International Measurement System

IMS

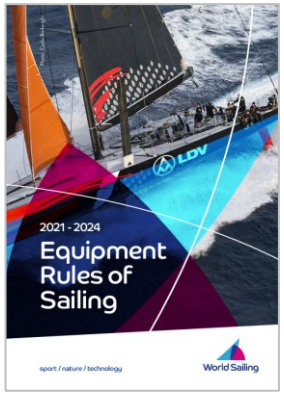
2024

Measurement

- Fundamental part of any rating system.
- Boat's characteristics affecting her performance are measured.
- The International Measurement System (IMS) is a set of rules that defines what and how is measured on the boat.
- By using IMS, the complete boat can be measured, including the hull shape, appendages, propeller, stability, rig and sails.

Basic Rules

- IMS – The International Measurement System
- ORC Rating Systems (ORC International and ORC Club) which use IMS for rating calculations
- RRS – The Racing Rules of Sailing
- ERS – The Equipment Rules of Sailing - IMS uses ERS amended only for items specific to offshore boats



Basic instructions

Before measuring

- Be familiar with the rules.
- Take care of your equipment:
  - Basic measuring instruments: 2 m measure, 20 - 30 m measurement tape, 30 - 150 kg scale, small sprit level with 45°, plumb line, caliper/thickness gauge, densimeter.
  - Writing materials: Measurement forms, pens, waterproof markers.

During measurement

- Record and write everything you measure, WITHOUT calculations at the moment.
- Use only ONE measurement unit.

After measurement

- Input measurements in IMS Editor.
- Send the measurements to the Rating Office.
- File the handwritten measurement records.

Taking measurements

- Measurements shall be taken and recorded to the nearest greater value as follows:
    - Metric system: All measurements shall be in meters to three decimal places except that sail measurements shall be to two places of decimals. Weights shall be in kilograms to one decimal place.
    - Imperial system: All measurements shall be in feet to two decimal places except that sail measurements shall be to one decimal place. Weights shall be in pounds.
- IMS is used by the rules described in the ORC Rating Systems to generate ORC International and ORC Club rating certificates. Both systems are full compatible.
    - ORC International certificate is made from data taken from all measurements described in ORC Rating Systems as defined by the IMS.
    - ORC Club certificate data can be measured, declared by the owner or obtained from any other source, including photos, drawings, and/or data from identical or similar boats.

Complying with certificates

When IMS is used a boat is in compliance with its ORC certificate when:

- All measured, declared or recorded values shall be as close as possible to those on the certificate. Differences are allowed only if the values on the certificate give a faster rating.
- The sail area shall be smaller or equal to that printed on the certificate.
- The sails inventory shall include the largest of each when on board: mainsail, mizzen, headsail set on the forestay, symmetric spinnaker, asymmetric spinnaker, quadrilateral sails and sails set on the wishbone boom, mizzen staysail and all headsails set flying and all asymmetric spinnakers having SHW/SFL < 0.85.
- Items declared by the owner such as crew weight, use of asymmetric spinnaker tacked on the centerline and adjusting the mast foot while racing shall not be considered as issue of compliance with certificate. Boats need to comply with these rule independently of their rating effect.

Complying with certificates

When, as a result of any measurement protest by a boat or by the Technical Committee, it is determined that a boat does not comply with her certificate, the non-compliance shall be calculated as a difference in percentage of APH:

- If the difference is less than or equal to 0.1% - no penalty, the original certificate will be maintained
- If the difference is more than 0.1% but less than or equal to 0.25%, no penalty, but a new certificate shall be issued based on the new measurement data and all races of the series shall be rescored using the new certificate data.
- If the difference is more than 0.25% but less than 0.40%, a boat shall receive a scoring penalty that shall be 50% of the score for DNF in any race in which her rating was incorrect. New certificate shall be issued based on the new measurement data and all races of the series shall be rescored using the new certificate data.
- If the difference is 0.40% or more, a boat shall be disqualified (DSQ) in any race in which her rating was incorrect. The boat shall not race again until all non-compliance issues are corrected to the limit defined in a) above.

IMS Part B - Hull

Hull

- Hull shape and geometry is one of the most important factors for predicting a boat's performance.

- Hull shape describes not only length of waterline while sailing, but also displacement, wetted surface, and the volume distribution along the hull from which hydrodynamic forces of lift and drag can be calculated.

- A hull measurement is performed to create an offset (OFF) file describing the body plan of the hull together with appendages, by using an ORC-approved hull measurement machine or any available measurement instrument capable to produce a list of the points in the co-ordinate system defined as follows:

    - X axis – longitudinal with 0 at stem and positive towards the stern
    - Y axis – transverse with 0 at the centerline and positive to outwards
    - Z axis – vertical with 0 at the waterline and positive upwards

Hull

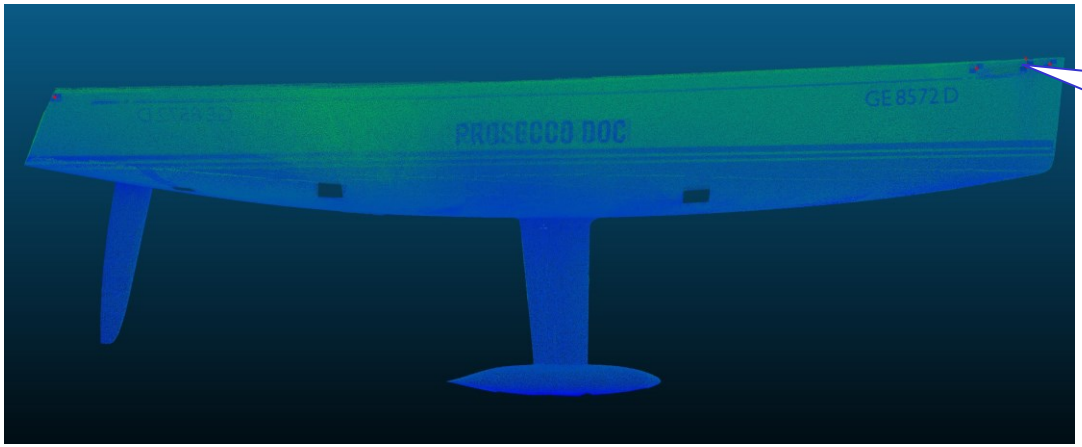
- Hull shape can be measurered either with Total Station or 3D Scanner

- 3D scanning
  - Cloud of points is taken of the hull but also all other objects around
  - Boat may be in any trim as cloud can be properly orientated in post processing
  - More post processing time needed cleaning up the cloud of points to include hull only, orientation and section creation

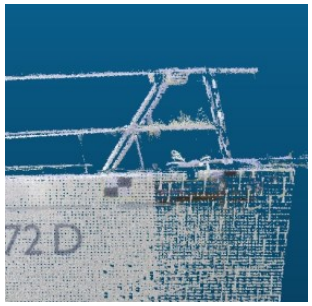
- Measurement with Total Station
  - Station and points are taken where it will be in the offset file
  - Boat needs to be properly leveled and in longitudinal trim as close as possible to flotation trim
  - Easy post processing

- Up to late 1990s there was special designed HMI (Hull measurement instrument)

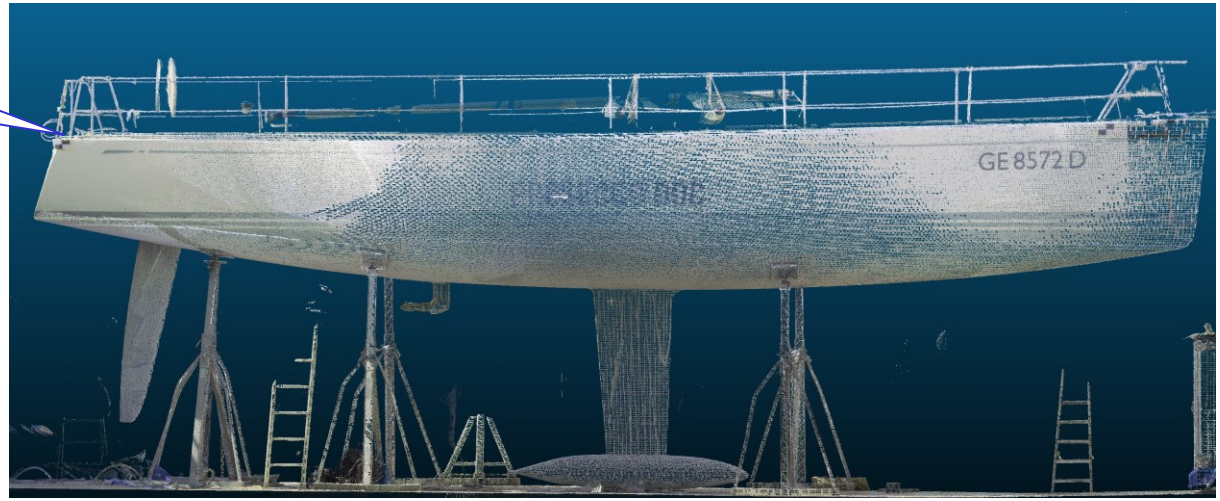
Hull – 3D scanning



Forward freeboard point

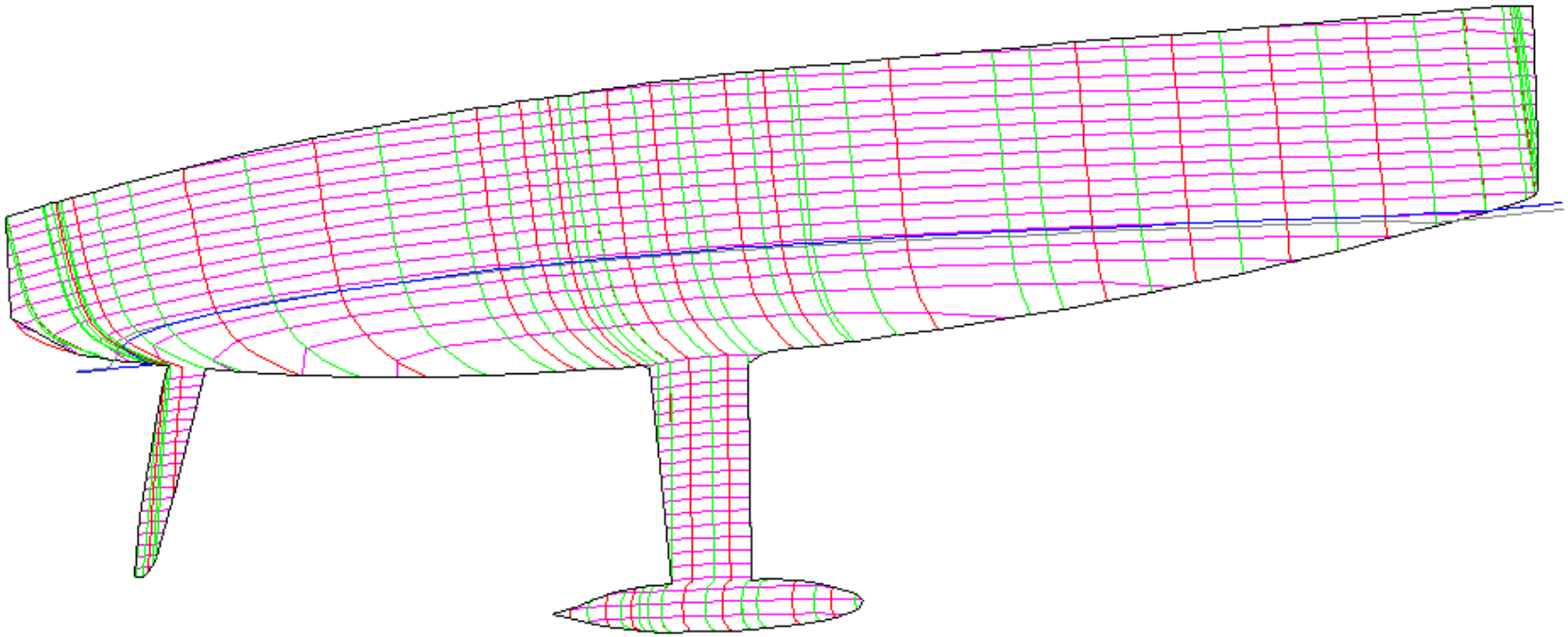


Aft freeboard point

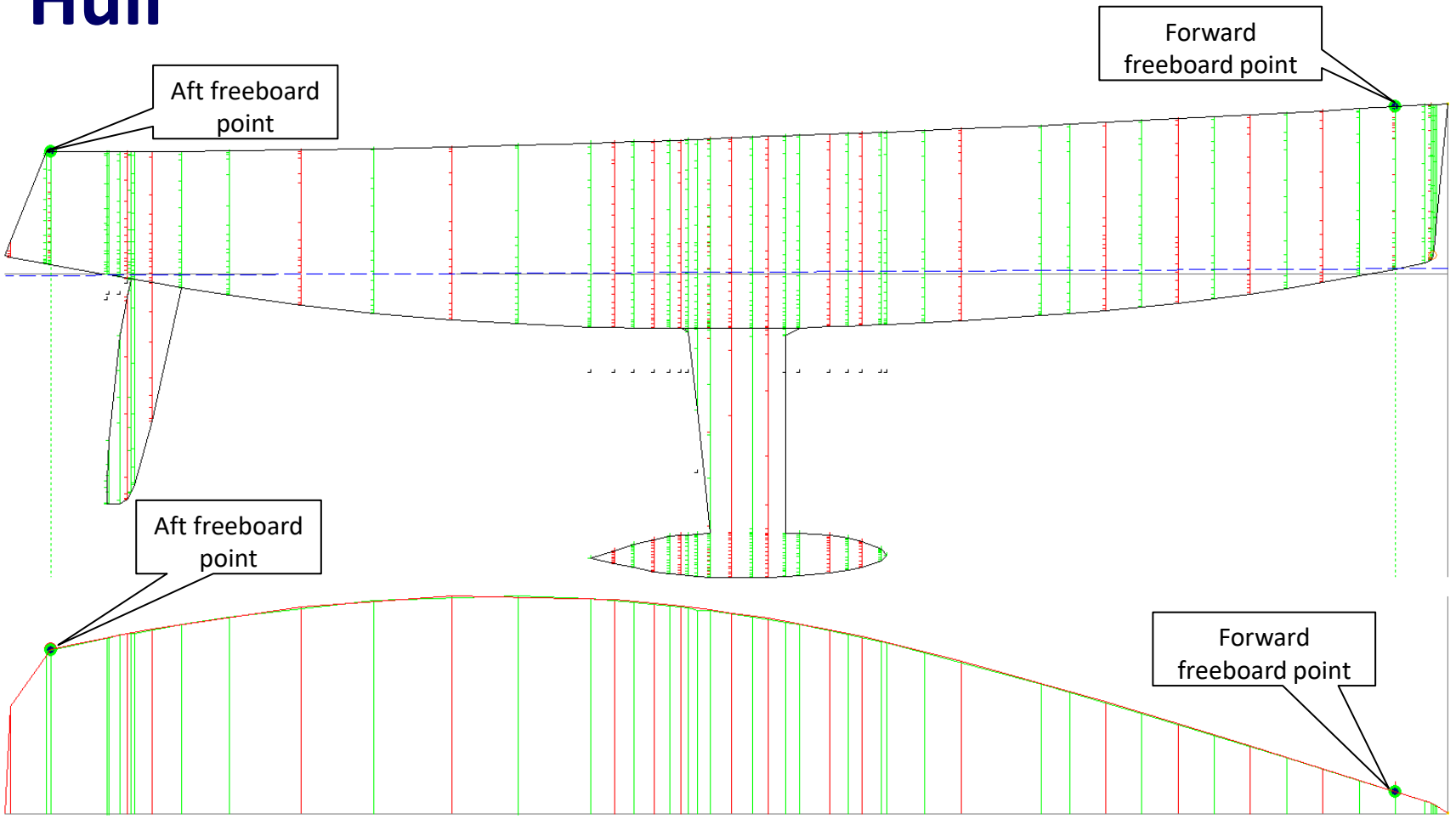


Hull – Total station

Hull

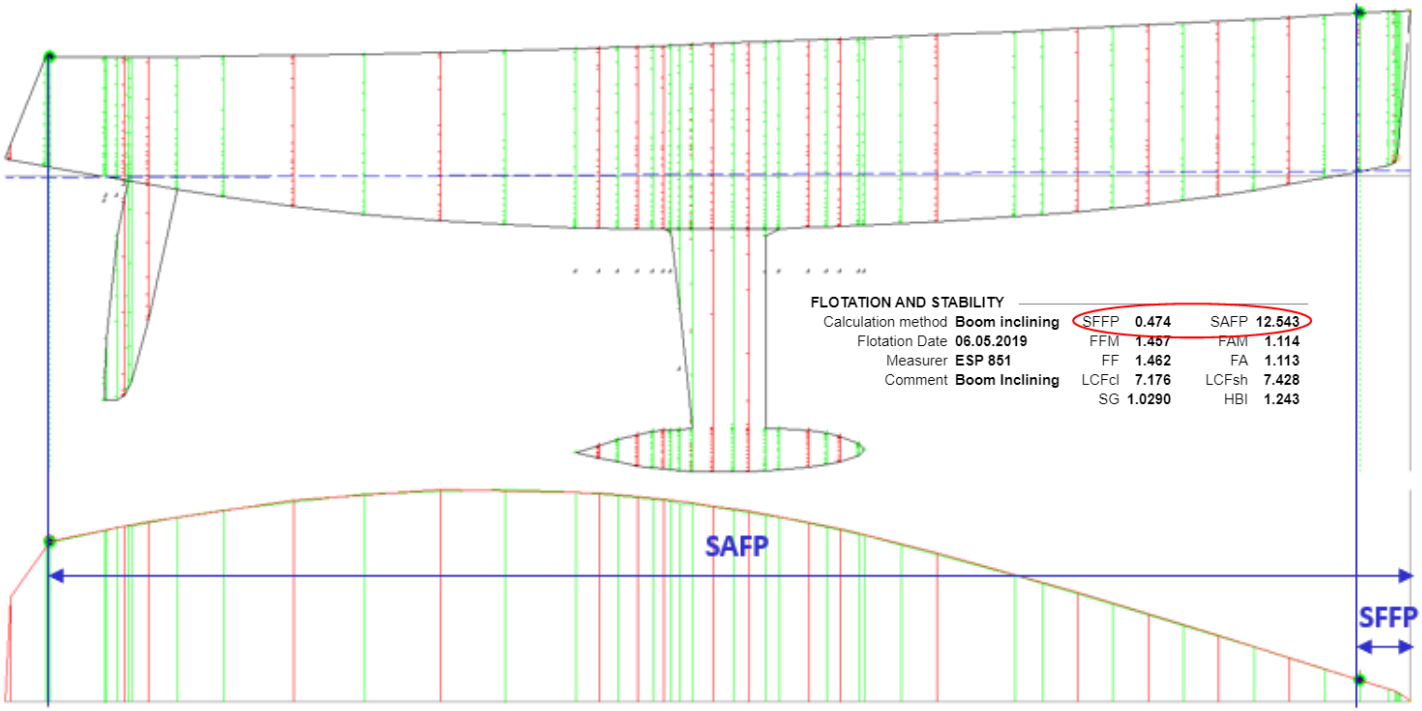


Hull


Forward freeboard point
Aft freeboard point
Aft freeboard point
Forward freeboard point

Hull

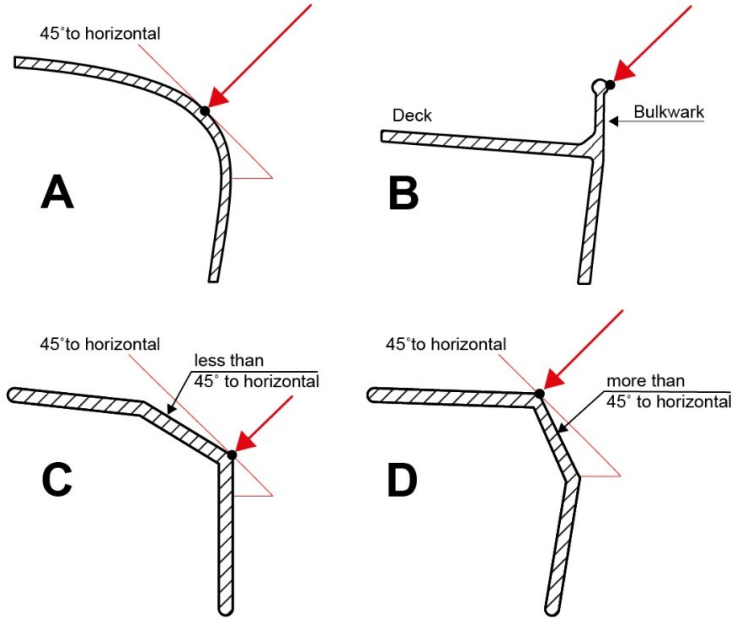
- Freeboard points
  - Before any freeboard measurements measurer **SHALL** check with the Rating Office position of the freeboard points for the hull he is measuring
  - ORC Certificate is showing longitudinal distance of the freeboard stations from the foremost point of the hull as
    - SFFP - horizontal distance from the forward end of LOA to the forward freeboard station.
    - SAFP - horizontal distance from the forward end of LOA to the forward freeboard station



Hull

- Freeboard points
  - The most important points on the hull used for freeboard measurements
  - The freeboard points shall be taken on the freeboard stations as either of:
    a) The top point as defined in B2.3; or
    b) Any other point that can be clearly identified on the hull and if needed described with photo or drawing

a) various Top Points



b) specific freeboard points

Hull

- Freeboards measurement
  - Boats shall be in measurement trim
  - Freeboards shall be measured in calm conditions without waves with boat floating freely without any pressure from the mooring lines
  - If there are no conditions (too much wind or waves) freeboard shall not be measured and measurement shall be postponed until proper conditions are available

✓

✗

Measurement trim

Boats shall be measured dry in light ship condition without crew, which as defined in detail in IMS Rule B4. Items on board include:

- Internal ballast
- Batteries
- Fixed interior accommodation, hatch covers and floorboards
- Fixed machinery, electrical and plumbing systems
- Outboard engine in the position as carried on board while racing
- Mast, boom, spinnaker pole and any sprit in their normal position when racing upwind
- Standing rigging and fittings
- Rudder, wheel/tiller and steering gear
- Centerboard(s) and drop keels fully raised, or locked as for racing with locker in place
- Fixed electronics, instruments, compasses, lights, antennas and masthead devices
- Halyards, boom running rigging and vang as for racing - Boom secured at the low point of P
- Pulpit, stanchions and lifelines
- Mattresses and permanently installed table and doors
- Permanently installed stoves, heaters or other electrical devices
- DSS appendage shall be completely retracted with no part outside of the hull

Measurement trim

Specifically excluded from the measurement trim are the following:

- Water and any liquid contents of any tanks or voids in the keel or other appendages
- Anchor and anchor lines
- Deck, mooring lines, fenders
- Any sails, including storm and emergency sails
- Sheets, blocks, winch handles
- All portable safety gear, including fire extinguishers and liferafts
- Cushions, pillows and any other bedding
- Cooking and eating utensils
- Any food or stores
- Miscellaneous portable and personal gear, books, navigational tools etc.
- Outboard engines without appropriate stowage and portable fuel containers

An easy explanation of lightship measurement trim would be that if the boat is rotated upside down, everything that falls out shall not be on board.

Measurement Inventory

A list of items presented on the boat during the measurement shall be recorded as follows:

- Ballast
  - Fixed ballast: description, weight, distance from stem, height from the waterline
  - Movable ballast: Maximum water ballast volume in liters that can be loaded on one side with its longitudinal distance from stem, vertical distance from the waterline and transversal distance from the boat's centerline.
- Tanks
  - Use, description, capacity, condition at measurement, distance from stem, height from the waterline.
- Other items
  - Permanently installed items such as: battery, engine, water heater, air conditioner and similar shall be recorded with description, weight, distance from stem, height from the waterline
  - For boats with LOA > 24.0 m: anchor, anchor chain, tools, safety equipment, deck gear may be on board during the measurement with its positions recorded

Measurement Inventory

INVENTORY

BALLAST	*Id*	*Kind*	*Description*	*Weight*	*LCG*	*VCG*	*TCG*
	1	Fixed	2X33 LEAD PIGS - STB	66	6.00	0.00	
	2	Fixed	3X33 LEAD PIGS - PT	99	6.00	0.00	
	3	Fixed	14X10 + 2.5X33 - STB	223	5.45	0.00	
	4	Fixed	8X10 + 1.5X33 LEAD PIGS - CL	130	5.40	0.00	
	5	Fixed	4X10 LEAD PIGS - PT - UNDER BATTS	40	5.45	0.00	
	6	Fixed	4X10 + 3X33 LEAD PIGS - STB	139	4.76	0.00	
			Fixed Ballast Total	**697**			

TANKS	*Id*	*Description*	*Sp.Wght*	*Capacity*	*Condition*	*LCG*	*VCG*
	1	Fuel	Fuel	150	0	11.00	0.20
	2	Water	Water	250	0	11.00	0.20
			Total deductible		**0**		

OTHER ITEMS	*Id*	*Kind*	*Description*	*Weight*	*LCG*	*VCG*
	3	Miscellaneous	ENERPACK PUMP	4	5.40	0.10
	1	Battery	1x70 Ah		10.40	0.10
	2	Battery	2X95 Ah		5.40	0.10
	4	Engine	VOLVO 30HP			
			Total deductible	**0**		

Freeboards measurement

ORC International

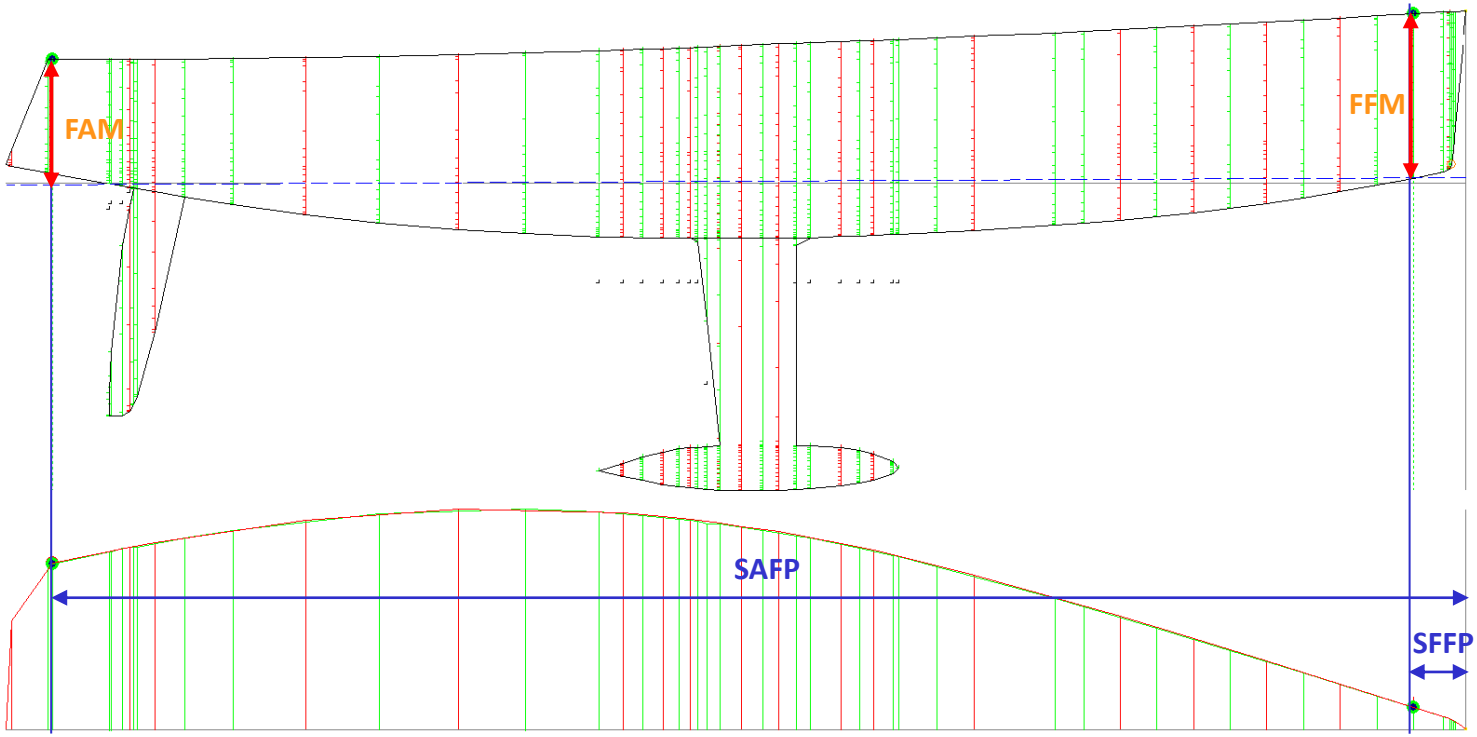
- Freeboard measurements are mandatory with the offset file approved for ORC International

ORC Club

- Freeboard measurement is performed only with the offset file approved for ORC International
- If there is no accurate offset file, the boat is weighed in measurement trim with a calibrated scale.
- If weighing is not possible, the rating officer can accept a displacement estimation from (a) the boat's manual, or (b) the designer's data, or (c) other identical boats.

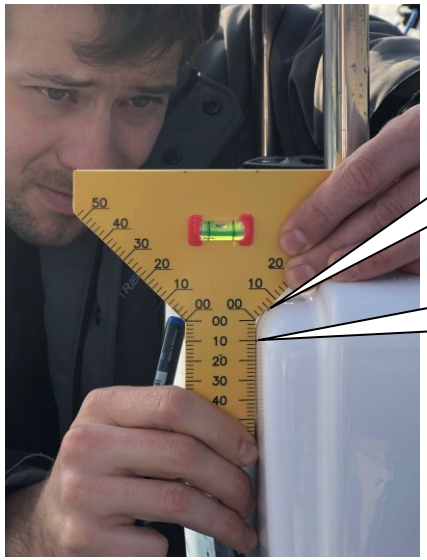
Freeboards measurement

- Check with the rating officer position of the freeboard points
- Identify freeboard stations with SFFP and SAFP as follows (measured along the centerline)

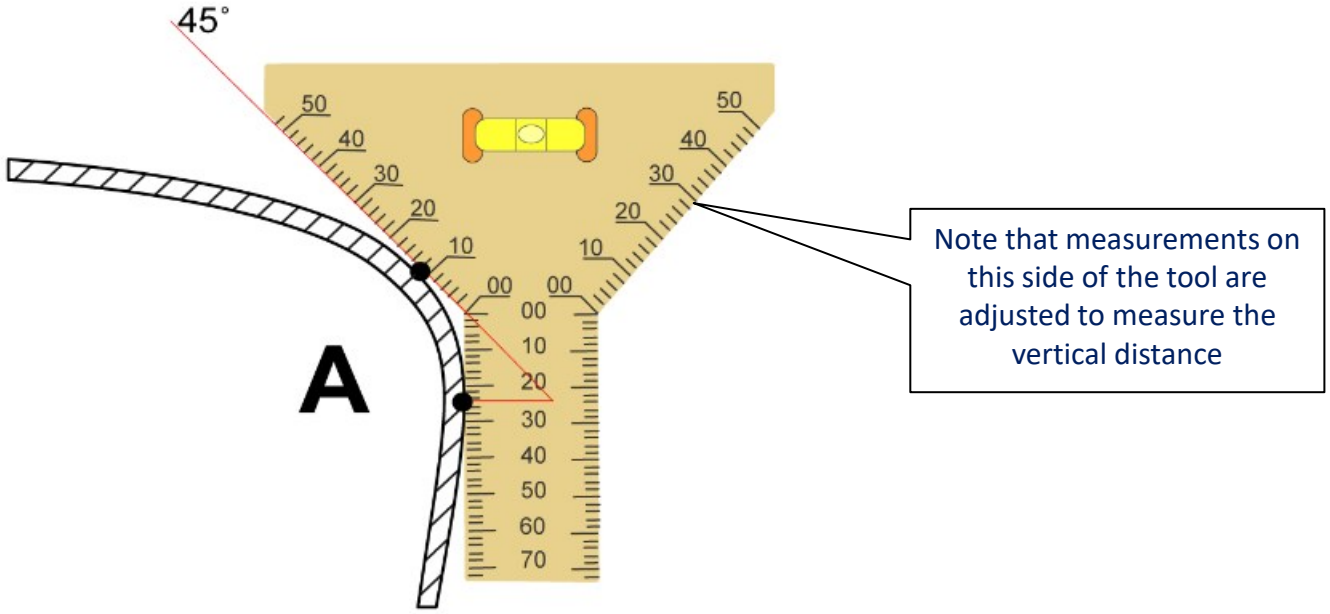


Freeboards measurement

- Check that boat is empty in measurement trim
  - Record ballast, if any
  - Check that water tanks are empty, record amount of fuel in the tank, if any
  - Check that no sails, personal equipment, safety equipment is on board – open various compartments
- If needed use a special tool or a 45 degrees level to find freeboard point on rounded sheerline



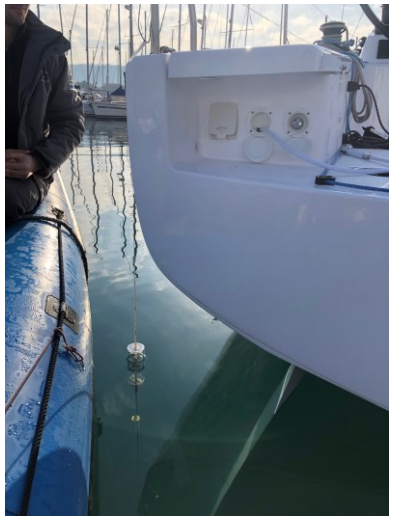
Freeboards measurement

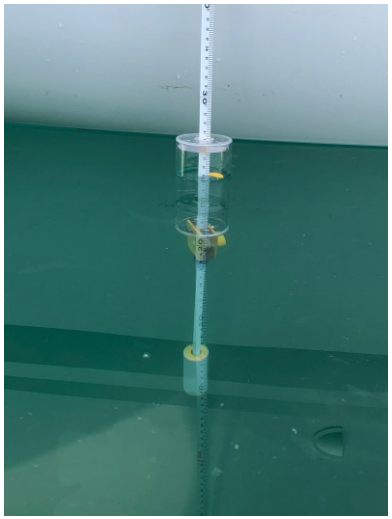


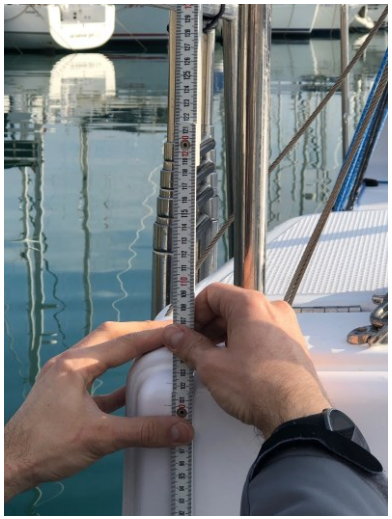
Calculate the offset to be added for freeboard measurement from the point on the hull. In case on the picture, it is 24 mm + 12 mm = 36 mm

Freeboards measurement

- Measure the freeboard from the point marked on the hull to the water level
- Use either special tool or hard 2 m measurement tape







- When there are port and starboard freeboard points, measure both and calculate the average
- Measure specific gravity of the water (SG)

Other hull measurements

- Hull construction
    - SOLID: Non-cored, solid E-glass, metal or wood hull and deck, but including also E-glass decks with core material.
    - CORED: Hull skin of E-glass (see above) or wood but incorporating a core material of less density than the skin.
    - LIGHT: All other construction types but excluding the incorporation of any carbon fiber.
    - CARBON: Where carbon fiber has been incorporated anywhere in the construction of the hull shell and/or deck shells.
- Rudder construction
    - STANDARD: Rudder stock does not contain any carbon fiber.
    - CARBON: Rudder stock contains carbon fiber in any amount.
- Light materials in stanchions
    - If there is light material such as titanium or carbon used in lifelines elements (stanchions, pulpits, pushpits etc.) this shall be recorded as “YES” and if not as “NO”.

IMS Part C - Appendages

Appendages

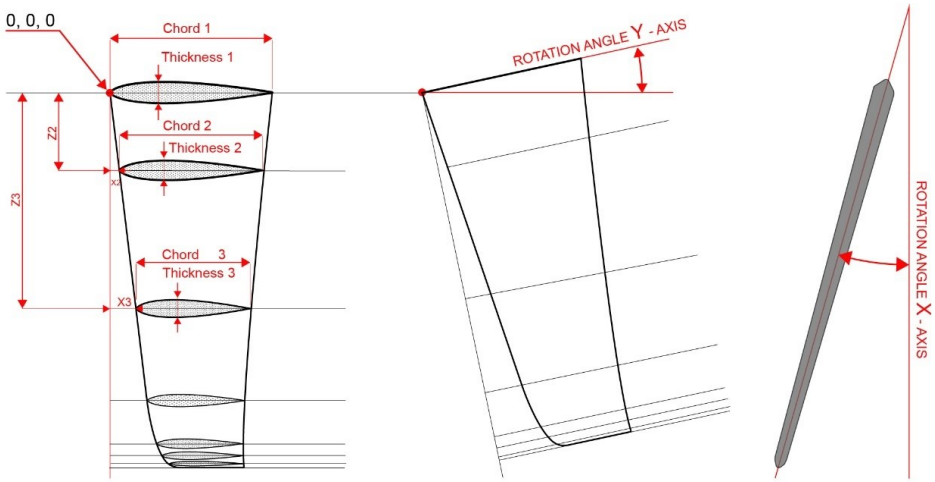
- Hull offset files shall include a fixed keel and single rudder set below the hull.
- Any other appendage such as a centerboard, transom hung rudder, twin rudders, bilgeboards, DSS, or foils shall be defined as follows:
    - Appendage should be set up in the local coordinating system with X axis – longitudinal, Y axis – transverse and Z axis.
    - In such a defined coordinating system, a series of points with its x, y and z coordinates describing the 'rondure' of the appendage shall be defined together with the associated chord and thickness at each point.
    - Anchor points defined with x, y and z coordinates in a respective coordinating system for the hull or other appendage shall be defined so that they will position the appendage in relation to the hull or other appendages. Two additional codes shall be defined where the local x, y and z coordinates on the appendage connect an anchor point on the hull or other appendage, as:

        1- in fully extended position

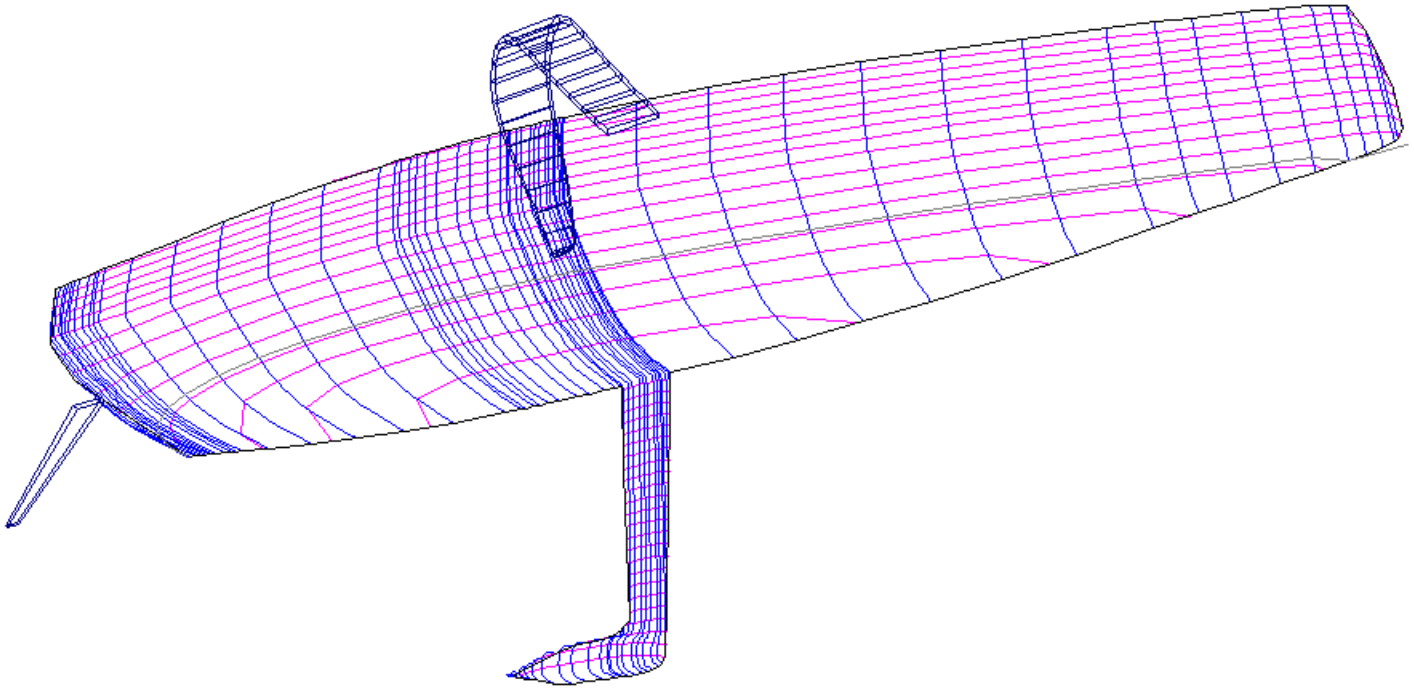
        2- in fully retracted position

Appendages

#	X	Y	Z	Chord	Thickness	Code
1	0	0	0	512	59	1-root
2	38	0	-241	440	55	0-none
3	79	0	-669	360	48	0-none
4	118	0	-957	311	42	0-none
5	147	0	-1087	280	36	0-none
6	161	0	-1121	265	33	0-none
7	184	0	-1149	240	29	0-none
8	238	0	-1165	190	5	0-none

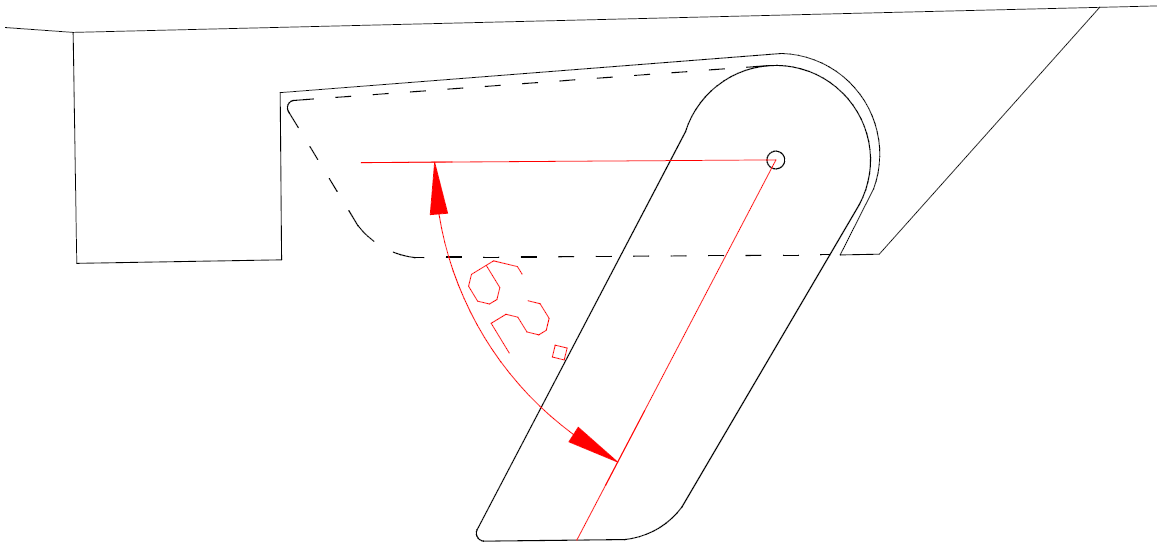


Appendages



Appendages

For each appendage rotating about single transverse axis a maximum angle of rotation shall be recorded.



Appendages

Additional measurements shall be taken for appendages:

- WCBA shall be the weight of the centerboard or drop keel.
- CBDA shall be elevation of the center of gravity of the centerboard
- The presence of a movable trim tab shall be recorded.

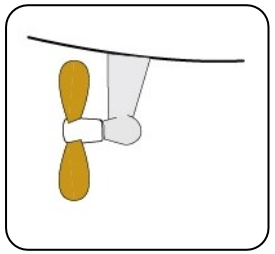
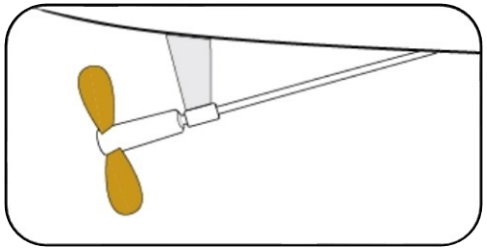
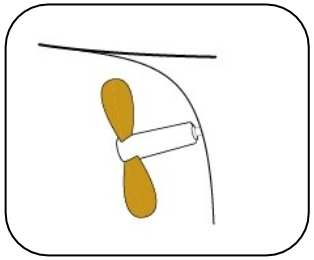
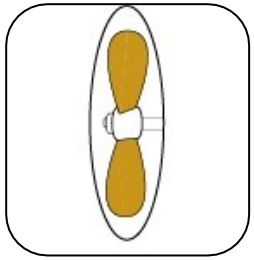
ORC
Offshore Racing Congress

IMS Part D - Propeller

Propeller - Installation

a) Strut drive
b) Shaft (exposed)
c) Shaft (not exposed)
d) In aperture

Outboard engine or retractable propeller shall be recorded as „No Propeller”



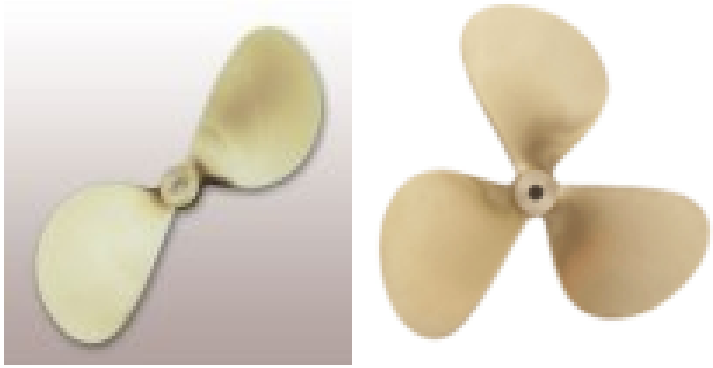

(a) **(b)** **(c)** **(d)**

Propeller - Type

a) Solid

b) Folding

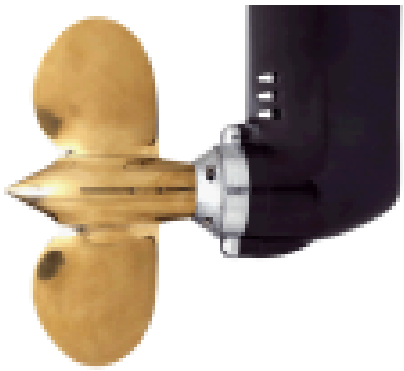
c) Feathering



a) Solid (2,3 or 4 blades)

b) Folding (2, 3 or 4 blades)

e.g. Gori



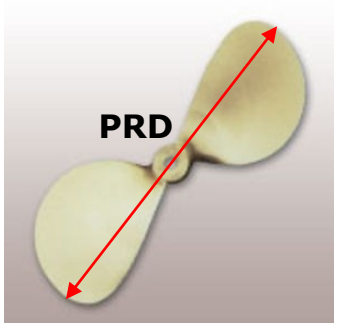
c) Feathering (2,3 or 4 blades)

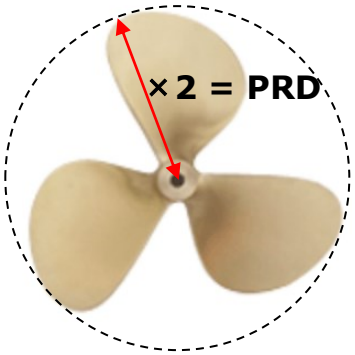
e.g. Max Prop

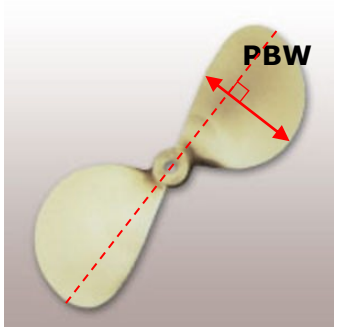
Propeller - Measurement

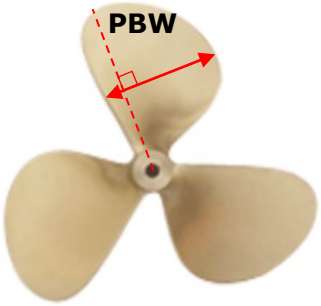
PRD - Propeller diameter

PBW - Propeller blade width

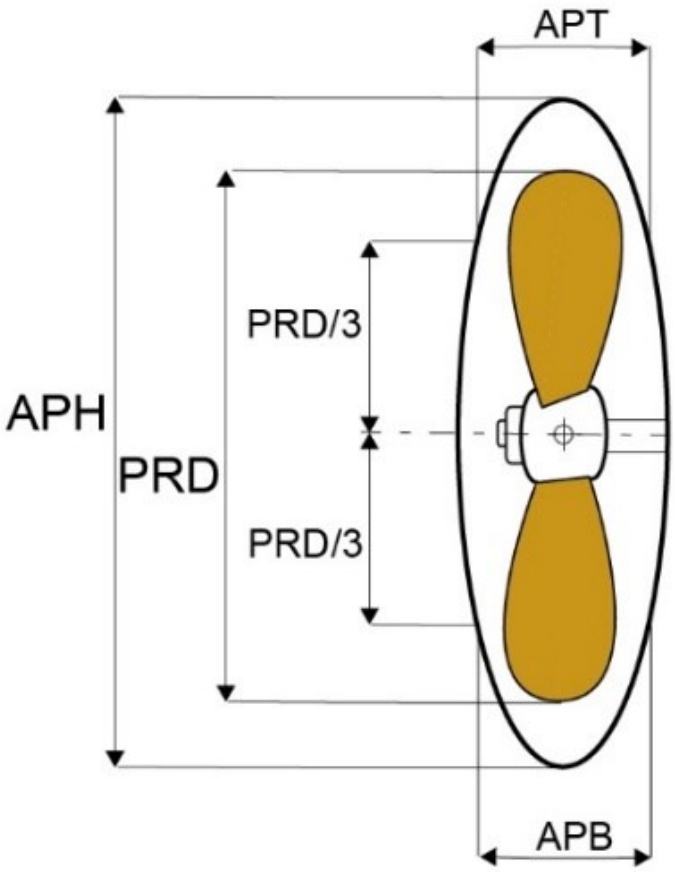




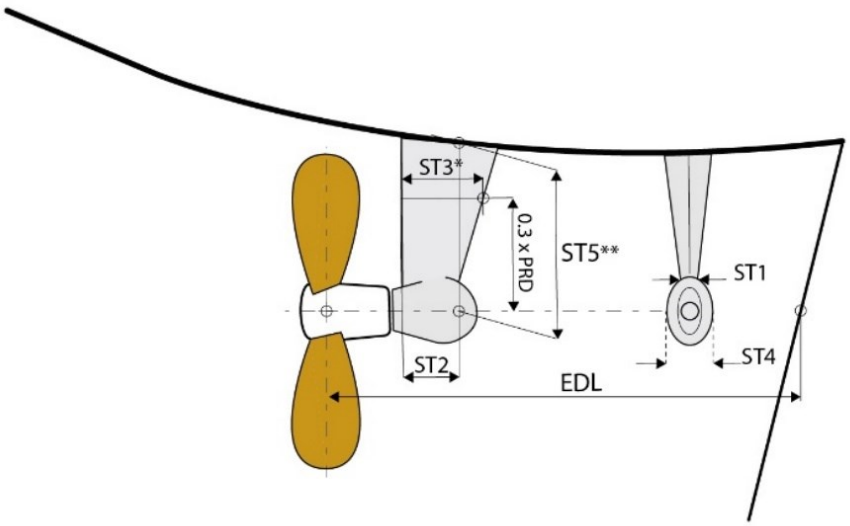


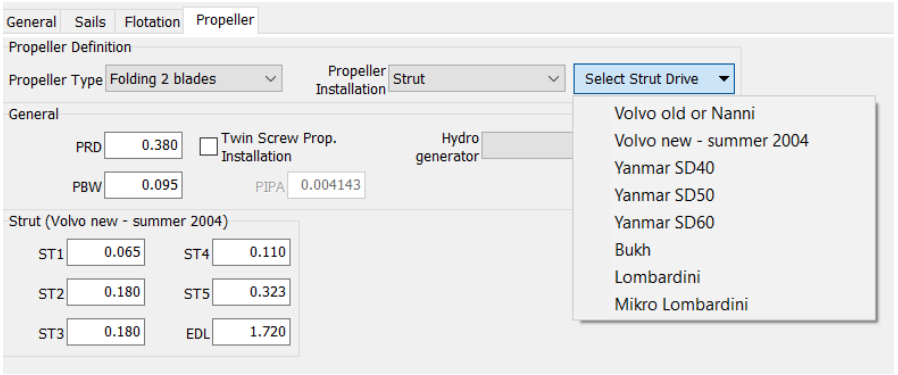


Propeller – In Aperture



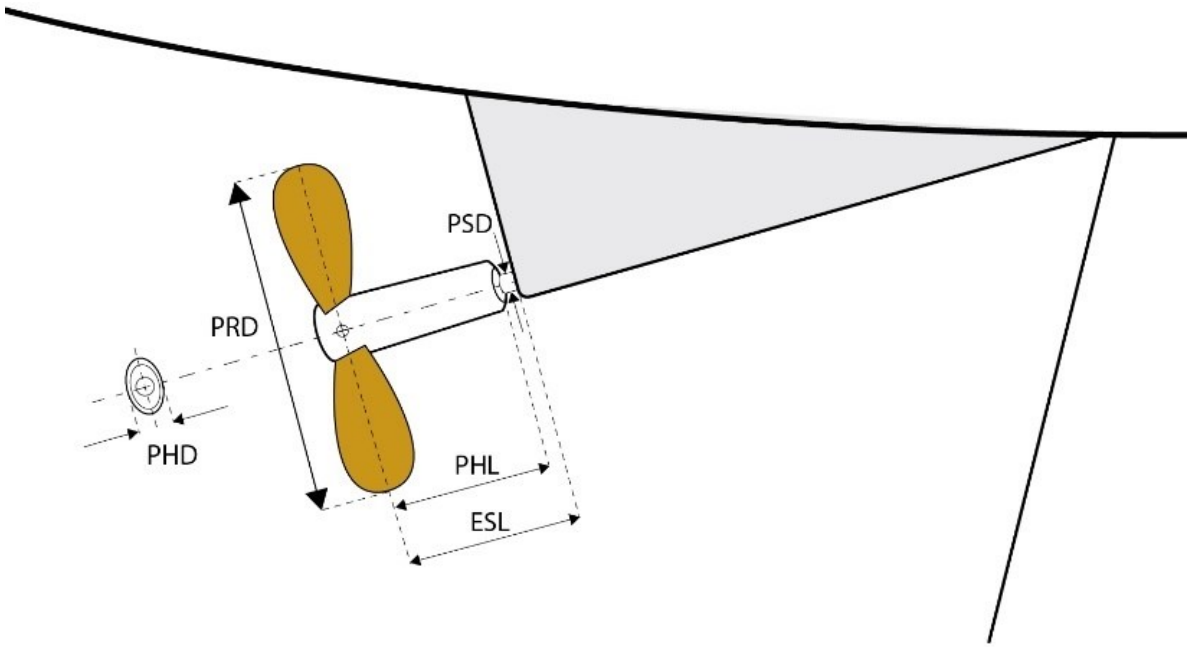
Propeller – Strut drive



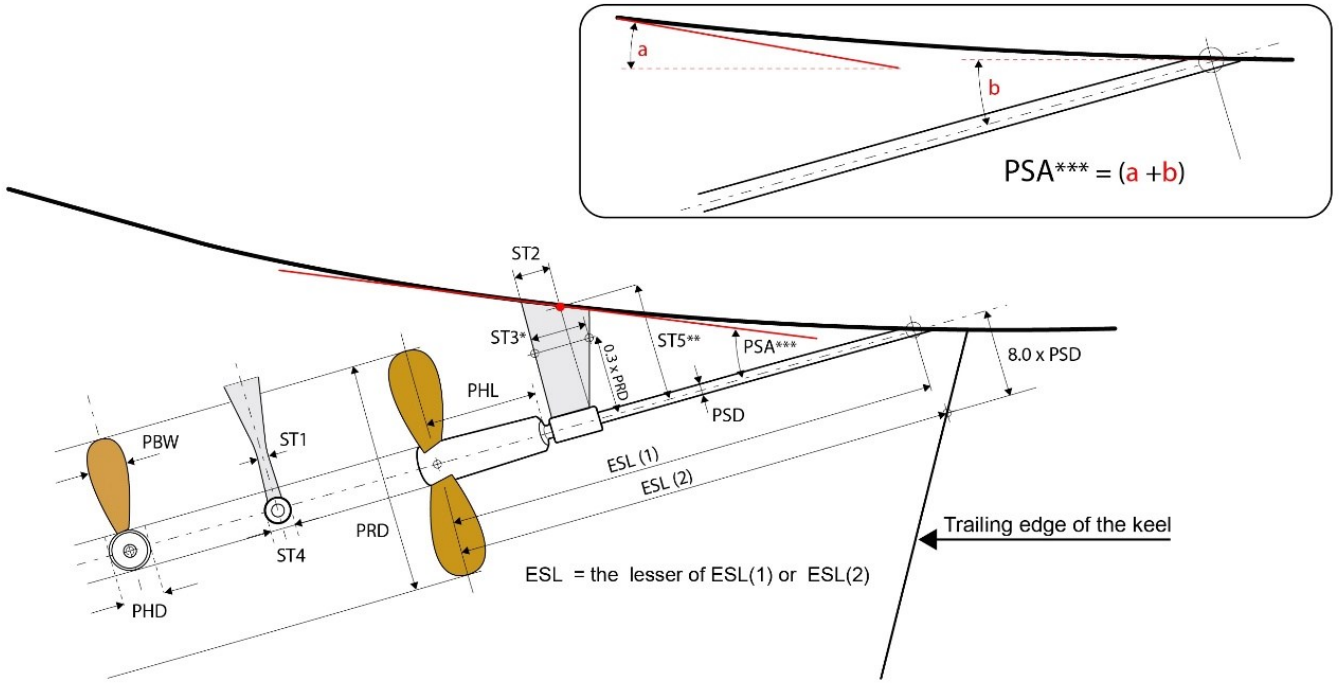


- IMS Editor software has pre-defined measurements for ST1 – ST4 for standard production strut drive models
- ST5 and EDL still needs to be measured as they may vary from boat to boat

Propeller – Shaft not exposed



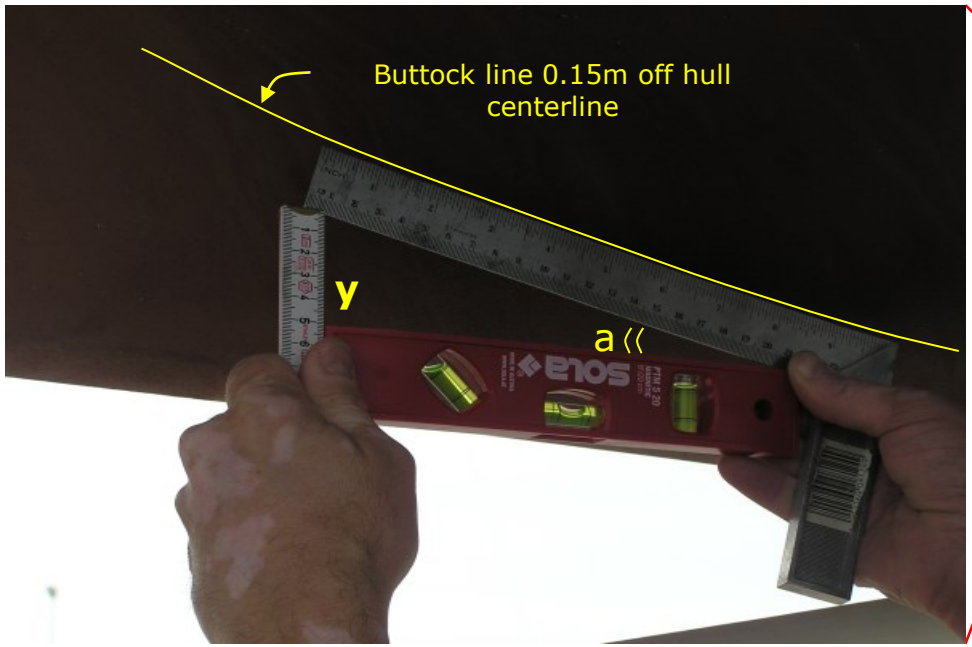
Propeller – Shaft exposed

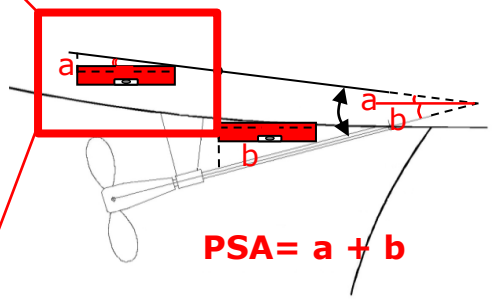


*ST3 is the maximum strut width measured parallel to the propeller shaft found not more than 0.3 x PRD.
**ST5 is measured perpendicular to the shaft centerline from the hull to the shaft centerline at the forward end of ST2.
***PSA (Propeller Shaft Angle) may be measured in two steps:
1. Angle between shaft centerline and level datum line.
2. Angle between buttock tangent line and level datum line.
Add angles to arrive at PSA.

Propeller – Shaft exposed

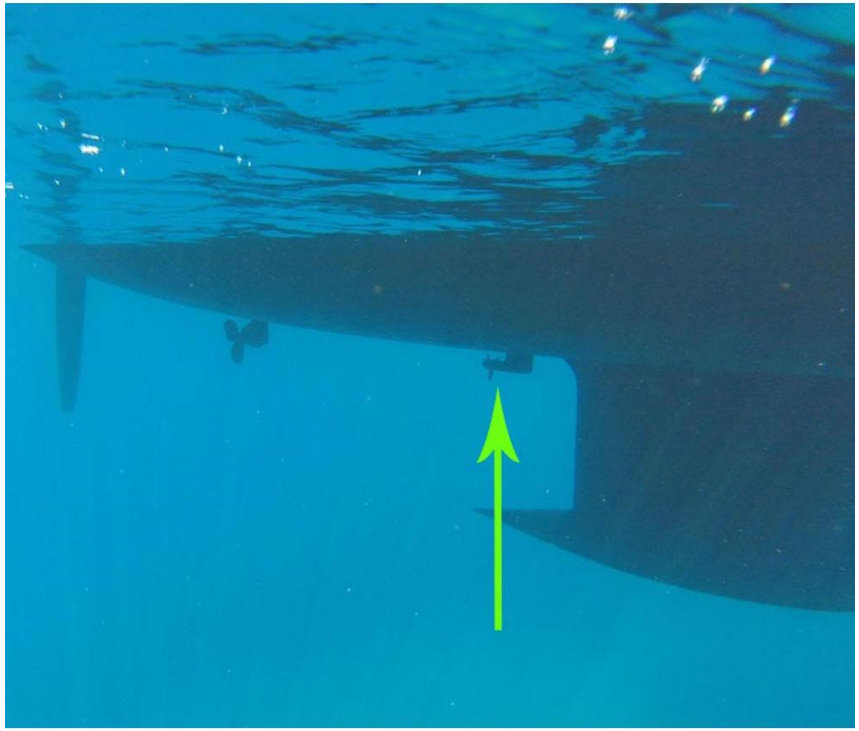
PSA - angle between the shaft and the hull (at the middle of the shaft and at a distance of 15 cm from the boat's centerline)





Propeller – Hydro generator

The presence of permanently deployed hydro-generator shall be recorded.



IMS Part E –Stability

Stability

ORC International

- Inclining test is mandatory and are always performed simultaneously with the freeboard measurements

ORC Club

- The inclining test is not mandatory (it is estimated by the VPP).

The results of a stability test gives a boat's righting moment, vertical centre of gravity (VCG) and limit of positive stability (LPS), which with the Stability Index (SI) can help determine a boat's eligibility to enter races categorized according to the WS Offshore Special Regulations.

Stability Index may only be calculated if stability is measured

Stability – Inclining test

- It shall be performed in calm water with the boat not depressed on any side by lying to a mooring, and with no one aboard while in measurement trim.
- If there are no conditions (too much wind or waves) inclining test shall not be performed and measurement shall be postponed until proper conditions are available
- A manometer as a "water scale" or an ORC-approved electronic inclinometer shall be used.
- Inclining test may be performed with the poles or with the boom.
- Both methods are equal and will give the same results. Boom method may be better for bigger boats or when the poles are not available while poles method require less time and may be mor suitable for smaller boats
- Before starting inclining test, make sure that boat is in measurement trim as explained under Part B - Hull

Stability – Inclining test

- Weights shall be selected to have heeling angles as

LOA	*Angle (on one side)*	*PD (poles inclining)*		*PD (boom inclining)*	
		min	max	min	max
< 24.0 m	2 – 4	0.070 · ***PL***	0.140 · ***PL***	0.035 · ***PL***	0.070 · ***PL***
≥ 24.0 m	1 – 4	0.035 · ***PL***	0.140 · ***PL***	0.0175 · ***PL***	0.070 · ***PL***

- where PL = PLM / (1+GSA/RSA). For electronic inclinometer PLM is recorded as 9000, GSA and RSA as 1.0 giving PD limits as

LOA	*Angle (on one side)*	*PD (poles inclining)*		*PD (boom inclining)*	
		min	max	min	max
< 24.0 m	2 – 4	315	630	157.5	315
≥ 24.0 m	1 – 4	157.5	630	78.75	315

Stability – Boom Inclining

Step 1 – Place electronic inclinometer on the flat surface at the centerline of the boat

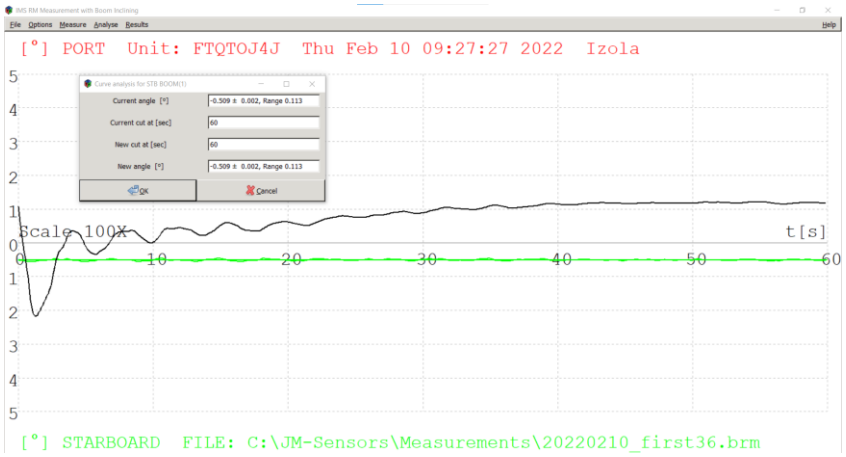
For electronic inclinometer ***GSA*** = 1, ***RSA*** = 1 and ***PLM*** = 9000

If manometer (water level) is used the distance between the gauge and the reservoir ***PLM*** shall be at least 2000 mm. Gauge Surface Area (***GSA***) and Reservoir Surface Area (***RSA***) shall be calculated and recorded.

Measurements is than taken of PDs (in mm) by measuring the difference in height of the water level in gauge

Stability – Boom Inclining

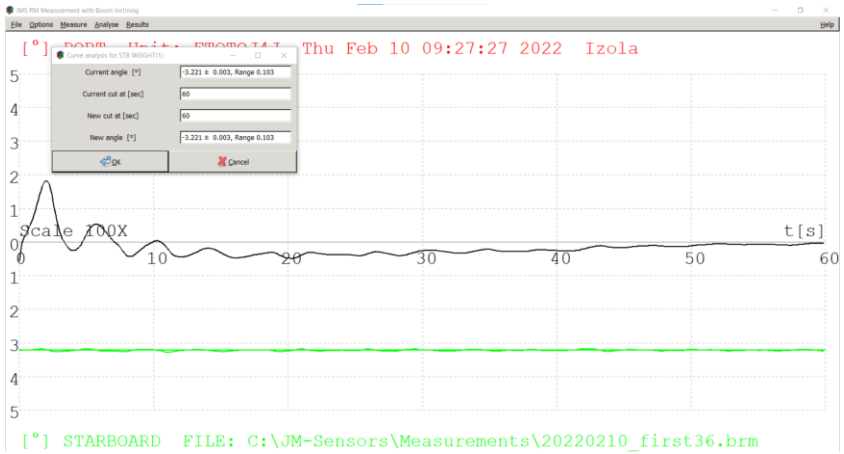
Step 2 – Place the boom outwards and tied it up to the shrouds



Measure the heel with boom only 4 times for 1 minute. In case of any disruption (spike in the line of heel recorded) stop that measurement and repeat it again.

Stability – Boom Inclining

Step 4 – Put the weights on the boom

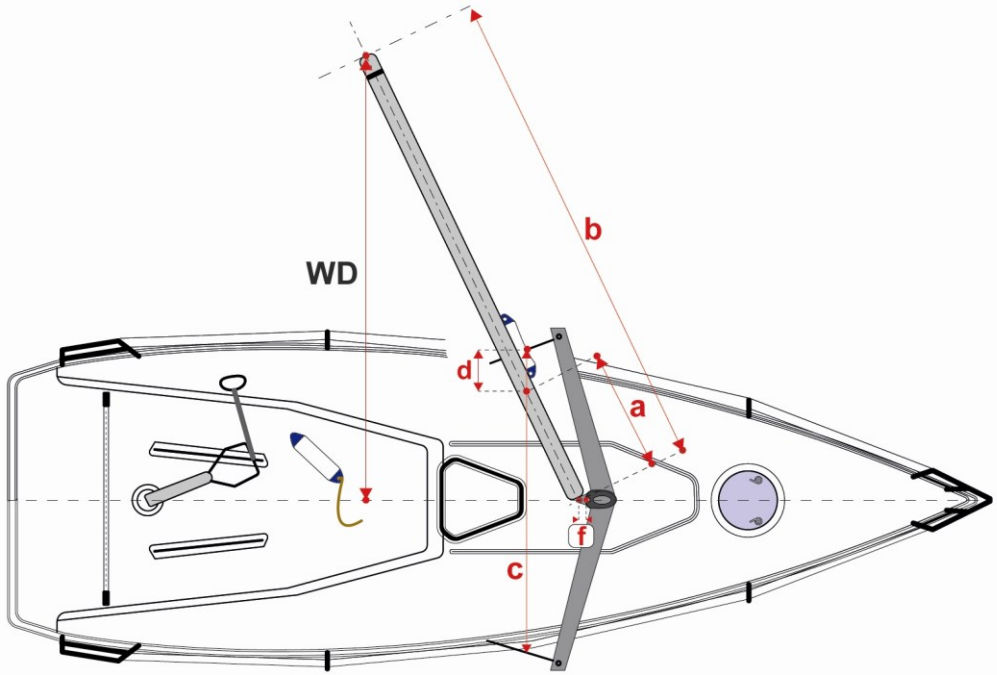


Measure the heel with weight on the boom 4 times for 1 minute. In case of any disruption (spike in the line of heel recorded) stop that measurement and repeat it again.

Stability – Boom Inclining

Step 5 - Version 1 – Calculate WD (weight distance) from the measurements shown below

- Measure the distance between the centers of shrouds (c).
- Mark the point on the boom where the measurement tape intersect boom centerline
- Measure the distance from the shroud to the point marked on the boom centerline (d)
- Measure the distance from the boom rotating point (pin) to the mark on the boom centerline (a)
- Measure the distance from the boom rotating point (pin) to the center of weights suspended on the boom (b)
- Measure the distance from the boom rotating point (pin) to the aft side of the mast (f)
- Calculate WD and LCFD



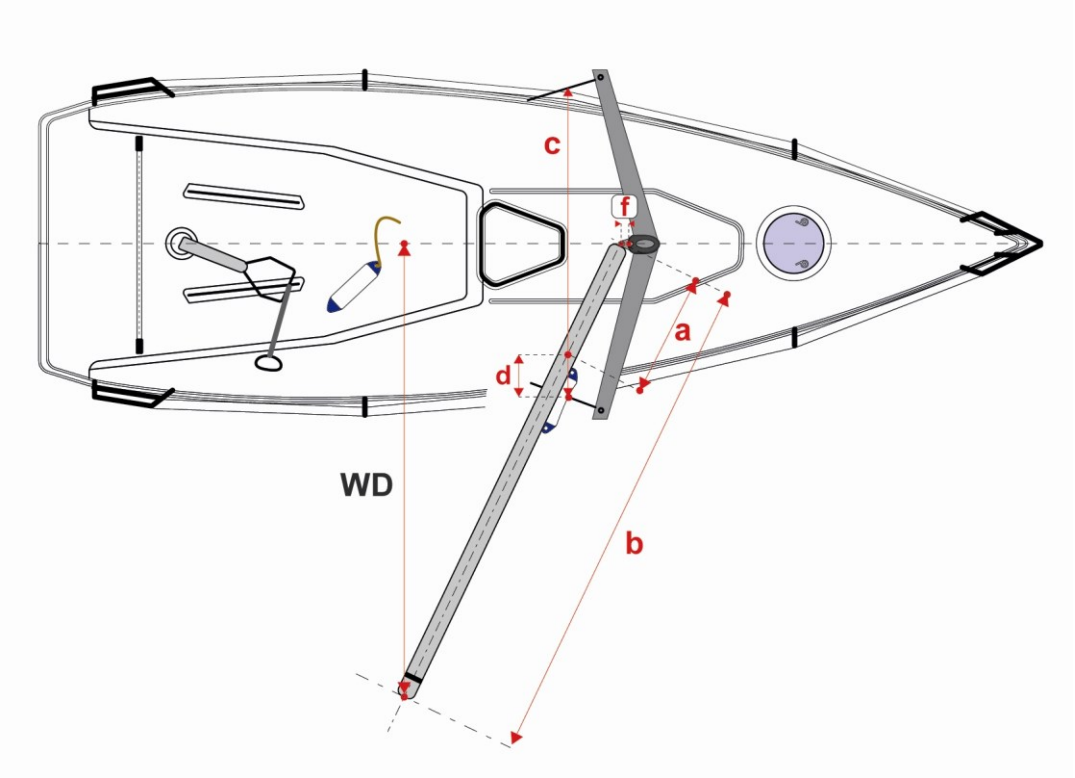
$$WD = \frac{b \cdot \left(\frac{c}{2} - d\right)}{a}$$

$$LCFD = \sqrt{b^2 - WD^2} + f + MDL1 + J + SFJ$$

Stability – Boom Inclining

Step 5 - Version 1 – Repeat the same procedure with the boom on the opposite side

- Measure the distance between the centers of shrouds (c).
- Mark the point on the boom where the measurement tape intersect boom centerline
- Measure the distance from the shroud to the point marked on the boom centerline (d)
- Measure the distance from the boom rotating point (pin) to the mark on the boom centerline (a)
- Measure the distance from the boom rotating point (pin) to the center of weights suspended on the boom (b)
- Measure the distance from the boom rotating point (pin) to the aft side of the mast (f)
- Calculate WD and LCFD



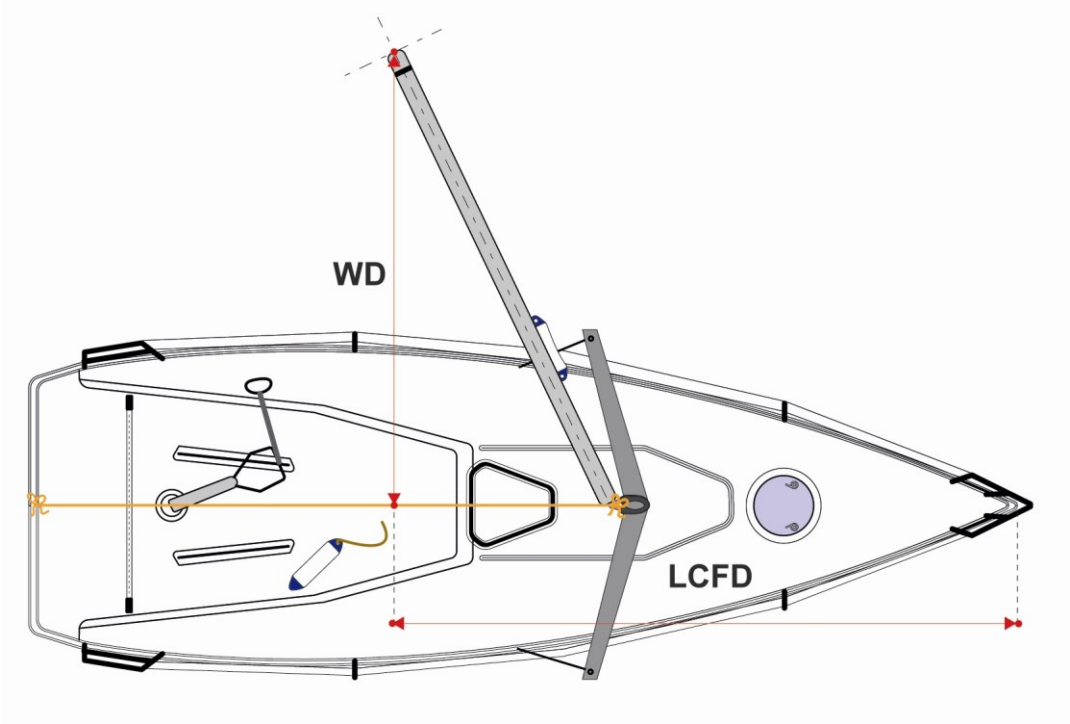
$$WD = \frac{b \cdot \left(\frac{c}{2} - d\right)}{a}$$

$$LCFD = \sqrt{b^2 - WD^2} + f + MDL1 + J + SFJ$$

Stability – Boom Inclining

Step 5 - Version 2 – Measure WD by putting the string from the backstay to the aft side of the mast

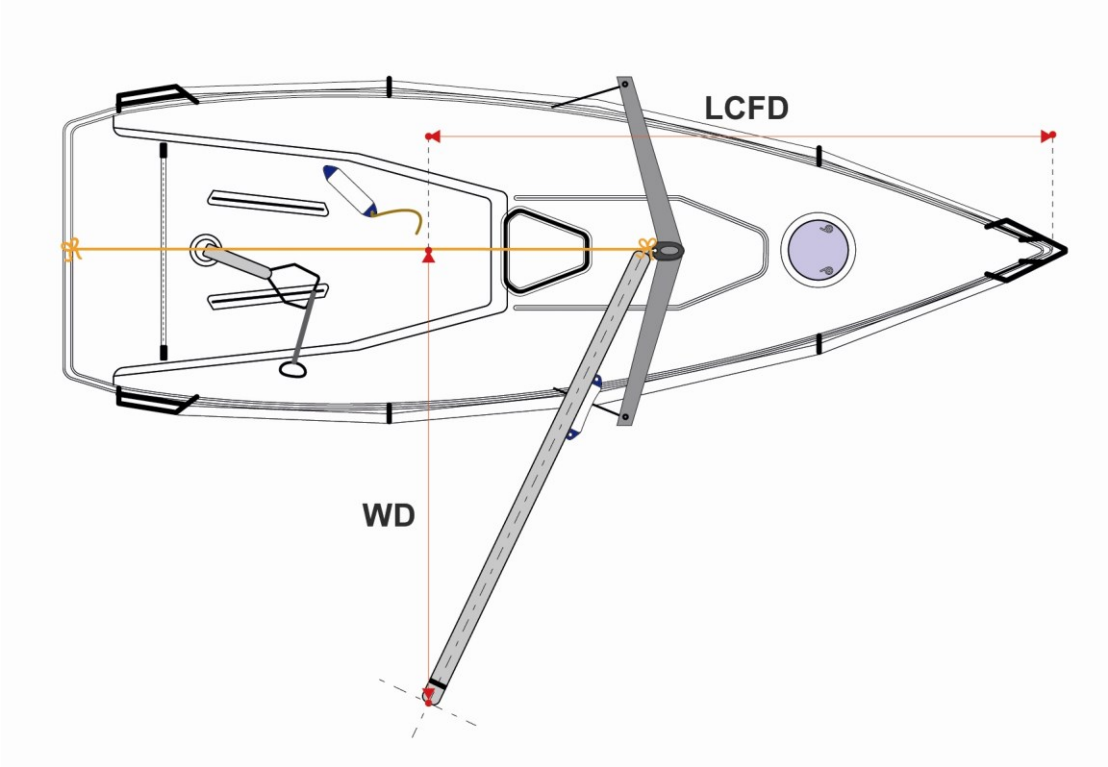
- Put the string at the centerline from the aft side of the mast to the backstay
- Measure the shortest distance from the center of weights suspended to the string.
- Mark on the deck the point where WD measurements is taken on the string
- Measure the distance from the point marked on the deck to the aft side of the mast and add MDL1, J and SFJ to get LCFD



Stability – Boom Inclining

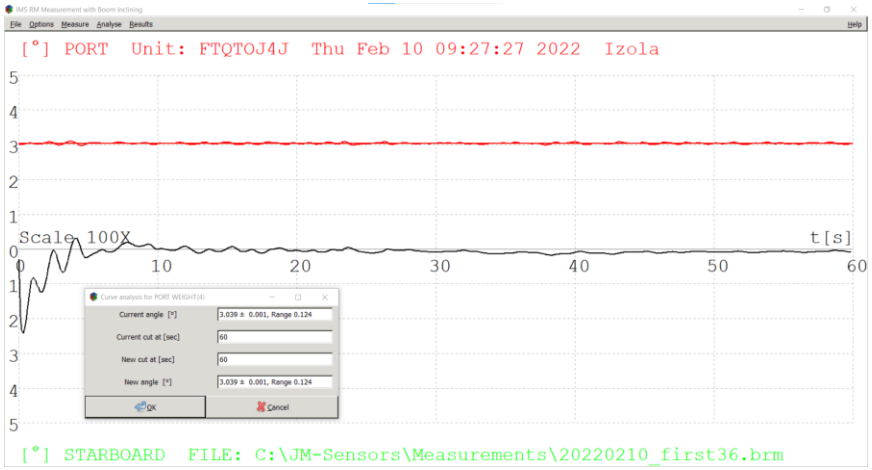
Step 5 - Version 2 – Repeat the same procedure with the boom on the opposite side

- Put the string at the centerline from the aft side of the mast to the backstay
- Measure the shortest distance from the center of weights suspended to the string.
- Mark on the deck the point where WD measurements is taken on the string
- Measure the distance from the point marked on the deck to the aft side of the mast and add MDL1, J and SFJ to get LCFD



Stability – Boom Inclining

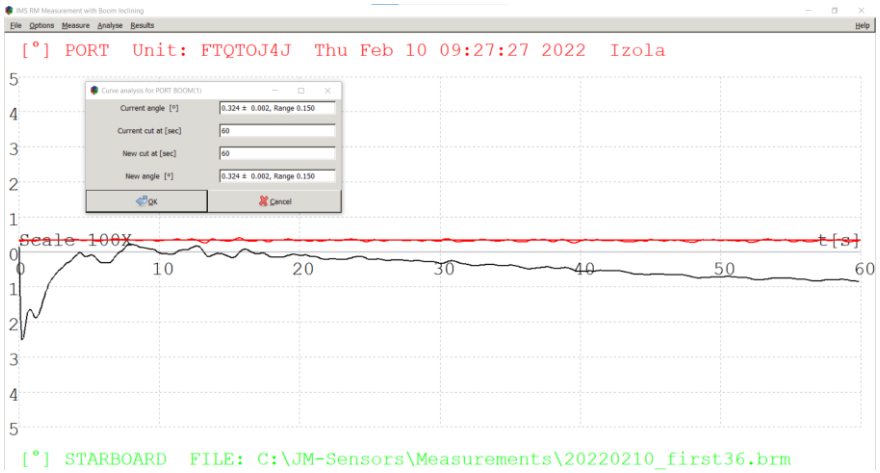
Step 6 – Move the boom with the weight on the opposite side



Measure the heel with weight on the boom 4 times for 1 minute. In case of any disruption (spike in the line of heel recorded) stop that measurement and repeat it again.

Stability – Boom Inclining

Step 7 – Remove the weights from the boom and leave boom only.



Measure the heel with boom only 4 times for 1 minute. In case of any disruption (spike in the line of heel recorded) stop that measurement and repeat it again.

Stability – Boom Inclining

Step 8 – Measure the weights

Stability – Poles inclining

Step 1 – Place electronic inclinometer on the flat surface at the centerline of the boat

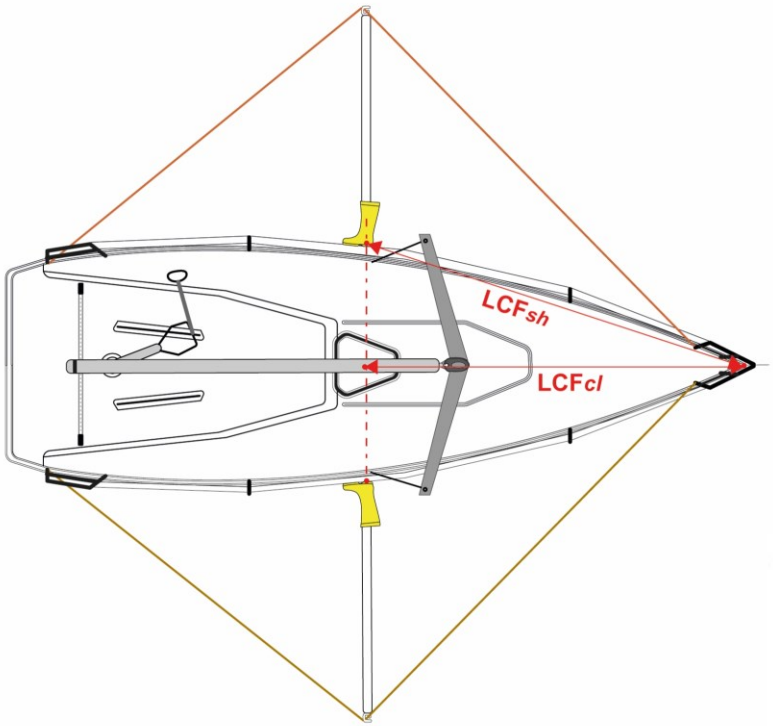
For electronic inclinometer ***GSA*** = 1, ***RSA*** = 1 and ***PLM*** = 9000

If manometer (water level) is used the distance between the gauge and the reservoir ***PLM*** shall be at least 2000 mm. Gauge Surface Area (***GSA***) and Reservoir Surface Area (***RSA***) shall be calculated and recorded.

Measurements is than taken of PDs (in mm) by measuring the difference in height of the water level in gauge

Stability – Poles inclining

Step 2 – Place the poles outwards at the LCF positions

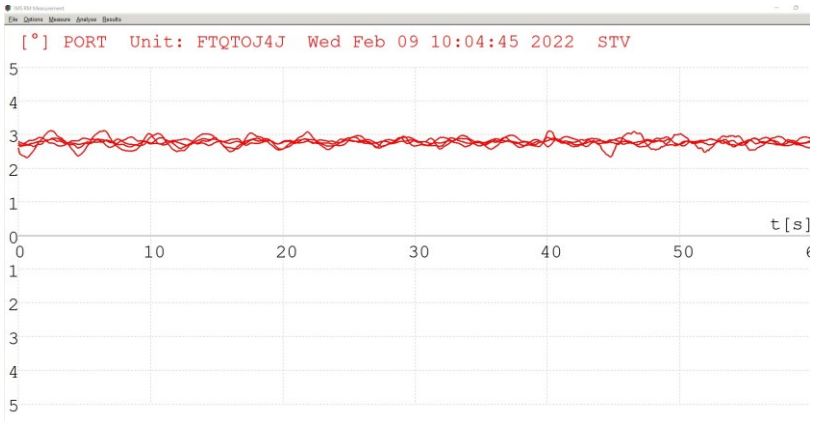


FLOTATION AND STABILITY

Calculation method	**Poles inclining**	SFFP	**0.624**	SAFP	**13.360**
Flotation Date	**29.06.2021**	FFM	**1.466**	FAM	**0.963**
Measurer	**ESP-295**	FF	**1.466**	FA	**0.963**
Comment		LCFcl	**7.358**	LCFsh	**7.680**
		SG	**1.0250**	HBI	**1.427**

Stability – Poles Inclining

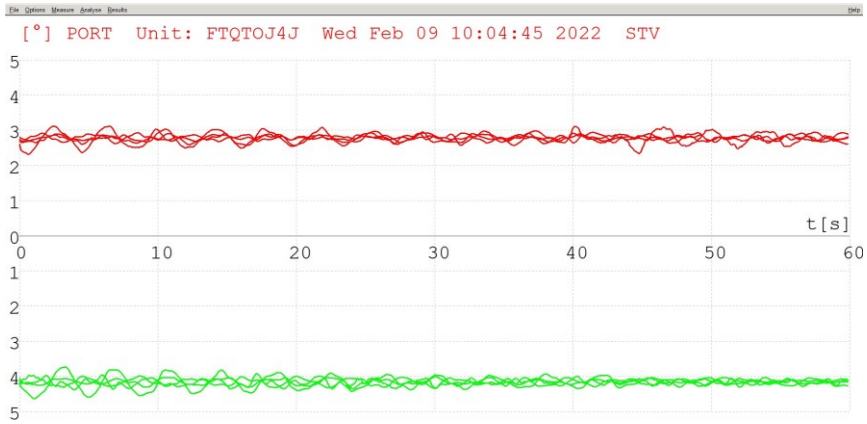
Step 3 – Suspend the weight on the pole on one side



Measure the heel 4 times for 1 minute. In case of any disruption (spike in the line of heel recorded) stop that measurement and repeat it again.

Stability – Poles Inclining

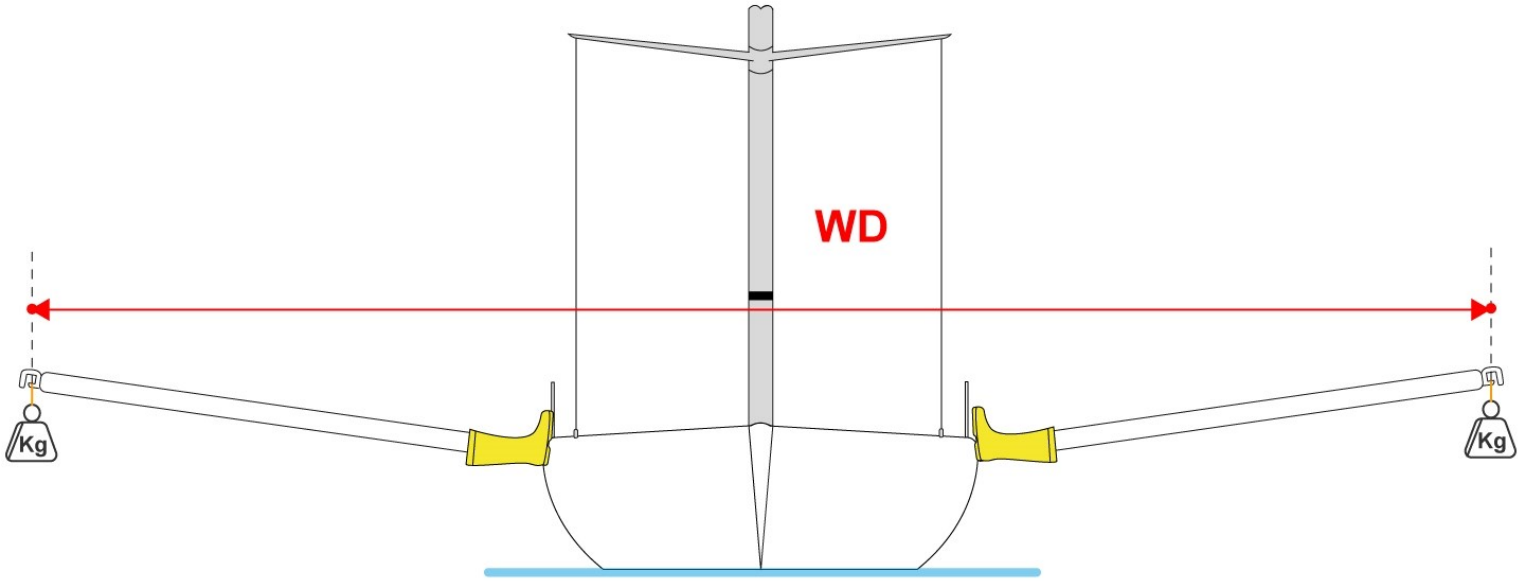
Step 4 – Suspend the weight on the pole on the opposite side



Measure the heel 4 times for 1 minute. In case of any disruption (spike in the line of heel recorded) stop that measurement and repeat it again.

Stability – Poles Inclining

Step 5 – Put half of the weights on the port pole and half of the weight on the starboard poles and measure WD – the distance between the weights



Stability – Poles Inclining

Step 6 – Measure the weights

Stability – Canting keel

- ***LIST*** shall be the average of the port and starboard list angles to the nearest tenth of a degree.

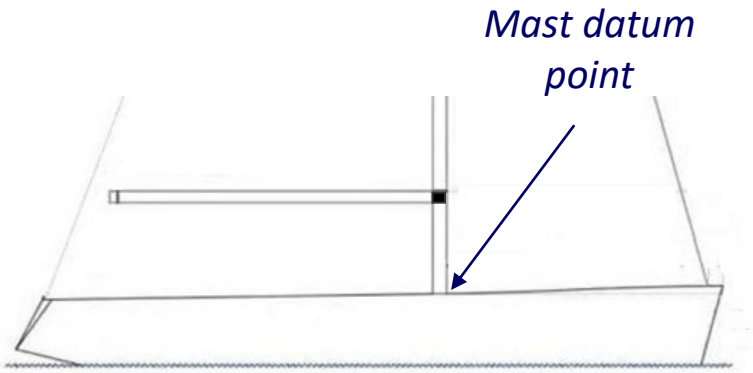
- ***CANT*** shall be the average of the port and starboard cant angles.

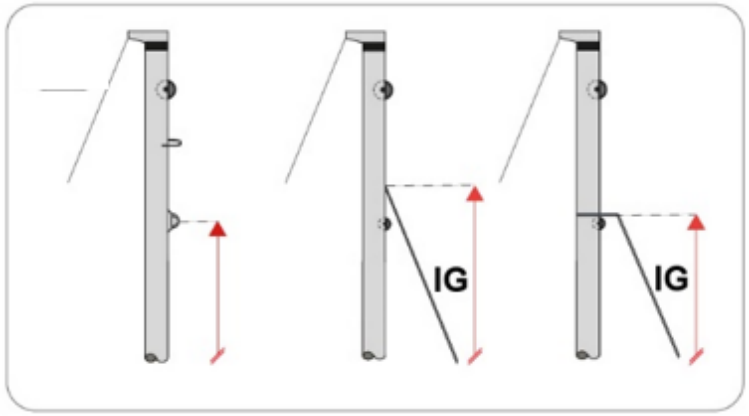
IMS Part F – Rig

Rig

Rig measurements are following the WS Equipment Rules of Sailing (ERS) with only couple of modifications specific for offshore boats:

- Mast datum point is at the sheerline point at the foreside of the mast
- Rigging point is attachment of the forestay to the mast, or the intersection of the extended forestay with the mast structure.





Rigging point

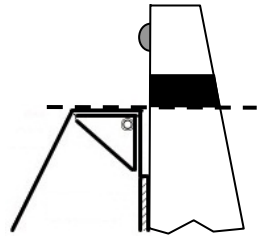
Rig – Mast measurement

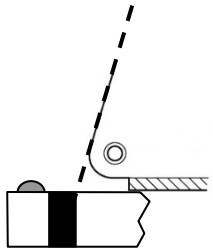
- The black bands (measurement bands) on the mast and on the boom are bands that designate the mainsail limits. They are placed by the owner in a contrasting color on the mast and boom and must be 25 mm wide.

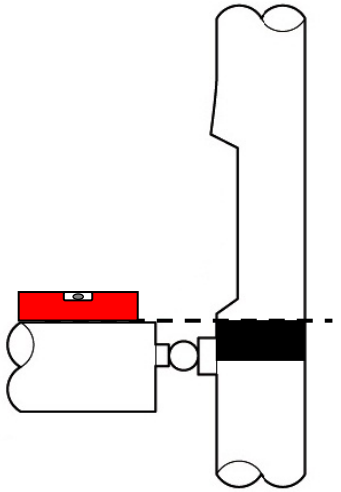
- Upper black band: It is placed on the mast, so that the mainsail head does not exceed it.

- Lower black band: Placed on the mast at the level defined by the upper side of the boom when at 90° to the mast. If the gooseneck is adjustable, then the band shall be placed at its lowest position.

- Outer black band: Placed on the boom so that the mainsail clew does not exceed it.



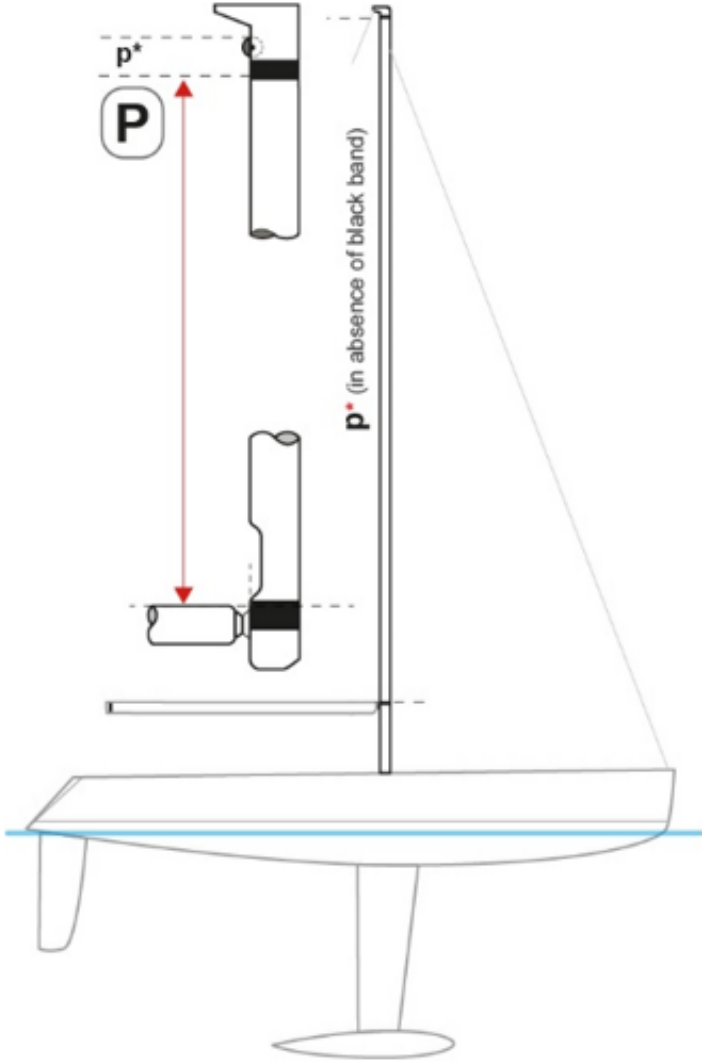




Rig – P measurement

P - distance between upper and lower black band.

- In case of absence of upper black band: measure to the upper part of the main halyard sheave.
- In case of absence of lower black band: measure to the upper side of the boom at 90° to the mast, while the gooseneck is at its lowest position.



Rig – P measurement

So-called „Park-avenue" booms

ERS B1.2 is changed to:

- When a sail is set above the highest points of a main boom or mizzen boom, the extension of the upper edge of the spar shall intersect the mast spar above the mast lower limit mark, with the boom spar on the mast spar centerplane and at 90° to the mast spar.

- When any part of a sail is set below the highest points of a main boom or mizzen boom, the tack point shall be above the mast lower limit mark.

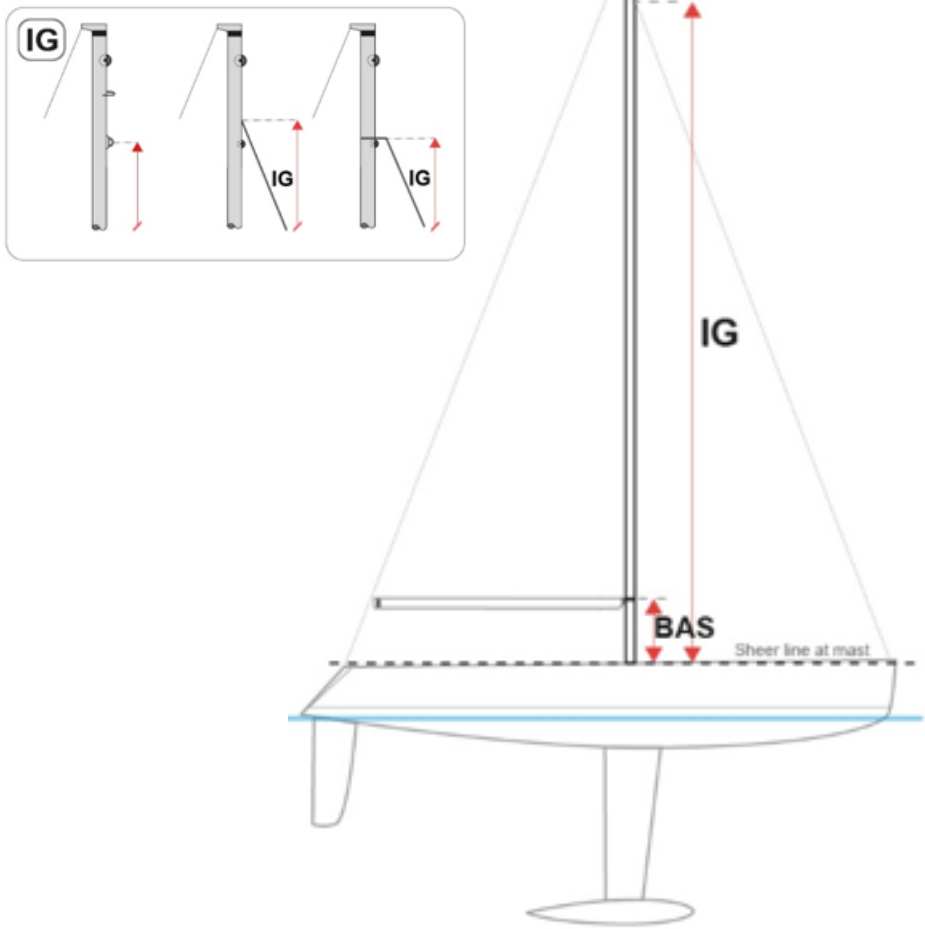
Rig – IG measurement

IG – Forestay Height from the rigging point to the sheerline at the mast.

Rigging point:

- Attachment of the forestay to the mast structure; or
- Intersection of the center line of the forestay with the foreside of the mast where the point of attachment is internal.

Practical measuring method: Measure to the lower black band, then add BAS

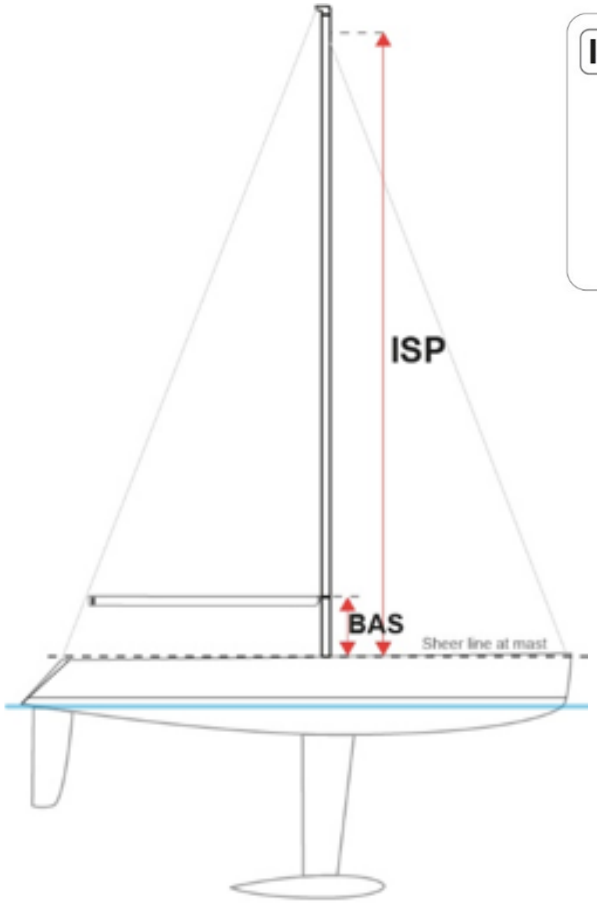


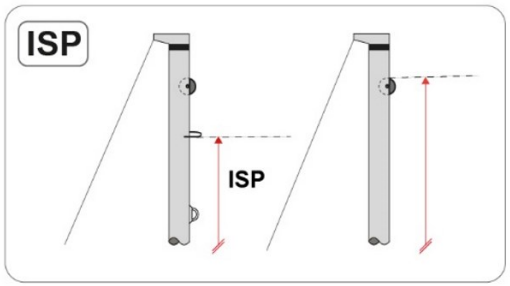
Rig – ISP measurement

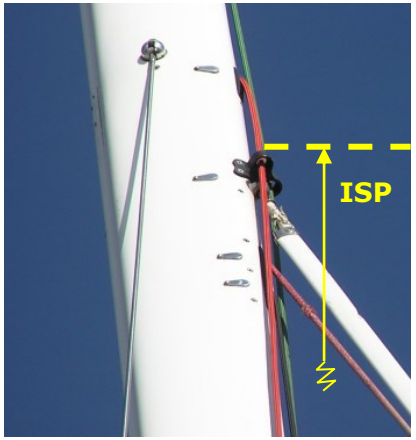
ISP - upper point of spinnaker or headsail set flying hoist to sheerline at the mast.

- Upper side of the halyard sheave or
- Lower side of a halyard ring, if one exists

Practical measuring method: Measure to the lower black band, then add BAS





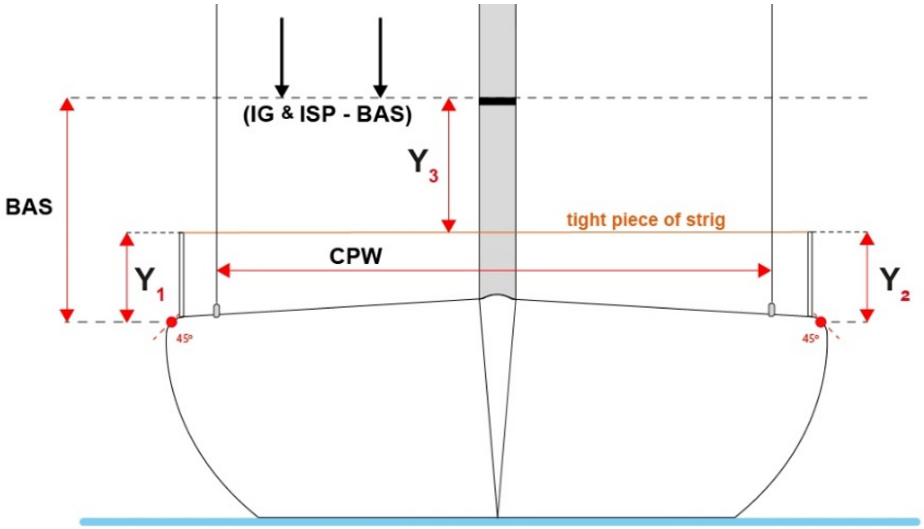


Rig – BAS measurement

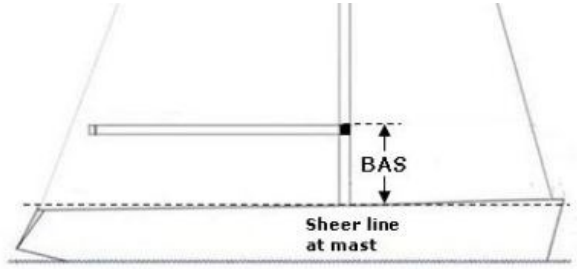
BAS **-** lower black band to the sheerline at the mast.

- Place the string across the lifelines perpendicular to the centerline touching the foreside of the mast
- Measure the height from the string to the sheer point at each side (Y1 and Y2)
- Measures the distance from the string to the lower black band
- Calculate BAS as follows:

$$BAS = Y3 + \frac{Y1 + Y2}{2}$$



Rig – BAS measurement



BAS - lower black band to the sheerline at the mast.

Alternative measuring method:

- Mark on the mast a point at ***500 mm*** below the lower mark.
- Measure distances from the sheer point to that point and to the lower mark.

$$BAS = z^2 + a^2 - b^2 \quad **$$

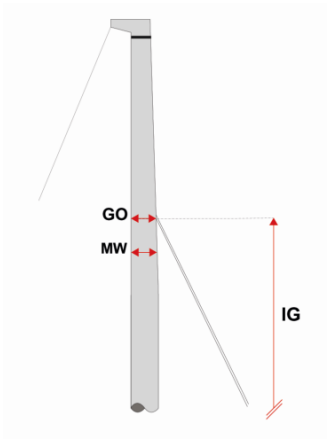
- Repeat the same on both sides and calculate average.

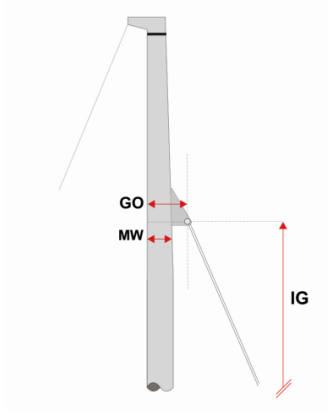
*** Only when values are in meters, and only if z=0.5m, exactly.*

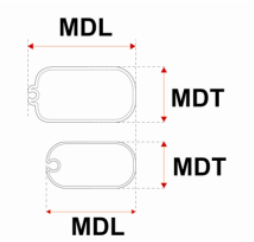
Otherwise, $BAS = \frac{z^2+a^2-b^2}{2*z}$

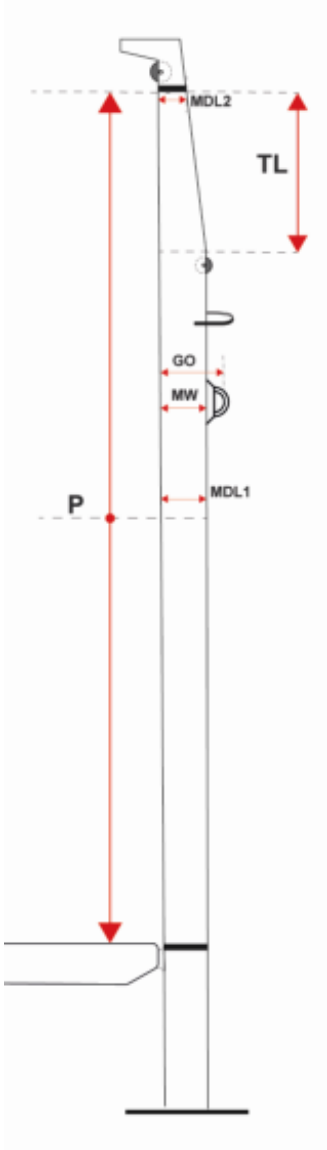
Rig – Mast profiles

- **MDL1 -** maximum longitudinal mast cross section above 0.5·P from the lower black band
- **MDT1** - maximum transverse mast cross section above 0.5·P from the lower black band
- **MDL2** - minimum longitudinal mast cross section below the upper black band
- **MDT2** - minimum transverse mast cross section below the upper black band
- **TL** - distance from the point where the mast begins to taper to the upper black band
- **MW** - longitudinal mast cross section at the forestay's upper rigging point
- **GO** - longitudinal distance from forestay's upper rigging point to the aft side of the mast
- **FSD** - the maximum cross section of the forestay (if the forestay is wire, then FSD=0)









Rig – Boom measurement

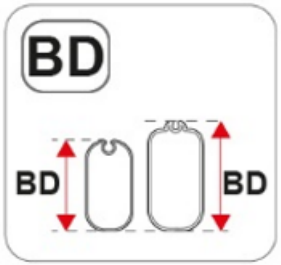
E **-** distance between aft side of the mast and the outer black band.

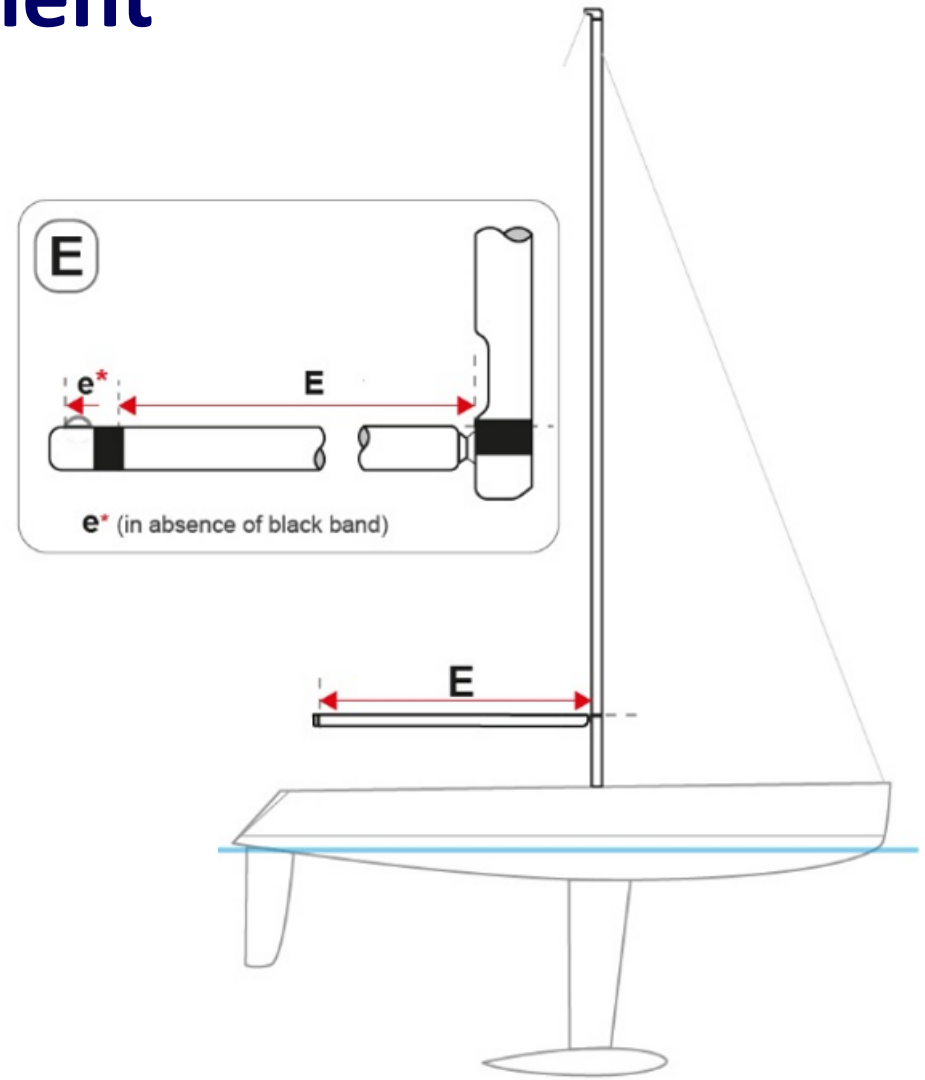
- In case of absence of outer black band: Measure the distance on the boom as far aft as the mainsail clew can reach (any mainsail)

E.g. 1: *At the aft side of the outhaul sheave*

E.g. 2: *In case there is a track, it must be positioned as aft as possible*

BD - maximum vertical boom cross section.

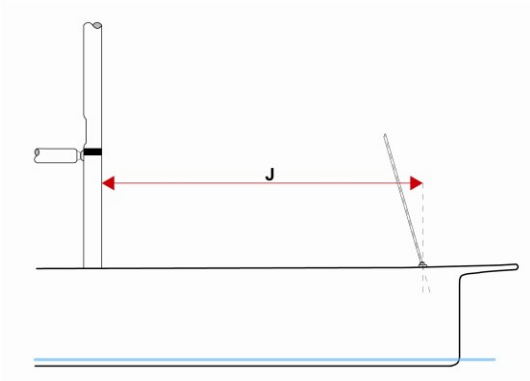


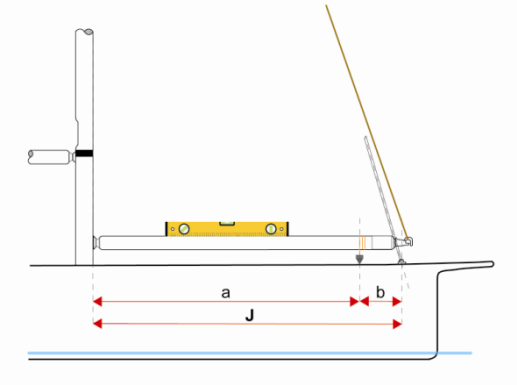


Rig – J measurement

J - from the fore side of the mast to the intersection of the forestay's centerline and the deck.

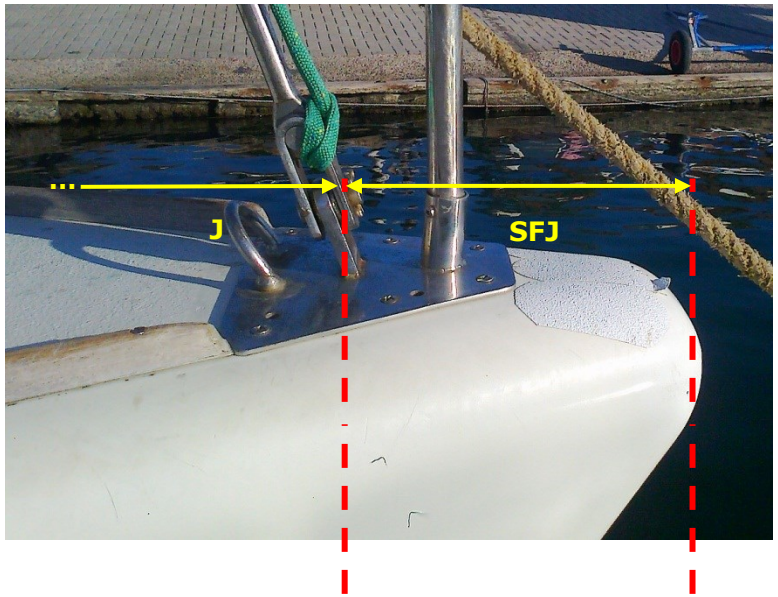
- Place the spinnaker pole in its normal position horizontally and attach it to the forestay, e.g. with a strap
- Hang a plumb line from the pole exactly over the end point of ***J*** on the deck.
- Measure ***J*** along the pole, from the fore side of the mast to the plumb line.
- If the plumb line does not easily reach the fore point of measurement of ***J***, then mark a point on the deck and take the measurement in two parts.

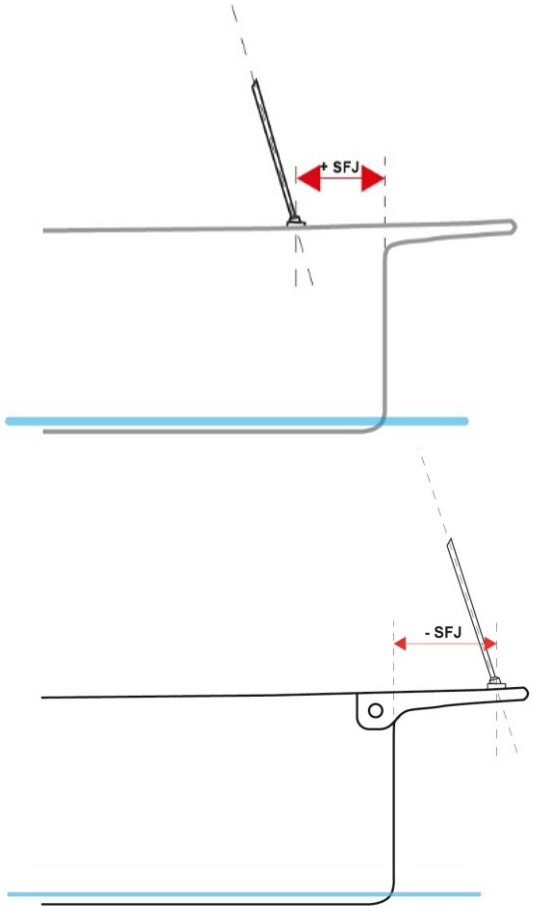




Rig – SFJ measurement

SFJ - from the end of J to the bow



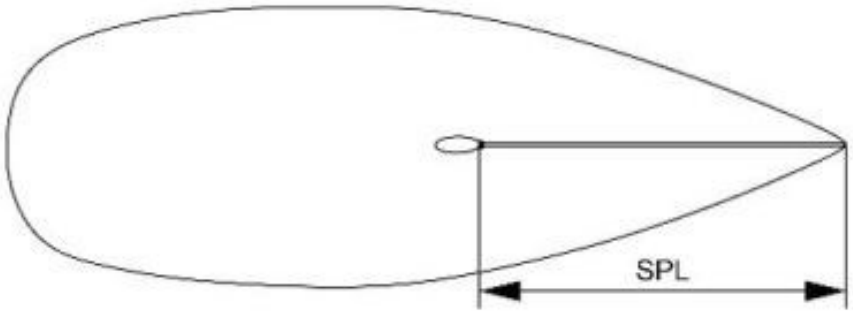


Notes:

- The bow does not include any fittings, box construction, bowsprit etc.
- If the forestay's deck rigging point is forward of the bow, then SFJ<0

Rig – Spinnaker pole

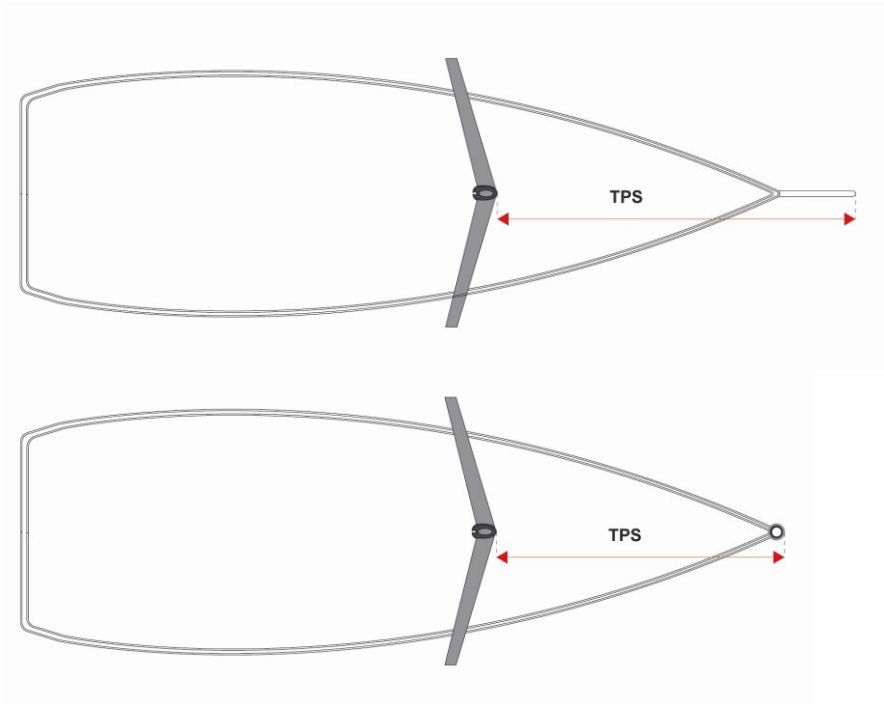
SPL - spinnaker pole length measured from the forward face of the mast spar, ignoring any fittings and tracks, on or near the centerline of the boat, to the extremity of the spinnaker pole.



Rig – Tacking point of spinnaker or HSF

TPS **-** the greatest horizontal distance from the forward face of the mast spar, ignoring any fittings and tracks at its lowest point above the deck or coach roof to the foremost of:

- the point of attachment of the tacking point of any spinnaker or any headsail set flying, or
- the extremity of the bowsprit.



Rig – Headsail Set Flying Foretriangles

- If there is any other point of attachment of the tacking point of a headsail set flying, between the bowsprit outer point and the mast, respective distances from these points to the mast shall be recorded as TPS1, TPS2, etc … from the foremost point to the mast.

- If there is any lower spinnaker halyard or the halyard of the headsail set flying these shall be recorded as ISP1, ISP2, etc … from the top down."

Rig – Whisker pole length

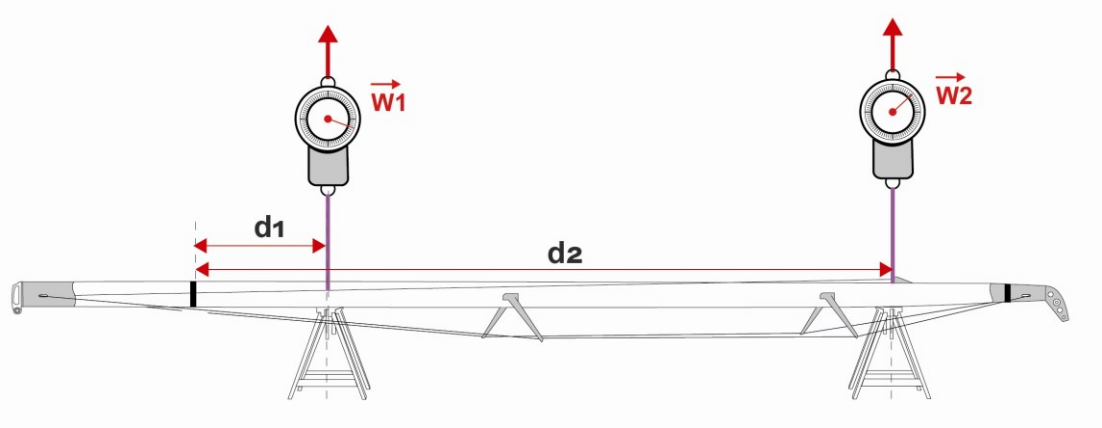
WPL – the horizontal distance from the mast spar, ignoring any fittings and tracks, to the extremity of the whisker pole.

Rig – Mast weight

- **Optional for all masts** (but advisable for carbon spars)

- **Small/light masts:**
  - Weigh at one point
  - Measure MWT and MCG (directly)

- **Large/heavy masts:**
  - Weigh at two points
  - Measure W1, W2, d1, d2
  - Calculate MWT and MCG



Note: If lower black band lies between weighing points, then d1 < 0.

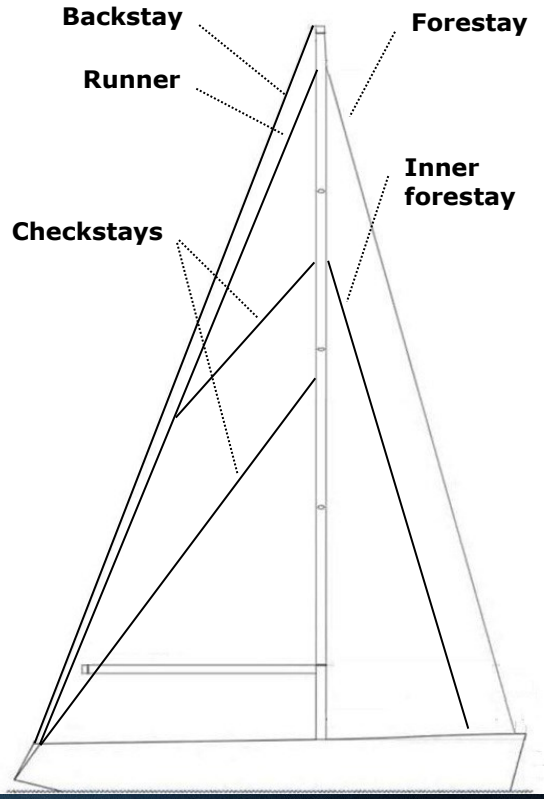
$$MWT = W1 + W2$$

$$MCG = \frac{W1 \cdot d1 + W2 \cdot d2}{W1 + W2}$$

- Included are: Forestay, backstay, spreaders, jumpers, shrouds, chain plates, runners, lights, antennae, wiring (and other permanently fitted components), with all slack stretched down and secured with light material (such as tape) at the bottom of the mast
- Excluded are: Checkstays, halyards (they may be replaced with light messengers of max. 4mm diam., 15 g/m weight), boom vang, reefing lines

Rig – Other details

- **Spreaders:** Number of pairs
- **Runners (and checkstays):** Number of pairs
  - Runners: they are rigged near the upper rigging point of the forestay *(but a backstay that enters the mast below the upper limit mark, but it is attached in the internal structure above the upper limit mark, shall not be counted as a "runner", IMS F9.5)*
  - Checkstays: they are rigged below the upper rigging point of the forestay *(but checkstays that are at a distance of 10% of IG from the highest runner are excluded, IMS F9.5)*
- **Inner forestay:**
  - adjustable
  - fixed
  - none
- **Forestay tension:**
  - aft = adjustable uppermost backstay
  - fwd = adjustable forestay
  - aft & fwd = adjustable backstay & forestay
  - fixed = fixed uppermost backstay & forestay



Rig – Other details

- **Fiber rigging**: If any part of the standing rigging is made of any fiber

- **Mainsail furler**: If there is mainsail furler in the mast

- **Headsail furler:** If there is a headsail furler on a fixed forestay used in association with only one headsail, which has HLP greater than 110% of J

- **Non-circular rigging**: If the standing rigging has any non-circular sections, except at the intersections with the spreaders and the deck

- **Mast foot adjustment (mast jack pump)**: If there is a possibility to adjust the base of the mast while racing, this shall be declared by the owner

- **Non-manual power:**
  - SHEETS: when non-manual power is used for adjusting clew of a sail or a boom
  - RIG: when non-manual power is used for adjusting backstay, vang or outhaul
  - YES: what include a) and b) above used together
  - NO: when there is no non-manual power used

IMS Part G – Sails

Sails

- Sails are measured completely in accordance with the WS Equipment Rules of Sailing (ERS).

- The following type of sails can be measured:
  - Mainsail
  - Mizzen
  - Headsails (including headsails set flying)
  - Mizzen staysail
  - Spinnakers (including symmetric and asymmetric)

- Other sail terms, such as gennaker, drifter, wind seeker, staysail, etc … belong to one of the above categories, according to their dimensions.

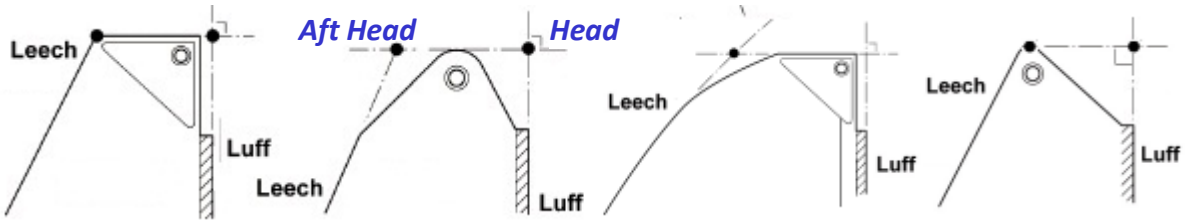
Sails

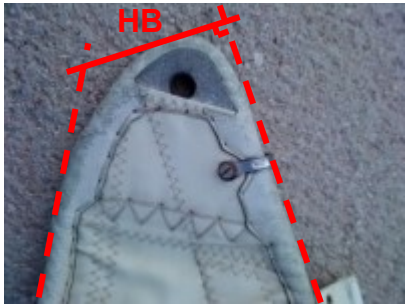
When measured sails shall be:

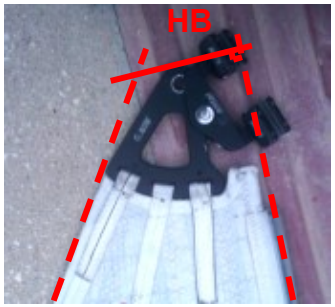
- completely dry
- on a flat surface
- with just sufficient tension to remove any wrinkles across the line of the measurement being taken.
- in normal temperature
- without battens
- permanently attached devices (clips, cars etc…) along an edge of a sail (i.e., luff) are not taken into account when measuring the dimensions of the sail.
- permanently attached extensions, straps etc… at the corners of a headsail (usually the head or the tack) are not taken into account when measuring the sail.

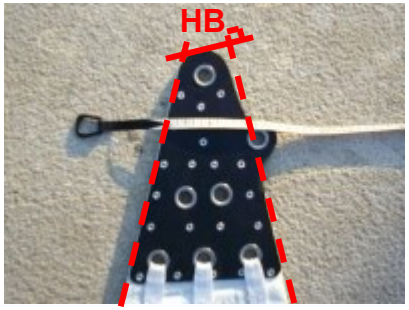
Sails – Mainsail and mizzen

- **Head point:** Perpendicular to the luff from the highest point of the sail

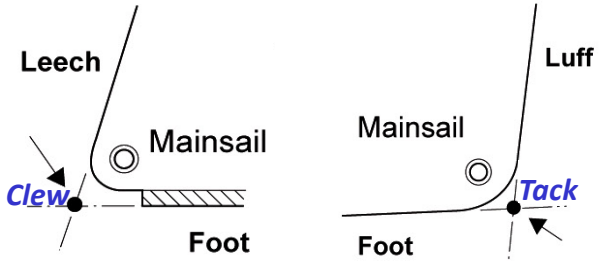


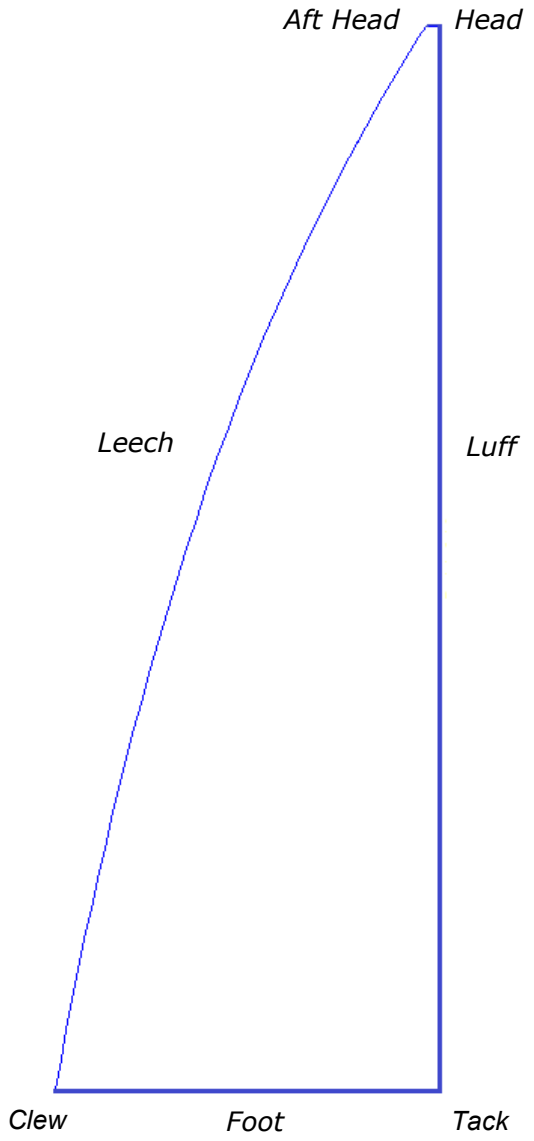






- **Tack point:** Intersection of luff and foot
- **Clew point:** Intersection of foot and leech





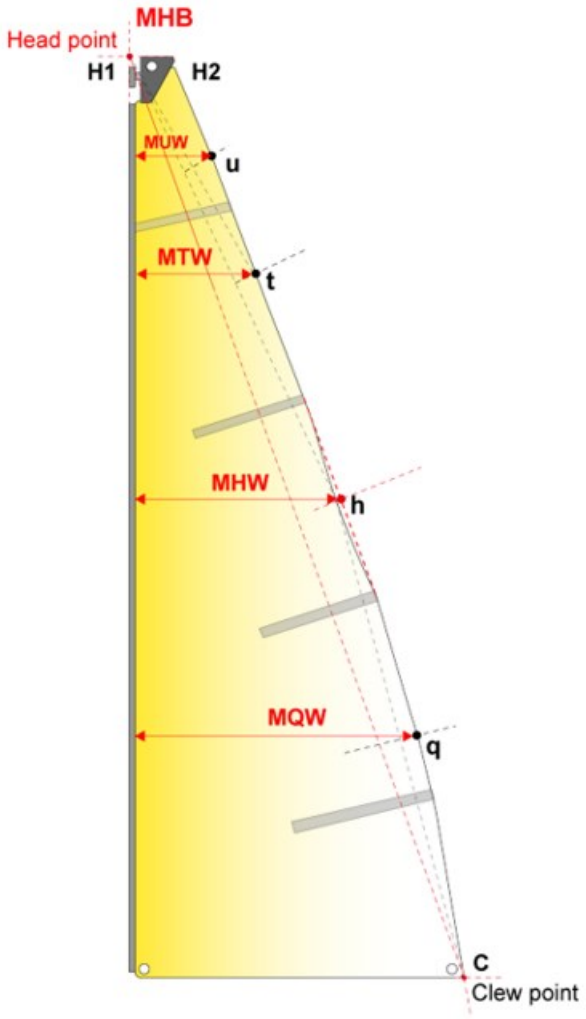
Sails – Mainsail and mizzen

Leech points

- Fold **H1** over **C** to get **h**
- Fold **H1** over **h** to get **t**
- Fold **H1** over **t** to get **u**
- Fold **C** over **h** to get **q**

Mainsail measurements (shortest distances)

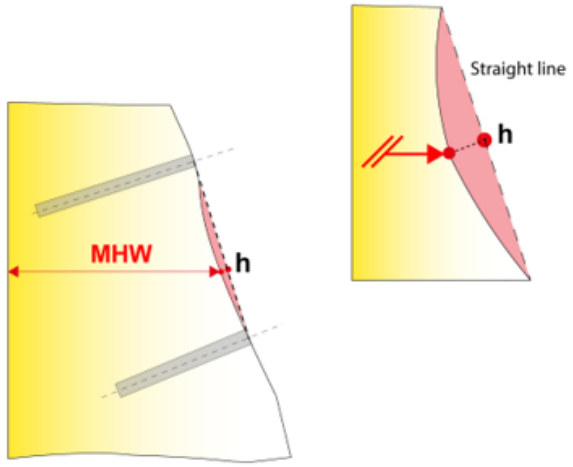
- **MHB:** from the aft head point (H2) to the luff
- **MUW:** from 7/8 leech point (u) to the luff
- **MTW:** from 3/4 leech point (t) to the luff
- **MHW:** from 1/2 leech point (h) to the luff
- **MQW:** from 1/4 leech point (q) to the luff



Sails – Mainsail and mizzen

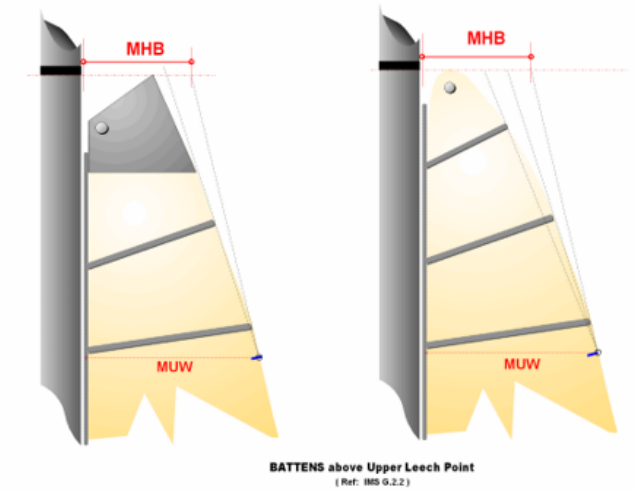
Leech hollows

- When there are battens out of the leech points, straight line shall be taken on the leech between two adjacent battens
- The shortest distance from the leech points to that straight line shall be measured and added to the respective mainsail width measurement

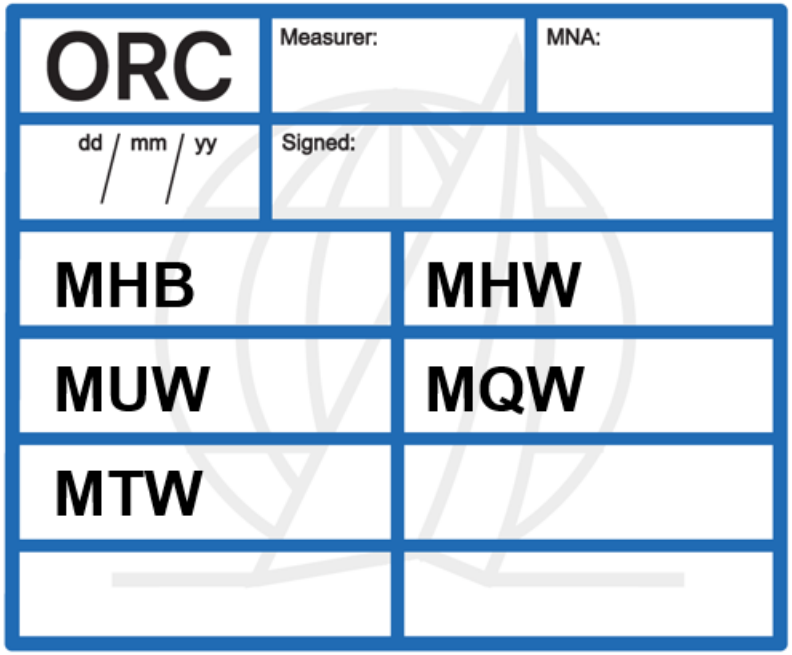


Batten above 7/8 leech point

- If the centerline of a batten pocket is situated above the 7/8 leech point, a straight line shall be taken through 7/8 leech point and the centerline of the lowest batten on the leech situated above this point.
- The intersection of that straight line and the line through the head point at 90º to the luff shall be taken as the point from which MHB shall be measured to the head point.



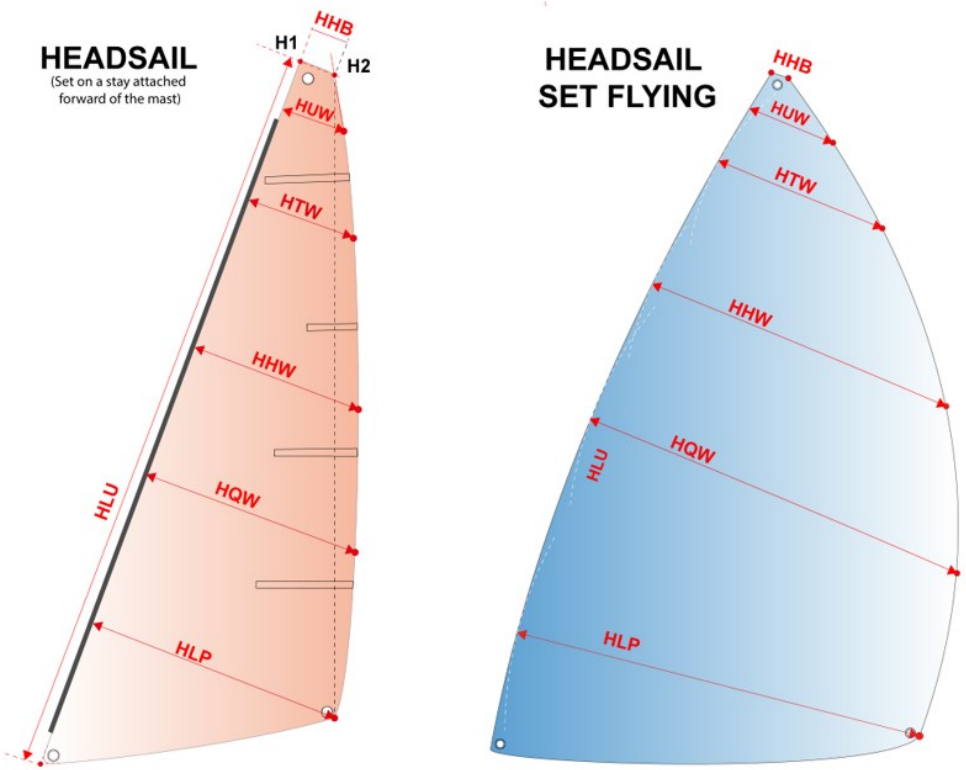
Sails – Mainsail and mizzen



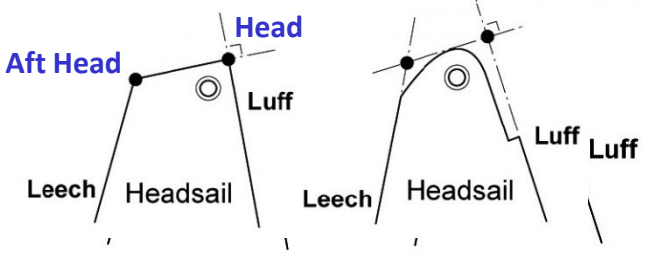
Measurement stamp (at the head)

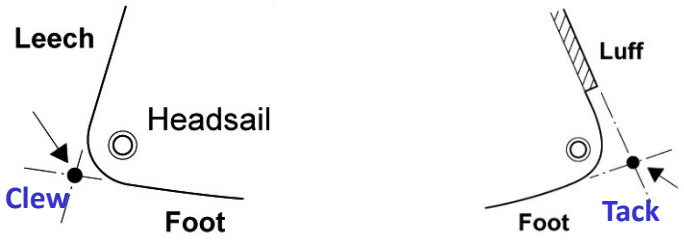
Sails – Headsails

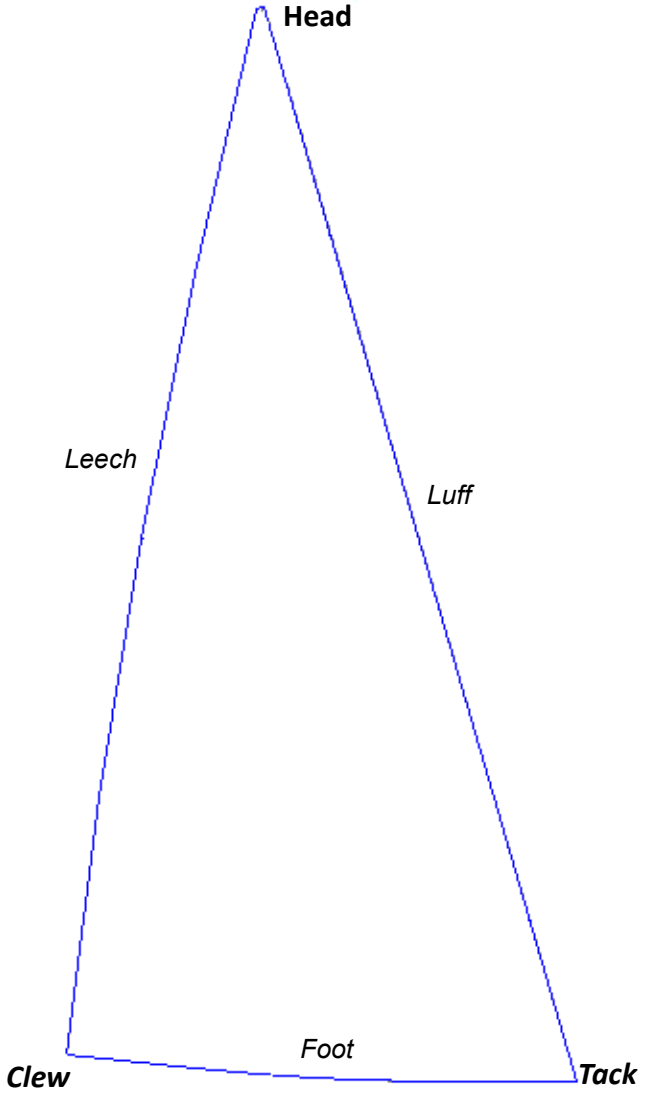
- **Half width** shall be less than 75% of the **foot length**.
- Headsails can be set **on the forestay** or **set flying**.
- Headsails may have battens.



Sails – Headsails







- **Head point:** Perpendicular to the luff from the highest point of the sail
- **Tack point:** Intersection of luff and foot
- **Clew point:** Intersection of foot and leech

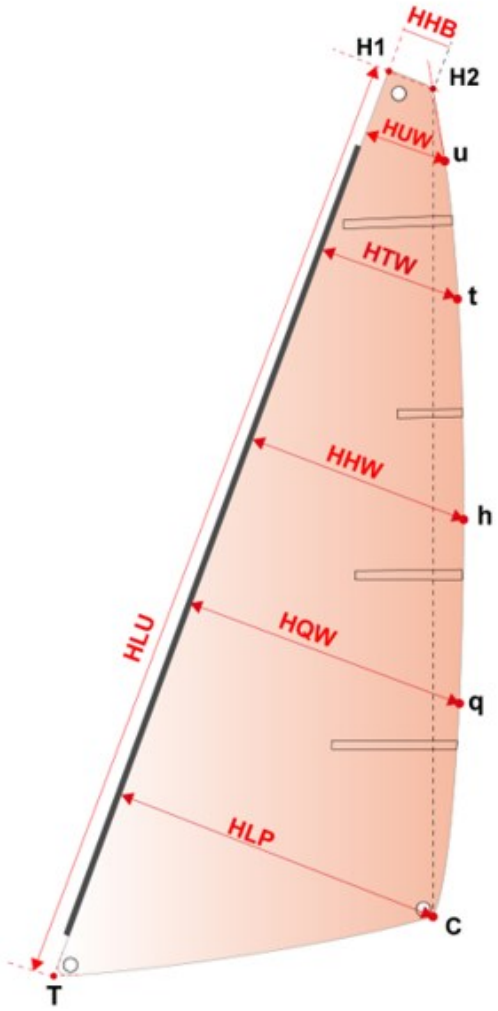
Sails – Headsails

Leech points

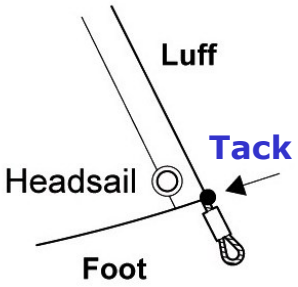
- Fold **H1** over **C** to get **h**
- Fold **H1** over **h** to get **t**
- Fold **H1** over **t** to get **u**
- Fold **C** over **h** to get **q**

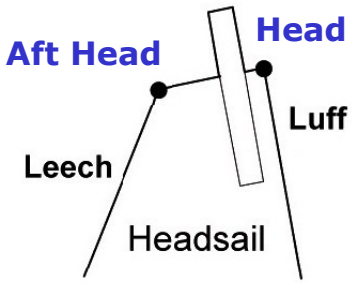
Headsail measurements (shortest distances)

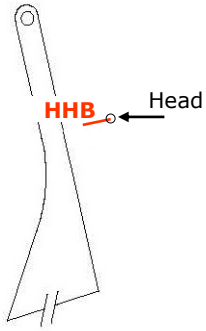
- **HHB:** from the aft head point (H2) to the luff
- **HUW:** from 7/8 leech point (u) to the luff
- **HTW:** from 3/4 leech point (t) to the luff
- **HHW:** from 1/2 leech point (h) to the luff
- **HQW:** from 1/4 leech point (q) to the luff
- **HLP** from clew point (C) to the luff
- **HLU** from the tack point (C) to the head point (H)
- Flag for **battens**: Yes / No
- Flag for **set flying**: Yes / No



Sails – Headsails







Extensions, attachments or any luff tape at the corners of headsails are not taken into account.

In order to flatten the sail and measure a dimension correctly, fold (flake) the sail lengthwise parallel to the dimension to be measured

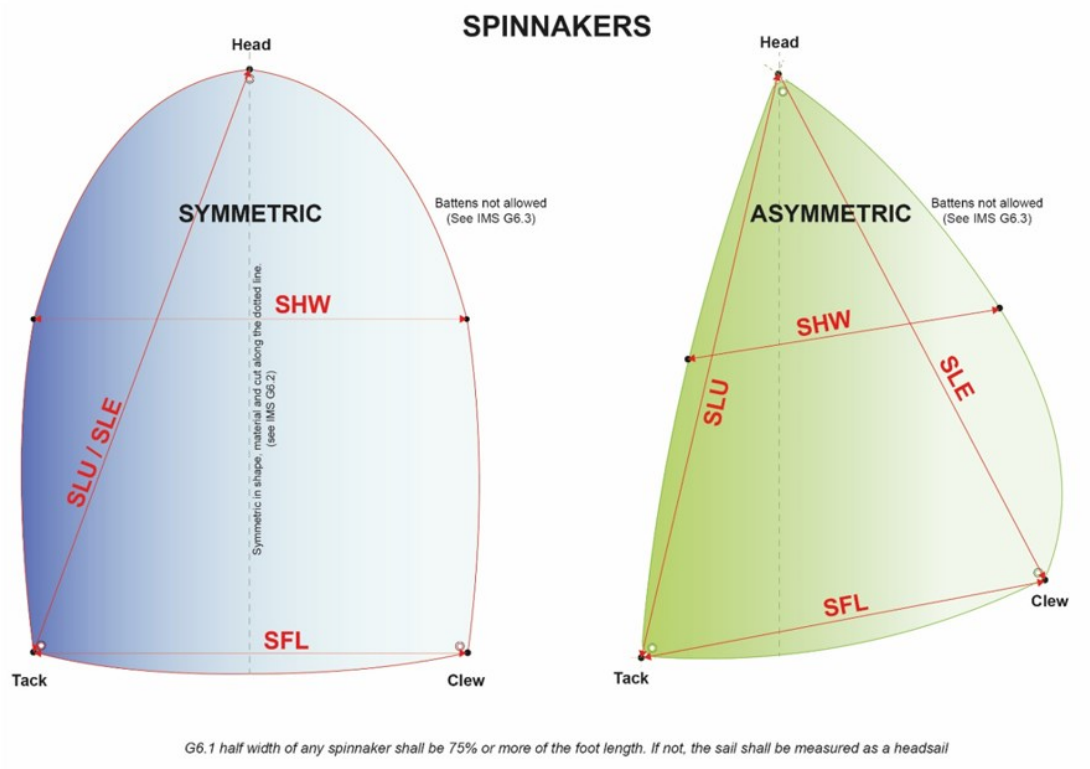
Sails – Headsails

ORC	Measurer:	MNA:
dd / mm / yy	Signed:	
HHB	HQW	
HUW	HLP	
HTW	HLU	
HHW		

Measurement stamp (at the head, except for the sails where the head may not easily be inspected (like furling sails) in which case, the stamp shall be places at the clew.)

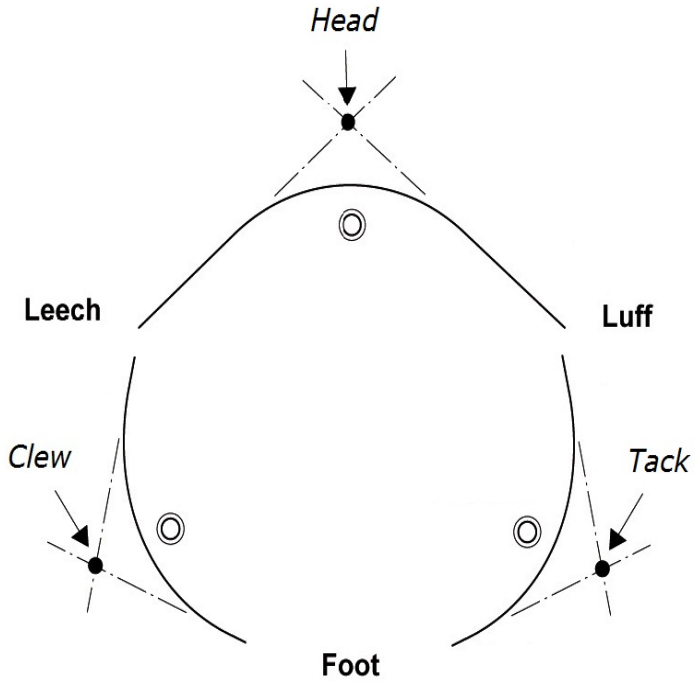
Sails – Spinnakers

- **Symmetric spinnaker**
  Symmetric in shape, material and cut
- **Asymmetric spinnaker**
  A spinnaker which is not symmetric



Sails – Spinnakers

- **Head point:** Intersection of leech and luff
- **Tack point:** Intersection of luff and foot
- **Clew point:** Intersection of foot and leech



Sails – Symmetric Spinnakers

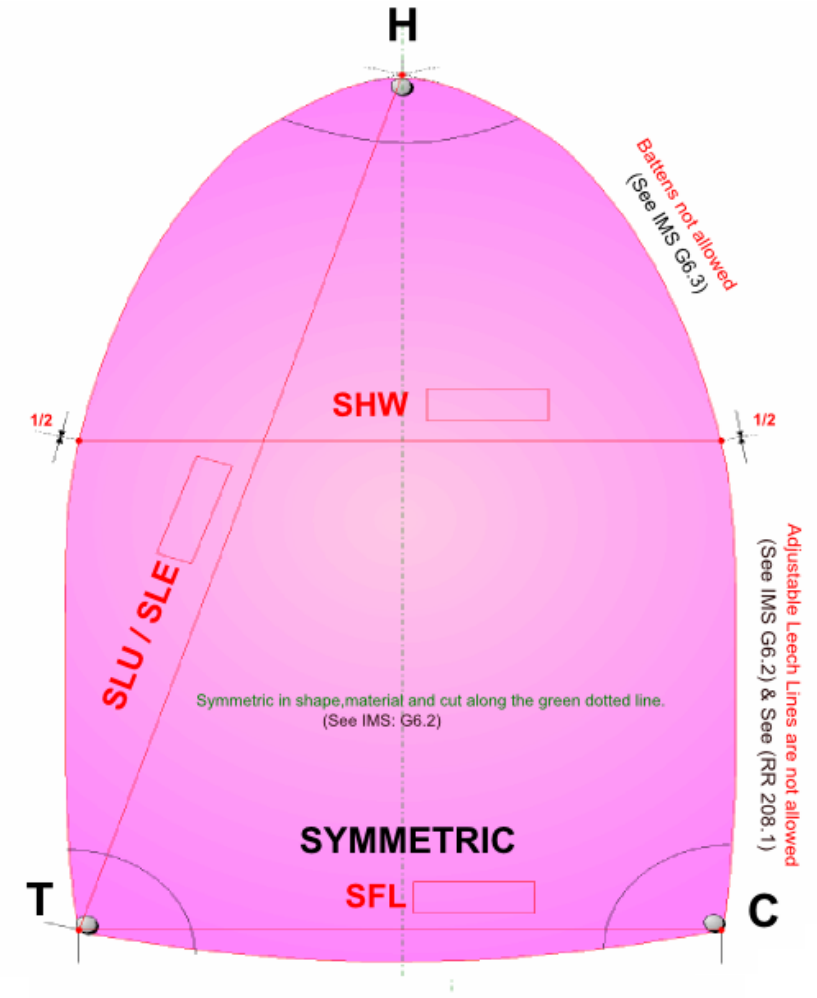
Leech and Luff points

- Fold Head **(H)** over Clew **(C)** to get **half leech point**
- Fold Head **(H)** over Tack **(T)** to get **half luff point**

Spinnaker measurements (shortest distances)

- **SLU:** from the **head point** to the **tack point**
- **SLE:** from the **head point** to the **clew point**
- **SHW:** from the **half leech point** to the half **luff point**
- **SFL:** from the **tack point** to the **clew point**

- Check that SHW/SFL ≥ 0.75.
- If not, measure the sail as a headsail



Sails – Asymmetric spinnaker

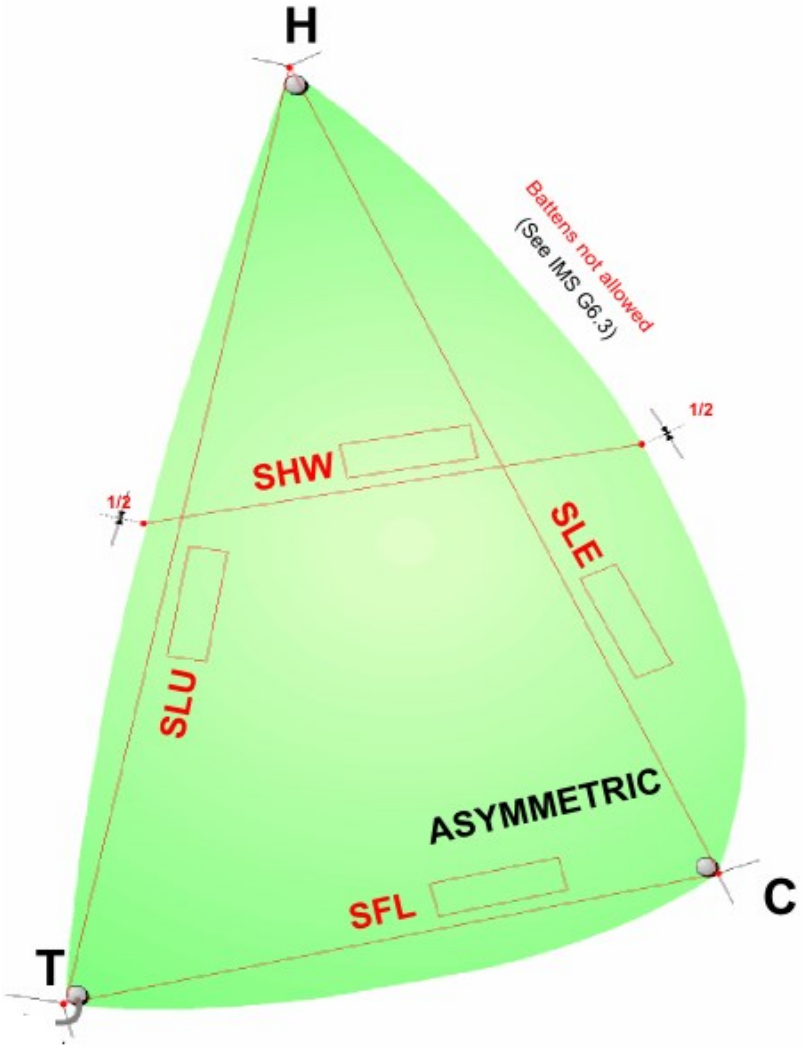
Leech and Luff points

- Fold Head **(H)** over Clew **(C)** to get **half leech point**
- Fold Head **(H)** over Tack **(T)** to get **half luff point**

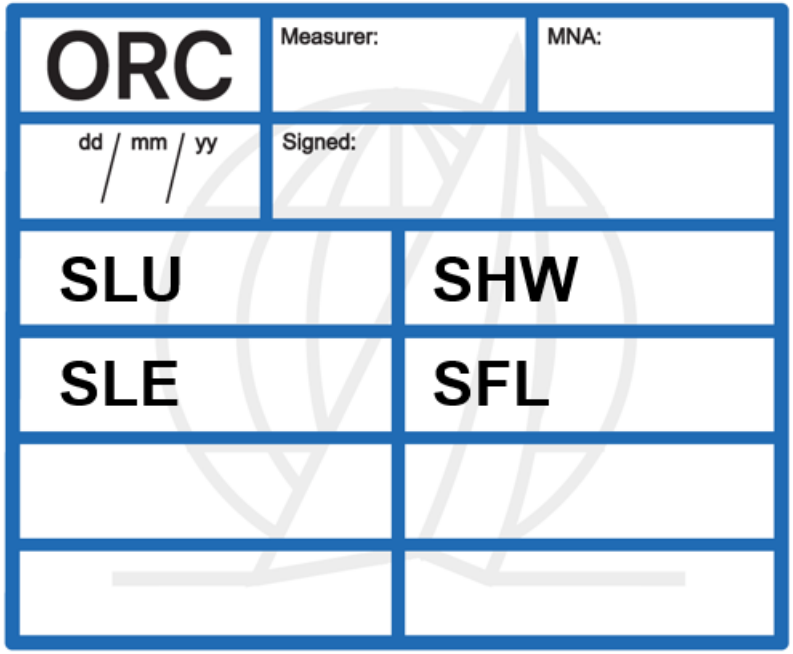
Spinnaker measurements (shortest distances)

- **SLU:** from the **head point** to the **tack point**
- **SLE:** from the **head point** to the **clew point**
- **SHW:** from the **half leech point** to the half **luff point**
- **SFL:** from the **tack point** to the **clew point**

- Check that SHW/SFL ≥ 0.75.
- If not, measure the sail as a headsail



Sails – Spinnakers



Measurement stamp (at the head)

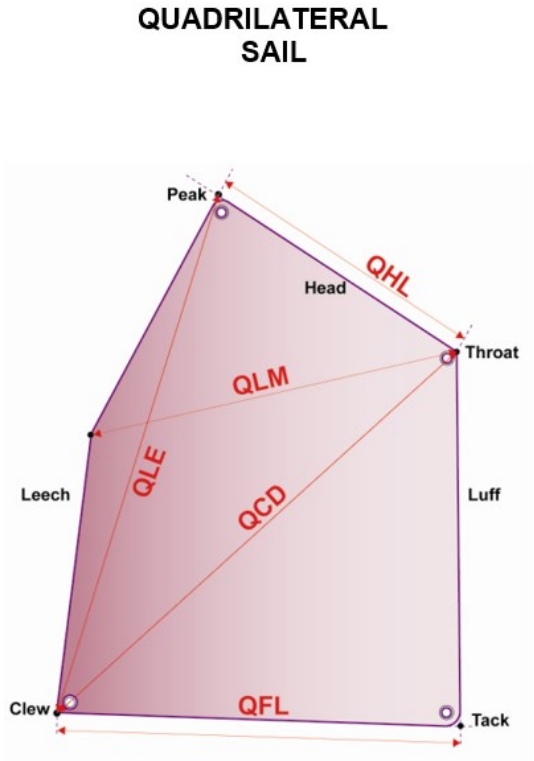
Sails – Quadrilateral sails

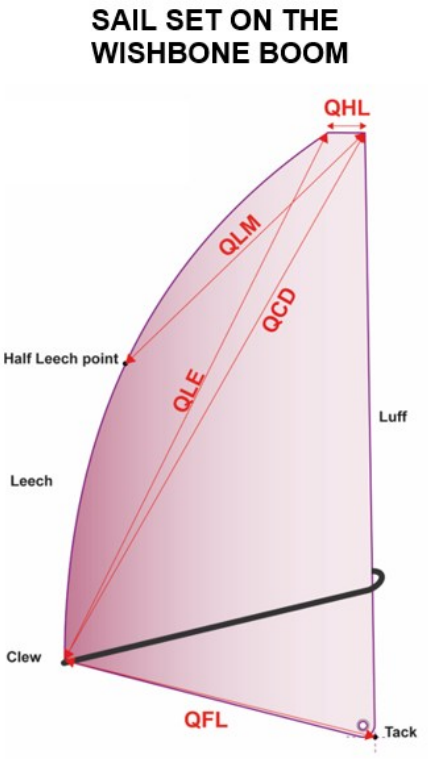
Leech points

- Fold **Peak** over **Clew** to get **half leech point**

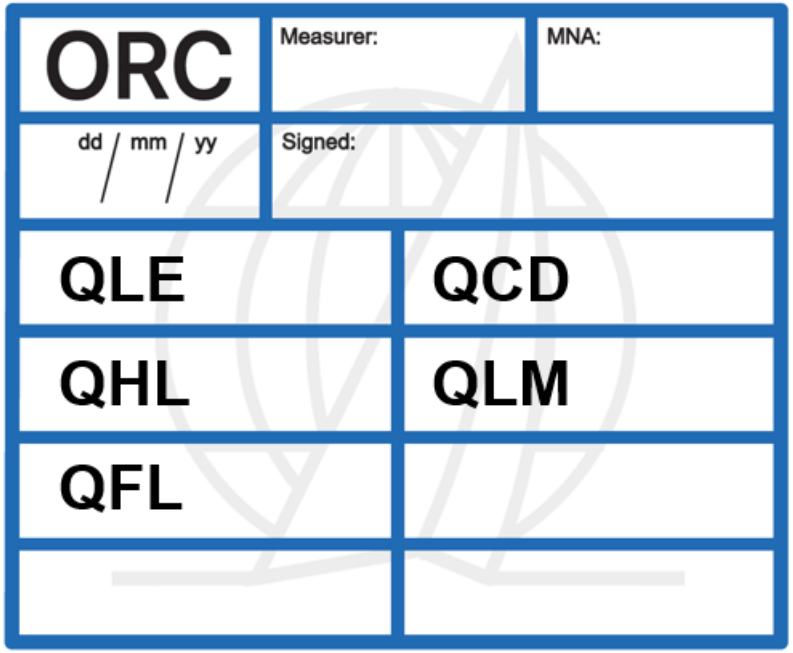
Quadrilateral sails measurements
(shortest distances)

- **QLE**: from the **clew** to the **peak**
- **QHL:** from the **peak** to the **throat**
- **QFL:** from the **clew** to the **tack**
- **QCD:** from the **clew** to the **throat**
- **QLM:** from the **throat** to the half **luff point**





Sails – Quadrilateral sails



Measurement stamp (at the head)

IMS Appendix 1 – Accommodation

Accommodation

- IMS Accommodation Regulations define Cruiser/Racers types of boats by controlling their cost while promoting safety and crew comfort.

- Cruiser/Racer yachts shall be those designed for cruising and longer stays on the boat, and the minimum requirements are intended to guarantee the boat design follows this basic philosophy, and includes these criteria:

    - The purpose of the yacht shall be primarily cruising.
    - Accommodation layout and outfit shall be at least comparable to the standards of series production models that would find a broad market as cruising yachts.
    - Sacrifice of layout and accommodation to features which are primarily suited to the racing character of a yacht shall be suppressed.
    - The yacht without modification is fully suitable and actually used for cruising.

- Boats complying with IMS Accommodation Regulations are categorized as Cruiser/Racers. All other boats are categorized in Performance Category.

Accommodation

Fundamental Requirements for Cruiser/Racer division are as follows:

- The interior of the yacht should include living area with table and settee, sleeping area(s), galley area, navigation area and a separate enclosed compartment for toilet/wash basin, accessible through a rigid door.
- A living area (cabin) shall consist of space containing a table and settees.
- Sleeping Area shall consist of a space containing berths and adequate facilities for personal gear stowage.
- Galley Area shall include stoves, sinks, galley gear stowage and food stowage
- Navigation Area shall include flat area suitable for chart work. The area should be built with storage for charts, navigational instruments, books, etc.
- Toilet shall be premanently installed

Accommodation

- A cabin sole shall extend fore and aft over a length which provides convenient access to lockers, berths, galley, head, navigation area and other components making up the yacht’s interior.
- Headroom is defined based on boat's length.
- Hanging Locker(s) shall be of sufficient dimension to permit hanging garments vertically.
- Fresh Water Capacity is defined based on length of boat and number of crew members
- Boats with inboard engines shall be directly supplied from permanently installed fuel tankage.
- For cruising amenity, the cockpit should feature fixed seating, seatbacks and coamings. The length of seating should accommodate crew numbers at least equal to the required number of berths

Accommodation

CRUISER/RACER REQUIREMENTS*

Accommodation length	**11.9 m**	Table area	**0.55 m²**	Headroom	**1.81 m**
Minimum number of berths	**5**	Personal gear stowage	**0.20 m³**	Fresh water capacity	**148 l**
Minimum number of seats in cockpit	**4**	Food stowage	**0.30 m³**	Fuel capacity	**88 l**

**This list refers to the calculated requirements. See IMS Appendix 1 for the complete list of requirements.*

Typical Cruiser/Racer boat

Typical Performance boat