International Measurement System

IMS

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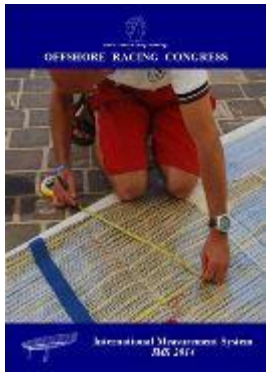
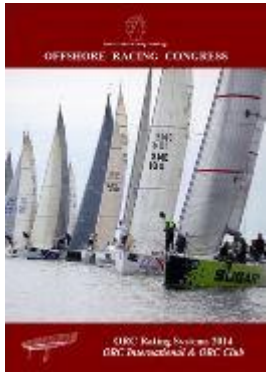
Measurement

- 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

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





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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 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.

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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 headsail set on the forestay, all headsails set flying and all headsails with ***LPG*** > 110% of ***J*** having battens.

- Crew weight shall not be considered as issue of compliance with certificate, but shall not be greater than the declared or default value noted on the certificate.

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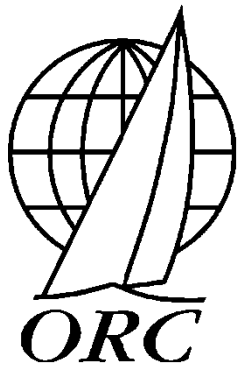

IMS Part B - Hull

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Hull

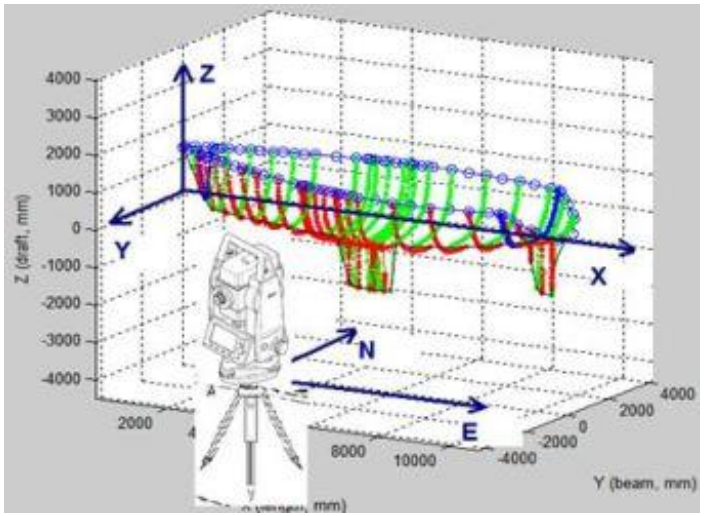
- Hull shape and geometry is one of the most important factors for predicting a boat's performance.

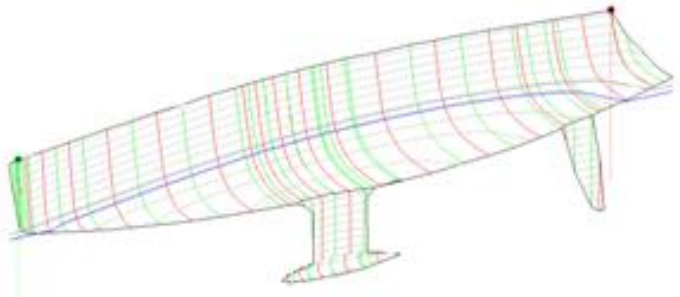
- Hull shape describes not only length of waterline while sailing, but also displacement, wetted surface, and the volume distribution along the hull from which hydrodynamic forces of lift and drag can be calculated.

- 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





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Hull

- Approximately 20 stations up to a maximum of 180 are taken from either side, spaced with maximum distance of 5 % LOA and 2.5 % of LOA within the forward 15% of the hull.

- Two stations where freeboard measurements are taken are at the same distance from the stem on port and starboard sides:

  - the forward freeboard station is normally placed approximately 0.5 m from the stem, and
  - the aft freeboard station shall is normally placed at the intersection of the hull and the transom at the sheerline

- Stations are also taken at the edges of any appendage, at the maximum draft and at any significant change of appendage profile in the longitudinal direction.

- Once a hull is completely measured, an OFF file is generated. Such an OFF file can then be used for any boat of the same production model.

- There are more than ***12.500 offset files*** existing in the ORC database, including most standard production boats. Thus, new hull measurements are required only for a completely new production boat or for custom builds.

IMS Part C - Appendages

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Appendages

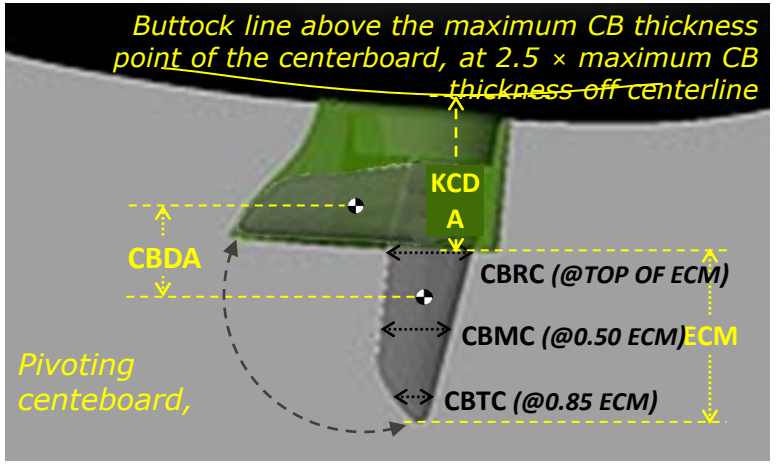
Retractable hull appendages or those set outside of the symmetry plane are measured separately from the hull measurements to generate an OFF file

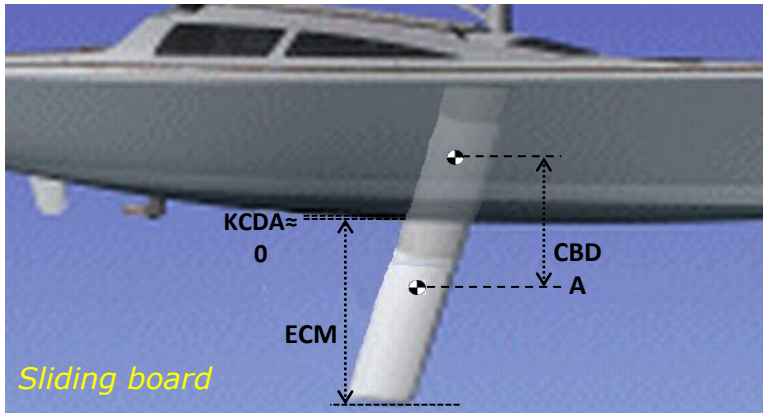
Centerboards can be:

- pivoting or dropping/sliding.
- housed by a fixed keel, or not.

Measurements to be performed:

- ***ECM*** = height of the exposed part of the centerboard (CB) when lowered
- ***KCDA*** = height from the exit of CB from hull or fixed keel to a buttock line on hull or fixed keel at 2.5 times the maximum thickness of the CB off the centerline
- ***CBDA*** = elevation of the center of gravity of the CB (*CBDB*, for a second CB)
- ***CBRC, CBMC, CBTC*** = CB chords (root, mid, tip, respectively)
- ***WCBA*** = weight of the CB (*WCBB*, for a second CB)





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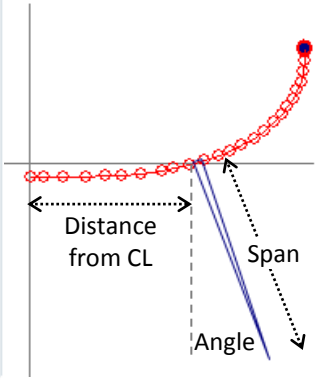
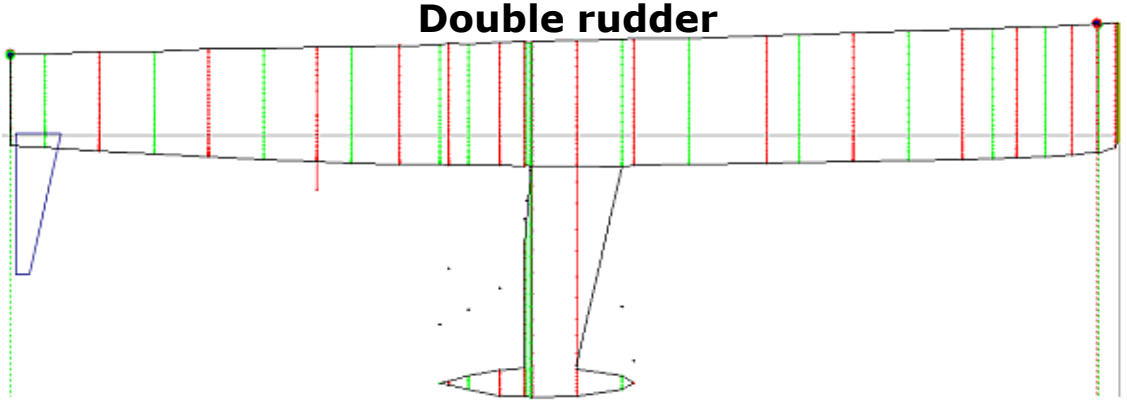
Appendages – twin rudders

Manual Rudder

CG	11.880
Span	1.722
Root Chord	0.495
Root Thickness	0.062
Tip Chord	0.150
Tip Thickness	0.008
Distance from CL	1.293
Angle	19.0

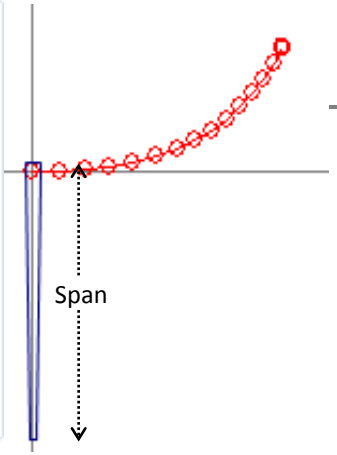


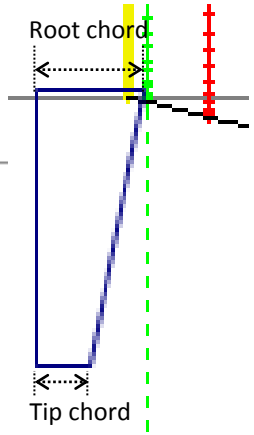
Double rudder



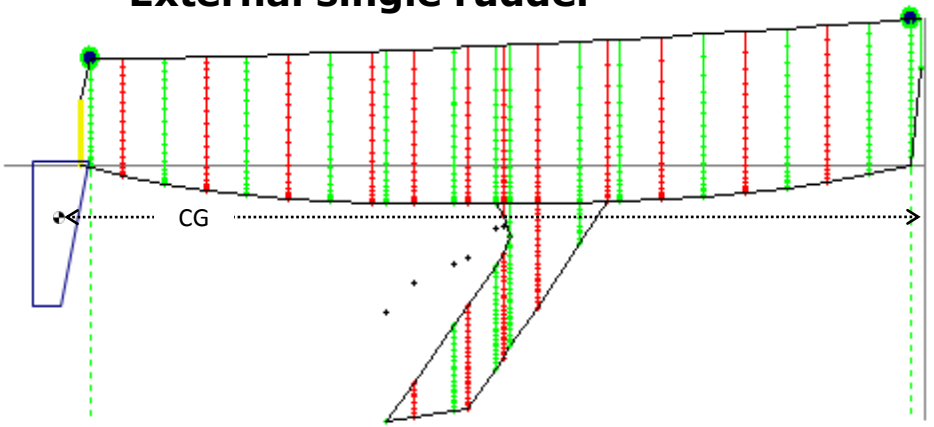
Manual Rudder

CG	6.250
Span	1.000
Root Chord	0.400
Root Thickness	0.060
Tip Chord	0.200
Tip Thickness	0.020
Distance from CL	0.000
Angle	0.0





External single rudder



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Appendages - Bilgeboard

- ***BX*** and ***BY*** - longitudinal and transverse position of the bilgeboard leading edge,
- ***BS*** – span
- ***BC*** – chord
- ***BT*** – thickness
- ***BA*** – angle
- ***BF*** - percentage of the bilgeboard remaining outside of the hull when the bilgeboard is fully raised.

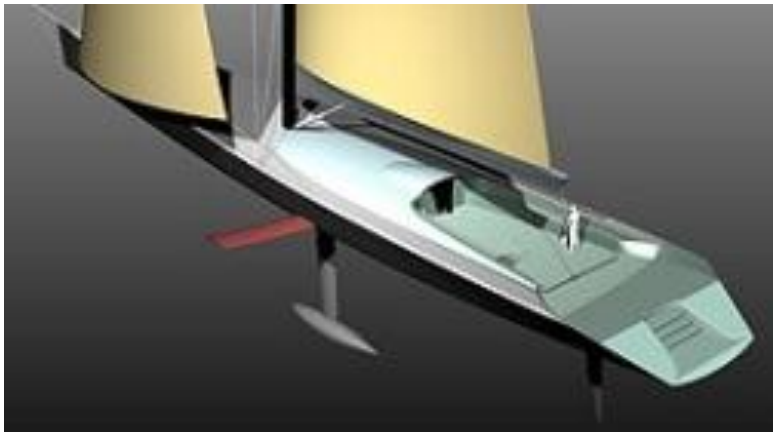
Bilgeboard measurements can also be applied for a single bilgeboard on centerline with ***BY*** measurements set to 0.

Appendages - DSS

The Dynamic Stability System is a horizontal foil that can be extended from the hull with the purpose of increasing stability.

Measurements include:

DSS - span of the extended wing measured along any curvature
DSC – maximum chord
DST – maximum thickness
DSA – angle of the wing to the horizontal axis
DSD - distance from the root chord to the centerline of the boat.



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IMS Part D - Propeller

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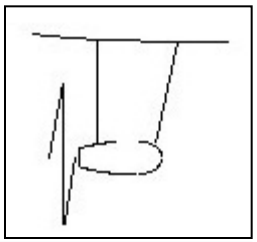
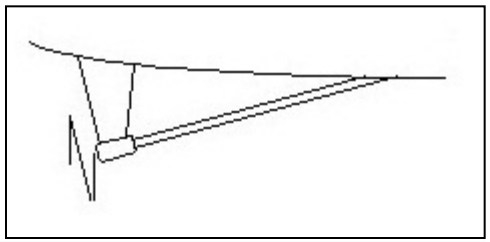
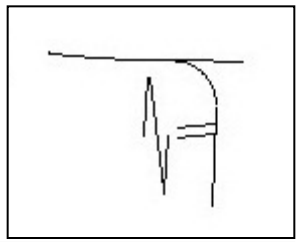
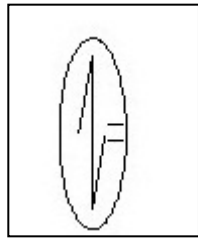
Propeller - Installation

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

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

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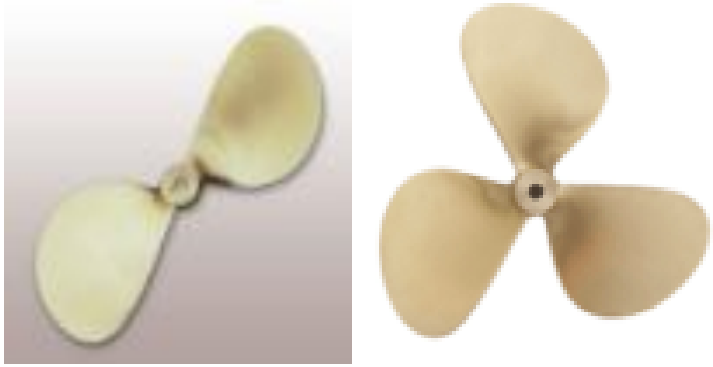
Propeller - Type

a) Solid

b) Folding

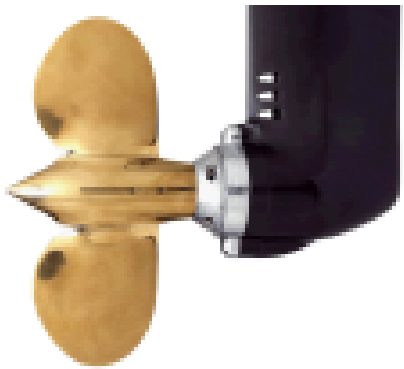
c) Feathering



a) Solid (2/3 blades)

b) Folding (2/3 blades)

e.g. Gori



c) Feathering (2/3 blades)

e.g. Max Prop

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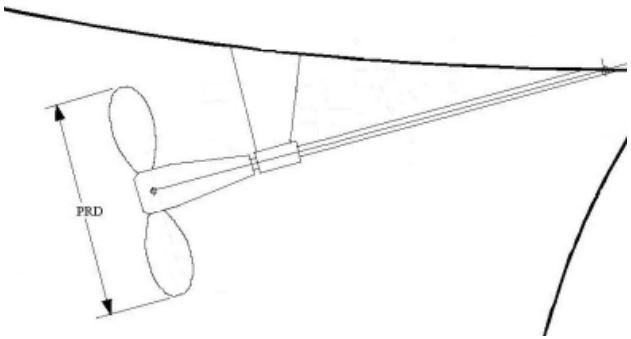
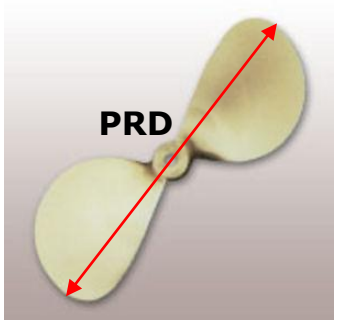
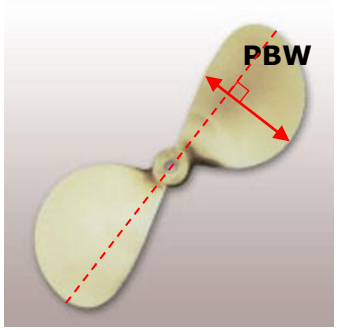
Propeller - measurement

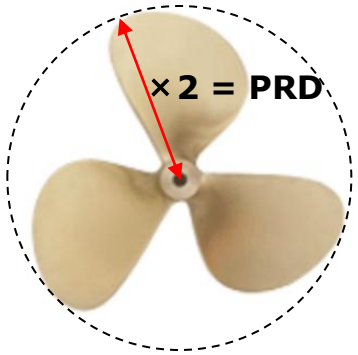
PRD - Propeller diameter

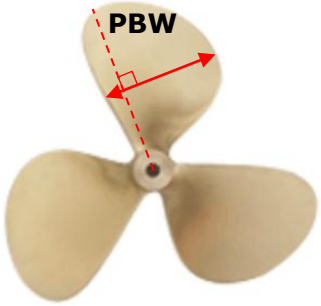
PBW - Propeller blade width











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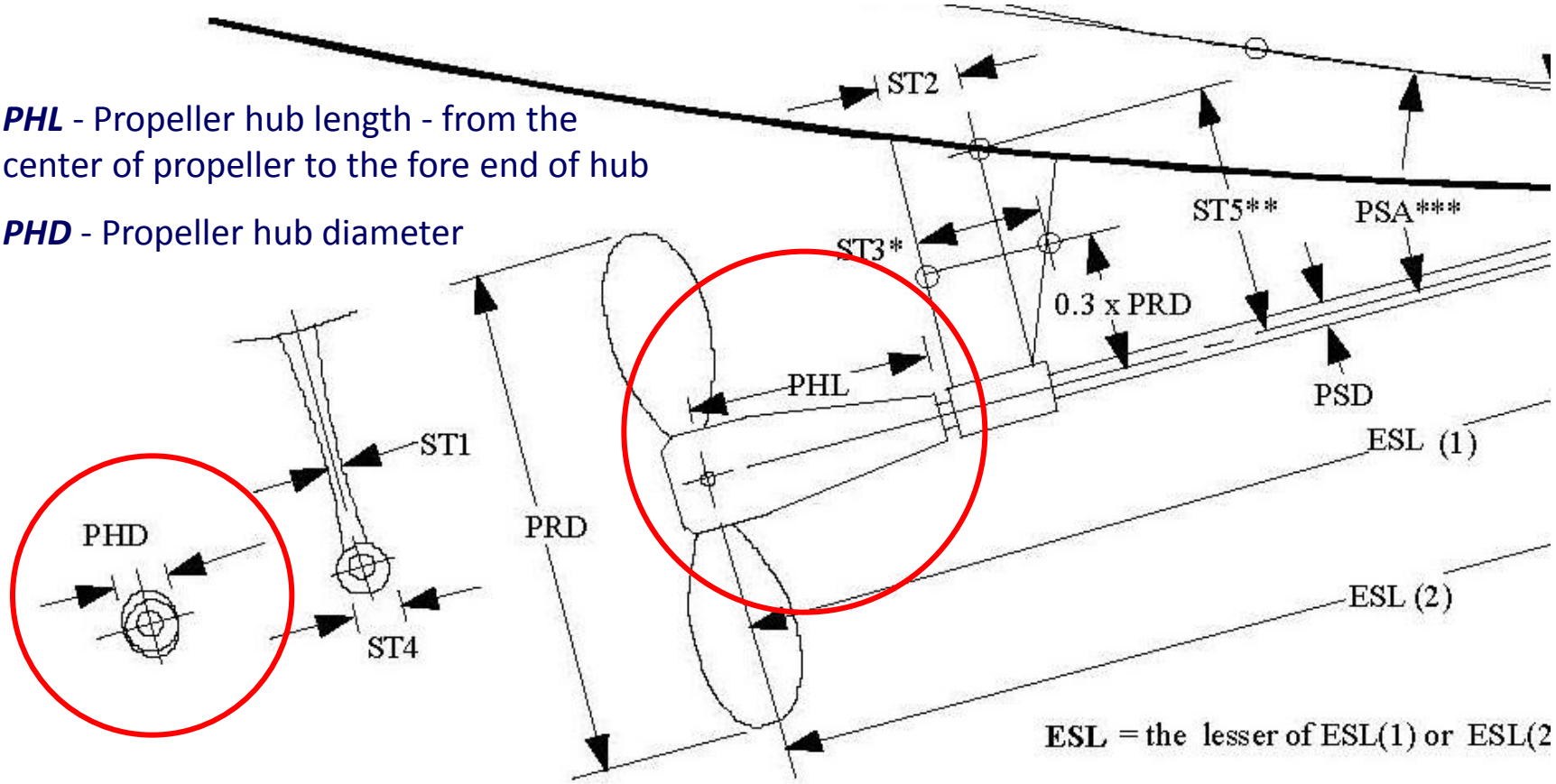
Propeller – hub dimensions

PHL - Propeller hub length - from the center of propeller to the fore end of hub

PHD - Propeller hub diameter



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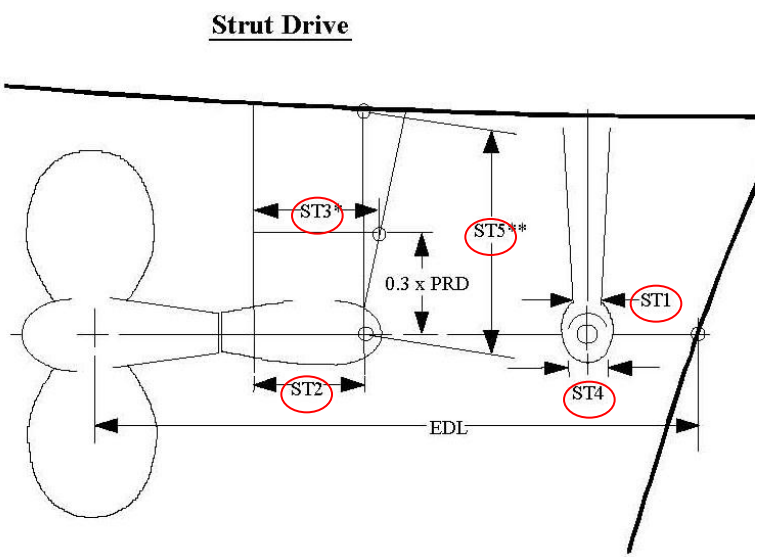
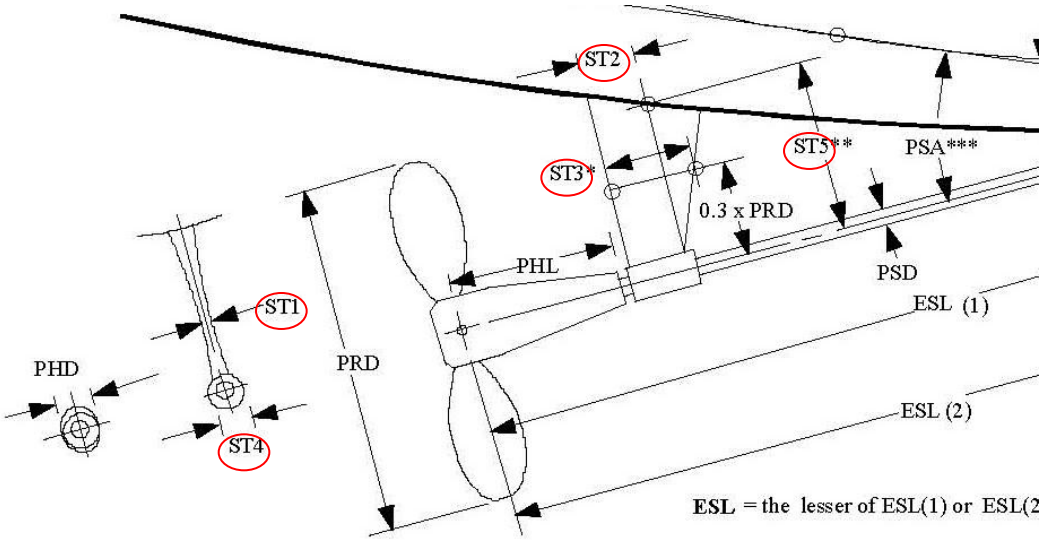
Propeller – strut dimensions

- ***ST1*** = minimum strut thickness
- ***ST2*** = minimum strut width (measured parallel to the shaft)
- ***ST3*** = maximum strut width within 0.3·PRD (measured parallel to the shaft)
- ***ST4*** = strut hub diameter at the aft end of the hub within ST2
- ***ST5*** = strut hub distance from hull





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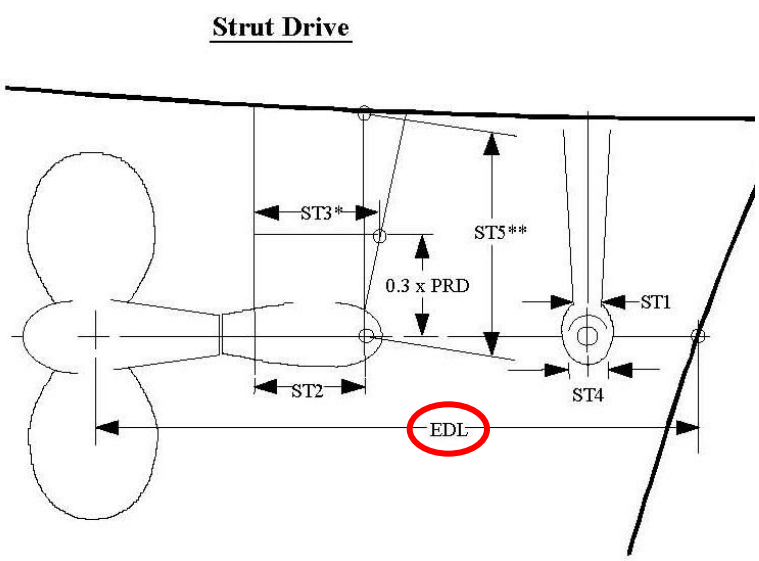
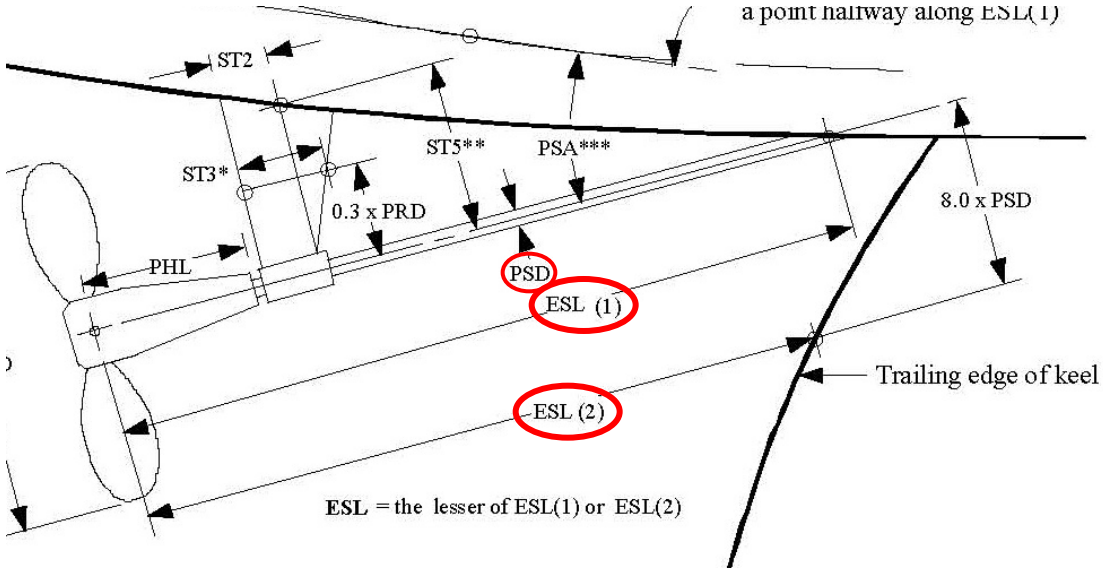
Propeller – shaft and distance from keel

- ***PSD*** = propeller's shaft diameter (usual standardization: 25mm, 30mm, 35mm)

- ***ESL*** (shaft) = the lesser of ESL(1) and ESL(2), where:
  ESL(1) = distance of propeller's center to the point where the shaft emerges from the hull
  ESL(2) = distance of propeller's center from keel at 8·PSD under the shaft and parallel to it
- ***EDL*** (strut) = horizontal distance of propeller's center from keel





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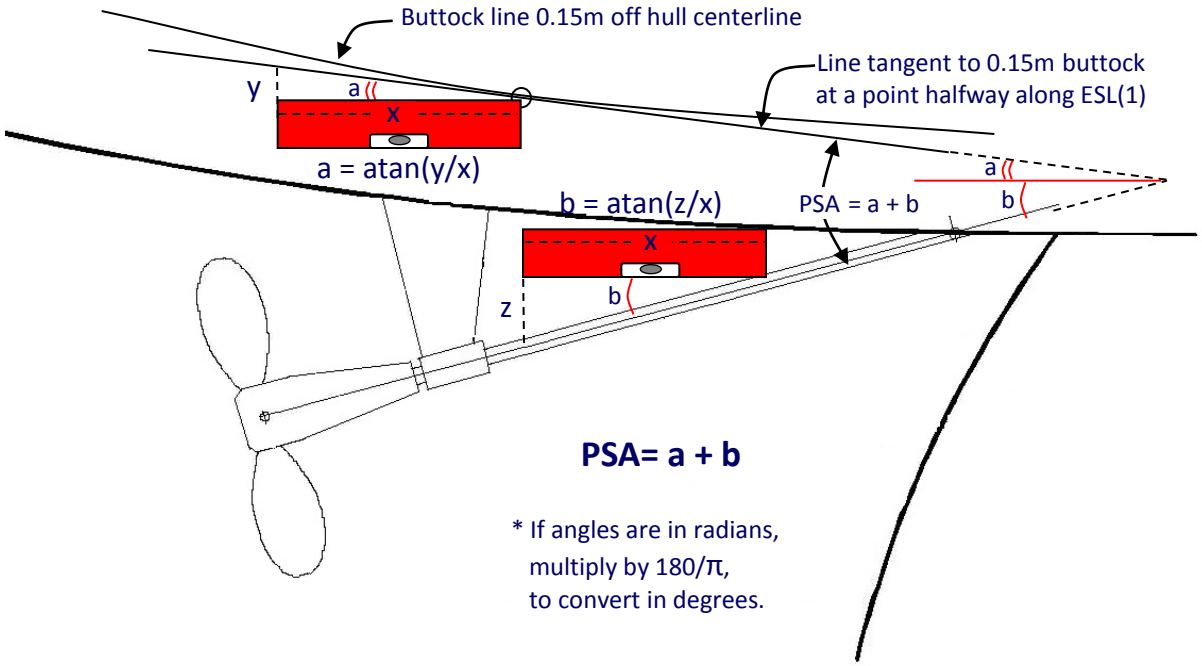
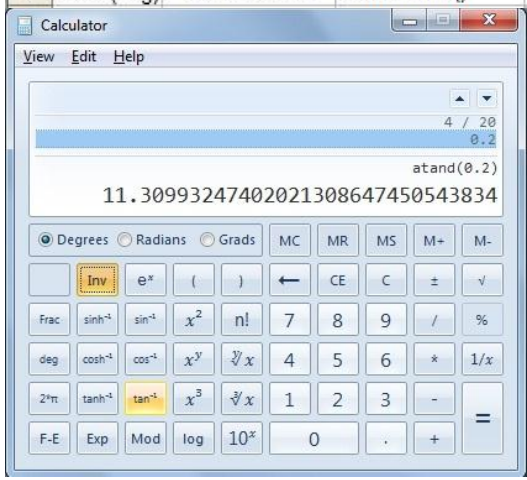
Propeller – shaft angle

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)



Microsoft Excel - IMS PSA calculation.xls

	A	B	B (formulas)
1	x	20	
2	y	4	
3	z	5	
4	a (rad)	0.19739556	=ATAN(B2/B1)
5	b (rad)	0.244978663	=ATAN(B3/B1)
6	PSA (rad)	0.442374223	=B4+B5
7	PSA (deg)	25.34617594	=B6*180/PI()



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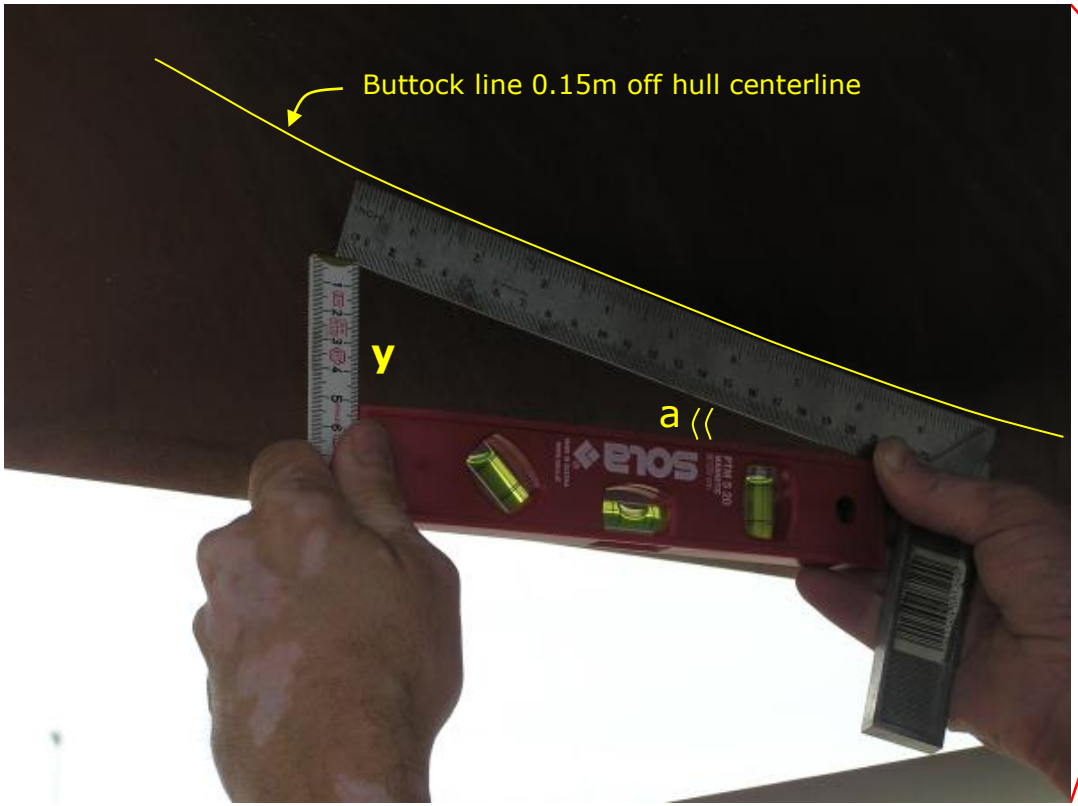
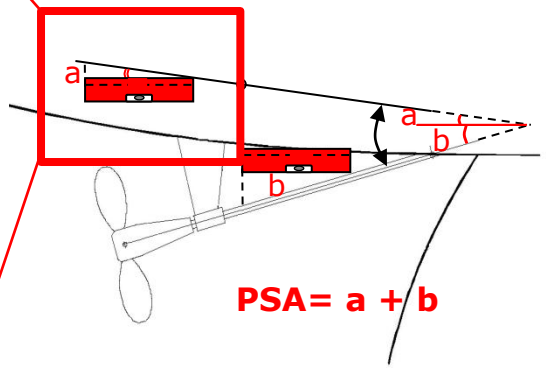
Propeller – shaft angle

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)





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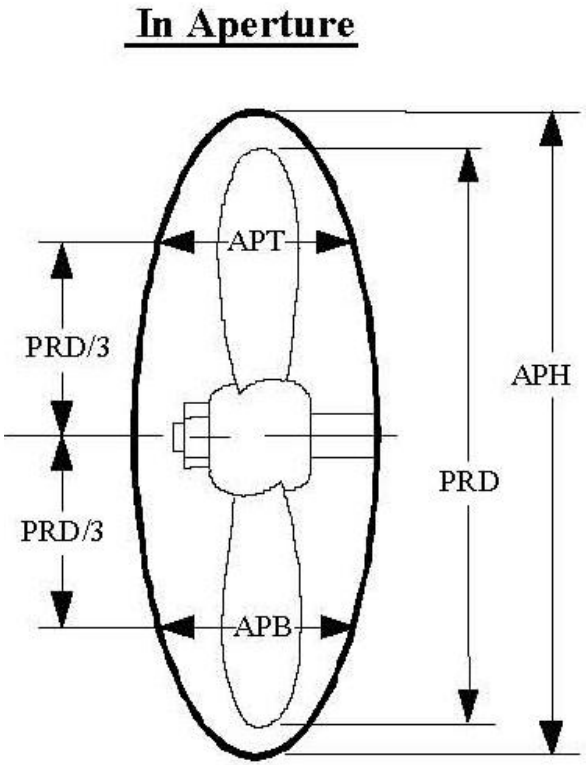
Propeller – In aperture

- ***APH*** = aperture height
- ***APT*** = aperture width at PRD/3 above the propeller shaft
- ***APB*** = aperture width at PRD/3 below the propeller shaft



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IMS Part E – Freeboards and Stability

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Freeboards and Stability

ORCi certificates

- Freeboard measurements and inclination test are mandatory and are always performed *simultaneously.*

ORC Club certificates

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

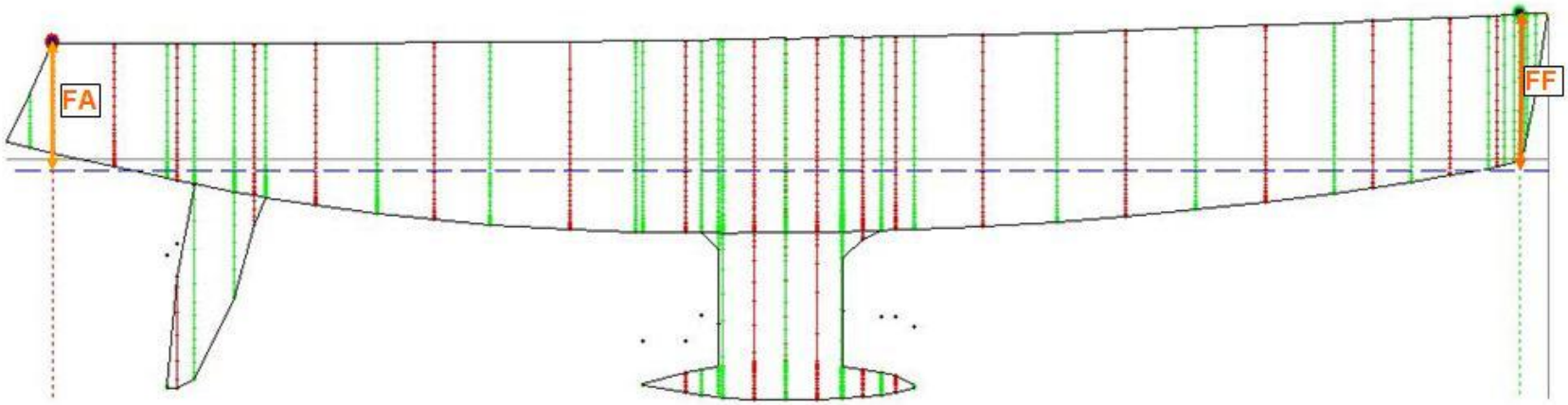
- Freeboard measurement is performed only when an accurate electronic offset file of the particular type of boat exists.

- If there is no offset file, the boat is weighed in measurement trim with a national authority-approved 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

- Freeboard measurements give a boat's waterline in measurement trim from which displacement, wetted surface and overhangs are calculated from the hull lines available in an offset file.
- Freeboards are measured on the port and starboard sides at freeboard points identified in the hull offset file at specific distances from stem (SFFP and SAFP).
- Measured freeboards (FFM and FAM) are then adjusted for the specific gravity of the water, and also for pre-2013 measured boats for any differences in empty measurement trim ("lightship" condition).



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Freeboards – measurement trim

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

- Internal ballast
- Batteries
- Fixed interior accommodation, hatch covers and floor boards
- Fixed machinery, electrical and plumbing systems
- Mast, boom, spinnaker pole and any sprit
- Standing rigging and fittings
- Rudder, wheel/tiller and steering gear
- Fixed electronics, instruments, compasses, lights, antennas and masthead devices
- Pulpit, stanchions and lifelines
- Mattresses and permanently installed table and doors
- Permanently installed stoves, heaters or other electrical devises

Freeboards – 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 and mooring lines
- Any sails, including storm and emergency sails
- Sheets, blocks, winch handles
- All portable safety gear
- Cushions, pillows and any other bedding
- Cooking and eating utensils
- Any food or stores
- Miscellaneous portable and personal gear, books, navigational tools etc.

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.

Freeboards – sheer points

Sheer line

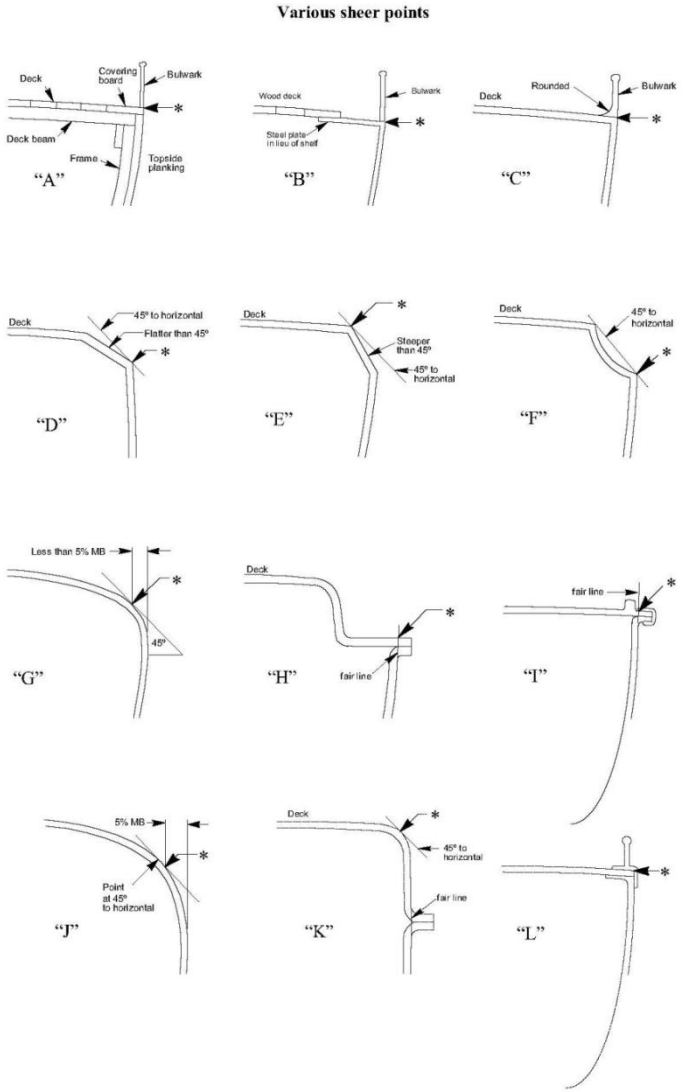
The imaginary line where the hull and the deck meet.

Sheer points

The points comprising the sheer line. They are the lowest points on the topsides of the hull where a 45° tangent can be rested (but not higher than the deck).

The sheer points are recorded during the hull measurement of the boat (offset file) and they are the reference points for the freeboards height measurement.

The sheer points vertical position is described in detail in the Rule (see drawings). The distance from the stem of the sheer points that are marked as freeboard measurement points is recorded in the offset file (fore - and aft freeboard point stations SFFP, SAFP).



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Freeboards – measurement

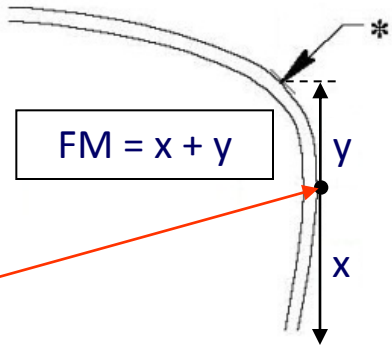
- Pay attention to the sheer point (*).
  In case of doubt, take photos of the point of measurement.
  Discuss the issue with the chief measurer/rating officer.

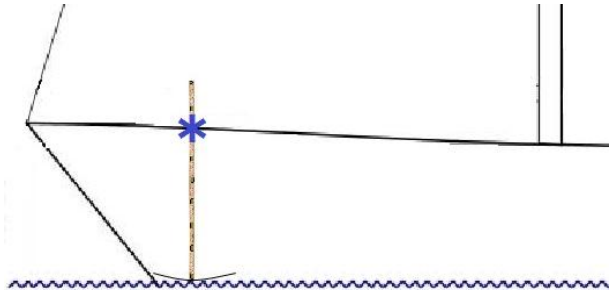
- Use a 45°spirit level for curved sheer line.

- Choose an easily accessible point for measurement, then measure and calculate the difference from the sheer point.

- Use a hard 2m measure to measure freeboards.

- Use a densimeter for the specific gravity of water (SG).





FFM/FAM = freeboards measured
FF/FA = freeboards after adjustment to default SG (1.025) and pre-2013 measured boats for any differences in empty measurement trim ("lightship" condition).

INCLINING TEST AND FREEBOARDS					
Inclining Test **Current Inclining**					
Flotation date **01/04/2009**				SG	**1,0300**
FFM	**1,264**	FF	**1,262**	SFFP	**0,343**
FAM	**0,985**	FA	**0,984**	SAFP	**10,031**

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Stability – inclining test

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 ISAF Offshore Special Regulations.

- An inclining test is performed on a boat in lightship measurement trim while floating in calm water
- Two poles are simultaneously positioned on port and starboard sides approximately at the longitudinal centre of flotation, or LCF).
- The poles are suspended outboard to provide arms for supporting weights, and arranged to be perpendicular to the boat's centreline and as horizontal as possible.

Either a manometer or an ORC-approved electronic inclinometer is placed on the deck and positioned athwart the boat where it can be read by the measurer.

- Weights, depending on the size of the boat, are suspended on one the pole on port side and resulting heel angle is recorded.
- Half of total weight is suspended at the same time on the port in starboard sides so that the total distance between weights can be measured.
- All weights are then suspended on starboard side and resulting heel angle is recorded again.

Stability – inclining test

Electronic inclinometer

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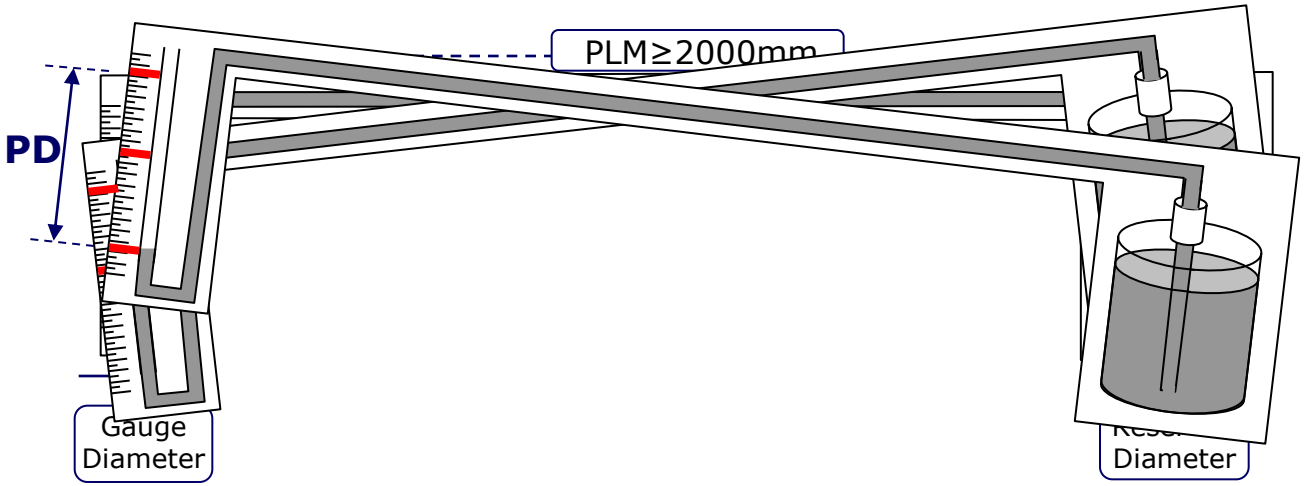
Stability – inclining test



• Mark the datum of the liquid surface in the gauge, with no weight suspended yet.

• Suspend on one side of the boat enough weight as to induce about half of the permissible deflection. Mark the datum.

• Move the weights to the other side and measure the total deflection (PD). In case it is not within limits, adjust the weight accordingly and repeat the procedure.

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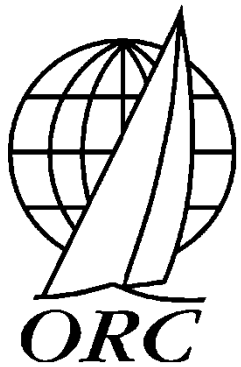
Stability – inclining test



IMS Part F – Rig

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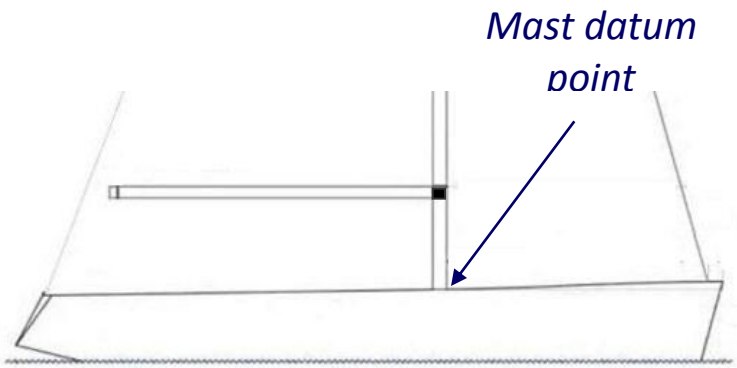
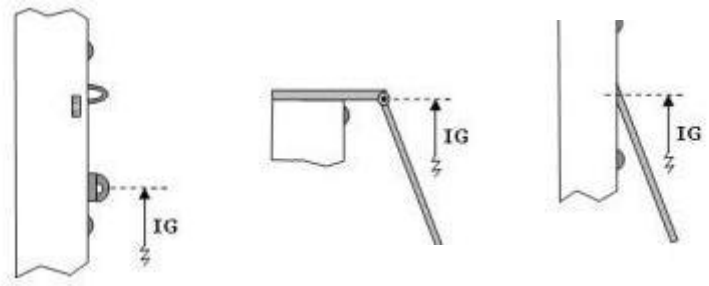
Rig

Rig measurements are following the ISAF 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

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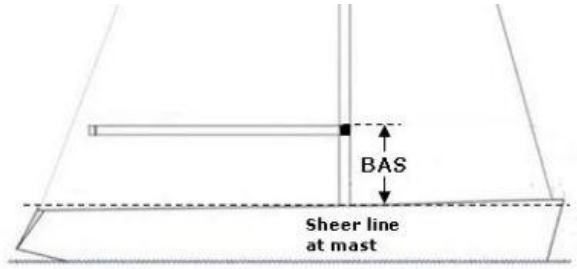
Rig – BAS measurement

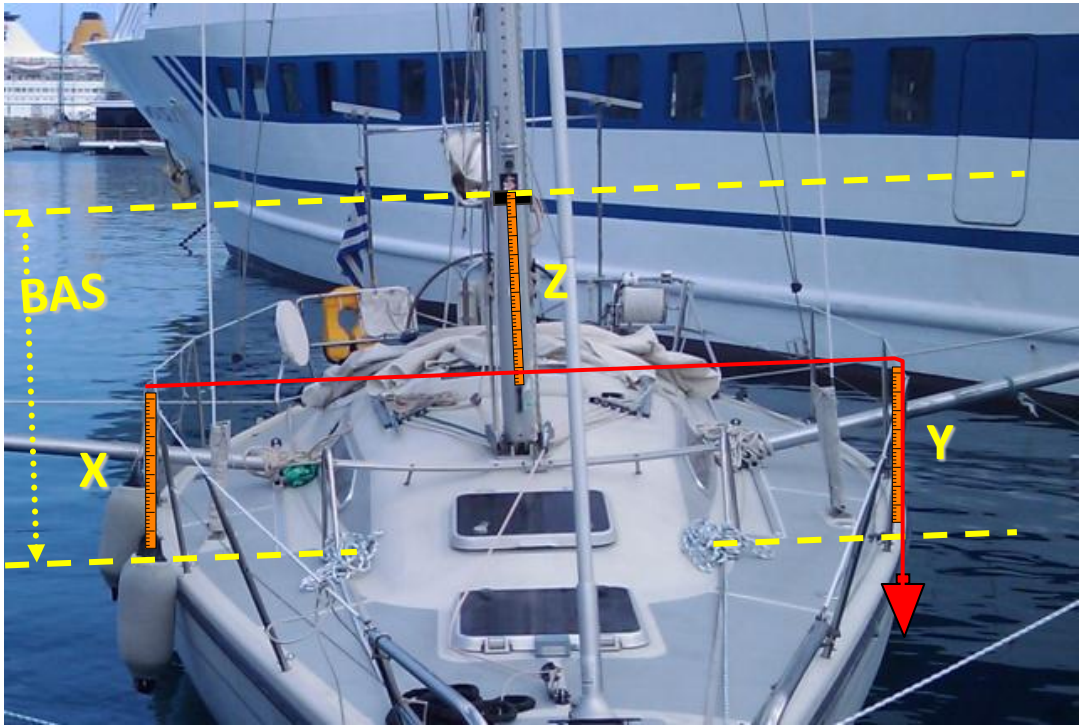


BAS - lower black band to the sheerline at the mast.

Practical measuring method:

- Place a string across the lifelines, perpendicular to the boat's centerline, touching the fore side of the mast.
- Measure the height of the string from the sheer point on each side (X, Y).
- Measure the distance of the string to the lower black band (Z).
- Calculate BAS as follows:

BAS = Z + (X+Y)/2



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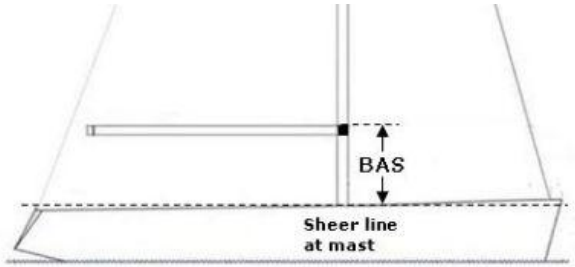
Rig – BAS measurement



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

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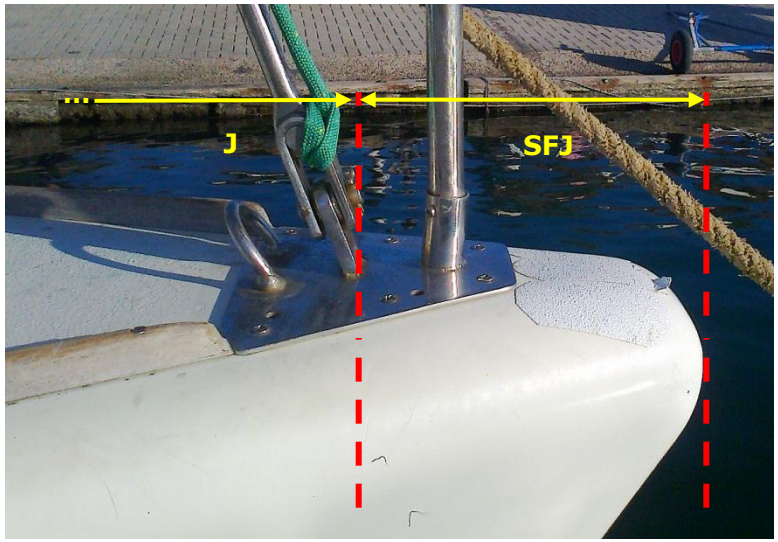
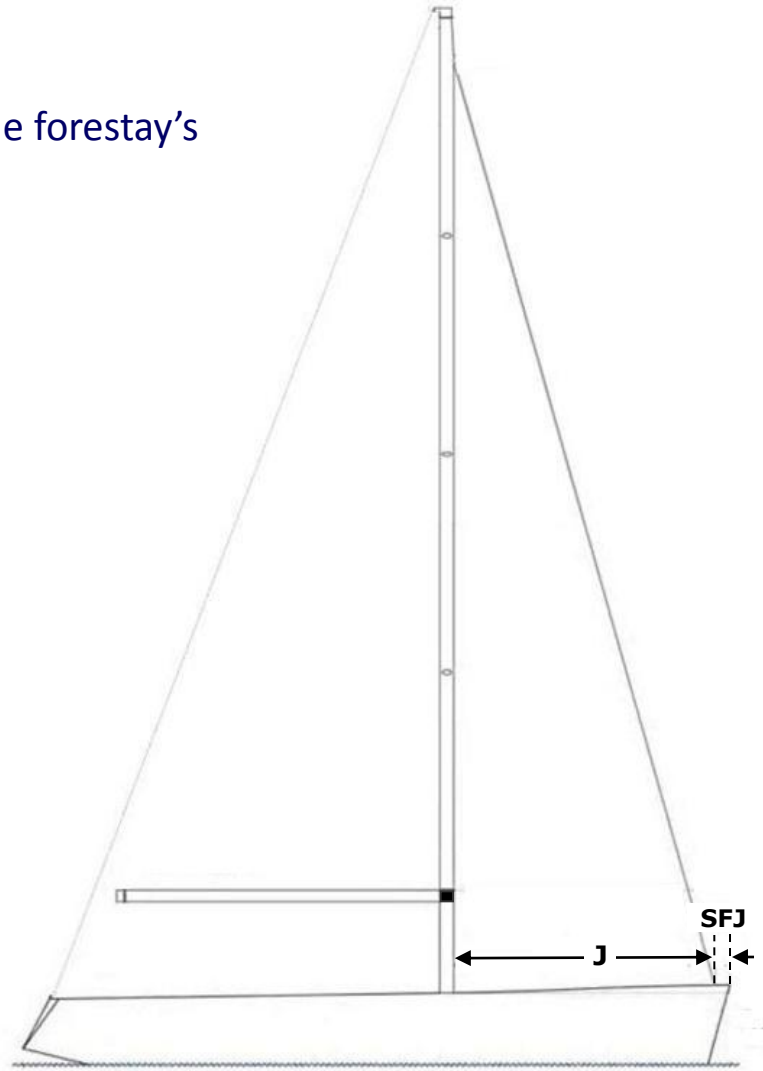
Rig – Foretriangle base

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

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

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Rig – J measurement

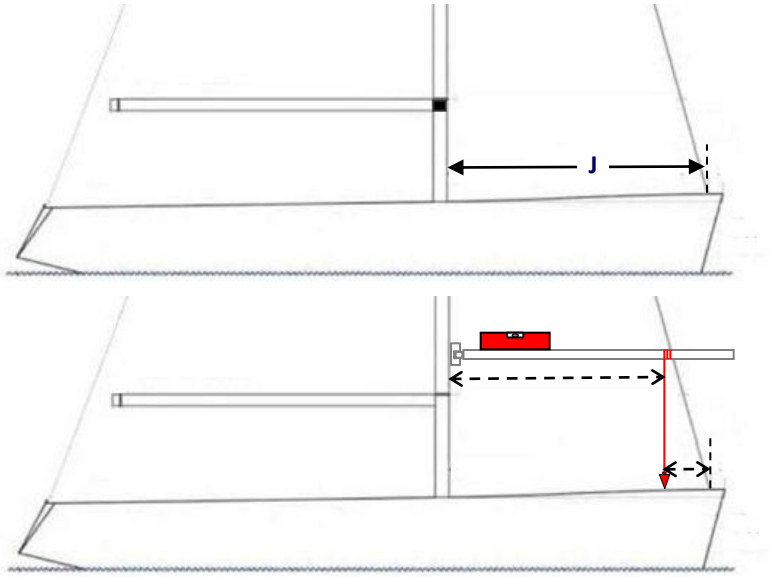
J = from the fore side of the mast to the iintersection of the forestay's centerline and the deck.

- 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.



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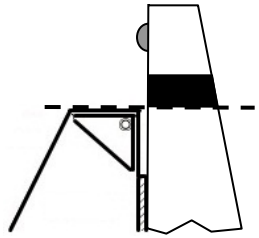
Rig – Mast measurement

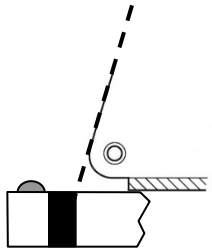
- The black bands (measurement bands) on the mast and on the boom are bands that designate the mainsail limits. They are placed by the owner in a contrasting color on the mast and boom, and must be 25 mm wide.

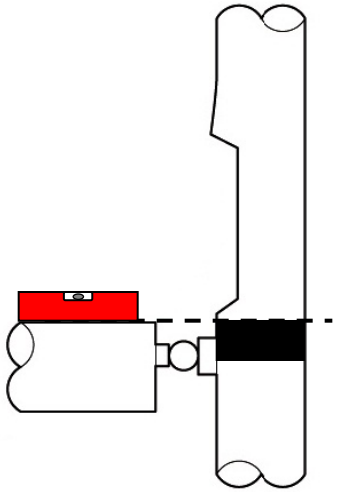
- Upper black band: It is placed on the mast, so that the mainsail head does not exceed it.

- 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.







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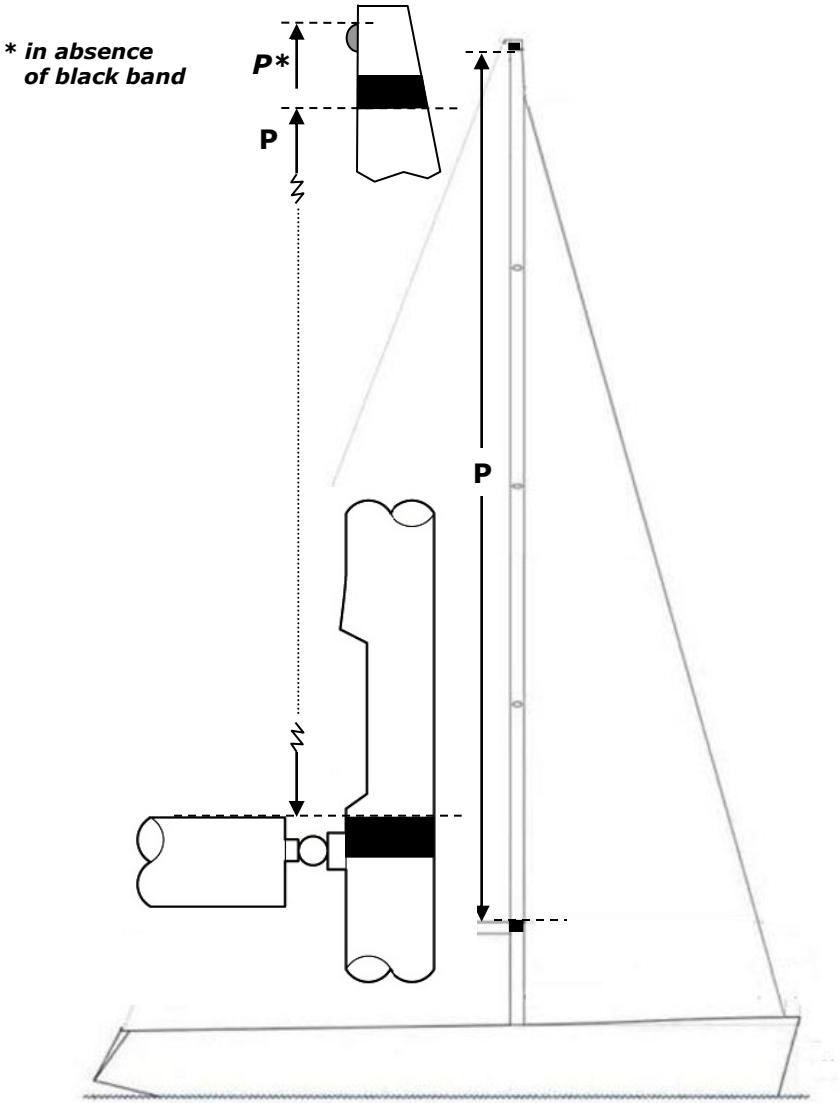
Rig – P measurement



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.

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Rig – IG measurement

IG - upper point of forestay to sheerline at the mast.

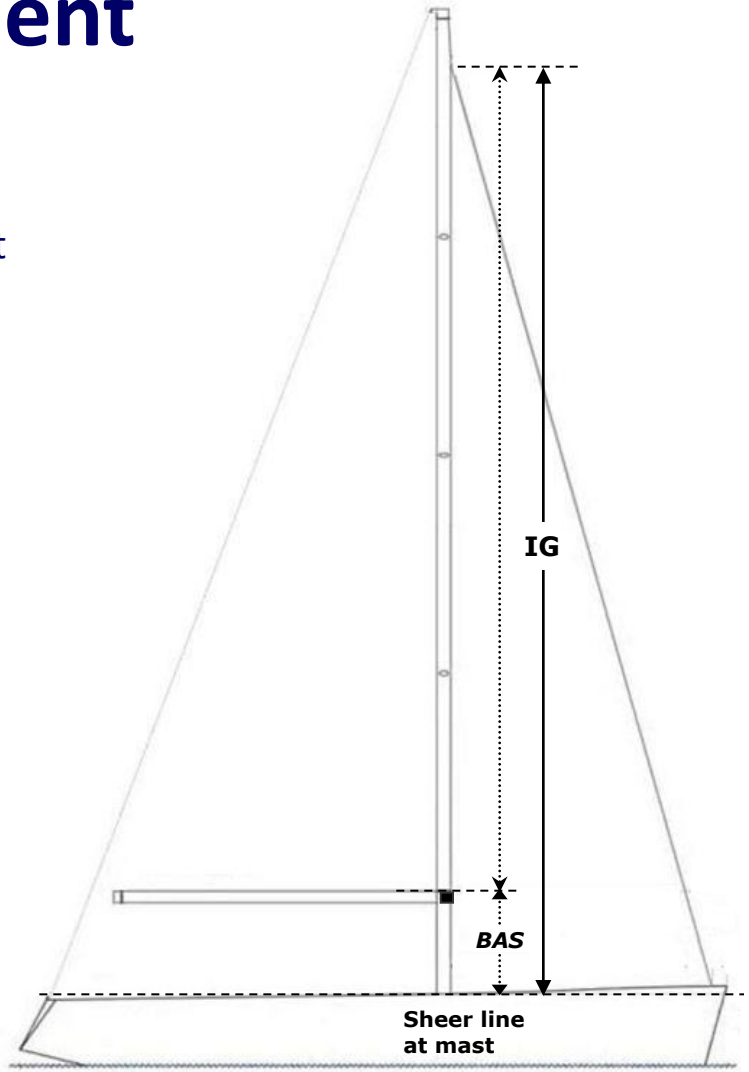
Upper point of forestay:

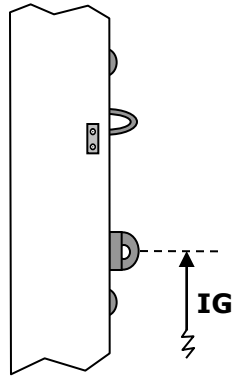
- Forestay fixing point (pin);

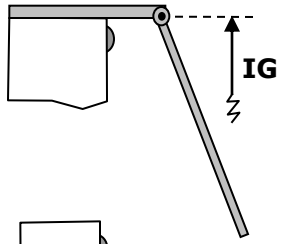
or

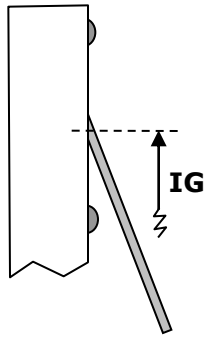
- Intersection point of the forestay centerline and the fore side of the mast.

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









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Rig – ISP measurement

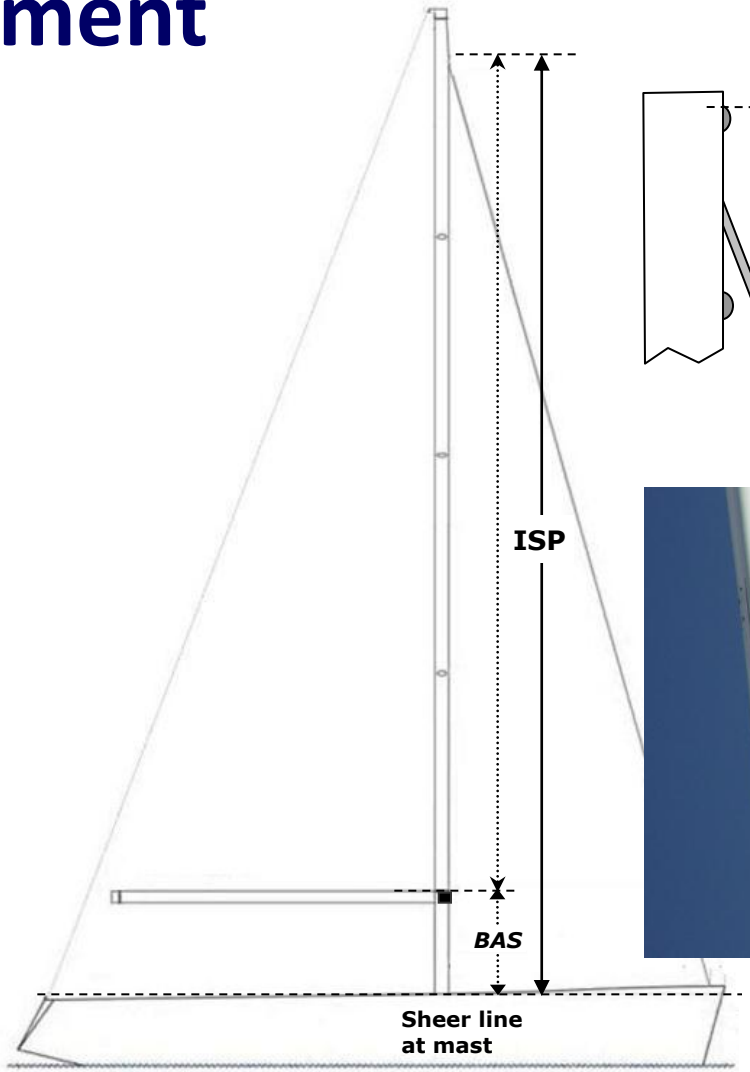
ISP - upper point of spinnaker or headsail set flying hoist to sheerline at the mast.

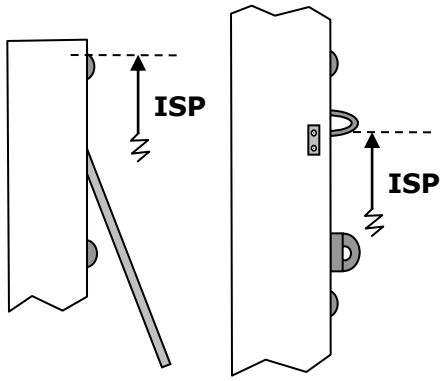
- Upper side of the halyard sheave

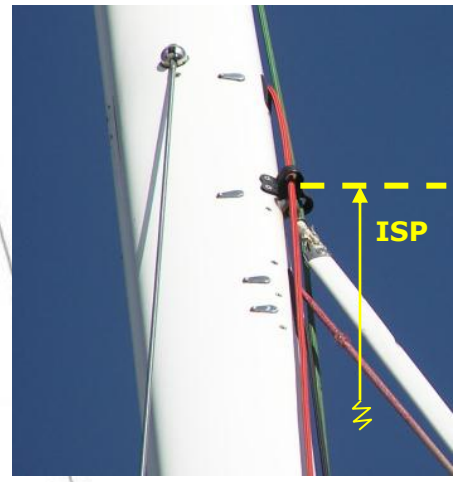
or

- Lower side of a halyard ring, if one exists

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







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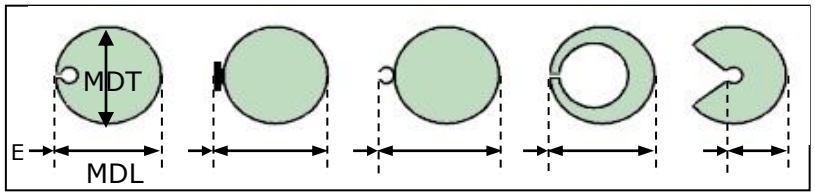
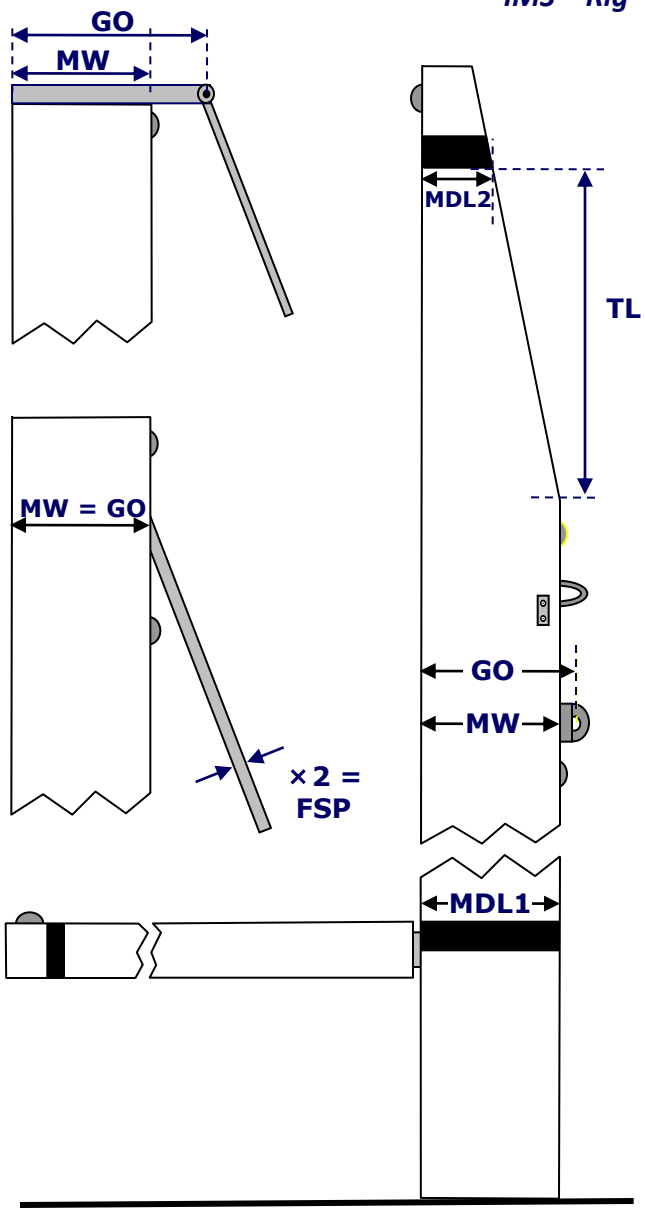
Rig – Mast profiles

- **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
- **FSP** = twice the maximum cross section of the forestay (if the forestay is wire, then FSP=0)





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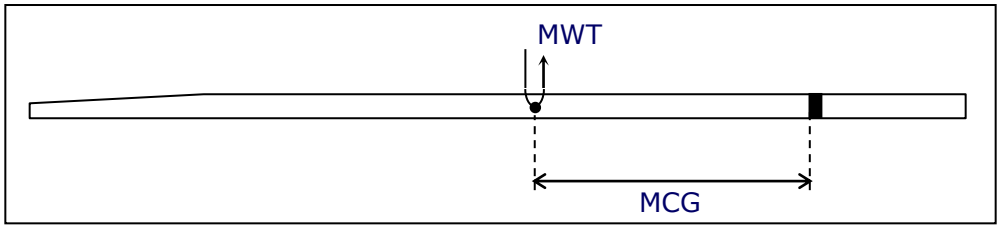
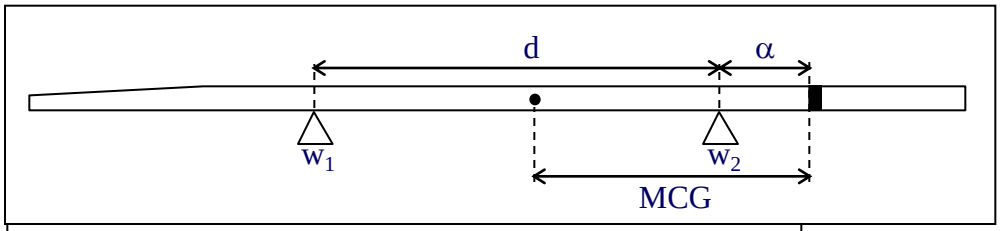
Rig – Mast weight

- **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, d, α
  - Calculate MWT and MCG



$$MWT = w_1 + w_2 \quad , \quad MCG = \frac{w_1 \cdot d}{w_1 + w_2} + \alpha$$

Note: If lower black band lies between weighing points, then $\alpha<0$.

- 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 – Boom measurement

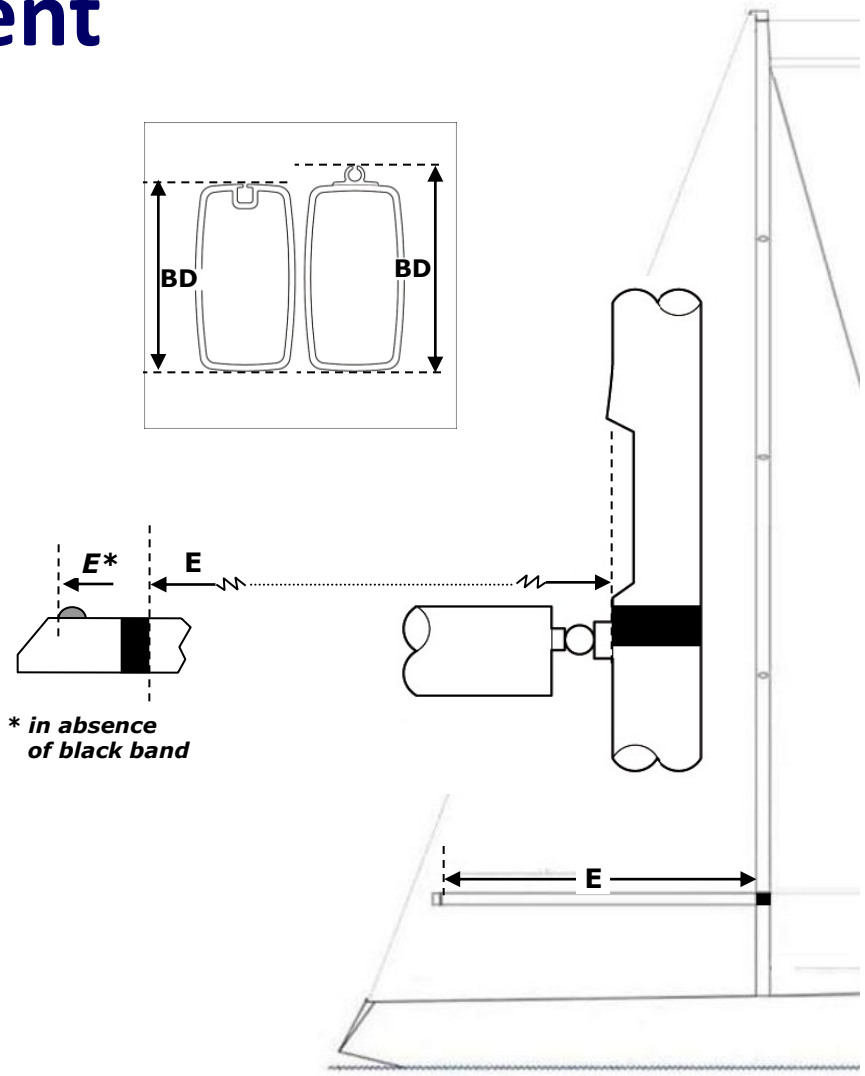
E **-** distance between aft side of mast and outer black band.

- 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.



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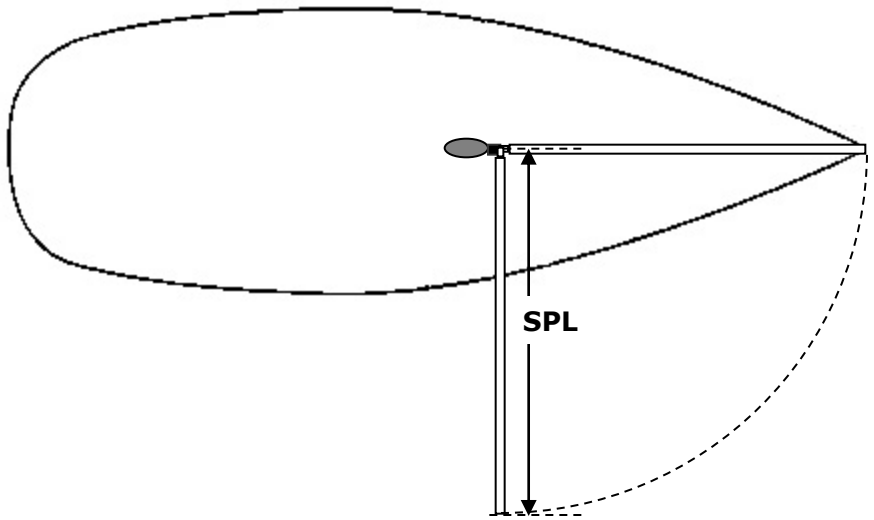
Rig – Spinnaker pole

SPL - spinnaker pole length, measured from the boat's centerline to the outer end of the pole, when placed horizontally in its normal position and perpendicular to the boat's centerline.



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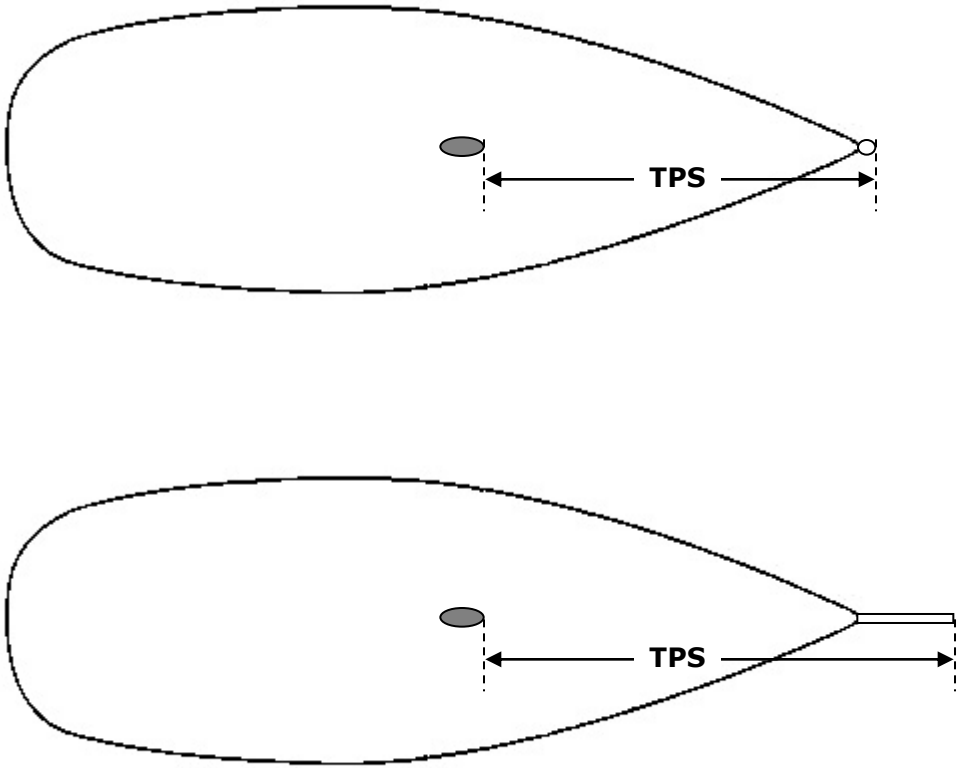
Rig – Tacking point of spinnaker

TPS **-** from the fore side of the mast to the foremost tacking point of a spinnaker or headsail set flying (or to the outer point of a bowsprit)



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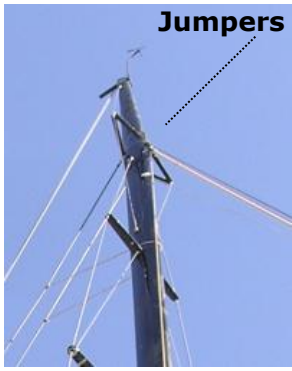
Rig – Other details



- **Jumpers:** Yes/No
- **Spreaders:** Number of pairs
- **Runners (and checkstays):** Number of pairs

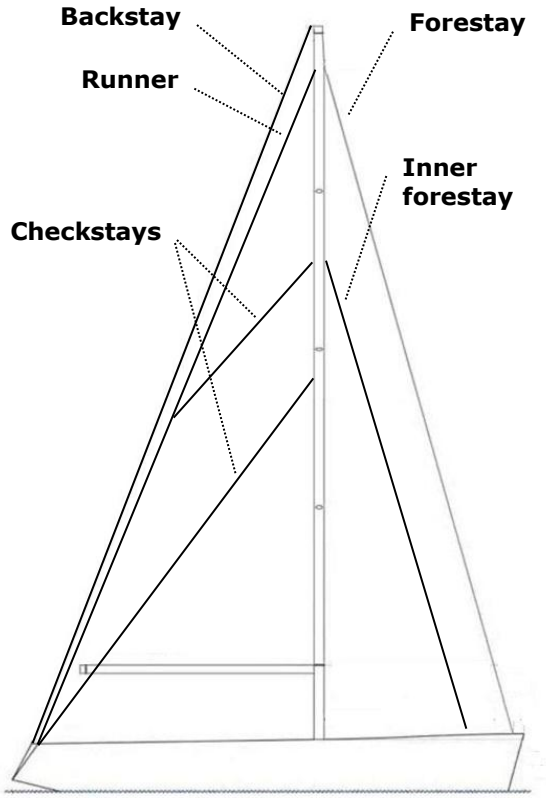
- Runners: they are rigged near the upper rigging point of the forestay
- Checkstays: they are rigged below the upper rigging point of the forestay. (*Checkstays that are at a distance of 10% of IG from the highest runner are excluded (IMS F9.5))*

- **Inner forestay:**

- adjustable
- fixed
- none

- **Forestay tension:**

- aft = adjustable uppermost backstay
- fwd = adjustable forestay
- aft & fwd = adjustable backstay & forestay
- fixed = fixed uppermost backstay & forestay



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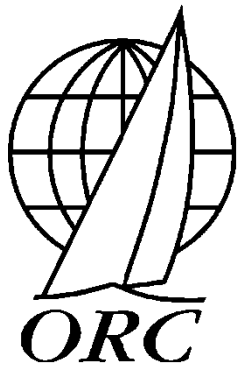

IMS Part G – Sails

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Sails

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

- The following type of sails can be measured:
  - Mainsail
  - Mizzen
  - Headsails (including Inner headsail)
  - 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.

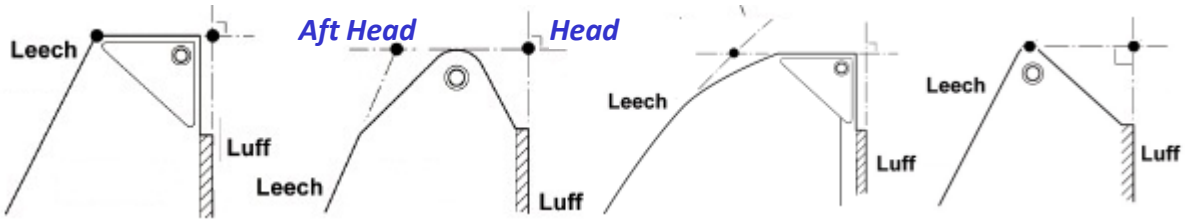
Sails

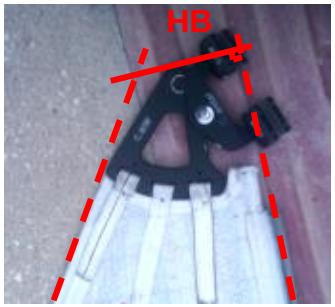
When measured sails shall be:

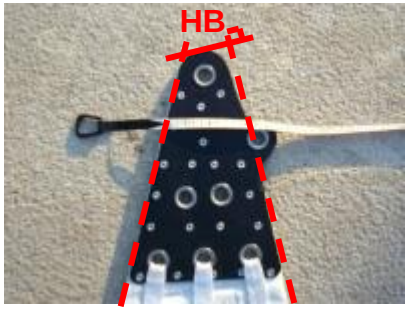
- completely dry
- on a flat surface
- with just sufficient tension to remove any wrinkles across the line of the measurement being taken.
- in normal temperature
- without battens
- permanently attached devices (clips, cars etc) along an edge of a sail (i.e. luff) are not taken into account when measuring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

Sails – Mainsail and mizzen

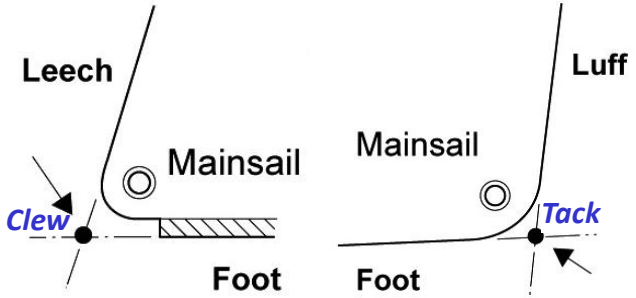
- **Head point:** Perpendicular to the luff from the highest point of the sail

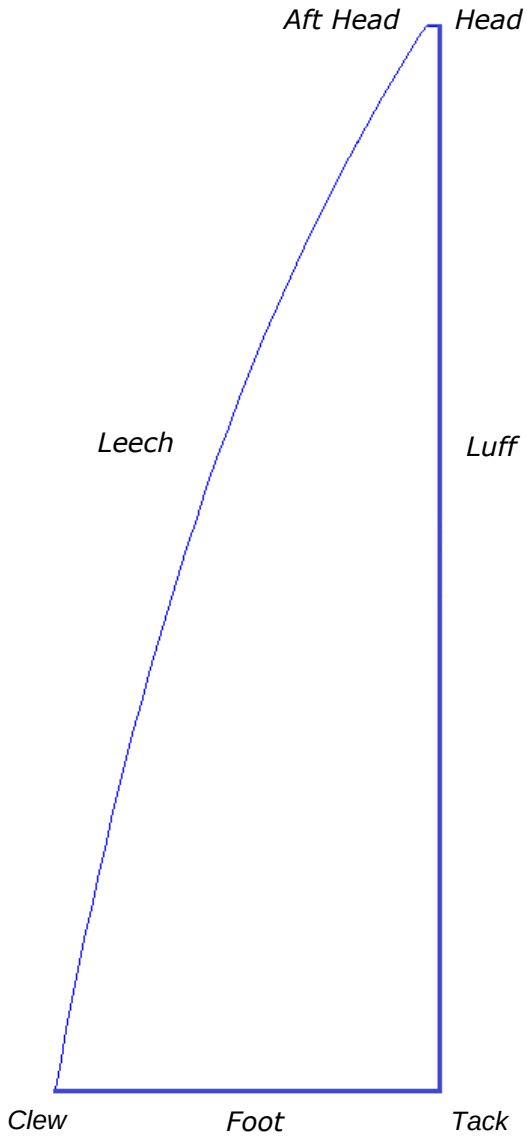






- **Tack point:** Intersection of luff and foot
- **Clew point:** Intersection of foot and leech





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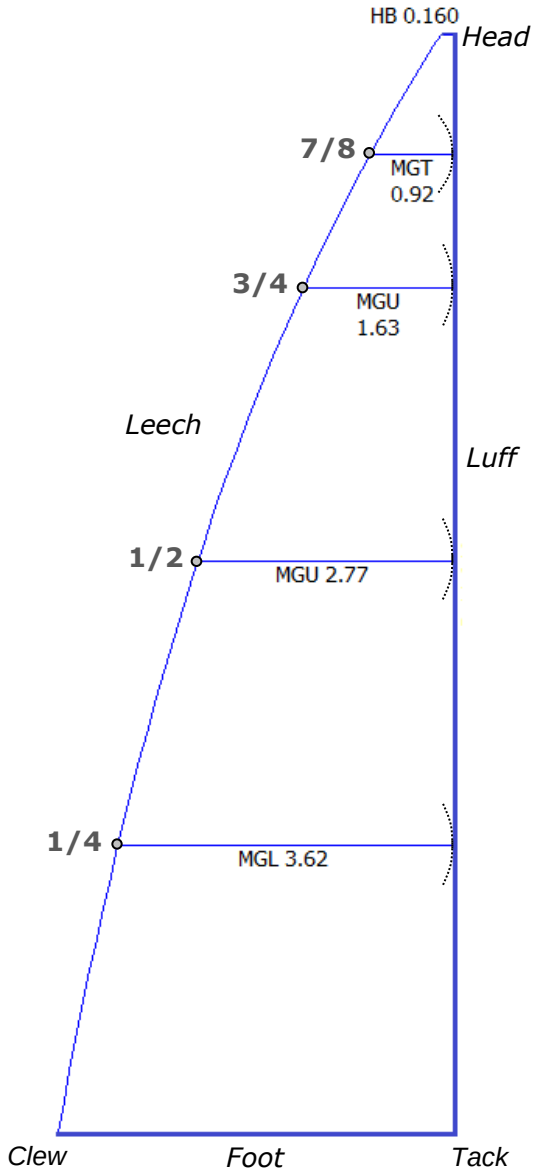
Sails – Mainsail and mizzen

Mainsail measurements

- **HB:** headboard (head to aft head)
- **MGT:** from 7/8 of leech perpendicular to luff
- **MGU:** from 3/4 of leech perpendicular to luff
- **MGM:** from 1/2 of leech perpendicular to luff
- **MGL:** from 1/4 of leech perpendicular to luff

ORC	measurer: nr.	MNA
d / m / y	SIGNED:	
HB	MGM	
MGT	MGL	
MGU		

Measurement stamp (usually at the head)



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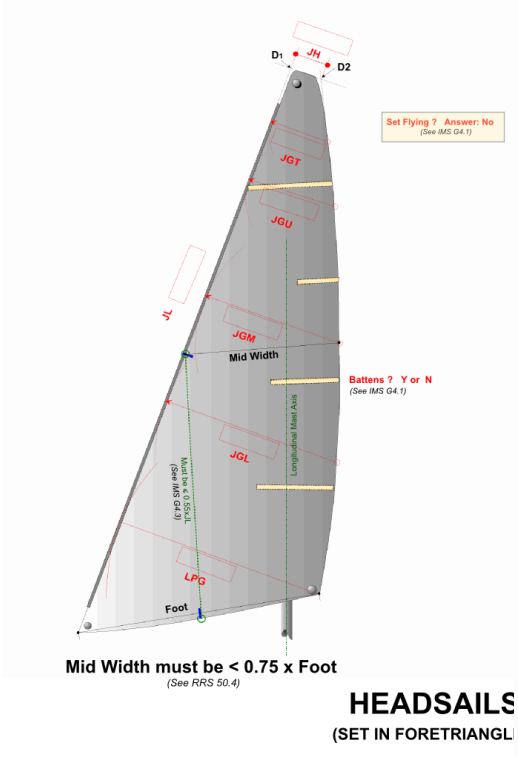
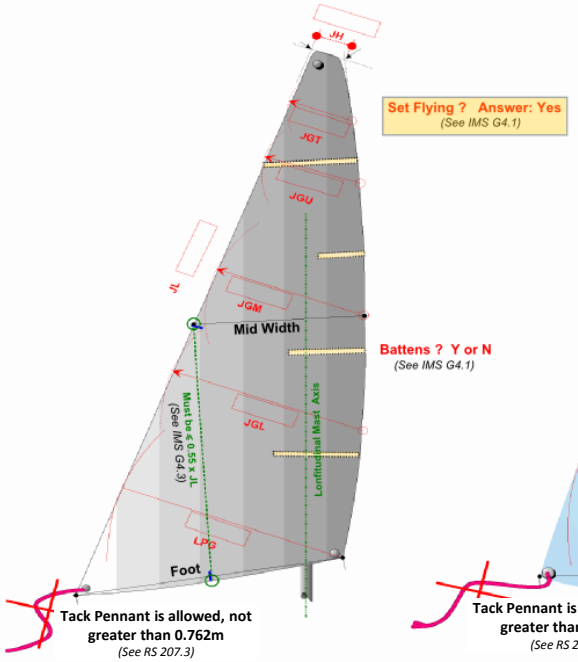
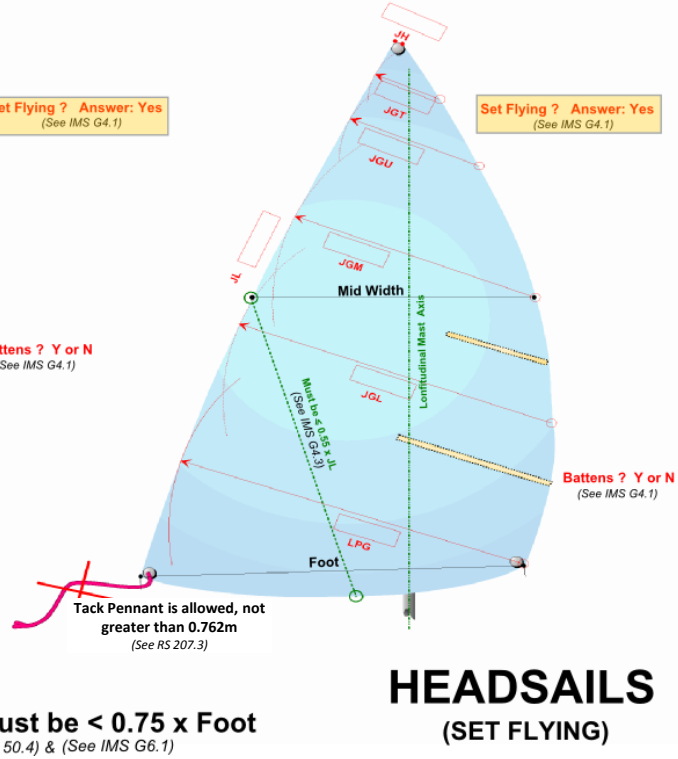
Sails – Headsails

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







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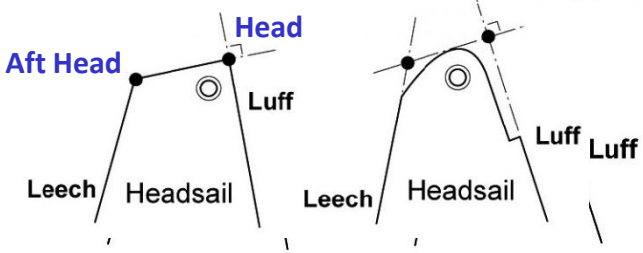
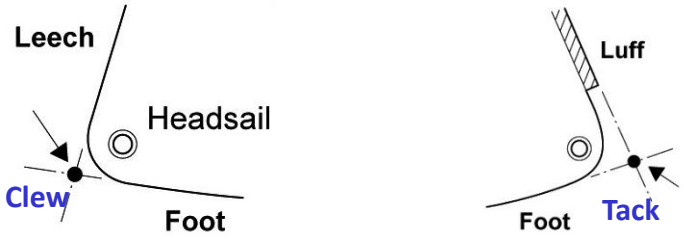
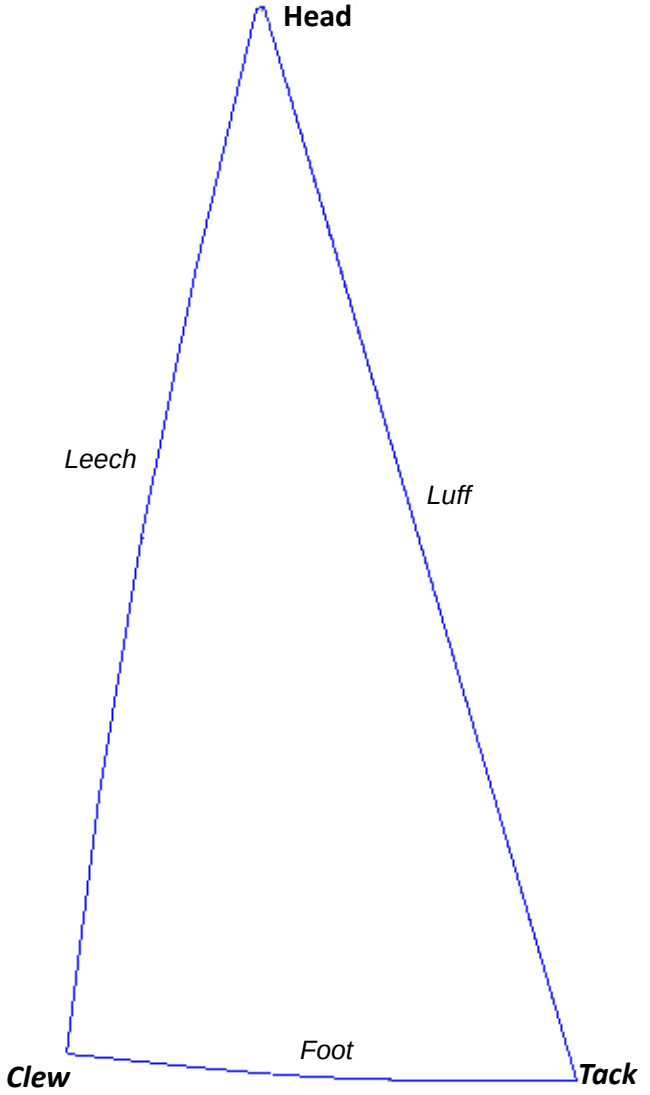
Sails – Headsails







- **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

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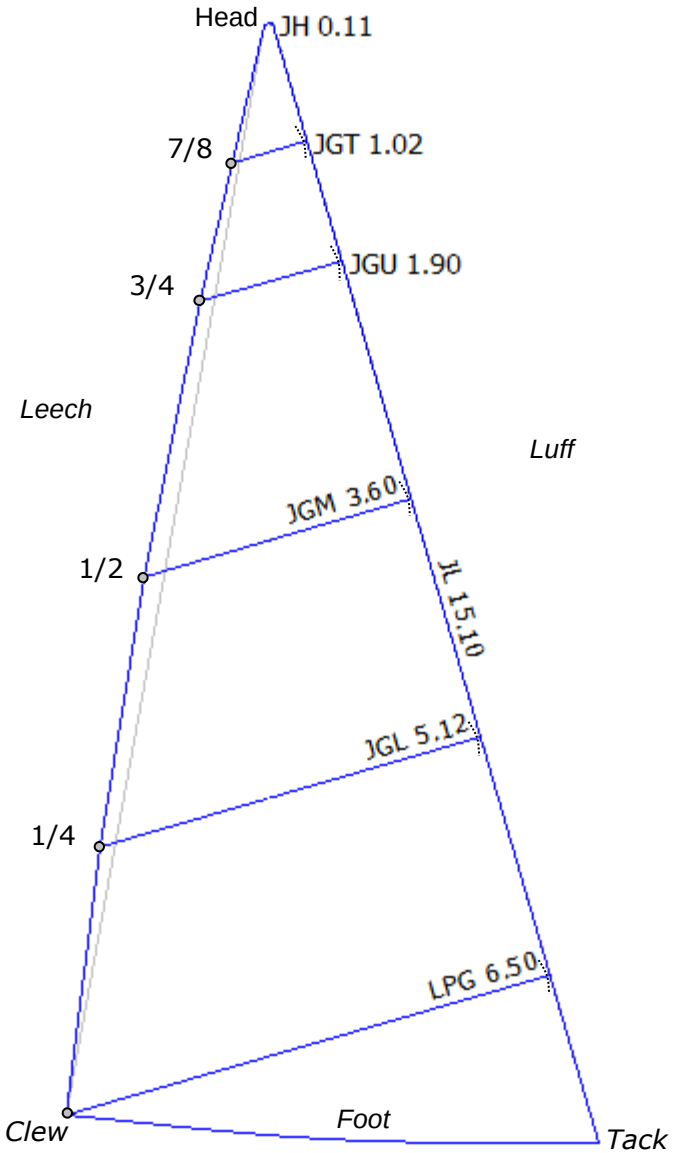
Sails – Headsails

Headsaila measurements

- **JH:** headboard
- **JGT:** from 7/8 of leech perpendicular to luff
- **JGU:** from 3/4 of leech perpendicular to luff
- **JGM:** from 1/2 of leech perpendicular to luff
- **JGL:** from 1/4 of leech perpendicular to luff
- **LPG:** from clew perpendicular to luff
- **JL:** luff length (head to tack)
- Flag for battens: Yes / No
- Flag for set flying: Yes / No

ORC	measurer: nr.	MNA
d / m / y	SIGNED:	
JH		JGM
JGT		JGL
JGU		LPG
		JL

Measurement stamp (usually at the head)



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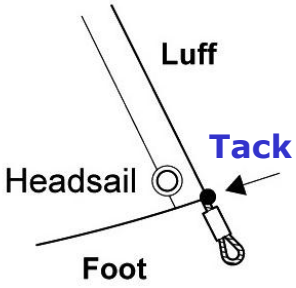
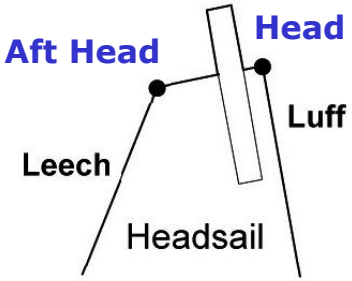
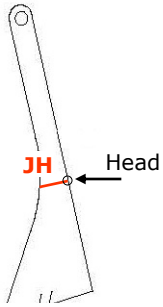
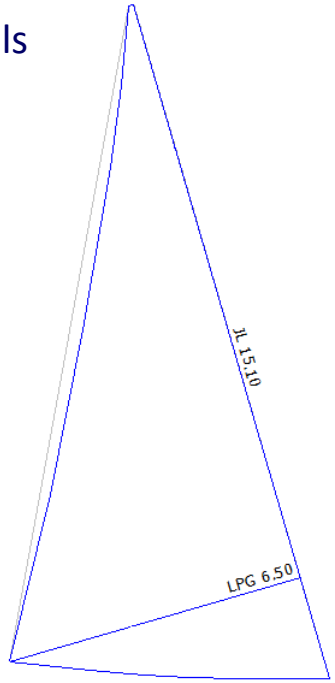
Sails – Headsails



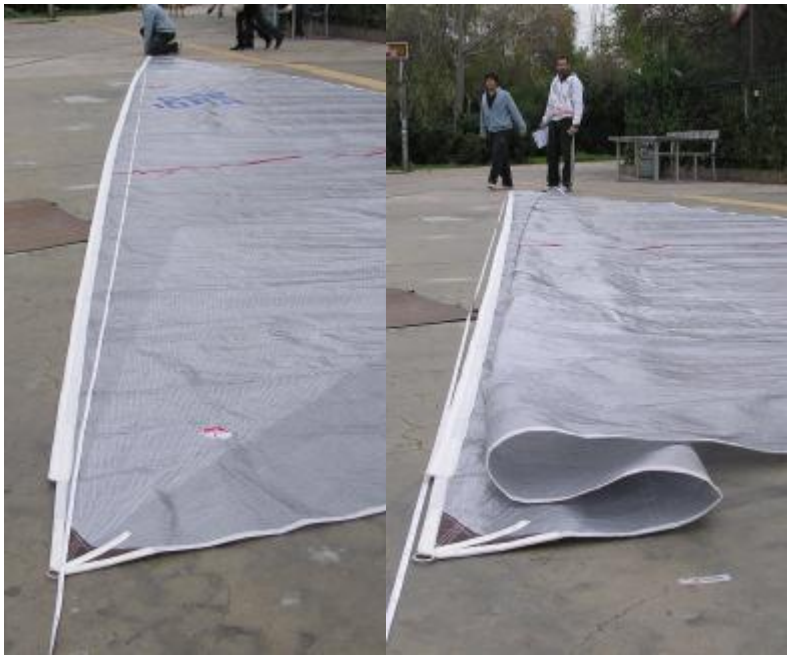




Extensions at the corners of headsails are not taken into account.



In sails with sail area smaller than the maximum and which obviously have a negative roach, it is allowed to measure ***LPG*** and ***JL*** only



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

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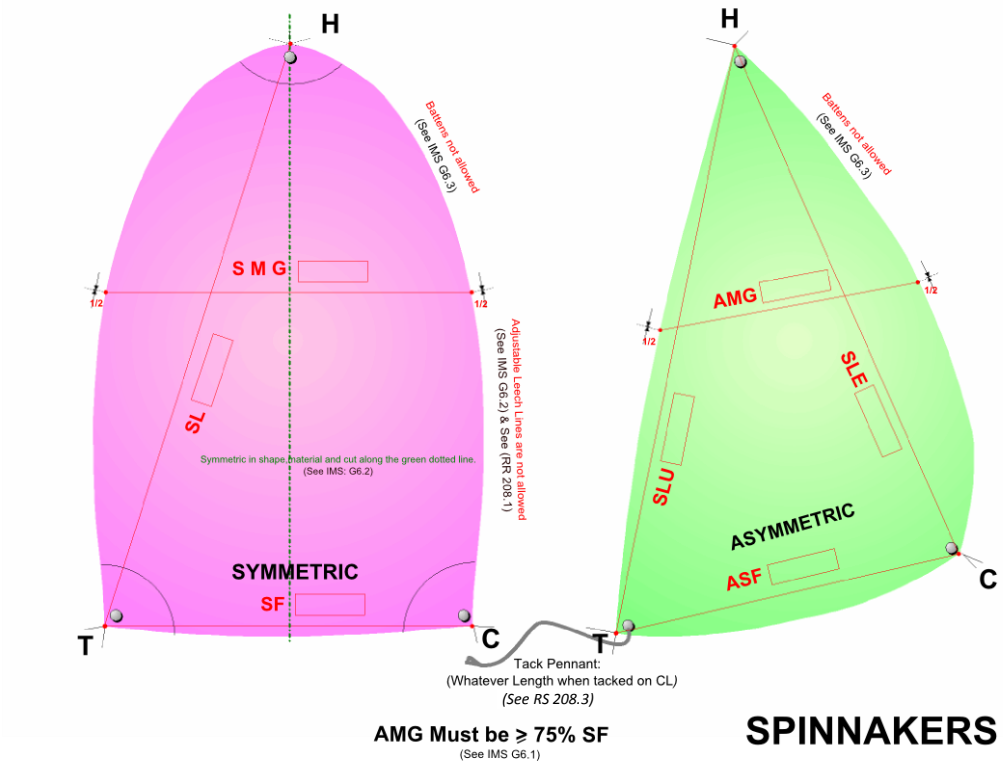
Sails – Spinnakers

- **Symmetric spinnaker**
  Symmetric in shape, material and cut

  SMG ≥ 75%·SF

- **Asymmetric spinnaker**
  A spinnaker which is not symmetric

  AMG ≥ 75%·ASF



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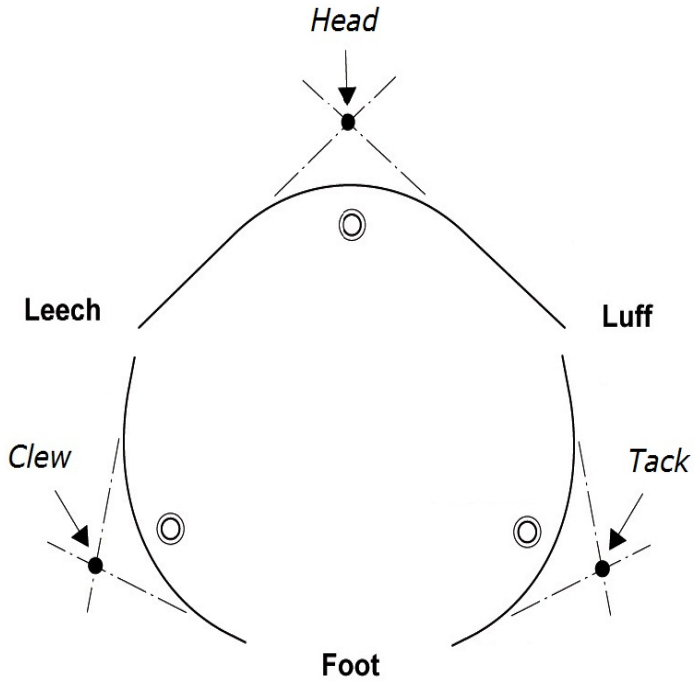
Sails – Spinnakers

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



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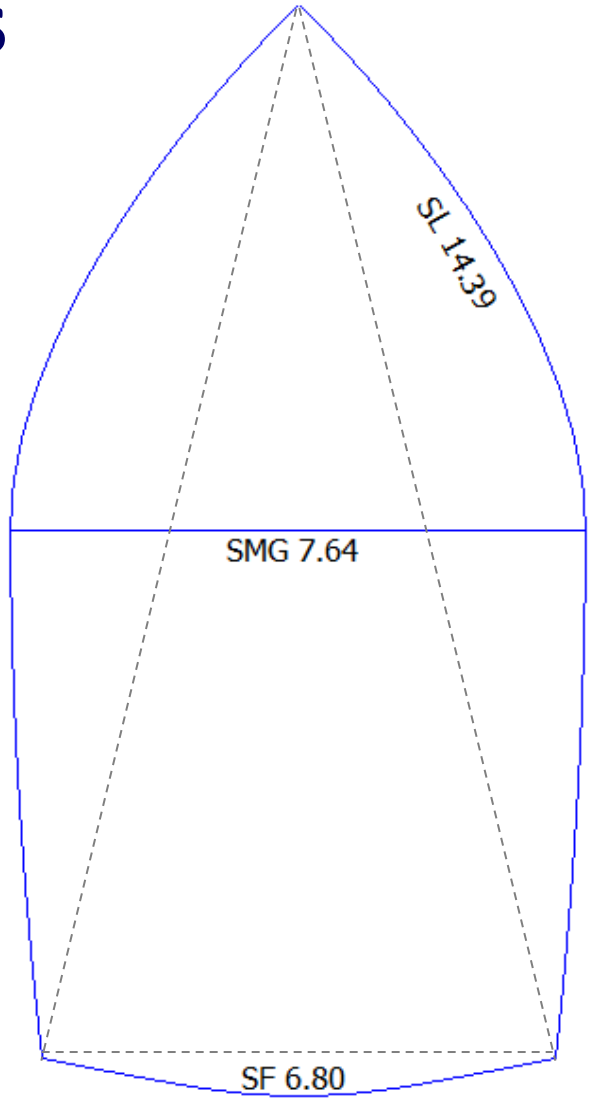
Sails – Symmetric Spinnakers

- ***SL*:** Length of leech or luff (head-clew or head-tack)
- ***SMG*:** Width at midpoints of leech/luff
- ***SF*:** Foot length (head-clew)



ORC	measurer: nr.	MNA
d / m / y	SIGNED:	
SL		
SMG		
SF		

Measurement stamp (usually at the head)

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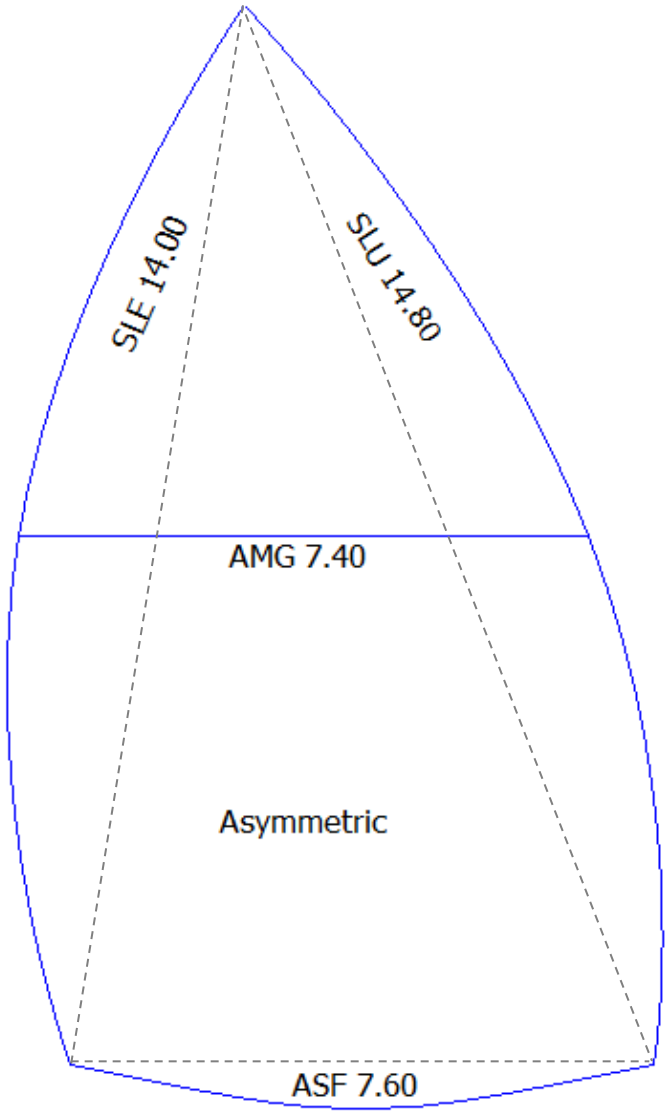
Sails – Asymmetric

- ***ASL*:** Length of leech luff (head-tack)
- ***ASF***: Length of luff (head-clew)
- ***SMG*:** Width at midpoints of leech/luff
- ***SF*:** Foot length (head-clew)

ORC	measurer: nr.	MNA
d / m / y	SIGNED:	
SLU		
SLE		
AMG		
ASF		

Measurement stamp (usually at the head)



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IMS Appendix 1 – Accommodation

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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

Typical Cruiser/Racer boat

Typical Performance boat

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