

**DELPHIA 24 ONE DESIGN DELPHIA 24 ONE DESIGN DELPHIA 24 ONE DESIGN**

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The class has emerged as a joint enterprise of Delphia 24 Racing Association and Delphia Yachts Kot yacht yard.

The staff – none of whom are newcomers to sailing – have developed design assumptions based on their knowledge and experience of the 730 class.

Taught by experience, they decided to create a one-design yacht characterized by the following features:

- the yacht is supposed to fill in the gap between professional daggerboard/centerboard yachts and sports keel yachts
- it is to become a popular sports yacht designed for training, match-racing regattas and fleet races
- it is to satisfy the requirements of recreational sailing
- it is supposed to be cheap and easily transportable, both individually and in bulk
- it should be safe, easy to handle and sailor-friendly
- the yacht's production should be highly repeatable and non-complex
- the yacht should endure at least three racing seasons in full operating efficiency, and at least seven training and recreational seasons
- materials used for the construction are supposed to be cheap and easily accessible, yet of high quality.

### Design assumptions

Designing a cheap yacht is by no means an easy task.

The only condition I made was that I would design it without any restraint whatsoever.

First, the yacht yard would build a prototype; after sufficient testing a body of experts from the Association would make a decision as to the creation of a new class – or withhold it.

I accepted this challenge and embarked upon the project with enthusiasm.

Minute analyses of the market, technology, and also of designers' tendencies and yachtsmen's sailing preferences and habits facilitated the process of decision-making.

The most important thing to decide upon was the yacht's position on the fixed racing market.

Many professional sailors, after quitting their Olympic class careers, are at a loss what to do next.

Commercialized professional sailing fails to offer enough space for this particular group of people.

Only a few of them can afford sophisticated and expensive equipment.

Even the well-functioning MELGES class, though related to Delphia 24 in terms of parameters, poses severe financial barriers.

Delphia 24 proffers a helping hand to all those suspended in vacuum.

The costs of purchasing a Delphia 24 and its subsequent operation may be even 60% lower.

The boat's sailing and crew tactics are well known to Olympic class sailors, and at the same time facilitate the styles and habits of typical sea-sailing on keel boats.

The concept of Delphia 24 makes it much more possible for former Olympic sailors to switch to the exclusive realm of sea-sailing and racing.

The Delphia 24 class may effectively support the development of other classes, including MELGES, by means of a continuous supply of well-trained sailors.



DELPHIA 24 ONE DESIGN

## DELPHIA 24 ONE DESIGN CONSTRUCTIONAL ASSUMPTIONS

I decided to build the yacht's hull by using three cooperative elements made of glass/polyester laminates and reinforced with rowing fabric that have been partly stiffened with interleaves of light PCV foam.

In order to insure the product's repeatability, resistance and durability,

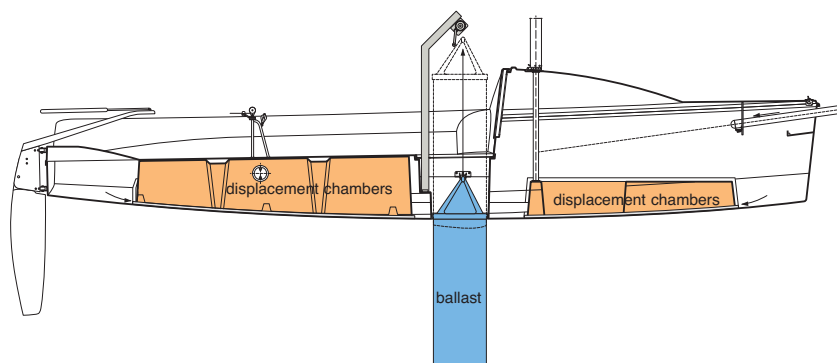
I suggested that the technology of infusion in negative forms should be implemented.

For the sake of cost-cutting I had the mast and boom made of aluminum profiles.

The rig was produced of woven polyester fabrics.

Transom rudder, equipped with a rudder that is blocked during sailing, seemed an optimal solution since – when unblocked – it can be drawn aside in order to decrease the draft during launching. The system of fastening the cast iron ballast inside the hull implies the necessity of its mechanical, firm blockage prior to setting sail. Because of this feature, the yacht becomes a keel boat when sailing. This system makes it impossible to sail with the ballast lifted even as low as 5 centimeters.

During entry to a shallow port, launching, or land transportation, the ballast may be lifted up from the cockpit's position by means of a special elevator. It can also be transported separately.



## DELPHIA 24 ONE DESIGN SAFETY

Safety is a special value inherent in every yacht.

Keeping that in mind, I decided to have Delphia 24 comply with the European EN ISO norms.

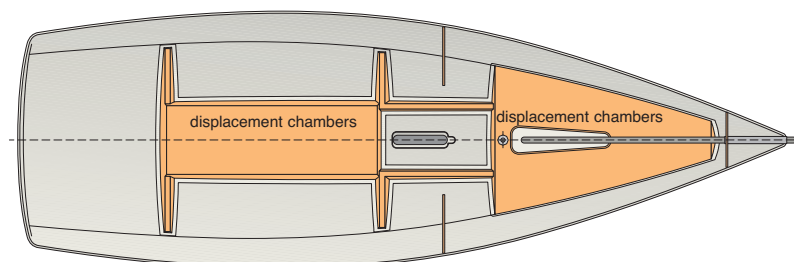
This makes the boat freely-accessible without any additional safety measures.

It can be sailed by anyone who is willing to do so, provided that certain navigational conditions are observed. The "C" design category (as expressed in the EN ISO norms) enumerates them clearly. Every yacht with this category is seaworthy with the non-variable wind strength not exceeding degree 6 in Beaufort scale, and a considerable wave height of 2 metres; it is also capable of surviving worse conditions.

These may occur in open internal waters, river estuaries, and offshore sea waters – when weather conditions are moderate, and the wind speed during squall does not exceed 17 m/s.

In order to obtain this level of safety the yacht has to comply with all the EN ISO norms.

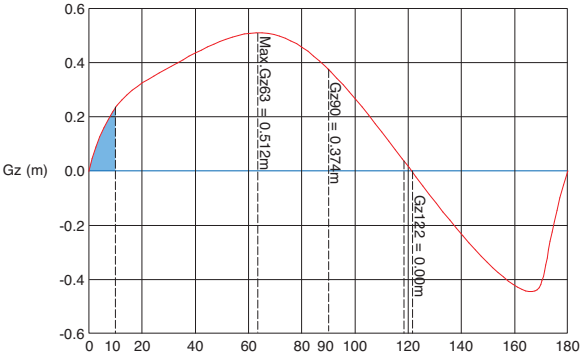
The boat's parameters have been optimized for this purpose.



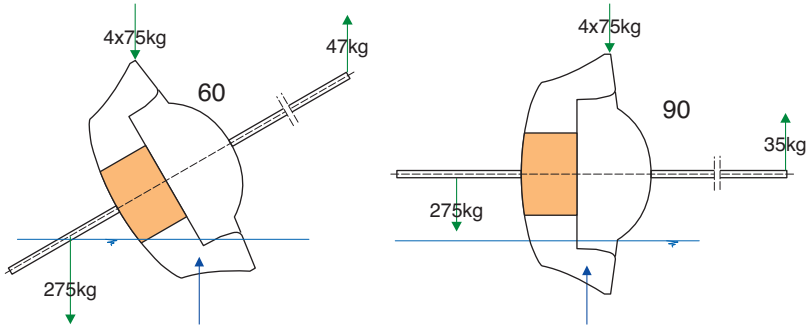
Unless we are absolutely sure that our yacht will stay afloat, we will feel ill at ease.

Delphia 24 is equipped with leak-proof displacement chambers (1650 kg).

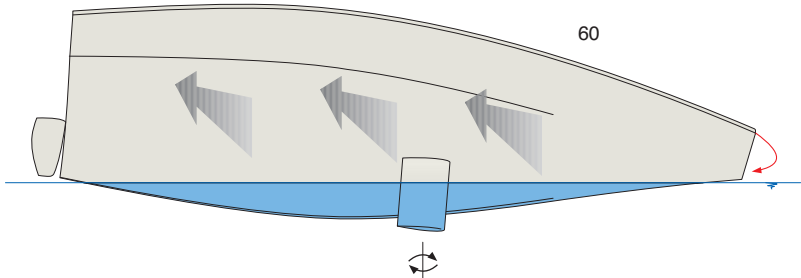
The Gz curve clearly illustrates different running tactics on different courses.



A list up to 15 provides highly efficient functioning of sails on upwind course. The righting force increases abruptly within the 0 -10 list range; it is still on the increase up to 60, though much less intensively. From 60 onwards the force starts to decrease, and at the list of 122 is no longer. Practically speaking, a list of more than 60 may occur when sailing with gennaker or spinnaker, the wind force being stronger than degree 5 in Beaufort scale and the wave higher than 1 metre. It is only when the crew makes an elementary mistake in running the yacht, ending in a typical capsize, that either of the above-mentioned sails may be doused. If the crew reacts properly (with lousing spinnaker halyard) the yacht will round to the wind and straighten up by itself, making further sailing possible. Please bear in mind that the above graph illustrates the yacht's stability as according to strict safety conditions enforced by the EN ISO norms. Namely, at a list of 60 Delphia 24 raises the 47kg-weight of the masthead (35kg at 90). In reality, when the boat is loaded with crew and the wind acts upon sails, those forces are comparatively stronger – from 30% to 50%.



Increasing list results in the decrease of the forward drive. At a list of 60 the force practically disappears since the hull screens off most of the sail area. As the wind presses on the hull, it turns the yacht's bow towards itself.





## Efficiency

The initiative group's assumptions and my own decisions as a designer brought about an important obstacle in building a racing boat, namely the increase of weight as compared with ultra-light yachts built of expensive materials.

As we know, the efficiency of a racing boat is determined by three factors:

- a) human factor
- b) hull efficiency
- c) sails efficiency

## Human factor

I have always considered it to be the most important. It is a man's decision to sail – and to race, too. A racing boat, therefore, has to be capable of exerting the adrenaline-charged thrill and the need of proving oneself. At the same time it has to be trustworthy and offer a lot of opportunities while discreetly putting the mistakes right. Even the most skilled yachtsmen take advantage of no more than 70% of their boats' efficiencies.

My idea was to build a man-friendly racer – one that requires the least effort to handle and ensures the smallest possible struggle with wind, water, and a tangle of ropes.

It should be dry and safe, too!

Delphia 24 has been equipped rather frugally, yet she has all that is needed for very efficient yacht running. One-spreader mast rigging automatically reacts to violent gusts of wind.

The preference of head-sails on all courses has an effect of the yacht's self-navigability.

Such approach to power drive makes it as flexible as a modern engine of a brand new car.

The crew's comfort is assured by a spacious cockpit divided conventionally into several manoeuvring posts. When sailing, everybody in the cockpit faces the yacht – this boosts the boat's efficiency and helps to integrate the crew.



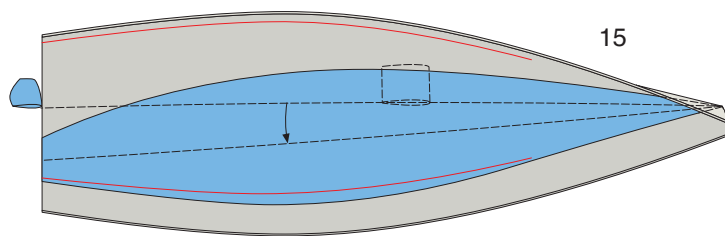
## Hull efficiency

Hull efficiency standards for upwind sailing are different than those for downwind sailing.

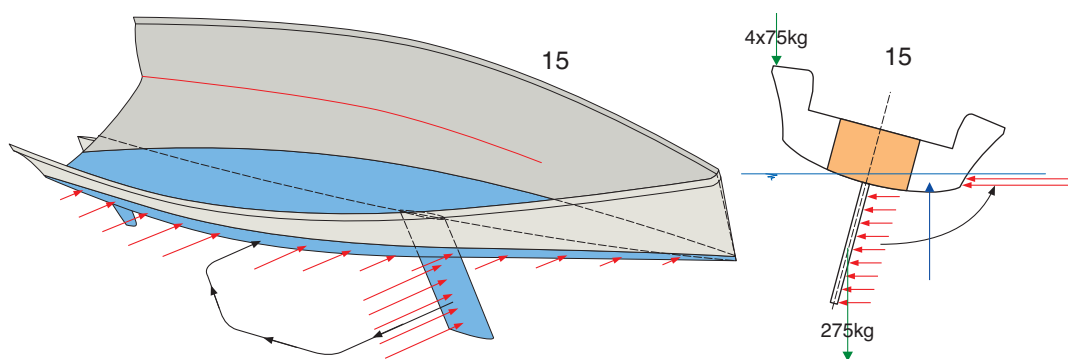
To make matters even worse, I would say they are like fire and ice. When sailing upwind, a good hull should demonstrate maximal efficiency at a list of 10°, and behave equally well during brief lists of greater value (up to 15°) caused by squall. As the degree of list increases, so does the hull's stability.

The hull is supposed to deal smoothly with light waves – without bow spreads or longitudinal rollers. In order to force one's way through higher waves, though, good navigability is needed. Skilled sailors know this very well.

Thanks to the special shape of its hull, Delphia 24 is fully-featured in this respect.



As the degree of list increases from 0 to 15, the waterline lengthens, becomes narrower, and at the same time moves onto the yacht's leeward side. The submerged hull's axis changes advantageously as well.



Thanks to the hull's shape most of the lateral resistance is relocated from the keel onto the submerged surface of hull side. The mechanism moves the lateral resistance higher and at the same time towards the reef. This prevents excessive growth of the yacht's weather helm during increasing list. The change of degree of the wet hull's axis results in decreasing leeway. Freed from the pressure of water, the keel instantly boosts the yacht's stability with its own weight. The operation progresses smoothly and without the crew's notice.



Delphia 24: at 10° heel

**DELPHIA 24 ONE DESIGN** A hull that is efficient for sailing downwind should be equally adapted for sailing upwind. It has to provide safe planing, too. The transition from displacement sailing into planing should be smooth and inconspicuous to crew.

In order to sail downwind effectively, the yacht must not pop out of a wave only to bash into another with great speed. In most cases this results in capsize, serious damages of the racer, and crew's injury.

The yacht's increased weight (as compared to ultra-light constructions) proved vital in overcoming these obstacles. Determining Delphia's weight, its precise apportionment in relation to the above-water placement of the hull, and a wise selection of sails resulted in the specific shape of the hull and hull sides.



**DELPHIA 24 ONE DESIGN** Delphia 24 one design planing - first phase of overcoming of wave.



**DELPHIA 24 ONE DESIGN** Delphia 24 one design planing - second phase of overcoming of wave.



## DELPHIA 24 ONE DESIGN Yacht's Efficiency

The prototype of Delphia 24 was built and tested in the spring of 2005, and became mass-produced almost instantly. "There was no need for us to fight with the racer" – such was the opinion of the testing crews, and it filled me with satisfaction.

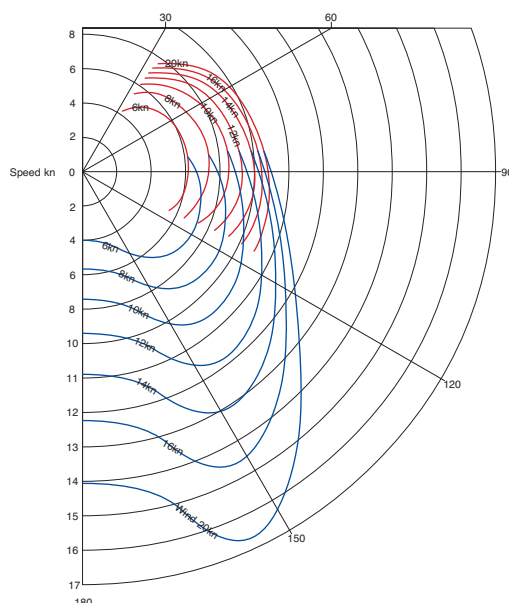
We decided to test the boat for two consecutive racing seasons in order to offer a boat which is 100% efficient and seaworthy. A dozen or so Delphias, with different crews and experiencing different weather conditions, gave us plenty of feedback and one fundamental conclusion: Do not change a thing!

The boat proved extremely efficient and fit for varied levels of sailing skill.

There is a common say that "Delphia sails by herself".

And truly, this is the way it was supposed to be.

During the design phase I ran initial speed tests for Delphia 24 using of computer software. The results were satisfactory (see the polar curves below).



The polar curves illustrate the estimated approximate picture of Delphia's efficiency at various wind speeds (6, 8, 10, 12, 14, 16, and 20 knots). In reality, with well-matched rigging and sails, the racer proved even better – specifically on courses from 150 to 160 degrees in relation to the wind direction.



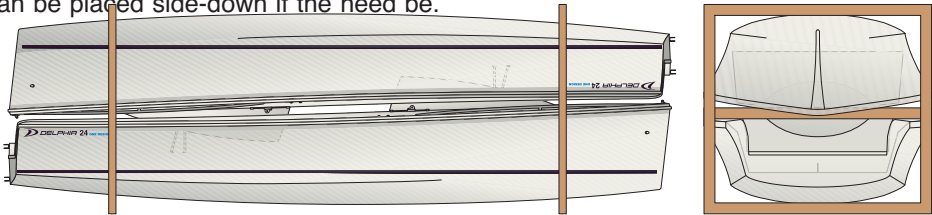
Delphia 24 one design planing at 22 knots speed.



**DELPHIA 24 ONE DESIGN** **Transportation**

In terms of construction, the yacht's hull is firm and may be transported by different means. Individual transportation can be carried out with the use of a trailer. The manufacturer supplies a trailer hull frame to be assembled on the trailer, as well as special metal racks installed on board – these are used for the anchoring of masts and booms (2 of each). Ballast elevator is also supplied with the package.

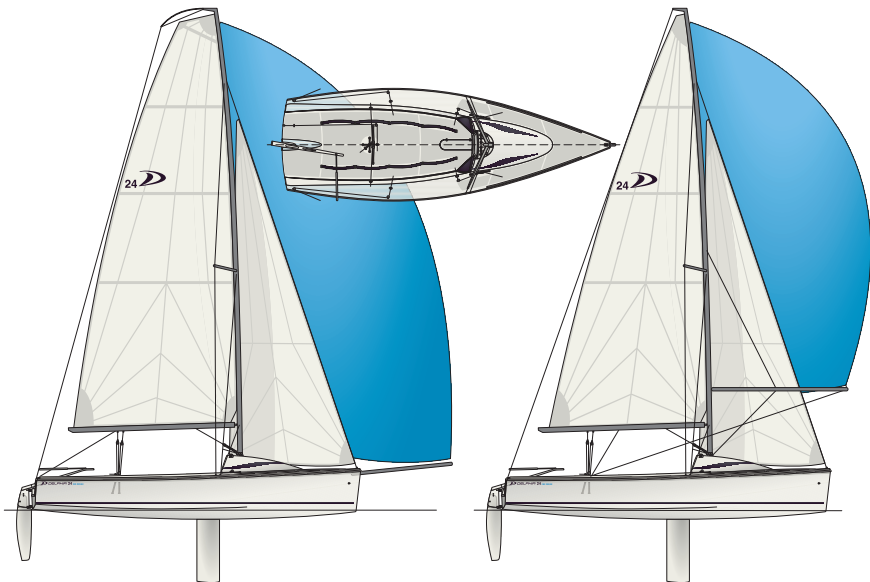
Collective transportation may be carried out on a special rack enabling simultaneous hauling of two hulls. Entire assembly weighs as much as 1300 kg (7.4m x 2.5m x 2.3m) and can be placed side-down if the need be.



**One step further**

After the experiences of two racing seasons and a great deal of enquiries, we decided to expand our offer by introducing the yacht's modified version – Delphia 24 match. It is basically the same racer, though a bit differently equipped. The mainsail is smaller and of a different shape, while the gennaker has been replaced by a spinnaker. Practically, Delphia 24 may be equipped in two separate sail systems simultaneously.

Delphia 24 match is a lot easier to handle. Excellent for training, it seems a perfect choice for beginners as well as those who sail for pleasure. And you don't have to be an experienced sailor to enter a professional race in the Delphia 24 match monotype class.



DELPHIA-24-one-design:	
length	7.30m
width	2.50m
draught	1.60m
mast height	9.50m
weight	850kg
ballast	275kg
mainsail	21.00m2
foresail	10.00m2
gennaker	45.00m2
crew	2-4
design category	"C"

DELPHIA-24-match:	
length	7.30m
width	2.50m
draught	1.60m
mast height	9.50m
weight	850kg
ballast	275kg
mainsail	17.80m2
foresail	10.00m2
gennaker	38.00m2
crew	2-4
design category	"C"

## DELPHIA 24 ONE DESIGN DELPHIA 24 ONE DESIGN DELPHIA 24 ONE DESIGN **Organization & regulations**

Delphia 24 Racing Association is the organization engaged in the activities of Delphia 24 and Delphia 24 match classes in Poland. Applicable regulations have been issued.

### **Measuring regulations of the Delphia 24 one design/match monotype**

#### 1. General Provisions

- 1.1. Yacht complying with the regulations specified herewith is a Racing Monotype DELPHIA 24 one design.
- 1.2. The monotype's logo placed on the mainsail constitutes the monotype's visible mark.
- 1.3. The yacht's certificate constitutes the monotype's formal mark.

#### 2. Specific Provisions

- 2.1. The monotype's logo should be rendered according to the standard (Fig. 1) and fixed to both sides of the mainsail in a firm manner; the logo's position has been expressed in the regulations (Fig. 4).
- 2.2. The term "prototype" denotes the manufactured prototype of the yacht (Delphia 24 one design / match) as designed by Andrzej Skrzat. The prototype's documented technical specification is available at the designer's and the producer's.
- 2.3. The prototype comprises of the following:
  - 2.3.1 hull consisting of hull mould, daggerboard, deck mould, hatch cover, rigging feel, stay and backstay, mast pillar, spinnaker/gennaker bag, and spinnaker/gennaker pole devices
  - 2.3.2 steering device consisting of stock with hinges, rudder, and tiller
  - 2.3.3 keel
  - 2.3.4 rigging consisting of mast, boom, and gennaker pole with all the fittings; stay, shrouds, and backstay
  - 2.3.5 mast, boom, and gennaker pole/spinnaker pole must be manufactured of aluminum alloys
- 2.4. All above-mentioned modules must be manufactured according to standard and marked in a permanent manner by the manufacturer as compliant to standard. The manufacturing number must be specified in the yacht's certificate.
- 2.5. Sail system:
  - 2.5.1 mainsail – manufactured according to Fig. 2  
It is permitted to use just one type of single-ply woven material for the entire sail. It is likewise permitted to use transparent windows (max. 0.8 m2).
  - 2.5.2 foresail – manufactured according to Fig. 2  
It is permitted to use just one type of single-ply woven material for the entire sail. It is likewise permitted to use transparent windows (max. 0.8 m2).  
The sail must be fixed to the stay, yet not in a continuous manner.  
Any type of snaps is permitted. Rollers and the like are not permitted.
  - 2.5.3 additional sail (gennaker/spinnaker) – manufactured according to Fig. 3  
It is permitted to use just one type of single-ply woven material for the entire sail. Sail fixing points must not change their position when sailing.
  - 2.5.4 sheets and halyards – no restrictions.

## Measuring regulations

### 3. Additional provisions

- 3.1. In order to obtain the desired yacht weight, taring force of 15 kg or less is permitted; its position and assemblage are specified by the standard.
- 3.2. It is forbidden to use gennaker/spinnaker-hoisting system based on the so-called "tubus".
- 3.3. Constructional amendments are not permitted.
- 3.4. When racing, adjustment of rigging is permitted only by means of under-deck halyard.
- 3.5. Outboard and cockpit trapezes are not permitted.
- 3.6. Mainsail may be equipped with no more than five stiffening battens – three upper ones may reach the luff, while the remaining ones must not be longer than 1.5m each.
- 3.7. Mainsail may be equipped with luff cringles.
- 3.8. It is permitted to stiffen the jib leach with only three battens, yet without making it convex.
- 3.9. It is forbidden to stiffen the leaches and gennaker heads with battens.
- 3.10. It is permitted to use trim lines on all sails.
- 3.11. DELPHIA YACHTS KOT is the sole licensed manufacturer of the DELPHIA 24 one design monotype.
- 3.12. DELPHIA 24 Racing Association is licensed to coordinate the organizational and sports activities.

### 4. The following advertising space is permitted (Fig. 4):

- 4.1. advertising space for sponsor of class
- 4.2. advertising space for yacht's sponsor

Fig. 1

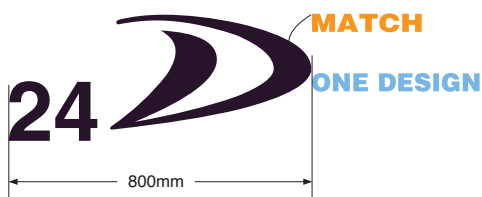
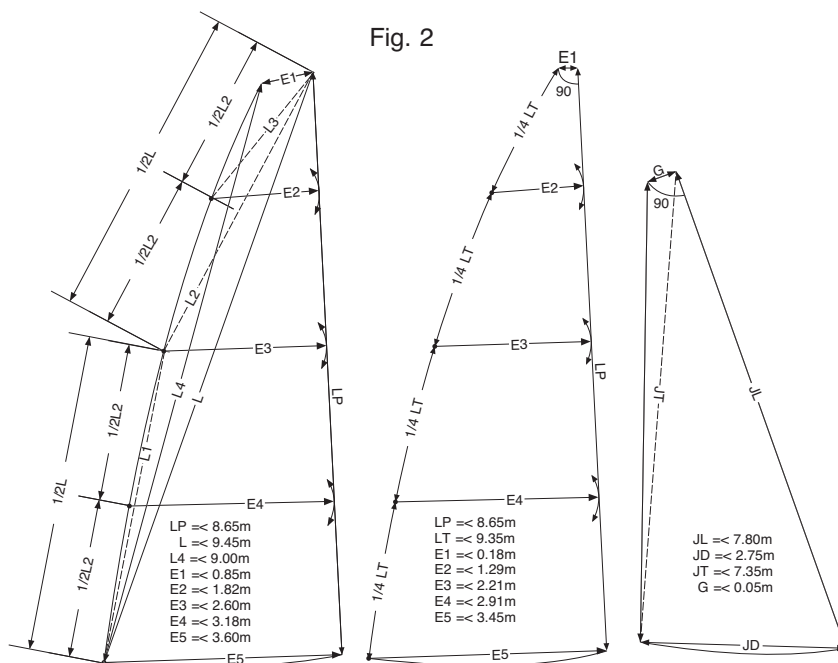
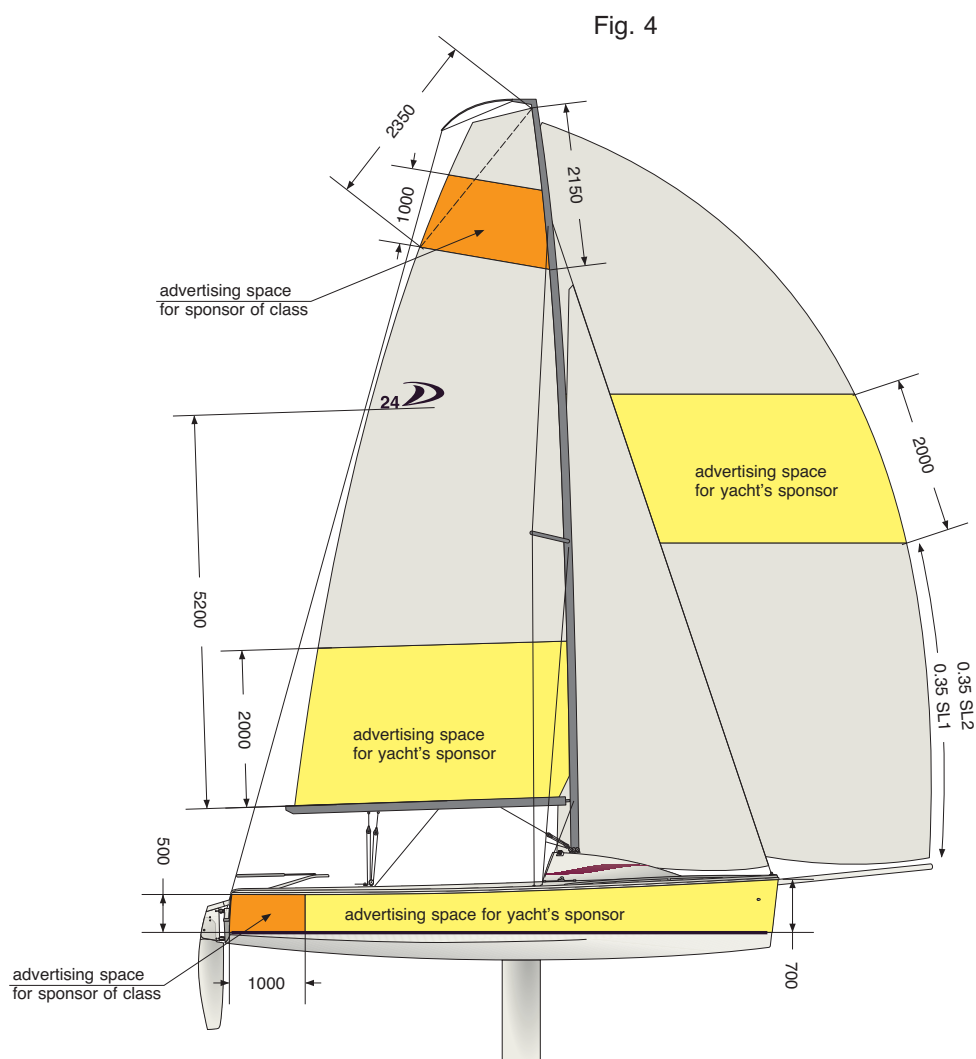
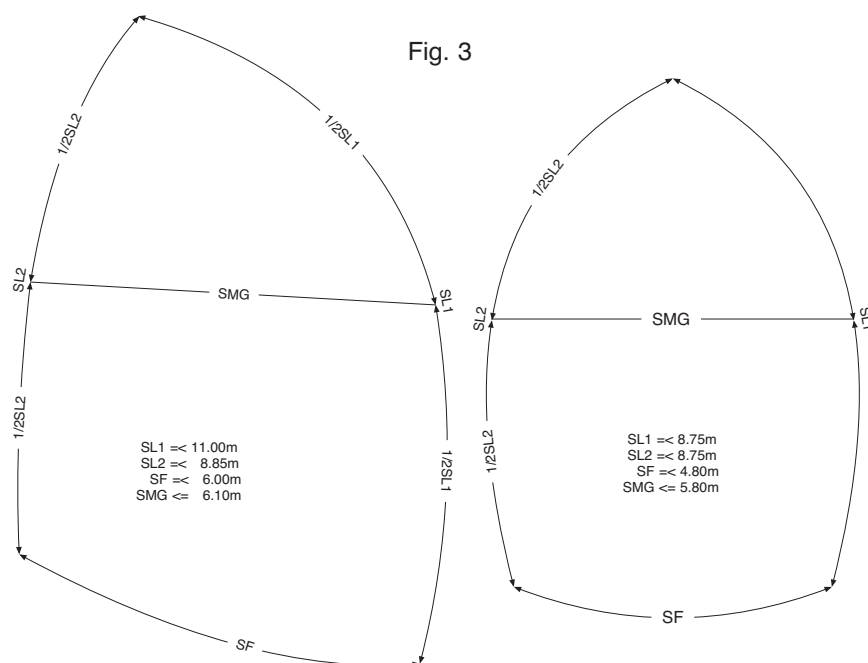


Fig. 2









DELPHIA 24 ONE DESIGN

## Contacts:



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