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TECHNICAL SPECIFICATION

MARKING VESSEL

Annex X.

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List of abbreviations

AE/A0	Propeller blade area ratio
AIS	Automatic Identification System
Art.	Article
B _{OA}	Breadth overall
BUS	Communication system that transfers data between components inside computer
CEE	International commission on rules for the approval of electrical equipment
CEVNI	European Code for Inland Waterways
CF	Compact Flash card
DC	Direct Current
DIN	Deutsches Institut für Normung; German Institute for Standardization
Dir.	Directive
e.g.	For example
EBL	Electronic Bearing System
EC	European Community
ECDIS	Electric Chart Display and Information Systems
EN	European Norm
ENI	European Identification Number
etc.	And other similar things
EU	European Union
excl.	Excluding
GPS	Global positioning system
HP	Horse power
IACS	International Association of Classification Societies
IENC	Inland Electronic Nautical Charts
Incl.	Including
ISO	International Organization for Standardization
JCU	Joystick Control Unit
LED	Light Emitting Diode
L _{OA}	Length overall
MFM	Multi-Function Monitor
NMEA	National Electric Manufacturers Association
P/D	Propeller pitch/diameter ratio
PVC	Polyvinyl chloride
RAL	Reichs-Ausschuss für Lieferbedingungen, State council for terms of delivery and supply. The colour matching system

rkm	River kilometre
t	Autonomy
TFT	Thin Film Transistor
T _{max}	Maximum draught
UV	Ultraviolet
U-value	Overall heat transfer coefficient
v	Speed
VHF	Very high frequency
VRM	Variable range marker

0 General provisions

01 Regulations

0101 Validity

All the regulations listed in this document shall be applied in their valid version at the moment of contract award.

0102 Legal regulations

Design, construction and building of the vessel intended for waterway marking equipped with a push-bow (in following text given as marking vessel) is governed by the provisions of:

- CROATIAN ACT ON INLAND NAVIGATION AND INLAND PORTS (Official Gazette No. 109/2007, 51A/2013 and 152/2014);
- TECHNICAL RULES FOR STATUTORY CERTIFICATION OF INLAND NAVIGATION VESSELS (Official Gazette No. 92/13,07/14 - consolidated Directive 2006/87/EC);
- Class rules of a recognised classification society in accordance with Directive No. 2006/87/EC;
- CEVNI – European Code for Inland Waterways.

0103 State of technology

If neither these service specifications nor the Ship Technology Regulation contain provisions or detailed specifications of the individual structure and components, the respective norms (EN, ISO), construction regulations of the recognized classification society, in line with EU Directive 2006/87/EC or relevant rules in force, as well as generally accepted rules of the shipbuilding technology shall apply.

The hull and superstructure, machinery, systems and electricity shall meet regulations of the recognised classification society.

Construction safety certificate and certificate of compliance to Directive 2006/87/EC to be issued.

0104 Hierarchy of the regulations

At discrepancies between the regulations, they shall be applied in this hierarchy:

1. Legal regulation
2. Directive 2006/87/EC and Class Rules
3. Contract
4. Technical specification

0105 Ambiguities

All details not covered or not sufficiently described by the regulations shall be designed and built in line with the generally accepted rules of the shipbuilding technology.

0106 Construction parts, equipment and components

It is only acceptable to use products which are commonly sold for the intended use in the European market, and have to have logistic support by the European representative.

02 Basis

0201 Hull form

Vessel shall be monohull for the navigation in ice with maximum ice thickness of 5 cm. Hull shell shall be reinforced to be able to resist floating wooden stumps which may occur.

Hull form has to be defined with following set of documentation:

1. Body plan
2. General arrangement
3. Preliminary resistance calculation and speed/power estimation
4. Preliminary stability calculation

Preliminary resistance calculation and speed/power estimation have to be confirmed by model testing after contract sign, where resistance and estimated power should not differ more than 10% to the model test results. Increase of more than 10% will be penalized.

0202 Propulsion

The marking vessel shall be designed as twin screw vessel with two propellers, two propeller shafts and two engines. The propulsion performance shall be confirmed during trial runs.

03 Operation

0301 Deployment conditions

The vessel is foreseen to operate in waterway zone 3, Danube: from rkm 1.295,500 to rkm 1.433,100.

The vessel shall be designed to operate as a vessel for waterway marking.

The marking vessel shall serve for placement, manipulation and maintenance of the floating marking buoys and coastal signs and surveying of the waterway in order to determine the available depth in the waterway.

The marking vessel shall be designed for single operation, with the capability to push or tow other vessels occasionally.

0302 Crew

The vessel shall be designed for operation with a four-man crew. In addition to the crew, the deck house shall be arranged in such way that it can provide sufficient accommodation for 10 persons.

For emergency conditions (e.g. in case of accidents), auxiliary bunks shall be provided in the salon for the accommodation of two persons.

0303 Life time

The marking vessel will be designed for a life time of a minimum of 30 years.

0304 Internal and external noise

In accordance with Art.7.01 (2), Art 8.10 and Art.12.02 (5) of Annex II of Dir. 2006/87/EC.

04 Design

0401 General

Marking vessel shall be designed as Inland Waterway Vessel for Waterway Marking, equipped with a push-bow.

0402 Exterior design

The official function and the character of the marking vessel shall be expressed through the exterior design.

0403 Interior equipment

A sober, clear design, robust, easy care and maintenance free equipment shall be selected. When designing the helm position, navigation equipment shall be integrated ergonomically. Provision of a view of the working area is particularly important!

0404 Colour and designations

Basic colours:	Hull:	RAL will be specified by end user
	Superstructures:	RAL will be specified by end user
	Deck:	RAL will be specified by end user

05 Main dimensions

Length overall	$L_{oa}=18 - 22 \text{ m}$
Breadth overall	$B_{oa}= 4,00 - 6,00\text{m}$
Draught, maximum	$T_{max}=1,00 \text{ m}$
Main engines number	2
Main engines power	will be calculated by the bidder
Displacement	will be calculated by the bidder
Operating cruising speed	$v=18 \text{ km/h}$ minimum
Autonomy	$t =10\text{days}$

The fully loaded vessel shall operate at cruising speed of at least 18 km/h on an average water depth of 5,0 m, average river flow at 4 km/h and at wind and wave conditions not exceeding Beaufort 2 with the engine running on 80% of the maximum brake power.

06 Vessel form, space arrangement

0601 General

The design of the superstructures and the space arrangement as well as the lines of the hull shall be proposed by the bidder, taking into account general arrangement plan as provided.

0602 General plan

A general plan and other drawings showing the layout of all spaces of the vessel shall be created and submitted for an approval.

0603 Compartments

The compartment arrangement shall be in accordance with the relevant rules and regulations.

The hull must be divided into watertight compartments in accordance with the rules and regulations.

At least these compartments shall be integrated into the design:

- fore and aft collision compartment,
- engine room compartment,
- crew accommodation compartment below the deck,
- storage (hold) compartment,
- salon – wheelhouse in superstructure (deck house),
- working space on the fore deck.

0604 Push-bow

The bow shall be designed as a push-bow, aimed for occasional pushing of specific working platforms or similar working craft, as well as manoeuvre assistance.

0605 Engine room

The engine room shall be designed such that the main engines, the Diesel generator, the electric distribution box, the accumulators and all necessary equipment can be accommodated in the engine room.

The engine room shall be designed such that the main engines, the Diesel generator and the shafts can be dismantled and pulled out of the vessel without damaging the superstructure or the hull.

0606 Deck

In the front part of the vessel a working area and space for storage of the buoys shall be foreseen.

The area shall be designed for accommodation of:

- 5 buoys (steel buoy with a diameter $\varnothing = 1$ m and a weight of ca 80 kg, equipped with a steel rope of 25 m length and 2 concrete anchor weights of ca 125 kg each),
- Sparerope, spars with hook and other material necessary for marking works.

The working area shall be minimum 30 m².

The floor of the working area must be strong enough for heavy duty works with heavy buoys and concrete anchors. The floor must have an anti-slip surface, being effective all

year-round (water, ice, snow, mud). Working areas shall be washable by the installed pumps.

The working area walls and railings must be designed such that the manipulation of the buoys can be carried out without barriers, freely and safely.

The width of the side deck around the superstructure shall be 700 mm or more.

0607 Wheelhouse

The wheelhouse shall be designed sufficiently high in order to allow the helmsman to watch the working area on the vessel. In addition, the helmsman shall be able to watch all areas around the vessel for safe navigation and conduction of works in the vicinity of the vessel.

The wheelhouse shall be designed for the navigation by one person.

0608 Below deck space

If the design of the bidder contains belowdeck space arrangement for the crew to stay, the space needs to have a clear height of 2 m (excl. rooms where the access area may have a chamfered roof wall with the angle of max. 45°). The distance between beds and the deck or roof has to be at least 1 m.

0609 Stern working area

In the aft part of the vessel, there shall be a working area for the manipulation of the service boat.

07 Drawings

0701 General

All construction and architectural drawings shall be created after the contract is closed by the supplier, discussed with the customer and submitted for his approval.

0702 Approval of the drawings

The construction works can start only after the approval of the drawings by the customer.

In addition, the construction works can start only after the approval of the drawings by the recognized classification society that shall be defined in the contract.

0703 Responsibility for the function

The supplier shall be liable for the functionality of the whole vessel, incl. the equipment and devices, as well as all installed or supplied components and equipment parts necessary for the intended use.

0704 Documentation after the vessel construction

Prior to delivery of the vessel, revised documents and drawings (as built), approved by recognised classification society, shall be handed over to the customer in two copies

Note:

- Technical documents, including manuals, drawings, dimension and type descriptions, switch and wiring schemes, pipe plans shall be in Croatian language

- Maintenance plan for the whole vessel, incl. the machines, aggregates and equipments shall be in Croatian language

08 Inspections and takeovers

0801 Inspections during construction and production

During the period of construction, the Customer has the right to dispatch authorized representatives to the yard in order to inspect the execution of the work.

The Supplier shall provide the Customer with the schedule of construction and tests necessary for the Customer's inspection. Supplier shall prepare Inspection and Test Plan with important key points during construction and shall propose which of those inspection and tests to be presented to the Customer and Class Surveyor.

0802 Welding inspection

Non-destructive tests of the welds shall be carried out in compliance with the requirements of the Classification Society.

The hull construction and welding joints shall be inspected by the Customer after completion of hull construction.

Tightness test of the outside shell shall be carried out prior to painting.

0803 Piping and coolers

All piping parts (especially prior to assembly of their covers) shall undergo a pressure test. All coolers shall undergo a seal test prior to painting.

0804 Tanks

Tightness and hydro test of all tanks have to be carried out prior to painting.

0805 Painting

Painting works including surface preparation and inspection shall be carried out in accordance with the Supplier's practice and the paint maker's recommendation based on this specification. Technical supervision shall be provided by the paint maker during preparation and paint application. Paint report to be submitted by paint maker.

0806 Trial runs

Customer representatives have to be present during trial runs. The supplier shall inform the customer representatives about trial runs time at least 14 days in advance.

The fuel and oils needed for the test navigations shall be provided by the supplier.

The crew shall be provided by the supplier. Testing during trials should be in accordance to Directive 2006/87/EC. Testing during trials shall include speed trials, stopping trials, turning circle tests, speed trials with the vessel in a pushing mode (vessel with fully loaded, maximum sized barge to be pushed: speed requirement: 13 km/h without the influence of wind and current on deep water), endurance trial (4 hours with maximum speed without any alarms), noise measurements and vibration measurements.

0807 Protocols

All inspections and takeovers defined in this Section 08 shall be documented in protocols and signed by the supplier and customer.

0808 Takeover

The takeover shall be performed by the Agencija za vodne putove (Agency for Inland Waterways), the end user's representative and the supervisor of the recognized classification society that will be chosen by the customer. The parties shall elaborate a takeover protocol.

0809 Delivery

The vessel shall be delivered fully equipped and in clean condition. The place of delivery and takeover shall be Vukovar. The parties shall elaborate a handover protocol.

0810 End user's crew training

The supplier shall deliver all the equipment of the vessel in function.

The supplier shall demonstrably train the crew of the end user.

The supplier shall deliver manuals in Croatian language for all equipment on the marking vessel.

0811 Stability

The stability of the vessel must be in accordance with the Directive No. 2006/87/EC.

0812 List of the issues that can be penalized

The issues that will be penalized if the supplier will not deliver correctly or fully shall be written in the contract. The conditions of penalization will be in contract.

The penalized issues will be (at least):

- | | |
|--------------------------------|-----------------------|
| 1. Date of delivery | – will be in contract |
| 2. Draught | – see 05 |
| 3. Operating cruising speed | – see 05 |
| 4. Stability | – see 0811 |
| 5. Crane | – see 1106 |
| 6. Any fail against EC 2006/87 | |

1 Metal construction**11 Vessel's hull including the deck****1101 Hull form**

Marking vessel shall be a monohull type.

The vessel is designed for all season service and must have a reinforced structure of the hull for operating in heavy duty conditions. The hull must be strengthened such that the vessel can lean on riparian stone fortifications without damaging the vessel.

The hull must be strong enough for navigation in water, where floating wooden stumps may occur. The hull must be strong enough for navigation in icy water with ice floes and ice with a maximum thickness of 5 cm.

The marking vessel shall not be used as an icebreaker.

1102 Materials

Vessel construction shall be of the steel grade A, in accordance with the rules of recognized Classification Society acknowledged in the Directive 2006/87/EC, for the vessel's hull and the deck.

The quality and origin of the materials shall be proven by material test certificates and certificates of origin.

All used metal plates and profiles shall be covered with anti-corrosion priming.

1103 Welding

Welding shall be carried out in accordance with the Supplier's practice and the requirements of the Classification Society.

1104 Construction type

The vessel's hull, incl. the deck shall be constructed in accordance with recognized Classification Society acknowledged in the Directive 2006/87/EC.

1105 Dimensioning

Scantling of hull structural members based on the scantling draft shall be in compliance with the requirements of the Classification Society.

1106 Crane and winch for lifting the buoys

General description

In the central part of the working area or more toward the bow of the vessel there shall be located a hydraulic crane with integrated winch for the following purposes:

- Manipulation of the floating marking signs (buoys) and coastal marking signs,
- Removal of drifted wood from river,
- Reloading materials needed for marking activities from the shore to the vessel and vice versa,
- Manipulation of the stone made waterway structures which will be used during the positioning and maintenance of coastal marking signs.

Hydraulic Crane

The crane must be a knuckle boom marine crane with an own winch of the following characteristics:

- Enhanced to work in hard conditions
- Located in the central part of the working area or more toward the bow of the vessel in order to maximise the efficiency of the crane
- Maximum lifting capacity: 2,5 tons

- Hydraulic reach: at least 12 meters
- Lifting power in the range of 5 meters at least 1500 kg and in the range of 10 meters at least 500 kg
- Attachments to manipulate stone, capturing the drifted wood from river and attachment to be able to excavate earthwork materials.

Anchoring winch and buoy installation winch

Vessel has to be equipped with the anchor winch as defined in referent rules and regulations.

Anchor winch intended for buoy installation shall be equipped and able to:

- Operate with the chain size \varnothing 10 – \varnothing 14 mm (DIN 766)
- Operate with the steel rope \varnothing 10 – \varnothing 16 mm
- Lifting capacity 1 ton
- Minimum lifting speed 10 m/min
- Pulling speed 6-15 m/min.

Above system may consist two separate winches or one single device may be used.

12 Vessel's hull installations

1201 Tanks –general

All tanks shall be non-structural, built and installed with no direct connection to the outside shell of the vessel. Tanks scantlings and design have to be in accordance with Classification Society requirements.

All tanks must be equipped in accordance with Directive 2006/87/EC

All tanks shall be built from anticorrosive materials.

1202 Fuel tank(s)

The size of the tank(s) shall be designed to provide autonomy of 80 hours on cruising speed, with 75% of tank capacity, during the winter time when full heating is running.

1203 Fresh water tank

Minimum capacity: 1500 litres.

The fresh water tank must be manufactured from stainless-steel material or from certificated plastic material for the fresh water storage.

1204 Waste water tank

Minimum capacity: 1500 litres.

13 Sheer strakes on the vessel's hull

1301 Protection sheer strakes

Robust rubber protection of sheer strakes shall be installed at the height of the deck or top of the bulwark from the stern to the bow.

A second protection of sheer strakes shall be installed from the stern to the bow approximately in the middle of the freeboard.

14 Superstructure

1401 Materials

The superstructure shall be built of the construction steel grade A.

Quality and origin of the material shall be documented by material test certificates and certificates of origin.

As large plates as possible shall be used for the construction (minimising the cutting).

All plates and profiles used (excl. the aluminium components) shall have an anti-corrosion protection priming.

1402 Welding

All welding joints shall meet the best welding quality in line with the relevant procedure requirements.

Subsequently, the welding joints shall be flash grinded and sandblasted.

Compensation of accommodation walls deformation can be done with appropriate materials.

Welding quality shall be in accordance with the IACS Shipbuilding and Repair Quality Standard for New Construction; Part A; 6. Fabrication and fairness

1403 Exterior storage space

Exterior storage space shall be accessible from the outside and integrated in the design. It shall be well vented, and it shall provide storage space for deck cleaning material (buckets, brushes etc.).

Holding grips for ladders, probe sticks, and ship hooks shall be foreseen.

15 Surface protection and paint

1501 General

Brand products accepted and available in EU shall be used.

The colour composition and processing shall be in line with the regulations of the producer.

The layer thicknesses listed below are reference values which may be adjusted to the colour composition instructed by the producer.

1502 Underwater paint layer

2x 2-component basic paint layer with zinc (or equal) (50 μ).

2x 2-component deck paint layer (150 μ).

Ice protection layer in the area of the floating water to be applied.

1503 Vessel's Hull– water line to bulwark

2x 2-component basic paint layer with zinc (or equal) (50 µ).
2x 2-component deck paint layer (50 µ).

1504 Superstructure

2x 2-component basic paint layer with zinc (or equal) (50 µ).
2x 2-component deck paint layer (50 µ).

1505 Decks

2x 2-component basic paint layer with zinc (or equal) (50 µ).
2x mechanically loaded 2-component deck paint layer with structure effect (50 µ).

1506 Vessel's Hull– interior – general

1x 2-component basic paint layer with zinc (or equal) (50 µ).
2x 2-component deck paint layer (50 µ).

1507 Engine room

2x 2-component basic paint layer with zinc (or equal) (50 µ).
2x oil and thermal resistant 2-component deck paint layer (50 µ).

1508 Superstructure interior

2x 2-component basic paint layer with zinc (or equal) (50 µ).
1x 2-component deck paint layer (50 µ).

1509 Piping

The paint colours shall be in line with the valid regulations.

2 Equipment

21 Steering

2101 Rudder

The steering shall be performed by two balance flat blade rudders placed behind the propellers in the way that the propeller shafts can be removed without removing the rudders.

2102 Steering system

The steering system shall be designed in accordance with Directive 2006/87/EC and with the requirements of Classification Society.
The steering system shall be hydraulic or combined type.

2103 Bow thruster

The vessel shall be equipped with bow thruster.

22 Anchoring, mooring,

2201 Anchor

Anchor's weight shall be in accordance with Directive 2006/87/EC. The anchor(s) shall be reduced mass type (High Holding Power).

2202 Anchor chain

Minimum length of the anchor chain shall be 40 m.

2203 Anchor winch, chain stopper

The vessel shall be equipped with electric or hydraulic anchor winch. The anchor winch shall be used as mooring winch as well. Manual chain stopper shall be installed.

2204 Bollard

At least of 6 bollards shall be installed on the deck:

- 2 double cross bollards at the bow
- 2 single cross bollards at the sides of the deck
- 2 double cross bollards at the stern.

2205 Bulwark fairleads

Sufficient fairleads with round steel topping for the front double cross bollards shall be installed.

23 Rescue equipment

2301 Life buoys and lifejackets

Lifebuoys and lifejackets have to be in accordance with Directive 2006/87/EC.

2302 Service boat

The marking vessel shall be equipped with a service boat for 4 persons and with outboard engine. The service boat and engine must be suitable for heavy duty use. The service boat material shall be aluminium alloy. The service boat shall have a length of 5 to 6m.

The outboard engine shall be a 4 stroke engine with a power output of at least 30 HP.

The engine shall be electrically started.

On the marking vessel, davits for safe manipulation of the boat (without crew on the boat) shall be foreseen.

The service boat shall be placed in such a way that it does not interfere with the vessel mooring.

24 Hatches and covers

2401 General

Execution: anti-slip and stumble protected, closed by a key bolt, lightened with a gas spring, mechanical securing against falling down, water drainage.

2402 Engine room

Placement in line with Section 0605, sufficient access to the engines and shafts for maintenance has to be secured.

2403 Front of vessel, chain box

Clear opening of at least 0,36 m² with the shortest side having not less than 0,50 m.

2404 Belowdeck space

All the below-deck rooms are accessible through hatches, clear opening of at least 0,36 m² with the shortest side having not less than 0,50 m.

2405 Rudder room

Every rudder has to be accessible via its own hatch. Hatch dimensions shall be such that the uninstallation and installation, as well as maintenance of the whole rudder is possible.

25 Pathways and securing

2501 Mobile ladder

1 overboard ladder on the side of the stern, material - aluminium, clear width of at least 0,40 m, distance holder to the side wall for maintaining a distance of at least 0,15 m, length designed in a way that at least 3 steps of the ladder can be placed under water.

2502 Fixed ladders

One ladder for access to every belowdeck room through a hatch, material - steel or aluminium, clear width of at least 0,40 m, both side round hand rail with diameter of 40 mm
One fixed ladder integrated in the design for the mounting of the deck house, clear width of at least 0,40 m, distance holder to the side wall for maintaining a distance of at least 0,15 m, both side round hand rail with diameter of 40 mm, holding handles pulled up to at least 0,50 m above the deck house roof.

2503 Stairs in the interior

Stair steps of steel, closed steps, anti-slip surface, rounded hand rail on both sides with diameter of 40 mm.

2504 Handrails, railing, handles

Easygrip rounded handrails, diameter of 40 mm, around the whole deck house.

Rounded handrail of stainless steel, diameter of 40 mm, placed on the bulwark, upper edge at least 0,70 m above the deck.

Foot points for standing rigging for life belts, positioned to allow securing on each point of the deck.

Base boards, height around 5 cm, on all deck edges without bulwark.

2505 Floors

In the below-deck rooms accessible via hatches, the floors shall be made of aluminium tear metal plates, they shall be screwed tightly.

The floor in the tank room shall be isolated from static electricity and it shall have an anti-slip cover.

2506 Deck surface

Anti-slip cover shall be applied on deck's surfaces.

26 Windows and doors

2601 Superstructure, wheelhouse windows

Superstructure shall be equipped with glass with an U-value of $\leq 1,1 \text{ W/m}^2\text{K}$. Front window and front side windows, as well as back window shall be equipped with glass heating.

Front window as well as back window shall be equipped with generously dimensioned windscreen wipers.

Side windows in the height of the helm position shall be able to open to both sides and shall be fixable in all positions.

All windows shall be equipped with thick sun protection blends.

Windows on the accommodation rooms shall be able to open and fixable.

2602 Superstructure doors

Doors shall be able to be fixed at open position and locked from inside.

2603 Interior doors

All interior doors need to be made of laminated plastic plates, have a lock and door furniture of higher quality, suitable for heavy duty.

27 Firefighting equipment

2701 Portable fire extinguishers

The vessel shall be equipped with portable fire extinguishers in accordance to Directive 2006/87/EC.

2702 Fire extinguisher system

Engine room shall be equipped with permanently fixed fire-fighting system in accordance to Directive 2006/87/EC. Fixed fire-fighting system with automatic triggering in engine room is not permissible.

2703 Fire and smoke indicators

Fire and smoke indicators in the engine room shall be in accordance to Directive 2006/87/EC.

2704 General fire extinguishing system

The system shall be in accordance with Directive 2006/87/EC.

28 Piping

2801 Bilge piping

Bilge piping shall be in accordance with Directive 2006/87/EC and in accordance with requirements of Classification Society.

2802 Fresh water piping

Fresh water piping shall be made of stainless steel and shall be isolated.

2803 Waste water piping

Waste water piping shall be made of high quality plastic material (no PVC). Outer wall penetrations shall be via galvanised steel pipes or stainless steel.

29 Signs and identification denominations

2901 Vessel name and ENI number

Vessel's name and ENI number shall be marked on both sides of the bulwark and on the middle of the upper stern.

Font type, size and colour shall be provided by the customer.

2902 Draughtmarks and draught indicator

It shall be in accordance with Directive 2006/87/EC.

2903 Room labelling

All rooms doors to be labelled.

2904 Sign of the customer (end user)

The official sign of the customer shall be marked on the superstructure. Reflecting foil, positioning, font and size shall be in accordance with the customer's instructions.

2905 Builders plate

Builders plate to be placed on the deck house and shall be made of stainless steel.

2906 Instrument labels

Instruments, warning lights and switches on the helm position shall be labelled by engraved Croatian signs fitting to the interior equipment.

2907 Labels on valves, cocks and pipes

Valves, cocks and pipes shall be labelled by engraved signs in Croatian language.

2908 Other labels

Pictograms pursuant to the Safety Plan in line with Directive 2006/87/EC.

3 Interior

31 General

The layout of the cabins and spaces for the crew shall be according to the respective EU directives.

3101 Quality of processing

The interior equipment shall be in high standard and high professional quality.

3102 Materials

All material must be inflammable, produce low smoke and no burning droplets (DIN 4102 norms or equal).

Exhaust emissions (interior hazard) has to be at the lowest acceptable edge values in Croatia.

Furniture made of panel plates with corrosion-resistant joints.

Particleboards, blackboards and medium density fibreboard is not acceptable.

Hand rails and deflectors of stainless steel shall be of diameter 40 mm.

Samples (incl. the price per m²) need to be attached to the offer.

3103 Assembly

The assembly of the upper visible layer shall be performed generally covered; the empty spaces behind the furniture in the back must remain accessible.

3104 Service openings

Sanitary, heating and electric wiring needs to be accessible via service openings.

Covered wiring needs to be documented in the respective plans.

32 Insulation

3201 Thermal insulation

Insulation materials must be inflammable, produce low smoke and no fire droplets (in line with Classification Society Rules).

Material properties must be proven with the certificate that will be acceptable for the classification society.

Full thermal insulation of the deck house, including the deck and any belowdeck rooms designed for the stay of the crew.

Thermal transition factor aligned with the efficient operation of the air conditioning.

3202 Sound insulation

For the purposes of as low noise production in the interior and exterior, these minimal requirements must be met:

- elastic positioning of propulsion engines, including the transmission
- elastic positioning of power aggregates
- elastic positioning of pumps, ventilators etc
- sound isolation for exhausts with sparkle catchers for all combustion machines
- sound insulation rails in the air input and output pipes
- elastic pipe positioning for all machines
- sound insulation of the engine room on the deck and the walls and perforated plate cover.

33 Panelling

3301 General

Panelling shall be placed on impregnated middle wood layers, screw connection of the middle layers with stainless steel screws on the steel construction.

3302 Material

All material must be inflammable, produce low smoke and no burning droplets (DIN 4102 norms or equal).

Exhaust emissions (interior hazard) has to be at the lowest acceptable edge values in Croatia.

Furniture made of panel plates with corrosion-resistant joints.

Particleboards, blackboards and medium density fibreboard is not acceptable.

Hand rails and deflectors of stainless steel shall be of diameter 40 mm.

Samples (incl. the price per m²) need to be attached to the offer.

3303 Footfall noise insulation

Footfall noise insulation plates (25 mm) under the carrier plate of the floor cover.

3304 Floor panelling

Any floor panelling must be waterproof.

34 Floor covers

3401 General

Floor cover must be anti-slip, antistatic, and easy to clean; no carpet, repair possibility of cover parts needs to be documented, plastic fully welded with wall socle, waterproof.

3402 Doormats

At every exterior door of the deck house, there must be an integrated doormat in the floor, with the width of 0,50 m, which can be taken out for cleaning without a tool.

35 Furniture

3501 Material

All material must be inflammable, produce low smoke and no burning droplets (DIN 4102 norms or equal).

Exhaust emissions (interior hazard) has to be at the lowest acceptable edge values in Croatia.

Furniture made of panel plates with corrosion-resistant joints.

Particleboards, blackboards and medium density fibreboard is not acceptable.

Hand rails and deflectors of stainless steel shall be of diameter 40 mm.

Samples (incl. the price per m²) need to be attached to the offer.

3502 Wheelhouse board

Steel body with large locking service openings.

Hand rail, stainless steel, diameter of 40 mm.

Carrier plate for instruments needs to fold up with fixation in the open position.

3503 Table

Connected firmly to the floor with screws, for at least 10 persons, stainless steel legs, round topping of stainless steel, diameter of 40 mm, full panel plate.

3504 Seating

Integrated padded banks with padded back for at least 5 persons, all paddings detachable, the space under the banks to be designed as storage space. Additionally vessel shall be equipped with 5 padded folding chair. Padding of several layers, robust, non-hydrophilic. Dirt resistant and water resistant cover, object quality, unicolour.

3505 Office furniture

At least 1 meter of cabinet for the document folder, lockable.

At least 3 drawers for small materials, approximately 0,40 m wide and 0,30 m deep.

3506 Computer working space

Table for common laptop (17'') and a printer, including storage space on both sides with 3 power sockets (230 V~) shall be placed in a way that the monitor and work lights do not distract the helmsman at night.

3507 Storage Space

The vessels shall be equipped with following:

- Storageshelf for coats and hats for 4 persons.
- Easytogrip storage place for life jackets for 4 persons.
- Storage for at least 6 sets of tableware (cutlery, plates, cutting board, mugs).
- Storage for first aid material (at least 1 medical kit).
- Washing machine.

35 Sanitary devices**3508 Toilet**

Thevessel toilet shall be equipped with:

- Toilet booth with marine electric pump toilet.
- Washbasin with cold and warm water.
- Soap dispenser.
- Mirror.

Waste water treatment plant will be installed. The waste water tank will be dimensioned in accordance with capacity of the waste water treatment.

36 Pantry**3601 Refrigerator**

One electric 24V= refrigerator with freezer, at least 180 l + 40 l.

3602 Electric stove, microwave and fume hood

One electric stove with oven.

Above the electric stove there shall be placed range hood.

One microwave (approximately 900 W).

3603 Water supply device

Pressurisedfresh water device for cold and warm water with high quality mixer tap.

Washbasin with drip plate, stainless steel.

Locking cock at outer wall outputs in the steel pipe supports.

3604 Working space

Working space of approximately 1,0 m x 0,50 m, full panel plate.

3605 Storage space

Lockable storage space with at least 2 drawers and a separate drawer for kitchenware.
Dinnerware set shall be included, for at least 6 persons.

3606 Electric connections

In addition to the connections for the refrigerator and the microwave, 2 easy to access power outlets (230 V~).

37 Helm position

The wheelhouse shall be designed for radar navigation by one person.

Control house board in line with Section 3502, close to the radar display, there needs to be sufficient storage space for one 17" laptop, incl. 230 V~ power socket. The laptop shall be used by the crew member next to the helmsman.

2 working chairs for the helmsman and 1 person shall be installed, not integrated in the vessel.

4 Propulsion

41 Main engines

4101 General

The vessel will be powered by two main 4-stroke Diesel engines for heavy duty using.

Engines are started by electric starting system. Engines have to fulfil requirements of Directive 97/68/EC.

The fuel system shall have a separate flow meter to measure the real fuel consumption (for each engine and for diesel generator and diesel heating, as well).

Each engine shall have measuring of the real worked hours.

The type and placing of the engines, concept of the gearbox, the shaft will be designed in the project.

The exact engine type needs to be specified in a separate annex with data sheets and drawings.

4102 Power

Main engines power will be calculated by the bidder.

4103 Torsional vibrations

It is necessary to provide torsional vibrations calculation for the whole propulsion system, incl. the transmission, drive shaft and the propeller showing that the expected vibration levels are acceptable.

4104 Installation position

Each of the motors shall be installed elastically on the engine foundations welded to the vessel's hull. The foundations need to be designed in a way that the engine forces are transmitted to the vessel's structure equally and without load or tension peaks.

4105 Exhaust gasses regulations

The engines must have an EC type approval in line with Directive 2006/87/EC and/or 97/68/EC as amended.

4106 Exhaust pipes

Exhaust pipes shall be made of stainless steel. Adequate compensators on the engine, as well as in front of and behind the noise isolation shall be installed.

Exhaust pipes and compensators shall be elastically mounted and isolated.

4107 Fuel supply

The diesel engines take the fuel directly from the tank described in Section 1202.

All equipment shall be in line with Directive 2006/87/EC and technical requirements of Classification Society and main engines manufacturers.

4108 Cooling

All equipment shall be in line with Directive 2006/87/EC and technical requirements of Classification Society and main engines manufacturers.

4109 Starter and stop device

Electric starter with separated starter battery per engine.

Turning off by solenoid unit (24V).

Switching on at the helm position.

4110 Combustion air filter

The diesel engines take the combustion air from the engine room; the combustion air filters are mounted to the engines and equipped with the necessary maintenance indicators.

42 Power transfer

4201 Reverse gear

Reverse gear with coupling is flange mounted on the engine, heavy duty model.

4202 Elastic coupling, drive shafts

Elastic coupling in relation to the result of the torsion vibration calculation, in any case placed between the gear output and drive shaft.

Drive shaft with longitudinal compensation between the gear and propeller shaft, easy to uninstall, well accessible.

4203 Thrust bearing, propeller shaft

Thrust bearing on the front end of the propeller shaft for intake of the propeller power, the foundation in a way that no load and tension peaks occur.

One propeller shaft bearing inside, one on the outside (shaft support with vertical flap as propeller protection), waterlubricated bearing in the shaft support.

Sealing of the propeller shaft transition through the outer wall is well accessible and friendly maintenance.

43 Propulsion

4301 Propellers

The customer prefers a propulsion concept with fixed pitch propellers on rigid shafts (see also item 0202). The propellers shall be positioned so that they are well protected against damage.

In addition, the customer prefers nozzles to protect the propellers against damage e.g. from grounding. Alternative technical solutions that provide an equivalent level of protection are acceptable.

Sense of rotation of the propellers shall be inwards over the top in forward propulsion.

Dimensions and parameters (pitch distribution, number of blades, P/D , A_E/A_0) of the propellers shall be determined by the bidder as necessary to achieve the required performance characteristics (see item 05).

5 Heating, venting, sanitation

51 General

Only common products in EU with available spare parts and maintenance shall be used.

52 Outerwater system

5201 Service water device

Supplies the toilet with flush water.

Supplies the outer circuit of the water cooling system for engines.

5202 Drainage system

Single pipe system with pipes leading to all waterproof compartments.

Every room intake pipe with drainage basket and reverse flap.

Connection of the drainage pipes to the main piping through well accessible ball valves.

Electrically supplied drainage pump in the engine room.

53 Fresh water system

5301 Cold and warm water piping

Material in accordance with Section 2802.

5302 Isolation

Hot water piping requires aluminium coating isolation in the whole vessel to avoid warmth loss.

Cold water piping isolated in warm rooms in full to avoid condensation of water.

5303 Disinfection

The fresh water tank needs to be equipped with a UV disinfection device.

5304 Pressurised water device

Supply of the appliances in the toilet and the pantry.

5305 Hotwater device

Hot water processing by electric flow heater or by using the warmth from engine cooling system.

54 Drains

5401 Rain water gutters, drain holes

All exterior surfaces need to be designed to provide good water drainage to the outside of the vessel. Any drainage pipes, connections and bends need to be maintenancefree and made of stainless steel.

55 Venting and heating

5501 Natural venting

Two air pipes in each of all below-deck spaces.

Air supply openings need to be closable via latch.

5502 Artificial Venting

The deck house, engine room, as well as the accommodation shall be vented artificially.

5503 Heating

Air heating system with warmth exploiting from the engine cooling water.

Diesel auxiliary heating with thermostat regulation.

Additional thermostat regulated 230 V~ air blows for thermoregulation of the deck house, rooms for the crew and for the engine room.

5504 Air conditioning

All rooms designed for the crew need to be equipped with an air conditioner, able to provide interior temperature of 23°C at outdoor temperatures of 35°C and 18°C interior temperature at -15°C outdoor temperature.

5505 Engineroom venting

Sufficiently designed supply air fan with noise silencer for combustion and cooling air, deflecting the remaining air over the silencer and air outlet grid shall be supplied. Remotely controlled fire protection hatches for air supply and outlet openings shall be provided.

6 Electric Devices

61 General

6101 Components

It is only allowed to use parts and components which are permitted in EU and for which spare parts and maintenance can be provided.

6102 Board network

Alternating current distribution system is 3~400/230V with distributed neutral supplied by generator (isolated neutral) or shore connection (grounded neutral).

Direct current distribution system isolated 24 V=. There is one network on board for each of the: service, emergency and engine start batteries.

6103 Emergency power supply

Board network independent emergency power supply for navigation lights, VHF ship radio, radar, GPS, AIS, emergency lights, ship whistle, searchlight etc.

6104 Radar pilot connection

The radar pilot is a 24 V= industrial standard PC; a voltage stabiliser is needed if the supply goes directly via the 24 V= board network.

In each case, a continuous power supply needs to be secured.

62 Power sources

6201 Diesel generator

The diesel generator(s) shall be provided in accordance with energy balance calculation.

Note: calculate the final required power according to installed devices.

Diesel generator(s) has(have) to fulfil requirements of Directive 97/68/EC.

Positioning of the engine and the generator on the same frame, which is to be placed in the engine room pursuant to Section 4004.

Connection between the engine and the generator with an elastic coupling in line with the vibration calculations.

Fuel system, cooling and exhaust piping analogically to the drive main engines.

Starting electrically from the starter battery of the drive engine, turning off by solenoid unit, operation from helm position.

6202 Battery Chargers

Battery chargers for charging the 24 V= board network accumulators and the emergency power accumulators shall be provided.

63 Power storage

6301 Board network batteries

24 V=, sufficient capacity for all intended appliances + 20% reserve.

6302 Starter batteries

Separate battery for every engine and the diesel generator, independent from the board network, allowing starting the engine via separated switch shall be provided.

6303 Emergency power batteries

Emergency power system shall be provided in accordance with regulations in force.

64 Battery charger

The following equipment shall be installed:

- One charger for the board network.
- One charger for each starter battery.
- One charger for the emergency power.
- Charging electronics with accumulator care means.

65 Shore Connection

6501 Main Switch Board

3~400V, CEE 3/N/PE connector value of at least 32A, water resistant plug connection on the exterior of the deck house, with mechanical interlock. Voltage and phase sequence control and protection on the main switchboard.

6502 Supply to other vessels

3~400V 3/N/PE and 230V L/N/PE CEE connectors of at least 16A, water resistant socket connector on the exterior of the deck, with mechanical interlock.

66 Electric switching devices

6601 Main switch board

400/230V switchboard installed in the engine room or the wheelhouse, well accessible. Provides switchgear and control and protection devices for the following:

- Power source selector switch
- Main generator control
- Insulation control device
- Emergency lighting activation
- Shore connection
- Three-phase and single phase consumers (Electrical drives, chargers, lighting, ship systems etc.)

24V= distribution boards may be integrated as separate sections.

6602 Service battery switchboard

24V= distribution board for service consumers

- Propulsion system control and monitoring
- Ship systems (hydro pack, UV sterilizers, refrigerator, etc.)
- 24V= socket network (portable bilge pump and lighting)
- Other consumers.

6603 Emergency battery switchboard

24V= distribution board for emergency consumers

- Navigation and communications
- Navigation lights and signalization
- Fire, bilge, tank alarms
- Steering
- Emergency lighting.

67 Wiring

6701 Wire trays

The wires shall be placed generally in suitable wire trays, if needed, also in protection pipes.

6702 Reserve wiring

There have to be installed reserve wires for both the spare sub-distributors for the connection of appliances at well accessible places in the deck house (2x), as well as in every belowdeck room, except forepeak and aft peak.

6703 Bulkhead openings

Bulkhead openings of electrical wires need to be performed in own cover pipes; the respective rules of the Classification Society have to be followed.

6704 230 V~ sockets

In PC working place area, in line with Section 3406.

In the pantry area (for all installed electric devices): sockets for the refrigerator, microwave oven, electric stove, range hood and warm water processor + 2 in the working place area (well accessible).

In the helm position area: 2 well accessible sockets.

Rest of the deck house: connection for the heat blower, as well as 3 more well accessible sockets, in addition, at least 2 well accessible sockets in the optional area for the crew in below-deck rooms.

Below-deck rooms: 1 socket in each room to plug in a working light.

Engine room: heater connection.

Deck house exterior: in the area of access to the deck house on the exterior wall one socket which can be turned on from the inside, ex-protected and waterproof socket for connecting working tools with connection output of at least 3 kW.

68 Lights

6801 General

Only voltage fluctuation resistant LED lamps and energy saving bulbs may be used. Supply from the 24 V= board network.

6802 Deck house interior

Main switch for interior lights on the helm position

Blendfree general lighting for all the rooms designed for the crew, or non-direct lighting.

Working place lights in the PC area, as well as at the table in line with Section 3503.

Night navigation lights with blue colour of light, intensity and placement in a way that the night view ability of the helmsman is not affected, switch from normal lights to night lights at the helm position.

6803 Belowdeck rooms

The lights in the belowdeck rooms have to be placed in a way that their operation and routine maintenance of the aggregates and the operation devices in these rooms is possible without light blinding and creating shadows.

The switch shall be easy to access to the entrance.

6804 Deck floors

In front of and behind the deck house, there shall be sufficient lighting installed for the working area.

6805 Search light

The search light with at least 200 m light distance, switchable and adjustable at the helm position, LED is acceptable.

6806 Navigation lighting

Only LED lamps may be used.

Night sign in line with the CEVNI (European Code for Inland Waterways) for:

- Single navigating vessel with machine propulsion;
- Vessel with machine propulsion on the tip of a towing system;
- Still floating single vessel;
- A yellow flash light visible from all sides (no revolving light);
- A white flash light (meeting lights) for the day, and night;
- Tone signal lights.

6807 Emergency lights

In case of power failure, in all rooms designed for the crew, there shall 25% of the lights automatically be supplied by emergency power in line with Section 6103.

7 Communication**71 Lights and signals****7101 Night signs**

In line with Section 6807, the placement shall be aligned with the design.

Operation of all signal lights shall be from the helm position with operation indicator.

The operation indicator has to be integrated in the scheme drawing of the vessel.

7102 Signal mast

Device integrated in the design for installation of top lights;

- tone signal lights
- meeting lights
- radar antenna
- GPS antenna for AIS transponder
- radio antennas.

7103 Flag Staffs

One flag staff on the bow and one on the stern, stainless steel, and diameter of at least 50 mm with easy to grip top cover.

The flag staff on the bow must be removable and usable as hand rail for the transition to a pulled working platform.

The flag staff on the stern has to be adjusted for dipping of the flag.

72 Navigation system

7201 General

Navigation system shall be equipped in accordance with inland navigation rules.

7202 Radar device and turn indicator

Installation of the indicator devices in line with the regulations for radar one-man helm position. (Radar device shall be approved for use on inland waterways).

A. Colour river radar

Consisting of:

- 19" TFT monitor incl. protection glass
- Scanner 7ft
- Processor unit and control panel
- CF-card, incl. adapter

Functionality:

- Compact control panel
- Compact processor unit
- Scanner 7ft
- Magnetron 5kW
- Displaying (if connected): time, trip, GPS (position, course and speed), echo sounder, AIS, rate of turn, rudder indicator, steering lever (pilot), prediction/own ship vector

Functions:

- Range 150m – 32km
- 2x VRM
- 2x EBL
- 2x navigational lines
- Cursor
- Own ship, 2nd ship and extra barges drawing
- 8 day / night screens
- Interference rejection
- Variation of antenna speed
- Screenshot, 15 minutes capture
- 2 pieces own ship vectors and docking
- AIS
- Relative and true trails

B. 20 meters of radar cable

7203 Inland AIS transponder

Comprising:

- Display, incl. transponder
- Incl. VHF antenna
- Incl. GPS antenna
- Power supply 24/12VDC, PV3I

Installation in line with the regulations and recommendation of the producer. Refer to the commission regulation 415/2007/EC. Inland AIS transponder class A.

7204 Acoustic signals

A signal horn with tone height and sound pressure of “adult” intension for producing the sound signal in line with the CEVNI regulations incl. the keep-away signal.

Radar triple-tone signal horn.

Operation of all acoustic signals from the helm position with operation indicators.

7205 Sonar

The main echosounder

- Single beam echosounder with the possibility of displaying the depth on the ECDIS device and the possibility of measuring the depth in centimetres.
 - Min. range: 0.3 -100m (210 kHz)
 - Accuracy: $\pm 0.01\text{m}$ or $\pm 0.02\%$
 - Resolution: min. 0.01m (210kHz)
 - Probe 210 kHz, max. beam width 9 °
 - Ability to connect RTK GPS receiver
 - Software

Additional echosounder

- Professional navigation echosounder approved for use on inland waterways.

1 x Echosounder MFM - comprising: MFM indicator, fully digital display unit.

1 x Echosounder sensor, incl. interface - comprising: transducer; interface module.

Installation of the devices and probemust be possible without lifting the vessel by crane or slip.

7206 ECDIS viewer +IENC charts

1 x Software and/or charts comprising:

- Basic software
- AIS extension software
- Chart, Danube Croatia

1 x Software & hardware extension comprising:

- Software extension
- Hardware extension

1x Overlay computer

1x 19" TFT monitor, portrait, comprising:

- 19" TFT flush mount monitor, colour grey or black
- Dimmer.

7207 GPS Compass

GPS Compass device shall be approved for use on inland waterways.

1 x GPS Compass comprising: Antenna incl. display, anti-ice/ snow design and data cable.

2 x NMEA box (NMEA splitter, 1 in / 4 out).

7208 Rudder indicator

The rudder position shall be clearly displayed at the steering position. If the rudder-position indicator is electric it shall have its own power supply.

Rudder indicator device shall be approved for use on inland waterways.

The following equipment shall be provided:

- 1x Rudder indicator MFM - comprising: MFM indicator; fully digital display unit; Alpharudder interface MK2
- 1x Rudder feedback unit - comprising: Feedback
- 1x Belt set incl. mounting ring - comprising: Belt set.

73 Command systems

7301 Engine remote control

Positioning and scope of equipment shall be in line with the regulations referred for radar navigation by one person.

Starter and switching off device on the helm position shall be provided.

Speed adjustment and gear shift in line with the regulations for radar navigation by one person shall be provided.

7302 Control indicators

Positioning and scope of equipment in line with the regulations for radar navigation by one person.

74 Send and receive system

7401 VHF Ship Radio

The following equipment shall be provided:

- 2 VHF ship radios for inland ship radio network, positioning and scope of equipment in line with the regulations for a radar one-man helm position.

VHF radios comprising: transceiver; CX 4 antenna; incl. DC/DC power supply.

One man control comprising: gooseneck microphone; feet switch; microphone amplifier interface.

One of the two VHF ship radios shall be operated by another crew member next to the helm position.

2 additional handheld VHF – comprising: Walky Talky; leather bag; hand microphone.

7402 External speaker

One external speaker with microphone on the helm position shall be provided.

7403 Radio and TV receiver

1 radio receiver with USB port, MP3 compatible.

1 TV with ship antenna.

7404 Data BUS

1 data BUS NMEA 2000.

7405 Day/Night Vision camera

Thermal night vision cameras in 640×480 high-resolution format.

Ethernet connectivity.

2× e-zoom function.

Continuous 360° pan and $\pm 90^\circ$ tilt field of regard for horizon-horizon visibility.

- camera head
- joystick control unit (JCU)
- 25 foot, shielded ethernet cable
- weather proof ethernet coupler
- mounting hardware
- user guide

Power supply: 24V – DC.

75 Operation monitoring system

7501 Bilge water level

Water level monitoring in every waterproof compartment shall be provided.

Indicator with alarm (visual and acoustic – can be turned off) on helm position shall be provided.

7502 Fire and smoke indicators

Fire and smoke indicators for the engine room in line with Section 2603, indicator with alarm (visual and acoustic – can be turned off) on helm position shall be provided in accordance with Directive 2006/87/EC.

Fire and smoke indicators for all belowdeck rooms, except the front and aft peak, indicator with alarm (visual and acoustic – can be turned off) on helm position shall be provided in accordance with Directive 2006/87/EC.