 010 GENERAL REQUIREMENTS

It is the intent of this specification, together with the accompanying General Arrangement plans, to set forth the work to be executed and items to be furnished for the construction of a vessel suitable for RORO/passenger duties between Puerto La Cruz / Cumana and Margarita Island, Venezuela.

The vessel shall be designed, constructed and outfitted to the requirements outlined in this document, and in accordance with the requirements of the Classification Society and the Venezuelan Flag Authority (INEA).

The Builder shall supply all items required by the latest stipulated rules and regulations for completion, trials and handing over of the vessel ex Shipyard.

Anything not described or omitted from this specification, but required by Class or the Flag Authority, shall be supplied by the Builder.

In all cases where contradiction exists between the plans and specification, the specification shall govern unless mutually agreed with the Owner, or the Owner's authorised representative. In all cases where such contradictions are found the Builder is required to notify the Owner before any related work is undertaken.

In the case where contradiction exists between the specification and the contract the contract will govern unless mutually agreed with the owner, or the Owner's authorised representative.

Any modifications to this specification shall be mutually agreed between the Designer, Owner and Builder.

## 020 PRINCIPAL PARTICULARS

### **HULL PARTICULARS**

L.O.A (excluding ramps)	Approximately	73.60 Meters
L.B.P	Approximately	67.30 Meters
L.W.L	Approximately	69.11 Meters
Beam Max (Inc. Fenders)	Approximately	22.00 Meters
Depth Moulded (At Midships)	Approximately	5.75 Meters
Max Loaded Draft	Approximately	2.75 Meters

Principle dimensions of the vessel are subject to slight changes according to the results of final trim and stability analysis.

### **SPEED**

Service Speed at 2.5m draft	Approximately	22 Knots
Max Speed	Approximately	23 Knots

### **DISPLACEMENT**

Loaded Displacement	Approximately	1257 Tonnes
Deadweight	Approximately	475 Tonnes
Revenue Deadweight (Vehicles+Pax)	Approximately	460 Tonnes

### **INTERNATIONAL TONNAGE (ITC '69)**

Gross Tonnage	Approximately	>1000
Net Tonnage	Approximately	TBC

## 030 DEADWEIGHT & CAPACITIES

### PASSENGERS / CREW

Passengers, Total	<del>772778</del>
Business Class, Starboard Side	<del>7683</del>
Tourist Class, Starboard Side	178
Tourist Class, Port Side	318
Sun Deck, Total	200
Crew	10
Total Complement	<del>782788</del>

### DECK CARGO

Cars, Average Size (Incl. Centre lanes)	2t Axle Load	99 Cars 490 Lane Metres
Trucks/Buses (Main Deck)	11.5t Axle Load	140 Lane Metres

?  
(amount of trucks?)

### TANK CAPACITIES

Fuel Oil	Total	148,000 L
Fuel Oil	Saddle Tank (Day Tank)	2x 31,000 L
Fuel Oil	Forward P&S	2x 14,000 L
Fuel Oil	Midship P&S	2x 29,000 L
Fresh Water	One side, midship	13,000 L
Grey/Black Water Holding Tank	One side, midship	10,000 L
Lube Oil	Port Engine Room	3,500 L
<del>Lube Dirty Oil Waste</del>	<del>Starboard-Port</del> Engine Room	3,500 L
<del>Sludge Fuel Overflow</del>	Starboard Engine Room	3,500 L
Bilge Water	<del>Port-Starboard</del> Engine Room	3,500 L



## 040 RULES & REGULATIONS

### 041 CLASSIFICATION

The vessel shall be constructed with hull, machinery and equipment installed in accordance with the latest rules and regulations of the classification society for construction of steel vessels in restricted coastal operation. The following Class notation shall be assigned:

Lloyds Register ✕100A1 SSC, Passenger, Catamaran, LDC, G3

[✕]LMC. Service restriction: 'Venezuelan Coastal Service'

Special Duties Notation: RoRo Passenger Catamaran Ferry

### 042 STATUTORY REQUIREMENTS

The Vessel shall be designed and built to comply with the codes as applicable, for coastal water ROPAX operations. Statutory requirements shall be assessed by the Venezuelan Flag Authority (INEA). Various aspects of statutory approval may be delegated to the nominated classification society if requested by the Flag Authority.

The vessel shall comply with the following Codes, Rules and Regulations:

- National Standard for Commercial Vessels (Australian Transport Council)
- International Convention on Loadlines , 1969/1988
- International Convention on Tonnage Measurement of Ships, 1969
- COLREGS
- MARPOL Annex I (oil)
- MARPOL Annex IV (sewage)
- MARPOL Annex V (garbage)
- MARPOL Annex VI (air)
- International Convention on the Control of Harmful Anti-fouling Systems on Ships\_ (AFS)
- ISM Code

### 043 CERTIFICATES

The following certificates and approved documents are to be supplied, in duplicate, at the time of delivery of the vessel (one copy of each to be kept aboard the vessel):

Document	Approval Issued by	Document Supplied by
Class Certificate	Class	Class
Builder's Certificate		Builder
International Tonnage Certificate (1969)	Class	Class
International Load Line Certificate	Class	Class
International Load Line Exemption Certificate, if applicable	Class	Class
Approved stability booklet – statement of compliance	Class	Designer
Fire Control plan/booklet	Class	Designer
International Oil Pollution Prevention Certificate	Class	Class
Oil Record Book	Class	Builder
Shipboard Oil Pollution Emergency Plan	Class	Owner
International Sewage Pollution Prevention Certificate	Class	Class
Garbage Management Plan	Class	Owner
Garbage Record Book	Class	Builder
Cargo Securing Manual	Class	Owner
Passenger safety statement-of-compliance	Class	Class
List of operational limitations	Class	Owner
International Anti-fouling System Certificate	Class	Class

Statutory certificates may be omitted if they are not required by Flag or the relevant systems / equipment are not required.

## 050 GENERAL CONSTRUCTION REQUIREMENTS

### 051 BUILDERS RESPONSIBILITIES

The Builder shall be responsible for meeting the Owner's requirements as stipulated in the Specifications herein, and fulfilling all applicable Class and Statutory requirements.

The Builder alone shall bear full responsibility for the construction and quality of workmanship. The Builder shall be and remain entirely responsible for the proper construction and efficient functioning of the vessel in accordance with all the provisions of the Contract, including rectification of excessive vibration.

#### ***Owner Absolved From Liabilities***

Examination of drawings and other documents submitted by the Builders and approval given hereto by the Owner will not attach to the Owner any liability to the Builders or to anyone and the Builders shall indemnify defend and save the Owner harmless from and against any claim deferred action proceeding.

### 052 EQUIVALENT STANDARDS OF MATERIALS & EQUIPMENT

Where equipment is specified herein by manufacturer's name, make, or model number, "or equal", the manufacturer's specifications and performance characteristics are included by reference in this Specification. The Builder may propose equivalents to these equipment selections by submitting their proposal in writing to the Owner's representative for approval. To determine acceptability of a proposed equivalent item, the Owner will review the item based on the following criteria:

- Meet equivalent performance, service life, size and weight designated by the originally specified equipment manufacturer.
- Possess required Regulatory Body approvals.
- Spare parts and service to be readily available in ship operation area.

Where equipment is specified herein as "or similar" a manufacturer's name, make, or model number, the manufacturer's specifications and performance characteristics are those determined by the Owner to meet operational needs. The Builder may substitute equivalents to these equipment selections, provided the equivalency requirements of a) and b) above are met.

### 053 WORKMANSHIP & QUALITY OF MATERIALS

All workmanship is to be of a high quality and shall be in compliance with requirements of the applicable regulatory requirements.



Equipment and fittings shall be installed in accordance with good shipbuilding practice; i.e construction to soundly conceived and engineered detailed working plans prepared by the Builder or Designer, incorporating the specified components and utilizing recognized shipbuilding construction and testing methods to ensure that the completed ship conforms to specification requirements.

All materials, fittings and equipment shall be of good marine quality, supplied newly manufactured, free from any defects and shall be suitable for use in a marine environment. They shall be unaffected by moisture, sea spray, extremes of temperature, and other hazards of the marine environment, and have been designed and constructed to perform their intended function in the marine environment conditions, plus the dynamic motions and cyclic loads imparted in a marine environment. They must further be designed and constructed for ease and safety of operation under dynamic conditions, and must require minimum maintenance.

All fasteners fitted in conjunction with equipment, fittings and piping shall be corrosion resistant and generally of 316L stainless steel construction. Care shall be taken to avoid galvanic corrosion and dissimilar metals shall be effectively isolated as appropriate.

#### 054 NOISE & VIBRATION

Vibration levels in the accommodation spaces, engine room and wheelhouse shall be kept to a minimum and within the limits indicated by ISO 6954-2000.

Noise levels in the accommodation and working areas shall not exceed the IMO Code on Noise Levels on Board Ships Resolution A.468(XII) as far as practicable or the following, whichever is the more stringent.

Accommodation Spaces	NR65
Wheelhouse	NR65

Shipborne noise levels measured at various referenced positions on the shore are not to exceed local authority requirements.

#### 055 WEIGHT CONTROL

The Builder shall take all necessary steps to minimise deviation of the vessel's lightship weight and centre of gravity from the weight estimate prepared by the Designer.

Any deviation from the Designer's weight provision for materials and equipment shall be submitted to the Owner for approval prior to purchasing such materials or equipment.

Modifications in the construction of the ship, such as revisions in ship geometry, equipment and/or materials, which result in departures from the approved light ship weight and/or centre of gravity, must be submitted to the Owner and Designer for approval. Such submissions must include an estimate of the modification's effect on the weight and centre of gravity of the ship. Such modifications may not be undertaken until written approval has been granted by the Owner.

#### **056 DELIVERY**

Upon completion, the vessel is to be delivered at the shipyard in a clean and seaworthy condition, afloat, safely moored and clear of obstructions at the wharf. All machinery is to be in perfect running order. Outfits and stores are to be properly stowed and compasses adjusted. The vessel shall be delivered with 5,000 litres of fuel, and the fresh water at working level.

#### **060 SUPERVISION, TESTING & TRIALS**

##### **061 SUPERVISION**

The Owner may nominate a representative to supervise construction. The Builder shall supply the Owner's representative with suitable on-site office space during such supervision periods, and allow free access to all parts of the ship at any time.

##### **062 INSPECTION**

Throughout the construction period and at any time prior to the delivery, the Class and Flag Surveyors shall be given free access to the Builder's yard for inspection during normal working hours and after hours if work is carried out on the vessel at such time.

##### **063 PRE-LAUNCH COMMISSIONING & TESTING**

Detailed wharf trials schedules shall be prepared and submitted for Owner's and Classification Society's approval at least one (1) week prior to commencement of such trials. System testing shall be done according to the Builder's Quality Assurance (QA) system. The Owner shall have the right to witness such tests at his own expense. The below mentioned tests are indicative only and may change based upon final requirements of the Classification Society and Flag Authority.

Before delivery of the vessel, the following tests are to be carried out and signed off alongside wharf in the presence of the relevant Surveyor and Owner's representative (including but not limited to):

- Test of bilge pumping system
- Test of life saving appliances
- Test of rescue boat launch arrangement and load test of davit to 150% of working load
- Test of other safety equipment
- Tests of steering gear, windlass and navigation lamps
- Tests of mechanical ventilation (E/R fans, Galley and other vent fans)
- Tests of air conditioning and drain
- Tests of generators, motors
- Tests of all ships monitoring and all alarm systems
- Tests of insulation resistance of all circuits on completion of work
- Tests of radio apparatus
- Tests of shipboard intercoms
- Tests of ramps and all hydraulics
- Test of WC systems (incl. Black/grey water, FW)
- Test of all Galley equipment
- Test of all FW, FO, LO, Sullage and all other pumps
- Test of all scuppers
- Test of all valves
- Test of all Doors and Hatches (watertight and weather tight)

#### 064 SEA TRIALS

The Builder shall prepare a detailed sea trial procedure and submit to the Owner for approval at least one (1) week prior to commencement of such trials.

During the tests and trials the following data shall be recorded:

- Wind speed
- Wave heights
- Air and sea water temperature
- Draft, trim and displacement of the Vessel.

Sea trials shall be undertaken in the following conditions:

- Wind speed: Maximum Beaufort 5
- Wave height: Maximum 1.5m → *could be of concern.*
- Water depth: Deepwater so as to avoid shallow water effects
- Loading Condition: Draft corresponding to 50% deadweight loading

Cumulative sea trial period shall be no less than 20-8 main engine hours (per engine). Tests to be conducted at sea trials, as a minimum, are:



- Progressive speed trials. Speed tests are to be conducted over a recognized measured mile with engines running at ~~different engine r.p.m.~~ RPM increments of 500RPM from idle speed to wide open throttle. Upwind and downwind measurements are to be taken at each increment of engine RPM~~ever multiple directions~~. Speed measurement shall be via the GPS equipment.
- Endurance trials at the maximum specified engine rpm for a period of 4 hours starting with the trial medium load condition. During the test, the exhaust gas temperature, cooling water temperature, and lubrication oil temperature of the main engines will be recorded. The approximate fuel consumption will be measured from the difference in tank soundings that are recorded before and after the endurance trials.
- Manoeuvring, including:
  - standard turning circle measurement with the two outer propellers only
  - Steering test
  - Crash stop ahead at the maximum continuous RPM of the main engines.
- Anchor handling test
- Noise measurements. Sound level (dB(A)) shall be measured at the following locations:
  - Three (forward, mid and aft) positions each, in the upper and lower decks passenger saloon.
  - In the engine rooms (P&S).
  - Outside the Vessel, about 25m away from aft main deck with the Vessel moored alongside at idle speeds of main engine, and during berthing.
- Any other trials required by Class or Flag

## 070 DRAWINGS & PUBLICATIONS

The following plans are to be supplied with the vessel in A3 size:

- General arrangement
- Stability booklet including Hydrostatic curves
- Machinery/ER layout
- Transverse sections through each compartment and each bulkhead (5 sheets approx..)
- Longitudinal sections (3 sheets approx..)
- Superstructure details, transverse and longitudinal
- Access details
- Venting details

- Anchoring, mooring arrangement
- Shafting, propellers, bearing and A bracket arrangement
- Welding schedule
- Safety Plan (LSA, FFE and Evacuation)
- Structural Fire Protection diagram
- Capacity with deadweight scale.
- Docking Plan

As built plans to be supplied by the Builder for:

- Domestic piping diagram
- Fuel piping diagram
- Bilge & fire main piping diagram
- Salt Water system diagram
- Hydraulic system
- Rudder and steering gear
- Electrical Plans, including wiring diagram of main distribution circuits, 480V / 220V/110V A.C. and 24V D.C. & wiring diagram of lighting
- Final electrical load analysis

The following publications are to be supplied by the Builder-Owner and carried aboard in hardcopy:

- International Code of Signals
- IAMSAR Manual Volume III
- Nautical Charts & Publications for the area of operations
- Publications required by ISM Code

*International Safety Management*

Latest editions of each publication shall be supplied.

## 080 OWNER SUPPLIED EQUIPMENT

To be confirmed



## **100 HULL & SUPERSTRUCTURE**

### **110 GENERAL HULL CONSTRUCTION**

#### **111 HULL MATERIALS**

Hull construction is to be of Class approved marine grade high tensile (AH36) and mild (Grade A) steel. In general the following Class approved material grades are to be used:

1. Plate:
  - a. Shell – AH36
  - b. Main Deck (truck lanes) – Grade AH36
  - c. Main Deck (elsewhere) – Grade A
  - d. Frame / Girder webs – Grade A
  - e. Bulkheads – Grade A
  
2. Profiles:
  - a. Shell longitudinal stiffeners – AH36
  - b. Frame / Girder face bars – Grade A

All stainless steel materials shall be grade 316L unless specified elsewhere in the drawings or this specification.

Pre-cut steel framing parts for hull construction will be supplied by Sea Transport Solutions Pty Ltd. Refer Appendix B for scope of supply.

#### **112 HULL STRUCTURAL ARRANGEMENT**

The configuration, dimensions and construction of structural members requiring Class approval are to be approved by the Classification Society before construction is commenced. Scantlings not specified by the above mentioned rules to be in accordance with good shipbuilding practice.

The vehicle deck shall be strengthened for trucks/busses in the centre lanes with an 11.5 tonne axle load rating. Car lanes shall be strengthened for a 2.0 tonne axle load rating. Both truck and car lanes are constructed using designated axle loads.

Hull sides and bottom shell are constructed using a longitudinal framing system.

Bulkheads are of corrugated construction.

### 113 TANKS

Refer to Section 030 for tank capacities.

Fuel and fresh water tanks are to be of integral construction.

Sewage tank is to be freestanding independent type of roto-moulded polymer construction.

All tanks shall be provided with an access manhole, stainless steel bottom plugs, venting, and sounding arrangement via sounding pipes / sight glasses as appropriate.

### 114 SEAWATER INLETS

Seawater inlets shall be streamlined for minimal drag and cavitation, as well as for efficient water inflow. Each seawater inlet shall be fitted with a valve and a strainer.

### 115 MAIN ENGINE FOUNDATIONS

Main engine foundations shall be suitably constructed to minimise transmission of vibration from the engines to the hull. Engine girders shall be longitudinally continuous and double continuous welded throughout.

## 120 GENERAL SUPERSTRUCTURE CONSTRUCTION

The superstructure is to be of Class approved marine grade aluminium. The configuration, dimensions and construction of structural members requiring Class approval are to be approved by the Classification Society before construction is commenced. Scantlings not specified by the above mentioned rules to be in accordance with good shipbuilding practice.

Passenger decks shall be constructed using extruded aluminium planking. Superstructure side shell shall be constructed using a longitudinal framing system.

In general the following Class approved material grades are to be used:

1. Plate: 5083 H321
2. Extrusions:
  - a. In general: Aluminium 6082 T5/T6.
  - b. Grade 6061 T6 may be used in areas *not* in contact with sea water, subject to approval by Class.
  - c. Grade 6050 may be used in fitout applications only
  - d. Grade 6005A is *not* acceptable for use in any structural application.
3. Filler Wire: 5356 or equal

## **130 HULL OPENING AND CLOSING DEVICES**

### **131 HATCHES**

Class approved hatches are to be provided of sufficient size to facilitate access to:

- Forepeak (flush watertight bolted manhole located inside fwd P&S deckhouse)
- Fwd Void Port (raised weathertight hatch located port Main Deck)
- Fwd Void Stbd (raised weathertight hatch located stbd upper deck)
- Engine Removal (bolt down watertight flush hatch to enable clear removal of engine with gearbox (refer engine removal hatch drawing)

### **132 MANHOLES**

Manholes shall be fitted to provide access to all tanks and voids, and shall be fitted with handles and lifting bolt to facilitate easy removal.

### **133 WEATHERTIGHT DOORS**

Weathertight doors are to be installed in passages leading to all accommodation, wheelhouse and stowage areas. All doors are to be powder coated and fitted with self-closing devices and latches to secure in open position. All doors will have the ability to be locked and unlocked from both sides. One set of spare seals shall be provided by the Builder.

### **134 WATERTIGHT DOORS**

Class approved Kontrail or equivalent steel hinged watertight doors are to be fitted in hull transverse bulkheads P&S. Door mechanisms are to be single action 6 dog doors with stainless steel components. Doors leading to the deck have the ability to be locked and unlocked from both sides.

### **135 WINDOWS**

Windows shall be toughened safety glass to give maximum viewing possible. The thickness is to comply with Class requirements. Windows are to be direct glazed type using Sika bonding system installed by Sika approved installers. Windows to be fitted with dot matrix type ceramic band around perimeter. Bridge windows shall be of fixed clear type. Side windows are to be opening or fixed as marked in the structural drawings. Sliding windows are to have aluminium frames. There is to be an unobstructed view from the wheelhouse to the loading deck in all trim conditions during docking. Six (6) wheelhouse windows shall be fitted with heavy duty Hepworth or equal pantograph wipers. Fresh water shall be supplied to the wipers for window washing.



Windows shall be supplied in accordance with the following schedule:

Location	Qty	Type	Tint
Wheelhouse Front	10	Fixed	Clear
Wheelhouse Side	10	Fixed	Clear
Wheelhouse Side	2	Sliding	Clear
Wheelhouse Aft	8	Fixed	Grey Smoke
Wheelhouse Door	4	Fixed	Grey Smoke
Upper Deck Port, Outboard	68	Fixed	Grey Smoke
Upper Deck Port, Inboard	0		
Upper Deck Port, Deck	32	Fixed	Grey Smoke
Upper Deck Stbd, Outboard	58	Fixed	Grey Smoke
Upper Deck Stbd, Inboard	0		
Upper Deck Stbd, Deck	28	Fixed	Grey Smoke
Upper Deck Doors	8	Fixed	Grey Smoke
MES Doors	4	Fixed	Clear

Grey smoke windows shall incorporate 25% tint.

Central wheelhouse window is to be fitted with a solar blind.

### 136 AIR, FILLING & SOUNDING PIPES

Tanks are to be fitted with air and filling pipes of 316L stainless steel for fuel oil and galvanised steel construction elsewhere. They shall be terminated above the open deck, shall be flanged close to the deck, and vent pipes equipped with Class approved automatic closing devices.

Voids are also to be fitted with appropriate number of galvanised steel vent pipes with automatic pipe closing devices.

The open ends of air pipes to oil fuel tanks are to be fitted with a wire gauze diaphragm of non-corrodible material which can be readily removed for cleaning or renewal. Where wire gauze diaphragms are fitted at air pipe openings, the area of the opening through the gauze is to be not less than the cross-sectional area required for the pipe.

All vents pipes are to meet height requirements required by Class and Flag as applicable.

Fuel oil sounding pipes are to be located in the deepest section of the fuel tanks and include a black dip stick with stamped measured increments in 500L increments. The cap of the sounding tube is to consist of a 4" stainless steel camlock.

### 137 VENTILATION OPENINGS

Provision will be made to manually isolate engine room ventilation openings in the case of fire or water ingress. Visual Indicator at engine room fan control will show intake closed.

### 138 MISCELLANEOUS CLOSING DEVICES

N/A

### 140 ACCESS & EGRESS

#### 141 STAIRS & LADDERS

Stairs and ladders located in and leading to/from passenger spaces shall be designed and constructed in accordance with Flag requirements. Stairs leading to crew spaces below deck shall be of painted steel construction.

Where practical stairs should be inclined at 45deg with a rise 200-225mm. If not practical inclined ladders with angles 45-65deg to horizontal may be accepted, however the angle must be kept to a minimum. Inclined ladder rise should be within the range 200-250mm, with going to suit the rise and stair angle. Treads shall have a minimum depth of 115mm, and must overlap by at least 10mm. Treads must be evenly spaced, within 5mm tolerance. The nosing of the treads are to be rounded, and are to be fitted with a non-slip surface.

Minimum stair / ladder width is 600mm unless otherwise required for Class or Flag approval.

#### 142 ELEVATORS / LIFTS

One (1) Thyssen Krupp 'Vector' or equal electric powered disabled person access lift to be fitted in the starboard aft quarter for the purpose of transferring passengers from Main Deck to the Upper Deck. Lift is to be incorporated into the superstructure and surrounded by a shaft casing.

Lift doors shall have mechanical means of fastening in the closed position while the vessel is at sea.

An uninterrupted power supply shall be fitted to the lift control equipment to ensure the system does not lose power during transfer from ship to shore power.

*If asked  
ask  
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access*

#### 143 HANDRAILS, RAILING AND GRIPS

All handrails above Main Deck will be constructed from Aluminium as per Flag and Class requirements. Stairways will incorporate a hand rail. Hand rails shall be fitted to machinery spaces to protect personal from hot or moving parts, and throughout hull voids.

Handrails will be required on both the forward and aft ramps iwo passengers walkways and these may be removable – see designer drawings.

#### **144 EMBARKATION**

Passengers will embark and disembark via bow and stern ramps on the Main Deck.

#### **150 HULL & FITTINGS**

All deck fittings to be fully welded.

#### **151 FENDERS**

400mm diameter half-round heavy duty steel tubing, to be fitted APD, minimum wall thickness 12.7mm.

#### **152 ANCHOR**

Anchor rests in cradle, spare anchor is on fore deck.

#### **153 CHAIN LOCKERS**

N/A. Anchor ground tackle stowed on windlass winch drum.

#### **154 BOLLARDS & BITTS**

Steel double bitt bollards are to be fully welded and to be located:

- Stbd Bow
- Port Bow
- 2x Stbd Midship
- 2x Port Midship
- Stbd Stern
- Port Stern

Superstructure shell opening and Main Deck IWO bollards to be reinforced with 38mm diameter round bar.

Safe Working Load shall be stamped on each bollard.

#### **155 LIFTING LUGS**

Lifting lugs for moving small machinery and equipment shall be mounted on engine room and steering compartment deck head. The lifting lugs shall be designed for a safe working load of the equipment in that compartment. SWL to be marked in yellow.

Lifting lugs shall also be fitted underwater above rudders and propellers to facilitate their removal in accordance with designer guidance.

Vehicle lashing lugs shall be provided on the Main Deck suitable in number and rating to effectively secure vehicle cargo. SWL shall be stamped on each fitting, and each fitting shall be provided with adequate certification to verify strength.

#### **156 MAST**

A lightweight aluminium mast (APD) is to be erected on the Wheelhouse roof to accommodate navigation and communication equipment. Provision will be made to hoist and display flags and day shapes from the bridge deck. Subject to Flag requirements, additional fore and aft masts of simple arrangement may be required.

#### **157 RAMPS**

Ramps shall be fitted at the bow and stern, each with approximately 5m length and an additional 1m flap. Construction shall be of marine grade aluminium and designed to accommodate passenger and vehicle loading. Vehicle loading shall only consider a single lane of trucks with 11.5tonne axle loading.

~~Shore ramps in lieu of ship ramps should be considered as an option.~~

#### **158 PERMANENT BALLAST**

N/A

#### **159 HELICOPTER LANDING AREAS**

N/A

#### **160 MARKINGS**

#### **161 VESSEL IDENTIFICATION**

Vessel identification to be provided on the Bow P & S in 300mm lettering and on the transom in 300mm lettering with port of registry on the transom in 250mm lettering. Vessel 'Official Number' to be clearly etched into a designated transverse frame in the void forward of the engine room.

#### **162 COMPANY'S NAME & EMBLEM**

To be provided in consultation with Owners



### **163 BUILDER NAME PLATE**

An engraved plate is to be mounted in the front of the wheelhouse and Upper Deck passenger accommodation area adjacent cafe displaying:

- Ship's name
- Builder's name
- Designer's name
- Date and place of construction

### **164 DRAFT MARKS & FREEBOARD MARKS**

The draft marks are to be permanently marked (welded) on both sides of stem and stern. Numerals are to be 100mm height with bottom of numerals indicating vertical height in metric above bottom of keel. The marks to start at trim light draft and are to cover extreme draft in operation. Draft marks are to be as per the Authority requirements and verified by the surveyor during final marking.

### **165 GENERAL TAGS & LABELS**

The builder is to supply high quality notices in English and Spanish such as, 'NO SMOKING', 'CAUTION', 'NOTICE BOARD', etc. where necessary. Each entry point is to have a label above the doorway. Each tank lid, fuel oil fill, water fill, lube Oil, sewage and air pipes are to be clearly labelled as per ISO, Flag and vessel Class requirements.

## **170 PAINT SYSTEMS**

### **171 GENERAL**

Paint system is International or Sigma, or similar brand nominated by the Owner. All surfaces are to be prepared and paint to be applied in accordance with the specifications supplied by the paint manufacturer. Colour scheme to be decided by owner.

### **172 HULL ABOVE WATER**

Refer Appendix F for paint specifications.

### **173 ANTIFOULING SYSTEM**

Refer Appendix F for paint specifications, and to be a 3 year system with AFS certification and suitable for vessel speed and local water temperature conditions.



#### **174 TANKS**

Refer Appendix F for paint specifications.

#### **175 SUPERSTRUCTURE**

Refer Appendix F for paint specifications.

#### **176 DECK COVERINGS (EXTERNAL)**

All weather decks to be non-skid finishing. Deck colour to be decided by Owner.

Vehicle deck to be marked with vehicle lanes in Yellow. Areas not suitable for vehicle parking should be painted accordingly.

#### **180 CATHODIC PROTECTION**

A sacrificial based cathodic protection system shall be fitted and will utilise aluminium alloy anodes supplied by Anode Engineering Pty Ltd. The anodes shall be bolted directly to the hull with 3 anodes for each hull side. I.e, 3 anodes on both the inboard and outboard side of the port hull, with the starboard hull fitted likewise.

Twelve (12) Aloline Aluminium alloy Anodes shall be fitted with approximate dimensions 450x150x35mm, c/w Stainless steel straps. All anodes are to be fitted below the lightship waterline, with two anodes fitted on each transom, two each hull amidships and two on each hull forward (total 12).

The anodes will be produced by a foundry having ISO 9001 certification and will be supplied with the appropriate certificates.

The level of cathodic protection to the hull shall be monitored in the wheelhouse by two reference cell monitoring electrode and logged through the ship's integrated programmable logic controller alarm and monitoring system along with the supplied software.

These cells shall be fitted aft on each hull with the skin fitting welded to the hull and the reference cell fitted as per the installation instructions. Once fitted a 4-20 mA signal conditioning box is required to be fitted at a convenient location near the hull penetration.

The signal converter fitted at each hull penetration which requires 24 volts DC power. The shipyard shall supply power to these locations as well as the wheelhouse. The system will interface with the ship's alarm and monitoring system. Hull potential readings and alarm condition will be programmed into the monitoring system by the shipyard utilising the installation instructions supplied with the system.

## 200 EQUIPMENT

### 210 ANCHOR & MOORING EQUIPMENT

The mooring equipment is to comply with Class requirements for equipment number = 521. Lloyd's Register SSC equipment requirements are as follows for G3 operation:

- 1 x horizontal, self-contained hydraulic drum winch on port bow APD
  - Rated for continuous duty pull of 37.5kN over a period of 24 minutes, short term pull of 56.3kN over 2 minutes.
  - Minimum rated brake load of 360.1kN
  - Drum suitable for storage of 195m wire rope
- 1 x 175m x Dia. 28mm 6x36 IWRC galvanised wire rope (breaking load not less than 468kN) attached to a 20m length of Ø30mm Grade U2 short link hot dipped galvanised chain (breaking load not less than 514kN).
- 4 x 160m mooring ropes with minimum breaking strength of 112.8kN (eye spliced each end). Dia. 26mm twelve strand braided polypropylene rope.
- 1x 789kg HHP danforth primary anchor, galvanised, on roller, port side (proof load 209kN).
- 1x 789kg HHP danforth secondary anchor, galvanised, on chocks port side (proof load 209kN).

The windlass shall be fitted with the wire rope / chain assembly and the anchor attached in a suitable working condition ready for operation. The anchor shall be attached to the chain using suitable joining shackles and a swivel forerunner.

### 220 FIRE FIGHTING EQUIPMENT

#### 221 FIXED FIRE FIGHTING SYSTEM

Engine rooms are to be fitted with FM 200, NOVEC, or Class approved equivalent fixed fire protection system. Gas storage cylinders to be stored on the main deck in a dedicated gas tight locker P&S.

Main Vehicle Deck shall be fitted with a dry pipe manually activated fixed pressure water-spraying system complying with Flag Authority requirements. Pump sets shall be fitted in the void space immediately forward of the engine room P&S. Seawater shall be supplied to the pumps from the main engine seawater cooling sea chests.

Refer Section 514 for fire main and hydrant system.

## 222 PORTABLE FIRE FIGHTING EQUIPMENT

- To be in accordance with Authority requirements for passenger vessels and positioned for optimum effect. The equipment is to be as follows (subject to confirmation): 10x Portable fire extinguishers (4.5kg DCP) W/house, Accommodation, Engine Room, Deck
- 2 x 15 kg. Carbon Di-oxide extinguishers (1 each engine room)
- 2 x Fireman suits and Breathing apparatus, lockers to be supplied
- 1 x Fire blanket in each cafe (shop)
- 1 x Fireman's axe

## 223 FIRE DETECTION SYSTEM

An approved type fire detection system shall be fitted throughout the vessel. Smoke and heat detectors shall be fitted throughout the vehicle deck, passenger spaces, engine room and aft peaks in accordance with Flag Authority requirements.

Fire detection system shall have multiple zones and shall be monitored from the Wheelhouse.

## 224 FIRE CONTROL ARRANGEMENTS

A fire control station shall be fitted outside each Engine Room entry with the following functions located within close proximity:

- Engine Room Fixed Fire fighting system release
- Vehicle Deck sprinkler system activation
- Engine Room Ventilation fan shut-off
- Engine Room ventilation fire damper release
- Engine room vent closing device release
- Fuel pump emergency shut-off
- Main engine and generator fuel supply shut-off / fuel tank isolation

## 230 LIFE SAVING APPLIANCES

To be to the Authority requirements and fitted on board the vessel in position for best access. The equipment is to be as follows (subject to confirmation):

- 1x non-SOLAS rescue boat (Zodiac or equal inflatable type)
- 1x Rescue boat davit in accordance with NSCV requirements (adjacent rescue boat)
- MES system with four evacuation stations on the Upper Deck, Viking, DSB or equal
- 6x 100 man throw overboard self-righting coastal liferafts: Viking, DSB or equal
- 10 x lifebuoys (6 with self-igniting lights & smoke signals, four with 30m buoyant line)
- 820 x SOLAS lifejackets (with lights and whistles)
- 78 SOLAS Children's lifejackets
- 12 x Parachute distress rockets
- 2 x Red hand flares
- 1 x Hand held orange smoke signal
- 4 x rocket line throwing devices each with lines
- 1 x Copy of Rescue signal table
- 1 x Medical supplies
- 2 x Waterproof torches as required
- 1 x Set International Code Flags

Liferafts and MES systems shall be of a make with service representation in the area of operation.

## 240 NAVIGATION & COMMUNICATION EQUIPMENT

To be in accordance with survey requirements, including (subject to confirmation):

- A complete set of Aquasignal or equal navigation & NUC lights (24V D.C.) to be fitted in accordance with COLREGS.
- Furuno NAVNET system with dual 15" colour flat screens with integrated display of GPS chart plotter, radar, depth sounder, AIS
- 1 x Furuno Echo sounder
- ~~1~~2 x Furuno 36 Mile Colour Radar
- ~~1~~2 x Furuno GPS Plotter with electronic charts for local area
- 1 x Furuno AIS, FA150 (TBC)
- Autopilot / GPS interface
- 1 x Signal Horn (hand held)
- 1 x 12" bell
- Copy International code of signals
- Barometer & chronometer & Ships Clock
- Set of international flags, shapes and pennants
- 1 x 400mm through deck head manually operated spotlights



- NUC shapes and lights as required by collision regulations.
- 1 x 150mm Suunto or equal magnetic compass
- 1 x ICOM VHF Transceiver with DSC (on radio network)
- 1 x ICOM or Furuno SSB transceiver w/ auto antenna tuner
- ICOM Hand held Marine VHF radios (water proof) x 3 units
- 1 x 406MHz EPIRB McMurdo or equal
- 2 x SART, McMurdo or equal
- 1x IBUKI or equal Ships Horn to class requirements
- 1 x Day light signalling lamp
- 7 x 50 binoculars
- Chart table light
- 1 x Satellite Television dome and receiver
- Satellite Television Decoder rack with 8 x slots

## 250 CARGO HANDLING EQUIPMENT

N/A

## 260 TENDERS

N/A

## 270 CRANES AND LIFTING DEVICES

### 271 RESCUE BOAT DAVIT

One rescue boat davit shall be fitted on the Sun Deck. It shall be electric or electro-hydraulic powered from the ship's emergency power supply.

### 272 BOW & STERN RAMP LIFTING

Bow and stern ramps shall be lifted using hydraulic cylinders and chain. Two cylinders shall be fitted to each ramp and each shall be designed to support the entire weight of the ramp in case of a single cylinder failure. Hydraulic rods shall be of stainless steel construction.

Hydraulic power shall be supplied by a HPU forward and aft. The forward HPU shall also service the anchor windlass. All hydraulic equipment is to be arranged for ease of serviceability and equipment is to be installed over a deep drip pan so as to capture any hydraulic oil leaks.

## 300 PROPULSION & STEERING SYSTEMS

### 310 MAIN PROPULSION ENGINES

The main propulsion machinery shall consist of four (4) MTU high speed marine diesel engines, Type approved heavy duty continuous rated engines. Engine configuration to be as follows:

- 4x MTU 16V 4000 M70 (2240kW @ 2000rpm)

All engines to be fitted with independent sea water cooling and a heat exchange system. 24V x 120 amp alternators shall be fitted on each engine, or suitable size recommended by engine manufacturer. The engines shall be of sufficient output to produce the rated performance at heavy duty rating according to DIN6270 after allowing for site derating to 32°C SW temperature, 40°C ambient temperature 760mm Hg and up to 100% relative humidity.

All limber holes under main engines and to be closed up so as to form a drip pan.

Each engine shall be supplied with the MTU standard scope of supply for accessories. Additional options may be quoted.

Main engines and transmission to be resilient mounted using Vulkan or equal mounting.

### 320 TRANSMISSION

Type approved ZF reverse reduction vertical offset gearboxes shall be arranged in the following configuration:

- 4x ZF 7600, ~~2.565:1~~ or 2.905:1 ratio (ratio TBC), island mounted and connected to the prime mover via a Geislinger or equal resilient coupling.

Lifting eyes are to be located directly above transmission.

### 330 PROPELLER, SHAFT & STERN TUBE

Four (4) fixed pitch Teignbridge C-Foil propellers shall be fitted. They are to be a polished 5 blade of aluminium bronze construction, to meet BS1400 standard as a minimum. Blade sections shall meet the Class requirements. The bore shall be machined to a taper compatible with the shaft design with a surface finish not exceeding 63 microns. Contact with the shaft taper to be a minimum of 70%. All areas of the propeller to be fine disc finished to Ruberts slip propeller scale type 'B' (2 micrometres Ra). Balancing will be initially

to within 2 grams static on knife edges. Tolerances and inspection of the propeller to be in accordance with ISO 484 Class 1.

Propellers shall be coated with proppspeed®.

Looking forward the propeller rotation should be as follows:

#1 Propeller (Port Outboard):	Anti-clockwise
#2 Propeller (Port Inboard):	Anti-clockwise
#3 Propeller (Starboard Inboard):	Clockwise
#4 Propeller (Starboard Outboard):	Clockwise

Propeller shafts shall be fitted with rope cutters between propeller and shaft bracket.

Propeller shaft diameter is to meet Class requirements. The shafts are to be of 2205 stainless steel and to be reversible with standard tapers at each end. The stern tubes are to be made of heavy wall Steel tube, or in the case of an alloy hull an alloy tube, properly welded into the structure of the vessel. All shafts shall be electrically bonded to the hull.

The stainless steel stern tube bearing carriers are to be secured within the stern tube using chockfast after all major welding has been completed in this area of the vessel.

Stern tube bearings shall be Thordon cutlass type. Stern Tube seals shall be Kobelco Eagle water lubricated type. Stern tube bearings shall be water cooled via seawater injection at the forward end of the stern tube.

A flexible shaft coupling (Vulkan or equal) shall be fitted between propeller shaft and transmission to reduce vibration.

Propeller and shaft shall be supported by an 'A' bracket of high tensile steel construction.

### 340 ENGINE CONTROL

Main engines shall have provision to be controlled from the engine room, wheelhouse bridge station and also the starboard wing station via MTU electronic controls. Full instrumentation, alarm systems, stop, start etc shall be suitable for one-man operation. Dual lever engine controls to be used. Controls are to meet Class electrical and machinery approvals. Engine synchronisation not required. Engine alarm and monitoring shall be via MTU 'Bluevision' or approved equivalent system.

Wing station shall include engine control levers, rudder control lever and rudder indicator instruments.

## **350 STEERING**

### **351 RUDDER**

One (1) x Rudder is to be allocated to each hull behind the outer propellers. Rudders are to be stainless steel foil section rudder that meets Class approval.

Rudder stock to be grade 2205 stainless steel.

Rudder bearings are to be self-lubricating, fabricated from Thordon SXL material or similar.

### **352 STEERING GEAR**

Class approved Steering shall be Kobelt or equivalent power pack hydraulic system, with the rudder indicator sited in the wheelhouse and steering flats.

Each rudder shall be fitted with a single tiller and independent hydraulic system. Synchronisation of rudders P&S to be possible from wheelhouse.

The system shall efficiently make the two tillers to swing 37 degrees either side of amidships within 3.5 turns of the wheel (lock to lock maximum).

Primary steering control is to be via Joysticks located in the wheelhouse and wing station. Manual hydraulic back-up steering is to be provided at the helm station with local manual back-up control to be provided in each aft peak.

All hydraulics and valves are to be mounted in or over a drip pan.



## **400 AUXILIARY MACHINERY**

### **410 POWER GENERATION MACHINERY**

#### **411 DUTY POWER GENERATION**

Duty power will consist of 2 x 125kWe Northern Lights auxiliary engine and Stamford alternators to be located in Port and Starboard Engine Rooms. Each shall be sea water cooled with wet exhaust system. Generator and associated equipment is to be mounted in suitable drip pans.

#### **412 EMERGENCY POWER GENERATION**

Standby power will consist of 1 x 65kWe (minimum) Northern Lights auxiliary engine and Stamford alternator to be located on the Main Deck forward, starboard side. Emergency generator shall be radiator cooled with dry exhaust system. Generator and associated equipment is to be mounted in suitable drip pans. Prime mover controls, instruments and dip stick is to be orientated so that is closest to compartment door.

### **420 BOW THRUSTER**

Two Schottel STT110 (150kW) hydraulic bow thrusters shall be fitted to the vessel, both in the port hull. Thrusters will be powered by the ship's thruster central hydraulic system, powered by inboard main engine driven pumps via clutchable PTO. Isolation valves are to be included at the thrusters so as to isolate each hydraulic motor. All control, inclusive of pump clutch is to be activated from the helm station. Hydraulic pumps and valves are to be mounted over drip trays so as to eliminate bilge contamination.

### **430 STABILIZER SYSTEM**

N/A

## **500 SHIP SYSTEMS**

### **501 GENERAL REQUIREMENTS**

All pipes to be arranged according to good marine practice and to meet the Authority requirements. Pipes are to be lightweight and of sufficient bore and wall thickness for the purpose intended. Pipes and valves are to carry identification to meet LR and ISO standards. Pipes are to be provided with supports and clamps and to have minimum number of bends. All domestic plumbing to be of metric size that meets Marine Plumbing Standards.

Valves are to be suitable style and material for the application and to be suited to a marine environment. Valves are to be located for practical operation and easily removed for repair or replacement.

Approved types of fittings are to be used where piping penetrates watertight bulkheads, deck and tank top. Expansion bends to be fitted where necessary to avoid stresses due to thermal expansion. Mud boxes, strainers, filters and valves to be fitted to meet the Authority requirements, and arranged in accordance with the approved piping diagram.

All valve and pipe flanges are to be installed to a uniform national standard such as JIS, ASME/ANSI.

All pipe flanges are to have bonding wires installed across the flange to ensure pipe/fitting electrical potential is zero.

### **510 BILGE, BALLAST & FIRE MAINS SYSTEMS**

#### **511 PIPING**

Piping of galvanized steel, suitable for intended use, with sufficient diameter and wall thickness to meet the Authority requirements is to be connected to bilge pumps.

#### **512 BILGE SYSTEM**

The bilge system is to be an electric system consisting of a Grundfos or equal AC 15kL/hr electric submersible pump per compartment. Emergency bilge pumping is via two AC electric portable self-priming pumps stored on Main Deck, each with capacity 15kL/hr. Each bilge space shall be fitted with a suction pipe leading from the compartment to above main deck and fitted with a camlock fitting compatible with the emergency pump. Emergency bilge water to be pumped directly overboard via a flexible hose.

Primary submersible pumps are to pump directly overboard (except ER low suction, which is to be pumped directly into dirty bilge water tank, with overboard selection valve) through a

discharge pipe with a non-return check valve located at the discharge point through point and located at the pump, in order to meet authority requirement for dual non ret

The discharge is to exit the hull plate through the bridging structure plating.

All bilge pumps are to be managed and controlled by a Class approved bilge management system integrated into the ships PLC system. Bilge management system is to consist of the following alarm, monitoring and control functions on the PLC and from each bilge space:

1. Low level alarm to indicate presence of water, broadcast on bilge management system and localised pump control panel.
2. Medium level alarm indicating presence of water, broadcast on bilge management system and localised pump control panel. In addition, bilge pump auto start function and pump run indication on bilge management system and local pump control panel
3. High level alarm, broadcast on bilge management, local bilge control panel and a stand-alone bilge high level alarm panel sighted at helm station.

Localised bilge pump panels are to be located at shoulder height to the operator and to consist of the following features

1. Power indicator lamp
2. Pump Auto/Off/ Run switch
3. Pump Run Indicator lamp
4. Pump Auto Indicator lamp

Bilge level sensors shall be heavy duty and oil resistant.

### **513 OILY WATER SEPARATOR**

A small oily water separator compliant to IMO MEPC 107(49) is to be plumbed into the bilge water tank in the Starboard Engine room. The unit is to be capable of processing minimum 1m<sup>3</sup>/hr, with the alarm system to be integrated into the ships PLC system

### **514 FIRE MAIN & PUMPS**

One (1) 25kL/hr AC electric fire pump is to be fitted in each engine room by the forward engine room bulkhead, over a drip pan. One fire pump designated as primary and the other designated as emergency fire pump.

Each pump shall be painted red and fitted with a pressure gauge and pressure relief valve.

Fire pump seawater supply shall be from the main engine seawater cooling seachests located forward of the engine room P&S. An additional pickup shall be fitted in each engine room to facilitate emergency bilge pumping in the engine room. Where fire pumps are



located above light ship waterline an “S” trap is to be included in the sea water suction to ensure the pump remains wet at all times.

Fire main piping and flanges shall be steel and hot dipped galvanised after welding is completed. The fire main is intended to be dry while not in use, and piping should be arranged to avoid low points where seawater cannot freely drain from the system. Drain cocks shall be fitted at any such low points. Means shall be provided to drain the fire main back to the sea chests after use.

The fire main system is to be installed to service hydrants located in:

- Engine room (P&S)
- Main Deck forward (P&S)
- Main Deck aft (P&S)
- Accommodation Deck aft (P&S)
- Accommodation Deck forward (P&S)
- Sundeck forward (P&S).

12x18m + 4x15m hoses and nozzles shall be stored in fibreglass fire hose boxes located adjacent the hydrants.

## 520 ENGINE COOLING SYSTEM

Main engines and duty generators shall be sea water cooled through heat exchangers.

Sea water intake is to be via sea chests located in the void space immediately ahead of the engine room forward bulkhead. Two (2) sea chests and strainer assemblies shall be fitted in each hull and designed in such a way to prevent weed entry. Each intake shall include a dedicated strainer box made of stainless steel (316L) and fitted with a stainless steel strainer basket inside with maximum mesh clear opening of 2mm. Sea chests/strainers shall be sized to enable main engines and generators from each hull to run at full power from a single unit while the other is being cleaned. The two seawater intakes shall be cross connected via a manifold and shall supply the following services:

- Main Engine Cooling
- Duty Generator Cooling
- Fire Pumps
- Vehicle Deck sprinkler system pumps

Each sea water supply line is to be oversized and each line shall be capable of being independently closed. Where machinery sea water cooling pumps are located above light ship water line, a “S” bend is to be included in the sea water suction to ensure pumps remain wet at all times. On discharge from the engine, the sea water shall enter the

transmission. Discharge overboard shall be via the wet exhaust system. Prior to entry to the exhaust system a branch line shall be led to each stern tube to facilitate shaft bearing cooling and lubrication. Sea water flow switches are to be included in the shaft bearing and exhaust water so that a low flow alarm is activated via PLC/HMI

All seawater cooling and exhaust piping shall be 316L stainless steel with flanged joints and suitable wall thickness. Stainless steel bonding straps shall be fitted across all flanged joints to ensure zero electric potential. All lines shall be fabricated so as they can be removed and taken on deck via the engine room access doors for cleaning purposes.

### 530 FUEL OIL SYSTEM

Main engines and generator are to be run on marine gas oil (MGO) drawn from the aft fuel day tanks. Drain cocks are to be fitted at the lowest point. Shut-off valves to be fitted to all supply lines, and are to be remote isolated from above the main deck to surveyors and Owner's satisfaction.

Main fuel day tanks are to each include one (1) approved type Econosto or equal sight glass in each engine room. Fuel tanks contiguous with the Main Deck shall have sight glasses of a design where penetration through the side of the tank is not required.

Fuel oil piping including tank filling pipes, air escapes, engine supply and return lines shall be constructed of 316L stainless steel and utilise flanged joints with nitrile seals. Flexible braided lines to be used in fuel connection as required to prevent vibration fatigue.

Fuel filling and vent pipes shall be located on the vehicle deck at side, close to the tank and with a large save-all. Filling lines shall not be fitted to the day tanks. Pipes shall be located adjacent superstructure frames and be fitted with mechanical protection to avoid impact damage from vehicles.

An Alfa Laval centrifugal fuel separator shall be fitted in each engine room to treat fuel oil before filling the day tanks. Capacity minimum 1.5m<sup>3</sup>/hr each. One unit shall be located in each engine room and shall be mounted over a drip pan. System shall be designed to transfer fuel from the forward fuel storage tanks to day tank as well as for automatic recirculation of day tank fuel oil.

Racor duplex fuel filters are to be located on forward engine room bulkhead.

One (1) 15kL/hr fuel transfer pump shall be fitted in each engine room. Each shall be configured to independently transfer fuel between all fuel tanks.

One (1) 2.5kL/hr fuel oil transfer pump shall be fitted in the void space starboard side above the forward fuel tank to enable fuel transfer to the emergency generator day fuel tank.



## 540 LUBE OIL SYSTEM

A Lube oil transfer system will be installed in each engine room with electric pump and manifold to connect to each engine for removing waste lube oil. Fresh Lube oil will be plumbed to a wall mounted retractable hose reel with a trigger. Pumps and valves will be mounted over a drip pan.

## 550 EXHAUST SYSTEM

The exhaust systems from the main and auxiliary engines are to be MTU supplied stainless steel silencers, led through a spray ring (stainless 904L) to atmosphere via side shell at waterline P & S. The exhaust piping is to be fitted in such a manner that no load is carried by the engine and exhaust back pressure meets engine manufactures specifications. The exhaust pipes are to be fitted with cranked pipes to prevent ingress of water. Dry pipes will be wrapped in thermal blankets and shrouded in a metal skin to maintain desired engine room temperature. Where exhaust penetrates the hull a FRP sleeve is to be inserted so as to avoid damage to hull and hull penetration for exhaust fluids.

Crankcase breathers to be vented overboard via the bridging section or if Class and OEM allow venting to machinery space via filter.

## 560 HYDRAULIC SYSTEM

Hydraulic systems shall be installed to provide power to:

- Bow Thrusters via hydraulic pumps mounted on each inboard main engine transmission
- Windlass and Bow ramp via a HPU forward
- Stern Ramp via a HPU aft
- Rescue boat davits via HPU
- Steering system via HPU supplied by steering system supplier

Hydraulic pumps, cylinders, and HPUs shall be Rexroth, Eaton or equal.

Hydraulic oil storage and circulation tanks shall be fitted on the forward side of the engine room bulkhead.

All pumps and valves are to be mounted in or over a drip pan.

## **570 PNEUMATIC SYSTEM**

A portable electric air compressor shall be fitted in each engine room for use with power tools, sea chest cleaning etc.

## **580 HEATING VENTILATION & AIR CONDITIONING**

### **581 ENGINE ROOM VENTILATION**

Ventilation for each engine room is to consist of two(2) 3 phase electric axial type fans, Ziehl Abegg or equal. Fans are to be positioned forward of each engine and directed towards the machinery and to be located so as not to cause an obstruction when working or moving through the machinery space. Calculations are to be made by builder for correct size and airflow needed to maintain a maximum temperature differential of 10°C above ambient. Approved fire dampers are to be installed on each fan.

### **582 ACCOMMODATION VENTILATION AND AIR CONDITIONING**

The required numbers of suitable vents are to be fitted to meet Authority requirement.

All crew and passenger spaces including toilet areas and shops are to be suitably ventilated.

Accommodation area and wheelhouse to be air conditioned with Carrier or equal inverted air conditioners, air cooled split cassette units. Compressor Units are to be mounted on Sun Deck on a well supported frame that includes rubber vibration mounts. Flexible gas couplings to be used to absorb vibration and movement of the ship. Head units are to be well drained to the ship's deck drains.

Crew accommodation is to be suitably air conditioned by split system Carrier or equal inverter units with cassette type outlets in the saloon area. Cool air shall be drawn from the saloon to each cabin via an extraction fan located within each cabin. Fresh air shall be supplied to the crew accommodation compartment via a vent located above Main Deck at side.

The WC's are to have AC electric continuously rated extraction fans .

## **590 DOMESTIC PIPING SYSTEM**

### **591 POTABLE WATER SYSTEM**

A 6,000L integral tank on the port side to be provided with distribution lines led to the toilet compartments, cafe and ¾" wash down outlets on foredeck, P&S main deck aft, accommodation aft deck P&S, sundeck and P&S engine rooms.

Pressure shall be supplied by independent FW pumps. Each pump shall have the capacity to provide the ship with suitable water pressure and are to be mounted in drip pans. Plumbing shall be arranged with the option to select each pump independently or run both pumps simultaneously. Two (2) x 80L expansion tank will be included in the Fresh Water System located close by the pumps.

Pump make: Grundfos or equivalent

Type: Self priming

Piping is to be metric, pressure ABS or PEX. Fresh water tank to be fitted with approved electronic contents and type approved Econosto NL sight glass.

Fresh water hoses and fittings on board to be 19mm (3/4"), with filling station to be sited on Port Aft vehicle deck.

Two(2) small deck mounted solar hot water services located on sun deck, shall feed to the galleys.

## 592 GREY WATER SYSTEM

Grey water collected from ~~galley sink and water closet~~ sinks will drain via an "S" trap fitted below each sink. Galley and water closet floor drains are to be included before the "S" trap so as to maintain an active water seal and prevent odour. Grey water will travel along an independent pipe and connect to the ships Black Water Holding Tank with an additional large "S" trap located immediately before APD.

Piping is to be standard metric pressure ABS or PEX. All connections are to "Slip Joins". Penetrations through deck and bulkhead are to be flanged type.

## 593 BLACK WATER & SEWAGE SYSTEM

Toilets are to be fitted APD. The toilets are to be a standard dual flush domestic type suitable for movement of the vessel.

All waste fluids are to be plumbed to the sewage holding tank on the starboard hull (10m<sup>3</sup>). Sewage transfer shall be arranged with the facility to pump directly overboard, to a dedicated shore discharge connection or to a 12 person capacity sewerage treatment plant.

The sewerage treatment plant shall be a biological type unit, RWO or equal.

Pipe work is to have a gradient such that a minimum fall of 25mm in 1m is maintained. The discharge line is to be fitted with a valve prior to the discharge point. All pipe bends to have large radii with "Y" piece service ports spaced no more than 10 meters apart, along the piping system. Where the black water pipe enters the holding tank an additional large "S" trap is to be included to prevent odour from travelling back up the system. Suitable ventilation to the toilets and holding tank are to be supplied so as to prevent odour in accommodation areas in heavy seas.

Piping is to be standard metric pressure PVC. All connections are to "Slip Joins". Penetrations through deck and bulkhead are to be flanged type.

#### 594 DESALINATOR

N/A



## 600 ELECTRICAL

### 610 GENERAL

Primary shipboard voltage shall be 220V single phase / 480V three phase / 60Hz.

Full Class approved AC and DC Systems to meet general marine standards. An electrical load analysis is to be carried out to ensure that the selected power is of sufficient capacity. This specification will be read in conjunction with the Electrical Drawings.

This vessel will be subject to Class electrical survey during build and on completion the electrical drawings will be stamped as Class Approved.

Two auxiliary engines will each drive a minimum 80kWe, 3 phase 480V 60Hz alternators for use of operational equipment on board the vessel. A single phase 220V / 60Hz system for domestic use will be derived and balanced from the 3 phase supply. Provisions shall be made for a 100A / 3ph shore power connection.

General Power Outlets (GPO) are to be fitted in the following locations:

- Wheelhouse: Three (3) 110V / 60Hz
- Port side Passenger Accommodation: Fifteen (15) 110V / 60Hz fitted IWO tables at table height
- Starboard side Passenger Accommodation: Seventeen (17) 110V / 60Hz fitted IWO tables at table height
- Cafe: 220V / 60Hz, quantity suitable for operation of installed appliances plus an additional 4x spare 110V / 60Hz
- Main Deck: Eight (8) 110V / 60Hz
- Main Deck: Four (6) 480V / 60Hz
- Engine Room (each): Four (4) 110V / 60Hz
- Engine Room (each): Four (4) 480V / 60Hz
- Crew Accommodation: 220V / 60Hz, quantity suitable for operation of installed appliances plus an additional 4x spare 110V / 60Hz and 2x 110V / 60Hz in each cabin

### 620 SWITCHBOARDS & DISTRIBUTION BOARDS

The switchboards are to be totally enclosed type, splash-proof (rated to IP54), powder coated steel plate of 1.6mm thickness to be secured to a strong angle bar frame.

Electrical board, sub boards and junction boxes are to be mounted high to prevent water ingress.

All instruments and apparatus to be accessible from the front side.



Circuit protection is to be suitable for opening the circuit at: -

- under voltage
- under frequency
- overload
- short circuit current

Each alternator will have the means of monitoring:-

- Voltage
- Current
- Frequency
- Engine Hours

A power (kW) meter is to monitor the ships main bus at the main switch board.

Control for each alternator circuit breaker

- green for contactor open
- red for contactor closed
- orange for contactor failed

A non-preferential overload protection is to be fitted. The switchboard is also to have:-

- starter switches
- switches and circuit breakers for outgoing groups

Generators are to be controlled from Main Electrical Switch Board as well as locally. Switch Board will include Start, Stop, Fault lamp and audible alarm.

## **630 CABLE & WIRING**

AC system is to be 4 wire plus Earth with neutral earth Link. All wiring is to meet Class Standards.

DC system is to be 2 Wire above earth system with earth monitoring on bridge and Main Switch Board.

Cable is to be LSZH to IEC 60228 Class 5 standard. Care must be taken to ensure that all cables are supported and where required, perforated cable tray and secured by clips.

All cabling is to be finished in a neat and professional like manner.

All wiring in the accommodation areas is to be concealed. All connections to be made with crimp connectors.

Cables trays on Main vehicle deck shall be run *through* structural frames/girders such that vertical clearance above vehicle lanes is not impeded. Cable trays vulnerable to impact from vehicles shall be mechanically protected. Where possible the cables trays should be run from below deck to Upper Deck / Wheelhouse through structural service ducts shown on the General Arrangement plan. Exposed cable trays providing emergency power and control shall be suitably insulated against fire.

Where cables pass through watertight bulkheads, decks etc., a watertight sealing gland is to be provided. Where cabling is run on deck or other exposed areas it is to be run through suitable PVC conduit.

## **640 BATTERIES**

### **641 MAIN PROPULSION ENGINES**

24VDC 450AH battery banks are to be allocated to each Main Propulsion Engine.

Connection to be made so that each Main Engine start battery can be paralleled, via a switch, with its paired Main Engine. Batteries are to be practically located close to the machine, in a secured, ventilated acid proof fibreglass battery box. Box to be mounted so that the battery terminal height is to be no lower than the terminals of its associated starter motor. A 'smart' battery charger shall be fitted to each battery bank.

### **642 DUTY GENERATOR**

24VDC 220AH battery bank is to be allocated to each Duty Generator.

Connection to be made so that the start battery can be paralleled, via a switch, with the Main Propulsion Engine. Batteries are to be practically located close to the machine, in a secured, ventilated acid proof fibreglass battery box. Box to be mounted so that the battery terminal height is to be no lower than the terminals of its associated starter motor. A 'smart' battery charger shall be fitted to each battery bank.

### **643 STANDBY GENERATOR**

24VDC 220AH battery bank is to be allocated to the Emergency generator. Connection to be made to that generator start battery can be paralleled, via a switch, with wheelhouse batteries. Batteries are to be practically located close to the machine, in a secured, ventilated acid proof fibreglass battery box. A 'smart' battery charger shall be fitted to each battery bank.

Box to be mounted so that the battery terminal height will be no lower than the terminals of its associated starter motor.

#### **644 WHEELHOUSE SUPPLY**

Two(2) x 24VDC 220AH Battery Banks are to be allocated to Wheelhouse Supply. Connection to be made so that Wheelhouse Supply is drawn from each of the battery banks via a diode assembly. Batteries are to be practically located close to Wheelhouse, in a secured, ventilated acid proof fibreglass battery box.

#### **645 RADIO EQUIPMENT SUPPLY**

One(1) x 24VDC 120AH Battery Bank is to be allocated to the Radio Equipment/Fire Detection System.

Batteries are to be practically located close to Wheelhouse, in a secured, ventilated acid proof fibreglass battery box. A dedicated battery charger is to trickle feed this battery bank with means of monitoring to satisfy ships class and flag state requirements.

#### **650 ALTERNATIVE ENERGY**

An 800W Solar Array is to be located on the wheelhouse roof. Solar panels are to be Kyocera, BP or similar quality. Solar energy is to be regulated directed to the Wheelhouse DC supply.

Two(2) x small solar hot water systems to be located on the sundeck to assist the galley hot water systems as per 591

#### **660 ALARMS AND MONITORING**

A class approved PLC delivered by a Human Machine Interface (HMI) is to deliver ships monitoring and control to wheelhouse and each of the machinery spaces. The PLC is to be open architecture and to comprise of commercial off the shelf equipment.

In addition to the main PLC system a "hard wired" critical alarm panel is to be sighted adjacent to the helm station. This panel is to indicate bilge, engine/generator alarm, watertight door and DC power failure.

Audible and visual alarms to be fitted in the wheelhouse, to meet Class regulations. Alarm power to be supplied by wheelhouse 24VDC battery bank.

Fire alarm system is to meet Class/Flag requirements.

A general audible/visual alarm repeater is to be located in each engine room and steering flat. This alarm will indicate machinery fault, bilge, tank, watertight door and hatch status.

#### **661 MACHINERY**

The wheelhouse console shall have a control console which shall include cluster gauges for all engines with the following (subject to confirmation):

- Hour meters
- Lube oil pressure
- Tachometer
- System Voltage
- boost pressure gauge
- Marine gear oil and temperature
- Transmission gear pressure
- Transmission gear temperature
- Start – stop switch
- Emergency stop
- Alarm horn/buzzer
- Rudder angle indicator
- Cathodic Protection hull electrical potential meter

The instrument console is to have all instruments and switches clearly marked in permanently engraved lettering or internationally accepted signs. Starboard machinery instrumentation is to be laid out to starboard and port instrumentation on the port side.

A PLC can be considered as an option for monitoring the whole vessel

## **662 ELECTRICAL**

Ships AC power and Emergency Power will be monitored from the bridge displaying as per design:

- Voltage
- Current
- Frequency
- Power

## **663 BILGE**

All bilge compartments will be monitored by a class approved central audio visual system located in the Wheelhouse. In addition to this any bilge alarm will sound the general alarm with repeater in all machinery spaces. Each bilge compartment will have a “Low level” “Mid Level” with auto pump and “High level” signals . Bilge level sensor are to be ITIM 3PP make or similar.

## **664 TANKS**



Fuel Oil, Fresh Water will be monitored by a class approved central audio visual system located in the Wheelhouse. In addition to this, any tank alarm will sound the general alarm with repeater in all machinery spaces. Each tank will have a "High level" and "Low Level" signals. Tank sensors are to be of high quality and suitable for their application.

Econosto brand sight glass will be installed to:

- Centre Fuel Oil Tank, one port and one starboard,
- Lube Oil Tank
- Fresh Water Tank

## **665 WATERTIGHT DOORS**

All watertight doors fitted in hull bulkheads and Engine Room access doors at Main Deck shall be fitted with remote indication in the bridge showing open/closed status. An audible and visual alarm shall be fitted in the bridge warning of door opening. Proximity sensors fitted to the doors shall indicate 'closed' only when the dogs are fully closed. Sensors and electrical arrangements associated with door monitoring shall be installed to IPX8 standard for watertight integrity.

## **665 SECURITY**

Twenty(20) Channel CCTV M-PEG 4 system incorporating a H264 compression record, linked to a 15" colour monitor mounted on the bridge. Cameras are to be of high definition, minimum 420 TV lines, and to be suitable for the marine environment.

A central security alarm system will include all Accommodation and Wheelhouse doors via magnetic sensors. Key pad will be located at the aft Accommodation door.

## **670 LIGHTING**

### **671 EMERGENCY LIGHTING**

Emergency Lighting is to be a class approved automatic system. In the instant of a blackout, emergency lighting will be powered from the wheelhouse 24V bank. A large inverter system shall be fitted to provide emergency 220V AC power to approximately 25% of accommodation, vehicle deck, machinery space and void space fluorescent lighting. Hella HID 24V, 41 watt spot lights or similar are to be installed above life rafts, muster station and rescue tender. All exit points of the accommodation spaces are to be marked with laminated Exit signs with secondary power supply or approved luminous signage.

Lighting to be arranged as per Owner approved design supplied by the Builder.



#### **672 DECK LIGHTING**

All deck areas are to be well light. Light is to be delivered by Quality marine grade, electronic ballasts Fluorescent, 220VAC, 60Hz, IP65 waterproof. Lights are to be arranged in a manner so that bulbs can be easily replaced without the need of scaffolding (excluding lights under bridge). In addition 4 x Hella HID 24V, 41 watt spot lights (2 fwd, 2 aft).

Lighting to be arranged as per design supplied by Sea Transport Solutions.

#### **673 ACCOMMODATION LIGHTING**

Lighting in accommodation spaces will consist of florescent lighting in the main walkways and LED down lighting in the bulk of the accommodation spaces. Florescent lights will be electronic ballasted 220VAC, 60Hz, IP45, trough mounted fixtures. LED lighting will consist of Hella Rakino LED, 24VDC waterproof spot down light or similar.

Lighting to be arranged as per Owner approved design supplied by the Builder.

#### **674 MACHINERY SPACE LIGHTING**

All machinery areas are to be well light for safety and ease of operation. Light is to be delivered by quality marine electronic ballasted Fluorescent, 120VAC, 60Hz, IP56 water proof. Lights are to be arranged in a manner so that bulbs can be easily replaced without the need of scaffolding.

Lighting to be arranged as per Owner approved design supplied by the Builder.

#### **675 VOID LIGHTING**

All void spaces are to be well light for safety and ease of inspection. Light is to be delivered by quality marine electronic ballasted Fluorescent, 220VAC, 60Hz, IP56 water proof. Lights are to be arranged in a manner so that bulbs can be easily replaced without the need of scaffolding and lighting plan to be arranged as per design supplied by Sea Transport Solutions.

Lighting to be arranged as per Owner approved design supplied by the Builder.

## 700 FITOUT

### 710 DESCRIPTION

All linings are to be low flame spread surfaces in accordance with Class and Flag Statutory authority requirements for structural fire protection and accommodation fit out.

### 711 WHEELHOUSE

Wheelhouse to be fitted out with Ayres Composite or similar lightweight product. A functional appearance with ease of cleaning and access to equipment is a must.

Wheelhouse will include

- Two (2) high quality helmsman seats,
- Chart table
- Desk,
- Two(2) x 2 Draw Filing cabinet
- Bar fridge.

Colour and final layout to be approved by the Owner's Representative prior to the fit out.

### 712 PASSENGER ACCOMMODATION

Passenger comfort levels are to be in accordance with the Authority requirements for RORO/Passenger vessels, and to include:

- Four(4) x 50" Large screen and 8x 30" LCD/LED TV's in the passenger areas. Video source and the input to each television is to be centrally controlled from the wheelhouse, and to be capable of viewing different inputs on each screen. In addition to public address and dvd inputs, each television is to be capable of receiving two inputs from the satellite television decoder rack. Audio to be supplied by vessel's integrated PA system and to be capable delivering multiple inputs for different parts of the vessel
- PA zoned stereo system throughout (with zoning for all vessel areas) with override to entertainment system audio during public address. The following zones shall be provided as a minimum:
  - Business Class starboard side
  - Tourist Class starboard side aft
  - Tourist Class starboard side forward
  - Tourist Class port side aft
  - Tourist Class port side forward
  - Sun Deck
  - Main Deck and External Upper Deck

- Tourist Class seating P&S to be Beurteaux Ocean Contour seating with fabric covering, colouring to Owners requirement. Seats to be fitted with 850mm seat pitch and supplied complete with lifejacket bags, armrests and document holders.
- Business Class seats to be Beurteaux Ocean Club with leather covering and colour to Owner's requirement. Seats to be fitted with 1000mm seat pitch and supplied complete with lifejacket bags, armrests, document holders, meal trays and audio outlet.
- Internal overhead luggage racks are to be fitted above seating areas where possible.

### 713 **GALLEYKIOSKS & BAR**

Galleys/cafes~~Each Kiosk-arejs~~ to be a functional commercial style suitable for a ship with quality fittings.

Each Galley shall include:

- Microwave oven
- Cold Display Cabinet
- Under Bench Fridge
- Under Bench Freezer
- 3 Door Glass Display Fridge
- Coffee Machine for full range of coffee selection
- Coffee Grinder
- Instant water boiler (5L)
- Cash Register

The Sundeck bar is to be

### 714 **CREW ACCOMMODATION**

Crew accommodation shall be fitted in the starboard hull. Sleeping quarters shall be provided for 10 crew for use whilst alongside at night are not intended for use at sea.

A small galley with the following appliances shall be provided:

- Twin hob electric cooktop with ducted rangehood.
- Toaster
- Kettle
- Microwave
- 600L fridge/freezer
- Sink with hot/cold water supply
- Overhead cabinetry with under bench lighting.

#### **715 WATER CLOSET**

The WC's to be fitted out in good quality lightweight marine materials (Ayres or equivalent) and as shown in the General Arrangement drawing.

No windows to be fitted and all WC's to have high quality privacy locks

#### **716 ENGINE ROOM**

Engine room is to be constructed with ease of maintenance in mind, so that all components are safely accessible by crew. Aluminium chequer plate, 6mm, is to span across the entire engine rooms and steering flats, supported by a suitable frame work. Plates are to be tapped and secured by S/S fastening. Hand rails are to be installed when engine room floor changes height and around machinery to ensure same movement around the machinery whilst at sea.

#### **717 HULL VOID SPACES**

Walkways shall be fitted leading through the hull void spaces. Walkway be constructed of steel expanded mesh with minimum with 700mm. Steel handrail to be provided along walkway in accordance with loadline requirements for crew protection.

#### **718 SUN DECK**

Aluminium bench seating to be provided as shown on the General Arrangement Plan

#### **720 CEILING SYSTEM**

Ceiling in Accommodation, Heads and Wheelhouse are to be:-

- Dampa 600x600, AL-15, Aluminium, Bevelled, Perforated, Acoustic.
- Colour to be decided by Owner.

#### **730 JOINERY**

Joinery will be constructed from Ayres Composite or equivalent light weight.

All bench tops will be made from Water Resistant material.

Galley will be constructed with ease of operation and cleaning in mind. Soft close drawers and quality latches are to be used to secure all cabinetry doors. Colour to be confirmed by owner.

#### **740 FLOORING**



Wheelhouse and Accommodation flooring will be covered in commercial grade, high traffic, 100% wool carpet. Accommodation walkways will be commercial grade flooring. Bathroom and Galley floors will also be waterproof with 100mm water proof coving. Rubber non-skid matting is to be fitted at vantage points. Colour and pattern of all flooring to be decided by owner.

## 750 BULKHEAD & PARTITIONS

Accommodation bulkheads are to be dual colour Ayres Composite or equivalent

## 760 INSULATION

### 761 STRUCTURAL FIRE PROTECTION

The vessel is to be divided with structural fire protection boundaries into the relevant vertical and horizontal zones by way fire rated bulkheads and decks in accordance with the Class /Flag requirements for commercial passenger vessels.

'Firemaster' or equal lightweight ceramic blanket shall be fitted to achieve A60 or A30 rating where required. 316 Stainless steel pins are to be used throughout for securing SFP. All exposed SFP, including machinery spaces, is to be secured by means of stainless steel or aluminium perforated panelling.

Typical cases: **TBC**

Wheelhouse bulkhead	B15
Wheelhouse deck	A60
Accommodation deckhead IWO Galley	A60
Engine room deck head	A60
Upper Deck longitudinal bulkhead exposed to vehicle deck	A30
Underside of rescue boat and rafts	A60
Switchboard rooms	A30

Doors and windows shall be constructed with fire rating equivalent to the boundary protected, with the exception of hull watertight doors which may be A0 fire rated.

## **762 THERMAL / ACOUSTIC INSULATION**

Accommodation deck heads are to be insulated with a high quality 50mm glasswool blanket for thermal qualities.

## **770 DOORS (Accommodation Spaces)**

High quality doors constructed of light weight marine grade material with security locks on the Wheelhouse access door and privacy locks on toilet doors. All internal doors and external passenger cabin doors are to be heavy duty with minimum 5x heavy duty hinges per door and to include automatic door closing devices.

## 800 TOOLS & SPARE PARTS

### 810 SPARE PARTS

Two(2) left-hand rotation and Two (2) right-hand rotation propeller will be supplied.

Additional spare parts and accessories for the following items up to the value of US \$5,000 (five thousand US dollars) shall be supplied with the vessel in consultation with the Owner:

- Main and auxiliary equipment
- Lighting
- Hydraulic equipment
- 2x spare submersible bilge pumps

### 820 TOOLS

Tools and outfits to be furnished as necessary for proper maintenance and overhauling of equipment according to the maker's standard. All tools and outfits to be stowed in suitable positions where convenient in Engine Rooms.

General tools listed as follows to be supplied;-

In each engine room, one work bench with:-

- 1 set Feeler gauges
- 1 x Soldering iron
- 1x Digital Thermometer
- 1 x Hammer
- 1 x Hacksaw
- 1 x Steel tape measuring 10 metres long
- 1 x Packing knife
- 1 set Pipe wrenches
- 1 set Ring Spanners – imperial or metric to suit engine selection
- 1 set Pliers
- 1 set Screwdrivers

In addition to the above items additional items will include

- 1 x Digital Multimeter
- 1 x DC Test Light
- 1 x Electrical terminal hand crimper
- 1 x small pry bar
- 1 x Sledge Hammer

## **APPENDIX A – DESIGNER SCOPE OF SUPPLY**

See contract exhibit



## APPENDIX B – STEEL KIT SCOPE OF SUPPLY

The following parts are supplied with the STEEL HULL kit:

- Transverse Frames
- Keel plate
- Longitudinal Girders
- Bulkhead plates
- Tank ends and sides
- Stiffeners
- Frame / Girder Face Plates
- All material blasted to SA2.5, primed, marked & coded

The following parts are specifically excluded from the kit:

- Shell Plating, excluding Keel plate
- Tubular pillars
- Standard bracket parts
- Deck fittings such as bollards, fairleads, hawse pipes, anchor rollers, ramp hinges
- Superstructure and other aluminium components

Kit parts will be packed on a flat rack and delivered CIF to the builder's nominated address.

## APPENDIX C – STEEL & ALUMINIUM MATERIAL ESTIMATE

See separate document

## **APPENDIX D – ENGINE SPECIFICATIONS**

See separate document

## **APPENDIX E – GENERATOR SPECIFICATION**

See separate document



## **APPENDIX F – PAINT SPECIFICATION**

See separate document