



PROZERO 12M INTERCEPTOR

SPECIFICATION



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Contents

1	General	1
1.1	Introduction	1
1.2	Company Background.....	2
1.3	Tuco Marine Group	3
1.4	Quality Assurance	3
1.5	Build Codes & Standard	3
The boat has been built to meet the SOLAS requirements for fast rescue boats. Fejl! Bogmærke er ikke defineret.		
2	Principle Particulars	4
2.1	Vessel Dimensions.....	4
2.2	Capacities	4
2.3	Performance Summary	4
3	Vessel Operating Conditions	5
3.1	Operating Profile	5
4	Hull	6
4.1	Hull Construction and Materials	6
4.2	Engine Beds.....	6
4.3	Fuel Tank/Tanks.....	6
4.4	Bulkheads	7
5	Deck	8
5.1	Superstructure & Arrangement	8
5.2	Minor Fabrications and Mouldings.....	8
5.3	Hatches	8
5.4	Anchors and Cables	8
5.5	Bollards	8
5.6	Fendering	8
5.7	Handrails	9
5.8	Arch.....	9
5.9	Lifting / painter Gear	9
6	Mechanical and Propulsion	10

6.1	Main Engines and Gearboxes	10
6.2	Engine Controls and Monitoring	10
6.3	Waterjets	10
Waterjet model options:.....		Fejl! Bogmærke er ikke defineret.
6.4	Engine Removal	11
7	Systems	12
7.1	Fuel System	12
7.2	Engine Cooling	12
7.3	Exhaust System	12
7.4	Engine Room Ventilation	12
7.5	Bilge System	13
7.6	Fire Detection and Extinguishing.....	14
8	Electrical systems	15
8.1	General	15
8.2	12v DC System	15
8.3	Instrumentation	15
8.4	DC Equipment.....	15
8.5	Shore System.....	16
8.6	Navigation Lights.....	16
8.7	Searchlight/Deck lights.....	16
9	Electronic Systems	17
9.1	Navigation Equipment	17
9.2	Communication Equipment	17
10	Layout	18
10.1	General	18
10.2	Forepeak.....	18
10.3	Forward compartment.....	18
10.4	Tank Space	18
10.5	Engine Room.....	18
10.6	Signage	18
11	Painting and Finishes	19
11.1	External Finish.....	19

11.2	Internal Finish.....	19
11.3	Colour Scheme.....	19
11.4	Decals	19
12	Life Saving and Loose Equipment.....	20
12.1	Life Saving Equipment	20
12.2	Loose Equipment	20
13	Trials, Testing and Training	21
13.1	Trial Program.....	21
13.2	Warranty.....	21
13.3	Spares.....	22
14	Documentation and Drawings.....	23
14.1	Manuals.....	23
14.2	Drawings	23
14.3	Trial Data.....	23
14.4	Certification	23
15	Options.....	24
15.1	Build to Class	24
15.2	Man-Overboard Recovery	24
15.3	Extra equipment.....	24



1 General

1.1 Introduction

This specification has been developed to describe the details of the vessel.

The design is based on our modular ProZero concept.

Tuco Marine has a track record of designing, constructing and providing vessels to commercial clients. List of new builds is available on request.

The ProZero Interceptor has been especially designed for professional users with focus in improving:

- Visibility, with bow and side lights below the fender, for having a better visibility of the area ahead when sailing and to improve multi mission abilities.
- Railings and handholds. The console features a railing all around. To improve safety.
- Better access to engine room and technical compartments for service. The engine room features a double lid on top and the steering console has hatches in both front and rear parts for easy access to electronics and instruments. Additionally it's possible for overhaul to remove completely the engine cover and the steering console.
- Instrument and controls water tightness. Instruments are installed within a watertight glazed box in the steering console to avoid water ingress. Control levels are installed within a watertight box with all cables and hoses going through approved bulkhead watertight fittings.
- Reinforced fender, with the option of having in the bow a higher density foam and a thicker fabric cover for improved tearing resistance.
- Crew weather protection.



1.2 Company Background

Tuco Marine Group was founded in 1998 on the island Funen in southern Denmark. Initially the company was engaged in traditional shipyard tasks, i.e. building and servicing leisure crafts. Since then, the company has developed steadily and directed its attention towards the professional market. Our many years in the maritime business has furnished us with significant market knowledge and given us plenty of opportunity to demonstrate and substantiate our key proficiencies as expert boat builders.

Generally, we are experts in innovative maritime construction and material technologies. In addition to many years of successful deliveries of boats, this technological expertise and know-how has been tried, perfected and validated through contributions to quite a few large-scale, both national and international development projects and we have engaged several other industries such as the wind turbine industry, aeronautics and utility supply.

Taking advantage of our technological expertise and wide-ranging interactions with the maritime sector, we have developed the ProZero series of lightweight work boats for the professional market. The boats are produced using state of the art vacuum technology and composite materials. With these measures, we are well underway to satisfy our ambition of producing lightweight boats that offers improved life cycle performance, significant fuel savings and reduced CO₂ and NO_x-emissions without sacrificing performance, strength, durability and cost-efficiency.



1.3 Tuco Marine Group

Tuco Marine Group ApS is a subsidiary owned by Tuco Group ApS.

1.4 Quality Assurance

The company employs a quality management system called Tuco Quality Control System (TQCS). The system is an adapted and improved version of ISO 9001:2008. Due to the different requirements of classification societies and customers, the Quality Manual of TQCS is amended and adapted to each project resulting in an improved version of ISO 9001:2008.

1.5 Build Codes & Standard

The vessels will be built in compliance with the following rules and standards where they are applicable but will **not** be built to Class or under Class survey as standard.

All ProZero vessels are subjected to the following tests prior to delivery:

- FAT – Factory Acceptance Test
- HAT – Harbour Acceptance Test
- SAT – Sea Acceptance Test



2 Principle Particulars

2.1 Vessel Dimensions

The vessel's principal dimensions are:

Length Overall Appr.	12 m (depending of propulsion type)
Beam Hull Appr.	2.70m
Draft Appr.	0,63 m (depending of propulsion type)

2.2 Capacities

Range	400 nm
Capacity	15 persons

2.3 Performance Summary

Speed:	+60 knots
Cruise speed:	40 knots



3 Vessel Operating Conditions

3.1 Operating Profile

The vessel is designed to have a minimum service life of 15 years allowing for projected operating hours of 1,500 – 3,000 hrs./year of which 30% is at full power.



4 Hull

4.1 Hull Construction and Materials

The composite structure is designed, calculated and built to the requirements of DNV class

Careful attention is constantly paid to weight control and detailed design, to produce a robust and sea-kindly craft fit for the demanding role of high Speed operations. In view of the operational requirements, weight refinement is not taken to the minimum limits allowed by classification rules, but is carefully considered to combine robust construction with efficient operation.

The main hull shell is a one-piece moulding produced in accordance with the hull construction drawing. The hull shell shall have pigmented gel coat above and below the water line.

The first two laminates are of powder bound chopped strand mat reinforcement impregnated with resin. Subsequent laminate is applied as dry fabrics and core material, and infused in one operation with vinylester resin. In general, the complete structure is built as sandwich laminate, but in specific areas core is replaced with additional laminate.

The hull frames, stringers and longitudinals are built from of a combination of bi-directional fibers and uni-directional reinforcement, impregnated with vinylester resin, over foam sections.

Adequate limber holes are fitted throughout the craft to allow bilge water to drain. Under the main engines limber holes are omitted so the framing will form a drip tray.

Throughout the structure compartments are finished in gel coat.

Primary stiffening is to be by longitudinal engine beds and the fuel tank construction. Deck joint knees are bonded in at each frame. All deck knees etc. shall taper in to frames as gradually as possible. Stiffeners are formed in WR with uni-direction tapes (UDT) reinforcement as necessary on stiffener faces.

A general arrangement plan is provided, together with details of the proposed hull, and the arrangement for the rest of the vessel.

4.2 Engine Beds

Within the machinery space and tank space the main longitudinals are built up and profiled to form engine beds to suit the specified engines. Construction is of box section with tapping strips along their upper faces to accept the engine feet. The tapping strips are mild steel the full width of the bed and suitably abraded before inclusion in to the laminate.

4.3 Fuel Tank/Tanks

The fuel tanks are positioned amidships and/or port and starboard. The tanks are constructed of composite and bonded in to the hull to become an integral part of the hull construction.

Baffles are fitted inside the tank to prevent surging.

Large tank lids are fitted in the top face of the tanks for easy access for cleaning the tanks. The tank lids are molded from composite and are secured in place with a strong back.

The tanks will be subjected to a 0.2 bar leakage test.

A Tank Tender contents gauge will be fitted with the display head mounted in the steering console and a



Specification

A fuel filler locker is to be positioned on the deck and is fitted with container to collect eventual spillage. The filling system allows filling by normal fuelling hose. The fillers are routed down to the tank/s in flexible approved hoses. The main filler line is to be 38mm with the vent line being double Ø38mm. The vent lines will terminate inside the fuel filler locker and be fitted with a gooseneck.

4.4 Bulkheads

The vessel is to be fitted with structural watertight bulkheads dividing up the vessel as follows:

- Forepeak
- Tank / technical compartment
- Engine Room

Main bulkheads are constructed from composite board and fully bonded to the structure. Furthermore, the vessel is strengthened with open frames, to ensure hull and deck support, to comply with relevant rules.



5 Deck

5.1 Superstructure & Arrangement

The main deckstructure is a one-piece moulding, manufactured in accordance with the deck structure construction drawing. It is bolted/glued and laminated to the hull

1 x Steering console with width enough for 2 crew members. Console is ergonomic designed and optimized for crew weather protection. It has a polycarbonate windshield with a protective aluminum railing around.

The steering console has hatches both in the front and in the rear for easy maintenance. All controls and instruments are installed within encapsulated watertight compartments and all cables and hoses going through bulkheads are inserted into approved watertight fittings.

The steering console is bolted to deck and can be removed for mayor maintenance.

12 shock mitigation seats for passengers placed on a build in tract system making it possible to change layout and seating's to cargo carrying purposes.

5.2 Minor Fabrications and Mouldings

Generally, as many parts of the crafts structure as possible, will be formed in composite and bonded together to avoid corrosion issues. A number of smaller minor fabrications will be required and these will generally be fabricated in marine grade 316 stainless steel. Seat plinths, console, and engine box and hatches are composite molded.

5.3 Hatches

Deck hatches are of a robust reliable type with adequate securing clips for both internal and external opening, and fitted as shown in the GA drawing.

All hatches are to have notices "Keep closed at sea ".

5.4 Anchors and Cables

Appropriately sized anchors will be supplied in accordance with the code of practice.

5.5 Bollards

A set of three bollards will be fitted. One bollards fitted forward and two bollards aft.

Bollards will be manufactured from cast stainless steel.

5.6 Fendering

The fender is constructed of closed cell polyethylene foam. Not deflating with solid core that cannot



Specification

lose buoyancy or absorb water. Damage is strictly cosmetic keeping crew safe.

Fender system absorbs major impacts and retains integrity and shape.

The fender system will be bonded to the hull using a polyurethane adhesive system.

5.7 Handrails

Handrails will be fitted as necessary, to allow crew to move around the vessel easily and with safety. Generally, all grab and guard rails will be 30mm diameter and manufactured from either stainless steel or aluminium tube.

5.8 Arch

N/A

5.9 Lifting / painter Gear

The boat is designed to be lifted with slings by a boat hoist.



6 Mechanical and Propulsion

6.1 Main Engines and Gearboxes

Vessel is designed to suit several engine installations with or without gearboxes.

Engine room and engine cover are designed to allow either a single engine or twin engine installation.

Additionally it is possible to fit different engine and waterjet types.

Contact Tuco Marine for design review for a special engine / drive setup.

They will be arranged for electric start, be fitted with alternators, cooling water pumps and associated intake strainers and pipe work.

The engines and gearboxes will be mounted on the correctly selected resilient mounts, aligned to the output half-couplings. Particular attention will be paid to the size of the mounts and their securing bolts.

The machinery will be installed in accordance with the manufacturer's recommendations and the installation is to be approved by them upon completion.

Care and attention will be paid to providing a durable machinery installation with adequate support of piping and cable runs whilst minimizing weight gain.

Guards are fitted to rotating machinery as is required by health and safety legislation.

Each engine will be fitted with an alternator.

Torsional couplings are fitted between the engine and gearbox / adaptor flange.

Care will be taken to ensure that pipework for systems are adequately sized and incorporate the minimum number of 90 degree elbows.

6.2 Engine Controls and Monitoring

Engine and gearbox control installed at helmsman's position on the steering console.

Standard instruments from engine supplier, will be installed at the steering console.

Controls for remote operation of fuel valves and discharge of the fire extinguishing system will be brought together to a single point in the form of an emergency panel. Clear instructions for operation of the systems will be displayed by the panel.

6.3 Waterjets/Stern drives

Propulsion will be fitted and connected to the main engine / gearboxes with a cardan shaft.

Contact Tuco Marine for design review for special drive setup.

The propulsion units will be controlled from the console in the wheelhouse. Dedicated handle for operation of each drive, to obtain high maneuverability.



6.4 Engine Removal

Engine removal will be through dismantling the main engine cover placed directly above the engine and it will be possible to lift the engine directly off the engine bed in a straight lift.



7 Systems

7.1 Fuel System

Fuel filters will be fitted to supply each main engine.

The fuel system will enable each engine to be fed independently from each tank.

Fuel hoses to engines from tanks and return lines will be ISO – 7840 (marine hose).

To reduce the likelihood of fire, care and attention will be paid to shielding of fuel lines and filters.

7.2 Engine Cooling

Cooling water will be drawn through hull mounted intakes, or supplied from jet (depending on jet model), fitted with correctly sized scoops. Intakes will be fitted with isolating valves and clear top type strainers, one serving each engine.

Waste cooling water will be injected into stainless steel spray heads in the exhaust system to provide exhaust cooling.

7.3 Exhaust System

Each main engine will be fitted with fabricated stainless steel exhaust risers terminating with water injection spray heads. The stainless steel risers will be insulated.

Approved nitrile diesel exhaust hose will connect each engine to an exhaust silencer. The exhaust will then lead aft to terminate on the transom. All composite spigots will be fitted with stainless steel sleeves to avoid the spigots being crushed. The silencers will be suitably supported, and all hoses double clamped with stainless steel hose clamps.

7.4 Engine Room Ventilation

Air for combustion and ventilation in the machinery space is drawn from two openings in the back of the bow cover and ducted through a Z shaped channel below deck, to avoid water ingress in the engine room. Additionally, two smaller openings are placed in the lower part of the steering console back panel, to induce natural air circulation in the engine room. All opening are fitted with fire flaps.



7.5 Bilge System

Each compartment will be fitted with a remotely mounted, electrically operated, submersible bilge pump and a dedicated strum box. Each pump will have its own dedicated overboard discharge.

A dedicated manual bilge system is installed in each watertight compartment. One pump will be fitted above deck and connected with valves to bilge system.

All bilge suction will be fitted at the lowest part of the bilge and fitted with a strum box.

A bilge alarm system will be fitted which will monitor all compartments.



7.6 Fire Detection and Extinguishing

A fire extinguishing system can optional be fitted to protect the engine space. The control panel will be located in the steering console, at the emergency panel. Clear instructions on the operation of the system and the fire flaps will be posted next to the panel.

Portable fire extinguishers will be supplied to meet the Code requirements.



8 Electrical systems

8.1 General

The primary electrical system on the vessel will be 12v DC which will be distributed through a main switchboard located in the steering console.

The electrical system will be a two pole protected two-wire, insulated return system throughout. Three banks of batteries are charged by main engine driven alternators or.

The supply to all equipment will be cable and/or flexible cord, insulated in fire retardant sheathing, to IEC 332-3. All wiring is to be carried in trunking and/or conduit. Trunking and conduit will be secured in an approved manner using junction boxes and accessories for all internal circuits in watertight compartments and mounted as high as possible within the vessel. Where wiring penetrates bulkheads or deck heads appropriate glands are used. All external fittings will be of the highest waterproof marine quality.

All wiring on main engines and gearboxes is in proprietary cable. It will be adequately protected from mechanical damage and will be substantially clipped and where necessary protected. The wiring will be routed to avoid contact with high temperature surfaces of the engine.

All circuits and switchgear to be labelled to show their function, sockets will be clearly marked with their voltage.

8.2 12v DC System

The vessel will be fitted with three banks of batteries supplying 12v DC.

There will be one engine starting bank for each engine and one service bank.

All batteries will be AGM gel type and will be charged through blocking diodes by the main engine alternators. Secondary charging will be from shore supply via a 240v – 12v DC battery charger. Alternative a 42v – 12v DC/DC transformer.

The engine starting and service batteries will be secured in battery boxes in the tank space which are vented to atmosphere.

Furthermore, a 12V/12V DC/DC converter will be installed to charge emergency battery (GMDSS). Relevant equipment is connected to GMDSS bank according applicable rules.

8.3 Instrumentation

Digital combined voltage and current meters will be fitted monitoring each battery.

8.4 DC Equipment

The DC equipment fitted will include the following:

- Navigation lights
- 1x Searchlight in arch frame
- Bow lights below fender
- Bilge pumps



8.5 Shore System

A 42v – 12v DC/DC converter will be installed to charge with DC power.

8.6 Navigation Lights

The following navigation lights will be fitted:

- Port
- Stbd
- Stern
- Anchor
- Masthead

All navigation lights will be LED type.

8.7 Searchlight/Deck lights

LED flood lights will be fitted to illuminate the deck area.



9 Electronic Systems

9.1 Navigation Equipment

The following navigation equipment will be supplied and fitted:

- Magnetic compass

9.2 Communication Equipment

- Fixed VHF



10 Layout

10.1 General

The layout of the vessel is to comply with the GA drawings.

All areas will have sharp corners eliminated to prevent injury to personnel in extreme sea conditions. Suitable and adequate hand rails and hand holds are provided for safe passage throughout the vessel whilst at sea.

The quality of fit-out is to a high standard.

All surfaces to be finished to a high standard, to provide a low maintenance finish.

Generally, all fittings will be best quality marine grade aluminum or stainless steel, and all fasteners of A4 quality.

10.2 Forepeak

Access will be via a bulkhead hatch, access from main deck.

10.3 Forward compartment

Access to forward compartment, below deck, is from a deck hatch mounted on the fore deck.

10.4 Tank Space

Access to the tank space is from the deck through a deck hatch.

The main 12v DC distribution boards are contained in this space along with the three battery banks which are in ventilated battery boxes.

10.5 Engine Room

Access to engine room is from two flush hatch installed engine cover/central seating. Please refer to GA for further details.

The engine room arrangement is arranged to allow good easy access to engines for maintenance and repairs.

10.6 Signage

Suitable SOLAS/MCA approved signage is to be used throughout.

Signs and decals applied to the craft topsides, deck and console as necessary.

Vessel name and port of registry will be affixed to the transom (vinyl letters).



11 Painting and Finishes

11.1 External Finish

External hull is in GelCoat finish.

External superstructure is in GelCoat / painted

The deck is painted with non-slip screed applied.

11.2 Internal Finish

Console:

- Composite painted.

Forward compartment:

- All composite surfaces – TopCoat finish

Tank space:

- All composite surfaces – TopCoat finish

Engine space:

- All composite surfaces – TopCoat finish

11.3 Colour Scheme

To be agreed with client.

11.4 Decals

To be agreed with client, in compliance with rules.



12 Life Saving and Loose Equipment

12.1 Life Saving Equipment

Lifesaving appliances shall meet the requirements of class.

12.2 Loose Equipment

Loose equipment will be supplied according to requirements from class.



13 Trials, Testing and Training

13.1 Trial Program

Trials will be conducted in the waters around Faaborg, Denmark.

A comprehensive set of trials will be undertaken to the customer's and builder's requirements, this will include but not be limited to:

- Speed trials over an accurately measured nautical mile
- Maneuverability and steering at various speeds
- Monitoring of engine performance for a period of 1-2 hours.
- Full inspection of the entire vessel
- Testing of all systems and functions

A trial program will be developed during the build of the vessel and will be issued 4 weeks prior to trials taking place.

13.2 Warranty

The following warranty applies for up to 12 months from acceptance:

Subject to the conditions set out below and otherwise expressly set out herein the Builders warrant to the Purchaser that the Boat will be of satisfactory quality and reasonably fit for any purpose made known to the Builder in writing prior to Agreement whether or not such purpose is one for which the Boat is commonly supplied and will correspond with the Specification or any variation addition or modification thereto. The Builders further warrant that the Boat will be free from defects in materials and workmanship for a period of twelve months from the time of customer acceptance. The warranty is subject to the following conditions:

- a) The Builders shall be under no liability in respect of any defect in the Boat arising from the Specification supplied provided or varied by the Purchaser.
- b) The Builders shall repair (or replace at their discretion) any defect in the workmanship materials or equipment or their failure to correspond with the Specification where the defect or failure was not apparent on reasonable inspection at the Final Acceptance Inspection or within a reasonable time thereafter.
- c) The Purchaser shall notify the Builders in writing immediately on discovery of any alleged defect and the Builders or their agent shall have the right to inspect the Boat including the right of sea trials to enable the Builders or their agent to examine or assess the extent of the alleged defect. The expense of any such trial shall be borne by the Builder if the defect is shown to be one of workmanship or materials.

If any defective workmanship of the Builders and/or materials shall be discovered in the Hull, machinery or equipment (except as hereinafter provided) of the craft within eighteen months after the Final Acceptance Inspection, fair wear and tear excepted, and if written notice of the defect is given to the Builders within 14 days of the discovery (or is posted within 14 days of arrival at the



Specification

next port of call, if discovery is made while the craft is on passage), the Builders at their option shall either repair and make good the defects on the craft or pay to the Purchaser a sum to be agreed before any repair work is put in hand.

13.3 Spares

During the fit out of the vessel a materials schedule will be maintained. From that schedule, a list of consumable spares will be created detailing manufacturers, part numbers, etc.

Based on the clients anticipated annual hours running the schedule will also detail quantities required to support the craft for one year.



14 Documentation and Drawings

14.1 Manuals

A full set of manufacturers' manuals including recommended maintenance and training programs will be provided. A bespoke vessel specific manual will be provided.

14.2 Drawings

A full set of drawings will be supplied electronically (pdf format) and in hard copy form. This will cover the General Arrangement, Machinery Arrangement, Steering Arrangement, Docking Plan, Safety Plan, System Arrangements and Diagrams, Electrical Wiring Diagram, all "as fitted".

Other drawings deemed appropriate may also be provided.

14.3 Trial Data

A copy of the trials data will be provided on completion of trials which will cover the Pre-launch trials, Harbour trials and Sea trials.

14.4 Certification

The vessel will be delivered complete with all relevant certificates.



15 Options

15.1 Build to Class

This vessel is built in compliance with DNV rules

15.2 Man-Overboard Recovery

N/A

15.3 Extra equipment

Please refer to dedicated list with extra equipment.