

OLIMP

N A U T I K A

za brodogradnju, trgovinu i nautički turizam



April, 2013

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EFTA00605358

Brodarski institute LLC – Marine research & Advanced Technologies in Zagreb, about M – 46

“Can we built a super fast boat, the best of the best, whic will be and remain the No. 1”

(Ante Zaninovic, B.Sc., Nav. Arch, Zagreb, 2007)

“Tested was the boat model of queer, until than unbelievable lines, with the official code M 1322”

(at Brodarski institute LLC – Marine Research & Advanced Technologies in Zagreb, November 2008)

The super fast boat is from the visit of general director of Brodarski institute LLC – Marine Research & Advanced Technologies in Zagreb, PhD Vladimir Koroman, in November 2009 in Pula, Croatia, marked as s high speed interceptor, and on 01.01.2010 the official name of the boat is changed into M 46.

“In the third, we started with experimental sailing on high speed interceptor” was reported in December 2009 by Ante Zaninovic to the general director of Brodarski institute LLC – Marine Research & Advanced Technologies in Zagreb.

1 GENERAL

The motor boat M - 46 is a high speed interceptor of the latest generation (the hull so-called step hull, with a novelty of a stern tooth (edge), which smartly regulates the tilt of the front part of the boat), meant for shock actions of exclusively special forces of the navy, special squads, and anti-terrorism forces, special police forces, coast guard... It was developed in Brodarski institute LLC - Marine research & Advanced Technologies in Zagreb (<http://www.hrbi.hr/index.php?id=1&l=en&page=about>), who also tested it in the Mediterranean sea for 736 days in all period of the year and in all weather and sea conditions. Company Olimp Nautica d.o.o., which is the partner of Brodarski institute LLC - Marine research & Advanced Technologies and [Agencija Alan](#) d.o.o. , is producer of product M - 46.



PRIMARY USE OF THE M – 46



- Over the horizon insertion/extraction of special operations forces,
- Swimmer cast and recovery,
- Maritime intelligence gathering,
- Underway visit, board, search,
- Communications platform,
- Support direct action missions,
- Support amphibious operations,
- Waterborne combat search and rescue,
- Oil platform protection,
- Waterborne surveillance,
- Diving operations support,
- Non combat evacuation operations,
- Gunfire support.

REFERENCES

Unsinkable:

M 46 is unsinkable because its own mass amounts to 7.300 kg, and water displacement comes to 21.000 l. Even with all tubes emptied, with the capacity of over 10.000 l it does not sink and it is still seaworthy.

Invisible for radars:

It means that the perception of M 46 in sea states above 3 and 4 is very difficult for radar to detect due to the low structure and due to the small number of metal parts. In waves, the hull of the boat is mostly wet on the outside due to its construction and the radar cannot detect wet surfaces.

Safety design:

Tubes represent a reflective surface when M 46 approaches another vessel, the shore or when rescuing persons from the sea. Low construction allows operation directly on the sea surface. The depth of the front deck surrounded by tubes protects the crew against injury and from falling into the sea.

BUILT MATERIALS

The hull of the boat is produced with use of the latest technologies, and with best possible materials in regards of resistance known in the world now days.

Hull and deck materials

Hull and deck are of the M 46 is Plastic Vinylester* construction forced with Aluminum and Kevlar higher density and manufactured with use the 3D Vacuum Max S Infusion.

Tubes

Hypalon** – 1690 g / cm² (20 chambers)



* **Vinylester**, is a resin produced by the esterification of an epoxy resin with an unsaturated monocarboxylic acid. The reaction product is then dissolved in a reactive solvent, such as styrene, to a 35 - 45 percent content by weight. It can be used as an alternative to polyester and epoxy materials in matrix or composite materials, where its characteristics, strengths, and bulk cost intermediate between polyester and epoxy. Vinyl ester has lower resin viscosity (approx 200 cps) than polyester (approx 500cps) and epoxy (approx 900cps). It is a common resin in the marine industry due to its increased corrosion resistance and ability to withstand water absorption.

** **Hypalon** is a trademark for chlorosulfonated polyethylene (CSPE) synthetic rubber (CSM) noted for its resistance to chemicals, temperature extremes, and ultraviolet light. It was a product of DuPont Performance Elastomers, a subsidiary of DuPont.

The use of new technology and the construction of the very project enabled the manufacture of a light hull with incredible high carrying capacity, high speed and a strong gunfire support, and only 45 % radar visibility at sea condition 4 and up, that may not be compared with any other boat of that sort. The fuel economy of M - 46 is also superior because it can reach more than 500 nm at speed of 40 knots.

The constructional hull hardenings are made of the best and the strongest materials. The interior and the cockpit are manufactured in the latest sandwich technology. Well positioned openings on the cockpit bottom enable draining of the sea and the rain, with self-draining of the cockpit and the deck. On the deck of the cockpit a bracket with four dynamics seats are positioned (seats used by Special Forces)

Before the bracket, up to 20 shock-absorbing seats may be positioned. For the speed over +50 knots, for which the boat is meant for, special care was taken about the choice of seats, due to the high accelerations to body of the persons, who are on the boat. (Seats are tested to hold 7 G).

Along the side and on the bow, the balloons (air chamber) are attached on a glass-plastic hull with glue. They are made of a special materials of the highest density, and they consist of twenty chambers. They are attached to the polyester hull with the newest two-component glue. The air chambers are considered as buoyancy elements, assuring additional buoyancy. Due to the high additional displacement a larger number of persons may be transported (more than 75, if the mission is that kind of sort) and transported to the distant locations (open sea – heavy condition 6-7), with high speed. In addition, boat can be dropped from more than 5 m on hard surface without any damage. Also, if the air chambers are deflated, the boat can still travel with speed, more than 45 knots.

Test has been performed in which the boat was grounded to shore with speed between 15 and 20 knots. The boat passed the test without any damage.

DIMENSIONS

| | |
|---|--------------|
| Length overall | 14.25 m |
| Beam overall | 4.45 m |
| Collar diameter from 0,80 meters to | 0,63 meters |
| Collar volume | 10230 litres |
| Project Draft | 0.50 m |
| Draft (propeller included, trim in position high) | 0.65 m |
| Displacement (with full fuel, no payload) | 7300 kg |
| Max speed | + 60 Knots |
| Sea worthiness: | 8 |



RESISTANCE TESTS

|  BRODARSKI INSTITUT ZAGREB | | <small>Model/Ident.</small> 6045 - M | <small>Stranica/Page</small> 15 | | |
|--|-----------|--|---|-------------|------------|
| RESISTANCE TEST - Results ----- | | | | | |
| Test: B1-9433 | | | | | |
| Model: M-1322 | | Model scale: 7.000 | | | |
| Appendages: NONE | | | | | |
| SHIP PARTICULARS | | | | | |
| Displacement = 5.6. t (metric) | | | | | |
| Draught fore = .50 m | | | | | |
| Draught aft = .50 m | | Trim = .00 m | | | |
| Mean draught = .50 m | | | | | |
| Water density = 1.026 t/m3 | | | | | |
| SPEED RESISTANCE EFFECTIVE POWER IN KILOWATTS | | | | | |
| V | RT | PE | PEF | PER | (C) |
| (kn) | (kN) | (total) | (frictional) | (residuary) | |
| 22.00 | 10.13 | 114.6 | 41.8 | 72.9 | 1.980 |
| 24.00 | 10.83 | 133.7 | 53.0 | 80.8 | 1.779 |
| 26.00 | 11.47 | 153.4 | 65.8 | 87.6 | 1.605 |
| 28.00 | 12.15 | 175.0 | 80.4 | 94.6 | 1.466 |
| 30.00 | 12.88 | 198.8 | 96.7 | 102.1 | 1.354 |
| 32.00 | 13.64 | 224.6 | 115.0 | 109.5 | 1.260 |
| 34.00 | 14.41 | 252.1 | 135.4 | 116.7 | 1.179 |
| 36.00 | 15.19 | 281.3 | 158.1 | 123.2 | 1.109 |
| 38.00 | 15.95 | 311.9 | 183.1 | 128.7 | 1.045 |
| 40.00 | 16.69 | 343.3 | 210.8 | 132.6 | .987 |
| 42.00 | 17.35 | 374.9 | 241.2 | 133.6 | .930 |
| 44.00 | 17.93 | 405.7 | 274.7 | 131.1 | .876 |
| 46.00 | 18.43 | 436.2 | 311.3 | 124.8 | .824 |
| 48.00 | 18.90 | 466.6 | 351.3 | 115.3 | .776 |
| 50.00 | 19.37 | 498.1 | 394.8 | 103.3 | .733 |
| 52.00 | 19.89 | 532.0 | 441.9 | 90.2 | .696 |
| 54.00 | 20.51 | 569.8 | 492.6 | 77.2 | .665 |
| 56.00 | 21.23 | 611.4 | 547.1 | 64.3 | .640 |
| 58.00 | 22.01 | 656.8 | 605.6 | 51.2 | .619 |
| 60.00 | 22.84 | 705.0 | 668.1 | 36.9 | .600 |



**7.1 Ship Model M – 1322 , Displacement Mass 5.6 t
Resistance Test**

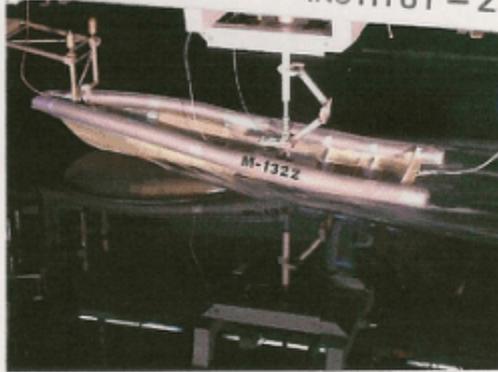
Test No. B1 – 9433

Date: 12.11.2008

V = 0 kn



V = 20.57 kn



V = 25.7 kn



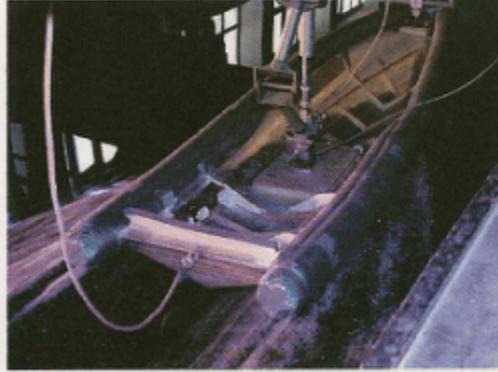
V = 25.7 kn



V = 30.86 kn



V = 30.86 kn



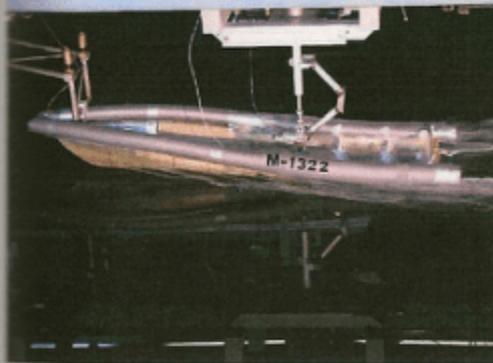


7.1 Ship Model M – 1322 , Displacement Mass 5.6 t
Resistance Test

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Date: 12.11.2008

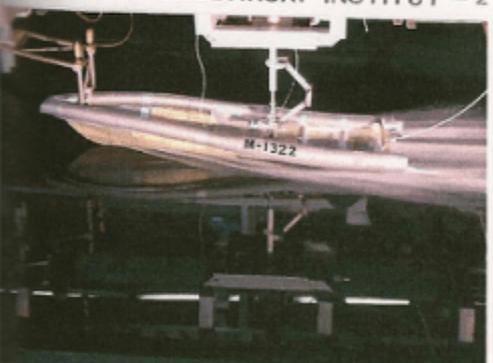
V = 41.15 kn



V = 41.15 kn



V = 51.43 kn

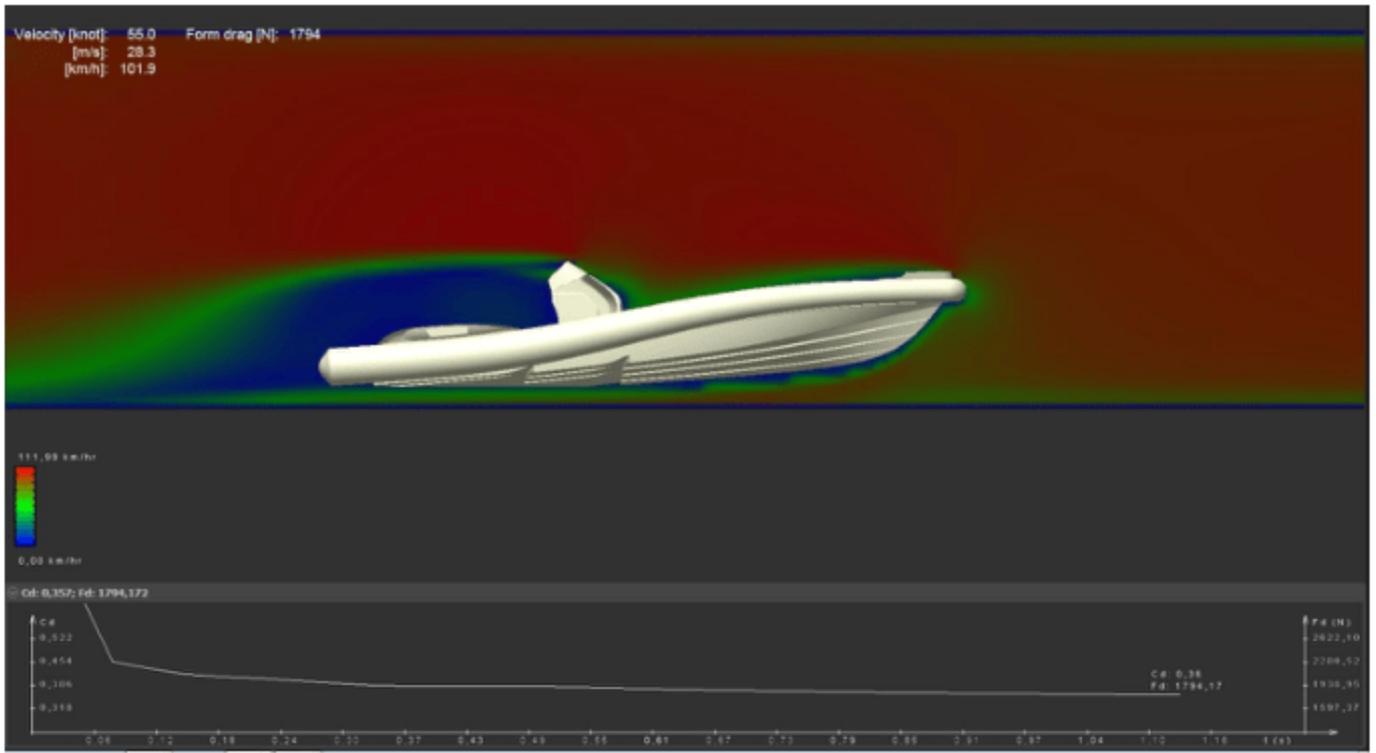


V = 51.43 kn

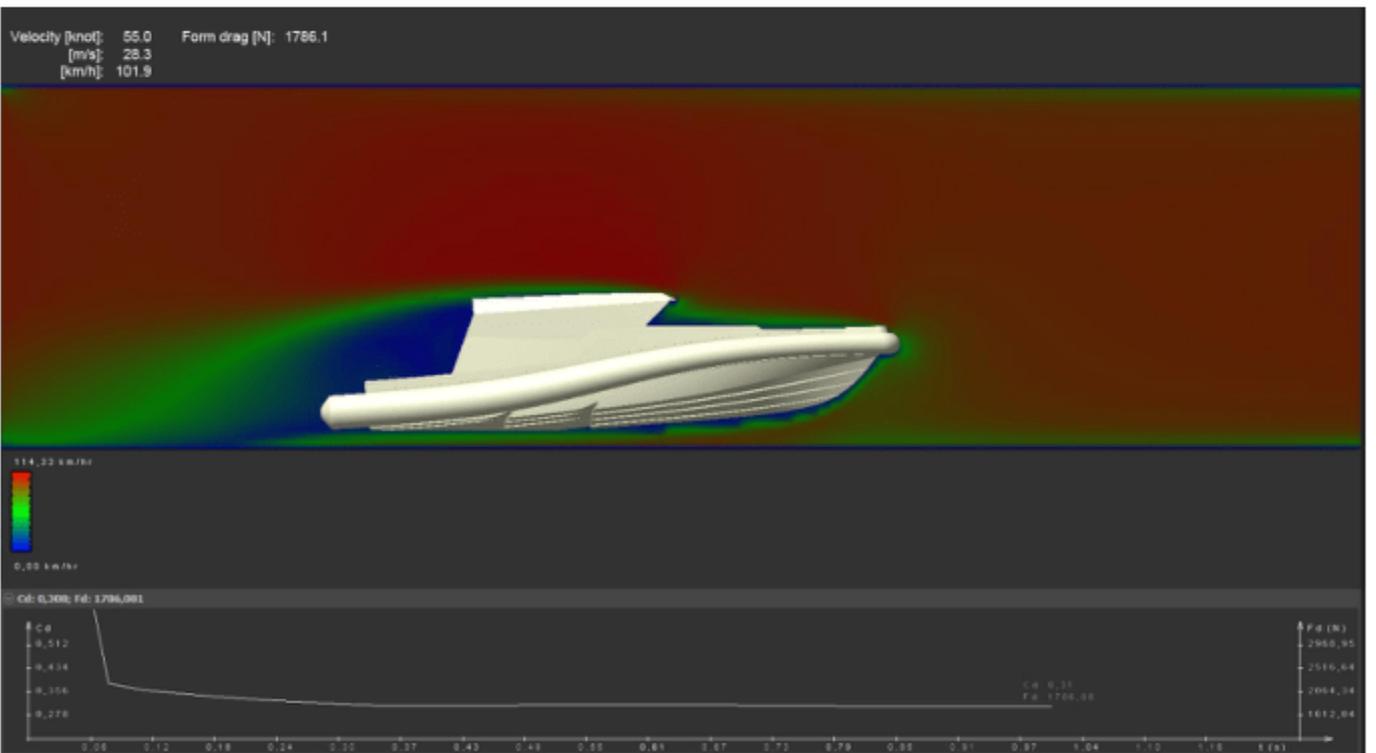


V = 61.7 kn





Cd: 0,36
Fd:1794,17



Cd: 0,308
Fd:1786,08

CAPACITY

| | |
|-------------------------|---|
| Fuel Tank Capacity | 800 / 1500 litre (aluminium or PVC) |
| Autonomy with full tank | 400 nm at +50 Knots 500 nm at 40 Knots |
| Battle autonomy | 250 nm |
| Number of air chambers | 20 chambers |
| Load I | up to 10000 kg |
| Load II | up to 21000 kg |
| Number of seats | up to 20 seats with absorption system |

DRIVE

| | |
|--|--|
| Max power of the inside diesel engines | 2 x 600 KS + 60 knots |
| Recommendation power | 2 x 570 KS + 55 knots |
| Minimum power | 2 x 370 KS + 40 knots |
| Drive: | Arneson 8 i 8 integral L or ZF surface drive |

Propellers: Olimp Origin, from 22"33" to 22"36"

ENGINES

Inboard engines:

The high speed interceptor can be equipped with two engines FPT NEF 560 or 370 Marine Engines. Speed +50 knots, is achieved with ZF 286/A marine gearbox and Jolly Drive and Marine Surface Drive transmissions, made and calculated especially for this boat. The same holds true for the propellers; they are manufactured for this boat. The engine carries a fastener transmission Boat may under ideal circumstances achieve the speed over 55 knots, with the consumption of only 94 litre/h per engine.

Outboard engines:

Good solution for speed intervention and low maintenance and service costs are outboard engines, two to four engines of 350 HP (Yamaha or Mercury) or three engines of 500 HP Yamaha.

Maximum calculated speed during the test at the Brodarski institute LLC - Marine research & Advanced Technologies in Zagreb, was on the model 1 : 7, about 61,7 knots (the speed of 40 knots, is not achieved by any similar boat in sea condition 6 and the wind of 60 knots, but M - 46).

ELECTRONICS

On the bow of the boat, there is an anchor of 1300 Watt, with a rope and anchor and fastening windlass. There are bollards strong enough to fasten the boat up to 50.000 kg. The boat is equipped with the navigation equipment in standard option: Raymarine radar, Raymarine chartplotter, Raymarine camera and Raymarine VHF...

It is possible to equip the boat with additional military devices (High definition radar, Thermo camera (IC FLIR), military HF ...)





AGENCIJA ALAN [REDACTED]

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e-mail: export.dep1@alan.hr web: www.alan.hr [REDACTED].0272060 OIB 83317234406

TO WHOM IT MAY CONCERN

| |
|---------------------|
| AA Ref.No. 8752562 |
| Zagreb, 11.06.2012. |

Subject: Statement – cooperation between companies Agencija Alan [REDACTED] and Olymp Nautica [REDACTED].

Dear Sir,

Agencija Alan [REDACTED], with its registered seat in Zagreb, Grškovićeve 15, Croatia, represented by Mr. Ivica Nekić, General Manager, herewith state that there have been established cooperation between companies Agencija Alan [REDACTED] and Olymp Nautica [REDACTED] from Pula regarding arming of the boat - Olimp M 46.

Hereby, Agencija Alan [REDACTED] confirm that contact person from company Olymp Nautica [REDACTED] is Mr. Kristijan Gnilšak.

Respectfully,

mr.sc. Ivica Nekić
Direktor

u.z.

AGENCIJA ALAN [REDACTED]
© Z A G R E B

BRODARSKI INSTITUT (Shipping Company)
Avenija V. Holjevca 20, HR-10020, Hrvaška (Croatia)

OLIMP NAUTICA [REDACTED]
n/r Kristijan Gnilšek
Industrijska zona 16
52216 Galižana

Your ref
Our ref.: A4/ZaA-12-
Date: 2012-06-10

CERTIFICATE

Brodarski institut confirms that the experimental sailing of rapid assault boat mark M 46 was successfully completed. After testing it along the entire Adriatic coast in the period of one year, in all weather conditions, it has been established that the prototype M46 may be placed on a market. Brodarski institut as an architect supervised the construction, equipping and putting into service the boat M46. The boat was tested on aquatorium between Pula and Dubrovnik. Tested were maximum achieved speed (56 kt), maximum number of people on board (47), acceleration on the bottom of the hull when hitting waves. Further tested were the acceleration of the speed of the boat, crash -stop test was performed (test of rapid stopping) (with 56 kt), stopping with inertion, circles of turning the boat on the left and on the right side (with 50 kt). Tested was the possibility of getting the boat on the coast with the prow (somewhere near Banjoli) with a speed of 15 kt. Afterwards the boat was returned to the sea astern.

When inspecting the bottom of the boat after lifting it, no damages were found on the hull.

The boat reacted as expected and according to the project demands, and some loads were endured even better as expected in the project.

The rapid assault boat M 46 is a joint project of Brodarski institut [REDACTED] and Olimp Nautika [REDACTED]. Brodarski institut elaborated a technical project for the rapid assault boat for Olimp Nautika [REDACTED], performed the tests that are necessary for the evaluation of the project quality. The rapid assault boat M 46, is from now on in 100% ownership of the company Olimp nautika [REDACTED].

Brodarski institut confirms therewith that the boat M-46 has a certificate of Germanisches Loyd, that tested M 46 in the period March-May 2010

MA Ante Zaninović. Dipl. Eng.
Head of Department Firmness,
Vibrationen and examinations in nature

Seal reads:
BRODARSKI INSTITUT [REDACTED]
ZAGREB



3 IMPLEMENTING OPTIONS

M 46 has a lot of implementation options because of their size.



Cabine version



Outboard Engines

3 x Yamaha or Mercury engines (3 x 350 HP).



4 x Yamaha or Mercury engines (4 x 350 HP).



Radar invisible M 46

It means that the perception of M 46 in sea states above 3 and 4 is very difficult for radar to detect due to the low structure and due to the small number of metal parts. In waves, the hull of the boat is mostly wet on the outside due to its construction and the radar cannot detect wet surfaces.

M 46 is possible equipment with Anti radar RCS reduction coatings, 97% RCS reduction X band.

Bullet prove protection

Bullet-proof curtains:

M 46 have a solution available against both threats 5.56 & 7.62.

The ammunition against which you need the ballistic protection they are:

- 5.56 X 45 NATO SS 109

- 5.56 X 45 NATO M 193

- 7.62 X 51 NATO Ball

- 7.62 X 39 mm MSC

- 7.62 mm x 51 A.P. (W.C.)

- 7.62 x 54 API B32

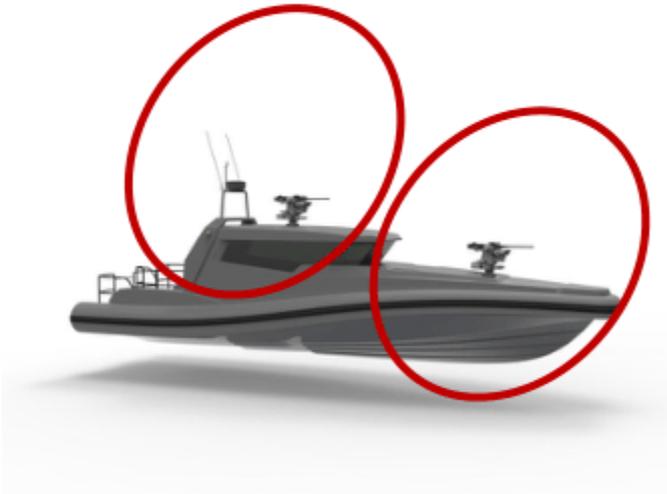
Protection for tubes is possible but up to NIJ 0108.01 Level III A (0.44 Magnum & 9mm Bullet Only).

For cabin and hull there is no restriction of the solutions.

Safety design

Tubes represent a reflective surface when M 46 approaches another vessel, the shore or when rescuing persons from the sea. Low construction allows operation directly on the sea surface. The depth of the front deck surrounded by tubes protects the crew against injury and from falling into the sea.

Remote control weapon



4 ARMAMENTS (MIL-SPEC)*

The large part of the cockpit on the deck is on the bow, made of aluminium, forced with the kevlar, and may be used for assembly of the light weapons to the medium heavy firearms, and so achieve a combat resistance of the boat. On the platform there is also a place for assembly of the firearms. Due to the large number of chambers and layers of kevlar built in the hull, this boat is extremely tough in combat with the light infantry weapons. The boat has places to keep for example different weapons, munitions etc.

Classics and remote control weapon stations armaments:

- ▣ 5.56mm
- ▣ 7,62 mm
- ▣ 12,7 mm
- ▣ launcher grenade 40mm



*Olimp nautica is not authorised dealer for weapons. Olimp Nautica is able only for prepare boat for weapon montage according to the customer.

5 WHY M - 46 IS ON THE TOP?

- High speed
- Fuel economy
- Full loaded
- Long range
- Low radar visibility
- Strong gunfire support
- Unsinkable
- Operated in all weather and sea conditions
- Lowest maintenance costs



6 CONTACTS



OLIMP NAUTIKA d.o.o.



Tel:



e-mail:



7 VIDEOS

<http://www.youtube.com/watch?v=o63aYOoRgn0&feature=relmfu>
<http://www.youtube.com/watch?v=SzW8rVrQ2w8&feature=relmfu>
<http://www.youtube.com/watch?v=aEvnuk6TUoU&feature=youtu.be>