Denis Dupin
translated with the precious collaboration of Graham Hutchings, Tim Laws

A few things you should know for racing the Europe

édition 2020
V 20-07




2d Voile Performance

Consultant pour la performance globale

Mini-Guide edition contact

Denis Dupin: 2dvoile@gmail.com

What is the Europe dinghy ?

The International Europe class dinghy is an 11ft (3.35m) long, 4ft 6in (1.38m) wide, 45kg, single-sail monohull dinghy, designed to be sailed by one person. The hull can be constructed in wood, though almost all modern boats are composite foam sandwich construction. The mast, made of aluminium or carbon is free-standing, and sails are dacron.

The sail area of the boat is approximately 75ft^2(~7m^2) which is comparable to a full-rig Laser. However, in the Europe, as the mast and sail can be customised to the sailor's weight and height, this sail area can be utilised by helms who would be far too light for the Laser. The large sail-area on a small, rounded hull shape, provides a boat that is fast and responsive in light winds and exciting but controllable in stronger conditions.

The class has its beginnings in the European Moth class of the 1960s (which eventually became the International Moth Class – famous in recent years for pioneering hydrofoil racing). In 1963 the FFV (French Federation Voile) called for submissions for a 'Monotype' Moth. The winning design was by Belgian Alois Roland, based on developments of drawings by Pierre Marique. Roland named his boat 'Europe' and it quickly became popular in Belgium and France.

In 1976 the class had grown sufficiently to be awarded International status by the IYRU (the forerunner to ISAF/WS). In 1989 the class achieved another milestone when it was selected as the Olympic women's singlehanded dinghy event. This tenure lasted from Barcelona 1992 to Athens 2004, after which the Europe was supplanted by the Laser Radial.

During the Olympic years the class had many different builders and significant optimisation of hulls and masts, sometimes at significant expense. Since the passing of the class' Olympic era the opportunity has been taken to tighten the rules in many areas with the aim to make the class a stricter one-design.

The class in 2020 is still popular throughout many countries in mainland Europe, with the UK fleet showing a resurgence in recent years. There are other small pockets of Europe's spread across the globe, in South America and even New Zealand. The class holds many well supported events in Europe, with fleets often in excess of 100 boats, including a World Championship and Youth & Master's European Championship.

Why sailing the Europe ?

• A simple boat
The Europe is a simple boat. Speed mainly depends on the sailor's ability to set the sail for the conditions.

• A light boat
The basic hull weighs 45kg with an all-up ready to sail weight of around 60kg. This makes the boat easy to manage by oneself making it one of the lightest boats around (excluding boats such as the optimist and open Bic). No bad backs from lugging around heavy boats.

• A huge range of ages and sailor weights
The Europe suits males and femailes equally and caters from those fresh out of junior classes such as the Optimist and Topper, right up to those of 'advanced age'. Sailors weights range from 40kg to 85kg (no other boat can do this) with an ideal range of 55 to 75kg. French sailor 'Pépé' was once crowned World Champion at the age of 60!

• Equipment adapted to the sailor
The range of weights and ability of sailor is extended by the choice of equipment that can be tailored to the specific requirements of the sailor. In particular the carbon mast and sail size and shape can be tailored to the specific requirements of the sailor

• Rig adjustments
Despite the relative simplicity of the boat, the rig can be adjusted greatly for the conditions. Outhaul, inhaul, kicker and especially the Cunningham, all led to the sides, control sail shape with the traveller controlling the angle to the wind. Between races the mast rake can be adjusted too to maintain the balance of the boat.

• A boat that rewards fine tuning
To get the best out of the Europe the sailor needs to be in tune with all aspects such as the balance of the boat, sail shape, body placement and body movement. Small differences make a large difference on the race-course and this teaches the sailor how to get the best out of the boat. Perhaps this is why a great many former Europe sailors go on to other classes including the Olympic classes, with great success.

Contact IECU

President.
Paul Depoorter - ESP - president@europeclass.org - Ph. 0034 972315100

Site internet: http://www.europeclass.org/index.html

Facebook: https://www.facebook.com/groups/392745884106341/

National classes

Belgium: http://www.europeclass.be
Denmark: https://www.europeclass.dk
Spain: http://www.aecie.org/novedades/index.php
Finland: https://www.europeclass.fi
France: https://www.europeclass.fr
Great Britain: https://www.ukeuropeclass.com
Germany: https://www.europe-class.de
Italy: https://www.classeeuropa-italia.com
Norway: https://sites.google.com/site/europajolleklubben/
Poland: https://pske.pl
Sweden: https://www.svensksegling.se/Klassforbundssidor1/svenskae-jolleforbundet/

Buy a boat

• New boat

When purchasing a new boat, you should make sure that the IYRU or ISAF plate is on the starboard side of the bulkhead, depending on the year of construction (blue sticker). You must also check that the contructor's badge is to be found on the inner part of the transom.

You should receive the following documents:

The Measurement Form
The Measurement Form must, at least on section 2, be signed by an agreed measurer of the building country.
The Fee Receipt (fees to IECU

After completing paragraph 8 the documents should be registered with your country's class association to obtain a sail number.

You shall be sended back the conformity certificate with your national sail number.

This number has to be in your racing sails.

New hulls are available from Winner. Finessa have stopped production. The OSIS moulds have recently been obtained by a Danish company that is making hulls. Plans for hulls to be made once again in the UK. And I heard about a new italian hull. (to be confirmed !)

• Second hand boat

There is a lack of second hand boats on the market. Despite this good boats with carbon masts can be bought for as little as 1500 pounds. Good places to start are the class associations, facebook, Apollo duck, deuxieme main, etc..

When buying, make sure that the boat is sold with the correct measurement form that corresponds with the IYRU plaque number. Help can be found with the class associations. Measurement forms should also be available for the mast, boom, sails, rudder and daggerboard.

Check the IYRU plate or ISAF blue sticker (N° > 7000)
Check that hull number is the same that on the conformity certificate.
Check that the sail numbers are the same.
The reseller must give you the conformity certificate and the Measurement Form of each part of the boat: hull, mast, boom, centerboard, rudder, rudder head, sails.
Send the papers or copys to he tecnical commission of your country, with the national fees if needed.
You shall be sended back the conformity certificate with the confirmation of your national sail number.

This number has to be on your racing sails.

Choosing a hull

Europe hulls last very well. The general condition is probably more important than the age of the hull. Many hulls in good condition can be found dating from around 1980 to 2004, corresponding to the years that the Europe was an Olympic class.

Prices vary but a hull (without sails and mast / boom) should cost around 1200 to 2500 euros.
Over 2500 or 3000 euros the hull should be in great shape.

Hull shape
In the past Europes have been made by many constructors, particularly in the 'Olympic' years: Roland, Hein, Lanaverre, Stafler, Van Wattum, Silvestro, Hendriksen, Barracuda, Itsa, Selboat, Boutemy, Galetti, Cristalli, Tebbertman, Taylor, Optimazur, Duquesnoy, Roga, Rondar, Falat, White, Vanguard, Boyer, Lennam, Winner Dk, Borresen, Nautivela, Naïx, Phileas, Erplast, Finessa, Osis, Winner Es, and may be those forgotten.
The majority on the market at the moment are Winner, Finessa, Osis, Naixx, with a few Rondar, Falat and White boats in the UK. Very good sailors may notice the difference between hull shapes but for the majority this makes no difference at all.
Wooden boats, Roland, Silvestro, Galetti, Duquesnoy, Cristalli, are precious "collectors".

Hull surface
A hull that appears to be in poor condition can be repaired to a good finish professionally or by an experienced amateur.

Structure
There are a few key areas to look at when assessing the structure of the hull;

Stiffness – generally, the hull should be stiff. If it flexes then it absorbs energy and slows the boat through the water.
Mast step – this must be totally solid. Huge forces act here and if it breaks the foredeck will be damaged as the mast falls
Mast ring – this again must be solid. Many boats have a wooden reinforcement uncer the foredeck that can be rotten and would need to be replaced
Daggerboard case – look for flexing and cracks
Junction between side-decks and forward bulkhead
Side decks, especially near the traveller track where the sailor would sit
Transom and ruder pintles should be solid
It is a good idea to check that the mast, dagerboard and rudder are all aligned and vertical. This can be done with care by putting the boat on it's side.

1973"collector" Silvestro Sail n° FRA 3454
Really few units were built.
Is there anothere one sailing somewhere ?

Choosing a mast

Masts have evolved from wood, aluminium, carbon with mast track through to today's carbon masts with integral mast track. The latter are the only choice for serious racing but there are many sailors who still use aluminium masts to great effect. There is a special trophy at the UK Nationals for first boat with an aluminium mast. Of equal importance to the material are the characteristics of that mast. There is no point in paying for a stiff carbon mast that suits a 70kg sailor if you weigh 55kg. In addition, the sail should be adapted for the particular mast.

- Side bend

Side bend is produced by the lateral forces acting on the sail and is amplified by Cunningham tension. In general, a lighter sailor would aim to have a softer mast with more side bend that would allow the sail to depower at the top. A rough guide is to be found below:

Barreur	Side bend
Poids < 55 kg	430 ≤ mm ≤ 375
55 ≤ kg ≤ 60	370 ≤ mm ≤ 355
60 ≤ kg ≤ 65	360 ≤ mm ≤ 345
65 ≤ kg ≤ 70	340 ≤ mm ≤ 325
70 ≤ kg ≤ 75	320 ≤ mm ≤ 305
75≤ poids	300 ≤ mm≤ 280

- Back bend

Back bend is a result of leech tension. And again amplified by Cunningham tension. The more the mast bends, the more;
The sail will flatten, open at the leech and be more responsive in the gusts, but this easy depowering may come at a price of performance in certain conditions where power is more easily lost. A very stiff mast on the other hand will have a very narrow range where it cannot adapt readily to the different conditions.
Generaly the back bend is between:
Back bend
300 ≤ mm ≤ 500

- Winning combinations

There is a great variation of masts found at regattas and many can be made to work very well. Side bend is probably the most important factor and then adapting or choosing a sail to fit.

Choosing a sail

Many sail lofts will be willing to make Europe sails. Many have had experience in the past when the Europe was an Olympic class. However only a few are still actively making sails regularly. Green, Wb, Quantum, North and recently UK sails (Denmark). Sailcloth is usually precut and then stitched together according to the profile requested, then the luff curve is cut to fit the mast bend. Recently, SailTech has been very active, developing and making only Europe sails on an individual basis.

New sail
• When ordering, specify your weight and height
• Specify the mast bend characteristics or even its serial number so that the sail adapts perfectly to the bend of the mast under load

• You may even specific the wind range, sea state of expected using, and your physical condition

It can take between 1-4 weeks to obtain the sail after ordering, depending on the size of the sail loft and the timing during the year (Be carefull, before the Worlds is a busy period !)

Used sail
A used sail in good condition that was designed for more or less the same weight of sailor and mast can be a good option if the budget is limited but remains a second best for the reasons outlined above. You should check the condition of the cloth and the cringles. Ideally, hoist the sail and move the boat to a close hauled position. Bring the boom down to the transom – provided the rake is set up correctly, if there is a small fold at most from clew to mid mast, the sail is probably a good fit. If the fold is very pronounced then the fit is probably not so good.

Sail worn out Sail adapted to mast Fold from midpoint of luff to the clew
(On the third sail here the fold is not too pronounced and so the and so performance will not be affected.)

Mini, Lite, or not ?

The measurement rules for Europe sails provide a certain flexibility in the dimensions. Most sails are pushed to the maximum allowable in an effort to increase sail area but this may not always be the fastest option for everybody. Around 2010 Green sails started production or a ‘mini’ sail specially adapted for lighter sailors. More recently, SailTech have introduced the Stormy and Lite versions. These sails have a shorter foot, reducing the leech length and the roach of the sail. The resulting sail has a smaller sail area and less area higher up the sail. In the same way that yachts reef their sails to increase performance in higher winds, or Toppers roll the sail round the mast to decrease the sail area, this smaller sail can greatly increase performance in certain conditions and in certain conditions. Two-boat training and in group training sessions have seen objective improvements in performance such that sailors under 60kg are quicker around a course in anything over 12kt. All things being equal, the bigger sailor will be faster but the difference between the heavier and the lighter sailor is reduced with the smaller sail, particularly if the smaller sailor is less experienced.
In heavy conditions when the difference is 10-13%, with the smaller sail this is reduced to 8-10% which is a 2-3% increase in performance. The downside is that in lighter winds the reduction in performance is 1-1.5%. In practice, the wind is often greater for more of the time and the net gain is usually in favour of the smaller sail.

We may resume hare arguments against or for using such a sail:

Against
The name suggests that the sail is worse.
In less that 14kt the sail is 1-1.5% less efficient downwind.

For
An increase in performance of 2-3% close hauled in 12+ kt. Off the wind the smailler sail may be more stable and easier to handle in transitions making the sailor feel able to be more dynamic rather than staying in safe (and slow) mode. A smaller sail is less physically demanding – useful for thos long days on the water with multiple back-to-back races.

The Europe class rules allow 2 sails to be used for a regatta. Therefore smaller sailors may find significant advantage in choosing the correct sail for the conditions

In grey, the part of the sail that is removed giving an efficient smaller profile.

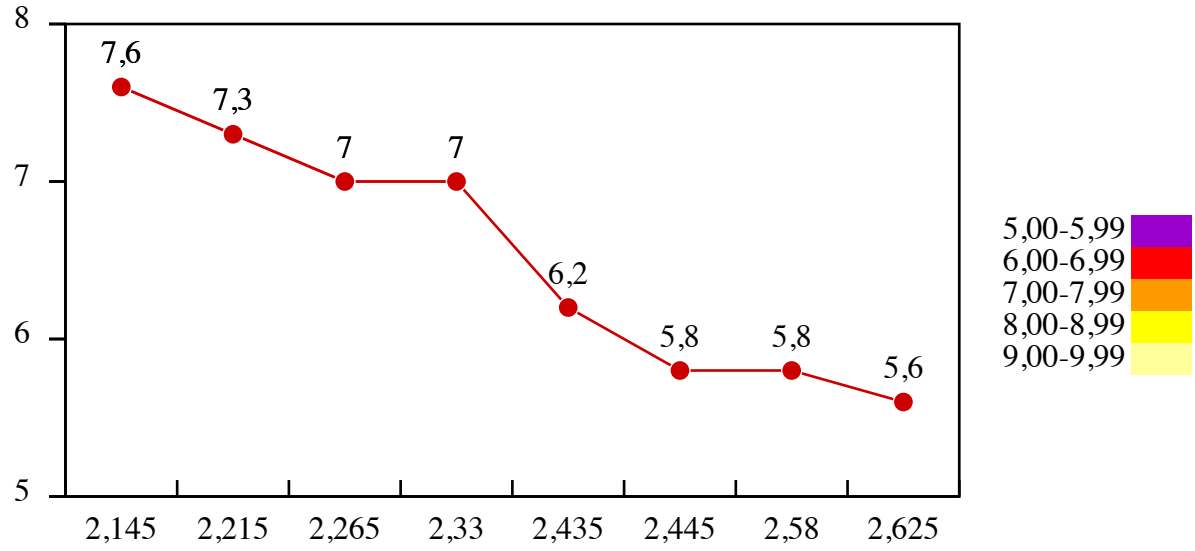
Choosing a daggerboard

The daggerboard may be less important that the mast and sail but nevertheless is an important element to get right. Because the Europe is relatively slow, the daggerboard has to be relatively large to counteract the sideways forces developed. In general the board should be more flexible for the lighter sailor but made-to-measure boards are not generally available and the gains are likely to be small. The weight of the board may be an indicator of its flexibility and this should be marked on the measurement certificate. Weight varies from 2-2.8kg.
The graph shows the result of testing flexibility against weight of the board that confirms the relation between the two.
Although there are no definitive guide, smaller sailors under 60kg should probably aim for a board of <2.2kg and heavier sailors >75kg should aim for a board >2.5kg.

New daggerboard
When ordering, specify your weight and height, and the ideal weight of the board. The seller may have a number of boards in stock of varying weights and builders.

Used daggerboard
• The general state and finish of the board is probably much more important that the flexibility. It should be smooth, particularly the edges and especially around the areas in contact with the case. It should be straight and there should be no signs of ingress of moisture. Chack the weight against the measurement certificate.

Curve of flexibility against weight according to the testing protocol. The more the coefficient is raise, the more flexible the foil



Performance elements

It is not always possible to buy a totally new boat. Many sailors want to know where the biggest gains are to be made – which part of the boat is crucial for speed?

The hull
The hull needs to be down to weight, stiff, watertight with a good finish. Fittings such as cleats need to work well.

Mast and sail
These should be considered together. The sail is adapted to the mast and both must be adapted to the sailor's weight and fitness. If you have the wrong mast it might be better to swap with someone in the fleet rather than continue with the wrong one and buy a sail that will never be right for you.

Daggerboard
Boards should be solid and smooth with intact edges. Full wood boards, wich are not nervous as the modern sandwich boards (not to be confused with the excellent laminate boards), are to be replaced.

Rudder
As with the daggerboard but less important. Few gains to be made here.

Rudder stock
Must fit well to avoid vibration. Carbon versions are available. The rudder stock must be very stiff or you should have bad surprises when windy…

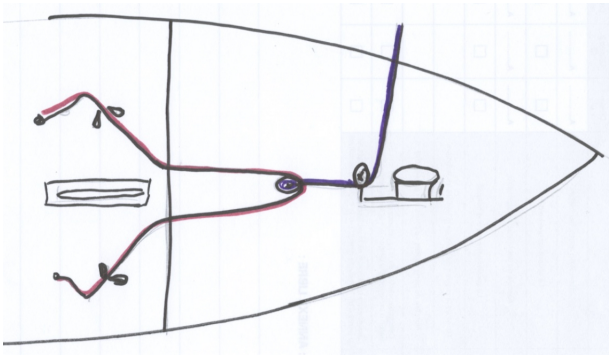
The sailor
Undeniably, the most important factor is the sailor. Whilst the boat must be good, the sailor must be in good physical shape and should sail and train regularly. Sailing should be fun, but practice in the gym or on the water makes for better sailing. As a guide for what is the most important, on a scale out of 23*, the elements can be classed as follows:

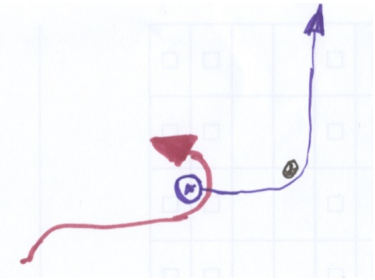
Sailor	20/23
Mast / Sail	16/23
Daggerboard	15/23
Hull	14/23
Rudder stock	10/23
Rudder	6/23

Two things should be noted. Firstly, in terms of cost / benefit the daggerboard is the best option (and a new board looks great!). Secondly, this is just a guide and serves as a discussion pont for the boatpark or the bar !
* This sacle is a joking one, refered to one of my favorit sitcom: Kaamelott…

Fitting out - ropes

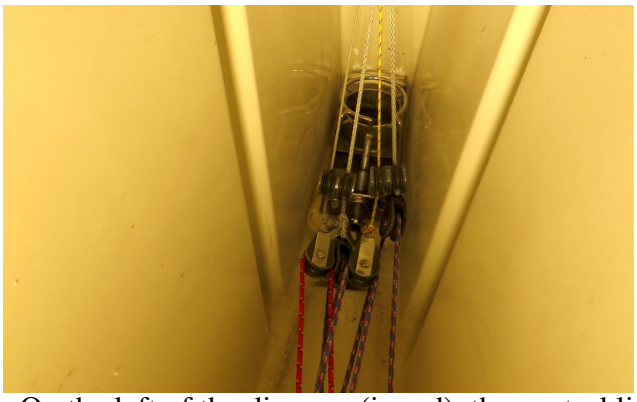
From afar the control lines on a Europe look like a knot of spaghetti but when fitted out properly everything should work with ease to allow the sailor to change the sail shape whilst sitting out. The lines come from the boom or sail, pass through the deck to the mastfoot and are rekayed to each side deck.

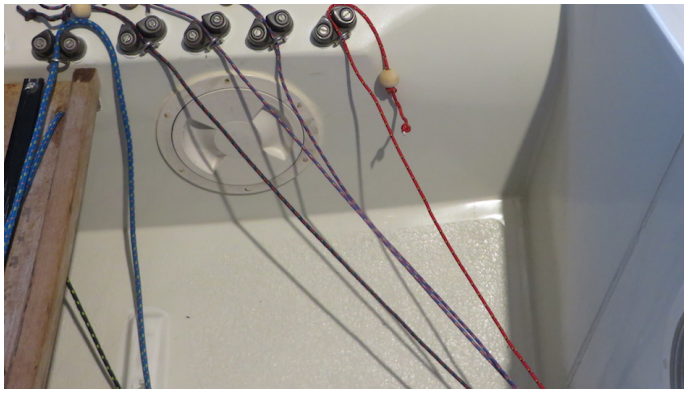




Each control line has two parts. In blue (on the right of the diagram) an end passes through one of the pulleys fixed to the base of the mast and passes backwards to a small pulley, generally Ø16 - 22 mm.

• The other end of the line passes upwards and through a small hole in the mast collar. When rigging it is easier to do thiswith the mast already nearly in place before dropping the mast a further 10 cm into the mast foot.





• On the left of the diagram (in red) the control line passes from the side deck, through a pulley in the forward bulkhead, through the pulley of the line passing around the mast foot, back through the pulley on the bulkhead and to the other side in a symmetric fashion.

For each control line you will need:
- ± 3m, Ø de 3 - 6 mm, for the line on the side decks (choose a diferent colour for each)
- 1 small pulley fixed to the end of the line from the mast foot
- 1 small pulley fixed to the back of the mast foot (often Two double pulleys for the 4 lines)
- ± 1,20m, Ø 1,5 - 3mm for the inhaul and Cunningham
- ± 2m , Ø 3mm or the Vang and outhaul

Donc pour équiper un bateau, il faut:
- ± 12m de bout Ø 3 - 6 mm
- ± 3m de bout Ø 1,5 - 3 mm
- ± 4m de bout Ø 3mm
- 4 pulleys Ø 16 - 22 mm (generaly the pulleys at the mast foot are already present)

To complete the running rigging you will need a mainsheet of approximately 7.50m, Ø 8 to 10 mm

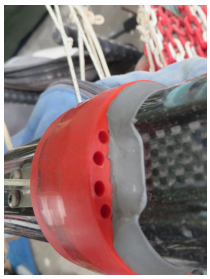
Adapt fittings under deck and to sidetanks for an old hull

For a good understanding of the principle, read the chapter: "Equip your boat".

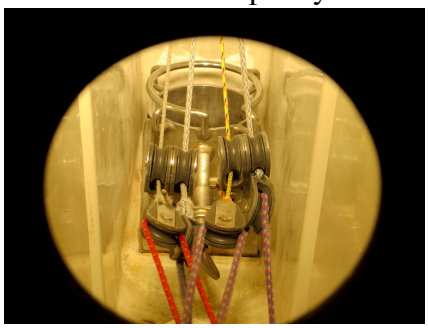
The older hulls received the controls on the deck.
Many sailors would like to adapt the controls according to the current model:
the adjustment lines pass through the mast ring, descend into pulleys at the rear of the mast foot and end in a pulley.
Each pulley receives a command which is returned in cleats fixed on each sidetank, passing through the floor. (Vertical wall that closes the deck).

To adapt such a system, it is necessary:

1 - Provide holes in the mast ring.
The carbon masts are all equipped with it.
For the old aluminium masts, you will have to drill the 4-hole ring, Ø 4 mm

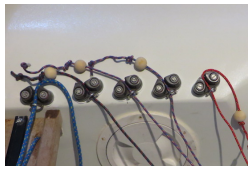



2 - Fix two double-pulleys at the rear of the mast foot



3 - Fix 4 double pulley-bulkhead , two each side of the centercase .
Under each pulley, drill a hole, Ø 4 à 6 mm to guide the lines.
(Measurement rules allows holes until Ø 8mm).
You can also take the option of cutting a slot to the size of the double pulley-bulkhead to come and embed them from the inside.

4 - Fix the adjustment clams to the sidetanks. 4 clams per tank, allowing to receive:
cunningham, inhaul, outhaul, boom vang

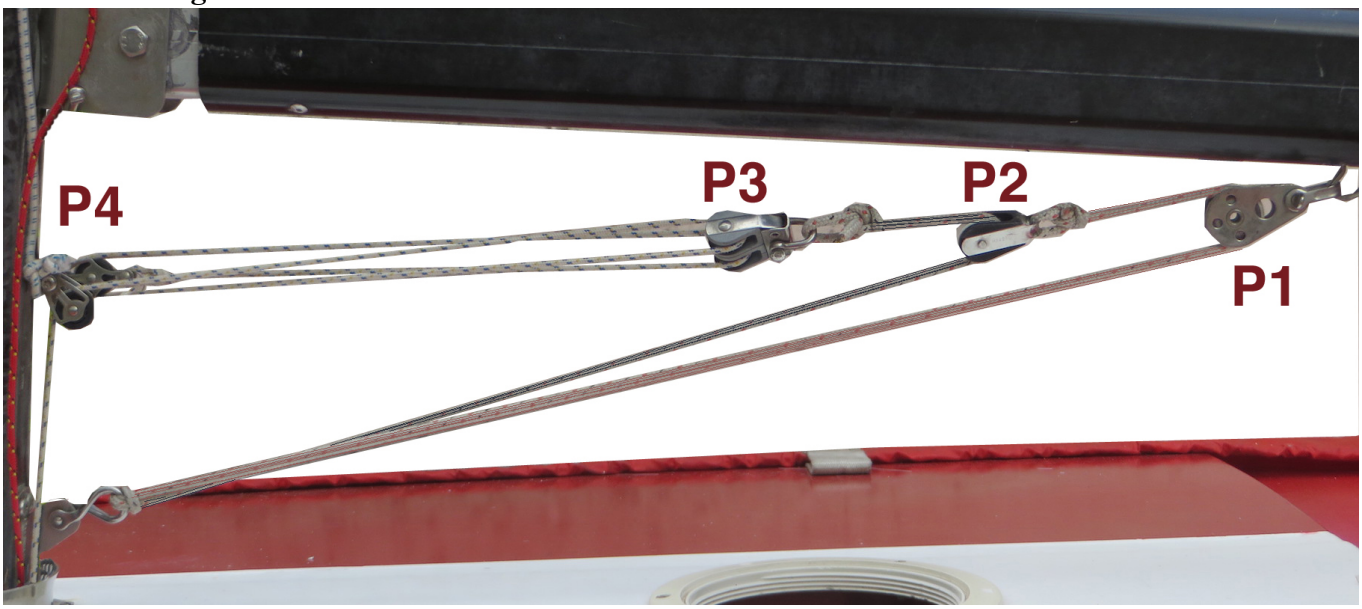



To ensure a good tightness of the tanks, do not forget to generously fill the holes and the bottom of the cleats before passing the bolts and screwing.

Fitting the boom vang/kicker

There are two types of vang commonly used in the class:

- Cascade vang



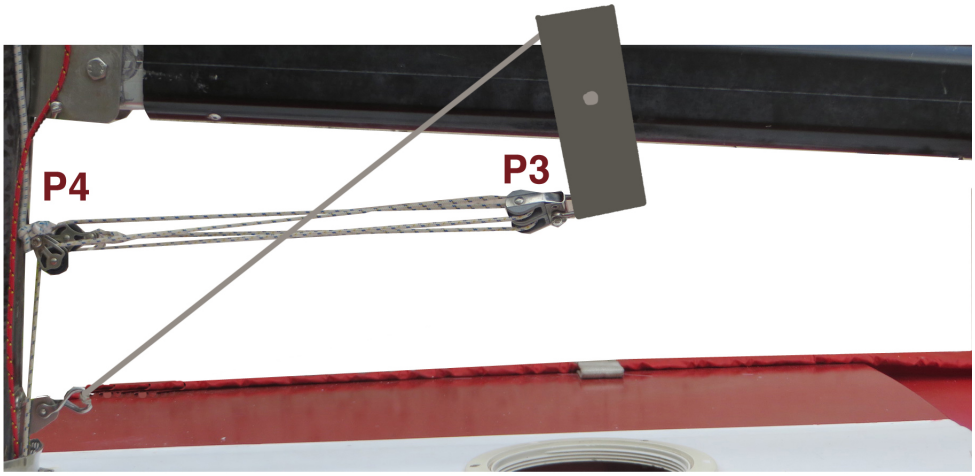
The vang fitting is installed as standard on the boom 7 60 cm from the gooseneck bolt on the mast. The fitting should have one side bolted into a hole drilled into the underside of the boom - if just friction is used then the fitting tends to creep towards the mast under tension

- A double ended length of dyneema (Ø 5mm) starts from the shackle attached to the mast.
- One end passes through the (Ø 24 or 30mm) block attached to the vang fitting on the boom (P1). Another block (Ø 18 mm) (P2) is tied to the end of this part.
- The second part of the end passes through the smaller block (P2). At the end of this a double pulley is attached (Ø 16 or 18mm) (P3).
- The control line end which exits the mast ring passes through one of the sheaves of the double pulley fixed at the mast/gooseneck (P4). It then passes through one of the sheaves in P3, returns into the second sheave P4 and passes into the second sheave P3 and attaches to the becket of P4.
- Care must be taken to check that when the control line inside the mast tank is all the way aft (fully pulled on), then the double block on the cascade is block-to-block with the one on the gooseneck

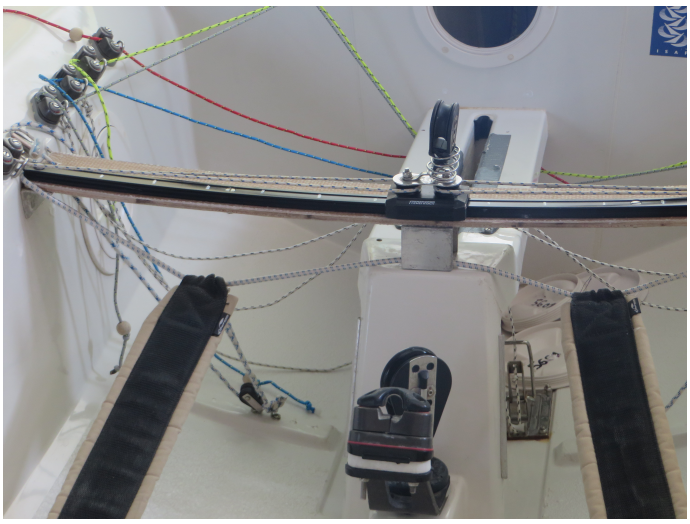
- Lever vang

This system is based on an aluminium lever is fixed on a pivot through the boom.

- A double ended length of dyneema (Ø 5mm) starts from the shackle/block attached to the mast.
-The two ends attach each side on the upper part of the lever.
- The control line which exits the mast ring passes through one of the sheaves of the double pulley fixed on the mast (P4), then passes through one of the sheaves on the double pulley at the bottom of the lever (P3), returns to the second sheave P4, passes into the second sheave P3 and is attached to the becket of P4.



Hull fittings



Side tanks:
clam cleats 27mm with guide (6 for each side tank: cun, inhaul, outhaul, kicker, footstraps, traveller)
clam cleats 38 mm (1for each tank for the mainsheet) or alternatively swivel cleat on the lower mainsheet block
traveller with 2 to 1 purchase around a 29mm pulley

Floor of the hull
2 lateral footstraps 85cm or one central footstrap of 65cm for sailors over 175cm, with 20mm pulley.
Self bailers, Europe super mini Self bailers RA435200

On the deck
Loop for fixing to trolley
Mast ring and loop for tying down mast

Under deck
Stainless adjustable mast foot with 2x double pulleys for the four sail control lines (outhaul / inhaul / kicker / Cunningham) with 4 pulleys, one on each line after it passes aft from the mast foot

Bulkhead
4 double pulley-bulkhead

Inspection hatches
4 hattches Ø 15cm, 1 for each side tank, 1 for deck, 1 for bulkhead
1 trappe Ø 10 cm n the front tank in front of the mast ring

Transom
2 stainless gudgeons Ø 10mm

Boom and mainsheet pulleys

Variations in the stiffness of the boom itself may have a small but noticeable effect on the performance of the sail. The role of the boom is to regulate the foot of the sail and the relationship between mainsheet tension and leech tension.
- the softer the boom, the more it bends to reduce the depth in the lower part of the sail.
- the softer the boom, the more it can flex at the clew in order to open the leech of the sail.

Lighter sailors may opt for a more flexible boom whereas heavier sailors may benefit from a stiffer version

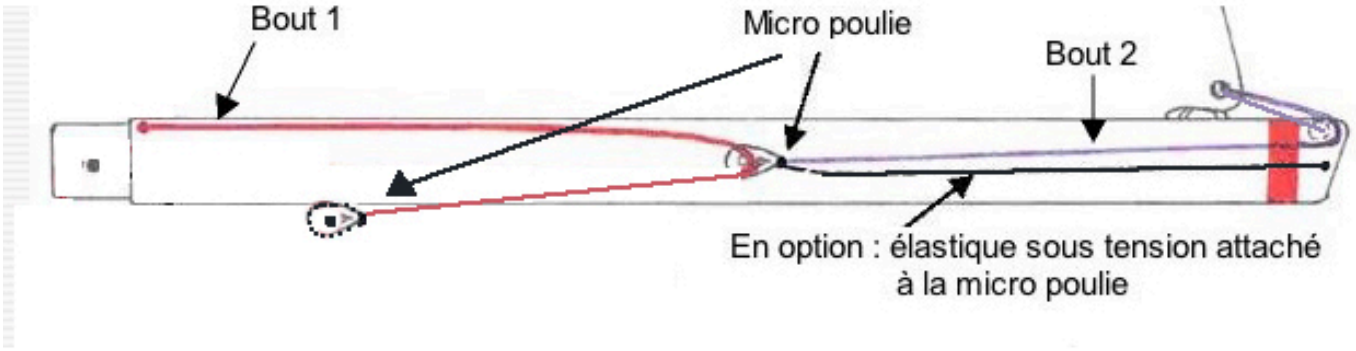
The apparent stiffness may also by adjusted by the position of the boom take-off points for the mainsheet. Small differences here may have a considerable effect on performance and 'feel' of the boat.

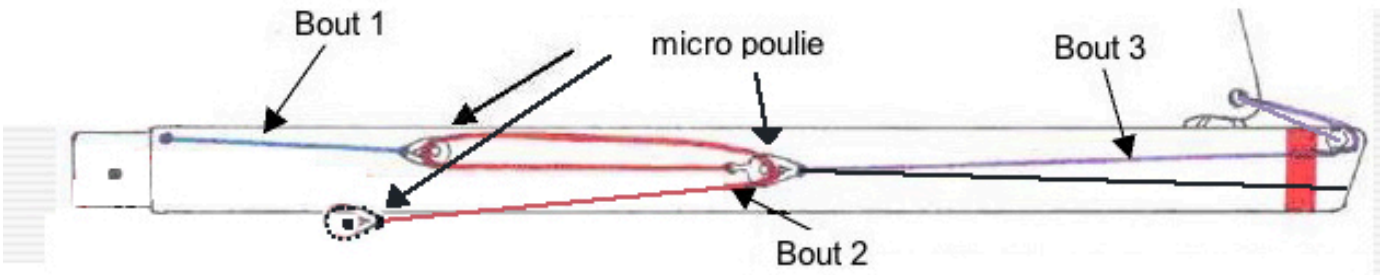
In order to allow the leech to open and flatten the lower part of the sail, the take-off points can be moved marginally forward, and can be placed adjacent to each other. This allows the boom to flex more to allow the clew to rise and open the leech when a gust hits.
Alternatively moving the take-off points further aft and slightly apart will reduce flex of the boom. However, this may make it harder to get the boom down on the deck when close hauled.

Attention should be paid to the state of the boom, particularly at the take-off area, to ensure there are no breakages.

Outhaul system inside the boom

Two examples are shown adapted from *J.K Mack in "Rigging Guide", in the previous internet site of the French Europe Association*

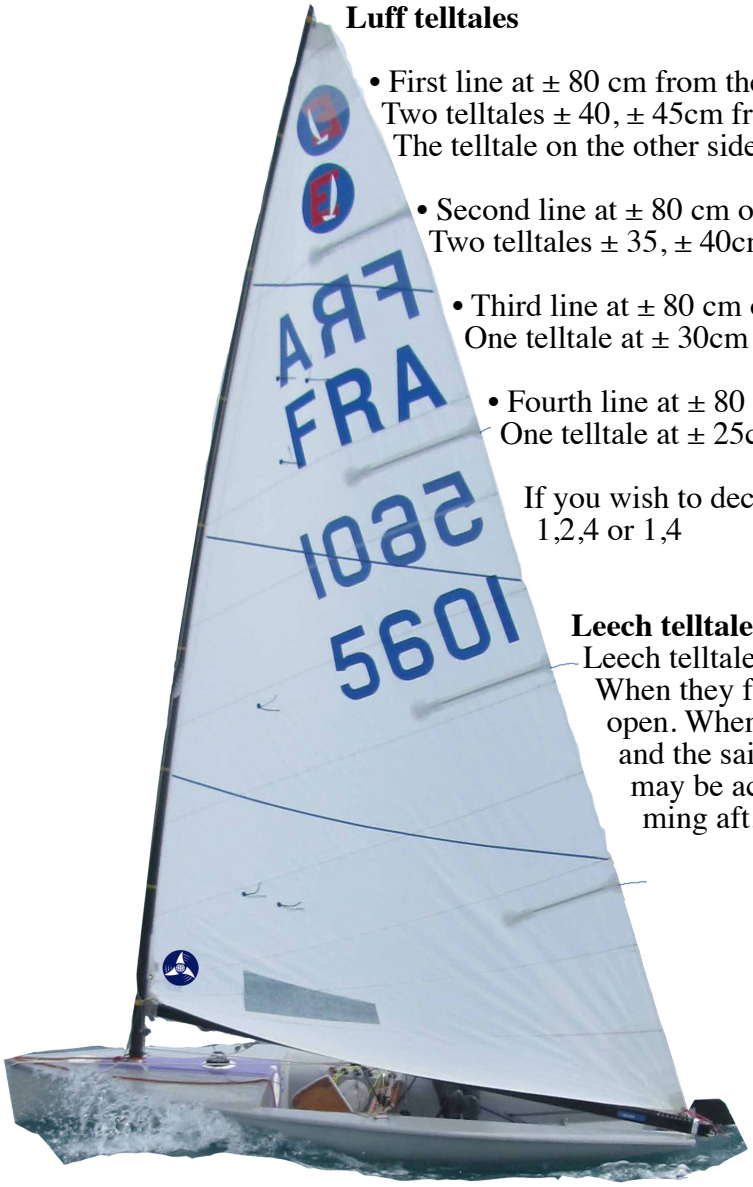




Sail telltales

Telltales are used to ‘see’ the flow of wind over the sail They are placed primarily on the luff of the sail for the angle of sheeting and the leech to assess leech tension.

Reading the telltales on the luff
When close hauled, laminar flow is achieved when the telltales on both sides of the sail are are lifted from the sail and run parallel towards the back of the sail.
When the windward telltale is lifting and moving in all directions, the sail should be pulled in or you should bear away. If the leeward telltale is lifting and moving in all diirections then you should ease the sheet or head up. In the Europe, as in other boats, there is nothing worse for the sail than oversheeting



Luff telltales

• First line at ± 80 cm from the sail foot.
Two telltales ± 40, ± 45cm from the luff.
The telltale on the other side of the sail should be about 2cm above the other.

• Second line at ± 80 cm over the first.
Two telltales ± 35, ± 40cm from the luff.

• Third line at ± 80 cm over the second.
One telltale at ± 30cm from the luff.

• Fourth line at ± 80 cm over the third.
One telltale at ± 25cm from the luff.

If you wish to decrease the number of telltales, use positions 1,2,4 or 1,4

Leech telltales

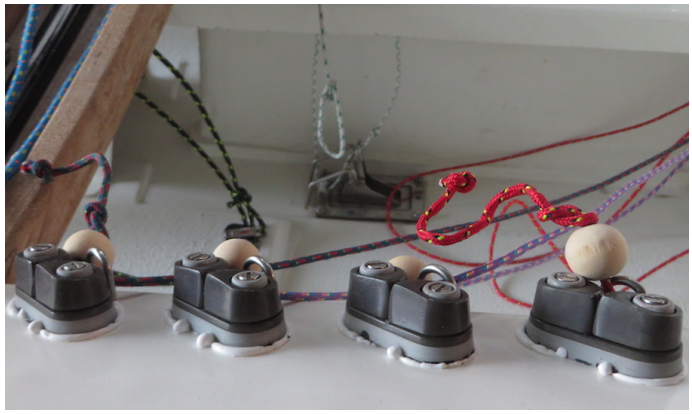
Leech telltales are placed at the back of the batten pockets. When they flow horizontally the air is escaping and the leech is open. When the telltales are not flowing the leech is closed and the sail is stalled, killing performance. Optimal pointing may be achieved when the upper leech telltale is 50% streaming aft, 50% flicking to leeward.

Help, my boat is leaking!

It is relatyively common for a boat to take on water in the bulkhead or side decks, especially in rough conditions.

Remember to remove this water at the end of the day's sailing rather than the following morning. This reduces the risk of water ingress into the hull which can lead to damage and weight gain. When stored dry this weight will literally evaporate but will leave saly behind.

Side tanks
Water can enter into any of the holes made for fixings such as the inspection hatches, fixing for the traveller or the cleats. The best way to avoid this is to remove each fitting, clean thoroughly and apply a generous dose of silicone before fitting firmly once again.



Significant amounts of water may also be due to a leak between the hull and side deck, particularly in older boats. If this is the case then a more extensive repair will polyester or gelcoat will be required.

Forward bulkhead
Again, water can enter into any of the holes made for fixings and the best way to avoid this is to remove each fitting, clean thoroughly and apply a generous dose of silicone before fitting firmly once again.

Cockpit
The cockpit can take on large amounts of water, some from obvious causes and some from less obvious causes.

- Sinking the sides of the transom when tacking
- The evacuation holes in the transom. Close with duct tape or fix a firm plastic sheet (even an X-ray film) over the hole in a hinge flap.

- The self-bailers can have leaks around them, be loose or the trap door can be ill-fitting. Fix firmly if obviously loose, or take out, clean, apply silicone and replace. New trap doors can be bought for a couple of Euros, and new bailers can be bought if needed.

- At the back of the daggerboard case. This can be diificult to detect. It usually arises from damage to the inside of the case from the daggerboard and so the state of the trailing edge of the daggerboard should be a clue. A repair should be made on the inside of the case before replacing the protective rubber between the case and the daggerboard.

Cleaning and polishing of the hull

Which one of us didn’t wonder how to restore all its brilliance to a used hull?

It’s fairly inexpensive, and it just takes time and patient work...
To protect you from the products used, we recommend using gloves.

First step; great cleaning:
Apply oxalyc acid (or sorrel salt), leave on as recommended, then rinse thoroughly.

Second step: surfacing:
If necessary, repeat the larger impacts or scratches with mastic or gel-coat loaded (in which you incorporate glass powder).
Sanding with abrasive water paper. Very marked areas can be passed to 500 or 600.
Otherwise, use 1000 or 1200.

Third step: polishing preparation
Sanding with abrasive water paper 2000.
If you have a pneumatic orbital, the must is to finish at the Trizact 3000, a special disc that you will find from suppliers specialized in the sale of composite products.

Fourth step: polishing
Apply polishing paste in small areas. Do not rub too quickly or too hard. Do not heat the gel coat.
The ideal is to have or borrow an orbital machine: pass the polishing paste with a sheepskin.

Fifth step: glossing
Pass wax or fine gloss liquid with microfiber cloths.
With a machine it is faster……

Surely, you're not required to work during the night !

Replacing the slot gaskets

The slot gaskets must be perfect. If not they will cause significant drag through the water and by letting the water enter the daggerboard case. Water can also come up through the daggerboard case and into the cockpit area, sometimes at a rate that is greater than the self bailers can cope with.

Three simple steps.

• Remove the old slot gaskets . Scrape off any bits of gasket or glue left behind, sand and wipe and clean thoroughly with acetone.

• Smooth with mastic or gelcoat if necessary, including the inside of the case

• Cut new gaskets
New gaskets can be made of Mylar canvas or other semi-rigid material. Cut carefully to the correct dimensions. Clean the side that is to be stuck to the hull with acetone.

• Stick with neoprene glue
Apply a fine layer of glue to the hull and gasket, wait for the required time and place one gasket and the other. The whole process should take one hour before you are ready to sail

or

- Stick with sykaflex glue
Add the glue as a 1mm layer to the hull side, delicately place the gaskets, add a batten over the top kept in place by tape to keep the gasket in place and wait the required time. Total time taken from start to ready to sail finish is between 2-4 hours depending on conditions.

Warning:
The quality of the work depends on the quality of preparation but also the conditions. Warm and dry conditions are best. This type of work can be done in the middle of a regatta if necessary but you must find a warm and dry area. Neoprene glue is probably the best option because it sets quickly and is readily available in small tubes. Obviously it is best to check the gaskets regularly and perform repairs well in advance, with some even suggesting replacing at the start of each sailing season.

! Note!
When repairing the slot gaskets, have a good look at the inside of the case for damage and replace the rubber protection at the lower back end of the case to protect the trailing edge of the daggerboard.

A central strap. Why? How?

Taller sailors may find an advantage in using a central strap rather than both sides.

There are several arguments:
- Weight: two long straps (85 to 100 cm) are replaced by a shorter one (65 cm), fittings, ropes, sheaves are removed from the end. Switching to a strap allows you to earn 160g dry.
- Weight centering: the centre strap is … centered
- Less tiring in marginal hiking conditions: When not yet fully hiked, the central strap offers more comfort, with the strap over your feet and heels against the central cockpit spine. The body is then extended by pushing against the spine and the effort is significantly less tiring than when hiking.
- Better transmission of body weight and support: The stretched body position on the central cockpit spine gives a much more natural body posture than when hiking. The body transmissions on the hull get better quality.
- The way the strap is fastened means that, in use, the strap is parallel to the centreline (rather than aft - as in the conventional double toe-strap configuration). Thus in waves the helm doesn't end up sliding toward the stern!

Depending on the configuration of your boar, you may need to cut away part of the back of the daggerboard case, drill a hole on each side Ø 8mm.
Drill a hole in the false keel, according to the length of the strap 65≥d≥85 cm from the daggerboard, Ø 8mm.
Attach a guide (as shown in the photo) in this hole.
Using a wire, pass a 3≥Ø≥5 mm line through this, forward through the false keel to the back of the daggerboard case.
Attach this line to the back fixing of the strap.
To the front, attatch a small pully to lead the control line to the side tanks.
The front of the strap is fixed by a rope led through an aluminum tube which crosses the housing.

Tips & tricks to take care of details…

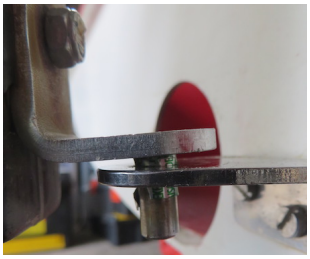
Using dry silicone or Teflon on frictions part is usefull.
! Carefull: Never put silicone on a sheave or its balls, or on a rail on which they are moving (for example, a traveller rail). And of course, when you use silicone, make sure you don't spill it all over the boat!

Mast stand: Before the mast is installed,silicone may be placed on the bolt assembly, on the support plate, in the mast stand housing. Especially not in sheaves or on adjustment ropes.
Same for the deck ring and the mast ring.
Mast: Before mast is up, clean its ralingue and pass it to silicone: the circulation of the sail will be easier.
Boom: Proceed in the same way for the boom before installing the sail.
Centerboard case: you may use a bit of silicone into the centerboard case, trying to avoid the highest part whose friction keeps the centerboard in a chosen position.
Bailers: clean, spray the parts that slide will make it easier to operate and will prevent you from pulling too hard -at the risk of deforming them- when you close them

Automatic axis
Tired of tightening and loosening the shackle? Replace it with a split pin of the same diameter.

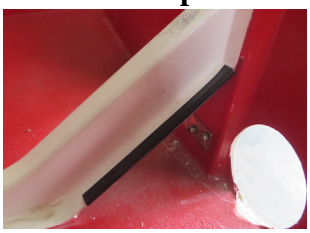
Wedge the centercase
Some racers remove the drift set in the centercase by sticking strips of mylar or scotch.

Wedge the rudder fittings
Here is a patience game. Cut small pieces into aluminum can. Insert it into the rudder fittings. Stand the rudder. As it's not so easy to insert, don't remove it before the end of the regatta.



Take off numbers in a sail: gently pull out the numbers.If the sail is not too old, the numbers are removed with the glue. If the sail is too old, glue may stand on the sailcloth. It can then be removed with acetone or K2r.
Remove stickers that resist by gently heating them with a hair dryer.

Protect the ropes or elastics from wear by placing binding on the edges of polyesther



Check list of equipment

Remember – It is unacceptable to have a break or other problem due to poor maintenance. In case of doubt, repair today, not tomorrow, and do it properly

Si vérif OK mettez une croix dans la case: X, Si vérif pas faite laissez un blanc
Si la vérif indique un problème, mettez un point d'exclamation: !

	Vérifications pour le Mât:
!	symétrie du cintre latéral
	rectitude du tube, propreté de la ralingue
	état fixation de la bague de pied de mât
	état fixation de la bague de pont
!	fixation du boitier de bôme
!	état des fixations ferrure de hâle-bas
	marques de jauge
!	hook drisse gv
	nature, qualité, drisse GV , spectra Ø 3mm
	poulie de drisse en tête de mât
	Vérifications pour la bôme:
	rectitude du profil, propreté de la ralingue
	marque de jauge
!	état des fixations ferrure de hâle-bas
!	état des fixations et emplacement des ferrures de poulies gv
	état du bout de bordure en spectra Ø 4mm
	poulie de bordure
	état d'usure de l'écoute au point d'accroche des tackets; long 6,5m (palan 3brins) Ø 6 à 10 mm
	Vérifications pour la dérive:
	rectitude, symétrie
	état de surface, marquages
	état bord d'attaque
!	état bord de fuite: (Attention particulière si entamé au point de contact du puit de dérive)
	Vérifications pour la tête de safran et le safran:
	état général, oxydation, raideur, jeu
	état des fixations de la base du stick
!	état du cardan et du stick
	jeu des aiguillots, jeu de la liaison barre/tête
	rectitude, symétrie de la lame
	état de surface
	état bord d'attaque
	état bord de fuite
	fermeté et facilité du pivotement de la lame;
	en position basse, vérifier compensation, verticalité
	état et facilité de l'usage de l'axe de maintien en position basse
	Vérifications pour la coque
	état, fixation, du pontet avant
	conformité, état du bout de remorquage
	fixation fonctionnement de l'embase de mât
	état, fixation des poulies embase de mât
	état, fixation des poulies embase de mât
	état des fixations, mâchoires, guides, des taquets de réglage
	axe, symétrie, calage du puit de dérive
	mouvements de la dérive

Vérifications pour la coque

	Vérifications pour la coque
	état, fixation, du pontet avant
	conformité, état du bout de remorquage: Flottant, long 14m, Ø 6mm
!	fixation fonctionnement de l'embase de mât
	état, fixation des poulies embase de mât
	état, fixation des poulies embase de mât
	état des fixations, mâchoires, guides, des taquets de réglage
!	axe, symétrie, usure en bas à l'arrière du puit de dérive
	mouvements, calage, de la dérive
	état, fixation, de la barre d'écoute
	état, fonctionnement du chariot et des taquets
	état des fixations, mâchoires, guide du tacket de GV, tourelle
	étanchéité, glissement des trappes et bouchons
	étanchéité, fonctionnement des tauto-videurs
	positionnement, symétrie, verticalité des femelots
!	jeu des femelots
	état, longueur, qualité des bouts de réglage au mât, spectra long ±1 à 2,5m, Ø 1 à 3mm
	état, longueur, qualité des bouts de réglage au caisson, spectra long ±3m, Ø 3 à 4mm
	état des fixations, qualité des sangles
	élastique de maintien des sangles
	état des fixations, mâchoires des taquets de réglage des sangles
!	état et fixation des lèvres de puit de dérive
!	présence du caoutchouc de protection à l'arrière en bas du puit de dérive
	état de surface de la coque

	Vérifications pour les voiles
	état des tissus
	état de la fenêtre
	état des goussets de lattes
	état de la ralingue
	état des renforts sous les œillets
	conformité des numéros
	certification

Frequent problems

Boom – loose fixings for mainsheet and Vang
Mast – loose gooseneck fitting, breakage of running rigging (eg outhaul line inside the boom).
Hull – Slot gaskets, control lines
Rear end of daggerboard case – water ingress and absence of rubber protection for daggerboard
Tiller extension
Trailing edge of the daggerboard

Toolbox – minimum requirements

Pliars, screwdriver (flat and posidrive / Phillips), knife
Stainless nuts and bolts size 4 and 5
Stainless shackles (straight and twisted)
Silicone / Mastic, acetone, Neoprene glue, duct tape, grey tape

Pro toolbox

as above plus;
Drill (metal) size 3, 4, 5, 8, 10
Metal saw, rivet gun
Threads of wool / telltales
Gelcoat
Sanding paper wet and dry (80, 100, 600, 1000)
Spinaker tape

Accessories

Pencil
Compass (ex: silva 85); compucourse
Firm plastic sheet for transom holes
Bailer (plastic bottle with top cut off), sponge

Ropes

The wider the rope the more the friction. Therefore smaller diameter ropes are generally easier to play and therefore put less stress on the hands. Therefore controle lines should be of 3m diameter rather than 4 or 5mm. Smaller ropes also weigh less.
The same is true for the mainsheet. A diameter of 8mm compared to 10mm runs more freely and puts less pressure on the hands. Any smaller though and a loop can easily run into the mainsheet block and get stuck.

Requirements

Location/Part	Material	Diameter (mm)	Length (m)
Painter*	Floating line (polyprop 8 plait)	6mm	14m
Control takeups/toestraps	Shock/Bungee	4mm	Varies
Boom elastic	Shock/Bungee	10mm	2m
Mainsheet (3 part)	Dyneema or similar	6-10mm	7.5m
Vang (boom-mast)	Dyneema	4-6mm	Varies
Vang (mast foot to boom)	Dyneema	3mm	± 2 m
Outhaul (mast foot to boom)	Dyneema	3mm	± 1.5 m
Inhaul (mast foot to sail)	Dyneema	1-2mm	± 1.2 m
Cunningham (mast foot to sail)	Dyneema	1-2mm	± 1.2 m
Control lines (to side tanks)	Dyneema	3mm	≥ 3m

Transporting your boat

This section is a warning that the majority of major accidents occur during transport of the boat and not on the water. A majority of problems occur due to poorly attatched boats. Straps are often poorly placed, can rub so that they break or can be fragile through UV degradation.
Keeping straps in good condition and replacing them when required is key. Wide, strong straps are best. Don't hesitate to use 2 straps or a safety piece of rope as a belt-and-braces way of ensuring that the boat stays on the trailer or roof.

Protection from vibration

Every effort should be taken to minimalise vibrations. The hull should be secured with wide straps, padding around the hull and between hull and straps is essential and spars should be secured so that they do not move. Remember to fix halyards, pulleys and shackles (for example with electrical tape), so that they do not come loose.

Clothing

Very few sailors care precisely about their closing.
In this "detail" we recognize the mark of the "big", the picky, those who avoid losing any potential of speed.

Closing must comply with five principles:

- Adapted to the temperature of water and air (sometimes a compromise) & gives sun protection.

- Optimised to the size of the sailor: A heavy helm is best equipping himself with the lightest clothing possible, so that his weight varies as little as possible when his outfit changes.

- For a lightweight helm the rules offer the possibility of wearing up to 10kg of (wet) clothing*. As soon as conditions increas to the point that they are overpowered, it is worth considering wearing extra layers to increase the righting moment created by hiking. Obviously it also usually the case that the conditions require extra layers for warmth and comfort anyway.
* Class rules

-Present as little air resistance as possible.

- Protect from possible shocks or injuries. The most frequent injuries are:
• Impact of the boom on the head.
• Cuts from the bailers, when righting a capsized boat.
• Cuts to the feet in the cockpit.

- Not cause discomfort or a restriction in movement.

When buying kit it is worth a look at options available for other watersports. These are often cheaper and may be better suited to your body size/shape that the standard range from sailing labels, in fact often products may simply be rebadged but otherwise identical (and cheaper!).

Author uses a set of neoprene combinaisons:

clothing	weight dry	water	wind
Nylon boxer+nylon long shirt		warm	light, medium
neoprene 2 mm boxer	350g	warm	medium, windy
shorty 1mm	585g	warm	light, medium, windy
long shorty 1mm	770g	warm	medium, windy
integral 1 mm neoprene	710g	cold	light, medium
integral 3 mm neoprene	1360g	cold	medium, windy
shoes			
neoprene 1mm	55g	warm	
neoprene 3mm	90g	cold	

Requirements for racing (the admin!)

While at club level and at smaller regattas there is a relaxed attitude to measurement and paperwork, to take part in bigger events or championships it is best to have all your paperwork in order (even if it never gets asked for...).

- Insurance form – check the level of cover required as this can vary by country.

- The sailor should be a current paid-up member of their national class association. This is often confirmed by a stamp or sticker that is affixed to the boat's measurement certificate.

- A valid measurement certificate -new/replacement certificates can requested from the sailor national authority who will usually charge a fee.

- Sails should have measurement forms and the sail itself should be signed by a class measurer. The boom, mast and foils should also have their own measurement forms and matching serial numbers.

Racing targets

Class Events
The Europe class offers events for all levels of sailor: From regional regattas and national circuits to national championships and international events. In countries with larger fleets there may be separate events for youth sailors, whereas in smaller fleets such as the UK, divisions for masters and youth sailors are incorporated into open events and championships. For sailors wanting to improve it is always worth attending the bigger events, as it is only real world experience that can prepare you for a 50+ boat start line!
On the individual level, the racing target of reference for each rider can be the qualification and participation in a national Championship.
The most experienced competitors can aim for an international qualification.
The least experienced or almost beginners in competition start with access to the regional levels.

Régional Access is usually free of trials

National Access is actually free of trial access in most of the countries
Actually, the main countries sailing Europe in Europe are Norway, Sweden, Finland, Denmark, Germany, Belgium, France, Spain.
Great Britains seems to get a "new start" racing Europe.
Italy, Poland, seem to have a program of national races.

Major International races
• most of races are open, foreigner racers need to provide Insurance form
• **NEW**: Open European championship - All racers. No age condition. Each year
• Masters European Championship - Open - Ladies ≥ 30, Men ≥ 35. Each year
• Youth European Championship - National trials- Youth ≤19 ans. Each year
• Women and Men World Championships. National (or Open week) trials. No age condition. Each year

Few regattas

While the Europe class is not a huge fleet, it has the advantage of easily accessible international events that other competitor classes do not offer. These events attract large turnouts and high level competition. Some events are suggested below (but there are plenty of others, especially in Spain):

• World Championships (venue usually in Europe during the northern hemisphere summer – qualification/ selection for country places may apply).

• European Championships for Youth (under 19 years) and Masters . (venue usually in Europe during the northern hemisphere summer).

• Open Week (the week before the World Championships at the same venue, open to all competitors).

• The Torbole Meeting (April - Lake Garda, Italy).

• Belgian Championships (September - http://www.europeclass.be/).

• French Championships (End of October - https://www.europeclass.fr/).

• Kiel Week (June - Kiel, Germany

Performance targets and priorities

The season is punctuated by events of various levels. For some of them, you are looking to achieve a particular result, but before this you need to prepare (and qualify in some cases)! It is necessary to set precise objectives for each specified event, and to stick to them.

World Championships, European Open Championships, Euro Masters, Euro Youth:
The goal is the best possible performance.
However, to achieve the best placing in the overall results it is best to sail conservatively. To go all out to win every race often results in taking too many risks. It is often better to give way in uncertain boat-on-boat situations, or risk ending up being slowed by extra manoeuvres, receiving a protest/penalty, or even damage.…

Selection test for major events
The objective is qualification, not the overall result.
We are only trying to achieve a performance sufficient to make the qualification cut-off. It is worth remembering that male and female sailors are competing for separate selection slots. As with the international events conservative sailing pays off avoiding costly mistakes is imperative.

Local and regional open events
These are not a major objective in terms of performance.
However they are a good forum for testing or validating choices of equipment; refining manoeuvres; improving planning of regatta logistics (timings, food and fluids, etc) or working out wind/tidal strategies at new venues.

Daily organisation - Preparation routines

Having a regular routine to your race days allows you to devote your energy to its main objective of sailing well. It saves time and energy and helps to minimise stress. Elite sailors are used to managing their time ahead or launching in a structured way. If attending an event as part of a team it is important to respect any agreed timetables. A coach can tell you: just by observing sailors preparing for a race, they can spot those whose attitude to preparation will allow them to compete at the highest level!

Example: Daily organisation/preparation
Launch -3h: Wake up, get up, shower, breakfast, organise sailing kit, prepare lunch, snacks and fluids for the day, check weather forecast, travel to the club observing the weather on the way (does it agree with the forecast?), check the noticeboards for anew information from the jury, race committee or any changes to the results (eg due to the result of protests from the previous day). Check weather forecasts (again) and tide information (HW time, stream direction and strength). Unroll the sails and rig the boat, check all equipment is present and working, attend briefings and/or discuss strategic scenarios for the present weather, get changed, sign on.

Launch: Sail out to the course, observing weather conditions and tidal flows, observe the location of the race area, it's orientation and any geogrpahical features that may impact on the wind/tide. Sail upwind and get the boat set up for the conditions, practice maneouvers to get physically and mentally warmed up. Observe and record minimum and maximum compass headings, check equipment (and lunch!) is securely stowed. Identify your main competitors, find a competitor or team-mate and sail upwind together to check speed/ pointing.

Race Start -00:15: Continue to monitor weather and tide conditions on the course, identify laylines for the ends of the start lines, identify the position of the windward and wing marks, identify any shift pattern and how it relates to compass headings. Keep checking committee boat for course information and any signals. Once the pin buoy is set check the line bias and any visible transits. Time the length of the line and recheck the laylines. Make practice runs to the line to check timing and how long it takes to accelerate. Before a start, most experienced sailors repeat these tasks, often in the same order, over and over again: the more information you take, the more you can formulate an effective race strategy.

Between races: hydration, food, analyse the previous race and restart the preparation routines again.
Warning! The time between races is short, don't waste it!

Returning to shore: sign out/tally, check the deadline for protest time if necessary, get changed, debrief, check over equipment and make repairs/replacements if necessary. If involved in a protest, prepare protest forms and attend the protest hearing.

Return to accommodation: active recovery, stretching, shower, relaxation, meal, limit screen time

Sleep: bedtime - recovery is an essential factor in performance!

Developing a race strategy

A strategy develops from the weather and tidal information for the day and – if relevant – identifying specific competitors. One of the first observations to make is how the course orientation fits with the wind direction and expected tidal streams. Do they favour a particular side of the course and does this require being further to that side of the course than our main competitors?
A compass and watch are the only instruments allowed by the rules (at present electronic tactical compasses are not permitted). A compass is very useful on the sea and for identifying small, slow moving changes in wind direction. For those who don't have one, try to find ways to stay objective in your analysis...

Wind tracking
Is the direction stable, oscillating, or moving to one side?
Is the windspeed stable, gusty, increasing, or dropping?
Is there a link between strength and direction?

Weather changes
Height and type of cloud cover? Rate of change? Are the clouds raining?
Approaching fronts? Temperature variation between the sea and air?

Geographical influences
What is the shape and height of the coastline? Where is the course located in relation to the coast?
Are there shoreline effects: compression/acceleration, ‘permanent’ windshifts or calm areas.
Is there a shear effect?

Current tracking
Is there a tidal current, a drift current, a river current?
Are distribution and influence uniform across the course?
Are there varying depths or effects due to the shape of the coastlines (eg eddies)?
Is the tidal current changing direction or increasing/decreasing in strength?
What impact will there be on the laylines and rhumblines at the start and around the course?
Are tide lines (the divisions between different currents) visible on the water?

Sea state
Are different water colours (indicating different depths or currents) apparent on the course?
Are the waves long regular swell, short choppy waves or a mixture? Do they move in different directions?
Is the movement of the waves in line with the wind?
Are there areas where the wave movement is different (perhaps indicating different depth/current)?
Is the body of water crossed by debris, bags, wood, algae, which might get caught on the foils?

The Start Line
How long does it take to go from one end to the other?
Is the bias even or is one end (usually) favoured? Which direction is the current moving with regards to the line?
Is the favoured end the same as the side of the course that is perceived to be favoured?

Weather sources
There are now many websites that provide forecasts. Sites that only provide strength and direction as simple numbers/arrows can be difficult to interpret. In recent years the advent of sites such as www.windy.com that combine wind direction arrows overlaid on a map combine the overview of the wider weather situation with the ability to query lots of different data for any given location. One of the simplest and most useful observations that can be made using such a site is to compare the two main weather models ECWMF & GFS: If they agree closely then you can be reasonably certain that the weather will occur as forcast, if they do not then you should keep your eyes open, as conditions are uncertain!

Compass or not ?

Dictionary definition: "navigation instrument indicating the course". The compass is a measuring instrument. A tool: It simply indicates the course the boat is making at the time of reading. This allows the navigator to check their route and possibly decide to correct it, or to infer changes in wind direction (if the boat is being sailed at a constant angle to the wind).
Europe class rules state that:
"with the exception of a chronometer watch and a magnetic compass, no electronic or other instrument is authorised on board."
Therefore only a watch and the compass are the only measurement tools allowed on board.

Compass Pros & Cons

For:
- An accurate measuring instrument.
-It makes it possible to precisely quantify and infer data such as:
- Windshifts
- Rhumblines between marks
- Assessing start line bias

Against:

- Many sailors "drown" in the use of the compass, distracting them from sailing and becoming fixated on the numbers rather than what is happening in the real world.
- Adds weight to the boat…

How is it used – some examples:

- Comparing way at different moments:
- At 11.05 am, sailing upwind on starboard, the boat's course is 180 ° ; at 11.15am it is now 190. $\Delta = + 10$ ° (ie a 10 ° lift).
- At 11:05am on the first run, the boat's course sailing dead down wind is 190 ° , at 11.35am, on the next lap it is 210 ° . $\Delta = + 20$ ° (clockwise change in average wind direction)

- Comparing different boat headings at the same time:
at 11:05 am, two boats located 0.2 miles from each other set sail on the same tack, one has a heading of 180°, for the other it is 195 °. $\Delta = 15$ ° (perhaps a geographical wind bend one side of the course)

- Comparing the heading at the time of reading with a target heading: my boat is under way at 050, I have to go around a mark at 045 ° . $\Delta = 5$ °.

- Measuring the start line bias: the wind is at 225 °, sailing along the start line (the best method is to a sail beyond the end of the line and then line up the pin and race control boat and sail straight along this transit) the compass reads 140 °, therefore 225-140 = $\Delta = 085$ (the pin end of the starting line is 5 ° upwind).

- Measuring current direction: putting a floating obect in the water near an anchored mark and using the compass to measure its direction of drift.

• Datas
The compass allows analysis of a race in actual numbers rather than just in impressions/estimations. It is important to be able to quantify the facts. (Eg "it shifted 5 ° to the right …"). The following grid is used to transcribe the angle measurements into distances:

Angle	Distance gained at 100m separation (m)
5 °	9m
10 °	17m
15 °	26m
20°	34m

Therefore, for a starting line 500m long, 5 ° line bias gives a gain in wind of ± 45m at the upwind end.

Racing with a compass

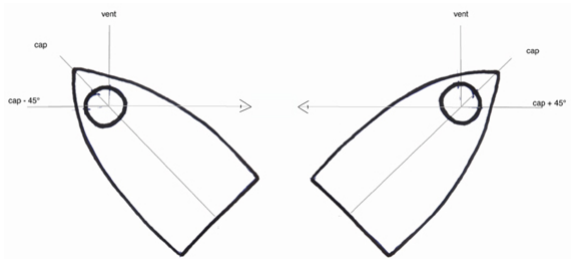
The compass can be an aid in decision-making aid. As noted in the previous section the compass allows us to quantify the size of windshifts, determine maximum, minimum and average values and determine the time periods over which these changes repeat. Are they slow, fast, regular or irregular ? This all helps in the development of an overall strategy.
It is also important to get to know your own compass as layouts vary between makes. As the compass is viewed from an angle when hiking, most analogue compasses come with extra lubber lines at 45° to either side to the main one and often have separate 'tactical' scales related to these.

Tack or continue?
By making a sufficient number of observations sailing upwind before the race it is possible to arrive at suitable average heading values for both tacks (a chinagraph pencil to write number on the deck is very useful here).

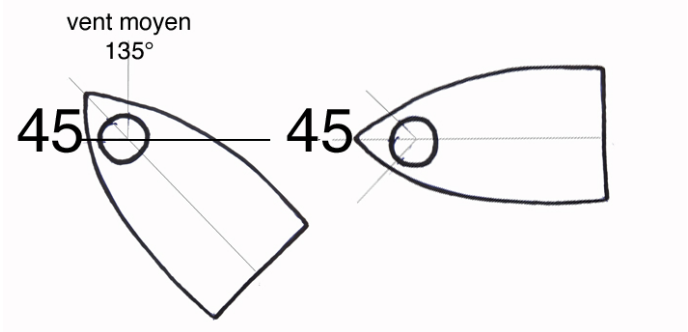
For example, if the wind is blowing from due north (0°) with 10° oscillating shifts, and we assume that a Europe sails at ~45° to the wind then we should expect to see values as per the table below:

Tack	**Lift**	**Average**	**Header**
Port	35°	45°	55°
Starboard	335°	315°	305°

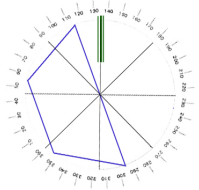
Therefore if sailing on port and the compass reads <45° it indicates a lift relative to the average wind direction and the course should be maintained, if it reads >45° then it indicates a header and that a tack on to starboard may be required.
In the real world the situation is far more complex; the wind may be oscillating but the average direction may be consistently changing in one direction, or on a gusty, unstable day there may be no predictable pattern to the shifts at all. Particularly in the latter scenario the compass number should be viewed sceptically and a close eye kept on the relative headings of other boats in the fleet.



- Evaluating the starting line
In the absence of current:
- A neutral line is 90° the wind. Therefore if the 'average' wind is at 135°, then the starting line is neutral if when sailing along it on starboard tack I read 45° on the compass. Coincidentally the same value as the one I read on average while sailing upwind (due to the 45° offset lubber lines on the compass…



- Wind axis/course axis
The compass permits checking how the windward leg aligns with the average wind. If they have the same angle from the centre of the startline then the course and wind are completely aligned. A small offset indicates that slightly more time may be spent sailing on one tack without having a big impact on the race. A significant offset (eg >20 °) could indicate it is worth taking the tack towards the side the buoy is shifted to. This quickly puts the boat ton the central axis of the course, reducing the risk of bing to close to the laylines early in the beat.



- Find the marks
The compass is also useful for finding the other buoys making up the course and identifying the headings between them. The sailing instructions define the course format and sometimes indicate the approximate angles between the sections. Therefore when the race committee displays the course axis heading, the course caps can be calculated in advance.
Examples are given below, but the values given here are only indicative: it is up to the sailing instructions to specify them. Even with the increasingly widespread use of gps, it is impossible for anyone to guarantee the perfect positioning of course marks!

Windward/Leeward: Windward leg is 180° relative to the run.

Olympic Triangle: Windward leg is 180° relative to the run.
The gybe/wing mark is typically set at 135 ° from the windward leg direction.
Therefore for a course/wind axis of 100°:
The direction of the run will be 100° – 180° = 280°
The first reach will be 100° - 135° = 325°
The second reach will be 100° +135° = 235°

Trapezoid: Windward leg is 180° relative to the run.
The wing mark is typically set at 120° from the windward leg direction.
Therefore for a course/wind axis of 100°:
The direction of the runs will be 100° – 180° = 280°
The first reach will be 100° - 120° = 340°
The second reach will be 100° + 120° = 220°

• Using the compass – key moments

Before the start, estimating wind and course axis, determining the size and regularity of any windshifts, estimating current direction.

On a starting line, check line bias, current & wind direction.

Immediately after the start, checking if the boat is on the lifted or headed tack.

Windward leg, if the wind is oscillating, deciding whether to tack or continue.

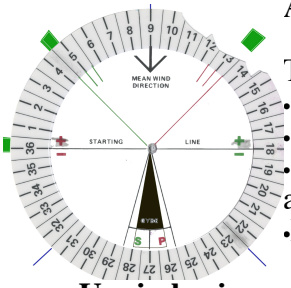
At the windward mark, deciding whether to gybe or bear away – if numbers suggest a lift while on the starboard layline then a gybe is favoured. Using the compass heading to find the next buoy.

On the run and at the leeward mark, checking for changes in the average wind direction.
As with upwind, knowing the gybing angles relative to the average wind confirms whether the boat is on the favoured gybe. Assessing any change in the average wind direction and whether the lifted and headed compass courses for the upwind leg need to be modified.

The Compucourse: an anti migraine solution

The compucourse is a simple tool invented by Keith Musto (silver medallist in the Flying Dutchman class at the 1964 Olympic Games).
The compucourse is 3 layers of screen-printed plastic superimposed:
- The base layer positions marks.
- The intermediate layer is a circle graduated in 5° increments.
- The upper layer positions the course axis.

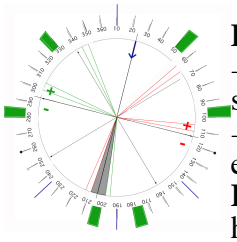
In its original version, the Compucourse is no longer manufactured, but you can make them by printing each of the 3 layers, cutting them and laminating them before assembling them with a small bolt.
A modern version exists in the form of a watch, the TackingMaster (very expensive!).



The compucourse does all the calculations for you:
- It offers guide values to help decide whether to to tack or jibe.
- It indicates the heading of courses perpendicular to the course/wind axis (the 'start line').
- It calculates the headings provided from one edge to the other (with an assumed tacking angle of 45°).
- It calculates the headings between marks.

Use in basic mode
This assumes the race committee have measured "reliable" average wind direction(!) and that this is the axis of the course.
- Go to the back of the race control boat, read the compass heading displayed for the course. (90° in the example diagram)
- Position the compass rose with this heading (90°) displayed at the top marking.
- Position the 'mean wind direction' arrow on the displayed heading (in the diagram all three: upper marker, course heading, & mean wind are all aligned).
- Now reading off the example diagram it can be seen that:
- The starting line is neutral if it bears 0° or 180°
- The leeward mark bears 270°
- The wing mark is at 135° from the windward mark, so it should bear 315° for this course axis.
- From the wing mark to the leeward mark the bearing should be 225°.
- On starboard, if the lubber line of the compass shows 0° the wind is at its median direction. If it is higher (eg 10°) then the wind is lifting, if lower (eg 350°)then the wind is heading.
- On port, if the lubber line of the compass shows 180° the wind is at its median direction. If it is lower (eg 170°) then the wind is lifting, if higher (eg 190°)then the wind is heading.

Use in offset mode
This is used when the average wind is aligned with the axis of the course.
- Go to the back of the race control boat, read the compass heading displayed for the course. (10° in the example diagram)
- Position the compass rose with the heading displayed (10°) at the top marking.
- Position the 'mean wind direction' arrow on the estimated average wind direction(25° in the diagram)
- Now reading off the example diagram it can be seen that:
- The starting line is neutral if it bears 295° or 115°
- The leeward mark bears 190°
- A wing mark at 135° from the windward mark will bear 235°.
- From the wing mark to the leeward mark is 145°.
- Mean upwind angles are at 295° on starboard, 115° on port.
- The course axis is offset – therefore there is more distance to be sailed on starboard than port.



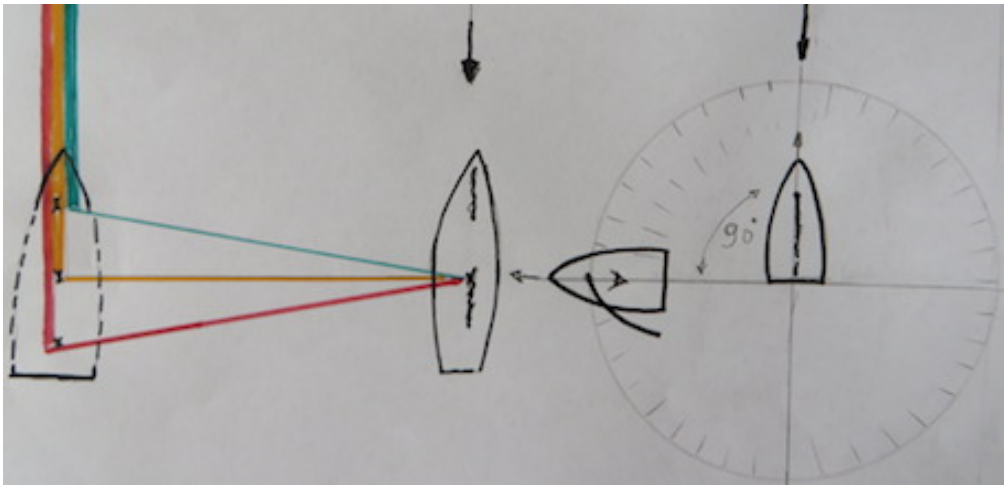
Reading tips
- The + / - symbols indicate the lifted/headed compass numbers. In the example, upwind on starboard the + indicates values >295° (a lift) , on port the + indicates a lift for values <115°
- When sailing along the starting line heading on the + side of the neutral line indicates upwind end of the line.

Find the pdf files of funds to make your Compucourse here:
https://www.dropbox.com/sh/xk28y0hirngkgu0/AACvZaNa39sd8LDIPQ1CJwL-a?dl=0

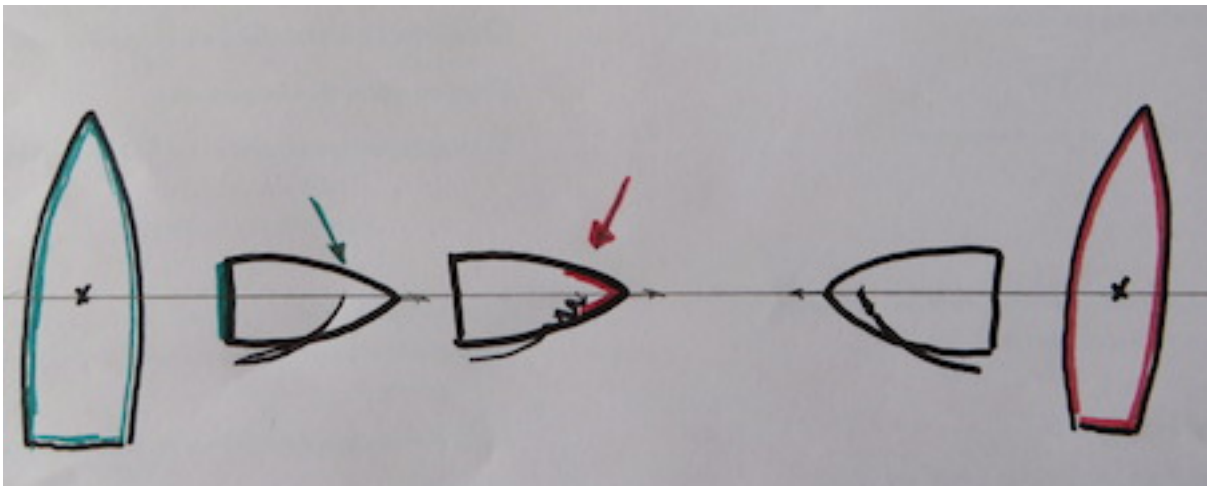
Find the windward side of the start line

The “windward” side is the one with the shortest distance to the windward mark.
It is often said (sometimes it is wrong), that is it the ”most favourable” side of the start line.

With the compass :
Place the boat in the axis of the wind and read the number given by the compass : Cv
Then sail along the startline and read again the number given by the compass for this heading : Cl
If Cv-Cl=90 deg, the startline is “neutral”, same distance to windward mark at each end of the line (orange line)
If Cv-Cl < 90deg, the startline is “higher” on the side you are heading to, meaning that the distance to the windward mark is shorter (green line)
If Cv-Cl > 90deg, the startline is “lower” on the side you are heading to, meaning that the distance to the windward mark is longer (red line)



Without compass:
Sail along the startline and adjust the sail to the edge of fluttering
Tack or gybe without changing the sail adjustment and sail again along the startline.
If the sail is less fluttering, then the wind is coming slightly more from the stern of the boat. That means that the startline is ”higher” and the distance to the windward mark shorter behind the boat
If the sail is more fluttering, the wind is coming from the bow, meaning that the line is “higher” and therefore the distance to windward mark shorter on the side of the line, the boat is heading to.



Obviously, with the compass, it is more precise. It allows to put real numbers in addition to the feeling. Except if you are in the middle of a tight group of boats, it allows you to get new reading of the wind axis at any time and to adjust your position on the startline accordingly….

Tuning

- Mast rake
Mast rake can only be adjusted at rest and not whilst actively sailing. Open the inspection hatch and turn the butterfly scew of the mastfoot on eway or the other to increase or decrease rake.It can be useful to have an idea of how much the rake varies with each whole turn of the screw from a base setting so check this against your tape measure and make a note of it.
The amount of rake has a considerable effect on the balance of the boat and the leech tension
- Raking the mast backwards moves the whole of the sail plan backwards and has two effects:
• The centre of effort of the sail moves aft, which increases weather helm (so the centreboard may need to be moved back/raked).
• The leech becomes more vertical, but (assuming the boom is fully pulled to the deck in all cases) is under less tension than if the mast was more upright.
- Decreasing mast rake by angling the mast forwards has the opposite effect, giving more leech tension when the boom is on the deck.
Note! There are two contradictory effects: Increased rake moves the effort backwards but the leech can open more easily decreasing power and pointing. This is useful in light winds to keep the boat balanced and flow over the sail, and useful in heavy winds to depower the rig. This explains the use of more rake in lighter winds, bringing the mast forward in medium conditions and then raking back again in stronger winds.

- The cunningham
This is a fundamental control on the Europe exerting the greatest effect on the sail. As the wind increases the draft of the sail (the bulge) moves backwards, ruining sail shape and producing horizontal lines on the luff. Pulling on the Cunningham progressively will counterbalance this tendancy of the draft of the sail to go backwards in stronger winds. This also flattens the sail and opens the leech, exactly what is required when the wind blows harder. As a bonus, its effects are amplified at the head or the sail, depowering the top of the sail more than the bottom.
Trimming – Close hauled, pull on tension progressively and hard as the wind strength increases, release off the wind

- Inhaul
The first role of the inhaul is to position the tack of the sail in a neutral position to give a smooth shape to the lower forward part of the sail. From that position, increasing tension pulls the draft of the sail forwards and releasing tension allows it to fall backwards. In this way it has a similar role to the Cunningham but pulls down less and so has less of a depowering effect.
Trimming – sufficient tension just to maintain shape, then tension when close hauled to have the desired effect on draft position.

- Outhaul
Tensioning the outhaul moves the clew backwards, flattening and opening the lower part of the sail.
Trimming – loose off the wind, medium to loose upwind in waves or chop for power, and tensioned progressively on smooth water or as the wind increases

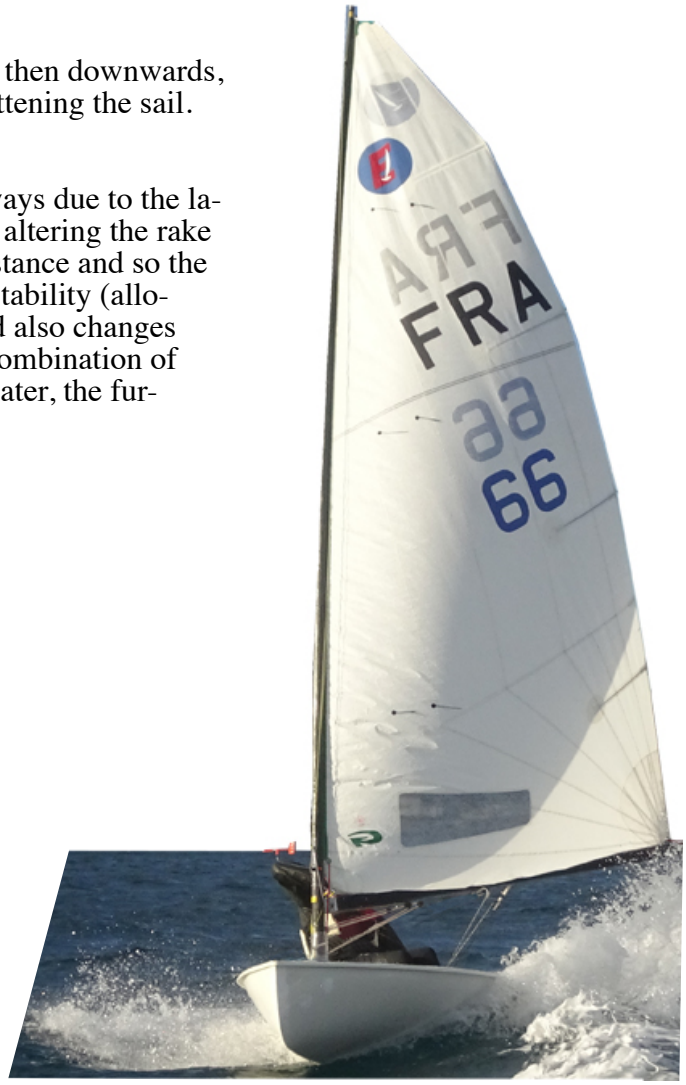
- Mainsheet traveller
The traveller controls the lateral position for the mainsheet blocks and so controls the position of the sail relative to the wind for a given mainsheet tension.
If the traveller is closer to the centerline, mainsheet tension will ned to be less to allow the boom to move laterally and this decreases the leech tesnsion opening the top of the sail. Moving the traveller out will have the opposite effect. The traveller can also be 'played' allowing the sail to be let out or pulled in whilst maintaining the same level of lech tension. Letting out the sail in this scenario also has more of an effect on the lateral bend of the mast, depowering the sail. Therefore the traveller is an effective control for the profile and power of the sail.
Trimming – Released more with increasing wind strength to allow the boom to go out laterally beyond the corner of the transom as the wind increases, whilst maintain leech tension and mast bend. Off when downwind.

- Vang (kicking strap)
The kicker controls leech tension and can flatten the sail. However, contrary to other boats, the kicking strap is very rarely used upwind. The leech tenson is controlled by a combination of rake, mainsheet tension, traveller position and Cunningham. The kicker would add nothing to this but would make manouvres such as tacking close to impossible. Instead the kicker controls leech tension on the reach and prevents 'skying' of the boom on the run. Trimming – on the reach adjust for maximum power (too loose – leech loose and no power, too tight – flat sail and no power). On the run it is a question of adjusting the tension according to your sailing style, pumping conditions and tendancy to roll. Relatively loose is usually a good starting point. When the boat rolls, if the leech stays rigid then the vang is too tight. The boom may also hit the water easily. If the upper leech 'flops' but doesn't spring back to position then the vang is probably too loose. Ideally the leech will move but spring back against the twisting force on the sail – identifying the optimum is down to experimenting and time in the boat.

- The mainsheet
The mainsheet pulls the sail towards the centerline and then downwards, controlling leech tension, and bending the mast and flattening the sail.

- Daggerboard
The daggerboard prevents the boat from slipping sideways due to the lateral forces of the wind. Its position can be changed by altering the rake and its height. The rake modies the ceter of leteral resistance and so the balance of the boat, and the height changes the lateral stability (allowing the boat to slip slightly can depower the boat) and also changes the centre of lateral resistance – lateral resistance is a combination of rudder and daggerboard. The less daggerboard in the water, the further back the combined center of lateral resistance.

Left: perfect leech tension, right: too opened.

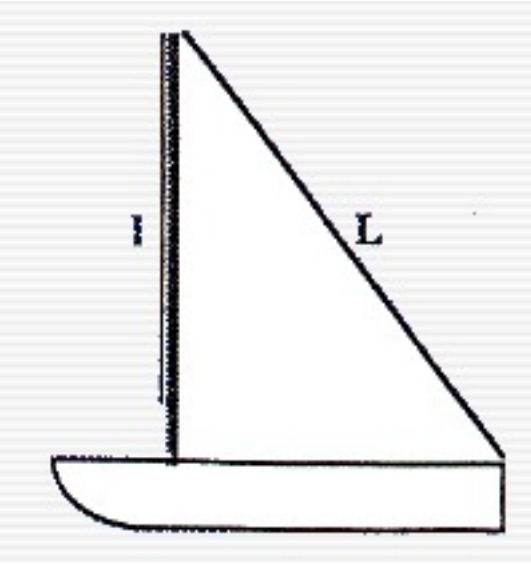


Good tension for the vang

Measuring the mast rake

Measuring the mast rake is a relatively simple procedure. It is standardized so that the same measure can be taken using different masts, boats, halyards and tape measures either for the same person when changing settings or to compare the set up of different sailors.
- attatch the end of the tape measure to the end of the shackle used to secure the head of the sail, and hoist to the normal sailing position.
- measure the distance (I) down to the upper edge of the lower measuring band of the mast
- measure the length (L) from the top of the mast to the upper rear edge of the transom above the pintles.
- calculate the mast rake using the equation Q=4/57-I+L

Example – If my measure for I is 4.55 and L is 4.43, my rake is 4.45 (4.57-4.55+4.43 = 4.45)



Reproduced from Olivier Bacques in "A vos marques", ancien site internet de l'AFE.

Basic rules of tuning

Two aspects should be taken into consideration – power and balance.

To reduce power we need to flatten the sail and open the leech. To do this we can:
- loose slightly the inhaul
- tighten the outhaul
- tighten the cunningham
- pull in the traveller and loosen slightly the mainsheet (to allow the leech to open)
- increase mast rake (mast tip more aft)
- lift up the daggerboard (this does not reduce power but does reduce turning moment about the foil and makes it easier to keep the boat flat)

To increase the power we want a fuller sail with a tighter leech:
- pull on a little inhaul
- loose outhaul
- loose cunningham
- let the traveller out a little and pull on more mainsheet
- put the daggerboard dow
- decrease mast rake (mast more upright)

Generally we need more power in lighter winds and when there is more chop. We need less power when the sea is flat and the wind is blowing more strongly.
A l'inverse, on diminue la puissance quand le vent est fort et/ou quand la mer est plate.

In order to balance a boat that has a tendancy to luff, we need to move the centre of effort of the sail forwards or move the center of lateral resistance back by:
- bring the draft of the sail forwards by pulling on more inhaul.
- bring forward the draft of the sail and open the leech by pulling on the Cunningham
- raking the daggerboard back or even pulling up the daggerboard in stronger winds

Quick tuning guide

• I want to point higher

- flatten the sail:
pulling on outhaul and a little downhaul to pull the draft forwards.
(careful – this will also decrease power)

- increase leech tension:
pulling on mainsheet and moving the mast forwards

• I want more power

- increase fullness of the sail:
letting off inhaul, outhaul and cunningham

- increase leech tension:
increase mainsheet tension and decrease mast rake

- put the daggerboard fully down

• I want to decrease power and balance the boat (upwind)

- flatten the sail:
move the draft forwards by pulling on outhaul and cunningham and letting off slightly the inhaul.

- open the leech:
pull on the cunningham, letting off a little mainsheet and moving the mast forwards

- lift the daggerboard

On the run, no leech tension is a recipe for disaster

• I want to stabilize the boat downwind
- tighten the leech with sufficient kicker to avoid 'skying' the boom
put the daggerboard further down to stop rolling
When going downwind with a kicker that is too loose, the top of the sail opens too much and provides a force to push the boat on top of you. This explains in part why the majority of capsizes occur on downwind legs. When coming around the windward mark, do not let out the mainsheet too much until you have had the chance to pull on the kicker. See Steve Cockerill's (http://www.roostersailingblog.com/explaining-the-4th-dimension/) articles for an explanation of the basics.

Tuning guides:
Note: while these are useful they are also now dated, so techniques and sail design may have moved on. Talk to a sailmaker/coach/top sailor to get a better view of the current go-fast settings and techniques.

http://wb-sails.web13.hubspot.com/Portals/209338/docs/wb-sails-europetrimguide.pdf
http://asso.ffv.fr/europe/articles/reglages_shirley_robertson.htm
http://asso.ffv.fr/europe/articles/wb/quete.htm

Sail adjustments whilst sailing

Sail settings for upwind and downwind sailing are very different.
The tension on the sail is far greater in upwind mode than in downwind mode.
Therefore releasing sail controls to get a fuller sail for downwind sailing is best achieved just before the windward mark before bearing away.
Pulling on sail controls is more easily achieved before rounding up before the leeward mark

Adjusting the daggerboard whilst sailing

Due to sideways pressure on the board when sailing upwind in medium to strong winds, it is more difficult to adjust the board on this point of sailing.
Therefore the board should be raised after passing the windward mark.
It should be lowered to the close hauled position before hardening up around the leeward mark.
If you have to adjust the daggerboard upwind you may need to release mainsheet tension and slow down before adjusting.

Knowing more of the Europe…

VMG, speed polars

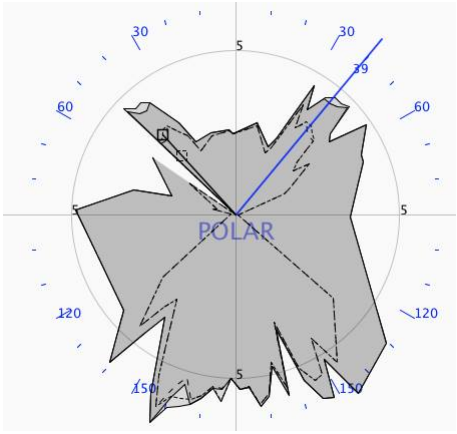
Velocity made good is a measure of the speed made directly towards your intended target. For example, on a reach boatspeed and VMG will likely be identical as the boat is pointing straight at its objective. For beating and running the picture is more complex; on a beat the boat cannot sail directly to the mark so while boatspeed might be 4kts at 40 degrees to the windward mark the VMG directly to the mark would be closer to 3kts. On the run the situation is further confused by the fact that the boat *can* be sailed directly to the mark (so again VMG=Boatspeed), however this is rarely the fastest option.
A polar diagram is a graphical representation of boatspeed vs heading, from the closest angle the boat can sail to the wind, around to a dead run at 180 degrees from the wind, for a given windspeed. As dinghies do not usually carry instruments to allow the measurement of true windspeed and direction the polars are very much an rough approximation of real world performance. However they are still useful to illustrate points about how the Europe is sailed.

A polar diagram allows the identification of the *theoretical* best angle to the wind for optimum VMG, both upwind and downwind. For beats and runs the optimum is simply the angle of the highest point on the diagram for the beats and the lowest point for runs. It should be noted that in the real world this is complicated by many variables in equipment, ability and most importantly wave conditions (especially downwind).

Here down are approx values.
The strength of wind is measured in knots
VM: average windspeed in knots
Var: wind behind

Vent	VM Près	Polaires Près	VM Var	Polaires Var
04-06	3,8	40-45°	4	185-190°
06-08	4,2	40-45°	4,6	185-190°
08-10	4,3	42-46°	5	185-190°
10-12	4,5	42-46°	5,8	185-190°
12-14	4,7	45-48°	6,5	185-190°
14-16				185-190°
16-18				
18-20				

Example – on a graph of VMG close hauled in 8-10kt, the best VMG is get at an angle of 40° to the wind.



The Europe does not accelerate a great deal on freeing off and so this does not compensate for the ground lost to windward.
- It is usually not a good idea to free off to try to pass underneath a boat when close hauled.
- It is usually better to pinch to windward and gain ground in this way
- It this is not possible then two short tacks, executed well, is a better strategy where possible.

Downwind, the best gains are at an angle of 165-175° ou 185-195° (running by the lee).
Running dead downwind at an angle of 175 à 185° is usually slow.
However when surfing, a slalom course of heading up to 170° to gain speed before bearing away to 190° and surfing to gain lost ground is effective.

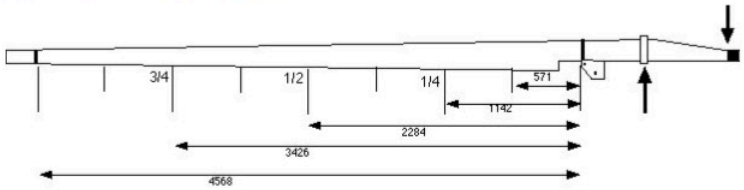
Measuring mast bend

! Carefull ! It is very difficult to measure mast bend correctly. The support of the mast must be absolutely rigid with no play whatsoever, otherwise the measures will not be correct. In order to validate the set up, measure the back bend and side bend, take the mast down and then do the same again, and the following day. If the measures are the same then the set up is good.

Celidh measurment protocol

The preferred method for Ceilidh is as follows,

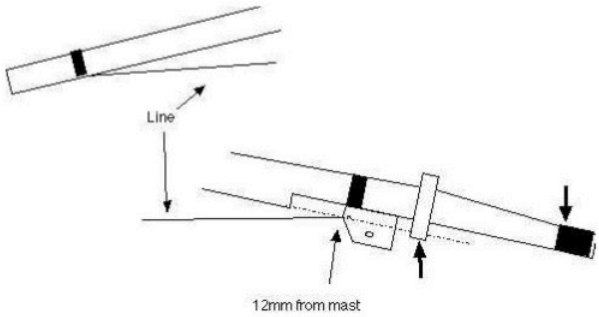
Divide your mast into equal sections by placing markers (tape or waterproof marker) on your mast every 571mm starting from the lower mastband. This gives measurement points at the positions as shown below.



Place the mast in a bending jig such that the tip is 400mm (approx) above the height of the gooseneck by fixing the top of the mastfoot from the upside and the mast-ring from the downside. For Backbend measuring let the gooseneck point to the floor. For sidebend place the gooseneck at 0 degrees/ horizontal.

Carefully apply exactly 10kg (a chunk of lead or other heavy material with loop attached to it) at the upper mastband

Make a straight line from the inside ends of the lower mastband and the upper mastband with some fishing line or rope. You can do this by tying the line to the block up in the mast and to the gooseneck. Then tape it to the mast so that the line comes loose from the mast at the beginning of the mastbands. Make sure the line is straight and exactly coming lose at the right place. See below.



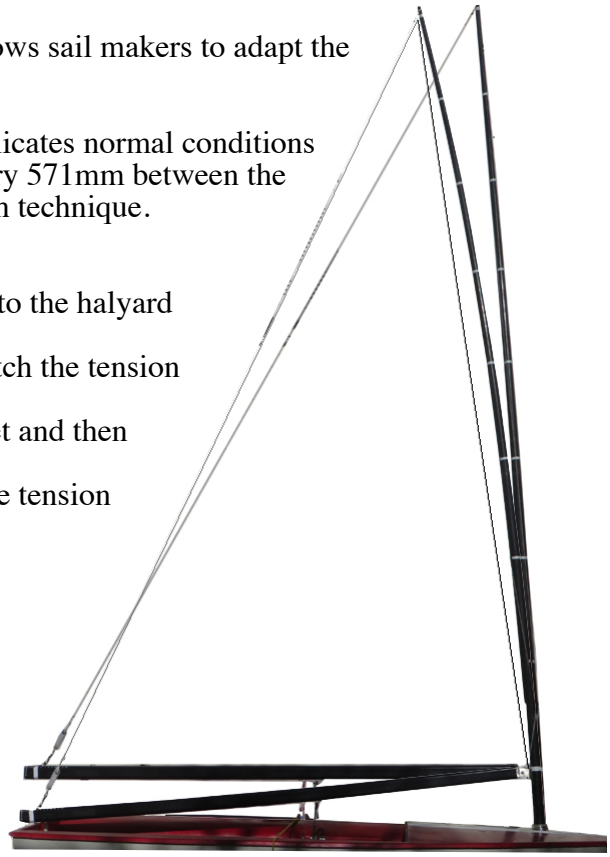
Measure the distance between line and the markers on the mast. Make sure you measure at a right angle to the line. Measure also the difference in vertical height at the upper mastband with and without the 10kg attached to the mast. This gives the tip deflection.

Tension Protocol

This technique measures the longitudinal bend of the mast that allows sail makers to adapt the luff curve for a particular mast.
It does not allow measurement of lateral bend.
It is useful in that it uses the boat to hold the mast in place and replicates normal conditions of bend with compression. The 7 calibration points are spaced every 571mm between the two measuring bands, top and bottom of the mast, as per the Celidh technique.
Light string is applied between the two mast bands.

- Attatch a length of Dyneema or spectra Ø 3mm, length ± 4,40 m to the halyard shackle and raise it up the mast
- Attatch a tension meter to the lower end of the rope and then attatch the tension meter with a length of rope to the outhaul at the measuring band.
-Apply 17.5kg (175N) of tension by pulling down on the mainsheet and then set the mainsheet.
- Put the boat on its side and do not adjust the mainsheet even if the tension changes.
- Perform the measures.

From Sèche à l'Huile, in Les Europiste du Balise

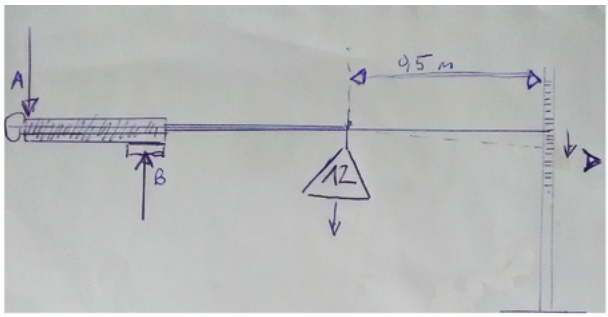


Measuring daggerboard stiffness

Two measures can be used to gauge the stiffness of the daggerboard
- The most simple way is to measure the mass of the board in kg. The simple rule of 'the heavier the board, the less it flexes' is true.
- The alternative is to try to measure the deformation of the board with an applied weight.in a similar way to measuring mast bend

Firstly you will need to construct a device similar to a daggerboard case (in terms of dimensions)

The daggerboard should be placed in this case and must be fixed firlmly in place.
Points A and B on the diagram must be very solid and cannot be allowed to move.
Fix a rod to the daggerboard so that it extends 50cm from the tip of the board.
At the tip of this rod place a ruler or other similar device to measure deflection and note the position.
Add 12kg to the tip of the board and measure the deflection of the rod in mm



In the table the boards are classed from stiffest to most flexible. The relationship to weight is seen clearly (kg mf = weight as noted on the measuring form)

			max	min	12		
der	kg mf	kg	cm	cm	mm		coef
Bloodaxe		2,43			5,20		8,97
N1 311	2,6	2,625			5,60		9,66
N1 343	2,565	2,58	22	21,5	5,80		10,00
N1 492	2,45	2,435	22	21,5	6,20		10,69
e&v 6297					6,80		11,72
Finessa FinInc1801	2,64	2,725			7,00		12,07
e&v 7584	2,24	2,265	22	21	7,00		12,07
e&v 6186	2,215	2,33	22	21,5	7,00		12,07
e&v 6796	2,18	2,215	21	20,5	7,30		12,59
N1 495	2,165	2,145	21	21	7,6		13,10
e&v 6686	2,2	2,325			8,10		13,97
Finessa 9560	2,24	2,35			9,70		16,72

Measuring the depth of a sail

Measuring the depth of sails enables the comparison of one sail with another. Dynamic measurement can look at ‘real time’ depth and deformation whilst sailing. The technique is standardized in the following way. Both luff and leech are divided into four equal parts using three marks, and then a line is drawn with tape between these lines to make three horizontal(ish) lines.

Static measurement

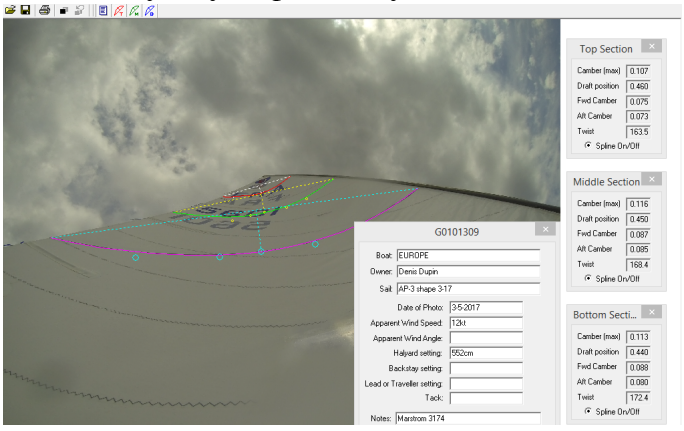
Hoist the sail and pull the outhaul to the measurement band. Center the boom with the mainsheet but without excessive tension.
Put the boat on its side.
Using a long measure, place this from the mast to the leech along one of the predetermined lines. Use a vertical measure, fixed perpendicularly; to measure the maximum depth of the sail and its position from the mast. This vertical measure should not push down on the sail but just peasure the distance. Perform the same measurement for the other two lines.

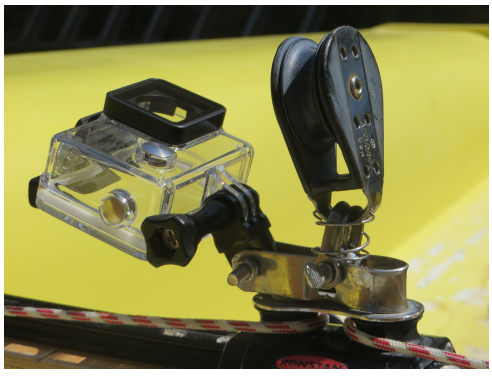
The table below shows a comparison of sails

	Leech	rd 2500	rd 1250	Top	Middle	Bottom	
				cm	cm	cm	
ap4-0817-170151-5049	5100	1643	952	20.83	22.24	24.18	67.25
ap3 1014	5185	1644	954	16.30	25.90	27.80	70.00
ap3 0815 bob	5125	1645	955	16.80	25.00	29.00	70.80
st-180017	5110	1640	930	19.00	27.70	27.10	73.80
ap3 1015	5185	1648	957	18.00	26.00	30.10	74.10
st005-0318	5210	1645	958	18.50	27.50	29.70	75.70
Green 1211	5185	1650	960	18.40	27.40	32.60	78.40
Green 1411	5125	1650	960	18.30	27.40	33.80	79.50
st-180121-stormy2	5090	1645	935	22	30.80	32.20	85.00
ap3 0716	5192	1649	956	20.40	30.80	34.5	85.70
st0022-180012-0119	5210	1645	955	20.40	32.90	34.70	88.00

Dynamic measurement

To make things more complicated, ‘real time’ measurement of the sail has been performed using a camera fixed near the lower mainsheet block taking images every 5 seconds.
Ashore, the images can be analysed to see the effect of gusts, sail controls and movement on the sail shape.
Comparison of different sails in this way is really difficult due to changes in wind and sea conditions, mainsheet tension, fittings…
But this way may help to verify the deformation of a sail while sailing and the effects of its wear.





Scope of work for Training

Sailors usually win or lose places at transition phases:
Start, tack, jibe, top and bottom mark rounding

The objectives to achieve during these transition phases are:
Being able to execute perfectly the manoeuvres while keeping an eye on the fleet close to you, and positioning your boat in the chosen and anticipated line to get a good advantage on the competitors.
The success of these objectives is coming from working on the two following points:
• Being able to choose the best trajectory before starting a new section of the race
• Being able to anticipate the situation at a mark or a transition with close competitors.

Loses are seen when a sailor is trying to pass a competitor on its leeward. A specific training is required to improve the skills and minimise the loses by doing 2 close tacks to move away from the competitor leeward without going too far from the chosen line or by going upwind as much as possible to avoid the competitor bad wind

New racing formats mean that sailing is becoming a “fighting sport”, in which close contact is required.

• Tactical basis have to be improved:
In automatisms that are difficult to accept, there are notably :
- Choosing a start line side in accordance with your strategic choices
- Being able to give up “the” best position on the start line
- Accepting to cross behind other boats to go to the chosen side (to do what you said) rather than being pushed on the other side
- Crossing soon enough to comfort your position in a group of the fleet instead of looking for the leadership
- Being patient enough to chase a boat or a group in the fleet rather than escaping “the fight”
These points are valid for both upwind and downwind course.

• Strategic basis to be improved:
Some competitors don’t know how to identify the characteristics of a wind.
That leads to choose the wrong side of the start line or to go downwind on a side that will become longer and longer because the wind direction is changing….
The only instruments authorized on a racing boat are the compass and the watch.
So it is important to learn how to use these instruments during a race, without relying only on them.
Some competitors do not accept to lose points to limit the risks during a race.
It can be a hazardous management of the championship.
The most broken rules remain the best known : 10, 11, 18

• On the overall management of a regatta, it can be added that:
Some sailors don’t know how to start a championship (beginning with a bad result in the first race), others don’t know how to finish it: it is the proof of a lack of rigor in the execution of routines from the preparation days to the end of a championship. (wake up time, bed time, launching time, feeding and hydration,…)

Racing rules

The Racing Rules of Sailing (RRS) govern the sport of sailing on the water. They are revised and published every four years by World Sailing.The current edition is The Racing Rules of Sailing 2017 - 2020.
https://www.sailing.org/documents/racingrules/

You should have a look to the cases in the Case book:
https://www.sailing.org/documents/caseandcall/case-book.php

Definitions
It's important to begin reading rules by the basic definitions

Fundamental Rules in part 1 are essential.
Not to comply them would prohibit you to take part to a race…

When boats meet rules are written in part 2
Most of the time jurys are requiered for infringement to rules 10, 11,12, 15, 18.

Right to protest
RRS indicate right to protest in chap 5 Rcv 61

Learning rules while playing ?

http://game.finckh.net/indexf.htm

Class Rules

Along with a thorough knowledge and respect for the Racing Rules of Sailing, it is essential to check the class rules that are specific for the Europe Class. In particular there are useful guides concerning Rule 42. Information can be found on the class website
Link to recent class rules edited by IECU:
http://www.europeclass.org/files/2015_class_rules.pdf

Builders & providers

Before buying a new boat, it's interesting to remember that buying a second and boat may be a good opportunity: Europe stay in good conditions even after many years of use and the second hand market may present hulls in really good conditions…
At the time of writing there are projects to bring to market new Europe hulls in Denmark using the OSIS moulds, and to begin construction of new hulls in the UK. We also heard of a hull project in Italy to be confirmed…

Hulls
Winner: http://www.winner.es/
Osis: http://www.osis.se/pris.html

Masts
Celidh: http://www.carbonmast.com/

Sails

Green Sails:	http://www.greensails.dk
North sails:	optim.azur@wanadoo.f
Pires de Lima:	http://www.velaspl.com/
SailTech:	esp698@gmail.com
Quantum:	http://www.quantumsails.com/
UK Denmark:	https://www.sails.dk/
WB:	http://www.wb-sails.fi/

Suppliers (hulls, sails, spars, rudders & centerboards, ropes, fittings…)
Paris Voile - www.paris-voile.tm.fr/
Proust: http://www.proust-sailing.com/
Van Laer sailing:https://www.vanlaersailing.be
Winner: http://www.winner.es/

Coaching - Performance Sailing Consultant

BRO Physical Coaching: Nicolas D'Hondt, Belgium
https://www.facebook.com/BROPhysicalCoaching/

2dVoile Performance: Performance sailing Consultant
Denis Dupin: 2dvoile@gmail.com
Training, race coaching, strategical profiling, performance analysis;
audit, advices, material preparation
Builders consulting - research - tests - development - material adjusting:

2d Voile Performance
Consultant pour la performance globale

Internet links

IECU - Association internationale: http://www.europeclass.org/
Isaf: http://www.sailing.org/
https://www.facebook.com/groups/EuropeSailing/
http://www.europeclass.org/buy-and-sell.html
https://www.ukeuropeclass.com