TECHNICAL SPECIFICATION

FOR A 17 METRES

HIGH SPEED PATROL BOAT

O.T. 55.XXe

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0.- GENERAL

0.01 OBJECTIVES AND DEFINITION OF SPECIFICATION

This general specification, together with the general arrangement drawings which are enclosed as annexes at the end, were developed to represent the fundamental documentation which defines the fast patrol boat, to cover the development of the project, as well as contracting and construction, and any other necessary step to be taken under the present legislation.

When in more than one of the sections of this document an installation or piece of equipment is mentioned, it should be considered as a repetition and not as a duplication of supply.

As a general rule, it is accepted that the manufacturing brand names for the equipment and installations are clearly outlined in this document and will be considered at the beginning as final. However, if the Owner considers that other manufacturers could provide technical qualities and service conditions of a higher standard, then they could be changed, provided that no price modification is involved due to such changes.

The following drawings are included in this document:

- 55.XXe.A6.00 GENERAL ARRANGEMENT
- 55.XXe.A6.01 GENERAL ARRANGEMENT

In the case of discrepancy between the Technical Specification and the annexed Drawings, the Specification will always prevail over the Drawings.

This document will be sufficient to completely define all aspects of construction.

When the fast patrol boat is to be delivered, the Shipbuilder will give the Owner complete descriptive manuals for the machinery, devices and installations, instructions for operation and maintenance, as well as codes for all spare parts which may need to be acquired, and finally manufacturers warranties for all devices and equipment installed by the Shipbuilder.

0.02 TYPE OF VESSEL

This present project aims to study and develop a fast patrol boat with a hull made of GRP – Glass Reinforced Plastic and Kevlar, of a "V" shape, and with diesel propulsion which drives twin water-jets.

The boat will be driven by two diesel engines of the kind specified further on to achieve the specified speed.

The hull will be suitable for obtaining high-speed with good sea keeping and optimum performance at sea up to sea state five, fulfilling the necessary requirements of stability, maneuverability, low draught and low profile.

The boat will be able to perform patrolling services in territorial waters and waters around them, as well as interception, inspection, register, physical presence and surveillance services in order to fulfill the national and international laws, taking into account security of a crew of 5 persons, one of which will be the Captain.

0.03 MAIN CHARACTERISTICS

The fast patrol boat has the following characteristics, at its project and constructed stages:

Length overall	17.33	Mt
Moulded breadth	3.80	Mt
Moulded depth to main deck	2.10	Mt
Draught	0.95	Mt
Fuel capacity	3,000	Ltrs
Maximum power	2 x 1,360	HP
Maximum speed at maximum power 50% condition	50	Knots
Range at cruising speed	300	Nautical Miles
Cruising speed	42	Knots
Crew	5	Men
Light displacement approx.	20.0	Tons

0.04 SPEEDS AND RANGE

The maximum speed to be attained by the boat in the defined trials in point 0.08 C), with a wind speed of no higher than 2 on the Beaufort Scale and sea state no higher than 2 on the Douglas scale and with the engines reaching their maximum power, should be of 50 knots.

The cruising speed that the boat should attain in such trial conditions will be 42 knots.

0.05 SHAPE, STABILITY AND TRIMMINGS

The shape of the boat bottom should fulfill the requirements of high speed, optimum stability and adequate displacement, making the boat sea keeping appropriate in unfavorable sea conditions, as well as ensuring the necessary security of the crew.

Therefore, the boat will have a transom stern and a hull-planning bottom, with a proper distribution of weight on the boat.

The shapes of the superstructure will be finished in order to minimize wind resistance to the high-speed boat seaway.

The Shipbuilder is responsible for supplying all the workforce and necessary materials for the stability trials.

0.06 INSPECTIONS AND AID PROVIDED BY THE SHIPBUILDER

The design and scantling will be done as per rules of the **Lloyd's Register of Shipping**, providing **Approval of Drawings and Construction Certificate** as applied to this kind of fast GRP patrol boats. Such certification will be as per Lloyd's SSC-Special Service Craft Rules, under notation **✠100 A1 SSC PATROL MONO HSC G2**

The Owner technical staff shall inspect the construction of the boat, and will be given free access to the yards of the Shipbuilder and of the manufacturers or suppliers.

The Owner inspectors will have the right to reject at any moment any defective material and shall scrap the piece of work that they may esteem necessary.

Any defects and anomalies observed in the materials, elements or equipment will be the responsibility of the Shipbuilder, even when these defects or anomalies are of third parties, including companies subcontracted by the builder, without prejudice of legal actions which may be brought against them.

0.07 TECHNICAL INFORMATION, DRAWINGS AND INSTRUCTIONS

Upon delivery of the high-speed boat and as agreed, the descriptive manuals of the machinery, apparatuses and installations, instructions for handling and maintenance, the codes of spare parts for future acquisition, and warranties of all devices and equipment supplied and installed by the Shipbuilder, will be provided.

On the delivery of the boat, the Owner shall receive two copies of each of the following drawings:

- Drawing of hydrostatic curves.
- Drawing of curves of static and dynamic stability.
- A plan of all facilities of the high-speed boat.
- Docking plan.
- Drawing of propulsion plant.
- Drawing of pipes and electric wiring.
- General plan of feed network and communication services including feed sources, battery lines and their charging units, etc.

Above technical information to be provided in both hard copies and soft copies.

0.08 TRIALS

0.08. A) DURING CONSTRUCTION

The Builder will send the Owner monthly construction reports.

0.08. B) PROPULSION ENGINE TRIALS

Each propulsion engine will undergo the following trial:

A bench-test lasting six hours at the engines speed rate corresponding to the maximum continuous power.

During this trial the data of the revolutions, power, consumption, pressure, and the temperatures will be recorded, which will allow the curves to be drawn up for the sea trials to check the power developed by the engines in terms of revolutions and fuel consumption per HP/h.

This trial can be substituted by the data of the engine manufacturer, who should prove the data regarding maximum continuous rating (without time limit that doesn't overload engine) as well as peak rating.

If these rates are not proven, the plaque power will be taken as the peak speed rating.

0.08. C) DISPLACEMENT TRIALS

Displacement in trials shall correspond to the entire high-speed boat with all the fixed weights on board and the entire crew, and 1,500 litres of F.O.

0.08. D) OFFICIAL TRIALS

The aim of the official trials will be to show the resistance of the boat and that it is built in accordance with the design and contract provisions as well as with this specification.

The performance of the trials shall be at the expense of the Shipbuilder and the boat manned by the staff of the same. Said trials shall be attended by representatives of the Owner.

Within a period of no less than 20 working days, prior to the official trials, the Shipbuilder will notify the Owner of the exact date when these trials are expected to take place.

The Official Trials shall not take place until the boat is completely finished and ready for delivery to the Owner.

All the information required for the trials will be obtained prior to the Official Trials.

The boat will not be considered ready for the Official Trials unless its state of real weight has been studied.

0.08. E) PRELIMINARY TRIALS IN DOCK

These trials will be performed with the boat afloat and will comprise of the following:

Revision of hull and installations: The hull and installations shall be revised to check the fulfillment of requirements of the contract and specification.

Stability check: This trial will be performed with the boat totally loaded with all fixed weights corresponding to a full load with no personnel on board. Liquids can be substituted by equivalent weights.

Main Engine and Generator Units Start-up Trials: When the engines have been shut down for at least 8 hours, 10 start-ups will be performed on each engine without recharging the batteries. There will be an interval of some minutes between each start-up.

Smooth performance at minimum speed and maneuvering of jets will also be checked.

Equipment testing: All equipment and facilities on board, electronics, fire-fighting, bilge, etc. will be tested.

0.08. F) PRELIMINARY SEA TRIALS:

Preliminary sea trials will be performed sailing at sea and will comprise of the following:

Free course trial: A free course trial will be performed at a regime corresponding to 80% of maximum rating of the main engines, with the displacement of trials defined in 0.08.C) in order to check the correct operation of all installations and facilities.

Maneuvering Trial: Change of engines speed trials shall be performed in astern and ahead running.

When the boat is not planning, repeated trials for inversion of gears at different operating ratings in the main engine shall be performed.

Maneuvering trials shall be performed at various speeds, both ahead and astern measuring the radio of turn, with the steering system installed in the boat, steering from side to side, checking for maneuvering difficulties at maximum speed and for the high-speed boat's correct performance.

0.08. G) FINAL SEA TRIALS:

Final sea trials will be performed with the boat in displacement conditions as defined in 0.08.C), in good weather conditions and over an officially measured mile. These trials will be as follows:

Progressive Trial: A series of progressive trials will be performed, varying the engines speed in the main engines ranging from the permitted minimum to the maximum revolutions. Data recorded during these trials will be used to draw up the speed and consumption curves in terms of r.p.m. A device must be fitted to check with precision and over a short period of time, the consumption figures for each trial.

The number of trials will be sufficient for the Builder to draw up the aforementioned curves. Each trial will involve one double run (one single run in both directions) over a measured "mile".

Speed trials: Speed trials shall be performed at the rpm corresponding to maximum power for maximum speed, and the corresponding to 80% of the maximum rating for the cruising speed. The average speeds will be calculated, in each case, over four runs of the measured "mile", two runs in each direction, then calculating the average giving double weight to the two intermediary runs.

Consumption trial: To be performed at a speed corresponding to 80% of maximum power of the main engines. The cruising speed of the high-speed boat will be deduced from the data obtained during the progressive trial, checking said speed while sailing thru the measured mile.

The high-speed boat will be operationally tested under weather conditions of sea state two (2) and four (4) Beaufort in order to verify their durability, sea keeping, maneuverability and operational capability.

The consumption obtained will be corrected in an inverse proportion to the fuel ratio if the fuel used in this trial differs from 10,100 Kcal/kg.

Range will be calculated on the basis of the rectified consumption.

Trial of movement with only one main engine: During fifteen minutes the boat will sail at various regimes, making sure that the engine is not overloaded and checking the maneuverability possibilities and docking of the high-speed craft. This trial will be repeated with the other engine.

Observations: During the course of the above trials, the following data will be recorded:

- Environmental temperature
- Temperature of the freshwater main engines cooling system.
- Exhaust temperatures.
- Lube oil temperatures.
- Lube oil pressures.
- Main engine revolutions.

Inspection: Once the trials are completed, machinery and equipment will be inspected, correcting any irregularities if any, repeating the trials if necessary.

0.09. WARRANTY OF QUALITY

The Shipbuilder will be responsible for any deficiencies owing to defective materials or fitting out according to the Contract provisions for one (1) year, applicable from the date of delivery of the boat.

During the Warranty period the Shipbuilder will be obliged to attend to any consultation made about the installations or services of the high-speed craft.

The hull, deck and superstructures in GRP will have a Warranty of 5 years.

0.10. INSURANCE, DOCUMENTS, ETC.

The Shipbuilder is obliged to perform all the necessary administrative procedures regarding commencement of works.

The boat will be insured by the Shipbuilder for the duration of the works, including trials, under the conditions required by current legislation. Payment of the premium of the insurance will be at the expense of the Shipbuilder.

Once building is finalized and trials are successfully completed, the Shipbuilder will supply the Owner with the documents required at delivery.

Once all trials are satisfactorily performed and completed in the area of VIGO, the boat will be delivered to the Owner as per the Construction Contract terms.

0.11 MODIFICATIONS DURING CONSTRUCTION

During the course of building, modifications may be introduced as the Owner deems suitable, whenever these may be technically feasible at the stage of building at which the boat is at that point in time, and whenever these do not endanger the quality of the materials or equipment, or reduce the efficiency during operation of the installations and facilities. Likewise, the Shipbuilder shall be at liberty to propose the modifications he deems suitable, whenever these are aimed at improvements to the building or facilities, requiring the written approval of the Owner to commence. All the above mentioned is subject to the agreement of both parties regarding variations in price and delivery dates of the boat, according to the stipulations of the Contract.

0.12 MATERIALS AND WORKMANSHIP

The entire workmanship will be of the highest quality, in all aspects, and any deficiency in the project, materials or workmanship should be corrected on request of the Owner, whenever it might be detected.

All the elements of construction that form part of the boat will have a fine finish. The metal parts will be completely finished prior to their installation on board. The interior corners will be beveled and exterior corners rounded. The countersinking will have a correct angle and depth for adjustment with the countersunk heads of the bolts.

The casting will be in accordance with the best industrial practices. The casting finish will be uniform on each piece. Repairs of defective casting will not be permitted, unless an express approval is obtained from the technical services of the Owner.

All the materials and elements of the equipment installed on board or delivered with the vessel will be new and of the quality specified herein.

Plywood must be of naval type, waterproof and in a healthy state on both sides.

All gluing will be done with glue resistant to water.

All wood used will be given an impregnation treatment against absorption of moisture, putrefaction, parasites, etc.

The Shipbuilder will select all the materials and work methods of the highest quality and appropriate for the projected service, taking into account the convenience for replacement and repairs in accordance with the best shipbuilding practice.

The bolts, nuts and riveting will be of copper, brass, silicon-bronze, stainless steel or aluminum. The washers used in the bolted sections should be of the sufficient size to avoid possible embedding in the area where they are placed.

The metal elements exposed to the weather will be of stainless steel, bronze, brass or anodized aluminum.

All materials and equipment used for the boat will be duly stored and protected until ready for use. Their situation at all times, either stored or installed, being the responsibility of the Shipbuilder.

As a general norm with non-ferric materials, they shall be:

- Stainless steel : 18% Cr - 8% Ni - 2% Mo.
- Aluminum : 3% Mg.

- Bronze : 88% Cu - 10% Sn - 2% Zn.
- Brass : 63% Cu - 1% Sn - 36% Zn.

The materials used by the Shipbuilder for the laminate and scantling construction of this boat will all be ratified by the Classification Society.

Polyester resins.
Vynilester resins.
Gel-coats.
Fiber glass.
Catalyzer.
Accelerator.

These are the technical characteristics of the polyester resins:

Density	1.20 g/cm^3	
Absorption of water (24 h at 30°C)	0.2% to 0.3%	
Barcol hardness	40 to 45	
Tensile strength	70 to 78	MPa
Bending strength	120 to 130	MPa
Flexual E-Modulus	3500 to 3700	MPa
Tensile E-Modulus	3700 to 3900	MPa

These are the technical characteristics of the E fiberglass used:

Specific weight	2.60
Tensile strength	2200 Mpa
Absorption of water	< 0.1%
Tensile E-modulus	73000 Mpa
Elongation to failure	3 to 4%

The composition of the glass/resin minimum will be 30%. The thickness of the isophthalic Gel-coat will be from 0.3 to 0.5 mm. Two layers of Vynilester resin to be applied in the hull for additional protection.

0.13. NAUTICAL STORES AND TOOLS

The following nautical stores will be delivered in the boat:

1 Barometer
1 Pair of dividers
2 binoculars 7 x 50, Steiner or similar
1 Parallel rule
1 Rule
1 Clock
1 Thermometer

The Shipbuilder will deliver the boat with all tools supplied as standard by the manufacturer of the equipment.

0.14 VIBRATIONS AND NOISE

The Shipbuilder will be responsible for ensuring that the hull and machinery on the vessel have no abnormal vibration or noise at any speed within the operating range.

1. STRUCTURE

1.01. TYPE OF CONSTRUCTION AND STRUCTURE OF THE HULL

The hull and deck will be built in "Glass and Kevlar Fiber Reinforced Polyester", each one of them forming one individual piece, without any exterior joint and using the most internationally used and recognized system for naval use.

The bottom of the hull must be of an efficient structured construction to withstand the high pressures that are generated when the vessel is planning. The bottom of the hull will be reinforced with continuous longitudinal girders of polyurethane covered with G. R. P. or kevlar, and transversally with flooring and frames or bulkheads.

There will be a rubbing fender around the boat, placed on the upper part of each side, as indicated in the General Layout.

Four (4) transversal bulkheads will divide the hull into five (5) watertight compartments.

All the joints of the structural elements will be made with G. R. P. in order to achieve the desired water tightness.

The hull and the other structures will be made in accordance with normal construction practice for this kind of boat, so as to diminish as far as possible the concentration of stress in openings, transitional points, discontinuities, changes of shape, etc.

Unsuitable or irregular thickness where these should be uniform in the hull and other structures will be not admitted. Neither fissures, cracks nor lack of homogeneity in the polyester or fiber glass panels.

Thickness measurement will be carried out using any one of the following procedures:

- By means of six (6) millimeter diameter drillings which are then filled in by the Shipbuilder with polyester resin.

- Using any measuring instrument based on the comparison of magnetic attraction depending on thickness, and the calibration of the device.

Measurements and thickness of hull and structure may be later compared with the calculations obtained from formulae for maximum-

minimum thickness according to class and number of layers of fiber glass reinforcement in order to establish if there is excess or insufficient resin. The outer gel-coat layer will not be taken into account when measuring thickness.

In the event of the Inspector being in any doubt as to the quality of the material used in the vessel, samples measuring 25 mm (25x25) may be cut for laboratory testing to investigate the class, quality, layers of material and resin properties.

The visual appearance of the hull and structure will be uniform, with no bubbles, delaminations, knots of glass, pores, gaps and air blistering which are characteristic signs of weak points or of localized strain.

Also to be taken into account is the good visual appearance of the hull and structural materials, avoiding swells, unevenness and changes of color that might indicate a badly prepared construction.

In no area will creasing or unevenness over 1/10 of the laminated thickness be accepted. In the case of this occurring with a value below that indicated, this shall not be accepted either if, in the opinion of the Inspector, it causes a detrimental effect to the exterior appearance.

The sound of the hull and structure shall be clear and there will be no characteristic smell due to the insufficient curing of the resins.

The number of gaps with trapped air shall not be greater than 4% of the laminated volume and, if required by the Inspector, samples will be taken to establish the gaps present in the same.

It will be checked that the vertical panels are not lacking in resin due to movement or dripping from insufficient viscosity or from a faulty application.

The decorative Gel-coat (whose color will be decided by the Owner) will not be superior to 75 hundredths of a millimeter thick and should be completely free of cracks and have adequate flexibility to resist cracking by moderate knocking.

For lamination of the hull skin, isophthalic and Vynilester resins will be used.

Gaps and depressions below the gel outer coating should be avoided to eliminate easy breaking and cracking.

Moisture conditions when under construction, excessive heat during the curing or excessive concentration of catalyzer or accelerator in the resin are factors that shall be controlled.

All the joints will give the same resistance to all elements joined and will be made using systems and methods of proven effective.

The moulds used should be in good condition to avoid superficial defects, potholes, perforations, crocodile skin or orange peel.

To verify that curing of the boat is complete, surface hardness of the laminate on the opposite side to the gel surface will be tested.

The resins, mats and fiberglass and Kevlar rowing used will be of approved type, appropriate for naval use and of the grammages normally used in the international market.

1.02 SUPERSTRUCTURE

The superstructure with the flying bridge will be constructed of G. R. P, being molded by hand on the same negative mould.

Its forms will be aerodynamic to minimize forward ahead resistance.

Armouring: Wheelhouse cabin to be armoured, to be protected to NIJ III A level. Such armouring is done through type approved ballistic panels fitted both in superstructure and hull where cabin is fitted, such armouring in addition to the own boat GRP structure which is composed of standard fibers and Kevlar.

1.03 WATERTIGHT TRIALS

Once the structure of the hull has been completed, the water tightness trials of the joint deck to hull will be carried out.

These trials will be performed with spurts of fresh water using hoses, in the presence of the Owner's inspectors.

Likewise, water tightness will be tested for wheelhouse windows and doors, and deck hatches.

2. EQUIPMENT

2.01 FUEL TANKS

There will be two non-structural fuel tanks made of G. R. P., having reinforcements and, provided with manhole, vent pipe, probe, level indicator, according to their situation and service rendered.

Both will be placed forward to the engine room, according to the General Arrangement Plan.

2.02 MOORING, TOWING AND ANCHORING MANOEUVRES

Eight cleats and four fairleads will be fitted on the deck, which will be in accordance with the normal requirements for this type of boats. These pieces will be made out of stainless steel and will be joined to the deck with stainless steel bolts, with an interposition of liners of hard wood or coatings of G. R. P. in the interior face, and the appropriate reinforcements under deck.

At the upper side of the stem, a strong stainless steel eyebolt for towing maneuvers will be fitted.

An electric anchoring windlass 24 V DC will be fitted in the bow of the vessel, and will have the appropriate characteristics, with local and remote control from the wheelhouse, for chain and rope. This will be also fitted with a safety slip stopper of stainless steel for fastening the anchor.

The following mooring and anchoring items will be supplied:

6	pneumatic tubular fenders
2	12mm x 25 m nylon ropes
1	16 mm x 30 m nylon rope
1	16 kg anchor Bruce or similar type of galvanized steel
40	mt x 14 mm of rope special for mooring
10	mt x 10 mm calibrated galvanized chain

2.03 INSULATION

The engine room will be acoustically insulated on the interior by an appropriate absorbent material.

2.04 MASTING AND RIGGING

Flagpole will be placed in the stern and the forward end, made of stainless steel, with its corresponding halyard.

Above the superstructure an arch made of stainless steel will be placed as support for navigation lights, radar aerials or others.

2.05 WHEELHOUSE ACCESS

Access to the wheelhouse is from aft of the wheelhouse, opening to the exterior, with locking devices.

2.06 WINDSCREEN, SIDELIGHTS AND PORTHOLES

The superstructure will have two ample frontal windscreens and side windows as shown in the General Arrangement Drawing.

The wheelhouse windows will be of laminated glass type as specified.

Two windscreen wipers of double arm with a cleaning device through fresh water spurts will be placed on the frontal windscreen.

Armouring: Wheelhouse windows to be armoured, both GRP, to be protected to NIJ III A PLUS level.

2.07 VENTILATION AND AIR CONDITIONING

The ventilation of the engine room will be made by natural air inlet through lateral grids with corresponding water traps and induced draught using two electric exhaust ventilators make G &R type ELL400/2R 230 V AC 50 Hz, each providing a capacity of 5,000 CM/H, total capacity of 10,000 CM/H. Such exhaust will have suitable duct. The ventilation and exhaust configuration will allow a temperature difference of 10ºC.

The air pipes will be made of G R P. and the gratings will be of G. R. P. or stainless steel.

Accommodation areas, both in the wheelhouse and below deck, will have natural ventilation through portholes and sidelights.

Additionally, the boat will be equipped with an Air Conditioning system make CRUSAIR by means 2 units share with a capacity of 12,000 and 12,000 BTU respectively.

2.08 ORDER AND SIGNAL SYSTEMS

Order equipment will be supplied, made up of a central loudhailer placed on the wheelhouse and an exterior weatherproof loudspeaker, positioned towards the bow **FURUNO LH 3000**.

One electronic or electro-pneumatic fog horn.

2.09 FLOORING

Floors in the accommodation below deck, wheelhouse, flying bridge and toilets will be made of G R P, and will be suitably joined to the vessel's structure to guarantee its rigidity. Interior floors covering will be of Pirelli type rubber.

The floor in the engine room will be of naval aluminum plates, coated with a stamped non-slip treatment.

All the weather deck and flying bridge areas that will be stood on will have a stamped non-slip finish.

2.10 LIFE-SAVING EQUIPMENT, FIRE FIGHTING AND SIGNAL SYSTEM

Life-saving equipment will consist of:

- Two (2) life buoys with Holmes light and ropes, with corresponding stowage fittings of stainless steel.
- Five (5) life-jackets will be supplied. The shipbuilder will provide the adequate stowage.
- One life-raft for 6 men each will be supplied in a container.
- One boat hook will be also supplied.

Emergency signal equipment consisting of:

- 6 red light flares with parachute.
- 6 manual orange smoke flares.
- 4 smoke floating signals.

This equipment will be enclosed in a case which should be waterproof and kept well away from any source of heat

The boat will have a smoke detection system: in the engine room with two ionic-type detectors and one thermo-ionic detector, the control centre being in the wheelhouse.

A FM200 flooding gas fire-fighting system will be fitted in the engine room, its release being from deck.

The vessel will be provided with 2 x 6 kg and 2 x 2.5 dry powder extinguishers.

A fire fighting hose with a two position nozzle, for connecting to the deck hydrant.

2.11 FURNITURE

The furniture distribution of the boat will be in accordance with the plan of General Arrangement Drawing 55 XXe.A6.00, 55 XXe.A6.01.

Distribution of furniture, below deck is as follows:

Chain locker.

Forward store room.

Accommodation area, including four beds, galley and toilet.

One toilette complete with WC JABSCO 37010-1096 24 V, wash-basin of stainless steel and shower.

Galley, micro-wave oven SAMSUMG 6W73 220 V, fridge INDEL 130 l., powered 230 V AC, extractor S&P HP-60 and stainless steel sink.

In the wheelhouse compartment there will be:

A control console, with all required instruments for the proper operation of the boat.

In the wheelhouse five (5) ergonomic padded seats with shock absorbers bases of high strength and security for the crew.

The colors of the finishing will be submitted to the approval of the Technical Services of the Owner, and so create a comfortable atmosphere.

There will be a hatchway in the forward cabin as emergency exit.

2.12 WATER TANKS

One fresh water tank with a total capacity of 110 liters made of stainless steel will be installed.

2.13 STOWAGE FOR ENGINE OIL

A stowage for two (2) cans of engine oil will be installed, each with a capacity of 25 liters.

2.14 RAILS, HANDRAILS, STAIRCASES AND STERN PLATFORM

The following rails and handrails will be installed:

Bow rail.
Handrails along the sides of wheelhouse.
Handrails along the sides and stern of the aft deck.

Handgrips will be fitted where required.

These rails will be made of stainless steel tube, constructed and fixed in a robust way for the facility which they serve.

Aluminum ladder for access from the deck to the engine room.

A stern platform made of aluminum.

2.15 VARIOUS SUPPLIES

A national Owner flag and a No. 3 First Aid Kit will also be provided.

3. - LAYOUT

3.01 GENERAL ARRANGEMENT

The general arrangement of the boat will be, according to General Arrangement Drawings 55.XXe.A6.00 and 55.XXe.A6.01, as follows from bow to stern:

BOW STOREROOM: It will be provided with a hatchway for deck gear.

ACCOMMODATION AREA: with access from interior through a door. It will have fixed bunks, with its independent mattress, as well as locker for keeping personal effects.

TOILET: There will be one toilette room on port side, with a WC unit, wash-basin and shower, and a cabinet with mirror.

GALLEY: Located in starboard side, with cooker, sink and refrigerator.

WHEELHOUSE: With access from deck through an aft door. There will be five seats. It will have ample frontal and lateral windows to give good visibility.

ENGINE ROOM: It will contain the propulsion engines, water jets, alternators, batteries, drainage pump and other facilities. The hatches to the engine room, appropriately soundproofed, will be flushed and will be located in the cockpit and it will be of self-supporting type in the opening position.

A special flushed hatch, for the sole purpose of access to the jets and engines, will also be provided.

The overhead, sides and bow bulkhead of the engine room will also be soundproofed according to the services installed therein.

3.02 LETTERING

The name and identification number of the vessel will be painted in the transom or in the hull sides.

All the valves of the piping system will carry identification plates indicating their dates for use and functioning.

Both sides will be painted according to the Owner indications.

The controls and instruments in the wheelhouse will be labeled, as well as the switches of the electrical system.

Lettering will be in English.

3.03 GENERAL DIRECTIONS FOR PAINTING

The interior surfaces of the lockers will be painted.

The application of the paint will be in accordance with techniques of the suppliers.

Special care will be taken when painting the outer areas of the boat so as not to be done in rainy conditions.

In the areas where more than one layer of paint is supplied, the final coat will be applied as late as possible. If surfaces get dirty during the trials, they will be given a coat of paint afterwards.

Before applying the first coat of paint, the surfaces to paint will be free of grease and dust, and any roughness smoothed.

3.04. PAINTING OF POLYESTER SURFACES

The exterior surface of the hull, deck and hatchway covers will be given a gel-coat layer, with a thickness no less than 3 decimals of a millimetre, and no more than 5 decimals of a mm. This layer will be incorporated to the polyester laminate and will be applied using a pistol on the mould on beginning the construction of these elements.

Both the interior surface of the hull above the floor of the cabin and cockpit, as well as the surface below deck inside the cabin, will have a gel-coat layer applied by brush. The thickness of this layer will be thick enough to leave the covered polyester surface completely opaque.

Likewise, any kind of transparency in the polyester surfaces will be avoided using a layer of paint of appropriate thickness in the interior unseen areas of the hull.

The surfaces inside the fore peak, the bilge areas, area of fuel deposits and engine compartment will be covered with polyester or paint using a brush.

An anti-fouling treatment will be applied to the bottom hull, Hempel Hard Racing type or similar.

3.05.- CATHODIC PROTECTION

The appropriate cathode protection system will be installed, both in the hull and in the bottom gear equipment.

4. - MACHINERY

4.01 PROPULSION MACHINERY

The boat propulsion system will be made up of two marine diesel engines, with turbo cooling of inlet air, with **10 V-cylinders configuration, capacity of 22.3 liters and a maximum power of 1,360 HP at 2,450 rpm, the make being MTU MODEL 10V 2000 M92**, based on 27º C seawater temperature and barometric pressure 1.0 bar. These engines drive a pair of water jets which are connected through a Cardan shaft and the relevant elastic coupling.

In addition, each engine will have a starter motor, an alternating battery charger, fresh and salt water pumps, oil and fuel filters, oil and fuel pumps and sensory devices.

Gas exhaust of main engines will be by wet exhaust, cooled by sea water.

The propulsion engines and the water jets can be handled and controlled from the wheelhouse, as well as from the fly-bridge.

In the wheelhouse, the following elements, necessary for the control of the boat, will be available:

1 steering compass.
1 rudder wheel.

For the start-up, stopping, speed regulation, and direction reversal:

2 switches (one for each engine) with key, to start up the engines.
2 RPM indicators (one for each engine).
2 fresh cooling water temperature indicators (one for each engine).
2 engine lubricating oil temperature indicators (one for each engine).
2 acoustic and visual alarms based on high fresh water cooling
2 temperature and low engine lubricating oil pressure indicator (one for each engine).
2 engine stopping push buttons (one for each engine).
2 maneuvering levers (one for each engine) to regulate speed and two levers for jet direction & reversal, working independently.

All the control indicators on the control console will be illuminated, with controlled intensity.

In the flying bridge, the following elements, necessary for the control of the boat, will be available:

1 steering compass.
1 rudder wheel.
Engine speed indicators.
Engines controls.
Water jets controls.
Engines stopping push buttons.

4.02 WATER-JETS

Two **Hamilton water jets model HJ 403** with two stations SMH mechanic-hydraulic control system will be installed each connected directly to the propulsion engine.

The water flow produced by the water-jets will be controlled from the wheelhouse or the fly bridge in order to steer and control the boat as well as to change to reverse direction. The required hydraulic pumps, cylinders, and associated control indicators will be installed to ensure the correct functioning and control of such maneuvers.

4.03 ANCILLARY MACHINERY

For the bilge drainage system two electric centrifugal self-priming pumps of 5,400 l/h. capacity each and of suitable pressure discharge will be installed. These pumps will be started up and stopped from the wheelhouse.

Likewise, there will be a manual drainage pump for the engine room.

An electric fresh water pump will be provided for fresh water service.

4.04 AC GENERATORS

One AC Generator 230 V AC single phase 50 Hz will be fitted for the on board AC services. Generator to be make **STAMEGNA SM 100** producing a power of 8KW. Engine generator of 3 cylinders and working at 1.500 RPM.

An Electric Balance Sheet for AC power is provided in attachment.

5. PIPING FACILITIES

5.01 GENERAL ASPECTS

The piping must be as straight as possible with a minimum of bends and a precise number of connections to facilitate speedy dismantling.

The diameter of the curves will not be less than three times the diameter of the tube.

All piping will be positioned as close as possible to the structural reinforcements and will be suitably protected against mechanical wear.

All piping will be as far away as possible from electrical equipment.

Where pipes cross over deck or bulkheads, they will have special pieces connecting them to the structure.

To avoid risk of fire, fuel overflows will be located in such a way that there is no leaking on to the engines or electrical equipment.

The fuel pipes will be located, whenever possible, far away from places where the temperatures exceeds 35 ° C.

Pump suction pipes will be fitted as low as possible to facilitate suction.

Pipes will be secured and appropriately supported in order to impede vibration and, where they may move due to dilation, suitably designed supports will be fitted.

Whenever possible, siphons will be avoided in the piping and when they can't be eliminated, appropriate draw-off facilities will be installed.

Each engine will have its own circulating, cooling, lubricating, supply and exhaust system. However, the pipes and accessories to these systems can be incorporated or separate from them.

5.02 COOLING AND CIRCULATION

The separate pipes from the ones integrated in the engines, will be made of stainless steel with rubber couplings and mesh with a spherical shutoff valve in bronze.

A seacock and a mud box will be provided for each engine circuit.

5.03 LUBRICATION

All the oil will be filtered and cooled before reaching the different points of lubrication of the engines.

Prior to the first oil fill; careful inspection for cleanliness in the whole circuit will be carried out.

5.04 FUEL FACILITY

Refill of the fuel tanks from the outside will be by a collector ending at one side of the deck.

Feed to the engines will be delivered directly from the fuel tanks astern to their fuel pumps, each set of main engine and generator unit having an independent circuit with a water-separating filter. The return flow of fuel from each engine will lead to the same tank.

Special care will be taken in cleaning the tanks and engine feed circuits prior to being put into service.

The piping will be of copper, with rubber couplings and mesh, for connection to engines and tanks. The spherical valves being in bronze.

5.05 EXHAUST

Each engine will be fitted with its own exhaust gas circuit with spreading.

All exhaust piping will be adequately supported and fixed, while allowing for spreading. This will be done in such a way that the stress caused by natural spreading during use, is not transmitted to the main engines, turbocharger, etc.

Piping will be of stainless steel and reinforced rubber, in the wet part and appropriately isolated in the dry part.

The discharges overboard will be made together with the circulating sea water through the stern transom.

5.06 SANITARY FACILITIES

Pipes will be of mesh material in the area with pressure and helioflex where there is no pressure, valves of spherical type and in bronze.

Shower, wash-basin and sinks will be supplied with fresh water through an electric pressure pump, which will suck from water reservoirs.

The water from showers will be discharged by gravity to one small-sized tank fitted with a level switch inside which will start an electric pump to discharge water from tank overboard.

5.07 BILGE AND FLOORING DRAINAGE FACILITY

The bilge water accumulated in the engine area will be drained by one side using the electric bilge pump installed in the lower central part of that area.

The water coming from the flooring and accommodation will be pulled by gravity to the bilge and from there to the stern area through flooring and frame drains; to be electrically pumped out.

The water coming from the cockpit flooring can be drained by gravity.

Pipes will be of heliflex and drain holes will be of brass.

5.08 DRAWOFF PLUGS, AIR PIPES AND FILLER NECKS

The fuel tanks will have an air tube with an exit to the deck through a swan-neck. The ends of the air tubes will be of stainless steel and will impede the entrance of water to the tanks; they will have firebreak grids. They will be placed over the highest part of the tanks, so that all air pockets can be eliminated.

Vent pipes and fill tubes will be of reinforced rubber.

Each fuel tank will be filled by gravity from an intake fitted on the deck and provided with a closing plug.

The propulsion engines will be provided with the adequate devices for the drainage to the bilge of all the water in their circulation and cooling circuits.

Oil drainage will be done using a portable manual pump.

5.09 SERVICE TANKS

All the service tanks will be suitably fitted on efficient mountings to absorb vibrations.

5.10 BUSHINGS, VALVES, CONNECTIONS AND TUBE SUPPORTS

All pipes will be connected using commercial type couplings.

Rubber pipes will be connected using couplings and double clamps.

Couplings for the copper alloy pipes will be in bronze or threaded brass.

Couplings for steel pipes will be in steel and threaded, or in synthetic material with stainless steel clamps.

The hydraulic driven oil pipes will be connected with steel precision couplings, appropriated to the working pressure.

Pipes will be secured to the structure of the vessel using brackets or sleeves, to impede them being affected by the hull vibrations.

In general, all the valves will be of bronze.

6. ELECTRIC INSTALLATION

6.01 GENERAL

The boat will have an AC shore power connection, with an input of 230 single phase 50 HZ V AC and output 24 V DC, which will allow the battery charging through the battery charger, capacity of the battery charger to be of 50 Amp/H.

There will be suitable battery units of 24 V D.C. which will supply energy to the main engines start-up, lighting, transmission, navigation, police vigilance and other equipment.

6.02 DISTRIBUTION CIRCUITS

The vessel will be fitted with a distribution network of 24 V DC network to feed the following points:

Navigation Aids and Communication equipment.
Fog horn
Loudhailer
Navigation lights.
Wheelhouse instruments.
Propulsion and engines instruments.
Start-up engines for the propulsion engines.
Sockets

Additionally the boat will have an AC V 230 through the shore power connection and through the on board AC Generator, providing AC power to the AACC system and other AC on board services

All the connections will be labeled, indicating the circuits fed from them.

All the switch-gear will be of marine type and anti-vibration, being protected against moisture, heat and salty atmosphere.

Care will be taken to normalize the different types of switches, fuse and automatic, to facilitate the acquisition of replacements.

Fixing by winding coated screws will not be permitted in electric devices, if it is done it will be with special adhesive.

All the distribution circuits will be protected by their corresponding switches, which will be grouped on the panel situated in the control cabin.

6.03 ACCUMULATING BATTERIES

Two groups of accumulating batteries of 24 V DC will be fitted, for the start-up of the main engines and to feed the equipment and facilities at 24 V.

The accumulating batteries will have the necessary capacity to attend the demand of the facility that they cover.

The batteries will be of lead-acid type.

6.04 ELECTRIC BOARDS

The appropriate electric boards, watertight where required, will be installed.

6.05 STARTERS AND ENGINES

The main engine starters will be grouped in the wheelhouse, following the general norms, and will have the following devices:

Indicators for pilot Start-up/stop switches.

All the starters will be across-the-line starting type.

The electric engines will have their winding protected to work satisfactorily in salty environments.

6.06 BATTERY-CHARGING EQUIPMENT

Any of the 24 V DC battery groups can be fed with current from:

- shore power connection through the marine battery charger.
- alternators coupled directly to the main engines

6.07 ELECTRIC CABLES AND WIRING

Inside the wheelhouse the wiring will be electrolytic copper single-core thermoplastic sheathed cable.

The remaining wiring will be of the appropriate type, having a number of conductors, with butyl insulation and PVC protection.

Generally, the cables will be bifilar, except those of the propulsion engine starters.

The Shipbuilder will take care to avoid laying cables across structural elements; where this is not possible, a sufficiently thick slab will be placed over the opening passage with well rounded edges to avoid damaging the cables.

Rectangular through bolt holes with presses will be used to cross decks and bulkheads.

All electric cables will be installed without branching. In the lighting distribution attempts will be made to use the least possible number of junctions, and in all cases, using watertight junction boxes located in accessible places and in no case on the cabin or cockpit floors.

Special care will be taken when wiring to avoid sharp bends and, where possible, to avoid laying in areas exposed to heat and/or damp; at these points crossed over by electrical wiring exposed to expansion, the necessary slack will be left in the cables to avoid breakage or disconnection.

All cables will be tagged to facilitate their localization.

All the outlets will be made through switches.

Where necessary, cables will be screened and treated with antistatic filters.

Shore power connection is provided with cable with both ends sockets, in length of 50 m.

6.08 NAVIGATION LIGHTS

The following navigation lights will be fitted:

One white masthead light.
One white range light.
Two side lights (one green, the other red),

All of them as per COLREG regulations.

These lights will be fitted in naval type certified beacons in rustproof material and will be watertight.

The lamps will be incandescent, and with sufficient power to meet the requirements established by International Regulations to prevent collisions at sea. The lamp screens for these lights will be in accordance with the standards established by said Regulations.

6.09 OUTLETS AND LIGHTING

The lighting points of the fixed lighting system will consist of incandescent 10 W lights, and will be enough to achieve the optimum lighting into the living-quarters.

The fixed lighting devices will be waterproof, of sufficient quality, protected with a mesh or grid and fitted over the compartment to be illuminated.

In the engine room, four light points will be fitted, as well as a fixed lighting system for the wheelhouse and accommodation area.

One 24 V DC outlet will also be installed in the engine room and another watertight outlet in the cockpit next to the switchboard.

There will be a suitable number of sockets in wheelhouse including a flex lamp, being sockets three pins UK type.

A blue rotating Police light will be provided and fitted in mast.

7. SPECIAL INSTALLATIONS

7.01 NAVIGATION AND COMMUNICATIONS EQUIPMENT

- SSB Radiotelephone make Barret model 2050 with antenna coupling unit and wip antenna, GMDSS class E compliant.
- VHF/FM Radiotelephone make Motorola model GM160, 45 w transmitting power.
- Two VHF/FM walki talki radiotelephone make Motorola model GP 140.
- Radiotelephone FURUNO FM 8800 S Marine GMDSS compliant.
- FURUNO FAISO AIS
- Satellite Compass FURUNO SC 50
- GPS FURUNO GP 37
- Loudhailer FURUNO LH 3000
- Plotter FURUNO MFD 12 LCD TFT 12'1"
- Radar FURUNO FAR 2117B
- Navtex FURUNO NX 700 A
- Sounder FURUNO FCV 620
- VHF ICON IC-A110, air band
- Automatic Pilot SIMRAD Compass RC 25
- Emergency Satellite EPIRB make SAILOR GSE with GPS built in
- Radar Transponder SART 20
- Night Vision Google make FLIR model HM 324 x P+
- Electro optical Night Vision System make GEM model EOSS-300-U, including fully stabilized turret, day light camera, uncooled infrared camera, 15" LCD display, keyboard with joystick and embedded video tracker.

- Binocular marine type 7 x 50 make Steiner model Commander.
- Two magnetic steering compass make Plastimo model Offshore 135.

8. ARMAMENT

Armament to be of Owner supply.

Forward deck area where a 0.5" caliber gun shall be fitted by Owner shall be properly reinforced to accept the installation of a gun mounting on both sides of aft deck and over structural bullwarks, two 7.62 mm caliber gun will be properly fitted.

Machine gun to be of Owner supply.