



TECHNICAL SPECIFICATION

QUEEN ANNE

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## 1 GENERAL DESCRIPTION

### 1.1 The Design

The vessel is to be a displacement hull type twin screw diesel motor yacht and is to fully comply with the requirements for a charter yacht. The hull is to be built of steel and the superstructure of aluminium.

The yacht shall be designed and built as a luxury yacht for worldwide cruising for use as a private yacht by the owner as well as for commercial charter. The commercial charter capacity shall be restricted to a maximum of 12 passengers as per Flag State requirements.

The arrangement of the vessel is to be generally in accordance with the General Arrangement Drawing that accompanies this specification.

The vessel is to be twin screw and is to be provided with a single bow thruster. The machinery installation is to comprise two main engines, each driving a fixed blade propeller through a reduction gearbox. Adequate diesel generating capacity is to be provided, including an emergency diesel generator.

It is to be understood that anything not mentioned in this outline specification but required by the Classification Society or Regulatory Bodies, is to be provided by the Builder. The Owner's Representative's views can not supersede the requirements of the Classification Society or Regulatory Bodies

### 1.2 Modifications

The Builder will make no modifications to the Specification without the written approval of the Owner and/or the Owner's Representative.

### 1.3 Discrepancies

In the case of any discrepancies between the design and the written Specification, the spirit and the aim of the Specification will prevail.

### 1.4 Care of the Yacht

The vessel is to be built on a covered berth and painted surfaces, equipment, deck coverings etc are to be suitably protected during construction.

Internal compartments are to be finished to the extent that areas to which access is required for tests and trials are easily accessible.

During the building period all parts of the yacht are to be regularly cleaned. Areas completed and accepted by the Owner's Representative during the outfitting period are to be kept locked.

All equipment and other parts that may be damaged by the weather, excessively hot or cold temperatures and humidity, are to be stored in a suitable warehouse. Special attention is to be paid to the manufacturer's instructions, with respect to installation procedures and storage conditions.

Suitable measures are to be taken to reduce to the minimum the level of risk of deterioration and damage and to prevent corrosion or other damage especially on all the parts not previously painted, lacquered and loose.

### 1.5 Main Dimensions

Length overall	-	46.50 metres approx
Length at the waterline	-	40.52 metres approx
Breadth moulded	-	9.00 metres approx
Depth	-	4.55 metres approx
Draught moulded	-	2.45 metres approx

The lightship weight of the vessel is defined as the weight of the vessel complete and in all respects ready for sea with all outfit and equipment in working order. It is to include:

Regulatory spare parts  
 Owner's supply items as agreed [allow 30 tonnes]  
 Machinery in working condition with fluids to working level  
 Piping systems in working condition including fluids  
 Sewage tanks at working level

The deadweight of the vessel is defined as the difference between the displacement in seawater, density 1.025 tonne/m<sup>3</sup>, including the effect of shell and appendages, taken at zero trim, zero heel, zero deflection, and the lightship weight. The deadweight is to include:

Fuel  
 Water  
 Stores  
 Owner, Guests and crew, with baggage

The vessel when loaded to its load waterline with full fuel, water and stores is not to have significant trim. Tanks are to be located to allow trim adjustment in service at partly loaded conditions. Arrangements are to be made through transfer of consumables to maintain a level trim at all stages between 100% loaded and 10% remains conditions.

Loading conditions are to be calculated for 100% departure, half load and 10% arrival. Trim, stability and damage stability are to be in compliance with the requirements of the applicable Regulatory Authorities.

A complete "Trim and Stability Booklet" including "Instructions to Master" is to be compiled by the Builder and formally approved by the appropriate Regulatory Authorities.

The trim and stability book is to include tank details, deadweight scales, trim profile and corrections at two draughts, hydrostatic particulars, , curves of minimum permissible GM, maximum permissible KG with loading conditions shown, etc.

### 1.6 Brief Description

## Type of Vessel

The vessel has been designed as a trans-ocean motor yacht for worldwide cruising, with an advanced displacement hull. It has a bulbous bow and stern that is designed for maximum seaworthiness for transoceanic voyaging, while at anchor opens up to become a large teak-lined beach.

The vessel is to be suitable for worldwide cruising and the vessel and all equipment are to be suitable for at least 25 years service.

The arrangement of the vessel is to be generally in accordance with the General Arrangement accompanying this specification.

The vessel is to be twin screw and is to be provided with a bow thruster. The machinery installation is to comprise two main engines, each driving a fixed pitch propeller through a reversing reduction gearbox. Adequate diesel generating capacity is to be provided, including an emergency diesel generator.

## Speed and Range

The yacht is to achieve the following speeds:

Main engines at MCR	15 to 16 knots
Economical cruising speed for a range of 4,500NM	12 knots

Capacities of consumables are to be at least sufficient for a transatlantic voyage of, plus a 3 days margin, at the designed cruising speed.

The Builder is to present a graph showing the range at various speeds taking into account the following:

- All engine manufacturers fuel consumption figures are to include tolerances
- A 10% margin on engine power to account for sea state
- Fuel tank unpumpables
- 98% fuel tank capacity
- 3 day reserve margin

The Builder is to advise the anticipated speed in service, with the main engines at 80% MCR, at full load draught, with dirty hull and propellers in Beaufort Force 4 and Sea State 4.

### 1.7 Speed

The vessel shall achieve the maximum design speed on sea trials at half load draught, with clean hull and propellers and weather conditions up to and including Beaufort Force 2 and Sea State 2, of at least 15 knots. The half load draught and associated deadweight components are to be declared by the Builder within 30 days of Contract signing. The main engines are to be operating at their tropical rated MCR and maximum rpm in this condition.

### 1.8 Capacity

Tank capacity, 100% filled, will be approximately the following:

Fuel Oil	66.00 m <sup>3</sup>
Lubricating Oil	4.00 m <sup>3</sup>
Fresh Water	10.75 m <sup>3</sup>
Ballast Water	Nil
Black water	2.40 m <sup>3</sup>
Grey water	8.20 m <sup>3</sup>
Oily Bilge and sludge	3.90 m <sup>3</sup>

### 1.9 Classification, Rules and Certificates

The vessel, including its machinery, equipment and outfitting, is to be constructed, equipped and certified to comply with the Laws, Regulations, Rules and Conventions listed in the following sections and all amendments and additions thereto in force at the date of signing the Contract as being intended to become enforceable by the Contract Delivery Date applicable to this vessel.

In particular, as detailed below the vessel is to be constructed to the requirements of Registro Italiano Navale (RINA) and the Malta Commercial Yacht Code Maritime and Coastguard Agency of the United Kingdom (MCA) Code of Practice for the Safety of Large Commercial Yacht Code (LY2).

The vessel is to be constructed under survey of RINA to obtain the notation Rina Charter Yacht / C+ HULL MACHINERY UNRESTRICTED NAVIGATION

The vessel is to also meet the requirements of the following Rules and Regulations:

Rules, Regulations, Acts and Statutory Instruments of the Maritime and Coastguard Agency (MCA) of the United Kingdom as defined by their Code of Practice for the Safety of Large Commercial Yacht Code (LY2).

Maritime regulations of the country of registration Malta

International Convention on Safety of Life at Sea, including and Amendments

International Tele-Communications and Radio Regulations, 1976, as revised.

I.E.C. Publication No. 92 - Electrical Installations in ships.

Marpol 1973/78 Annex I, including latest amendments + Annex IV + Annex V + Annex VI.

GMDSS 1992 rules.

International Regulations for preventing Collisions (COLREG 1972) at Sea, 1972, and Amendments

All certificates and approvals required for transit through the Panama Canal

USCG Rules and Regulations for Foreign Vessels operating in the Navigable Waters of the United States, without certification and inspection.

All required certificates are to be furnished to the Owner's Representative at the delivery of the vessel. The certificates to be obtained are listed below. The Builder's Certificate is to be supplied at least one month prior to delivery for registration purposes.

National tonnage certificate  
 Panama Canal tonnage certificate  
 Suez Canal tonnage certificate  
 Classification and Regulatory Authority certificates  
 Anchor, chain and hawser certificates  
 Certificate of fire fighting appliances  
 Certificate of life saving appliances with log cards  
 Certificate of nautical instruments including:  
 Lantern certificates  
 Compass deviation card  
 Compass certificate  
 Fresh water tank cleanliness certificate  
 Test certificate for all items of equipment (safe working load etc)  
 Relevant test certificates for machinery and electrical equipment  
 Radio licences for main radio station equipment and for portable "on board" radio equipment  
 Test certificates for all lifting equipment, etc.

#### 1.10 Tonnage

Tonnage and freeboard calculations are to be carried out leading to an assignment of a loadline mark. All necessary provisions are to be made accordingly.

#### 1.11 Weight Reduction

During the whole building process, all dimensions and thicknesses indicated, including the equipment specifications, are to be strictly followed to reduce weight as much as possible.

#### 1.12 Environment

The yacht and all equipment are to be suitable for environmental and weather conditions usually found in summertime Alaskan waters as well as the tropics.

The following conditions are to be used as a design basis:

maximum ambient air temperature	+45°C
minimum ambient air temperature	-5°C
maximum temperature of seawater	+32°C
minimum temperature of seawater	0°C

## 2. SOUND AND VIBRATION LEVELS

The Builder is to adopt a systematic approach to the control of noise and vibration levels taking into account all aspects of noise and vibration control during design, production, installation and commissioning. The Builder may employ a consultant to undertake this

work. The builder shall produce a report that is to include, but not necessarily be limited to:

Inspection:

Participate in cavitation testing

Regular inspection during construction to ensure recommended noise control measures are effectively installed

Carry out verification measurements during construction including sound insulation between sensitive areas to confirm acceptable levels of privacy

Carry out noise and vibration survey during sea trials

Assist in the solution of any noise and vibration problems arising

Copies of all reports by this specialist are to be sent to the Owner's Representative as soon as they become available.

Particular importance is placed on minimising noise and vibration levels throughout the vessel. Target levels for noise and vibration and particular aspects of noise and vibration control are highlighted below. Other aspects of noise and vibration control relating to particular systems or items of equipment are emphasised in the relevant sections of this specification.

## 2.1 Vibrations

Vibration levels in the vessel are to be such that they will not result in structural damage, discomfort or annoyance to the Owner, Guests and crew, damage to the main propulsion system or precipitate damage to or malfunction of other shipboard equipment.

Vibration levels throughout the vessel are to meet as a minimum the requirements contained in the classification Society Rules for the Classification of Charter Yachts and ISO 6954 "Mechanical Vibration – Guidelines for the measurement, reporting, and evaluation of vibration with regard to habitability on passenger and merchant ships". Variation in vibration levels should be considered more seriously than steady state vibration levels.

The limits for vibration levels (1 to 80 Hz overall frequency weighted rms velocity amplitude in mm/sec) are as indicated below:

### Cruising condition

- |   |                                     |            |
|---|-------------------------------------|------------|
| • | Owner and guest cabins              | 2.0 mm/sec |
| • | Saloons, crew accommodation, bridge | 2.5 mm/sec |
| • | Open deck areas                     | 3.0 mm/sec |

Cruising condition is to be taken as

- Maximum of sea state 2 and Beaufort wind force 2
- Both main engines at cruising condition
- One main generator in use
- Air conditioning and engine room ventilation in use
- One water maker in use
- Yacht fully furnished
- Stabilisers in use
- No extraneous background noise
- All doors and windows closed

### Harbour condition

- |   |           |            |
|---|-----------|------------|
| • | All areas | 1.5 mm/sec |
|---|-----------|------------|

Harbour condition is to be taken as

- One main generator in use
- Air conditioning and engine room ventilation in use
- Normal harbour systems in use
- Yacht fully furnished
- No extraneous background noise
- All doors and windows closed

Vibration measurements shall be included in the sea trials programme. On completion of the programme the results and findings shall be submitted to the Owner's Representative.

In order to achieve the required vibration levels, attention is to be paid to propeller design and clearances. All seatings for the main and auxiliary machinery are to be sufficiently rigid and continuity of structure is to be maintained throughout the accommodation and the aft end of the vessel.

The propulsion system is to be free from harmful lateral, axial and torsional vibration criticals and there are to be no restricted speeds within the operating range.

Where items of machinery or equipment are resiliently mounted the Builder is to ensure that the mounts are compatible with the lowest exciting frequency of the mounted equipment and the likely external exciting frequencies eg main engine, propeller orders. All units installed on resilient mounts are to have sufficient stability to prevent excessive motion due to the vessel's movement in heavy seas.

All resiliently mounted equipment is to have flexible connections installed between the equipment, associated piping and electric cables. Flexible hoses are to have appropriate approval for use in the service to which they are applied. Each end of flexible connections is to be securely anchored to appropriate structure.

## 2.2 Acceptable Noise Levels

The objective is to achieve background noise levels, which are generally considered as acceptable for a vessel of this type. Noise levels throughout the vessel are to meet as a minimum the requirements contained in the classification Society Rules for the Classification of Charter Yachts and IMO Resolution A.468 (XII) "Code on Noise Levels Onboard Ships"

The limits for noise levels are as indicated below:

### Cruising condition

- |                                 |        |
|---------------------------------|--------|
| • Owner's cabin                 | 50 dB  |
| • Guest cabins and saloons      | 55 dB  |
| • Crew accommodation and bridge | 60 dB  |
| • Open deck areas               | 75 dB  |
| • Engine room                   | 110 dB |

### Harbour condition

- |                                 |        |
|---------------------------------|--------|
| • Owner's cabin                 | 48 dB  |
| • Guest cabins and saloons      | 48 dB  |
| • Crew accommodation and bridge | 55 dB  |
| • Open deck areas               | 70 dB  |
| • Engine room                   | 105 dB |

Cruising and harbour conditions are those as described in section 2.1 above.

In areas not noted above noise levels under normal operating conditions are not to exceed the limits stated in IMO Resolution A.468.

Measures should be taken to ensure acoustic privacy in accommodation areas. Performance shall be verified by tests using sound excitation in one room at a time. The ratings to be achieved are listed below and will be the RW value according to ISO 717.

- Cabin to cabin in owner/guest areas 45 dB
- Cabin to passageway in owner/guest areas 35 dB
- Cabin to cabin crew areas 35 dB
- Cabin to passageway crew areas 30 dB

Noise level measurements shall be included in the sea trials programme. On completion of the programme the results and findings shall be submitted to the Owner's Representative.

If these target noise levels are exceeded on sea trials or in service the Builder is to take action to reduce the noise level to the target level.

Noise levels from air conditioning in the accommodation are to be less than the background noise level in each area and without pure tones. Attention must therefore be paid to the noise and vibration consultant's prediction of noise levels when ordering air conditioning equipment. Consideration will be given, however, to using steady levels of background noise from air conditioning systems to assist in achieving privacy requirements in areas of low background noise. Any such proposals are to be discussed with the Owner's Representative.

It will be the responsibility of the Builder to ensure that the background noise levels are not degraded under normal operating conditions by intermittent operation of auxiliary machinery, pure tones, noise from ventilation inlets and outlets, working of structure, linings, ceilings or joiner work elements, machinery space alarms etc. Particular attention is to be paid to minimising noise levels in the accommodation and on open decks during operations of the bow thruster and emergency alternator.

Any machinery space in which the noise level may exceed 85dB(A) is to be provided with a warning notice comprising a symbol complying with the International Standard ISO 3864 and a supplementary sign stating "High Noise Levels. Use Ear Protectors".

The selection of doors and door sealing and the method of installation of accommodation elements, are to be carefully controlled to avoid degradation of the isolation by flanking transmission. Attention is to be paid to closing all gaps in partitions and bulkheads above ceilings to prevent flanking transmissions between cabins, cabins and alleys etc. If, on completion of the installation, on sea trials or in service, degradation of the isolation due to flanking transmission is evident the Builder is to take any necessary corrective action. This attenuation is to be demonstrated to the satisfaction of the Owner's Representative.

Particular attention is to be given to selecting equipment with low levels of noise and vibration.

Appropriate silencing and vibration isolation arrangements are to be provided for the main sources of noise and vibration including main and auxiliary engines, all engine exhaust



systems and silencers, chiller plant, fans, hydraulic power packs, motors and piping for hoists, winches and stabilisers and any other noise source identified by the noise and vibration consultant.

All rattles and squeaks in accommodation spaces, emanating from doors, joinery, panels, furniture etc are to be eliminated prior to delivery.

### **3. DRAWINGS AND INSTRUCTIONS MANUALS**

Sufficient information is to be provided to enable the Owner's Representative to obtain complete information of the vessel and its equipment.

One copy of unpriced equipment purchase orders is to be provided to the Owner's Representative.

All drawings, plans, manuals, instruction books, and other documents are to be in the English language. Generally drawings are to be produced on A0 to A4 sized paper as

appropriate. All documents are to be supplied in triplicate to the Owner prior to delivery of the vessel with one set of documents being in electronic format.

Name plate and instruction plates are to be in English. External and machinery space nameplates and instruction plates are to be stainless steel or brass.

All equipment is to be of a type suitable for marine use. All equipment is to be of a type that can be easily and cost effectively serviced and repaired in the planned areas of operation. The choice of materials and makers are to be made by the Builder and are to be in accordance with the standard and intent of this specification, requirements of the Classification Society and the EU Marine Equipment Directive. Subcontractors are to submit the dry and, if applicable, wet weight of proposed equipment.

### 3.1 Technical Details and Drawings

Three copies of the final drawings are to be supplied. All plans submitted for inspection are to have a plan revision history contained within the title block.

### 3.2 Instruction Manuals

All of the technical information specified as being supplied with the vessel on completion is to be collated into one system with an index to facilitate storage and retrieval of data.

Three sets of this complete system are to be provided as follows:

- One set is to be placed on the vessel before hand-over
- One set is to be forwarded to the office of the Owner
- One set is to be forwarded to the Owner's Representative

One additional complete set is to be provided on CD ROM.

The set placed on board the vessel is to be located in filing cabinets and bookshelves provided by the Builder and located as required by the Owner's Representative.

All information is to be incorporated into good quality vinyl covered loose-leaf binders generally of A4 size or into box files or equivalent.

### 3.3 Indexing System

The builder is to provide a comprehensive and easily followed index system for all drawings, manuals and other documentation handed over to the yacht, Owner and Owner's Representative.

### 3.4 Training Manuals

The builder is to provide training manuals as required by SOLAS.

## 4. TESTS AND TRIALS

### 4.1 General

Within four weeks of contract signing the Builder is to provide the Owner with a work progress schedule relevant to the work detailed in the Specification and subsequently is to present to the Owner a progress report, at least every four weeks.

#### 4.2 Test of Materials & Radiographs

##### Structural Testing

Structural testing is to be carried out in accordance with Classification Society and Statutory Authorities requirements.

The following tests are to be included:

Tightness of tanks, void spaces and cofferdams is to be carried out by means of hydro testing and/or air pressure testing in accordance with Classification Society requirements. Tightness of hatches, watertight doors, weather doors, windows etc. is to be carried out by water hose in accordance with Classification Society requirements. X-ray photographs and other non-destructive checks are to be made in numbers and in locations as required by the Classification Society.

##### Bi-metallic Joint

The Builder's proposals for bi-metallic joints are to be submitted with particular reference to transition joints around curved surfaces.

#### 4.3 Test and Trials

Details of shop tests for the main and auxiliary engines, electrical equipment, all pumps and compressors and other major items of machinery are to be agreed with the Owner's Representative prior to implementation.

A list of the principal items of subcontracted equipment with the dates of order, shop test and delivery, with the name of the manufacturer is to be submitted to the Owner as soon as possible after Contract signing.

Shop tests for main and auxiliary engines are to be carried out at the premises of the engine package suppliers and are to include a total of at least six hours running for each engine at various loads. The test procedures are to include:

- Load tests
- Governor test
- Lowest revolution test at no load
- Confirmation of starting
- Emergency trip test at no load
- Overspeed test
- Fuel consumption measurement at normal and maximum output

The engine is to be set up on the test bed to meet the Marpol VI requirements before fuel consumption measurement. The engine timing, settings, etc as set up during the shop test to meet these requirements are not to be changed following the shop tests.

For all alternator sets these shop tests are to include governor block loading tests in accordance with the requirements of The Classification Society/International Association of Classification Societies. Test results are to include hard paper copy of the measured parameters, including load, voltage, frequency/speed and turbocharger speed, all against time. Parallel operation load sharing tests are to be carried out for all combinations of alternator sets.

The vessel is to be dry-docked and the underwater hull cleaned and painted prior to the official sea trial. This dry-docking may be accepted as the final docking provided that only a short period remains before delivery.

On completion of the vessel, and prior to delivery, an inclining experiment and lightship weight check is to be carried out in accordance with IMO resolution A749(18). If the vessel has a significant trim when the lightweight is being checked, trimmed hydrostatics are to be used for determining the displacement etc.

Basin trials to prove all machinery and electrical equipment capable of demonstration alongside are to be carried out following commissioning of equipment and systems and prior to sea trials. Technical sea trials are to be carried out before delivery

On trials, it is to be demonstrated that the speed/power requirements have been met by repeated double runs on an approved measured mile, or an equivalent method. It is not acceptable to obtain the output power of the main engines by calculation. The power output of the main engine/propulsion system is to be measured on sea trials using calibrated torque/rpm measuring equipment, ie strain gauges.

Speed trials are to take place with a clean hull in deep water in a maximum wind velocity of Beaufort Force 2 and Sea State 2.

The sea trials programme is to include the following:

Steering gear trial\*

Turning circle\*

Kempf manoeuvre\*

Dieudonne spiral at main engine CSR or Bech reverse spiral manoeuvres\*

Z manoeuvres at 10/10 and 20/20 angles

Ahead and astern stopping\*

Crash stop\*

Endurance trial of main engines (minimum 12 hours) at normal service power. This trial is to include 2 hours at MCR.

UMS operation (during endurance trial)

Demonstration of satisfactory astern running

Electrical power failure blackout tests

Stabiliser test

Crabbing test

Single engine/propeller operation

Anchor and windlass trials

Launching and retrieval of all boats and water toys from normal stowage positions

Launching of rescue boats in accordance with the MCA Requirements

Testing for exhaust gas in the accommodation when under way at a range of speeds and wind angles

Results of the manoeuvring trials indicated \* are to be displayed in the wheelhouse, in accordance with IMO Regulations.

Torsional, axial and transverse shaft vibration measurements are to be taken during the sea trial.

During sea trials, at normal service power, noise levels are to be measured as described in section 2. In addition noise levels are to be measured, under the same conditions, in any locations giving the Owner's Representative cause for concern.

Vibration levels are to be measured at normal service power with all refrigeration, air conditioning and ventilation plant in operation as described in section 2. In addition vibration levels are to be measured, under the same conditions, in any locations giving the Owner's Representative cause for concern.

Where it is not practicable to carry out measurements at the design draught during the sea trial the Builder is to allow for such measurements at a later date.

Noise and vibration measurements are also to be taken with the vessel at anchor and in harbour conditions.

The Builder is to demonstrate the HVAC system under the conditions prevailing at the time of the sea trials.

Post trials inspections of the vessel are to be carried out to the extent required by the Owner's Representative. All defective materials, equipment and fittings are to be made good as required.

All filters and strainers are to be inspected and, if necessary, cleaned or elements replaced after sea trials are completed.

Other items of equipment, which develop defects or otherwise give cause for concern during commissioning or trials are to be opened for inspection and rectification without extra cost to the Owner. Pumps are to be emptied, cleaned and inspected after sea trials.

#### 4.4 Acceptance

As specified in the Contract.

## 5. CONSTRUCTION

### 5.1 General

The vessel is to be of all welded construction with scantlings as approved by the Classification Society.

The Builder is to construct and complete the vessel using best quality materials and best workmanship in accordance with first class luxury yacht building standards. All proposed equipment suppliers must be able to provide spares and support services within the proposed operating areas of the vessel.

The hull is preferably to be constructed in an enclosed and heated building dock or slipway. The Builder is to indicate to what extent this can be achieved and the measures to be taken if these facilities are not available.

Particular attention is to be given to the design, construction, installation of equipment and choice of materials to ensure that the required quality is achieved throughout the vessel and can be maintained in service with economical use of manpower by taking measures such as:

The avoidance of sharp corners at junctions between plane surfaces.

The provision of effective drainage and scupper systems such that all areas are fully self draining in normal conditions of heel and trim.

Good accessibility for maintenance and cleaning with special attention to the layout of, and access to, concealed piping and cabling in accommodation areas.

All available space, including areas beneath stairways etc, is to be used for storage, where practical and in agreement with the Owner's Representative.

Provision for containment of spills in the machinery spaces with proper drainage, pumping and treatment facilities to deal separately with clean and oily drains with the objective of keeping a clean engine room.

Provision of a shipside monorail system and trolley for maintenance of deckhouse sides and window washing.

Other similar provisions are to be taken as a matter of good practice during the course of the design development and subsequent production processes.

## Fire Protection

### Structural Fire Protection

The vessel is to be divided into vertical fire zones in compliance with the MCA requirements and recommendations.

Fire division bulkheads and horizontal fire divisions, fire doors and fire dampers are all to be of a type approved by the Classification Society and Statutory Authority and are to comply with MCA Requirements.

Stairways and means of escape are to be constructed according to MCA Requirements. The machinery space is to be isolated from other areas by fire resistant bulkheads and decks.

Paints, varnishes and other finishes which present an undue fire hazard or produce excessive quantities of smoke or toxic fumes are not to be used in machinery spaces, galleys or other areas of high fire risk.

### Emergency Control Centre

An Emergency Control Centre is to be provided in the vicinity of the aft main deck to contain all remote stops, emergency controls for bilge valves, fire flaps, oil tank quick closing valves, watertight door and sprinkler system controls, etc.

### Fire Control and Escape Plan

A Fire Control Plan and an Escape Plan are to be provided in a position agreed with the Owner's Representative and complying with MCA Requirements. These plans are to

indicate the extent of fire protection, the position of fire fighting equipment, escapes and muster stations, lifesaving appliances etc. in accordance with MCA Requirements.

A damage control plan is to be provided in a position agreed by the Owner's Representatives and complying with MCA Requirements, indicating the position of watertight doors, actions to be taken in the event of damage, positions of valves, cross flooding ducts etc.

## 5.2 Welding

Welding methods, types of welds, grinding and preparation of edges, gaps, tack welding, electrodes, pre-heating, chipping, gouging, counter welding, assembly, welding sequence etc. are to be to building standards approved by the Classification Society.

All openings cut in the structure are to have well rounded corners with ample compensation where necessary.

Doubler plates are unacceptable anywhere in the structure. Where additional strength or stiffness is required thick insert plates are to be provided.

Keel blocks and other supporting structures are to be carefully sighted. Weekly bottom keel sightings are to be made and bottom alignment hardened.

All welding is to be carried out by certified welders approved by the Classification Society.

Welding is to be carried out in a scheduled sequence to minimise pre-stressing. Downhand welding is to be used whenever possible. Pipes, ventilation trunks etc passing through structure are to be welded on both sides. Welds are to be smooth, free of spatter and notches, inclusions, undercut and other defects. Each layer of weld is to be freed from slag and other deposits.

No welding is to be undertaken outdoors in adverse weather conditions without special precautions.

Full penetration welds are to be applied when required by the Classification Society. Random ultra-sonic testing of full penetration welds is to be carried out in accordance with the Classification Society requirements.

Erection eyeplates and lugs are not to be welded in way of the edges of structural members such as girders, webs, or face flats.

Erection lugs and eyeplates are to be carefully removed after use by chipping and/or grinding. Builder may leave certain lugs in place, where these lugs will not interfere or be detrimental to the operation and appearance of the vessel. Where builder leave eyeplates in place they are to be fully welded, free from sharp edges and be suitable for painting.

## 6. MATERIALS

### 6.1 General

All materials used in the construction of the vessel are to be new, suitable for the intended purpose and of the highest marine quality.

All equipment is to be the most updated type of its kind and manufactured by first class international firms.

The equipment is to be able to withstand temperatures in their respective operations areas for long periods of time without any decrease in their efficiency.

The Builder is to supply all details of materials and equipment appropriate and necessary for the good operation of the vessel, excluding those specifically included in the list of items to be supplied and paid by the Owner.

## 6.2 Steel

The hull and main deck are to be built with Class approved steel to standard AH 36 as follows:

6mm steel above water line

7mm and 8mm steel below the water line

10mm steel for the bulbous bow

Steel used for the hull, including main deck, will be of Shipbuilding quality, Grade A or grade ERS, according to the requirements of the Classification Society and will be tested as agreed. Principal structures will be ERS grade.

Plating and sections will be sandblasted and protected with shop primer.

## 6.3 Aluminium

The superstructure is to be built with Class approved marine grade aluminium with the following material specifications:

5083 H321 Plating

6082 T6 Stiffeners

## 6.4 Stainless Steel

Stainless Steel 316 L is used at all points in the hull where there is exposure to wear and chafe to avoid corrosion.

## 6.5 Bronze

Bronze will be sea-water resistant.

## 6.6 Wood

All wood used on board will be of top quality.

All wood will be free from moisture, splits, checks, knots and other defects.

All plywood throughout the boat will be marine type.

## 6.7 Rubber

Black rubber compound will be used for teak deck sealing.



## 7. HULL

### 7.1 General

The yacht is to be entirely welded with scantlings in accordance with the requirements of the Classification Society.

The hull is to be carefully built to ensure the necessary strength of main structural members and to keep the noise and vibration levels within the agreed values, with particular attention in the following areas:

- aft structures near propellers and rudders
- engines' foundations
- interior superstructures and frames in the cabin areas.

The hull is to be a longitudinal/mixed structure with welding in accordance with the requirements of the Classification Society.

Distortion caused by welding is to be eliminated as much as possible during the construction stage.

### 7.2 Tanks Location

An arrangement of tanks is to be developed by the Builder. Manhole access throughout tanks is to be of adequate size for crew inspection and cleaning. Manholes should be at least 600 x 400mm where possible.

Tank structures are to be designed to permit easy flow to suction connections. Stiffeners are to have adequate air and drain holes and pockets or recesses are to be avoided.

### 7.3 Double Bottom

Where necessary a double bottom arrangement is to be developed by the Builder. Provision is to be made for access around the stabiliser boxes and thruster tunnels for inspection and preservation treatment.

### 7.4 Manholes and Drain Plugs

Two manholes are to be arranged to each tank and void space except in the case of small tanks in the machinery spaces where one manhole may be fitted. Pipes, etc are not to obstruct the manholes. Stainless steel studs and bolts are to be used. The accommodation layout is to be considered when planning the location of manholes.

Stainless steel drain plugs, flush fitting to the shell, are to be provided at the lowest point of each tank. Sockets in the plugs and sizes of the plugs are to be different for oil and water tanks, thereby indicating the content. A minimum of two spanners of each type is required.

### 7.5 Shell Plating up to Deck Level

Thickness of plating and dimensions of supporting elements is to be in accordance with the Classification Society requirements.

Large openings in way of anchor pockets, sea intakes, stabilizers, rudders, bow thruster tunnel etc. are to be provided with additional thickness insert plates or stiffeners.

Increased thickness plates are to be used in way of A-brackets and stern tubes.

All insert plates are to be flush with the shell plating. Plating is to be reinforced in way of propellers. Additional stringers are to be used in the engine room and on the bow. Other structural solutions are to be considered to eliminate vibrations and noise.

Plating under the waterline is to be continuously welded.

Plating adjacent to the anchors is to be stainless steel. The stem is also to be protected with stainless steel for protection from the anchor chains.

#### 7.6 Freeing Ports

Freeing ports are to be provided in accordance with the MCA LY2 requirements.

#### 7.7 Anchor Pockets

Suitable anchor pockets are to be arranged for the secure stowage of two high holding power anchors.

#### 7.8 Decks

The structure of decks within accommodation and superstructure is to be carefully designed to ensure continuity of structure both vertically and horizontally. Particular attention is to be paid to ensuring that decks are effectively sealed against leakage by continuous welding.

#### 7.9 Bulkheads

Watertight divisions are to be arranged so that the damage stability requirements are met. Where necessary the bulkheads are to be provided with watertight doors meeting the MCA LY2 requirements.

Electro operated watertight horizontal sliding doors are to be provided in accordance with the MCA LY2 requirements and the General Arrangement plan.

The minimum width of escape route doors is to be in accordance with MCA LY2 requirements. The doors are to be monitored locally at the door, and from the wheelhouse.

The sliding watertight door are to have local audible and visual warning of movement and status indication at the emergency control position and wheelhouse.

Watertight doors in Guest area are to be integrated, as far as possible, with the surrounding decor.

#### 7.10 Chain Locker

Two deep self-stowing chain lockers are to be provided of sufficient size to allow a minimum of 1.0 m clearance above the stowed chain to the spurling pipes. The spurling

pipes are to be stainless steel and proper provision is to be made for effective self stowing of the anchor chains. Suitable means for drainage and pumping of the chain locker is to be arranged, including a non-return valve. Pumping arrangements for the chain locker are to comply with the Classification Society requirements.

The bottom of the lockers is to be provided with a portable false bottom of perforated galvanised steel plates.

#### 7.11 Anchor Hawse Pipes

Anchor hawse pipes and spurling pipes are to be arranged to allow the anchors to be dropped without fouling the bow or requiring the anchors to be “walked” out. The hawse pipes are to be fabricated in stainless steel and fitted with stainless steel nozzles for high pressure washing the anchor chains.

#### 7.12 Rudders

Amartech

Twin rudders with suitable stainless steel stocks are to be arranged. Top and bottom air and drain holes are to be provided.

The arrangement of the rudders is to be suitably considered during development of the Lines Plan. A jumping stopper is to be provided to prevent lifting of rudders. The rudders are to be air tested and proven tight.

The rudders are to be removable without removing the stock.

Rudder Trunks of heavy thickness pipe are to be provided in the aft body structure.

Rudder trunks are to be provided with seawater lubricated bronze or synthetic bearing bushes.

### 8. SUPERSTRUCTURE

#### 8.1 General

Superstructures above main deck level are to be aluminium using 5083 H111 and H321 aluminium alloy. Deck hull plating, beams, girders and pillars are to be in accordance with Classification Society requirements.

Careful attention is to be paid to the provision and location of bulkheads, girders, webs etc to provide the maximum possible continuity of structure.

Special consideration is to be given to the corners of all bulwarks and all openings in the superstructure to prevent cracking.

#### 8.2 Explosion Bonded Bi-metallic Joints

Aluminium superstructures are to be welded to the steel hull using explosion bonded bi-metallic joints.

### 8.3 Sundeck Area

Built-in seats are to be provided as shown on the General Arrangement Plan.

### 8.4 Mast

The mast is to be located in accordance with MCA LY2 requirements and provided with halyard lines for signal flags and with all the necessary equipment to accommodate antennas, navigation lights, horn, radars and other electronic equipment.

Safe access arrangements are to be provided to all equipment mounted on the mast.

The location of the antennae is to be approved by the radio and electronic equipment manufacturers.

## 9. PAINING AND COATING

### 9.1 General

As far as possible the painting specification is to be based on building the hull in a covered building site. If the vessel is not to be constructed in a covered building site, alternative proposals are to be submitted.

All paint materials used in the vessel are to be of first class yacht quality awl grip yacht paint. All paints are to be applied in accordance with the published recommendations and under strict supervision of the paint manufacturer's representative.

The Builder is to provide an extended guarantee from delivery, to apply to underwater hull, topsides, tanks and void spaces. The extended guarantee is to cover material, access, preparation and application costs for defects in excess of agreed levels, say 5% on hull/topside and 3% in tanks, excluding mechanical damage. In the event of a dispute between the Owner and the Builder the matter is to be referred to a mutually acceptable third party consultant.

#### Surface Preparation

Grit Blasting and Shop Primer

All rolled hull constructional steel is to be grit blasted and directly followed by the application of a shop primer within one hour. Sealed structural pipes may be prepared only to the outside. Grit blasting standard is to be SA 2.5, grit pattern to suit the shop primer. The entire surface is to be free from rust, mill scale and other contamination. A surface preparation inspection is to be conducted visually.

#### Shop Primer

Dry film thickness 18 to 22 microns.

Type of shop primer is to be to the Builders' standard. Generally, inorganic zinc silicate shop primer is to be applied.

Shop primer is to be compatible with the succeeding coats.

Shop primer is to have good cutting and welding properties including MIG/MAG welding.

#### Secondary Surface Preparation (Structural Steel)

##### General

Prior to the application of paint the surfaces are to be free from rust, zinc salts, oil, moisture, ice, dust and other foreign substances.

The method used should in no case degrade the keying profile of the surface.

##### Methods of Secondary Surface Preparation

Shot blasting	SA 2.5
Vacublast	SA 2.5
Light sweep blasting	
Power sanding or power brushing,	
Hand or mechanical tools	ST/2 to 3
Cleaning (removal of dirt and contamination)	

In principle the secondary surface preparation method is to be as required by the Paint Manufacturer's data sheets immediately followed by the application of the subsequent coat.

Mechanically damaged and heat damaged areas after coating are to be similarly prepared and touched up with the appropriate system.

#### Painting Specification

All paints are to be prepared and applied in strict accordance with the Paint Manufacturer's instructions and under his supervision.

#### Livery

Finish colours and logos are to be in accordance with the exterior designer.

### 9.2 Heat and Noise Insulation

#### General

All exposed decks and deckhouse sides in the accommodation deckhouse, including control spaces, are to be insulated. The insulation is to be pinned, glued and vapour sealed using aluminium or PVC foil. Special care is to be taken to ensure that insulation does not obstruct access for maintenance. Fire insulation is to be of an approved system and material, complying with MCA LY2 requirements.

Insulation is to be applied after preservative coatings are applied to the steel construction or other material as the case may be. Adequate studs or securing devices are to be installed to secure the insulation in place and the lining is to be installed in a workmanlike manner.

### Thermal Insulation

Machinery space insulation work is to be carried out before any auxiliary equipment such as pumps, cabling, piping etc is fitted.

Hot water pipes, including main and auxiliary engine HT cooling systems and chilled water pipes, are to be insulated.

Air conditioning ducts are to be made of pre-insulated pipes or insulated ducts and so arranged to prevent transmission of conversation between accommodation spaces.

Particular care is to be taken in the quality of materials and work standards to ensure thorough and effective piping insulation. The use of split insulation material is to be avoided.

All chilled water valves are to be properly insulated and/or have drainage for condensation. Particular attention is to be given to air conditioning piping or ducting runs to ensure that unavoidable condensation cannot damage interior décor.

### Acoustic Insulation

The shell, decks, bulkheads in hull and superstructure are to be insulated with rockwool of thickness and weight dependent on the location and on the advice of the noise and vibration analysis. This rockwool is to be combined with noise insulating mats and anti-vibration compounds where necessary.

Particular attention is to be paid to insulation between the engine room and accommodation and between crew accommodation and the Owner and Guest accommodation.

### Condensation

2mm Therm 192 S sprayable anti-condensation

### 9.3 Compartmentation

In order to ensure the maximum comfort with the vessel in service the Builder is to use floating structures for compartments, so that no flooring, bulkheads or ceilings are directly connected to the hull.

The compartments are to be connected to the hull by means of vibration-damping supports with no noise bridges between living quarters and metal structures.

The materials used for compartments are to be a sandwich of marine plywood, of different thickness with an insulating polyurethane sponge.

This kind of material provides excellent insulation between cabins, giving an excellent level of comfort.

#### 9.4 Furnishing

All wooden surfaces, bulkheads, hull coatings, furniture, tables and all visible details are to be carefully finished to reflect the high standard required for this class of yacht. Smoothing and polishing, where required, is to be given the utmost care.

#### 9.5 Protection of Tanks

All tanks are to be suitably protected, including:

- |                            |   |
|----------------------------|---|
| • Fuel and lubricating oil | Cleaned and degreased, no painting                                      |
| • Fresh water              | Two coats of suitable protection with a minimum thickness of 200 micron |
| • Sewage and grey water    | Two coats of suitable protection with a minimum thickness of 200 micron |

Before being closed, all tanks are to be inspected and closed up immediately following the inspection. If, for any reason, tanks are re-opened they are to be inspected again and then re-closed.

#### 9.6 Cathodic Protection

Cathelco cathodic protection system to be installed, number, type and location of anodes is to be finalised following advice from a supplier.

Sacrificial anodes are to be installed in the following locations:

- Underwater hull including rudders
- In sea chests
- Near transverse thrusters

Anodes are to be suitable for 2 years protection.

#### 9.7 Teak Decks

After filling, sanding and painting all the major areas of the vessel the teak deck areas are to be laid as follows:

- Levelling the deck and passages using self-levelling compound.
- Teak strakes, 20mm thick by 65 mm wide are to be glued to the compound.
- Sealing the seams with black rubber compound.

This procedure ensures the best stability of strakes against sudden changes in temperature, as it is extremely watertight and will allow, if required, easy maintenance and/or replacement.

The teak covering is to follow the line of the deck. The Builder is to provide a drawing of the teak deck for the Owner's approval.

## **10. DOORS AND WINDOWS**

### **10.1 Accessories**

All exterior doors and hatches, including sill heights, manhole covers, windows and portholes are to be in accordance with the MCA LY2 requirements.

Watertight doors and all fittings in the superstructure are to be the MCA LY2 Requirements.

Internal doors forming part of an escape route are to comply with the MCA LY2 requirements.

Cabin doors are to be rattle proof and have noise reduction properties equal to adjacent panels.

Fire doors, of approved/certified construction, are to be provided with "open/closed" indication in the wheelhouse.

### **10.2 Hatches on Main Deck**



Weatherdeck hatches are to conform to the MCA LY2 requirements, are to be proved watertight and finished in accordance with design.

### 10.3 Outside Doors

All external doors are to be weather tight. Doors are to be painted on the outside and all doors are to have stainless steel holdbacks.

Keys for weathertight doors are to be incorporated in the master key system. Cleating arrangements are to comply with the Regulatory Authority requirements.

The type and style of the weather doors and fire divisions doors is to be of good overall appearance, simple operation and type approved by the MCA LY2 requirements.

### 10.4 Saloon Doors

Saloon doors leading to the open deck are to be in accordance with the MCA LY2 requirements.

### 10.5 Doors on Bulwarks

Doors with stainless steel hinges are to be installed on the port, starboard and aft bulwarks.

The Builder is to install a hydraulically operated door on the transom to unload the tender.

### 10.6 Windows

Closures to windows and sidelights are to be provided in accordance with the MCA LY2 requirements.

Windows and sidelights are to be arranged as shown on the General Arrangement.

### 10.7 Portholes

Portholes under deck level are to be installed according to the General Arrangement Plan and fitted to avoid oxidation where the portholes touch the hull. They are to be fixed type,

All portholes are to be in accordance with the MCA LY2 requirements.

Windows, portholes and hatches are to be hose tested and made watertight as requested by the Classification Society.

## 11. MACHINERY

### Installation Design - General

The standard of machinery and outfitting in machinery spaces is to be in keeping with the overall standard of this luxury yacht. In particular, attention is to be paid to:

Quality of equipment and materials

Standard of workmanship by the Builder, their suppliers and sub-contractors to achieve similar high standards throughout.

Accessibility for maintenance and cleaning.

Maintaining a clean engine room by containment of anticipated spills, piping oily drains to the dirty oil tank with provision for treatment of oily drains and provision for pumping

waste products ashore. Attention is to be paid to the design of drip trays to ensure containment and drainage at all normal angles of pitch and heel.

The design and installation of systems associated with all equipment and machinery in the vessel must fully meet the requirements of the machinery and equipment designers.

Arrangements to achieve compliance with the MARPOL pollution avoidance requirements for oily bilge water, black water, grey water, galley waste and garbage.

Machinery and equipment selection taking account of the noise and vibration requirements.

Provision of a coherently organised set of documentation as described in Section 3.2 of this Specification.

Emissions from main and auxiliary engines and any other sources of exhaust are to comply with all relevant MARPOL requirements.

Machinery is to be identified by name and location, not by numbering, eg port forward, starboard aft, outboard, inboard etc.

Attention is to be given to the selection and design of equipment and systems to ensure that the machinery installation is well suited to the particular requirements of the intended service.

Special attention is to be given to the arrangement of machinery, piping, ducting, cabling, light fittings, ladders, handrails, floor plates, gratings, alarms, fire detectors, control panels, starters and other such fittings so that all routine in-service inspection, maintenance, drawing tail shafts and other survey requirements can be carried out with the minimum expenditure of manpower and minimum requirements for external assistance. This is particularly important in the case of equipment mounted above other equipment. In particular, provision is to be made so that heavy machinery parts can be readily moved around the machinery spaces and to and from the quayside using the vessel's own equipment to the greatest extent possible.

The layout of the alternators, switchgear, motors and associated control gear are to comply with the requirements of the IEE Regulations for the Electrical and Electronic Equipment of Ships.

The twin screw installation is to comprise two main engines driving through twin reversing gearboxes arranged with fixed pitch propellers. The couplings, gearing, shafting, propeller and any other drive elements are to be sized to allow the engine's maximum continuous rating to be utilised.

### 11.1 Main Engines

Type – Caterpillar C32 ACERT 970 kW @1800 rpm

The main engines are to be unidirectional diesel engines operating on diesel oil and are to be of a design well proven as propulsion engines in deep sea yachts. The engines are to be provided with the latest digital governors and are to incorporate all the latest developments. Provision is to be made for fuel control limiters to prevent excessive smoke, engine driven sea and fresh cooling water, lubricating oil and fuel oil pumps, lubricating and charge air coolers, lubricating and fuel oil filters. The lubricating oil and charge air coolers are to be cooled by the engine jacket water system. The engines are to be fresh water cooled via a salt water/fresh water heat exchanger.

Arrangements are to be made for an electrically driven pump to discharge from the engine sumps to the waste oil tank.

The engines are to be fitted with electrical starter motors utilising electric battery starting.

Each engine is to be separately resiliently mounted. A flexible coupling is to be provided between each engine and gearbox.

The engine isolation systems are to include suitable flexible elements in all connecting pipework.

Combustion air for the engines is to be drawn from the engine room.

## 11.2 Reduction Gears

Type – ZF 3356 ratio 4.478 : 1

Gears are to be designed in accordance with recognised National or International Standards, with conservative and proven reserve factors.

The design life of all components is to be based on an infinite life with respect to fatigue stresses.

The design and construction of the gearboxes must ensure high reliability and use equipment that is robust and simple. Use is to be made of proven specifications and arrangements wherever possible.

The gearing is to be single input, single output plus single offtake configuration. Gear elements are to be single helical, hardened and ground. Adequate inspection openings are to be provided to allow inspection of all meshings. The design of the gearboxes must ensure that all routine examinations, maintenance and repairs may be carried out within the limited space envelope available. It must be possible to carry out necessary examinations and maintenance without disconnecting pipe work, cables or any major component or assembly from the gear casing.

Airborne and structure borne noise are to be minimised by using high quality gears, by designing the gear meshes for minimum transmission error and using robust casings. Noise and vibration criteria are specified and are to be achieved with the use of an inherently quiet gearbox.

Gearboxes and their services are to be suitable for operation in trailing mode, ie with only one engine and propeller driving. Electrically driven standby gearbox lubricating oil pumps are to be provided. The lubrication systems are to include duplex discharge filters. The gearing is to incorporate the following, per set:

- Thrust bearing to absorb the propeller thrust
- Integral oil sump
- Directly driven oil pump
- Oil cooler
- Duplex oil filters with magnetic inserts
- Friction clutch

The clutch is to be provided with local and remote control. The clutch engagement time is to be adjustable. Suitable interlocks are to be provided to prevent inadvertent operation of the clutch. The clutch is to disengage automatically on low pressure of the operating

fluid.

### 11.3 Remote Control System

Type – Bosch Rexroth

An engine remote control system with controls in the wheelhouse and on the bridge wings is to be supplied.

### 11.4 Cooling Water System

Type – Sea Water Pumps gear driving centrifugal auxiliary sea water pump  
General

Main and auxiliary engines are to have fresh water cooling systems with heat exchangers, lubricating oil coolers and built on fresh water and sea water pumps.

Engine driven sea water pumps are to draw from the sea water cross over main and discharge via the sea water/fresh water heat exchanger either overboard directly or via the exhaust system as required.

Each main engine fresh water cooling system is to provide cooling for the associated drive line elements.

Flow alarms are to be provided on cooling sea water supplies.

Calculations for heat exchangers are to make due allowance for the effects of leakage through three way valves.

#### Sea Water Cooling System

Two main sea water inlet chests, one port and one starboard to be installed. Each inlet is to be sized to pass 100% of the maximum flow through main collector. Separate sea inlets are to be provided in other compartments for auxiliary equipment e.g. sprinkler, water maker plant, emergency fire pumps etc.

Except for wet exhausts overboard discharges are to be sited below the waterline. They are not to be in the area of the load line markings, the area where liferafts or boats are lowered or near any accommodation ladders.

In general all clean suction are to be taken from the starboard side of the vessel with all dirty discharges to port.

All heat exchangers cooled by seawater are to be provided with back flushing on the sea water side.

#### Fresh water cooling systems

Arrangements are to be made to provide water treatment into the system, not into expansion tanks. Sampling points are to be provided in the cooling water systems.

Cooling systems are to be treated with corrosion inhibitor immediately following the initial fill and monitored on a regular basis.

### 11.5 Sea Intakes

Sea chests are to be located to ensure that they remain immersed when the vessel is rolling. Each sea chest is to be provided with a removable grid with the total effective area of holes in the grid not less than three times the combined area of all the sea valves connected to the sea chest. Grids are to be designed for easy removal, handling and refitting by a diver with the vessel afloat. Grids are to be strengthened as necessary and holes in grids are to be at least 9mm diameter.

The top of each sea chest and inlet strainer is to be vented to atmosphere above the upper deck level and each sea chest is to be provided with drain holes. The vent pipe from each sea chest is to be fitted with a valve mounted directly to the sea chest with another valve about 2 metres above the sea chest and a compressed air weed-clearing connection provided between the two vent pipe valves.

### 11.6 Exhaust Gas System

Exhaust pipes are to be arranged to allow free expansion and all diesel engine exhaust pipes are to be resiliently mounted. Drains are to be fitted at the lower ends of exhaust pipes.

The Builder is to submit detailed proposals for the exhaust systems for the main and auxiliary engines, incorporating well-proven features for an installation of this type.

Exhaust systems are to meet the requirements of the engine designer for back pressure under all operating conditions and proposals for bypass arrangements are to be included as applicable.

The proposals are to include details of:

- Silencing arrangements and anticipated attenuation
- Materials throughout the system, with special attention being paid to corrosion.
- Isolation of the exhaust system from structure
- Insulation
- Prevention of smoke and soot emissions

The auxiliary engine exhaust systems are to exhaust either over the side

## 12. SHAFTLINES AND PROPELLERS

### 12.1 Propeller Shafts

Type – Amartech 4462 Ø140mm x 9000mm

Details of shaft alignment calculations and procedure, torsional, axial and lateral vibration calculations are to be carried out. Torsional vibration calculations are to include the one cylinder misfiring condition. The selection of couplings, dampers etc is to avoid any critical speed range within the operating range. All shaft vibration calculations are to be verified by measurement on sea trials.

The shaft alignment is to be optimised, by adjusting bearing heights if necessary, in order to give good load distribution across the stern bearing and equal loads in the running condition on the gearbox bearings. The shaft alignment is to be statically checked by strain gauges during basin and sea trials and, if necessary, intermediate shaft bearing

heights are to be adjusted in order to achieve the design conditions. Confirmatory readings are to be taken after the final adjustment.

The drive system, including gearing, couplings, shafting seals, or other elements, is to be selected for minimum maintenance.

Accessible arrangements are to be made to allow wear down readings for each bearing in the stern tube system.

A separate means of locking either shaft line is to be provided for use in an emergency whilst underway at full power on the other propeller.

Shafts are to be positively earthed using silvered slip rings with silver graphite brushes connected through terminals to the vessel's structure. Potential measuring equipment is to be installed.

Stern tubes and strut bearings are to be seawater lubricated neoprene.

### 12.2 Fixed Pitch Propellers

Type – Veem Ni.Al.Br 5 blades Ø1600 mm

The design basis for propellers, including blade number, scantlings, pitch, surface area and rotation direction is to be agreed with designer.

The propellers are to be guaranteed against singing and are to be manufactured in accordance with ISO 484/1, Class S, including balance. Consideration is to be given to the use of highly skewed blades to minimise noise and vibration.

## 13. GENERATORS

The diesel alternators and all associated equipment are to be designed to meet the following duties:

DUTY	SETS IN USE
Port services, including all deck, accommodation and engine room services	1
Normal load on sea passage, including full air conditioning	2
Maximum manoeuvring	2

Electrical load estimates for these conditions are to be agreed with the electrical system designer.

### 13.1 Main Generators

Type – Caterpillar C4.4 86 kW @ 1500 rpm

The diesel alternator sets are to meet the noise and vibration requirements set out above and the latest emission control requirements, with particular regard to low load operation over protracted periods.

The diesel alternator sets are to be driven by turbocharged, in line, marine diesel engines having a maximum speed of 1800 rpm.

The engines are to be fitted with electric starting from batteries.

The engine manufacturer's recommendations for minimising engine fouling problems due to low load running are to be incorporated. Engines are to be selected with special regard to minimising smoke and particle emissions when required to run at low loads for protracted periods.

Arrangements are to be made for an electrically driven pump to discharge oil from the engine sumps to the waste oil tank.

Each diesel alternator set is to be fitted with an acoustic enclosure, allowing free access for maintenance.

The interiors of the enclosures are to be suitably clad to prevent saturation by oil and oil mist. Each enclosure is to be provided with doors or detachable panels to give easy access for maintenance. Windows are to be provided to give a view of the interior of the enclosure.

Engine cooling and combustion air is to be drawn from and surplus air exhausted to the engine room via suitably silenced openings in the enclosure by a fan.

Instrument panels containing all necessary local controls and instrumentation necessary for the safe starting and running of the engines are to be provided for the machinery installed in each enclosure and are to be clearly visible through the windows in the enclosure.

The isolation system is to include suitable resilient mounts for the engine alternator set and suitable flexible elements in all connecting pipe work.

#### Emergency Generator

Type – Caterpillar C4.4 38 kW @1500 rpm

The engine driving the emergency alternator set is to be a four stroke diesel, direct air or radiator cooled, running at 1500 rpm.

The alternator set is to be installed on flexible mounts. All piping connections to the set are to be provided with flexible sections.

The alternator set is to be provided with means for automatic starting in the event of mains power failure.

The emergency alternator room is to be well ventilated but means for avoiding overcooling the space in low ambient temperature conditions is to be provided. The engine exhaust is to be led to a safe position with suitable drainage arrangements to prevent water entering the engine. A local fuel service tank is to be provided.



The installation and fuel provision are to be in accordance with Classification Society and MCA LY2 requirements.

### 13.2 Harbour Service Generator

Electrical power in harbour is to be provided by the emergency generator described above. As such there is no separate harbour service generator installed.

## 14. STEERING SYSTEM AND STABILIZERS

### 14.1 Rudders

Type – Rudders Steering Gear = Marsili CL.B 201/4n

The steering gear and its control systems are to comply with MCA LY2 requirements.

Each rudder is to be provided with a hydraulic steering gear. These are to be electrically or mechanically synchronised. Controls and rudder angle indicators are to be fitted in the wheelhouse and at the bridge wings. Additional indicator(s) are to be provided in the steering gear compartment. Follow up and non-follow up controls are to be provided.

Emergency steering arrangements are to comply with Classification Society and MCA LY2 requirements.

### 14.2 Stabilizers

Type – Quantum Zero Speed QC 1500

One set of non-retractable stabilizer fins system is to be installed, consisting of:

- Plate complete with stocks and hydraulic actuators
- Power unit
- Fins
- Control panel
- Gyro panel

The safety system provided is to automatically return and lock the fins in the neutral position when not in use.

The stabiliser supporting structures are to be carefully arranged with particular attention to their integration into the surrounding structures to ensure that they are well stiffened in all directions and that the fin loads are adequately transmitted to the main hull structure. Adequate access is to be arranged around the box to allow easy inspection of the structure.

**15. BOW THRUSTER**

15.1 Bow Thruster

Type – Quantum QT 120

One hydraulic motor driven bow thruster is to be provided with fix pitch propeller. The propeller is to be four bladed with optimised lip contour The tunnel is to be protected by grids and is to be double resiliently mounted, if considered necessary by the noise and vibration consultant.

Bow thrust joystick control is to be provided at the main control stations in the wheelhouse and on both bridge wings.

**16. ENGINE ROOM**

16.1 Engine Room Conditions

All machinery is to be delivered completely operational and suitable to operate in the following ambient conditions:

maximum ambient air temperature	+45°C
minimum ambient air temperature	-5°C
maximum temperature of seawater intake	+32°C
minimum temperature of seawater	0°C
maximum space temperature in engine room	+45°C
local hot spots in engine room (to be avoided as much as possible)	+60°C
maximum temperature for electronic and electrical equipment in machinery spaces	+50°C
maximum temperature for electronic and electrical equipment elsewhere	+45°C
minimum temperature of ambient air inside (if not specified otherwise)	0°C

16.2 Engine Room Floors and Protections

Ladders, floor plates and gratings are to be arranged throughout the machinery spaces to ensure easy access to all items of machinery and equipment. Floor plates are to be chequered aluminium. Frames are to be suitably spaced to avoid permanent deformation of the plates when a heavy load is placed on them. Floor plate sections are not to be larger than can be handled easily by one man. Securing screws are to be fitted to each plate. Portable insert/floor plates are to be provided for access to valves, strainers, manifolds and spaces below floors. Flush type hand grabs or small holes are to be provided for lifting portable plates.

All valves are to be arranged with hand wheels accessible from above floor plate level.

Coaming bars are to be provided around all permanent openings. Except where open gratings are required for ventilation or visibility, gratings on all levels are to be of solid anti-slip plate.

The headroom above walkways and ladders is to be as high as practicable.

Main access ladders are to be installed with a slope of not more than 60°. All ladders are to be about 600 mm wide. At the top of each ladder the coaming is to be cut away.

Main ladders are to be of steel construction with grating plate treads spaced not more than 300 mm apart.

Ladders and handgrips are to be fitted at manholes to facilitate access.

Stainless steel upper and lower handrails are to be provided on all ladders, platforms and around machinery and openings.

Handrails are to be about 900 mm high and supported by stanchions spaced not in excess of 1.5 metres.

Handrails are to have a clear hand space of at least 50 mm from adjacent equipment, piping and bulkheads.

All handrails and stanchions are to be in easily removable sections.

### 16.3 Engine Room Alarm System

A central alarm panel is to be fitted in the wheelhouse. This panel can be part of the vessel's overall monitoring system.

The alarm system is to provide the following groups:

- Main engines and reduction gears.
- All generators.
- High level alarm for bilges, grey and black water tanks..
- High and low level alarm for fuel and lubricating oil tanks and fresh water tanks.
- Additional alarms as required by the MCA LY2 Requirements and the Classification Society.

An alarm panel is to be installed in the wheelhouse complete with audio alarm, reset buttons, dimmer etc.

A general repetition panel is to be provided in the crew mess.

All required audio and visual alarms are to be installed in engine room.

#### 16.4 Labelling

See Section 22.1

#### 16.5 Working Bench in Engine Room

An engineering and electrical working area is to be located in/or adjacent to the engine room, containing a bench drilling machine, a twin wheel grinder, work bench, vice and electrical test panel. Provision is to be made for a fuel equipment test/overhaul station.

The Builder is to provide a working bench, drawers for tools and spare parts and a stainless steel washbasin with hot and cold water supply in this area.

### **17. COMPRESSED AIR SYSTEM**

#### 17.1 Air Compressor

One electrically driven compressor is to be installed in the engine room.

The compressor and electric motor are to be mounted on a base and are to be connected by belts. The compressor is to be resiliently mounted and all connecting piping is to be isolated from the compressor.

The compressor is to provide air to control air and service air systems. The control air system is to incorporate filtration equipment capable of producing the air quality required by the end users.

Providing that a supply of control air is not essential for operation of the main engines or other items of equipment proposals to dispense with a control air supply will be considered.

At least one air horn is to have a dedicated air line, with a locked open valve from the pressure reducing valve, independent of all other users.

## 17.2 Air Bottles

The following air bottles are to be provided:

One service air

Air bottles are to be mounted at a sufficient angle to ensure all condensate can be drained.

## 18. FUEL SYSTEM

### 18.1 General

- Fuel Transfer pump Gianneschi
- Fuel separator Alfa laval MIB 303
- Fuel filters Racor duplex 900M A30 for each main engine
- Fuel filters Racor 500M A30 for each generator
- Clean oil transfer pump Gianneschi
- Waste oil transfer pump Gianneschi

All engines are to be suitable for and arranged to run on diesel oil in accordance with ISO 8217: 1996 DMA. Alternatively, DMX may be used for the emergency alternator engine and for the tenders.

All fuel tank overflow and vent lines are to be self draining.

Engine fuel boost pumps are to be arranged for auto standby starting as well as local control.

Filtering arrangements, as recommended by the designers of the end users, are to be incorporated in all fuel supplies. Quick closing valves, operable from the emergency

control position are to be fitted at the inlet to all engines, in addition to the tank valves required by the regulations. Non-return valves are to be fitted at any fuel oil outlet from engines.

Particular attention is to be paid to the layout of the fuel supply system to avoid oil leaks impinging on heated surfaces. Where this is not possible all joints in pipes containing oil above atmospheric pressure are to be provided with containment to prevent a direct spray from a leaking joint.

#### Storage and Transfer

All fuel filling stations are to fully comply with USCG requirements, allowing bunkering from port, starboard and stern locations. The bunker stations are to be arranged with separate connections for oil fuel, lubricating oil and sludge.

The oil fuel filling lines to bunkers are to have a valve and coaming.

The air and overflow system is to be designed such that any overflow is to be to a designated storage/overflow tank and not to deck.

Attention is to be given to avoidance of the accumulation of vapour from any source in the fuel systems. There are to be no sources of ignition in the vicinity of terminations of fuel oil ventilation pipes, drain pipes or in tanks.

Two oil fuel service tanks are to be provided.

Fuel oil tanks above the tank top are to be provided with drain valves of the spring-loaded self-closing type. Drains are to be led to the waste oil tank via enclosed observation funnels.

One electrically driven oil fuel transfer pumps are to be provided in the machinery spaces. The pump is to be screw type.

#### Treatment

Fuel oil treatment is to be provided by a purifier. The purifier is to be arranged for automatic water discharge to the oily bilge tank and is to be provided with a high water content alarm.

The purifier pump is to be arranged to transfer from one fuel tank to daily tanks.

#### Fuel Supply System

Separate supplies of fuel are to be provided from the fuel oil service tanks to the main engine and auxiliary engines. Filtering arrangements, as recommended by the designers of the end users, are to be incorporated in these supplies. Quick closing valves, operable from the emergency control position are to be fitted at the inlet to all engines, in addition to the tank valves required by the regulations. Non-return valves are to be fitted at any fuel oil outlet from engines.

Particular attention is to be paid to the layout of the fuel supply system to avoid oil leaks impinging on heated surfaces. Where this is not possible all joints in pipes containing oil above atmospheric pressure are to be provided with containment to prevent a direct spray from a leaking joint.

Provision is to be made to fuel the tenders by a dedicated pump with a garage type nozzle, hard piped from the fuel day tanks to the leisure boat area. The fuel hose is to be long enough to reach the boats when they are afloat alongside the yacht.

18.2 Pumps and Filters

See Section 18.1

18.3 Tanks and Filling

See Section 18.1

18.4 Transfer Pumps

See Section 18.1

18.5 Daily Service Tanks

See Section 18.1

18.6 Tank Levels

Ultrasound type tank level gauges will be installed; they will be approved by the Classification Society and will have control panels on main supervising system.

The control panels will be calibrated by the Builder following the manufacturer's diagrams.

18.7 Gas Oil Purifier – Daily Service Pump

See Section 18.1

**19. LUBE OIL**

19.1 Lube Oil System

Lubricating oil filling connections are to be provided, one for each type of lubricating and hydraulic oil and piped to dedicated storage tanks. Separate deck filling connections are to be provided for filling the lubricating oil storage tank. Magnetic elements are to be provided in the strainers of all engine, gearbox and hydraulic oil systems. Filter capability is to be in accordance with the equipment designer's requirements.

Provision is to be made for discharging waste oil and sludge ashore through discharge connections at the bunker stations.

The lubrication arrangements for the main and auxiliary engines are to be in accordance with the supplier's recommendations. Pre-lubrication arrangements are to be made for the main engines.

Each main engine is to be provided with its own engine driven lubricating oil pump. An independent, electrically driven pump is to be provided to transfer the contents of the sumps to the dirty oil tank. In the event of failure of the engine driven pump the engine is to be stopped and declutched automatically.

Main gearing and auxiliary engines are to be provided with independent lubricating oil systems working on the wet sump principle. An independent, electrically driven pump is to be provided to transfer the contents of the sumps to the dirty oil tank.

A pump is to be provided to pump from the dirty oil tank to shore connections within the savealls provided for fuel oil filling.

## **20. FIRE AND BILGE SYSTEMS**

### **20.1 Floating Switches and Levels**

For bilge alarms the Builder will use stainless steel level switches of an approved type.

### **20.2 Bilge System**

Type - Recovered Energy 107- OWS

The oily bilge pumping and treatment section of the system is to be capable of being isolated from the remainder of the bilge pumping system. The oily bilge pump is to be of positive displacement type. The contents of the oily bilges are to be pumped from the bilges to an oily bilge tank. From the oily bilge tank the oily water is to be discharged to the oily water separator by the separator pump which is also to be a positive displacement pump. Separated water is to be discharged directly overboard, on the port side of the vessel aft of the main sea inlet or back to the tank. Recovered oil is to be discharged to the waste oil tank. The bilge separator is to be provided with a continuously indicating monitor.

The Rule bilge pumping requirements are to be met by fire, bilge and GS pumps meeting the MCA LY2 and The Classification Society Rules and Regulations. *One of the* fire, bilge



and GS pumps located outside the machinery space is to be connected to the emergency switchboard.

All valves and suction strainers in the bilge pumping system are to be in positions easily accessible at all times. Bilge valves are to be provided with local manual and remote control in accordance with the requirements of the MCA LY2 for operation in flooded conditions. Remote operated valves are to be provided with electric actuators, which permit local or remote operation at all times. The system is to be powered through the emergency switchboard.

Rule bilge suction and oily bilge suction are to be located to cover all recesses and low points in tank tops. All open framed areas are to drain towards bilge suction locations.

Remote control of the bilge system is to be provided from the emergency control position.

An emergency bilge suction is to be provided in each machinery compartment. Where an emergency bilge suction is provided, with the remote valve control. The location of such valve hand wheels is to meet the flooding requirements.

### 20.3 Ballast Systems

If necessary, the fire/bilge pumps are to be arranged to also serve as ballast pumps.

## 21. FRESH WATER SYSTEM

### 21.1 General

During design, procurement, installation and commissioning particular attention is to be given to the general and the detailed requirements of the various Regulatory Bodies with regard to the health aspects of ships fresh water systems. Reference is also to be made to ISO DIS 15748-1. The requirements of this Specification are to take precedence over those of ISO DIS 15748-1 where differences occur.

A shore connection is to be provided at the mid on both sides of the vessel. Provision is to be made for an additional shore supply connection, 40 mm diameter to be led to the fresh water tanks, feeding into the tanks via ball float valves.

Fresh water for domestic and machinery systems is to be produced by reverse osmosis (RO). The sea water feed is to be taken from a dedicated sea water inlet.

The sea water is to pass through a suitable filtration system prior to entering the RO plant. The design of the filtration system is to allow unrestricted operation of the RO plant in waters with high concentrations of suspended solids without damage or degradation of the RO plant.

All fresh water produced is to be sterilised by an approved method, chlorination or silver ion before entering the storage tanks. Provision is to be made for discharging the

contents of the storage tanks overboard, in a reasonable time after sterilising the fresh water systems.

#### Cold Fresh Water

Type – Gianneschi

Cold fresh water is to be distributed throughout the vessel. The pumps are to draw from the fresh water tanks and discharge to consumers. An carbon filter, cartridge filter, ultra violet filter and softener is to be provided in this system.

Circulation connections are to be provided at the extremities of the ring mains to ensure that there is no stagnation in the system. These are to be led back to the pump suction. Lines from the ring mains to consumer outlets are to be as short as possible and no branch is to be more than 2 metres in length.

Vacuum breakers are to be provided to all toilets, expansion tanks etc. Softened water is also to be supplied to the galley.

#### Hot Fresh Water

Type – Gianneschi 0.4 kW

Hot water is to be distributed throughout the vessel by a system generally similar to the cold water supplies. Water is to be taken from the cold fresh water system and heated in water heater.

Two hot water circulating pumps are to be provided, one working, one standby, drawing from the returns at the extremities of the ring mains and discharging back to the water heater.

The hot fresh water circulation rate is to be sufficient to maintain a water temperature of 66°C in the ring mains at all times. Lines from the ring mains to consumer outlets are to be as short as possible and no branch is to be more than 2 metres in length. Hot water is to be available at consumer outlets not more than 5 seconds after opening the outlet.

#### 21.2 Boiler - Hydrophore Tank

Type – Gianneschi 300l

The Builder will supply electrical boilers with stainless steel body and of sufficient, capacity for the guest area and for the crew area. In any case sufficient to satisfy the needs of 21 people.

#### 21.3 Fresh Water Maker

Type – Sea Recovery Aquamatic 1800 – 2

The RO plant is to be sized taking account of peak onboard consumption plus an allowance for washing down, using fresh water, at least once per day. The requirements of the jacuzzi are also to be taken into consideration. Details of the consumption estimates and assumptions made regarding cold and hot fresh water requirements are to be provided.

The RO plant is to produce its rated output with a sea water temperature of 10°C and is to be a complete module including all necessary pumps, filters, capacity and quality control, arranged for fully automatic operation.

The required cleaning systems for filters and membrane modules are to be provided and the treatment systems to preserve the condition of the membranes when not in use are all to be included. Provision is to be made for easy isolation of membranes by the use of flexible pipes to maintain system integrity. Cleaning arrangements are to include header tanks and hard plumbing to facilitate chemical cleaning.

#### 21.4 Black Water System

Type – Tidal Wave Headhunter TW-HMX-513 Sewage treatment plant

Type – Planus Toilet system

A sewage treatment plant and vacuum transport system are to be provided to handle all black and grey water before discharge overboard. The sewage plant is to meet the IMO and US Coastguard requirements.

The vacuum system is to comply with SS 78 20 41 (1983) and is to incorporate noise reducing measures as necessary. A full vacuum test is to be carried out before commissioning the system.

Water spray cleaning facilities are to be provided on all black and grey water tanks. Cleaning connections are to be provided throughout the black and grey water systems.

A MARPOL/USCG compliant sewage treatment plant is to be provided to handle all black and grey water before discharge overboard.

Low volume fresh water flush WC's, of the low noise type, are to be provided.

Black water is to be transported to the sewage treatment plant and then discharged overboard or to the black water tank. The vacuum system is also to be capable of discharging directly to the black water tank. The black water transfer pump is to be capable of discharging from the black water tank to the deck shore connection or to the sewage treatment plant.

Grey water tanks are to be provided. The grey water system is to be a gravity system. Transfer pumps are to discharge from the tanks to the deck shore connection, overboard or to the sewage plant. The discharge to the sewage plant is not to exceed the recommendations of the supplier.

Grey water from the galley is to pass through a macerator and grease trap before entering the grey water tank. Galley sinks are to be fitted with macerator waste disposal units.

All overboard discharges from the sewage system are to be arranged below the waterline on the port side of the vessel aft of the main sea water inlet.

Shore discharge connections are to be provided located under stairs on fwd deck.

## **22. PIPING AND HYDRAULIC ACCESSORIES**

### **22.1 Piping and Pump System Location**

Design:

Particular attention is to be paid in the design, installation and commissioning of all piping systems to the matching of pump and system characteristics.

The power required for pumping duties is to be minimised by the selection of pumps close to their points of maximum efficiency and by designing heat exchangers and piping systems so as to reduce flow rates and total head requirements.

For all branched systems, eg the fresh water cooling systems, chilled water systems etc., in addition to providing isolating valves at inlet to and outlet from each branch, a regulating valve suitable for flow control and flow measurement purposes is to be installed upstream of the outlet isolating valve. The electronic equipment necessary to give a direct reading of flow from the pressure tapping on the regulating valve is to be supplied.

If necessary, the flow through piping systems is to be adjusted in accordance with design requirements by means of orifice plates sized on the basis of pressure drop calculations and/or measurements. All orifice plates are to be made in a suitable grade of stainless steel or plastic material, labelled with their size and are to be shown on the "as fitted" drawings.

If necessary, provision is also to be made to prevent damage to pipework by excessive fluid velocities when parts of a system are shut down. Such provisions should include all necessary manually operated flow regulating valves, instrumentation and written instructions.

#### Arrangement:

All piping systems are to be arranged with sufficient flexibility to avoid excessive stress in pipes, machinery or fittings in service.

All systems are to have easily removable sections where necessary for maintenance or unblocking.

All pipe work is to be securely supported and isolated to prevent heat, noise or vibration transmission to structure.

Air release and drain cocks are to be provided wherever necessary, in particular drain cocks are to be located so that systems can be completely drained.

Pockets in pipe lines are to be avoided as far as possible.

Sufficient drop is to be arranged on all drainage piping.

Piping is to be arranged to give maximum accessibility to valves and machinery without removing adjacent piping or equipment. Piping is to be run as directly as practicable with a minimum of bends and sufficient joints for easy accessibility and removal.

Exhaust gas, and other piping carrying high temperature fluids are not to be installed adjacent to electrical equipment or wiring.

Flexible pipe work or bellows used in conjunction with resiliently mounted equipment are to match the isolation performance of the equipment mounts. The terminations of such flexible elements, at both the equipment end and the ship structure end, are to be sufficiently rigid to ensure that the isolation qualities of the flexible elements are not impaired.

Special attention is to be given to the location of any joints or valves on all oil pressure pipes. Such joints and valves must be visible and remote from heated surfaces and electrical equipment, or provided with a containment.

A dry tank top concept is to be applied. All drains are to be led to the waste oil tank or bilge wells, as appropriate, not onto the tank top. Coamings are to be arranged around oil and water pumps, engines, compressors, filters, tanks, heat exchangers, purifiers, air conditioning units etc. All scuppers and coamings are to be designed to contain fluids and to drain under all normal conditions of pitch and heel.

Pipes passing through non-watertight ducts or flats are to have coamings to prevent spillage to the lower space.

All engine exhaust systems including silencers are to be flexibly mounted to minimise noise transmission.

Where pipes penetrate watertight or oiltight bulkheads, decks or tank tops "three flange" spool fittings of 90/10 copper nickel, gunmetal, cast steel or welded steel construction are to be used as appropriate for the connected piping system. In general, pipes are not to be arranged within the insulation on bulkheads and decks.

Spools in way of insulation, deck coverings or linings are to have sufficient length necks to allow fitting and removal of flange bolts and nuts without disturbing the insulating material.

#### Production:

All lubricating, hydraulic and fuel oil piping is to be pickled before installation. After thoroughly scouring with fresh water the piping is to be treated with a neutralising solution and protected by end caps before installation.

Where galvanised piping is specified the pipes are to be hot dip galvanised after bending and attachment of flanges. Any accessible minor damage to galvanising during

installation is to be well coated with a zinc rich paint. Inaccessible or major damage is to be made good by full re-galvanising.

Screwed joints are not to be used. Couplings of the Straub or equivalent type are acceptable.

#### Installation:

All piping is to be securely supported and braced to prevent damage from vibration and isolated when necessary to prevent transmission of vibration. "U" bolt type pipe clips are not to be used for thin wall pipes. Pipe supports are not to be attached to machinery floor plates, gratings, ladders or other pipes.

During fitting out, temporary pipes or templates are to be used in place of flexible pipes and bellow pieces to prevent damage or overstressing. The flexible elements are not to be used to correct misalignment in adjacent pipe work. These flexible elements are only to be fitted after all major work in the area has been completed.

Non ferrous metal pipes are to be insulated from steel structure by suitably lined clips.

Small bore piping is not to be clipped to larger pipes.

Piping is to be kept clear of access routes, including pipe work within tanks.

#### Commissioning:

All lubricating, hydraulic and fuel oil systems are to be flushed with an appropriate flushing fluid after installation until the flushing filter elements cease to remove quantities of debris. After flushing, new filter elements are to be fitted throughout each system. Alternatively, temporary filters may be fitted during commissioning, but these are to be at least as fine in mesh size as the permanent filters. Flushing to the required standards is to be completed before connecting the system. For hydraulic oil systems the flushing is to be carried out by the equipment/system supplier.

Unless otherwise stated, or required by regulation, the test pressure of all piping systems is to be twice the normal working pressure, recognising the shut valve pump head where applicable.

#### Pipe Jointing Materials:

The number of grades of jointing material is to be kept to a minimum.

#### Insulation:

Generally, tanks and piping which radiate heat, including main and auxiliary engine HT systems, are to be insulated so that the external surface temperature does not exceed 55°C in an ambient temperature of 32°C. The principal insulating material is to be rockwool and is to be covered with painted glass cloth. For oil pipes and equipment the glass cloth is to be protected with a layer of oil and water resistant epoxy coating, this is to be completed before systems are put to work. All hot areas of main and auxiliary engine and incinerator exhaust pipes are to be insulated and clad with stainless steel over their entire length.

Insulation is to be provided on all metallic pipes conveying fluids below 32°C, where surface condensation could occur detrimental to the operation of machinery or cause discomfort to personnel. Pipes conveying cooled fluids are to be insulated to reduce heat transmission using insulation having a thermal conductivity K value of not more than 0.02 W/mK.

Vertical pipes, which are insulated, are to be fitted with rings to prevent the insulation from slipping on to the flanges.

Identification:

All visible parts of piping systems throughout the vessel, but including piping beneath floor plates, are to be coded by means of self-adhesive coloured tapes with arrows indicating direction of flow.

A board showing the key to the colour code is to be mounted on a bulkhead in the engine room. The Owner's Representative's preferred colour code system is indicated in the table below. The Builder may propose a different coding system.

<b>SYSTEM</b>	<b>COLOUR</b>	<b>BS381C No</b>	<b>REMARKS</b>
Sea water	Sea green	217	Single band
Bilge	Black		Single band
Cooling fresh water	Cobalt blue	115	Single band
Domestic FW (cold)	Arctic blue	112	Single band
Domestic FW (hot)	Arctic blue	112	Double band
Fire system	Signal red	537	Single band
Sprinkler system	Signal red	537	Triple band
Lubricating oil	Canary yellow	309	Single band
Hydraulic oil	Canary yellow	309	Double band
Oil fuel	Light brown	410	Single band
Sludge	Dark brown	412	Double band
Compressed air	Salmon pink	447	Single band
Air, sounding and filling	Light grey	631	Single band
Scuppers, drains and discharges	Dark sea grey	638	Single band
CO <sub>2</sub>	Light violet	797	Single band
Freon	Dark violet	796	Single band

Rectangular engraved brass nameplates for valves and gauges are to be attached to the valve body, pipework or structure adjacent to the items. No nameplates are to be fitted to valve hand wheels. Markings are to be filled with black. In the case of fire fighting services red filling is to be used.

All valves are to be identified by numbers corresponding to those on the piping diagrams and the numbers are to be engraved on the valve nameplate.

Valves:

In general, gate valves and cocks are not to be used. High quality, through lined butterfly valves and ball valves may be used.

Emergency shut-off valves and the bilge system valves are to be operated by remote control from the emergency control position. These valves are also to have local manual operating facilities.

Valves requiring a remote open and close facility are to have actuators, capable of opening/closing the valves when locally closed/opened.

Reducing, thermostatic, relief and control valves are to be of such a design as to permit adjustment, inspection and overhaul without removal from the pipeline.

Relief valves for air and water systems are to be of the exposed spring type with carbon steel springs.

## 22.2 Scuppers and Vent Holes

Adequate scuppers and drain pipes are to be provided throughout the vessel. Particular attention is to be paid to the need for proper drainage of deck areas at all normal angles of heel and trim.

All scupper and drain lines are to be provided with a minimum fall of 50mm/m. If this is not possible alternative runs are to be agreed with the Owner's Representative. Connections are to be provided for inspection and cleaning. All valves are to be readily accessible for inspection and maintenance. All drain pipes are to be large bore.

Compartments with access from weather decks are to drain internally through limber holes in the structure to drain holes in the watertight bulkhead fitted with screwed brass plugs attached by a keep chain.

## 22.3 Hydraulic Accessories

The vessel is to be equipped with Planus toilet system.

The selection of WCs, bidets, washbasins, shower heads and trays, and other bathroom fittings shall be determined by the Interior Designer.

## 23. AIR CONDITIONING - VENT SYSTEMS

### 23.1 General

The air conditioning system is to be designed to satisfy the following conditions:

	Summer	Winter
Sea temperature	32°C	0°C
External air	35°C, 90% RH or 45°C, 50% RH	-5°C
Internal air	25°C, 50% RH or 22°C, 50% RH	22°C, 50% RH

All accommodation, galleys, laundries and the wheelhouse are to be air conditioned. The air conditioning installation is to be designed and supplied as an integrated package including all machinery, air handling units, ducting, outlets and controls. Ducting is not to penetrate main fire zone boundaries.

### 23.2 Air Conditioning System

Type – Condaria chiller capacity 600,000 BTU/h & heater capacity 64,500 kcal/h

The air conditioning system is to be designed in accordance with the requirements of ISO 7547.



The final design and detail of the system is to be developed with the final design of the accommodation.

The Builder, in conjunction with the proposed supplier of the HVAC system, is to develop an appropriate system to meet the requirements, defined above and the layout defined by the General Arrangement.

The minimum acceptable standard is outlined below. The Builder is also to consider alternatives and be in a position to discuss these during development of the Building Specification.

The minimum requirement is to be based on a single duct supply system with discrete air handling units conditioning the air. Chilled water is to be supplied to the air handlers from central chiller units.

A minimum fresh air rate of 25 m<sup>3</sup>/h per person for each occupied room, is to be delivered with fresh air.

The system is to be designed to cope with smoking in accommodation areas and to minimise the risk of the intake of exhaust gases.

Special attention is to be paid to avoiding problems with the staining of fabrics throughout the vessel. Gaps under doorways are not to be designated as air passages.

Each compartment is to have individual variable thermostatic control thru SICCS system. Return air is to be ducted from each compartment to the exhaust fan.

In the summer the chillers produce cold fresh water. This water is to be used to cool the air, which is ducted to the air conditioned space. The set air temperature is to be achieved by a variable flow as required.

In the winter the air handlers heat the air, using electric pre-heaters delivering suitably warmed air to each air conditioned space.

Particular attention is to be paid to the location and silencing of the inlets and outlets to minimise noise on deck, particularly in the harbour condition. All inlets and outlets in exposed areas are to be provided with water spray eliminators, in marine grade aluminium, with in line dust filters.

The chiller refrigerating plants are to utilise a chlorine free HFC gas. Two 50% capacity units are to be provided as a minimum.

Chiller condensers are to be sea water cooled. Two pumps are to be provided, one in use and one standby.

### 23.3 Ventilation

The following ventilation systems are to be supplied:

- Exhaust in crew bilge
- Exhaust in sanitary areas
- Exhaust in the galley
- Exhaust in the laundry
- Exhaust and supply in the engine room

- Ventilation in the engine room

<u>Rate of air change</u>	<u>Supply</u>	<u>Exhaust</u>
Sanitary areas		10
Laundry	3	15
Galley		20
Crew dinette	3	
Wheelhouse	3	
Saloon	2.2	
Dining room	2.2	
Guests cabin	3	
Crew cabins	3	

The requirements of the main and auxiliary engine manufacturers are to be taken into account in the design of the engine room ventilation system.

The mentioned ventilation systems are to balance the air conditioning.

The supply and exhaust fans in the engine room are to have two-speed electric motors.

Suitable fans are to be provided for exhaust from the bow thruster room and the steering gear room with insulated ducts, gratings and exhaust outlets.

#### 23.4 Ventilation in the engine room

Type - Delta T

The design of machinery space ventilation is to be in accordance with ISO 8861, for a temperature rise of 12.5°C.

The machinery space(s) are each to be supplied by two fans, supplying the required amount of combustion air and ventilation air and two exhaust fans. The fans speeds are to be controlled seamlessly with Delta T Engine room ventilation system.

The capacity of the two exhaust fans is to be enough to ensure a slight over pressure with the two main engines and one auxiliary engine working at their maximum continuous power.

The supply ventilation air is to be distributed over the machinery spaces and other spaces in such a way that no hotspots or accumulation of oil vapour will occur and the relevant diesel engines, generators, motors, etc are provided with sufficient supply volume.

All other technical spaces on board are to be provided with mechanical ventilation.

## **24. FIXED FIRE-FIGHTING SYSTEM**

### **24.1 Fire-fighting System**

Type – Gianschi ACM 651 BT fire pumps

Type – Ultra Fog water mist system

Fixed fire fighting systems are to meet the requirements of the MCA LY2 and Classification Society.

Fixed fire fighting systems are to be provided for the engine room and generator room. Local systems are to be provided for the galley and emergency generator room.

An acoustic alarm in the engine room and in the generator room is to be automatically activated before fluid is released, in accordance with MCA LY2 and Classification Society requirements.

Ventilation fans, fuel oil and lubricating oil pumps are to be stopped in accordance with the MCA LY2 and Classification Society's requirements before the release of fluid.

### **24.2 Smoke and Fire Detectors**

An automatic addressable fire and smoke detection system is to be installed throughout the vessel. The system is to include optical smoke detectors fitted in the accommodation, rate of temperature rise detectors fitted in the galley and infra red detectors fitted over the main and auxiliary engines in the engine room. All cabins are to be fitted with optical detectors and all areas are to include break glass call units.

The system is to incorporate an low location lighting is to automatically switch on when a fire alarm signal is given.

The main fire panel is to be situated in the wheelhouse. A repeater panel is to be provided in the crew mess.

The system is to operate from the emergency switchboard supply with a battery backup supply.

#### 24.3 Extinguishers/Hoses

Approved portable fire extinguishers and fire hoses are to be provided in all areas of the vessel in accordance with the latest MCA LY2 requirements.

### 25. NOISE INSULATION

#### 25.1 General

The noise level in all parts of the yacht as specified in paragraph 2.2 Is to be achieved by the selection of suitable engines, generators and other equipment such as fans and their mounting and insulation of walls, bulkheads, ceilings and floors.

All areas are to be insulated after coats of protective painting have been applied to steel, aluminium or any other materials.

Suitable pins or fastening systems are to be used to fasten the insulation in place and all insulation is to be properly fitted by skilled and qualified workers.

If deemed necessary, the Builder may ask, at his own cost, an expert in acoustics his opinion on how to obtain the noise and vibration results mentioned in this Specification.

#### 25.2 Accommodation Insulation

In way of hull plating, decks, hull and superstructure bulkheads are to be isolated by rock wool type material.

This rock wool type material is to be applied with acoustic insulating panels fitted on hull in way of the engine and generator rooms.

Partition bulkheads are to be isolated using rock wool type material.

Insulation of the bulkheads between the engine room and guest cabins is to receive special attention.

#### 25.3 Piping Insulation

Hot and cold water piping is to be insulated. In general air conditioning ducts are to be pre-insulated pipes or ducts.

#### 25.4 Engine Room Insulation

Special attention is to be paid to the insulation of the engine and generator rooms.

Special attention is to be paid to the double insulation of the forward bulkhead between the engine room and the guests cabin.

The hull plating, bulkheads and decks between frames, beam and girders is to be insulated by means of rock wool type material covered with perforated aluminium plate.

The hot/cold water systems are to be insulated with ARMAFLEX or similar material.

## 26. ELECTRICAL SYSTEM

### 26.1 General

The electrical system is to be designed for unrestricted operation with the total electrical installation being compliant with the IEE Regulations for the Electrical and Electronic Equipment of Ships (sixth edition with amendments).

The design, construction and installation of all electrical equipment is to be suitable for marine service conditions.

All electrical equipment is to be installed so that sufficient space is available for inspection and maintenance.

The main electrical supply is to operate at 380 Volts, 3 phase, 50 Hz, distributed on a 4 wire system to enable single phase equipment to be supplied at 230 Volts using one phase and the neutral.

A shore power converter will be installed to allow the yacht a shore connection at a different voltage from the one on-board (50 Hz).

#### Main Power Supply Services

Suitable power supplies are to be provided in the appropriate location for all specified equipment and fittings.

Main power supply services operating at 3 phase, 380 Volts, 50 Hz, 4 wire:

- Main alternators
- Emergency alternator
- Electric motors, galley and laundry equipment (in excess of 3.0 kW)
- Other power distribution services
- Shore supply

- UPS – inverter (Uninterruptable Power Supplies - non break type)

#### Lighting and Low Power Services

Operating at single phase, 220 Volts, 50 Hz, 2 wire, 1 phase and neutral:

- SICCS Room controllers for lighting circuits (24 V DC also used)
- Galley equipment of 3.0 kW and less
- Internal communications and alarm systems (24 V DC also used)
- Communication, navigational aids, entertainment and security systems
- Portable equipment
- UPS (Uninterruptable Power Supplies - non break type)
- Laundry Equipment of 3.0 kW and less

Arrangements are to be made to ensure equal load balance across phases.

#### Low Power Services operating at 12/24 Volts DC

- Fire and general alarms
- Internal communications - telephones, talkbacks
- Radio emergency lighting
- Navigation lighting
- Engine control system
- Low level lighting and emergency lighting

All power cables are to be dimensioned in accordance with the Classification Society Rules for an ambient temperature of +45°C. Cables are to comply with IEC Publication 60092 series and the relevant parts of IEC 332.3 for flame retardant characteristics. High frequency cables and other special cables are to be in accordance with the manufacturer's recommendations.

Cables are to be Halogen free low toxicity type with the exception of special cables such as coaxial cables, compensating cables and special shielded cables which are all to be flame retardant type. Cables sensitive to interference are to be provided with additional screen made of aluminium polyester tape to ensure a 100% screening capability. Communications and instrumentation cables are to be segregated from power cables.

Cables from the main switchboard to main distribution boards are to be sized at 120% to allow for future growth margin. Minimum conductor sizes are to be stated but in any case must not be less than 0.75mm<sup>2</sup>. All multicore cables are to include at least 10% or a minimum of two spare cores.

Fire resistant cables are to be installed to Rule requirements. In areas of high ambient temperature, eg final connections to downlights, silicon rubber insulated glass braided cables, or a suitable equivalent, are to be used.

All voltage drops are to meet the requirements of the Classification Society.

All cables are to be identified at regular intervals with a number or other suitable marking system. Cables for the different voltages are to have colour coded sheaths or banding.

Multi cable transits are to be used throughout.

Cables in the accommodation are to be installed in plastic pipes behind panelling.

## 26.2 General Installation

The electrical systems are to include:

- Generator system
- distribution system
- lighting system
- alarm system

## 26.3 Generator System

Power is to be supplied by:

- main generators system
- harbour generator system
- shore connection
- batteries

## 26.4 Main 220/380V Generators System

### Main Alternators

Type – Caterpillar C4,4 380V 86 kVA @ 0.8 pf 50Hz

The main generating plant is to consist of two marine synchronous, brushless alternators enclosed to IP23 standard. They are to be insulated to class F with a temperature rise to class B and are to be rated for continuous parallel operation.

Each alternator is to be provided with an approved solid state automatic voltage regulator. Voltage control from no load to full load at rated power factor when running single is to be within 1%.

The alternators are to be rated at 380 Volts, 3 phase, 50 Hz, 0.8 pf.

## 26.5 Emergency/Harbour Generator System

Type – Caterpillar C 4.4 380V 36 kVA @ 0.8 pf 50Hz

The emergency/harbour alternator is to be a marine synchronous brushless alternator to IP23. It is to be insulated to class F with a temperature rise to class B and is to be rated for continuous operation.

The alternator is to be provided with an approved solid state automatic voltage regulator capable of controlling the output voltage to within  $\pm 1\%$  under normal steady conditions.

The alternator is to be rated at 380 Volts, 3 phase, 50 Hz, 0.8 pf.

## 26.6 Shore Connection

A shore supply panel is to be included in the main switchboard and is to be arranged to allow shore power to be paralleled to the ship supply during load transfer time only. The

rating of the shore supply facility is to be sufficient to permit normal operation of the vessel in port, including peak galley and air conditioning loads. The position of the shore connection box is to be in engine room.

An Atlas shore power converter is to be provided which converts any voltage, frequency and phase to the proper voltage, frequency and phase required by the vessel. The converter is to include an internal isolation transformer.

The shore supply panel is to be provided with a kWh meter and a separate ammeter, mounted on the main switchboard. A shore supply cable, 30 m long, is to be provided complete with reels located in the vicinity of the lazarette. Suitable receptacles and plugs are to be provided. A suitable opening and watertight door is to be arranged in the transom to provide a route to the quay.

## 26.7 24 V Low Voltage System

Type – Mastervolt

The following 24 Volt DC systems are to be provided:

- Emergency alternator engine starting
- Machinery alarm system
- Fire alarm system
- Navigation and communications
- SOLAS regulations for GMDSS are to be observed for charging facilities for safety communications
- Navigation signal lights and alarms, alternatively 12 volt DC may be used

Only batteries of the heavy duty, long life type are to be used for engine starting, and maintenance free, gas free, gel type for all other services. Consideration is to be given to using NiCad batteries.

All battery chargers are to be automatic voltage control type with taper charge characteristics, protection against short circuit condition, and are to include temperature monitoring of the cells.

UPS systems are to be auto bypass type and are to be supplied direct from emergency circuits. Input and output supply transformers for the UPS's are to be of a double wound insulated type.

The low level lighting system is to have independent fully redundant sets of batteries and is to include a master on/off switch in the wheelhouse for test purposes.

## 26.8 Radio Batteries

A battery at deck level will be installed for radio system emergency operations.

The battery will be installed with natural ventilation, complete with battery charger and distribution box.



The battery capacity shall meet GMDSS requirements.

A low voltage alarm for this circuit will be provided.

#### 26.9 Distribution System

Power supplies are to be distributed throughout the yacht by means of:

- Main switchboard
- Emergency switchboard
- Shore connection

#### 26.10 220/380 Volt Main Switchboard

Type – Atlas

The main switchboard is to be of the dead front type with side and top cover plates and hinged front panels, which can be opened without disturbing indications etc mounted on the panels. Access panels are to be opened only by a special key for use by authorised persons. Provision for ventilation of enclosed PLC's is to be considered.

The main switchboard is to be designed to control and synchronise the two main alternators and to distribute main power throughout the vessel. The switchboard manufacturer is to be responsible for co-ordinating the overall protective system in order to obtain satisfactory discrimination and for the submission of the records of official fault level tests for the switchboards.

Non-conducting handrails are to be provided at the front and rear of the switchboard. Platforms at the front and rear of the switchboards should have non-slip surfaces where access to live parts within switchboards is possible and the surfaces should in addition be insulated.

An unobstructed passageway not less than 1 m wide is to be provided in front of the switchboard. When the switchboard contains removable equipment e.g. circuit breakers etc. the unobstructed passageway should not be less than 0.4 m wide with the equipment fully withdrawn.

A fully automatic power management system is to be provided together with preferential tripping on galley and ventilation systems, using a three stage trip.

Each alternator panel is to be fitted with an automatic system for starting the diesel alternators after a blackout and the alternator circuit breaker is to be switched automatically on to the `dead' bus bars.

All bus bars are to be made in solid copper and a molded case bus tie switch is to be provided between generators.

Bus bars, each phase is to be clearly identified using the standard IEC colours.

Standard control and instrumentation is to be provided to allow for manual or automatic switchboard operation.

It is to be possible to back feed from the emergency generator down to the main switchboard under controlled dead ship start conditions. A key switch is to be provided to enable breaker safety interlocks to be over-ridden.

Constant earth monitoring with alarm and indication facilities is to be provided, with an output to the alarm monitoring system.

A switch for the inverter circuits is to be provided in the switchboard

Single and three phase circuit breakers are to be designed to protect consumers from overload and short circuit conditions.

Main alternator breakers are to be plug in type and all other circuit breakers are to be miniature circuit breakers (MCBs) or moulded case circuit breakers (MCCBs).

The main switchboard is to provide power to the following consumers:

- Four main distribution panels
- Hydraulic steering pump
- Chiller
- Power tie to emergency switchboard
- Inverter services

The main switchboard is to provide the following signals to the alarm monitoring system.

- Individual alternator power, kW
- Switchboard Voltage, V
- System frequency, Hz
- System power factor, pf
- Breaker and feeder indications, open / closed

#### 26.11 Emergency/Harbour Generator Switchboard

Type – Atlas

It will be installed in the emergency generator room and it will consist of different and separated panels with hinged doors.

The neutral to be grounded by a removable link.

The switchboard will be built and the circuits will be separated according to the Classification Society's requirements.

A dead front emergency switchboard is to be provided and is to be situated adjacent to the emergency alternator set. The switchboard is to be arranged to supply all the emergency services, sprinkler pump and at least one machinery space fan.

Normally the main switchboard is to supply the emergency switchboard via an interconnecting cable with the emergency power source taking over automatically in the event of a failure of the main power source.

The emergency switchboard is to be provided with the facility to synchronise to the main switchboard for a transitional period, to allow a smooth change over after a blackout.

## 26.12 Motors and Control Instruments

All motors are to be suitable for marine application and are to be compatible with the environmental conditions for each application.

In general motors below 12 kW are to be arranged for direct on line starting. All large motors, 12 kW and above, such as the air conditioning compressor motors are to be arranged with soft starting facilities.

The rotors of all machines are to be dynamically balanced with the balance weights screwed to the rotors.

All motors are to have each winding end brought out to the motor terminal box where the 'Star' connection is to be made,

All motors are to be fitted with spring loaded ball bearings. Roller bearings will not be accepted.

Drain holes are to be provided in the lowest accessible parts of all machines. Totally enclosed and watertight machines are to have screw drain plugs of non-ferrous material.

All motors driving pumps are to be fitted with half couplings so that the complete motor may readily be removed. Motors are to be arranged so that they may be overhauled with minimum disturbance to adjoining equipment.

The frames of all resiliently mounted machines are to have substantial earth connections to the vessel's permanent steel structure.

All motors are to have a power factor of 0.8 or higher. The ratio of the starting current to the full load current is to be within the range of 5 or 6 to 1.

Thermistors are to be fitted in bow thruster motors, air conditioning compressor motors and all generators.

All motors are to be Class F insulated and Class B temperature rated.

The bow thruster motor is to be IP23, continuously rated and capable of at least 40 starts per hour. Motors installed on weather decks and wet spaces are to be IP56 and all other motors are to be IP 44.

Group starter boards may be designed to form part of the main switchboard.

Motor controls may be individual or grouped type, but are to incorporate the following facilities:

- Isolating switch or circuit breaker
- Magnetic contactor with thermal over-current protection and single phase protection
- Stop and start remote
- Direct on line starting
- Local controls as appropriate
- Soft starting is to be provided for any motor above 12 kW

The MCC sections for essential services are to be positioned within the engine rooms.

Bolted links or breakers are to be positioned between the MSB and MCC panels.

Hours run meters are to be fitted to the following starters:

- Steering gear motors
- Purifier
- Machinery space pumps and compressors
- HVAC compressors

All starter components, where possible, are to be of the same manufacture according to the agreed suppliers list.

### 26.13 Lighting

The lighting is to be controlled thru SICCS room control boxes. Include main lighting supplied at 24Volts DC, emergency lighting supplied at 24 Volts DC, and low level lighting at all exits. This system is to be fully redundant, is to use LED technology and is to be installed to Class requirements in all Owner, Guest and crew accommodation including stairwells.

Low energy LED lighting is to be used in all areas.

Machinery spaces are to be illuminated by LED lighting strips. Proper consideration is to be given to the provision of illuminated signs for safety instructions and exits. All spaces are to have two ours supplementary lighting covering all escape routes.

The arrangement of decorative lighting is to be determined by the Interior Designer.

Room controllers are to be fitted in electrical cupboards and in ceiling spaces. They are to include 85°C thermal cut-outs.

Allowance is to be made for at least 200 m of decorative Tivoli lighting to cover built in furniture, stairwells etc.

Red night lighting is to be provided for the wheelhouse area.

All lighting controls are to be double pole.

### 26.14 Normal lighting

The intensity of lighting in all spaces is to be suitable for the space with levels and arrangements in all spaces. Decorative lighting fixtures and switches are to be selected by designer throughout the Owner, Guest and crew areas of the accommodation and on the external decks.

### 26.15 Decoration Lights

The total number of decorative lights in the guest cabin, on the main deck, on the sun deck and on the stairs is to be agreed with the Interior Designer; before engine room and all necessary connections are to be provided throughout the yacht.

#### 26.16 Deck Lights

Dress lighting is to be provided in all areas on all decks. The following exterior lighting is to be provided:

Flood lights are to be provided on the stern for the swimming platform, for tender illumination and at boat booms, passerelle and for the funnel. Small Led strips are to be provided for the foredeck and for anchor windlass work stations.

Searchlight are to be provided on the mast with remote control. At the stern docking lights are to be arranged. Portable rechargeable searchlights are to be provided for the principal tenders.

Liferaft preparation and over-side lights

Permanent hard wired Not Under Command Lights

One daylight signalling lamp complete with portable battery

The external lighting is to include overboard security lighting and floodlighting of the vessel, etc. Allowance is to be made for twenty for underwater lights.

#### 26.17 24V Emergency Lighting

Emergency lighting is to be about 10% of the total in any space except in the machinery spaces where this is to be substantially increased. Controll will be provided thru SICCS system.

#### 26.18 Navigation Lights

One complete set of fixed electric all LED Lopolight navigation lights are to be provided of a type approved by the Regulatory Bodies. These lights are to be controlled from a navigation light indicator panel on the Bridge.

The indicator panel is to have a control switch for each navigation light and have an visual indication in case of the failure of any light in use.

The navigation light indicator panel is to be supplied from two separate feeders, one from the 220 V AC feeder of the main switchboard, and the other from the 220 V AC inverter for the navigation lights.

## **27. GALLEY AND LAUNDRY EQUIPMENT**

### **27.1 Galley Equipment**

These spaces are to be as shown on the General Arrangement however, the following general principles are to be observed.

The decks are to be finished with high quality seamless, non-skid vinyl or equivalent. The counter tops and worktops are to be combination of quartz stone and stainless steel with integral deep sinks and draining boards. Splash backs are to be stainless steel.

Cupboards and fitments are to extend to the floor with plinth recess to prevent dirt collecting under units. Crevices and hollow sections, which may collect dirt are to be blanked off or sealed on all linings, equipment and furniture. All cupboards and cold cupboards, unless otherwise specified, are to have two adjustable shelves with at least four alternative shelf positions. Worktops are to have cupboards under. All cupboards and drawers are to be lockable. All items are to have adjustable feet.

Extraction hoods with easily removable and easily cleaned grease filters are to be sited over all equipment producing heat or water vapour.

In general the galley and the pantries are to be designed and outfitted in accordance with latest WHO Guide to Ships Sanitation. USPH Rules may also be used as guidance.

In general, the galley layout is to be a professional galley, with the following equipment:

- Four cooking hot plates (Lotus – marine)
- One fryer (Lotus – marine)
- Work induction (Lotus – marine)
- One convection oven (Lainox)
- One microwave oven
- One professional dishwasher
- One trash compactor
- Stainless steel fridge/freezers
- Vine cabinet
- Ice maker

One dustbin is to be provided under the counter. Cupboards are to be provided, with shelves, above and below the working benches. Racks for glassware etc, drawers for cutlery, with dividing walls are to be provided in the cupboards.

A stainless steel hood is to be installed above the hotplates, independent of the main exhaust system and with fire isolation and fire extinguishing arrangements in accordance with the MCA LY2 requirements.

### 27.2 Refrigerators

Small refrigerators are to be installed in the Upper deck saloon bar and in the owner office.

### 27.3 Refrigerating Rooms

Refrigerated storerooms are to be provided generally as shown on the General Arrangement and are to include the following:

REFRIGERATED SPACE	TEMPERATURE
Freezer store	-25°C
Refrigerated store	+3°C

Two water cooled compressors are to be installed using an environmentally acceptable gas, eg. chlorine free HPC. One of these compressors is to be capable of maintaining the above temperatures when running intermittently for not more than 12 hours/day. Each compressor is to be complete with its own condenser. Condensers are to be provided with de-scaling and flushing arrangements.

The temperature of each chamber is to be regulated by an easily adjustable thermostatic regulator valve with a suitable by-pass for emergency manual regulation

Defrosting of the cooler is to be by an electric heater controlled by a time switch. Cooler drains and door seals are to be provided with permanent defrosting arrangements where the temperature in the space is below 0°C.

Drains for refrigerators and freezers are to be provided with cocks and are to drain to a grey water tank. Removable trays are to be provided beneath each unit to contain run-offs.

The chamber doors are to be arranged with strong adjustable hinges. Door locks are to be quick acting type cleats operated from inside and outside the space. Stainless steel tread plates are to be fitted in way of each door sill. Shelves of perforated stainless steel, readily removable, are to be provided as indicated on the layout plan.

Protection strips are to be provided behind shelves to prevent stores coming in contact with the linings. Anti-roll bars are to be fitted. Hardwood gratings are to be arranged on deck.

Each refrigerated chamber is to be arranged with a thermometer pocket with a local reading in the handling room and a remote reading in the crew mess and galley.

#### 27.4 Laundry Equipment

The laundry is to be arranged as shown on the General Arrangement.

The laundry equipment is to include:

- Two commercial washing machines
- Two commercial dryers
- One steam iron
- One foldable ironing board

Linen storage racks and stainless steel hanging rails are to be provided.

The whole space is to have a very high standard of ventilation and air conditioning to ensure a comfortable working environment.

#### 27.5 Dumb Waiter

A dumb waiter with capacity 50Kg is to be provided as shown on the General Arrangement to serve the following areas/levels:

- Galley
- Upper deck

The arrangement of this dumb waiter is to meet the MCA LY2 requirements for fire protection.



**28. Hi-Fi AND TV SYSTEMS**

Soraya Intelligent Control Communicating System SICCS is to be used, in order to integrate all cabin comfort and communications systems into one integrated, simple to operate system. SICCS is based on the IP protocol connecting all equipment with CAT 6 cables thru CISCO switches and routers into single network. Main computer located in wheel house with dedicated software to be used to control all equipment. User will access system thru Wi Fi hotspots in the boat to control all systems thru mobile phone, Cisco phone and wall switches.

**28.1 Closed Circuit Television (CCTV) System**

CCTV IP based cameras are located in the engine room, stern decks, port and starboard doors, underwater and on the main mast. The camera on the main mast shall have night vision capability.

Cameras integrated in SICCS system may be monitored via all television screens onboard plus any computer connected the vessel’s internet.

Movement sensors connected to SICCS room controllers are to be positioned throughout the vessel in all rooms and corridors. To be used for intrusion alarm, for lamps on off, and air-conditioning presets .

Intrusion alarms may be transmitted ashore via email.

**28.2 Entertainment System**

Televisions Location	TV type
Saloons	Samsung smart TV 46 in LED HD 3D
Owner’s Suite	Samsung smart TV 55 in LED HD 3D
VIP Guest Cabins	Samsung smart TV 40 in LED HD
Guest Cabins	Samsung smart TV 37 in LED HD
External Deck	Samsung smart TV 46 in LED HD

Televisions on the external decks are to be in a watertight housing. The TV distribution system based in IP network and independent satellite input, is to be operated by local remote controller at each location. Users shall be capable of selecting:

- Satellite TV
- Local TV programming
- Movies stored on the server
- Music stored on the server
- Navigation information from the bridge
- Weather information
- Vessel CCTV cameras
- Underwater cameras

Each TV shall also have a HD DVD player connection and connections to IPod and USB ports.

## Audio System

Each of the saloons and the Owner's Suite are to be fitted with a surround sound audio system.

### 28.3 IP Telephone Installation

Part of SICCS the digital telephone system will be provided, using IP technology Cisco phones. Cisco Phones to be used for telephone conversations, paging, for controlling lights, blinds and air-condition in each compartment.

The wheelhouse, engine room and other selected lines are to have a priority override to enable connection to an engaged line. Telephone calls to the engine room are to be indicated by audible and visual signal in the engine room and other technical areas.

The system is to be supplied from a 230 Volt AC source with a battery backup suitable for 30 minutes operation on loss of main supply.

Direct dialling out from nominated extensions is to be possible by dialling the access code and then the appropriate international code number. The least cost routing selection and extra digit insertion is to be made automatically.

Complete coverage of all interior and exterior areas is to be provided by this system by means of additional base stations as necessary.

#### Paging System (Incorporating Steward Call)

A paging system operating thru Cisco telephone system to give coverage of all areas, operating crew to crew, crew to Owner and vice versa. Fixed and/or mobile steward call facilities are to be provided from Owner and Guest cabins, accommodation and deck areas.

Mobile Cisco phones with chargers are to be provided for all crew members.

#### Public Address System

A public address system capable of making clearly audible broadcasts in all interior and exterior areas with a priority emergency over-ride is to be provided thru Cisco phone system.

The system is to incorporate different tone sounds for fire and general alarm signals. The fire alarm is to be a continuous signal and the general alarm is to be 7 short followed by 1 long sound.

Remote visual and audible failure alarm annunciators are to be arranged in the wheelhouse, crew mess and the engine room.

The public address system is to be split into separate zones for Guest, exterior, technical and crew areas with zone selection to areas by single button. Microphone broadcasts are to be possible from the wheelhouse or via the PABX interface.

The system is to operate from 230 Volts supplied from the emergency switchboard with a battery backup sufficient for 30 minutes operation in the event of mains power failure.

Over-ride priorities are to be:

Fire alarm

General alarm  
Wheelhouse microphone

#### 28.4 Loud Hailer

A talk back system is to be provided enabling communication between the wheelhouse, engine room, steering flat thru Cisco system.

### 29. RADIO AND NAVIGATION EQUIPMENT

#### 29.1 General

##### Safety Communications

The following facilities are to be provided to enable the vessel to comply with requirements for operation in GMDSS area A1 and the vessel is to be area A3 ready.

The following is to be supplied:

- Two Inmarsat approved Satellite Standard C, with terminals and remote distress facilities
- One MF/HF radio station with DSC controller and incorporating RT
- One Weather facsimile
- One type approved Navtex receiver
- Two fixed VHF sets with DSC controllers are to be provided on the bridge.
- Three portable VHF sets with chargers, carrying cases and spare batteries.
- One EPIRB, 406 MHz.
- Two 9 GHz Search and Rescue transponders (SART)

A shore based maintenance agreement or a full set of spare parts is mandatory for GMDSS requirements.

##### External Communications Systems

##### Satellite Communications

The following equipment is to be provided:

- Two Inmarsat Mini M's or similar with interface to PABX.
- One Inmarsat Standard B with fax, voice and telex facilities and interface to the PABX and UPS system for 1 hour supply

##### Radio Communications

The following equipment is to be supplied:

- One AM/VHF airband radio in the wheelhouse
- Two GSM cellular phones suitable for worldwide operation and complete with coaxial cabling for antenna, twisted pair cabling for PABX interface and 12 V DC supplies
- Six portable UHF sets complete with spare battery, belt, clips, carrying cases and individual chargers
- One plain paper facsimile units to interface to PABX

The Owner's tenders are to be fitted with VHF radios, GPS and echo sounder. This equipment is to be suitably protected from the marine environment by use of appropriate sealed housings and is to be easily removable for storage when the tender is stowed.

## Navigation Equipment

### Magnetic Compass

One transmitting magnetic compass is to be provided with sufficient signal outputs for necessary navigation equipment and a repeater in the steering flat. Illumination is to be provided from the wheelhouse 24V DC supply.

### Gyro Compass

One complete set of fibre optic gyro equipment is to be supplied with NMEA interfaces. The installation is to include one master compass in the wheelhouse supplied from a 380 or 220 V AC emergency supply. Repeaters are to be provided at the steering position, bridge wings and in the steering gear compartment. A no-voltage alarm is to be provided at the steering position and a course recorder provided in the wheelhouse. Repeater circuits for azimuth stabilisation of radar and automatic control of steering gear are also to be provided.

### Auto Pilot and Steering Controls

One set of steering control equipment is to be provided, double electric circuit type with steering control in the wheelhouse and duplicated on the bridge wings. The system is to provide dual follow up and non-follow up hand steering and gyro automatic steering. Single independent and electronic synchronised steering is to be provided.

### Rudder Angle Indicator

Rudder angle indicators are to be provided in the wheelhouse, at the bridge wings and in the machinery control room console.

### Speed Log

One dual axis speed log is to be provided with the transducer mounted in a sea chest, forward, to allow replacement without drydocking. This system is to include a display installed in the wheelhouse console, a repeater in the engine room console and NMEA signal outputs for navigation equipment.

### Echo sounder

An echo sounding system is to be provided with two transducers, mounted in sea chests to allow replacement without dry docking, arranged with one transducer forward and one aft with a changeover switch. The system is to provide a continuous LED display, with optional printout, and is to include a depth alarm.

### Radars

One "X" band ARPA and one "S" band ARPA complete with colour monitors and NMEA interfaces are to be provided.

One ARPA is to be supplied from a dedicated auto bypass UPS system rated for 30 minutes continuous use.

### Navigation Radio Aids

Two DGPS satellite navigation systems are to be provided each including the antenna and a receiver equipped with an LCD display and microprocessor. The necessary interfaces with Satcom, radars and other navigational equipment are to be provided via NMEA interfaces. Systems are to operate on 24 V DC. One hand held portable GPS receiver is to be supplied.

#### Weather Facsimile

A weather facsimile is to be provided with one whip antenna and a 12 inch synthesized receiver.

#### Electronic Chart Facilities (ECDIS)

One electronic chart plotter with video output for TV distribution and one set of PC operated electronic chart facility on CD ROM are to be provided.

#### Wind Speed and Direction Sensors

A relative wind measuring system providing three displays of wind speed and direction on the bridge is to be provided.

#### Whistles, Bell and Gong

Signal devices are to be supplied in accordance with the Requirements, including two whistles, controlled from the wheelhouse and bridge wings, automatic fog signal, one portable daylight signalling lamp complete with battery pack and ship's bell and gong fore and aft.

### **30. DECK EQUIPMENT**

#### **30.1 Anchor Windlass - Anchor Swivel - Chain Stopper**

Type – Anchor Windlass & Capstans = Muir

Deck machinery is to be hydraulically powered.

The anchors and cables are to be handled by two, stainless steel, cable lifters also acting as capstans forward. Two further capstans, also stainless steel, are to be provided aft. Drums are to be smooth faced.

Suitable fairleads are to be provided for mooring lines to the forward capstans. All capstans are to be provided with manual override.

All handwheels on foredeck equipment are to be polished stainless steel.

#### **30.2 Anchors and Chains**

Two forward stainless steel high holding power anchors, of the Poole N type, are to be provided attached to galvanised steel stud link anchor chains to rule requirements. The weight of each anchor is to be in excess of the rule requirement.

Each anchor is to be connected to the anchor chain by a D type shackle. Stainless steel chain stoppers and devils claws are to be provided.

#### **30.3 Capstan**

See Section 30.1

#### **30.4 Mooring Bitts and Fairleads**

Fairleads, bollards and cleats are to be provided as required. The arrangement of bollards is to be to the approval of the classification society. All fairleads are to be lined and edged in polished stainless steel. Towing arrangements are to be made in accordance with the requirements of the National Administration, the Classification Society.

#### **30.5 Tender and Jet ski Storage and Handling**

The tenders and the jet skis will be supplied by the Owner and are not included in this Specification. The Builder will supply the suitable wooden and/or aluminium cradle together with the appropriate handling system for the tenders and jet skis chosen.

The Builder will give the Owner the correct dimensions of the space available so that suitable tenders and jet skis can be procured.

Arrangements for provision and handling of the rescue boat are to be in accordance with the MCA Code.

#### **30.6 Davits**

Type - Nautical Structures overhead crane and davit

A suitable hydraulically handling system for the tender and the water toys is to be installed in the aft garage/tender bays as appropriate.

A hydraulically operated davit is to be installed at the bow on the main deck for handling the rescue boat.

### 30.7 Aft Gangway

A hydraulically operated passerelle of suitable length and with slewing ability to 15° either side is to be provided aft as indicated on the General Arrangement. The passerelle is to have illuminated steps with teak treads and polished stainless steel handrails.

The passerelle is to have the capability to rest on the dock with the hydraulic system by-passed and/or automatic raising. A high temperature alarm is to be provided for the hydraulic system.

When retracted the passerelle is to be covered by a flush watertight door.

The following are to be provided:

One aluminium gangway

Mediterranean side boarding ladder. This ladder is to be designed to prevent the tenders riding under in a heavy swell.

One side gangway

One stern gangway

Two pilot ladders to Regulatory Authority requirements

All gangways are to have provision for tide range in all intended operating areas.

### 30.8 Bulwark and Hand Rails

Bulwarks are to be fitted in accordance with the Designer's drawings.

Freeing ports are to be provided as required by the Regulatory Authorities.

Bulwark doors are to be provided with stainless steel locks and hinges. All openings in bulwarks, including fairleads, freeing ports and separate sections of capping rail, such as on hinging bulwark doors, are to be lined, trimmed or stopped with polished stainless steel.

### 30.9 External Stairs

External stairs for Owner and Guests use are to be fabricated from teak, polished stainless steel and painted aluminium or steel.

### 30.10 Wooden Outside Decks

Outside decks will be planked with best grade teak, without knots and humidity below 12% max., 20mm finished thickness and 65 mm width.

Seams between planks will be 5 mm wide, filled with black rubber compound for decks in the most efficient way by skilled personnel.

Margin planks will follow the contour of the deck.

Teak strakes to be glued directly to the levelling compound on the deck.

The outside deck's ceilings will be covered with painted special marine plywood panels, painted PVC sheet, or painted aluminium sheet

### 30.11 Deck Furnishings

Deck furnishings are to be as shown in the General Arrangement Plans.

Seats and backrests are to be provided with vinyl or fabrics covered cushions and are to be covered with removable washable sponge fabric.

The Builder is to supply a jacuzzi on the sun deck. The jacuzzi is to be fed by salt and/or fresh water. Rapid draining arrangements in accordance with the MCA requirements are to be provided for the jacuzzi.

### 30.12 Flag Mast

Masts, including stern and jack staff poles, are to be arranged as shown on the General Arrangement and as required by the latest Regulatory Authority requirements of and are to be appropriate to the overall appearance of the vessel. Ample provision is to be made for signal halyards.

### 30.13 Covers

PVC/canvas covers are to be provided for davits, tables, warps, windlass and the outside sitting area.

### 30.14 Nautical Accessories

The yacht is to be provided with a clock, a barometer and flags according to the Builder's standard.

A complete set of international code flags is to be supplied and stored in the wheelhouse.

### 30.15 Mooring Lines

Mooring ropes are to be man-made fibre, stowed on reels or in boxes as appropriate to the arrangement.

The Builder is to supply four nylon mooring lines of the highest quality available, length at least 30m each.

Each line is to have at its end an eye with a stainless steel chain and a stainless steel handle.

A high quality tow rope, length 60m, is also to be supplied. The number and the dimensions of the ropes are to be to the requirements of the Classification Society.

The following additional ropes are to be supplied:

- Four 60 metre lengths for Panama transit
- One Manilla hawser on reel for streaming astern in heavy weather.

### 30.16 Deck Inventory

The following equipment is to be supplied and installed:



- Ten POLYFORM PVC inflatable fenders, in stainless steel vertical boxes and arranged on the deck or in a suitable room in the wheelhouse, at bow
- Four round POLYFORM PVC inflatable fenders
- Two NUC black balls
- Two plastic baskets with halyards
- Two brushes
- Two mops
- Two sponges
- Two pieces of chamois leather
- Two boat hooks, length 4 m
- Two electric torches

### 30.17 Search Lights

One 24V - 150W search light with remote control is to be provided.

### 30.18 Wipers

Three marine wipers are to be installed on the wheelhouse front windows. The operation modes of the wipers are to be selectable and fresh water sprayers, controlled by a solenoid valve, are to be installed on the wheelhouse front windows.

### 30.19 Electro-pneumatic Whistle

An electro-pneumatic whistle is to be supplied, controlled from the wheelhouse and in accordance with the MCA requirements.

### 30.20 Owner's Supply

#### General

The Builder is to provide any piping, cabling, seatings, mountings, housing units or storage required for Owner supply equipment and install, connect and commission such equipment unless otherwise agreed.

#### Storage, Protection and Handling of Owner Supply Equipment

The Builder is to provide suitable indoor storage and protection for all Owner supply equipment and is to provide such handling arrangements as may be necessary on delivery and for installation of this equipment. The Builder is to provide fully comprehensive insurance from receipt of Owner supply equipment until delivery of the vessel.

#### List of Owner Supply Equipment

Owner's supply equipment is to include:

- All boats, waverunners, jet skis, windsurfers, scuba equipment, and other similar equipment but excluding the breathing air compressor
- Two tenders
- Flags
- Nautical instruments and books
- Medical kits and equipment
- Specialist surgical equipment
- Crockery, cutlery and napery

Bedding  
 Works of art, books etc  
 Cleaning equipment and materials  
 Computers for staff use.  
 Loose custom furniture as detailed in Section 5.9.7  
 Oxy-acetylene welding set  
 TIG welding set

### **31. LIFE SAVING EQUIPMENT**

#### **General**

The provision of life saving appliances is to comply with the latest MCA LY2 and Flag State requirements for the maximum number of passengers and crew.

#### **Rescue Boat**

Arrangements for the location and handling of the rescue boat are to be in accordance with MCA LY2 and Flag State requirements.

#### **31.1 Life Rafts**

Fully equipped Approved liferafts of sufficient capacity to accommodate all persons on board are to be fitted in GRP containers on each side of the vessel. If the liferafts that are supplied are not readily transportable across the vessel then sufficient capacity for 150% of the complement is to be fitted on each side. Liferafts are to be fitted with a SOLAS A pack.

#### **31.2 Flotation Aids**

One life jacket is to be supplied per person the yacht is permitted to carry plus an additional 10%. Lifejackets to be stowed for convenient in an emergency. In addition two children's life jackets are to be supplied.

Lifebuys are to be supplied and fitted in accordance with MCA LY2 and Flag State requirements.

Immersion suits are to be provided in accordance with the MCA LY2 and Flag State requirements.

#### **31.3 Rockets**

All rockets, visual signals and line throwing apparatus are to be in accordance with the MCA LY2 and Flag State requirements.

### **32. TOOLS**

Special tools recommended by the manufacturers for the overhaul of any item of machinery are to be supplied. These special tools are to be kept in safekeeping by the Builder until the vessel is handed over to the Owner's Representative and are not to be made available for use by the Builder or Subcontractors other than for the demonstration of completeness and effective working of these tools.

### **33. SPARE PARTS**

Spare parts are to be provided in accordance with the Classification Society Requirements. In addition, priced as an option, equipment manufacturer's recommended spares for [two] years operation are to be supplied.

A list of the spare parts proposed by each equipment supplier is to be submitted to the Owner's Representative for approval.

### **34. INTERIOR JOINERY WORKS AND OUTFITTING**

#### **34.1 General**

The Internal finishes are to be the highest marine quality whilst providing durable surfaces and easy maintenance. They shall provide a luxury environment to the Owner and Guests. The Interior Designer shall be provided with adequate samples for approval in all decisions to be taken regarding the Interior. Appropriate working drawings have to be established by the interior subcontractor according to the Interior Designer's plans. The working drawings have to be approved by the Interior Designer prior to any fabrication or installation.

Details regarding material specifications can be found in the following sections of this interior specification. All descriptions of categories have to be read in conjunction with the detail plans that are part of this specification (see attached list of drawings).

#### **34.2 Finishes**

A superior yacht finish shall be achieved. There shall be no visible brush marks, paint runs, scratches or colour irregularities.

##### **Paint**

The base for all painted surfaces must be adequate for the marine environment and shall be of the highest quality without any imperfections. All interior surfaces are to be lacquered or painted where this is in accordance with the Interior Designer's requirements.

In general a two component polyurethane paint based system is to be used. The Contractor may however deviate from this if other systems are found to be more suitable.

Final coating is to be done more than one month before delivery. There shall be no major paint odours on board upon delivery.

Environmental conditions during paint application shall be as required by the paint manufacturer.

Application: A spray paint system is to be used to apply on the surface coats. Due attention is to be paid to over-spray. All painting is to be done by specially trained first class qualified personnel. All painting is to be done totally in accordance with the paint manufacturer's requirements.

All surfaces are to thoroughly cleaned and grind prior to painting. A suitable etch primer system shall be used if any internal aluminium structure is to be painted. New paint layers shall not be applied earlier on top the preceding layer before this layer has been thoroughly sanded and cleaned.

Paint shall be applied 'wet on wet' when required by the paint manufacturer with the due time of drying between all sprayings.

All high gloss lacquered surfaces are to be finished with six coats of lacquer.

All satin lacquered surfaces are to be finished with four coats of lacquer.

Reverse sides, even if not visible, should have a balancing sealing coat of lacquer. The interior of the storage areas will be of the same finish as the outside.

### Wood Varnishes

All surfaces to be stained and then finished with four coats of High Gloss, Gloss or Satin Varnish as required by the interior designer including the reverse sides for all the interior.

#### 34.3 Mirror / Glass

All mirrors are to have a waterproof silicon seal applied on the perimeter to avoid water and vapour ingress resulting in oxidation of the silvering.

All glass in doors including shower doors is to be laminated and / or toughened.

All glass shelves must have a thickness of 18 mm minimum in cabinets and showcases and shall have polished edges.

All glass shelves to have fibre optic lighting to illuminate shelving.

### Decorative Etched Glass

Where decorative etched glass to be used this shall be chosen in consultation with the Interior Designer. Samples to be provided to the Interior Designer for approval.

#### 34.4 Metals

The treatment used on metals must be for Marine Use and following the MCA LY2 requirements.

##### Chrome / Nickel

To be applied on brass plating after welding and of thickness appropriate for marine use. Finish to be highly polished.

##### Stainless Steel

On the interior of the yacht: St. Steel AISI – 316L – after welding, appropriate treatment for marine use.

On the external decks: St. Steel AISI – 316L – after welding, appropriate treatment for marine use.

Finish to be highly polished.

#### 34.5 Stones

### General

If necessary regarding weight requirements a light slab (10 mm) on honey comb support can be used for walls but not for floors.

Marble floors must have a non- slip finish – specially in the showers.

Marble nose must be marine type with top in recess in the galley / pantries / on washbasin cabinets.

#### Marble / Stone Selection and Use

The types of marble and stone to be used are to be stated by the Interior Designer.

#### 34.6 Synthetic Materials

Top quality surface laminates to be used. Brittle materials are to be used with a suitable surface thickness and on top of suitable core materials. The quality of the material and their use must conform with MCA LY2 requirements with respect to fire safety.

#### 34.7 Cabinetry

##### General

All items are to be constructed of light weight materials and maintain the highest possible sound absorption and attenuation qualities.

The sound consultant shall be consulted in all matters related to sound and vibration control.

All materials should be of marine quality.

Care is to be taken that heavy materials are not used in higher thickness than specified by the designer, due to the impact on the weight of the vessel.

##### Doors

Doors to be panel doors in a sandwich construction to attain best sound absorbing characteristics.

##### Solid Wood / Veneers / Decorative Materials

Solid wood to be of good quality without difference of colour or texture as required by the Interior Designer. Laminated solid wood to be used for curved elements.

Veneer is to be sliced, peeled or half-round cut.

Decorative Veneers and materials to be Mother of Pearl or equivalent.

All woodwork must be glued for tropical conditions.

#### 34.8 Hardware

All hardware must be of marine quality in:

Stainless steel – polished finish in technical area and exteriors

Stainless steel – brushed finish in the Galley, Cool & Cold storage  
Stainless steel – polished in Guest / Owner / Reception areas  
Chromed brass – polished finish in the Crew area  
Chromed brass – polished or satin finish in Guest / Owner / Reception areas

All equipment relating to lighting, alarm, detection, protection, fans, A/C, entertainment systems, electrical appliances, electronics should be integrated in the joinery and cabinetry with adequate forced ventilation fans when system is in operation.

#### Hardware for Doors

All doors have to be provided with rattle proof double action latches.  
All doors to be provided with automatic sound and draught excluder at the base. The sides and the top shall have airtight sealing gaskets.

Three hinges or pivot on top and bottom to be used.

Air intake grill to be at the bottom of the door and air outlet grill to be at the top of the door with a silencing air duct between the two.

#### Hardware for Full Height Storage

All doors are to be provided with top, bottom and central locating pins into frame when closed.

All large or high doors must be fitted out with a quadrant.

Door hinges to be pivots (top and bottom) or invisible hinges.

#### Hardware for Cabinets

All doors are to be provided with top and bottom locating pin in the frame when closed.

Door hinges to be pivots (top and bottom) or invisible hinges.

#### Hardware for Drawers

All drawers are to be provided with a marine type stop, metal/wood wedge to ensure that drawers do not open at sea.

All drawer slides shall have a minimum of movement without vibrations.

#### Handles for Plant Boxes

All plant boxes have to be equipped with accessible handles allowing removal of the plant box without dismantling the furniture.

#### Security Storage & Safes

Storage for arms

One independent security storage with metallic boxes in accordance with the weapons security rules in the Captain's cabin or wheelhouse.

Safes

Number, location and manufacturer to be determined.

#### Bond Store

One accessible bond store in accordance with the customs regulations.

#### 34.9 Bath Fittings/Accessories

The bath fittings are to match the hardware finishes and to be of marine quality in:

Stainless steel – polished finish in technical area and exteriors

Stainless steel – brushed finish in the galley, cool & cold storage

Polished chrome or stainless steel in crew area

Polished chrome or nickel in Owners and Guests bathrooms and powder rooms

#### Swimming Pool

Execution of swimming pool to highest yacht standard. Pool to be lit with watertight lights.

Pool in steel with finish in glass mosaic.

#### 34.10 Upholstery

##### General

All fabrics must be scotchguarded.

All materials must conform with the MCA LY2 requirements including fabrics / backing / lining / black out / foams / cushion internal material.

The shipyard shall supply a reference catalogue that contains a sample of all materials with the list of all suppliers and installers.

##### Blinds

To be vertically fixed to avoid vibrations and lateral movements.

##### Soft Furnishings

All soft furnishings shall be applied as specified by the Interior Designer. All material to be used and all work to be carried out shall be of high quality and standard suitable for a yacht and in keeping with the best practice in yacht interiors.

All installations are to be carried out in light weight construction if acceptable with respect to noise and weight per unit area as determined in the technical specification.

All hardware and fasteners are to be anti-corrosive and anti-rattling.

##### Leather

All leather is to be of superior quality.

Leather is to have foam and marine plywood backing in all conditions, unless otherwise specified. The density of the foam will vary according to the location.

Leather finishes are to provide appropriate detailing regarding sewing and piping, etc.

Leather backing and treatment to comply with leather suppliers recommendations, it must follow the MCA LY2 requirements.

### Curtains

Allowances should be made for occulting fabric (black out).

Daylight should not be visible through the seams of the fabric.

Bottom edge of roman shades to be equipped with magnetic strip to locate on steel strip covered with veneer/leather (as applicable) on windows sills.

A sample of each type of roman shade is to be submitted to the interior designer for approval.

### Sofas, Armchairs & Ottomans

All custom made sofas should be large and very comfortable and are to be made in accordance with the best workmanship expected to be found in yacht interiors. A sample of each model is to be approved by the interior designer. Sofa storage is to be foreseen within the sofa base.

### Fabrics

The selection will be made by the Interior Designer 12 months before the delivery date.

### External Mattresses / Cushions & Covers

All exterior cushions to be fabricated from sealed close cell foam and covered with high quality vinyl leatherette, to be supplied with two complete sets of terry towelling covers to the design and pattern as prescribed by the Interior Designer. Towelling to be pre-shrunk and colourfast – fabricated like a cushion cover with Velcro. Method of fabrication and fitting to be approved by the Owner's Representative prior to fabrication. All cushions to be fixed in position on the seat bases and backs with fasteners approved by the Owner's Representative.

### Beds & Mattresses

Spring box: classic extra-firm with padding.

Mattresses: custom made shape – thickness: 200 mm

### 34.11 Carpet

#### Fabrication

All carpets are to be executed in accordance with the requirements of the Interior Designer.

#### Installation

All carpets are to have underlay in accordance with the requirements of the acoustics reports.

All edges of carpet to be bound when not hidden under the plinths.



All carpets to be stretched when laying.

Corridors / Halls / Foyers / Saloons & stairs: provide a framing of the carpet made of solid teak or sycamore with joint in accordance with the finish of the room.

All carpets on vertical faces to be glued.

#### Protection

Protective covers in white canvas cotton to be supplied and fitted for all the floors (including marble and wood). Velcro and fixing points to be established.

#### Synthetic Carpet

Synthetic carpet is to be provided for heavy traffic in crew space, wheelhouse, ship's office, bridge corridor. Captain's and Officer's cabins to have carpet as Guest cabins.

#### Crew Technical Floors/Service areas

Galley to have non slip tiles. All other areas to have non-slip synthetic material such as vinyl, norament or other.

#### 34.12 Loose Accessories/Furniture

The selection will be made by the Interior Designer 12 months before the delivery date.

#### Internal Furniture

As per the requirements of the Interior Designer.

#### Deck Furniture

As per the requirements of the Interior Designer.

#### Art/Accessories

A budget of [ ] is to be included in the builder's offer for the purchase and the installation of basic decoration. The selection will be made by the Interior Designer.

#### 34.13 Lighting

##### General

Ceiling spot light: all spotlights are to be of low voltage type, 12 volts, 25/50 watts, halogen.

Chrome heat protector and cooling space are to be provided around all spotlights to prevent heat damage, details of which must be agreed with the interior designer.

Lighting density to be one fixture per square meter.

Dimmer sensor system to be used for all lighting except indirect lights.

A common switch panel for light circuits per space including all circuits, on/off switches with dimmer:

- Security on night
- Ambience
- Decorative lamps
- Spotlights

Lighting circuits shall be laid out to facilitate good maintenance access to all parts of the system.

All accommodation lighting is to be placed in accordance with the requirements of the interior designers.

Table lights and standing light fixtures have to be fixed in place.

A lighting analysis for all lighting systems shall be performed by the contractor, with an appointed lighting specialist.

Battery powered emergency lights are to be provided.

An electrical control system for all blinds, roman shades and curtains, except the ones in crew or service areas, is to be integrated in the overall lighting / electrical control system.

The bridge shall be equipped with red, glare free, night illumination.

The lighting in each compartment is to be connected at least to two different lighting groups, to avoid complete black out conditions.

Sensor type internal lighting controls are to be located in each space at the doorway (beside the doorframe and adjacent to the door handle), where indicated.

Remote control panels are to be used for the control of electrical fittings in all cabins except crew and service areas.

#### Technical Lighting

Finishes: all lighting must be of marine quality in:

Stainless steel – polished finish in technical area and exteriors

Stainless steel – brushed finish in cool & cold storages

White lacquer and chromed brass – polished finish in crew area, galley and pantries

Chromed brass in Owners, Guests & reception areas

#### Decorative Lighting

Selection will be made by the Interior Designer 12 months before the delivery date.

### **35. WORKING SCHEDULE**

In addition to the working schedule given in subsection 4.1 of this Specification, a schedule is enclosed indicating the main construction steps for the vessel.

During the construction, the schedule may be slightly changed as a consequence of more specific and detailed planning. The agreed delivery time is not to vary.

#### **Note**

Changes to this Specification are to be agreed in writing by the Owner and the Builder.