

# CREWTENDER.com



## Preliminary Building Specification For the Crewtender 10m

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## **1. GENERAL**

This preliminary building specification is intended to inform clients and/or rescue, salvage or pilot organisations interested in building the new type Crewtender.

The design, the data and specifications, and the branch name Crewtender 10m are the legal property of Habbeke Shipyard, KRVE and De Vries Lentsch, Yacht Designers & Naval Architects, and are not transferable to others without written authorisation.

### **1.1 Type**

aluminium crewtender, with deep V hull and reinforced rubber tube, closed main deck and closed wheelhouse. Propulsion by Rolls Royce Kamewa water jet and John Deere main engine

### **1.3 Main dimensions**

Length o.a.	10.50	m
Length aluminium hull	8.95	m
Length cwl.	7.80	m
Beam overall, incl. tube	3.94	m
Beam Hull	3.10	m
Draft at cwl	0.70	m
Draft fully loaded	0.75	m
Weight fully loaded	9400	kg
Displacement fully loaded		m <sup>3</sup>
Speed under trial conditions	32	knots
Range at full power	6	hrs
Crew	1	pers.
Tank volume	560	ltr.

### **1.4 Propulsion**

Main engine John Deere 6125SFM75, 455 kW at 2100 r.p.m. , with ZF350 reduction gearboxes ratio 1,225:1 allowing the engine to be declutched from the water jet. Water jet and gearbox are connected by horizontal steel driving shaft (Centa). Water jet Rolls Rocye Kamewa FF410 with vectorstick control system.

### **1.5 Tube**

Custom designed for this boat by Marant, polymer outside with foam core, outside diameter 600mm

### **1.6 Electric system**

24V / 12V DC system and 230V AC system, with 3ph. The 230 V system is supplied by a 10Kva hydraulic generator.

## **2. CONSTRUCTION**

### **2.1 General**

The construction will be all aluminium, according a transverse framing system (framing distance 400 mm) with longitudinal stiffening. The construction will be executed by the yard according to approved plans. Experienced certified welders execute all the welding. All welds to be smooth grinded on all outside surfaces. All welding stresses to be avoided, and/or eliminated. All not accessible area's where stress can be expected are dye penetrant tested in accordance with classification society's survey. Fairing of the aluminium plating (hull, deck and superstructure) to be within the standard limits (50% of plate thickness over 1 m).

### **2.2 Materials**

Aluminium plating, built sections and flat bar:	Aluminium (AA 5059 H321 almg 4,5 mn)
	min. tensile strength unwelded 370 N/mm <sup>2</sup>
	min. yield strength unwelded 270 N/mm <sup>2</sup>
	min. tensile strength welded 300 N/mm <sup>2</sup>
	min. yield strength welded 160 N/mm <sup>2</sup>
Aluminium extrusions:	6061 T6 or 6082 T6
	min. tensile strength unwelded 270 N/mm <sup>2</sup>
	min. yield strength unwelded 220 N/mm <sup>2</sup>
	min. tensile strength welded 160 N/mm <sup>2</sup>
	min. yield strength welded 135 N/mm <sup>2</sup>
Stainless steel:	AISI 316L
Fastenings :	st. st. grade A4 and Sopral P60

### **2.3 Scantlings**

- hull ..... 6 mm
- hull i.w.o. water jet ..... 10 mm
- transom..... 6 mm and 8 mm
- tube support..... 4 mm
- weather deck ..... 4 mm
- wheelhouse deck..... 4 mm
- raised deck near bow..... 4 mm
- superstructure window front..... 4 mm
- front auxiliary compartment ..... 4 mm
- superstructure elsewhere ..... 3 mm
  
- floors outside engine room ..... 5 mm with face flat 40x5
- floors in engine room ..... 6 mm with face flat 40x5
- hull frames ..... web 70x5, face flat 40x5
- w.t. bulkheads..... 4 mm, 5 mm
- w.t. bulkhead stiffeners ..... T 45x30x4,5 and T 75x32x6
- deck beams ..... web 50x5, face flat 40x4 and T 45x30x4,5
- superstructure stiffeners ..... T 45x30x4,5
- superstructure beams..... T 45x30x4,5 and 40x5
  
- stem bar..... 100x10
- margin plates ..... 5 mm
- longitudinal bottom stiffeners ..... T 45x30x4,5

- tank top ..... 5 mm
- manhole covers ..... 5 mm
- deck girders ..... T 75x32x6
- wheelhouse roof girders ..... T 75x32x6
- longitudinal stiffeners decks..... 30x4
- longitudinal stiffeners superstructure ..... 30x4

Pillars, webframes, bottom girders, stringers etc. according to construction plan

## 2.4 Construction parts

- Spray rails built onto the hull according to plans.
- 2x Stern extensions to add buoyancy and support aft deck.
- Heavy insert plating in bottom and stern in way of the water jet outside flush with surrounding plates.
- Provisions for mounting of sensors of navigation instruments like speed, log and echo sounder.
- Fittings to attach trim flaps at the transom.
- Trim flaps at the transom (optional)
- Special care for mounting of flush anodes, according to specification of specialist and yard standard.
- Centre girder with face flat and stem bar.
- Engine seatings with heavy flat bar on top.
- Floors with face flat and lightening holes.
- Frames and deck beams with welded flange and supporting brackets according to plans.
- Web frames with face flat according to approved plans
- Superstructure side extended downwards under the weather deck onto the bottom plating with large openings under the weather deck according to plan.
- Longitudinal girders and stringers according to approved plan.
- 3x W.t. bulkheads with (sniped) stiffeners including w.t. bulkhead penetrations. W.t bulkhead at frames 7, 14 and 19.
- 1 Integrated fuel tank with:
  - swashplates
  - margin plates
  - manholes
  - sockets etc. for filling, suction and ventilation and level indication systems.
  - drain plug at lowest point.
- Tube support according to approved plan.
- Hatches:
  - 1x large hatch ( $\pm$  1800x1000 mm) over main engines on the wheelhouse floor deck superstructure, complete with secured st. st. wing bolts. Only to be opened for maintenance.
  - 2x entrance hatch (500x600 mm) to the engine room in large hatch over main engine (see above). Can be opened from inside and outside.
  - 2x flush (with the deck) hatch ( $\pm$  600x600 mm) over the waterjet compartment with drains to the transom. Can be opened from inside and outside.
  - 1x hatch (600x500 mm) in foredeck above the forepeak for entrance engine room
  - 1x flush entrance hatch ( $\pm$  690x600 mm) to auxiliary compartment at the forward side of the superstructure.
  - The above aluminium hatches with adjustable st.st. or aluminium hatches, rounded corners and gutters, flush st.st. toggles and st.st. gas springs unless stated otherwise.
  - 2x Small hatches at starboard and portside at the stern for changing tubecorners

- Dashboard construction, arrangement to be made after try-out with mock-up (by yard).
- Captainseat: Shockwave offshore patrol
- Passengers seats: NorSap 800
- Eight bollards at Starboard and Portside
- 4x Specially designed lifting eyes, to hoist the boat out of the water.
- Aluminium handrails all along the superstructure, the wheelhouse roof, on the raised fore deck and at the aft side of the raised fore deck. Part of these handrails are heated
- Aluminium electronic, canting and removable navigation mast on heavy foundation plate. Mast with branches to support all navigational equipment and lights etc. Navigation mast w.t. inspection holes with access to cabling.
- Deck drainage through 2x flush fibreglass grating in the aft deck.
- Sufficient small deck drain pipes for draining of rainwater.
  
- Recesses in superstructure for:
  - 2x PS+SB navigation sidelights light in wheelhouse roof
  - 7x led deck lights,
  - Step in superstructure front to climb onto the wheelhouse roof
  - 1x Deck led floodlight in aft side wheelhouse roof.
  - 2 x led front lights at the front of the wheelhouse
  
- Engine room air inlet ducting (2xPS+1xSB) with aluminium grills, with salt filter.
- Engine room air outlet with a Jabsco blower (runs 15min when engine stops)
- Supports for piping, tools and equipment to be fitted where needed and to be provided with suitable anti vibration and insulation materials.
- Aluminium protection plates to be fitted over all dangerously moving parts.
- Special seawater/sand filters in seawater system. Custom made Aluboot

## **3. EXTERIOR**

### **3.1 General**

All equipment to be installed according to the recommendations of the KRVE / Habbeke Shipyard and the relevant subcontractors/suppliers.

### **3.2 Aluminium fittings**

On all positions where equipment will be installed, extra aluminium support to be constructed, and where needed eyes for mounting and swing plates for small parts to be fitted.

### **3.3 Deck equipment**

- Life buoy
- Boathook
- 4x 15 m Mooring ropes on rope holders

### **3.4 Tube**

D shape tube, made according to the specification of the supplier Marant. Outside diameter 600 mm. Fastening to the aluminium hull by Habbeke patent. Colour to choice.

### **3.5 Windows**

Construction and layout according drawings and instruction of the supplier Hobbel glas connect The Netherlands. Windows (3x in wheelhouse front, 4 at the side) to be made according to clear-view measurements of the architects. The windows will be electrically heated and have a solar control film at the top..

### **3.7 Pipelines and fittings on deck**

All fastening of pipelines to be of stainless steel, PP, poly-propylene or aluminium, and to be carefully insulated to prevent galvanic corrosion. There will be a connection of the reservoir to the wipers on the front windows. Handrails at the front and the rear are electronically heated (230V)

### **3.8 Electrical deck equipment and lighting (see also section 6)**

- Window screen wipers with st.st. wiper arms and blades. Make: Exalto 235 KK-HD
- Horn, mounted to prevent the ingress of water.
- Navigation lights
- Pilot lights
- Deck Lights
- Search light which can be operated from the wheelhouse (ACR RCL-300)
- Floodlight aft deck
- Front lights in front wheelhouse
- Intercom connections (option)

### **3.9 Various deck equipment**

- Installation of all kind of various equipment according instruction of KRVE / Habbeke.
- St.st. gas springs at hatches, make: Technics 500n
- Custom aluminium Locks or padlocks on doors, hatches.
- 4x Locking key for hatches.

## **4. INTERIOR**

### **4.1 General**

The interior arrangement will be executed according the architect's drawings. The KRVE will provide all data to the yard, in order to make a mock-up (yard supply) for the steering-position, the seats and the dashboard.

The (navigation) equipment to be integrated in the custom made dashboard.

### **4.2 Interior lay-out**

Main parts are the dashboard with steering-position. 1x Special high speed craft spring mounted seats with 4 point safety belt, make Shockwave, type Offshore patrol on aluminium foundation. 4 x spring mounted NorSap 800 seats on aluminium foundation.

## **5. Engineering and engine room**

### **5.1 General**

All equipment to be installed according to regulations of manufacturers, suppliers and subcontractors.

### **5.2 Construction**

- foundations for engine room equipment
- support for pipelines
- bulkhead penetrations

### **5.3 Propulsion and steering**

#### Main engine

- John Deere 2175SFM75, 455kw (610hp)
- ZF 3050marine gearbox with ahead, neutral and reverse. Reduction ratio 1,22:1.
- Alternator (capacity to be decided),

#### Installation of engine

- Main engine and built-on gearbox have specially designed engine brackets (KRVE) and flexible mountings. The installation should be able to cope with all weather and sea conditions.
- Engine with gearbox are flexibly mounted on suitable mountings (4x),
- Installation strictly according to instructions of manufacturers.

#### Shaft

- Straight steel shaft with flexible couplings at both ends to be designed by Centa. Steel spacer (Centa) may be needed at gearbox side.
- Watertight bulkhead seals for shafts lubricated with silicon oil. Seals made by IHC or similar.
- Shaftline is straight and horizontal.

#### Water jets

- Water jet make: Rolls Royce Kamewa, type FF410 with custom made 2 water inlets (dn50mm)
- 2 x Interceptors (option)
- Water jet and interceptors are controlled with vectorstick steering

#### Bow thruster

Hydraulic bow thrusters, make, Exalto  
15 hp at 1500 rpm, 2500psi (180bar)  
Controlled by vectorstick steering (in docking mode)

#### Exhaust

- Water-cooled exhaust line comprising of
  - Custom water injection bend, make: Habbeke KRVE, mounted after Cowl
  - certified rubber hose between water injection bend and outlet
  - Cowl muffler
  - St st flexible compensation by Polson
  - Temperature sensor, make: omron, installed in flexible compensation part
- High temperature alarm in wheelhouse as well as temperature reading (Omron).

- Dry part of exhaust to be well insulated by Veen en Tot
- Exhaust line and Cowl flexibly supported by Rubber design

#### Controls

- Engine and bucket controls will be integrated in the vectorstick system, supplied by Rolls Royce
- Gearboxes are controlled electronically from the wheelhouse. gearbox control panel consists of 3 lighted push buttons for the 3 modes: clutch in, clutch out and back flush.
- Complete backup system for the Rolls Royce Kamewa water jet, including backup steering

#### Steering system

- System will be integrated in the vectorsick steering system

### **5.4 Piping systems**

#### General

- Pipelines according the KRVE / Hydromarine / Habbeke approved diagrams and data.
- All piping to be adequately flexibly mounted.
- Pipelines, strainers, valves, pumps etc, all clearly labelled with plastic (preferable screwed on ) nameplates.
- On all pipelines stickers according to international colour code showing content and direction of flow inside pipeline.
- All hose connections by fitted 2 stainless steel clamps.
- All materials of pipe systems and appendages to be approved by classification society especially non-metallic piping (e.g. polypropylene piping), non-metallic appendages and hose materials.

#### Bilge system

- Pipelines and closing valves be made of polypropylene.
- Overboard valves to be made of aluminium. Or polypropylene
- Every compartment has his own submersible 24V bilge pump, make: Rule 3700-16A.
- Every compartment has a Kubler bilge alarm with a visual alarm on the dashboard.
- Each bilge pump can be started from the dashboard.
- There are 2 overboard pipelines; 1 for water jet / engine room, 1 for fore peak.
- There will be a emergency submersible bilge pump on board (cap. 60 ltr./min.), which can be used in every compartment.

#### Fuel system

- System has 1 bottom tank
- Tank with Kubler tank measurement with display on dashboard and engine room
- Tank with low-level alarm on dashboard.
- The filling stations is on the entry of the engine room, and have a capacity of min. 70 ltr/hr. Next to the filling pipe is a large ventilation pipe only to be opened during filling.
- Flame arrester in the permanent combined tank ventilation line.
- Filling and ventilation pipes are aluminium.
- Feeding and return piping is stainless steel
- 1x Duplex filter, fuel/water separator, make Racor

#### Seawater system

- Cooling (sea)water is taken from the water jet and pressed through special KRVE Habbeke water / sand strainers to the main engine.
- The cooling water will pumped through a hydraulic driven waterpump, make, HSP pumps, 400 liters/min

- Cooling water cools the aftercooler, heatexchanger, airco, hydraulic oil cooler and clutch cooler.
- Cooling water will be injected in the exhaust line after leaving the special titanium heat exchanger of the main engine
- The seawater lines will be polypropylene pipes and short lengths of hose.

## **5.5 Fixed fire fighting system**

### Fire detection in engine room

- Smoke detector in engine room

### Fixed fire fighting system in engine room

- 2 Fixed fire fighting systems in engine room, make: StatX 1000
- StatX fixed fire fighting system can be operated from the wheelhouse.
- StatX fixed fire fighting system will be activated automatically when temperature in engine room rises to more than 175 °C.
- Before StatX is released a audible alarm and a flashlight will be activated.

## **6. Electric system**

### **6.1 General**

- The design and lay-out in accordance with requirements of classification society and to be supplied by subcontractor. Cables of the halogen free type like "Husk, Huso, Hucom, TP" or equal. Electronic equipment, like navigation equipment etc, to be connected with protected (screened) cabling, and to be installed with the approval of the supplier of the equipment and the subcontractor. (Pay attention to the risk of fire, which occurred on one of the KNRM boats.)
- The system is special designed for aluminium boats, with double wiring and no mass connection to the aluminium. Wiring to be laid in pipes and ducts with watertight bulkhead penetrations.
- The system will be mainly 24V DC and partly 230V AC and 12V DC

### **6.2 AC system**

- The AC system is only installed for pre-heating the main engine, charging the batteries, deck and wheelhouse heating, handrail heating, windows and 3 supporting heaters. Fed from the shore by a 15m cable, connected with plug-in on board.

### **6.3 DC system**

- The DC System is 2-wire and mass free. The DC will be delivered by 2 starting batteries and 2 service batteries. These batteries will be loaded by the battery charger and, when the engine is running, by the alternator and the generator.

### **6.4 Batteries and battery control boxes**

- Make: Optima Yellow Top 12V 56 Ah. They will be placed in groups to form 2 sets, 1 for starting, 1 for service.
  - starting battery: 24V 224 Ah,
  - service battery: 24V 224 Ah,
- Starting battery control box with:
  - main switch
  - emergency switch
  - 2x Surepower diode bridges no. 1 and 2
  - Din 00 fuses/circuit breakers for alternators
  - fuses for volt indicator and ampere indicator
  - volt indicator and ampere indicator
  - earth error indication light
- Service battery control box with:
  - main switch
  - start protection main engines.
  - Din 00 fuses/circuit breakers for wheelhouse distribution board PS, wheelhouse distribution board SB and distribution board wheelhouse roof
  - fuses for volt indicator and ampere indicator and ampere shunt
  - volt indicator service set
  - ampere indicator charging/discharging
  - earth error indication lights

### **6.5 Battery charging**

- The alternator charges the starting battery and the service battery.
- The generator charges the battery charger (mastervolt 24/60) charging both starting batteries and service batteries.

## 6.6 Distribution panels and groups

- In the engineroom 3 panels are to be installed. The panels are built into aluminium boxes. The boxes are closed by watertight hatches. The distribution panels will contain volt and ampere indicators, fuses/circuit breakers/fuses and switches.
- Group 1, 24V panel 1 in engineroom on PS:
  - lighting in wheelhouse, water jet compartment, engine room, auxiliary room, fore peak
  - courtesy lights
  - search lights
  - spare
- Group 2, 24V panel 2 in engine room, behind the dashboard:
  - intercom system
  - mobilfoon
  - GPS video plotter
  - DGPS
  - VHF radio's
  - compass
  - radar
  - horn
  - VHF direction finder
  - echo sounder.
  - Spare
  - power supply for searchlight.
  - blue flash light
  - navigation lights
  - middle screen wiper with water spray
  - screen wipers PS+SB
  -
- Group 3, 230V panel 3 engine room at starboard:
  - screen heating PS
  - middle screen heating
  - screen heating SB

## 6.7 Alarm panels

- 2x CSI 8510F alarm panels, built in watertight in the centre part of the dashboard, 1x PS and 1x SB with the following alarms:

PS panel		SB John Deere panel	
01	main engine low oil pressure	01	main engine low oil pressure
02	main engine high temperature cooling water + high temperature exhaust line (= no cooling water)	02	main engine high temperature cooling water + high temperature PS exhaust line (= no cooling water)
03	gearbox low oil pressure	03	gearbox low oil pressure
04	bilge alarm fore peak	04	low voltage alarm panels
05		05	<a href="#">low pressure fixed fire fighting system</a>
06	bilge alarm engine room	06	water alarm fuel filter
07		07	low pressure alarm water jets PS+SB
08	low level alarm fuel tank	08	smoke alarm auxiliary compartment

09		09	smoke alarm engine room
10		10	smoke alarm water jet compartment
11	spare	11	spare

## 6.8 Electric consumers

- Lighting
  - all outside lighting will be 24V and will be operated from the wheelhouse
  - all inside lighting will be 24V and will be operated within the compartment
  - 1x bulleye 40W B22 in forepeak
  - 8x bulleye 40W B22 in engine room
  - 6x ceiling ledlights in wheelhouse
  - main engines displays on dashboard with dimmer
  - 7x deck lights, , 1x aft deck, 3x PS deck, 3x SB deck.
  - 2 x front ledlights
  - 1 x aft deck / flood ledlight
  - 2x navigation sidelights on wheelhouse roof
  - 1x masthead light in mast
  - 1x stern light in mast
  - 1x towing light in mast
  - 2 x red pilot light
  - 1 x ACR RCL-300 xenon searchlight on top of wheelhouse roof
- Screen wipers
  - 3x Exalto 2355 KK-HD screenwipers with separate controls for:
    - interval
    - slow speed
    - high speed
    - spray
- Horn
  - air horn to be mounted on the roof (marco)
  - air compressor for horn to be mounted in the engine room (BOF)
- Fuel tank level indication and trim system
  - Kubler tank level indication system for fuel tank
  - 1x tank meter on dashboard
- Exhaust temperature measuring system
  - 1x temperature measuring sensor for exhaust
  - display on dashboard
- Bilge system
  - each bilge location provided with
    - bilge alarm
    - bilge pump, make: Rule 3700-16A
    - no automatic switch

## **7. Engine room ventilation and air drying system**

### Engine room ventilation

- Combustion and ventilation air inlet grills are in the superstructure side forward of the engine room. The combustion and ventilation air passes through a water trap and through anti salt strainers into the engine room.
- Salt strainers can be taken out for rinsing.

## **8. Insulation**

- According to the specialist advice received, all insulation should be as light as possible. Insulation by Merford
- Noise in the wheelhouse aprox. 75db

## **9. Painting**

- According to specification of paint manufacturer and sub-contractor. Painting is not necessary on a aluminium hull. Name and decorations is done by using stickers / foil

## **10. Navigation and communication equipment:**

- Compass / GPS, JRC
- GPS videoplotter with map/card EN-C070.01
- Radar, make: JRC / Alphanon
- VHF radios, make:Sailor, type: 2048
- Mobilfoons make, Motorola
- AIS
- Autopilot AP50 Simrad (option)

## **11. Fire fighting and safety equipment**

### Smoke detection and alarm

- smoke detector in engine room
- Smoke detector with visible and audible alarm on alarm panel on dashboard

### Portable fire extinguishers

- 2x 1 kg CO2 extinguishers in the wheelhouse.

-

Fire Fight Sensor at Engine Room, with notice to the wheelhouse panel.

## **12. Intercom system (option)**

- Plug in type, for communication of the crew, with plug in stations in wheelhouse, engine room and 2 on the fore deck. (option: wireless)