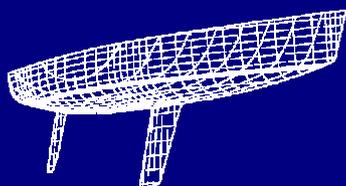




World Leader in Rating Technology

# OFFSHORE RACING CONGRESS



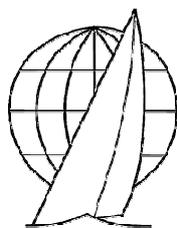
**International Measurement System**  
*IMS 2011*

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Cover picture: IMS Hull measurement  
by courtesy Dobbs Davis

Deleted rule from 2010 version: G4.6  
Margin bars denote rule changes from 2010 version.



**ORC**

*World leader in Rating Technology*

# **INTERNATIONAL MEASUREMENT SYSTEM**

# **IMS**

# **2011**

Offshore Racing Congress, Ltd.

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# Part A - ADMINISTRATION

---

## A1 Language

- A1.1 The official language of the IMS is English and in case of dispute over translations the English text shall prevail.
- A1.2 The word "shall" is mandatory and the word "may" is permissive.

## A2 Abbreviations and Definitions

- A2.1
- |      |                                  |
|------|----------------------------------|
| IMS  | International Measurement System |
| ORC  | Offshore Racing Congress         |
| ISAF | International Sailing Federation |
| ERS  | Equipment Rules of Sailing       |
| RRS  | Racing Rules of Sailing          |

## A2.2 Age Date

- a) Age Date shall be the month and year of the first launching when the boat was completed and equipped for sailing. Age Date may be taken either from the owner's documentary evidence or as month and date of the first measurement afloat.
- b) Age Date shall be changed and new measurement shall be required after any hull modifications except:
- change outside the canoe body, defined as the hull surface of the yacht, including transom, continued to the centerline tangentially from the point of final inflection into the keel and skeg
  - fairing of new appendages
  - removal of bumps outside the canoe body outer skin
  - filling of hollows (e.g., in the IOR after girth area)
  - forward or aft extensions or reductions of the fair surface of the hull, limited to modifications only within 0.10\*LOA of the forward and/or aft end(s) of LOA

The total of modifications to the canoe body surface shall not exceed 20% of the total surface prior to modification.

- A2.3 **Series Date** shall be the Age Date of the earliest boat of an unmodified series built in the production moulds or jigs.
- A2.4 **Flotation Date** shall be the date when the most recent measurement afloat was completed.
- A2.5 **Measurement Date** shall be the date when the most recent measurement was completed.

## A3 Authorities

The sole authority for the IMS is the Offshore Racing Congress and it shall be maintained and administered at the ORC's discretion.

## A4 ISAF Rules

- A4.1 These **class rules** shall be read in conjunction with the ERS.
- A4.2 Except where used in headings, when a term is printed in "**bold**" the definition in the ERS applies and when a term is printed in "*italics*" the definition in the RRS applies.
- A4.3 When printed in "***bold italics***" the term is used as measurement taken or recorded by the measurer.
- A4.4 RRS 50.4 is not applying.

**A5 Rules Amendments**

Amendments to the ORC International are subject to the submission by the ORC Nominating bodies and approval of the ORC in accordance with the Articles of Association of ORC Ltd.

**A6 Rules Interpretations**

The ORC Chief Measurer may at any time issue interpretations or correction of the ORC rules and regulations. Any such interpretation or correction shall be published and then deemed final unless and until overruled by the ORC Management Committee and Congress.

**A7 Measurement**

- A7.1 The term “measurement” shall be taken to include also identification as to type, category, number, material, construction, etc. as may be determined by examination or declaration.
- A7.2 Measurements shall be taken from the yacht wherever practicable but where this is unduly difficult the Chief Measurer may approve the use of plans or other such sources of information as he considers reliable.
- A7.3 Measurers shall be appointed by the ORC or, with the approval of the ORC, by the Rating Authority. A Measurer shall not measure a yacht of another Rating Authority without the permission of that Authority. No Measurer, assistant, nor Rating Office staff shall participate in the measurement or processing of measurements of a yacht owned, designed or built, wholly or partly, by himself or in which he is an interested party, or in which he has acted as a consultant or has a vested interest. Except for reasonable and brief clarification of points in the Rules, this applies to any consultation or advice on rating values regardless of whether or not any payment is involved.
- A7.4 Measurements, unless otherwise specified, shall be taken and recorded to the nearest greater value as follows:
- a) **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.
  - b) **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.
- A7.5 In case of doubt in any measurement taken or recorded or any procedure, the measurer shall refer his questions, together with the relevant facts, to the ORC Chief Measurer and shall be bound by his interpretation.
- A7.6 Boats measured under the IMS Rule before 01/01/2008 shall comply with the rules applicable at the time of measurement.

## Part B - HULL

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### B1 General

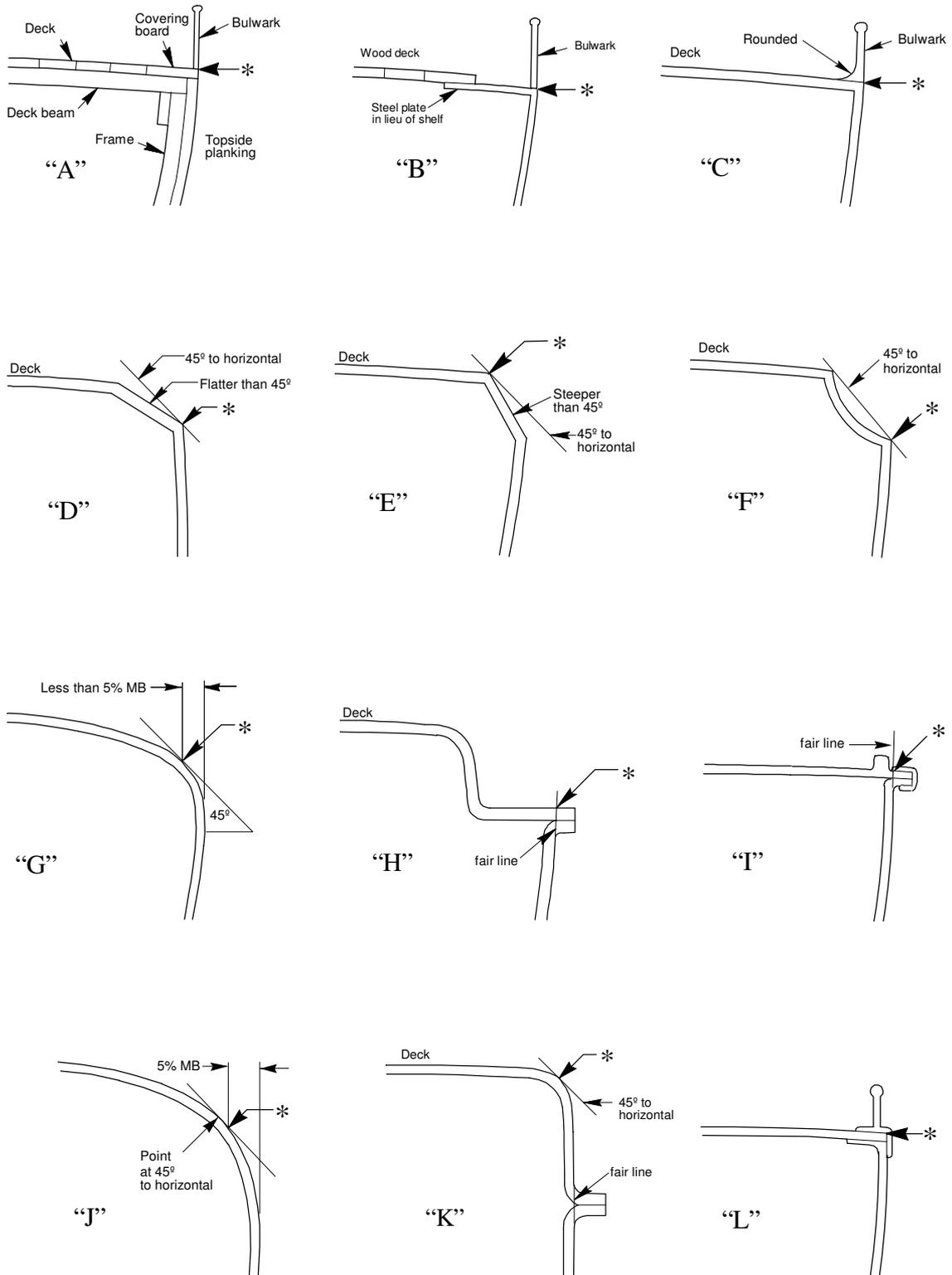
- B1.1 Hull shall be monohull only. Canoe body depth in any section shall not decrease towards the center line.
- B1.2 A hull measurement shall be performed to create an OFF file describing the lines of the hull together with appendages by using an ORC approved hull measurement machine or any available measurement instrument capable to produce a list of the points in the co-ordinate system as defined herein and detailed in the "ORC OFF File Format" document.
- B1.3 The co-ordinate system defining the hull shall be positioned as follows:
- X axis – longitudinal with 0 at stem and positive towards the stern
  - Y axis – transverse with 0 at the centerline and positive towards the beam
  - Z axis – vertical with 0 at the waterline and positive upwards

### B2 Measurement Procedure

- B2.1 The yacht shall be presented for measurement ashore in an accessible location, clear of obstructions, properly and firmly chocked and leveled athwartships and approximately in the same longitudinal trim which it might reasonably be expected to assume when afloat in measurement trim. A centerboard, if any, shall be in its maximum raised position. A centerboard that can be locked to prevent movement while *racing*, shall be in its locked position and measured as a keel. Rigging shall be slack. All appendages shall be fitted and any fairings shall be in place.
- B2.2 Station points shall be taken starting from deepest point to the sheerline at stations from stem to stern as follows:
- Approximately 20 stations shall be taken from each side spaced with maximum distance of 5% *LOA*. Within the forward 15% of *LOA* the spacing between stations shall not be greater than 2.5% of *LOA*.
  - The forward freeboard station shall normally be placed approximately 0.5 m from the stem.
  - The aft freeboard station shall normally be placed at the aftermost section at which the hull could be girthed without crossing the transom.
  - Stations shall be taken also at the edges of any appendage, at the maximum draft and at any significant change of appendage profile in longitudinal direction.
  - Freeboards stations and at least one midship section shall be taken from both sides at the same distance from the bow.
- B2.3 The sheer point at any measurement station shall be defined by the following rules:
- The sheer point shall normally be the lowest point on the topsides of the hull where a tangent at 45 degrees can be rested on the hull. The sheer point shall not, however, be taken to any point that is above the lowest level of the deck, or its extension where it intersects the topsides at that station. Where any bulwark or rubbing strake is fastened to the yacht, it shall be ignored in determining the sheer point.
  - Where any bulwark is a fair continuation of the line of the topsides of the yacht the sheer point shall be taken on the hull surface at the level of the lowest level of the deck at the station projected through the bulwark.
  - Where the sheer point at any measurement station, as defined above in a) or b), is more than 0.05 \* *MB* inboard of a vertical tangent to the hull at that station, the sheer point at that station will be at the point on the hull a distance of 0.05 \* *MB* inboard from the vertical tangent to the hull.
  - A bulwark shall be interpreted to mean any rail or part of the topsides extending above the lowest level of the deck at that station.

The level of the deck at any transverse station shall be taken to be the lowest level to which the yacht is rendered watertight at that station. Abreast a well or cockpit the sheer point shall be taken to the bulwark provided that this bulwark is in all respects a fair continuation of the hull surface. The sheer line on the bulwark shall be a fair continuation of the sheer line forward and/or aft of a well or cockpit. The edge of the working deck is defined as the most outboard point on the deck at the sheerline.

**Various sheer points**



- B2.4 If the sheer points on the freeboard stations can not be taken, they may be selected on different points in which case vertical distances shall be recorded in the hull offset file as:

**FFPV** shall be the vertical distance from the level of the sheer points in the forward freeboard station to the level of the freeboard points.

**AFPV** shall be the vertical distance from the level of the sheer points in the aft freeboard station to the level of the freeboard points.

### B3 Hull Measurements

- B3.1 **LOA** shall be the length overall of a yacht including the whole hull, excluding any spars or projections fixed to the hull such as chainplates, bowsprits, boomkins, pulpits, etc., and as measured between

- a) a point forward being the forwardmost of the following points:
  - i) the stem of the yacht, whether carried above the deck level or not, or
  - ii) the bulwarks of the yacht where these are extended above the stem.
- b) a point aft, being the extreme after end of the hull and bulwarks or taffrail of the yacht whether at, above, or below deck level. Rubbing strakes at the stern will be included. If a rudder and/or a push-pit extend abaft this point, neither one nor the other will be included.

- B3.2 **SFFP** shall be the horizontal distance from the forward end of LOA to the forward freeboard station.

- B3.3 **SAFP** shall be the horizontal distance from the forward end of LOA to the aft freeboard station.

- B3.4 **MB** shall be the maximum beam.

- B3.5 **SMB** shall be the horizontal distance from the forward end of LOA to the maximum beam station.

### B4 Hull Offset File

- B4.1 Once a hull is completely measured, an OFF file shall be generated using ORC-approved software by the Rating Authority or if needed by the ORC Chief Measurer. Where a number of hulls of the same model are built using the same moulds for hull, keel and rudder, a standard OFF file for that model will be created and no hull measurement will be needed for other boats built from the same mould.

- B4.2 Any change of the hull, keel or rudder of a model with existing OFF file shall be re-measured again and a new OFF file shall be created. In case of minor changes new measurements may be taken directly on changed parts by taking new dimensions comparing with existing point co-ordinates and changing them to the new values. Any larger changes shall be re-measured using the same method as on the original model.

### B5 Other Hull Measurements

- B5.1 **Hull construction** shall be recorded as one of the following:

- a) **SOLID**: Non-cored, solid E-glass, metal or wood hull and deck, but including also E-glass decks with core material. Where the construction is of wood, the minimum density of any layer shall not be less than 300 kg/m<sup>3</sup>.
- b) **CORED**: Hull skin of E-glass (see above) or wood, but incorporating a core material of less density than the skin.
- c) **LIGHT**: All other construction types, but excluding the incorporation of any carbon fiber.
- d) **CARBON**: Where carbon fiber has been incorporated anywhere in the construction of the hull and/or deck

Limited amounts of High Strength Carbon edge capping of bona fide hull structural frames, girders and stringers, and as localized reinforcement on bulkhead faces in way of chain plate attachments, are allowed in each of hull construction category provided it is used below decks between  $0.3*LOA$  and  $0.7*LOA$  aft of the stem.

For hull and deck construction, a declaration from the owner may be substituted for examination of one or more elements, but all elements are subject to examination at any time in cases of doubt.

- B5.2 **Honeycomb core** In addition to recording the appropriate construction type as above, if a honeycomb core has been incorporated in hull or deck construction, this shall also be recorded as "YES" or "NO".
- B5.3 **Rudder construction** shall be classified as one of the following:
- a) STANDARD: Neither rudder nor rudder post contain any carbon fiber.
  - b) CARBON: Rudder and/or rudder post contain carbon fiber in any amount.
- B5.4 **Forward Accommodation** When the bow forward of the mast is fully fitted out as a separate sleeping or living space built of solid construction, including bunks (pipe berths do not qualify), personal gear stowage, etc., this shall be recorded as "YES" or "NO".
- B5.5 **Anchor weight** shall be the weight of anchor and associated chain.
- B5.6 **Anchor LCG** shall be the longitudinal distance of centre of anchor and associated chain from stem.

# Part C - APPENDAGES

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## C1 Centerboard

- C1.1 In addition to the hull measurement, a centerboard or drop keel measurement shall be taken as follows:
- C1.2 *ECM* shall be the vertical distance from the lowest point of the hull or fixed keel, whichever is deeper, to the lowest point of the centerboard in its fully lowered position. In the case of tandem centerline centerboards, *ECM* shall be taken for the centerboard that produces the greatest effective centerboard extension.
- C1.3 *KCDA* shall be the vertical distance from the lowest point of the hull or fixed keel, whichever is deeper to a point directly above the point of maximum thickness of the centerboard in its fully lowered position on a buttock line on the keel or hull offset 2.5 times the maximum thickness of the centerboard from the centerline.
- C1.4 *WCBA* shall be the weight of the centerboard or drop keel in air. Where there is more than one board the weight of the additional board shall be recorded as *WCBB*.
- C1.5 *CBDA* shall be the vertical distance through which the center of gravity of the centerboard or drop keel can be lowered. When there is more than one board the figure for the additional board shall be recorded as *CBDB*.
- C1.6 Three centerboard chords shall be measured horizontally with the centerboard in the same position as that in which *ECM* was determined as follows:
- CBRC* shall be the centerboard root chord taken at the upper measurement point of *ECM*.
  - CBMC* shall be the centerboard mid chord taken at  $0.50 * ECM$  below the upper measurement point of *ECM*.
  - CBTC* shall be the centerboard tip chord taken at  $0.85 * ECM$  below the upper measurement point of *ECM*.

## C2 Canting Keel

Canting keel measurement is defined under Part E – Stability.

## C3 Bilge Boards

The location and vertical extension of the bilge boards shall be taken as part of the machine hull machine measurement procedure (Part B) and their draft determined from the OFF file at various angles of heel.

## C4 Trim Tabs

The presence of a movable trim tab shall be recorded.

## C5 Dynamic Stability System (DSS)

- C5.1 *DSSS* shall be the span of the extended wing measured along the curvature (if any curvature is present).
- C5.2 *DSSC* shall be the maximum chord length.
- C5.3 *DSST* shall be the maximum thickness.
- C5.4 *DSSA* shall be the angle of the wing with the horizontal axis (if the wing is curved the angle will be measured with a line connecting root chord to tip chord).
- C5.5 *DSSD* shall be the distance of the root chord from the centerline of the boat.

## Part D - PROPELLER

---

### D1 General

- D1.1 Speed under power with propeller in smooth water and without assistance of wind of shall not be less than  $1.811 * LOA^{0.5}$  (knots) where  $LOA$  is in meters ( $LOA^{0.5}$  where  $LOA$  is in feet).
- D1.2 The propeller shall at all times be ready for use and shall not be retracted, housed or shielded except by a conventional strut or aperture.
- D1.3 The propeller shaft exposed to water flow shall be circular in cross section.
- D1.4 If any of the requirements from the D1.1, 2 or 3 or are not met, this shall be recorded as "NO PROPELLER".

### D2 Propeller Types

- D2.1 **Solid Propeller** shall be a standard model in series production, unaltered, having a minimum of two fixed blades of normal elliptical shape and a maximum width of not less than  $0.25 * PRD$  measured across the driving face of the blade on a chord at right angles to the radius of the blade. Pitch shall not be greater than the propeller diameter. Hub and blade area projected into a plane at right angles to the shaft line shall not be less than  $0.2 * PRD^2$ .
- D2.2 **Folding Propeller** shall be a standard model in series production, unaltered, having a minimum of two blades that fold together pivoting on an axis at right angles to the shaft line when not being used for propulsion or any other propeller not qualifying as a solid propeller.
- D2.3 **Feathering Propeller** shall be a standard model in series production, unaltered, having a minimum of two blades that pivot so as to substantially increase pitch when not being used for propulsion.

### D3 Propeller Installations

- D3.1 **In Aperture** installation shall be with solid or three-bladed propeller entirely surrounded in the vertical plane of the shaft line by the keel, skeg, and/or rudder.
- D3.2 **Strut Drive**. The drive train shall be enclosed in a strut and the unit incorporating drive train and strut shall be of a standard model in series production. The surface and shape of the unit may be faired (e.g., with fillers) provided that its function is in no way impaired and none of the dimensions required for measurement of the unit are reduced relative to those as manufactured. For qualified units, where ORC standard dimensions are provided, they shall be used in place of measurements.
- D3.3 **Shaft**. All other propeller installation with shaft.

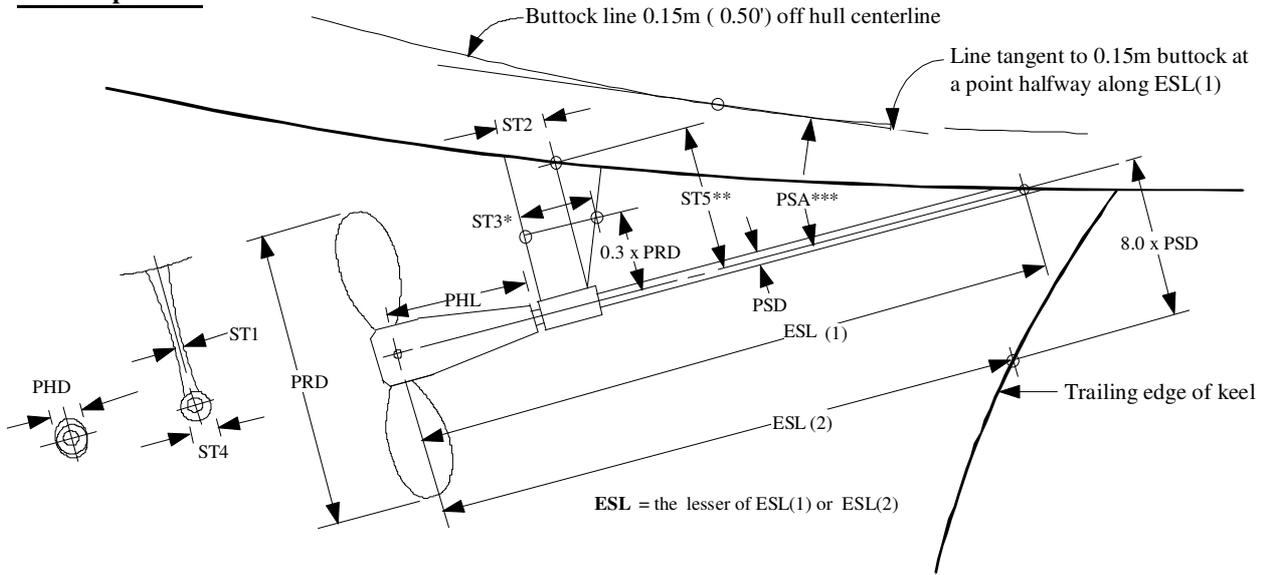
### D4 Propeller Measurements

- D4.1 **PRD** shall be the diameter of the propeller disc.
- D4.2 **PHD** shall be the smallest dimension through the shaft centerline of the projected area of the propeller hub.
- D4.3 **PHL** shall be the distance from the shaft end of the propeller hub to the intersection of the blade axis and shaft.
- D4.4 **PBW** shall be the propeller blade width measured across the driving face of the blade on a chord at right angles to the radius of the blade.

- D4.5 **PSA** shall be the angle between the centerline of the propeller shaft and a tangent to a hull buttock line 0.15 m (0.5 ft) off the hull centerline midway between the axis of the propeller blades and the point where the propeller shaft emerges from the hull. This angle approximates the angle between the propeller installation's shaft axis and the water flow past it. Any unfairness or reverse inflection shall be bridged to yield a fair approximation of the slope of the hull body in way of the propeller shaft.
- D4.6 **PSD** shall be the minimum propeller shaft diameter exposed to water flow including that part of the shaft within the strut hub.
- D4.7 **ESL** shall be the length of the exposed shaft measured from the center of the propeller (the intersection of the blade axis and shaft) to the point at which the shaft center line emerges from the hull or appendage. For a boat with a Series Dates 1/1985 or later, **ESL** shall be the lesser of **ESL** as defined above or the length of the line  $8.0 * PSD$  below the shaft axis and parallel to it measured from the blade axis to the fair line of the aft edge of the keel. If the shaft is not supported by a strut, positioned adjacent to the propeller hub, **ESL** shall be recorded as zero.
- D4.8 **EDL** shall be the distance, measured along and in prolongation of the propeller shaft, from the center of the propeller to the aft edge of any other strut or fin (except the rudder blade) forward of the propeller.
- D4.9 **ST1** shall be the minimum projected thickness of the strut at any point between the hull and the shaft.
- D4.10 **ST2** shall be the minimum width of the strut, (including the strut hub) measured parallel to the shaft.
- D4.11 **ST3** shall be the maximum width of the strut, measured parallel to the shaft, not above a line  $0.3 * PRD$  above the shaft centerline.
- D4.12 **ST4** shall be the smallest dimension through the shaft centerline of the projected area of the strut hub within **ST2** of the aft end of the strut hub.
- D4.13 **ST5** shall be the distance, measured perpendicular to the propeller shaft at the forward end of **ST2**, from the centerline of the shaft to the hull or fair continuation of the hull.
- D4.14 If any of **ST1 – ST4** measurements for the strut drive installation has been increased by the fairing of the standard production unit, **ST1 – ST4** shall be recorded as manufactured.
- D4.15 **APH** shall be the maximum height of the aperture opening measured at right angles to the shaft line.
- D4.16 **APT** and **APB** shall be the maximum widths of the aperture opening measured parallel to the shaft line at distances not less than  $PRD / 3.0$  above and below the shaft line.
- D4.17 For each of the propeller installation types following measurements shall be taken:
- a) In Aperture: **PRD, APH, APT, APB**
  - b) Strut Drive: **PRD, EDL, ST1, ST2, ST3, ST4, ST5**
  - c) Shaft: **PRD, PHD, PHL, PSA, PSD, ESL, ST1, ST2, ST3, ST4, ST5**
- D4.18 The presence of twin propellers shall be recorded.

# Propeller Installation Measurement

## Out of Aperture



\*ST3 is the maximum strut width measured parallel to the propeller shaft found not more than 0.3 x PRD above the shaft centerline.

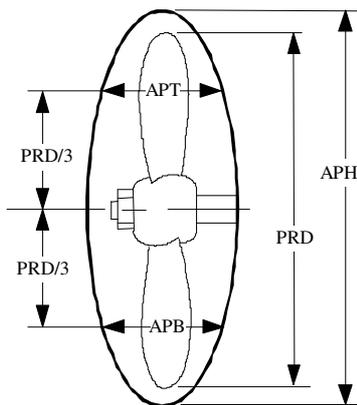
\*\*ST5 is measured perpendicular to the shaft centerline from the hull to the shaft centerline at the forward end of ST2.

\*\*\*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

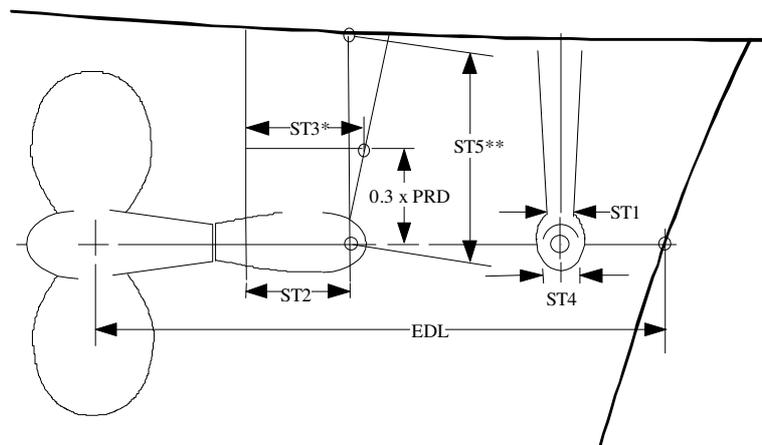
Add angles to arrive at PSA.

## In Aperture



APT and APB are the maximum aperture widths measured parallel to the propeller shaft, found not less than PRD/3 above and below the shaft centerline.

## Strut Drive



## Part E - STABILITY

---

### E1 General

- E1.1 Freeboards and inclining test measurement shall be performed in calm water with the boat not depressed from any side through lying to a mooring and with no one aboard in the measurement trim.
- E1.2 For the inclining test, a manometer as a "water scale" or an ORC-approved electronic inclinometer shall be used.

### E2 Measurement Trim

- E2.1 The owner or his representative shall put the yacht in measurement trim by following the procedure defined below. No substitutions are permitted during measurement afloat:
- a) All sails shall be removed from the yacht.
  - b) Ballast shall be fixed below the cabin sole, or as low as possible at any station and fixed to the hull structure to prevent movement. Anchors and chain shall be secured in clearly marked stowage. The batteries shall be secured in their proper stowage.
  - c) Heads, bowls, sinks shall be dry.
  - d) Bilges and other areas where water may collect shall be dry. There must be no effort to artificially moisten decks, rig, equipment or gear.
  - e) All tanks shall be empty, except the fuel tank which can be as empty as possible (recommended) or full with condition recorded as per E2.2(g). If the fuel tank was full, freeboard measurements shall be adjusted reflecting the "sink" effect on Measurement trim resulting from the weight and position of the fuel aboard.
  - f) Voids in the keel or any other appendage shall be declared and shall be treated as tankage.
  - g) Navigational and cooking equipment shall be aboard.
  - h) No clothing, bedding, food or stores shall be aboard.
  - i) All mattresses, cushions, and pillows must be aboard during measurement and shall be stowed in their normal bunks.
  - j) All portable gear normally stowed forward shall be placed abaft the foremost mast on the cabin sole.
  - k) Safety gear shall be stowed in normal position, but not forward of the mast.
  - l) No life raft or dinghy shall be on board.
  - m) Centerboard(s) and drop keels shall be fully raised. If any drop keel or movable appendage is to be locked when *racing* it shall be so locked and the locking device shall be in place.
  - o) One set of sheets and guys and any running rigging not carried permanently on spars and other portable deck gear used in *racing* the yacht shall be stowed abaft the mast on the cabin sole.
  - p) All standing rigging and related fittings used whilst *racing* shall be attached in their normal positions. Running rigging forward of the mast and all halyards and lifts shall be taken to the foot of the mast and hauled tight. All other pieces of running rigging abaft the mast shall be taken to their aftermost position and hauled tight. All halyard tails shall be taken to their normal working positions. If the halyard weight varies significantly along its length, the tail shall be on the cabin floor for the inclining experiment, with the halyard fully hoisted and attached to a light messenger line. A halyard may be used as a topping lift.
  - q) Masts shall be raked aft to the limit of their adjustment. Where this limit is forward of the vertical the mast shall be set vertical.
  - r) Booms shall be secured at the low points of *P* and *PY*, as the case may be.

- s) No spinnaker pole shall be aboard while measuring freeboards.
- t) Hydraulic systems including hydraulic tanks shall be full for measurement and shall remain full when *racing*.
- u) If an outboard motor, where it is the yacht's engine, is to be carried when *racing* it shall be provided with a proper locker and/or mounting bracket. It shall be in this stowage at the time of measurement and at all times when *racing*. This stowage shall not be such that the center of gravity of the motor is forward of the foremost mast.

E2.2 Measurement inventory shall be recorded as follows:

- a) **Interior Ballast**: description, weight, distance from stem
- b) **Anchor**: weight, distance from stem
- c) **Anchor chain**: weight, distance from stem
- d) **Batteries**: description, weight, distance from stem
- e) **Tools**: weight, distance from stem
- f) **Engine**: manufacturer, model
- g) **Tanks**: Use, type, capacity, distance from stem, condition at measurement
- h) **Items normally forward** but placed abaft the mast for measurement: weight
- i) **Deck equipment** placed abaft the mast: weight
- j) **Miscellaneous**: description, weight, distance from stem

### E3 Freeboards

- E3.1 **FFM** shall be the average of port and starboard freeboards measured vertically from the sheer point to the water level at the section at **SFFP** from stem.
- E3.2 **FAM** shall be the average of port and starboard freeboards measured vertically from the sheer point to the water level at the section at **SAFP** from stem.
- E3.3 **SG** shall be the specific gravity of the water sampled from a level 0.3 m below the surface.

### E4 Inclining Test

E4.1 The inclining test shall be performed as follows:

- a) The boat shall be in measurement trim as defined in E2.
- b) Two poles shall simultaneously be positioned port and starboard at the **MB** station (**SMB** from the stem) and suspended outboard to provide arms for supporting inclining weights. The poles shall be arranged normal to the boat's centerline and as nearly horizontal as is possible but allowing sufficient clearance to prevent the weights from touching the water. The poles shall be approximately **SPL** in length and the yacht's pole or poles shall normally be used when available. If a yacht's pole is not used it shall not be on board.
- c) Either a manometer shall be positioned athwart the yacht where it can be read by the measurer or ORC-approved electronic inclinometer shall be placed on the deck.
- d) When the poles are rigged and all the weights suspended on the starboard side the datum on the manometer shall be marked. Where an electronic inclinometer is used, the datum position may be recorded four times in succession.
- e) If the manometer is used the weights shall be transferred one by one to the port side, weight transferred and manometer reading shall be recorded. As an alternative or when an electronic inclinometer is used, all weights may be transferred at once to the port side, and the resulting angle recorded four times in succession.
- f) All the weights shall be suspended on the starboard side once again and the datum on the manometer verified.

- E4.2 **PLM** shall be the length of the manometer from the center line of the fluid reservoir to the centerline of the gauge cylinder recorded in millimeters to one decimal place and shall not be less than 2000.0 mm.
- E4.3 **GSA** shall be the surface area of the manometer gauge in square millimeters.
- E4.4 **RSA** shall be the surface area of the fluid reservoir in square millimeters.
- E4.5 When an electronic inclinometer is used **PLM** shall be recorded as 9000, **GSA** and **RSA** as 1.0.
- E4.6 **WD** shall be the horizontal distance from the point of attachment of the starboard weight to the point of attachment of the port weight with the weights distributed equally on the two pole ends. The weights shall be attached so that the weight distance is constant for all tests. The weight distance shall be of the order of  $MB + 2.0 * SPL$ .
- E4.7 **W1 ... W4** shall be the total weight suspended from the port pole for each reading of the manometer. They shall be of suitable magnitude to ensure that the largest **PD** is within:
- $\pm 0.01 * PL$  of  $0.105 * PL$  for yachts with **LOA** > 12.5 m
  - $\pm 0.01 * PL$  of  $0.125 * PL$  for yachts with **LOA** ≤ 12.5 m
- and the intermediate values are approximately equally spread over the range.
- E4.8 **PDI ... PD4** shall be the deflections on the manometer gauge after each weight of the set has been moved, from the datum established in E4.1(d).

## E5 Water Ballast

- E5.1 **WBV** shall be the maximum water ballast volume in litres (gallons in imperial units) that can be loaded on one side. It shall be recorded only if inclining test as defined in E5.2 and freeboard measurements as defined in E3 has not been performed.
- E5.2 The inclining test for a yacht equipped with water ballast tanks symmetrical about the yacht's centerline shall be performed as follows:
- The inclining test shall be made with ballast tanks empty according to E4.
  - The ballast tank(s) on the starboard side of the yacht shall then be filled pressed up and the resulting angle of list recorded.
  - The port ballast tank(s) shall then also be filled, pressed up and an inclining test shall be repeated with all ballast tanks full.
  - The starboard ballast tank(s) shall then be emptied and the resulting list angle recorded.
- E5.3 Measurements recorded for the inclining test with all ballast tanks full shall be the same as in E4 except that the corresponding data field names will include the suffix "**W**".
- E5.4 **LIST** shall be the average of the port and starboard list angles to the nearest tenth of a degree. If the port and starboard list angles are not approximately equal, the yacht may be deemed not to comply with the provision above for symmetric ballast tankage.

## E6 Canting Keel

- E6.1 The inclining test for a yacht equipped with a canting keel with symmetric maximum cant angles port and starboard shall be performed as follows:
- The inclining test shall be made with the canting keel on centerline according to E4.
  - The keel shall then be canted fully to starboard to the maximum angle or to the angle limited by the locking device above which canting keel shall not be canted while racing. The resulting list angle shall be recorded and the angle of the keel relative to the yacht's centerplane also recorded. These measurements shall be repeated and recorded with the keel canted fully to port.
- E6.2 **LIST** shall be the average of the port and starboard list angles to the nearest tenth of a degree. If the port and starboard list angles are not approximately equal, the yacht may be deemed not to comply with the provision above for symmetric cant angles.
- E6.3 **CANT** shall be the average of the port and starboard cant angles.

# Part F - RIG

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## F1 General

- F1.1 Spars shall not be permanently bent. A spar that will straighten when stresses imposed by the rigging are removed does not constitute a permanently bent spar.
- F1.2 Masts shall not be rotating. Masts shall be structurally continuous (non-articulating) from the masthead to the step. Masts that are not stepped on the keel shall not be pivoted fore or aft while racing.
- F1.3 Boats shall be fitted with a bona-fide forestay. Forestay and shrouds shall be connected by conventional turnbuckles, toggles or link-plates. The mast may be steadied to balance an untensioned backstay only by use of a headsail halyard and its proper winch. A device for measuring jibstay tension is permitted provided that it is incapable of adjusting the stay and has a possible movement of no more than 5mm.
- F1.4 The rig shall be measured according to the ERS except otherwise prescribed by the IMS, in which case IMS shall prevail.
- F1.5 The following amendments to the ERS shall apply:
- a) **Mast datum point** shall be the intersection of the forward side of the mast, extended as necessary, and horizontal plane at the sheerline abreast the mast.
  - b) **Rigging point** shall be the attachment of the forestay to the mast structure, or the intersection of the center line of the forestay with the foreside of the mast where the point of attachment is internal.
  - c) **Upper point** of the mast shall be the lowest point of the **upper limit mark** at the aft edge of the mast or top of the highest sheave used for the main halyard.
  - d) **Outer point** of the boom shall be the point on the boom's **outer limit mark** at the upper edge, nearest the fore end of the boom or the aftermost position to which the sail can possibly extend.

## F2 Mainsail Hoist

- F2.1 **P** shall be the distance along the afterside of the mainmast between **lower point** and **upper point**.
- F2.2 If a sliding gooseneck is used the **lower limit mark** shall be placed at the height below which the foot shall not be while *racing*.

## F3 Mast Heights

- F3.1 **IG** shall be the **forestay height**.
- F3.2 **ISP** shall be the **spinnaker hoist height**.
- F3.3 **SPS** shall be the vertical distance from the **mast datum point** to the point on the mast intersected by the centerline of the spinnaker pole when set at the highest point on its track or to the lowest point of a painted measurement mark on the mast in which case the pole shall not be attached to the mast above that point while *racing*.
- F3.4 **BAS** shall be the vertical distance between **mast datum point** and **lower point** on the mast.

## F4 Mast Spar Dimensions

- F4.1 **MDTI** shall be the maximum **transverse mast spar cross section** above  $0.5 * P$  from the **lower point**.
- F4.2 **MDLI** shall be the maximum **fore-and-aft mast spar cross section** above  $0.5 * P$  from the **lower point**.

- F4.3 **MDT2** shall be the minimum **transverse mast spar cross section** below the **upper point**.
- F4.4 **MDL2** shall be the minimum **fore-and-aft mast spar cross section** below the **upper point**.
- F4.5 **TL** shall be the vertical distance from the highest point at which **MDTI** or **MDLI** occurs, whichever is lower, to the **upper point**.
- F4.6 **MW** shall be the minimum **fore-and-aft mast spar cross section** below the **rigging point** and above the lowest spreader.
- F4.7 **GO** shall be the horizontal distance from the **rigging point** to the after side of the mast or vertical projection of the after side of the mast.

## F5 Boom Spar Dimensions

- F5.1 **E** shall be the **outer point distance**.
- F5.2 **BD** shall be the maximum **vertical boom spar cross section**.
- F5.3 **BAL** shall be the distance from the point on the boom **outer limit mark** at the upper edge of the boom, nearest the aft end of the boom to a contrasting measurement band denoting the limit on the boom beyond which no lead for the sheeting of jib/genoa or spinnaker shall be attached. In the absence of such a band **BAL** shall be measured to the boom end.
- F5.4 **BWT** shall be the **boom weight**.

## F6 Rigging Measurements

- F6.1 **J** shall be the **foretriangle base**. Where there is the capacity for the mast to be moved at the deck, **J** shall be measured with the mast at the aftermost limit of adjustment unless a 1 in. (25mm) contrasting measurement band is provided. In this case **J** shall be measured to the aft edge of the band and the forward face of the mast shall not move aft of this point.
- F6.2 **SFJ** shall be the horizontal distance from the forward end of **J** to the forward end of **LOA** (negative if the forward end of **J** is ahead of the forward end of **LOA**).
- F6.3 **CPW** shall be the distance between the centers of the bearing points of the chainplates for the upper shrouds of the mainmast.
- F6.4 **FSP** shall be the larger of either:
- twice the maximum dimension, measured at right angles to the longitudinal axis, of a luff groove device; or
  - the largest dimension of the doubled portion of a wrap-around jib measured at right angles to the luff line when opened out.

## F7 Spinnaker Pole and Bowsprit

- F7.1 **SPL** shall be the length of the spinnaker pole when forced outboard in its fitting on the mast and set in a horizontal position athwartships, measured from the center line of the yacht to the extreme outboard end of the pole and any fittings used when a spinnaker is set.
- F7.2 **TPS** shall be the horizontal distance from the foreside of the mast at its lowest point above the deck or coach roof to the point of attachment at deck level of the foremost tacking point of any spinnaker or to the extreme forward end of any bowsprit in its maximum extended position.
- F7.3 If bowsprit can be moved sideways from the centerline this shall be recorded as “YES” or “NO”. |

**F8 Rig Weight and Center of Gravity**

- F8.1 **MWT** shall be the weight of the mast together with standing rigging with the components dry and the spars fitted only with components with which the yacht will use whilst *racing* as specified below:
- a) The mast shall be completely rigged with standing rigging, running backstays, spreaders, jumpers, lights, antennae, wiring, luff groove device and all other permanently attached fittings, including those turnbuckles which are not permitted to be adjusted while *racing*.
  - b) Excluded for measurement shall be running rigging, checkstays, rigging adjusters of any type (hydraulic or otherwise) and any associated blocks and tackle, boom vang and reefing tackle. Halyard messengers of not more than 4mm diameter and weighing not more than 15 grams per meter and only sufficient for convenient re-leading may be used to replace internal portions of running rigging.
  - c) All wiring, messengers and standing rigging shall be in their proper attached positions, and any slack stretched down and secured along the length of the mast with light material, such as lanyards or tape, with any tails hanging free at the butt.
  - d) Headboard, luff slides, spinnaker pole cars and any other adjustable devices shall be at their lowest limit of travel.
- F8.2 **MCG** shall be the distance from the vertical center of gravity of the mast together with standing rigging as defined in F8.1 to the **lower point** on the mast.
- F8.3 As appropriate to the size of the mast, the values for **MWT** and **MCG** may be found either by measurement at the single point of the center of gravity of the mast and rigging or by measurement of tip and butt weights separately, followed by calculation of these values to be recorded.

**F9 Other Rig Measurements**

- F9.1 **Jumper Struts**. If the mainmast incorporates jumper struts, this shall be recorded as “YES” or “NO”.
- F9.2 **Inner forestay**. If there is an adjustable inner forestay, this shall be recorded as "ADJUSTABLE". If there is a permanent inner forestay which is only disconnected when gybing, this shall be recorded as "FIXED".
- F9.3 **Forestay tension**.
- a) If the uppermost backstay is adjustable, this shall be recorded as “ADJUSTABLE AFT”.
  - b) If the forestay is adjustable and backstay is fixed, this shall be recorded as "ADJUSTABLE FORWARD".
  - c) If the forestay is adjustable and backstay is adjustable, this shall be recorded as "ADJUSTABLE AFT & FORWARD".
  - d) If neither the uppermost backstay nor forestay itself is adjustable, this shall be recorded as "FIXED".
- F9.4 **Number of spreaders** shall be recorded.
- F9.5 **Number of runners**. Running backstays and checkstays (according to the ERS) shall be recorded as “runners”. The number of pairs shall be recorded. Any secondary runner tension adjuster, fitted to the mast within 0.1\***IG** from the upper attachment point of the runners, shall not be counted as another pair of runners.
- F9.6 **Jumper Struts**. If there is jumper struts, this shall be recorded as “YES” or “NO”.
- F9.7 **Taper Hollows**. If the mast taper has hollows, this shall be recorded as “YES” or “NO”.
- F9.8 If **MWT** and **MCG** are not measured following shall be recorded:
- a) **Carbon mast**. If the mast is made of carbon, this shall be recorded as “YES or “NO”
  - b) **Fibre rigging**. If the rigging is made of any fibre, this shall be recorded as “YES or “NO”
  - c) **Mainsail furler**: If there is mainsail furler, this shall be recorded as “YES” or “NO”.

- F9.9 If there is genoa furler, this shall be recorded as “YES” or “NO”.
- F9.10 If standing rigging has non-circular section, this shall be recorded as “YES” or “NO”

**F10 Mizzen Rig Measurements**

- F10.1 **PY**, **MDT1Y**, **MDL1Y**, **MDT2Y**, **MDL2Y**, **TLY**, **BASY**, **EY**, **BDY**, **BALY** shall be taken as corresponding measurements defined in F2 – F5.
- F10.2 **IY** shall be the vertical distance from the mast datum point to the higher of:
- a) the center of the highest eyebolt or eye used for a mizzen staysail; or
  - b) the intersection of the foreside of the mast with the highest strop used for the halyard of a mizzen staysail.
- F10.3 **EB** shall be the distance at deck level between the after side of the mainmast to the foreside of the mizzen mast.

## Part G - SAILS

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### G1 General

- G1.1 A sail shall not be constructed in such a manner that any portion may be completely detached.
- G1.2 No device other than a normal leech line shall be used to adjust the curvature of any batten.
- G1.3 Sails shall be measured according to the ERS except otherwise prescribed by the IMS, in which case IMS shall prevail.
- G1.4 The following amendments to the ERS shall apply:
- a) Add new Sail measurement point **Seven-Eight Leech Point**: The point on the **leech** equidistant from the **head point** and the **three-quarter leech point**. If the point can not be found on the **leech**, the **aft head point** shall be taken as **Seven-Eight Leech Point**.
  - b) Add new Primary sail dimension for mainsail and genoa/jib **Seven-Eight Width**: The shortest distance between the **seven-eight leech point** and the **luff**.
- G1.5 If mainsail and all genoas are made of woven polyester, this shall be recorded as “YES or “NO”

### G2 Mainsail

- G2.1 The following measurements shall be taken:
- HB* shall be the **top width** except as defined in G2.2
- MGT* shall be the **seven-eight width**.
- MGU* shall be the **three-quarter width**.
- MGM* shall be the **half width**.
- MGL* shall be the **quarter width**.
- MSW* shall be the dry weight of the mainsail without battens.
- G2.2 If the centerline of a batten pocket is situated above **seven-eight leech point**, a straight line shall be taken through **seven-eight leech point** and the centerline of a batten on the **leech** situated above this point. The intersection of that straight line and the line through the **head point** at 90° to the **luff** shall be taken as the point from which *HB* shall be measured to the **head point**.

### G3 Mizzen

*HBV*, *MGLV*, *MGMV*, *MGUV*, *MGTV* shall be taken as corresponding measurements defined in G2.

### G4 Jib/Genoa (Including Inner Jib)

- G4.1 The following measurements shall be taken:

*JH* shall be the **top width**.

*JGT* shall be the **seven-eight width**.

*JGU* shall be the **three-quarter width**.

*JGM* shall be the **half width**.

*JGL* shall be the **quarter width**.

*JL* shall be the **luff length**.

*LPG* shall be the **luff perpendicular**

The measurements can be reduced to the last two items for genoa measurements before 01/01/2009 or when the leech has a clear hollow and the jib/genoa is not the largest in the sail inventory.

- G4.2 Any device or sail construction used to artificially shorten a **luff** shall be removed for the *JL* measurement.

- G4.3 The distance between **half foot point** and **half luff point** on the genoa/jib shall be not greater than 55% of **JL**.
- G4.4 Jibs shall have **LPG** of 110% or less of **J** and may have a maximum of four (for **LOA** ≤ 14.0 m) or five (for **LOA** > 14.0 m) battens approximately equally spaced between **head** and **clew**.

- G4.5 Genoas shall have **LPG** greater than 110% of **J** and shall not have any battens. Width measurements on genoas shall be smaller than following limits:

$$JGT \text{ limit} = 1.01 * (0.125 * LPG + 0.875 * JH)$$

$$JGU \text{ limit} = 1.01 * (0.25 * LPG + 0.75 * JH)$$

$$JGM \text{ limit} = 1.01 * (0.50 * LPG + 0.50 * JH)$$

$$JGL \text{ limit} = 1.01 * (0.75 * LPG + 0.25 * JH)$$

## G5 Mizzen Staysail

Mizzen staysails shall be three-cornered. The longest side edge shall be taken as a **luff**, the shortest edge shall be taken as a **foot**, and third edge shall be taken as a **leech**. The following measurements shall be taken:

**YSD** shall be the shortest distance that can be measured from **head** to **foot**.

**YSMG** shall be the **half width**.

**YSF** shall be the **foot width**.

## G6 Spinnakers

- G6.1 The **half width** of any spinnaker shall be 75% or more of the **foot length**, except that for a Code 0 type of asymmetric spinnaker **half width** shall be equal to or more than 55% and less than 75% of the **foot length**.
- G6.2 The symmetric spinnaker shall be symmetric in shape, material and cut, about a line joining the **head** to the center of the **foot**. The symmetric spinnaker shall not have adjustable leech lines. Any spinnaker not qualifying as symmetric shall be considered as asymmetric.
- G6.3 Battens are not permitted on any spinnaker.
- G6.4 The following measurements shall be taken on symmetric spinnaker:

**SL** shall be the **leech length**.

**SMG** shall be the **half width**.

**SF** shall be the **foot length**.

*Note: For sails measured before 01/01/2009 **SMW** shall be the spinnaker maximum width between any two points on the **leeches** equidistant from the head.*

- G6.5 The following measurements shall be taken on asymmetric spinnaker and Code 0:

**SLU** shall be the **luff length**.

**SLE** shall be the **leech length**.

**AMG** shall be the **half width**.

**ASF** shall be the **foot length**.

## G7 Sail Measurement Stamp

All sails shall be available for measurement. The measurer shall mark the sails complying with the IMS with an ORC-approved stamp, enter the measurements found, date and sign them. The stamp shall be issued by the Rating Authority which 3-letters national code shall be displayed in the rightmost column of the first row, as shown thus:

|            |                  |            |
|------------|------------------|------------|
| <b>ORC</b> | measurer:<br>nr. | <b>MNA</b> |
| d / m / y  | SIGNED:          |            |
|            |                  |            |
|            |                  |            |
|            |                  |            |
|            |                  |            |

# Appendix 1 – CRUISER/RACER REGULATIONS

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## PART 1 - GENERAL

### Introduction

The purpose of these regulations is to define requirements for categorizing boats as Cruiser/Racers controlling the cost, promoting safety and crew comfort. Cruiser/Racer yachts shall be those designed for cruising and longer stay on a boat and the minimum requirements are intended to guarantee as far as possible that boat follow the basic philosophy which include:

- The purpose of the yacht shall be in the first instance cruising.
- Accommodation layout and outfit shall be at least comparable to the standards of series production models which 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.

### 101 Cruiser/Racer category

1. Boats complying with these regulations shall be categorized as Cruiser/Racers and all IMS and ORC rules regulations as well as VPP calculations using C/R category shall apply to these boats.
2. Boats not complying with these regulations shall be categorized in Performance category.
3. Boats measured before 01/01/2010 shall comply with accommodation regulations applicable at the time of measurement where former Cruiser/Racer division will be grandfathered as Cruiser/Racer category and former Racing Division and None will be grandfathered as Performance category.
4. Any division of fleets, whether only for scoring purposes or to actually separate fleets on the race course, is at the discretion of National Authorities or local event organizers. However, when fleet is divided Cruiser/Racer category boats may on their own choice join the Performance category.

### 102 Fundamental Requirements and Definitions.

1. All systems relating to living, eating, sleeping, and stowage specified in these regulations shall be arranged in a manner suitable for cruising use and shall operate so as to provide the service function normally associated with the system. Items shall be presented as they are intended to be used. For example, any item intended for use as a berth shall be in place and its function declared at the time of inspection.
2. Designations such as table, berth, sink, stove, refrigerator, and so forth are intended to define the full utility of conventional equipment and whatever weight is customarily associated with it.
3. Designations such as locker, bin and drawer, specify rigid construction and full practicality for convenient and safe segregated stowage usable and accessible under offshore conditions. The contents of all compartments shall be fully secured by doors or other suitable devices.
4. “Permanently Installed” means items are built in and may not be removed from their permanently installed position for measurement or during racing.

**PART 2 – ACCOMMODATION REQUIREMENTS**

**201 Accommodation Areas.** 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. Living areas and sleeping areas should be separated by means of rigid bulkheads or partitions.

**202 Accommodation Length (AL)** shall be the lesser of *LOA* or  $3.25 * MB$ , calculated to the nearest 0.1m.

**203 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.

**204 Headroom (HR)** measured from cabin sole to the ceilings shall be not less than

- For yachts with an AL of 8.5m or less, HR = 1.40 m*
- For yachts with an AL between 8.6m and 14.4m: HR = 1.5 + 0.1656 \* (AL - 8.5)^0.5 (metres)*
- For yachts with an AL of 14.5m or more, HR = 1.90 m*

**205 Living Area.** A living area (cabin) shall consist of space containing a table and settees.

1. **Table** should be permanently installed, of substantial construction and arranged with convenient seating, fixed to the cabin sole or hinged from a bulkhead to facilitate stowage.

$$\text{Required table area} = 0.11 * \text{Min. Number of Berths (m}^2\text{)}$$

2. **Settees** are required sufficient to allow a number of crew equivalent to the number of berths to sit around the table.

**206 Sleeping Area** shall consist of a space containing berths and adequate facilities for personal gear stowage.

1. **Berths.** Each single berth should be at least 1.9m in length and at some point at least 0.6m in width. A double berth shall be at least twice the width of a single berth. The ends of berths may taper as required by the hull shape. Mattresses are to be fitted to all such berths.

| <u>Accommodation Length</u> | <u>Min. Number of Berths</u> |
|-----------------------------|------------------------------|
| $AL \leq 7,9$               | 2                            |
| $8,0 \leq AL \leq 8,9$      | 3                            |
| $9,0 \leq AL \leq 10,6$     | 4                            |
| $10,7 \leq AL \leq 12,7$    | 5                            |
| $12,8 \leq AL \leq 14,9$    | 6                            |
| $15,0 \leq AL \leq 17,0$    | 7                            |
| $17,1 \leq AL \leq 19,1$    | 8                            |
| $19,2 \leq AL \leq 21,2$    | 9                            |
| $21,3 \leq AL \leq 23,4$    | 10                           |
| $AL \geq 23,5$              | 11                           |

2. **Personal Gear Stowage** shall be provided in the form of built-in lockers with doors, bins with hatches or drawers.

$$\text{Required volume} = 0.04 * \text{Min. Number of Berths (m}^3\text{)}$$

**207 Galley Area:**

A galley area is not permitted in a space counted as a Sleeping Area and shall include:

1. **Stoves:** A gimballed stove fitted with high retaining rails to permit safe operation underway.
2. **Sinks:** Permanently installed and fitted with pump/tap and drainage system.
3. **Galley Gear Stowage:** Should be provided in rigid lockers, bins or compartments.
4. **Food Stowage:** Stowage for food should be provided in rigid lockers, bins or compartments.

$$\text{Required volume} = 0.06 * \text{Min. Number of Berths (m}^3\text{)}$$

- 208** 1. **Toilet** Marine type permanently installed and operable in compliance with local regulations. |  
 2. **Wash Basin:** Near the toilet, fitted with pump/tap and drainage system which permits use underway.

**209** **Navigation Area** shall include flat area suitable for chart work. The area should be built with storage for charts, navigational instruments, books, etc. In smaller yachts, counter tops, cabin tables or portable chart boards.

**210** **Hanging Locker(s)** shall be of sufficient dimension to permit hanging garments vertically.

**211** **Fresh Water Capacity:** For yachts with an AL of 8.5m and greater fresh water pumps shall be installed at the sink and wash basin and fresh water shall be contained in permanently installed tankage either of rigid construction or of the bladder type.

*Min. fresh water capacity in litres = (5\*AL-30) \* Min. Number of Berths*

**212** **Fuel Capacity:** Yachts with inboard engines shall be directly supplied from permanently installed fuel tankage.

*For AL of 8.5m or less the required capacity for diesel fuel is 20 litres.*

*For AL of 8.6m or more the required capacity for diesel fuel = 20\*AL -150 (litres).*

*Fuel capacity for gasoline = 1.25 \* fuel capacity for diesel.*

**213** **Cockpit**

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.

# INDEX OF SYMBOLS

|      |   |           |       |                                   |         |
|------|---|-----------|-------|-----------------------------------|---------|
| AFPV | Aft Freeboard Point Vertical Offset             | B2.4      | MDL1Y | Max. Fore-and-Aft Mast Mizzen     | F10.1   |
| AL   | Accommodation Length                            | 202       | MDL2  | Min. Fore-and-Aft Mast            | F4.4    |
| AMG  | Asymmetric Spinnaker Mid Width                  | G6.5      | MDL2Y | Min. Fore-and-Aft Mast Mizzen     | F10.1   |
| APB  | Aperture Bottom Width                           | D4.16     | MDT1  | Max. Transverse Mast              | F4.1    |
| APH  | Aperture Height                                 | D4.15     | MDT1Y | Max. Transverse Mast Mizzen       | F10.1   |
| APT  | Aperture Top Width                              | D4.16     | MDT2  | Min. Transverse Mast              | F4.3    |
| ASF  | Asymmetric Spinnaker Foot                       | G6.5      | MDT2Y | Min. Transverse Mast Mizzen       | F10.1   |
| BAL  | Boom After Sheeting Limit                       | F5.3      | MGL   | Mainsail 1/4 Width                | G2.1    |
| BALY | Boom After Sheeting Limit Mizzen                | F10.1     | MGLY  | Mizzen 1/4 Width                  | G3      |
| BAS  | Boom Above Sheerline                            | F3.4      | MGM   | Mainsail 1/2 Width                | G2.1    |
| BASY | Boom Above Sheerline Mizzen                     | F10.1     | MGMY  | Mizzen 1/2 Width                  | G3      |
| BD   | Boom Diameter                                   | F5.2      | MGT   | Mainsail 7/8 Width                | G2.1    |
| BDY  | Boom Diameter Mizzen                            | F10.1     | MGTY  | Mizzen 7/8 Width                  | G3      |
| BWT  | Boom Weight                                     | F5.4      | MGU   | Mainsail 3/4 Width                | G2.1    |
| CANT | Average Cant Angle                              | E6.3      | MGUY  | Mizzen 3/4 Width                  | G3      |
| CBDA | Centerboard Centre of Gravity Drop              | C1.5      | MSW   | Mainsail Weight                   | G2.1    |
| CBDB | CBDA with Additional Centerboard                | C1.5      | MW    | Mast Width                        | F4.6    |
| CBMC | Centerboard Mid Chord                           | C1.6      | MWT   | Mast Weight                       | F8.1    |
| CBRC | Centerboard Root Chord                          | C1.6      | P     | Mainsail Hoist                    | F2.1    |
| CBTC | Centerboard Top Chord                           | C1.6      | PBW   | Propeller Blade Width             | D4.4    |
| CPW  | Chainplate Width                                | F6.3      | PD1-4 | Pendulum Deflections              | E4.8    |
| E    | Mainsail Foot                                   | F5.1      | PHD   | Propeller Hub Diameter            | D4.2    |
| EB   | Distance Between Masts                          | F10.3     | PHL   | Propeller Hub Length              | D4.3    |
| ECM  | Extension of Centerboard<br>bellow Hull or Keel | C1.1      | PLM   | Length of Manometer               | E4.2    |
| EDL  | Strut Drive Length                              | D4.8      | PRD   | Propeller Diameter                | D4.1    |
| ESL  | Exposed Shaft Length                            | D4.7      | PSA   | Propeller Shaft Angle             | D4.5    |
| EY   | Mizzen Foot                                     | F10.1     | PSD   | Propeller Shaft Diameter          | D4.6    |
| FAM  | Freeboard Aft Measured                          | E3.2      | PY    | Mizzen Hoist                      | F10.1   |
| FFM  | Freeboard Forward Measured                      | E3.1      | RSA   | Reservoir Surface Area            | E4.4    |
| FFPV | Forward Freeboard Point<br>Vertical Offset      | B2.4      | SAFP  | Stem to Aft Freeboard Station     | B3.3    |
| FSP  | Forestay Perpendicular                          | F6.4      | SF    | Spinnaker Foot                    | G6.4    |
| GO   | Forestay Outrigger                              | F4.7      | SFFP  | Stem to Forward Freeboard Station | B3.2    |
| GSA  | Gauge Surface Area                              | E4.3      | SFJ   | Stem to Forward End of J          | F6.2    |
| HB   | Mainsail Top Width                              | G2.1      | SG    | Specific Gravity                  | E3.3    |
| HBY  | Mizzen Top Width                                | G3        | SL    | Spinnaker Luff/Leech              | G6.4    |
| IG   | Height of Genoa Hoist                           | F3.1      | SLE   | Asymmetric Spinnaker Leech        | G6.5    |
| IH   | Interior Height                                 | 202, 302  | SLU   | Asymmetric Spinnaker Luff         | G6.5    |
| ISP  | Height of Spinnaker Hoist                       | F3.2      | SMB   | Stem to Maximum Beam Station      | B3.5    |
| IY   | Height of Mizzen Mast                           | F10.2     | SMG   | Spinnaker Half Width              | G6.4    |
| J    | Foretriangle Base                               | F6.1      | SMW   | Spinnaker Maximum Width           | G6.4    |
| JGL  | Jib 1/4 Width                                   | G4.1      | SPL   | Spinnaker Pole Length             | F7.1    |
| JGM  | Jib 1/2 Width                                   | G4.1      | SPS   | Height of Spinnaker Pole Stop     | F3.3    |
| JGT  | Jib 7/8 Width                                   | G4.1      | ST1-5 | Propeller Strut Dimensions        | D4.9-13 |
| JGU  | Jib 3/4 Width                                   | G4.1      | TL    | Taper Length                      | F4.5    |
| JH   | Jib Top Width                                   | G4.1      | TLY   | Taper Length Mizzen               | F10.1   |
| JL   | Jib Luff  | G4.1      | TPS   | Tacking Point of Spinnaker        | F7.2    |
| KCDA | Keel Centerboard Depth Adjustment               | C1.3      | W1-4  | Inclining Weights                 | E4.7    |
| LIST | Average List Angle                              | E5.4, 6.2 | WBV   | Water Ballast Volume              | E5.1    |
| LOA  | Length Overall                                  | B3.1      | WCBA  | Centerboard Weight                | C1.4    |
| LPG  | Jib Perpendicular                               | G4.1      | WD    | Weight Distance                   | E4.6    |
| MB   | Maximum Beam                                    | B3.4      | YSD   | Mizzen Staysail Depth             | G5      |
| MCG  | Mast Centre of Gravity                          | F8.3      | YSF   | Mizzen Staysail Foot              | G5      |
| MDL1 | Max. Fore-and-Aft Mast                          | F4.2      | YSMG  | Mizzen Staysail Mid Width         | G5      |