

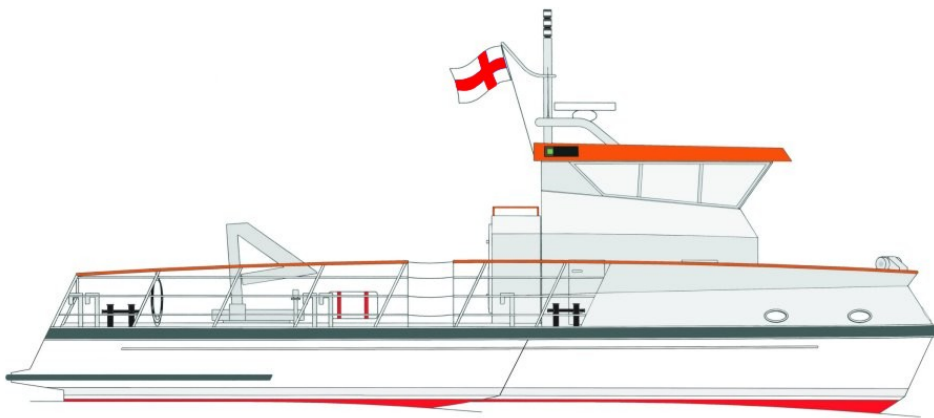
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PART OF THE ENERGY ENVIRONMENTAL GROUP



**Vikosprint COR 16
Specification
for version Work
2011**

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1 GENERAL DESCRIPTION

Vikosprint 16 offers an exceptionally wide and stable working platform. The vessel hull form is a carefully optimised trimaran. Different load conditions have relatively little influence to speed. Fuel consumption is low allowing for smaller fuel tanks and better payload. Smaller operation costs.

The basic model of the vessel is not constructed for navigation in ice field. However, we have tested the trimaran hull in arctic laboratory and know that when the hull is properly strengthened, the 16 m version can go in 20cm ice. The shape has been patented for navigation in ice conditions. The navigation ability in Nordic waters will be offered as an option.

The vessel has low wave making properties. Because of the relatively high speed low-weight materials and constructions are preferred throughout the vessel.

The deckhouse is in fore ship leaving flush and wide working deck of ~ 60 m².

The bridge is designed for single person navigation. There can be a co-pilot sitting next to the helmsman. A small sofa with table is mounted behind the pilots as shown in the GA. A kitchenette is arranged on the bridge.

The propulsion is marine diesel engine with conventional shafting and propeller arrangement.

Controllable pitch propeller is offered as an option for constant low speed working and maximum hydraulic power output in different sea states and load conditions. CP-propeller helps moving the vessel accurately and allowing simultaneous use of the needed hydraulic equipment.

The vessel can be outfitted for many different types of operations with optional equipment. For example the vessel can be turned into an oil recovery version by equipping it with an integrated FinnSweep® brush skimmer. See 1021.

Operational requirements

The vessel described in this text is designed for any work operations in ports and coastal waters.

The specified operational requirements are as follows:

Special service vessel/Coastal area.

The vessel shall be classified by Bureau Veritas.

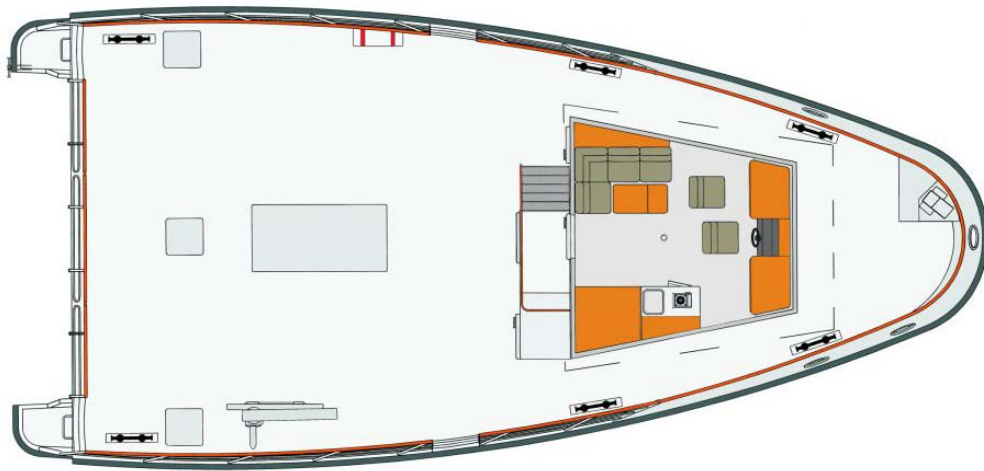
Ambient temperature: + 5 °C - + 28 °C

Sea water temperature: + 5 °C - + 23 °C

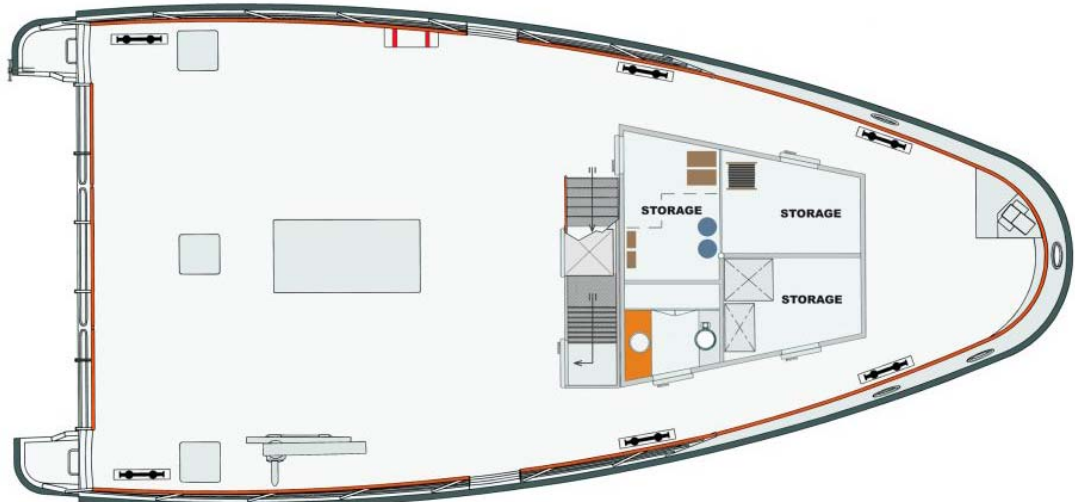
GENERAL ARRANGEMENT

VESSEL DIMENSIONS ~

Length, moulded	16,0 m
Beam	8,2 m
Draft	1,5 m (with fixed-pitch propeller)
Working deck area	60 m ²
Speed, service	18 kn
Fuel Capacity	2500 litres
Range	300 nm
Deadweight	Work 10 tons, FinnSweep 4,5 tons
Accommodation	Crew 2-4, classified max capacity 8 persons



Deckhouse arrangement D.1:



Deckhouse arrangement Main Deck: Water closet, Deck storage with small work area

11 Project management and design

111 Project monitoring and quality assurance

The Builder's quality assurance system is based on ISO9001-2003.

112 Design

The Builder will be responsible of the design of the vessel and takes care that the plans are properly approved by Classification Society.

1121 Project plans and timetable

Before starting the construction of the vessel Vikoma will send basic design documents to the Owner for information. In case Vikoma will not receive any comments within two weeks the project continues as shown in the design documents.

Vikoma will prepare a construction timetable for the owner for information.

The following plans and drawings will be sent to the Owner:

- General arrangement
- Quality assurance plan
- System diagrams
- Engine room arrangement
- Deck house arrangements and material specifications.
- Tank arrangement
- Electrical main diagram

1122 Workshop drawings

Workshop drawings are property of the Builder and they will not be part of the delivery material.

113 Purchases

The following principles are followed when purchasing materials for this vessel

Purchases are only made from audited and approved suppliers.

The purchased materials, equipment and services are in accordance with the contract specification and approved drawings.

Purchase contract is legally binding the subcontractor or supplier.

Materials are stored under good conditions

13 Documents and spare parts

131 Classification and inspections

General

The vessel shall be built and surveyed by Bureau Veritas according to rules I **•HULL •MACH Special service/Workboat**

Design Category: Workboat, Coastal service.

Work: "Workboat, non-sinking with one flooding department, deck crane".

(FinnSweep: "Oil recovery boat, non-sinking with one flooding department, deck crane".)

Owner's inspectors

The Owner's inspectors shall have free access to all spaces, where parts of the vessel are being manufactured within normal working hours.

The Builder will arrange for Owner's representatives possibility to visit the workshops of all the subcontractors making parts or equipment for the Vessel.

Tank tests

The tanks will be pressure tested with water or air depending on tank type or size.

Welding inspection

The inspection in hull welds will be in accordance with Class requirements. An authorised inspection company will be used to perform the tests. Reports will be given to Classification society

Lifting equipment

All lifting equipment will be inspected by the authorised lifting equipment inspector or equivalent authority.

132 Insurance

The vessel has full insurance coverage during building period.

133 Delivery documents

Delivery drawings and instructions in 1 paper copy and in PDF- format on a CD-ROM will be delivered to the Owner on the boat's delivery at the latest. All delivery material shall be of as-built type. The following drawings will be included in delivery material:

- General arrangement
- System diagrams
- Engine room arrangement
- Accommodation arrangements
- Shaftline drawing
- Tank arrangement
- Electrical main diagrams
- Safety plan
- Hydrostatic and stability data
- Trim and stability book for different loading conditions (100%, 50% and 10%)
- Docking plan

The manuals of the equipment suppliers will be delivered onboard, for example:

- Main engine and reduction gear
- Shaft sealing
- Steering propeller
- Deck crane
- Anchor winch
- Navigation equipment
- Radio equipment
- Equipment in accommodation

134 Certificates

Hull aluminium materials will be delivered with certificates 3.1.B or equal (see 21).

On delivery of the vessel certificates according to Rules and regulations will be delivered:

- Builder's Certificate
- Delivery and Acceptance Protocol
- Lifesaving Equipment Certificate
- Stability Booklet approved by the classification body.

All certificates will be free of any conditions.

135 Spare parts

Maintenance spare parts for first normal service of the main engine will be included in the delivery.

16 Tests and trials

The representatives of the Owner can participate in all trials. The Owner will be informed of all trials not later than 2 weeks beforehand.

Hatches, windows and doors will be tested with water spray.

Quay trials

The following will be tested operation tests at sea.

- Main engine running test
- Tests of electric installation in different loading conditions
- Test of manoeuvring and alarm functions
- Radar
- Steering system
- Navigation equipment
- Anchoring equipment
- Mooring equipment
- Deck crane
- Test of piping and pumps
- Test of windows, doors, handles, keys etc.
- Test of ventilation installation
- Test of fire alarm and fire extinguishing system
- Test of bow propeller
- Test of all machinery and installations

Sea trials

The sea trial program will be done together with the Owner to the Owner's satisfaction. Following tests will be done:

- Turning circle test to both directions
- Starting and stopping test including crash stop test consecutive 2 times
- Sea trial time will be at least 4 hours; special attention to main engine cooling
- Test of steering propeller with different speeds from 0 to 5 knots
- Noise level measurements at main engine 100% RPM
- Fuel oil consumption test from idling to full speed will be done under sea trial.

17 Delivery

The vessel will be delivered in full operational condition after the tests have confirmed that the vessel corresponds to design documents.

The vessel will be delivered in ready-for-sailing condition, with full lubricating and hydraulic oil tanks. No fuel.

18 Commissioning and user's training

Commissioning and user's training will be arranged as part of the quay and sea trials.

19 Warranty

The guarantee period is 12 months from delivery. The Builder's standard guarantee report form will be used for reporting faults during the guarantee period.

2 HULL

21 Hull structure

The hull and superstructure will be made of marine grade aluminium. All structures will be welded. Plate materials are EN AW 5754 (AlMg3) or EN AW 5083 (AlMg 4,5). The profiles are made of alloyed aluminium EN-AW 6082 or equivalent.

The materials shall have material certificates; aluminium plates EN 10204//3.1B and profiles EN 10204/2.1.

Hull protection fenders shall be installed according to the GA drawing. Fender is made from PE-pipe, colour black.

The top edge of the transom will be rounded to prevent wearing of booms or ropes. Handrail over transom is removable in three separate sections to give better working area in lowering and hoisting of equipment.

22 Tanks

There will be two fuel tanks of abt. 1,25 m³ in each side hull. Tanks are not interconnected. The tanks shall have remote level measurement with display at helm station. Filling on main deck near the tank on each side.

23 Fire, thermal and sound insulation of the engine spaces

The engine room fire and sound isolation shall be made according to the Rules.

3 DECK STRUCTURES

31 Superstructure

The superstructure will be made of aluminium.

311 Doors

Door construction shall be according to SFS shipbuilding standards. Door to engine room is watertight. Doors to other spaces are splash water tight.

312 Masts

There will be one fixed aluminium mast for radar and navigation equipment. Mast for Navigation lights can be turned down during transportation.

32 Viewports

Toughened glass will be used for all viewports; thickness according the Rules.

Viewports frames will be welded to the aluminium plates and the glass glued to the frame. Thus the water tightness is secured.

321 Window wipers

Bus-type window wipers with fresh water spooling shall be installed on helm station for all front viewports and one window on both sides.

33 Hatches, ladders, handrails, bollards and other fixed structures

Hatches, handrails and bollards according to the GA and made of aluminium.

34 Deck equipment

341 Anchor winch

Self-stowing hydraulic anchor windlass 1pc, cable locker and locker for warps etc will be on main deck forward.

342 Anchors

Two anchors, weights according to rules.

343 Anchor and mooring ropes

Anchor and mooring ropes and chains according to Rules.

344 Deck crane

Hydraulic crane type Ferrari 550.A3 or equivalent, capacity ~ 4tm with ~ 500kg winch shall be installed on main deck.

345 Deck fittings

There are 12 lifting eyes to allow fixing of equipment.

350 Floor covers

There are aluminium floor covers in engine room and in stock room.

37 Non-integrated tanks

372 FW tanks

Fresh water tank size ~ 75 litres and filling from main deck fittings.

373 Septic tanks

Black water vacuum collection tank with deck discharge points.

376 Bilge oil tanks

Small bilge oil tanks in engine room according to Rules.

4 PAINTING, ANTI-CORROSION

41 Painting of hull

42 Painting of superstructure

Surfaces to be painted are deckhouse (outside), hull (outside) and board (outside).

Colours will be agreed with the customer.

Sandblasting or equivalent to SA 2.5.

Wet Hull

Primer 1 x Epoxy, total 150µm

Coating 1 x Topcoat, total 135µm

Others

Primer 1 x Epoxy primer, total 60µm

Finish 1 x Topcoat, total 60µ

Deck with anti-slip finish.

All coating work will be carried out by professional painters only. Coating products are from Jotun or equivalent.

An "induction time", prescribed by the paint manufacturer, shall be respected for the use of 2-component paints.

The Builder and their subcontractors(s) are to have their own Quality Control and pre-inspect all items prior to calling the Owner for painting inspection.

Welding seams of stainless steel parts will be acid-treated or polished properly to prevent surface corrosion.

43 Anti-corrosion

Zinc anodes suitable for aluminium shall be mounted to the hull near propeller, rudder and water intakes in order to prevent corrosion of aluminium.

44 Hull markings

Vessel name and Owners logo shall be placed on both sides of the hull depending on client. Depth marks shall be painted to bow and stern.

5 SHIP SYSTEMS

51 Cooling system

Seawater cooling is used for cooling of:

- main engine
- exhaust gas
- reduction gear
- hydraulic oil system

511 Seawater pumps and filters

A closing valve shall be mounted to seawater line intakes.

52 Fuel oil transfer

Fuel system with double filters and water separators will be installed in fuel lines.

53 Lubricating oil system

The main engines shall have a built-in lubricating system

54 Fire-fighting system

541 Fire-fighting in engine spaces

A fire-fighting system type Pyrogen or equivalent shall be installed in the engine room.

542 Fire extinguishers

Portable fire extinguishers are mounted according to rules and location according to the Safety Plan

543 Fire / deck washing pump

Fire pump can be used as emergency bilge pump.

55 Ballast and bilge water systems, drainage and air pipes

Each hull shall have a bilge water pump. In main the main hull fire pump is used for emergency drainage. Side hulls have separate electrical bilge pumps. Main bilge pump capacity according to rules. Each hull section is ventilated with an air pipe.

56 Hydraulic systems

Power for hydraulic pump is taken off from PTO of either main engine or the reduction gear. The system consists a volume regulated pump, oil tank and seawater cooler.

57 Fresh water, deck washing and sewage systems**571 Fresh water**

H & C pressurised fresh water system to kitchenette and toilet.

572 Boiler

An about 16-litre hot water boiler will be installed.

574 Deck washing/fire water

Salt-water outlet on working deck. The water comes from emergency fire pump.

575 Sewage systems

Grey water and black water systems with their own tank. Tank discharging by vacuum suction from keyside.

58 Ventilation in engine spaces**581 Engine room ventilation**

Engine room ventilation is arranged with separate electrical inlet fans.

582 Other spaces

Natural ventilation with goose necks to be installed.

59 Exhaust gas piping

The main engine exhaust gas pipes and auxiliary engine pipes are of wet type and they are led out between the hulls. Piping is made of heat resistant hose.

6 PROPULSION SYSTEM, OTHER MACHINERY

The vessel propulsion is marine diesel engine with conventional shafting arrangement.

61 Main engine

Marine diesel total power ~ 650kW, fixed installation.

62 Reduction gear and clutch

Reduction ratio will be confirmed during the Technical Project. Reduction gear equipped with clutch.

PTOs for hydraulic pump and deck wash/fire pump either from the main engine or reduction gear; subject to approval of the engine/reduction gear manufacturer.

63 Propeller shaft, bearings and propeller

631 Propeller shaft

The propeller shaft material shall be seawater resistant material.

632 Propeller

Propeller 4 or 5 bladed, diameter ~900mm.

633 Propeller shaft bearings

The shaft bearings are water lubricated rubber bearings

635 Propeller shaft sealings

The shaft seal is of axial type.

66 Steering

661 Bow thruster

A hydraulic bow thruster 42 kW (propeller power) will be installed in the main hull.

662 Rudder machine

Rudder machine includes hydraulic cylinders, hydraulic components and a tiller.

663 Rudder stock

Rudder stock is made of seawater resistant material.

664 Rudder

Balanced spade rudder is high-power profile of plate construction.
Rudder angle shall be +40 --40 degrees.

665 Bearings

Two water lubricated bearings with a shaft sealing in the engine room.

666 Steering system

The steering system will be electro hydraulic.

7 ACCOMODATION

Low weight materials and constructions will be preferred in the accommodation.

71 Thermal, fire and noise insulation

Walls, ceilings and floors in the Pilothouse will be insulated.

72 Interior surfaces

721 Walls

Walls are covered with a laminate.

722 Ceilings

Ceilings upholstery with vinyl.

723 Floor

In all interior spaces the floor material is rubber flooring Norament® or equivalent. Flooring is chosen so that the floors can be washed with water and detergent suitable for heavy oil cleaning.

73 Heating and ventilation

731 Window de-misting

De-misting system for the Pilothouse front viewports.

732 Air condition and ventilation

One roof mounted air condition unit Aurora EOS 85 or equivalent.

There will be one ventilation unit for the Pilothouse.

74 Helm station furniture

741 Control desk

The control desk will be according to the GA.

742 Other furniture

Command centre equipment will be located at the same place. Chairs and a table for meetings.

743 Pilot seat

There will be 1 pilot seat of type Cobra Le Mans or equivalent

75 Kitchenette

The kitchenette shall have the following equipment:

- 1 cupboard/workdesk with a sink and faucet
- 1 microwave oven
- 1 refrigerator with freeze box, total volume abt. 100L
- 1 coffee-maker

76 Head

There will be a head with entrance from the main deck.

It has the following outfitting:

- 1 toilet bowl
- 1 cupboard with mirrored door
- 1 sink and faucet
- 3 hand towel hooks

8 ELECTRICAL SYSTEM

81 General

Vessels main electrical system is 24VDC, bipolar isolated from earth. System is operated with two separate battery packs (start batteries and consumer batteries).

Emergency equipment work with 12VDC and 24VDC systems. 12VDC is executed with voltage regulator.

At sea 230VAC is produced by 24VDC/230VAC inverter (3000W).

An earth leakage measurement system monitors 24VDC and 230VAC electric circuits.

82 Switchboards

821 Switchboard 400/230VAC

The main switchboard includes shore connection and inverter connection to vessels electrical network. The Main board also includes protections for AC electric circuits. The switchboard is located in the engine room.

822 Switchboard 24 VDC

Mainboard is in the engine room. Board includes main switches for batteries and protections for DC electric circuits.

Low voltage switchboard and the instrumentation connection boxes are mainly concentrated in control desk.

83 Shore connection and batteries

831 Shore connection

Shore connection box (16A 3-phase) shall be installed on main deck behind the deckhouse. Vessel's network is separated from shore network by 400VAC/230VAC transformer. Shore cable 20 m included in the delivery.

832 Batteries and charges

In engine room there shall be two battery packs (24V). One for starting and the other for consumers. Battery packs can be cross-connected in case needed for starting main engine.

When main engine is running, both battery packs are charged simultaneously by main engines battery charger. At quay both battery packs are charged simultaneously by separate 50/4A battery charger which is located in the engine room.

84 Cabling

841 Cable trays and electrical outlets

Cables are fixed to cable trays or into cable pipes. Only abt. 300mm of cable is without support at a time.

842 Penetrations

Cable penetrations on watertight bulkheads are made with standard components.

843 Cables

Power cables are Halogen-free marine cables.

Start cables are flexible cables.

85 Lights and lighting**851 Navigation lights**

Navigation lights according to Rules. Additionally NUC lights to be installed.

852 Searchlight

One remotely operated searchlight type Golight 220 or equivalent to be installed on Pilothouse roof.

853 Internal lighting

In deckhouse and accommodation area standard fluorescent lamps will be used

854 Deck lighting

The work deck shall have four halogen floodlights installed in each corner of the pilothouse to give illumination on the working area. There are also 9 separate deck lights attached to the pilothouse.

86 Navigation equipment

The following equipment installed at the helm station

Raymarine system with

- C120 Multifunction Navigation Display 12.1",
- Radar Pathfinder RD424 4kW
- GPS Antenna Raystar 125
- Echo sounder DSM 300
- Rudder angle indicator
- Magnetic compass Suunto D-165
- FM radio, car model Philips with antenna Or equivalent

87 Communication equipment and intercom**871 VHF-telephone, fixed**

VHF/DCS -radio Ray 240E or equivalent shall be installed

872 VHF-telephone, portable

Portable VHF radio Geonav Pocket 4300 or equivalent.

877 Signalling system

Signal horn ~ 100dB, type Marco, AFI or equivalent.

878 Command telephone

Raymarine 430 Loudhailer at helm station, bi-directional weatherproof loudspeakers on both fore and aft deck.

880 Alarm systems**881 Fire alarm system**

A fire alarm system with control panel on the helm station in accordance with the Rules to be installed.

882 Bilge water alarm

There will be a bilge water alarm from each hull section on the bridge.

884 Current alarms

Earth-leakage alarm.

885 Engine alarms

Main engine manufacturers' standard alarms will be used.

886 Level alarm of fuel tank

No separate alarm. See 22.

9 OUTFITTING

92 Emergency equipment

Life raft for 8 persons	1off
Life-buoy with line/light	4off
Inflatable life jacket	8off

Other life saving outfittings according to Traffic Area 2 TRAFI.

93 Other outfitting

Electronic clock on the bridge

A ship's bell will be installed on the aft bulkhead of the superstructure.

Signs according to technical project to doors, hatches, valves, pipelines and cables.

Tools, navigation and ship's inventory, flag, signals shall be Owner's delivery

10 OPTIONS

101 PROPULSION AND MACHINERY

1011 CP-propeller

In oil recovery mode the speed of the vessel is to be kept low, typically between 1,5 to 2 knots. However, simultaneously the hydraulic systems for the bow thruster, oil recovery system, crane and others must be on. Because the hydraulic pump uses the PTO of the main engine, revs must be kept high. On the other hand, hull resistance of this vessel is low, so typical speed even at idling exceeds the target speed.

Using a fixed-pitch propeller means that speed can be kept low only by switching the clutch on and off. At larger oil spill the recovery time can be days, so control of the vessel becomes straining for both the helmsman and the clutch.

This is why we recommend a CP-propeller for oil recovery application and it is practical to almost any other work also.

1012 Remote control

There will be one control position for the helmsman in the middle of control pulpit and a side steering position at the back of the wheelhouse. In both positions there shall be electric control of rudder, main engine and bow thruster. Additionally the rudder angle indicator shall be at the aft steering position.

Control pulpit shall have all communication equipment, alarm panels, light panel, motor control panel and indicators.

1013 Auxiliary engine

Auxiliary engine 9kW.

See 1032.

102 OUTFITTING

1021 FinnSweep® oil recovery system

The vessel can be delivered with a well proven integrated FinnSweep oil recovery system. There shall be mounted two brush skimmers in a watertight compartment behind the engine room. Under pressure is created behind the brushes and when oily water flows through them oil is separated from the water separated from the brush with the help of a comb. After the comb oil is pumped with a dedicated pump to sacks, a deck container or a rubber container tank floating behind the vessel.

Dead weight reduction 4,5 tons.

Classification change: "Oil recovery boat, non-sinking with one flooding department, deck crane".

103 ACCOMMODATION

1031 Heating

Heating for Nordic conditions

1032 Air conditioning system

One roof mounted air condition unit.

Aux engine 9kW needed

1033 Refrigerator

1 refrigerator with freeze box, total volume abt. 70L