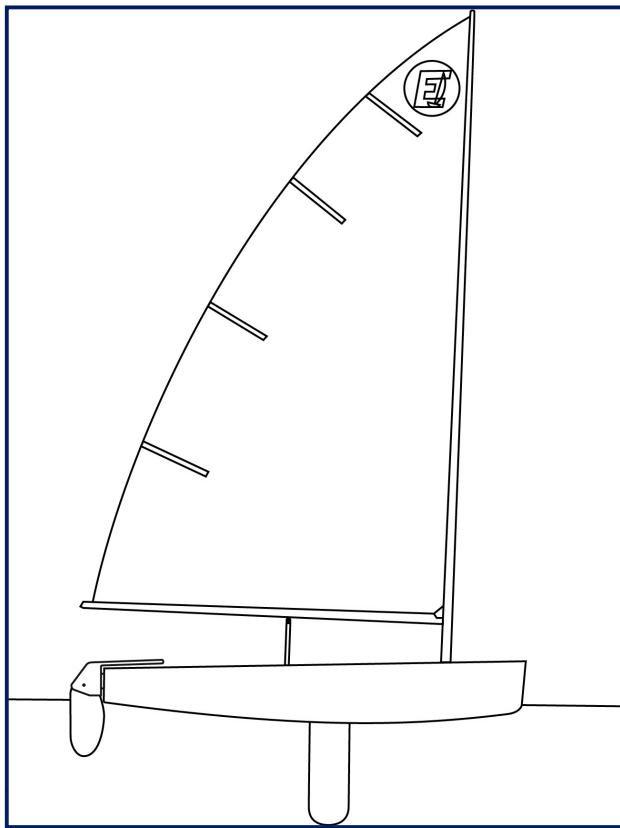




# INTERNATIONAL EUROPE CLASS RULES

2015



The International Europe Dinghy was designed in 1963 by Alois Roland and was adopted as an International class in 1976.

## 1. GENERAL

- 1.1 The Europe is a one-design class. The intention of these rules is to ensure that the boats are as alike as possible in all respects affecting performance. Everything that is not actually stated as permitted or optional shall be prohibited.
- 1.2 The official plans, measurement diagrams and measurement form shall be considered an integral part of these rules. In the event of any discrepancy between them the matter shall be referred to the ISAF.
- 1.3 Any interpretation of these rules shall be made by the ISAF, which may consult the International Europe Class Union (IECU).
- 1.4 Boats shall be built to comply with these Class Rules, the official plans, measurement diagrams and measurement form.
- 1.5 Neither the ISAF nor the IECU accept any legal responsibility in respect of these rules, the plans, the measurement diagrams and/or the measurement form or any claim arising from them.
- 1.6 Except where Part 4 Class rules specify that variations may be declared in sailing instructions Class Rules shall not be amended by any race organisation without the specific approval of the ISAF and concurrence of the IECU in writing on each occasion.

## 2. ADMINISTRATION

### 2.1 LANGUAGE

The official language of the class is English. In the event of dispute over interpretation the English text shall prevail.

### 2.2 BUILDERS

- 2.2.1 Professional builders shall be licensed by the ISAF. A professional builder is anyone who builds or has built boats of any type for sale.
- 2.2.2 A non-licensed builder shall be permitted to build not more than one boat a year.

### 2.2.3 Building licence

- (i) Applications for a building licence shall be made in writing on the appropriate form to the ISAF, who shall consult the IECU and the appropriate National Authority (NA).
- (ii) The issue of a licence shall not authorise the production of boats for sale until the licence has been ratified by ISAF approval of a prototype hull. Any subsequent proposed change to the production tooling, hull characteristics or layout, method of construction, materials or specification shall require ISAF approval. The procedures for approval of the prototype hull and subsequent changes, which shall include consultation with the IECU, shall be detailed in the licence agreement.

### 2.2.4 International Class Fee

- (i) The International Class Fee (ICF) shall be paid to IECU. The ICF shall be apportioned to the ISAF, the IECU and Europe Class National Associations. The amounts due to each shall be decided by the ISAF in consultation with the IECU.
- (ii) The amount of the ICF shall be reviewed by the ISAF annually in consultation with the IECU.

- (iii) The ICF shall be paid by the builder on every hull or kit produced whether or not it is subsequently completed, measured and registered. Payment shall be made to IECU. The IECU will inform Sailing International Limited which will issue a sticker, an ICF receipt and a current measurement form and invoice the IECU for their due portion.

## 2.3 REGISTRATION AND MEASUREMENT CERTIFICATE

- 2.3.1 No boat is permitted to race in the class unless it has a valid measurement certificate.
- 2.3.2 The certificate is only valid for racing if the hull owner or competitor is a fully paid member of a National Europe Class Association. If there is no National Europe Class the certificate shall be approved in written by the IECU.
- 2.3.3 The certificate is obtained as follows:
  - (i) The builder or owner shall apply to the National Authority (NA) for a sail number enclosing the ICF receipt. Personal sail numbers may be allowed. A same number shall never exist twice. The NA shall issue a sail number only on production of the ICF receipt.
  - (ii) The boat shall be measured by an official measurer. See Rule 2.4. The completed measurement form shall be returned to the owner.
  - (iii) On completion of measurement the owner shall send the completed measurement form to his/her NA together with any registration fee that may be required. If satisfied, from the evidence presented on the form, that the boat complies with the rules in all respects the NA may then issue a measurement certificate to the owner. See Rule 2.4.4. A copy of the measurement forms shall form part of the certification documents.
  - (iv) The certificate shall include the following information. ISAF ICF plaque or sticker serial number, National letter(s) and sail number, Owner's name, address and club, Builder and date built, Name(s) of measurer(s) and date measurement completed, Hull weight, number and weight of correctors, date of issue and issuing authority.
- 2.3.4 Change of ownership invalidates the certificate but shall not necessitate remeasurement. The new owner shall apply to his/her NA for a new certificate, returning the old certificate together with any re-registration fee that may be required and stating the changed particulars. A certificate may then be issued to the new owner. If there is a change of NA, a new sail number in that nation's sequential series shall be issued. The new owner and NA shall be provided with a copy of the original measurement form.
- 2.3.5 (i) Subject to prior ISAF approval the NA may delegate the administrative task of issuing sail numbers and measurement certificates to the class national association. The NA shall not delegate their overall responsibility to the ISAF for control of measurement standards.
  - (ii) The administration of issuing certificates shall be independent of the administration of measurement.

## 2.4 MEASUREMENT

- 2.4.1 An official Measurer is a measurer approved and authorised by a NA and/or IECU to measure International Europe Dinghies and equipment. Only an official measurer or measurers shall measure a boat, spars, sail, foils and equipment.
- 2.4.2 Boats shall be measured using templates authorised by the ISAF. All sets of ISAF approved templates shall be registered with the ISAF. A registration number shall be allocated to each set of approved templates and shall be stamped on each template of the set.

- 2.4.3 Spare number.
- 2.4.4 The measurer shall enter all measurements found in the 'actual' column of the measurement form. Any other form of entry is not acceptable.
- 2.4.5 The measurer shall report on the measurement form anything, which he / she considers to be a departure from the intended nature and / or design of the boat, or to be against the general interest of the class. Any feature not clearly permitted by these rules, the plans, the measurement diagrams or measurement form must be assumed to be illegal and shall be reported by the measurer on the measurement form.
- 2.4.6 Notwithstanding anything in these rules, on the evidence of a measurer's report and/or other information, even if the specific requirements of the rules are satisfied, the ISAF and/or NA shall have the power to refuse to grant a certificate to, or to withdraw a certificate from, any boat.
- 2.4.7 New, repaired or recut sails shall be measured, or remeasured by an official measurer who shall stamp, sign and date the sail across the IECU sail label. On first measurement the dimensions found shall be entered on the measurement form.
- 2.4.8 Boats and equipment shall be liable to remeasurement at the discretion of the ISAF, a NA or a race committee.
- 2.4.9 It is the owner's responsibility to ensure that his / her boat, including foils, spars, sails and equipment, complies with the class rules at all times and that alterations or repairs do not invalidate the certificate.
- 2.4.10 Corrector weights for hull, mast and boom shall not be removed or changed except after reweighing by an official measurer. The measurer shall record any change on the measurement form and the measurement certificate (if the National Authority requires this information in its forms).

## 2.5 MEASUREMENT INSTRUCTIONS

- 2.5.1 Except where otherwise specified in these rules, the measurement diagrams, the plans and/or the measurement form, the ISAF Equipment Rules of Sailing shall apply.

## 2.6 IDENTIFICATION MARKS

- 2.6.1 Each boat shall have:
  - (i) Permanently fixed on the starboard side of the main bulkhead and clearly visible the official ISAF ICF plaque or sticker.
  - (ii) The builder's company name clearly shown on the hull on the inside face of the transom on the starboard side.
  - (iii) Spare number
- 2.6.2 Each sail shall have an IECU sail label sewn on to the starboard side of the sail not more than 400mm from the tack.
- 2.6.3 Each NA shall issue sail numbers consecutively starting with 1.
- 2.6.4 Each mast (at the gooseneck), boom (at mast end), centreboard (near the top), rudder blade (near the top but not obscured by the rudder stock), and rudderstock (near the top) shall have a permanent, unique identifying code impressed in the starboard side by the manufacturer. The identifying code shall be clearly visible and at least 7mm in height, minimum of five digits.

### 3. **CONSTRUCTION AND MEASUREMENT RULES**

#### 3.1 **GENERAL**

- 3.1.1 Except where otherwise permitted under these rules the boat, spars, foils and sails shall be constructed generally in accordance with and shall comply with the measurements and tolerances specified in the plans, these rules, the measurement diagrams and the measurement form.
- 3.1.2 Tolerances on design dimensions are to accommodate small errors in construction and subsequent distortion during the life of the boat. There are reduced tolerances for prototype measurement. The requirements are specified in the Prototype measurement form. The builder shall contact the Class Chief Measurer before prototype construction.
- 3.1.3 Protective coatings of any type of paint and/or varnish are permitted on the hull, spars and foils.
- 3.1.4 Backing plates, or locating plates of metal or wood are permitted either behind or moulded into the hull and spars for local strengthening where permitted fixed fittings are to be fastened.

#### 3.2 **HULL**

##### 3.2.1 **Materials**

(i) Permitted materials:

The hull, including deck, side tanks, bulkheads, centreboard case and all structural components shall be made of wood, plywood, glass reinforced plastic (GRP) or any combination of these materials. Sandwich construction, whose total thickness is not more than 12mm, is permitted. The type of material used as a sandwich core or filler is optional except as prohibited by rule 3.2.1(ii). Any type of resin may be used.

(ii) Prohibited materials:

Fibres of carbon, boron, aromatic polyamides (such as Kevlar) or other high tensile materials, including any listed in the ISAF catalogue of materials classified as exotic, are prohibited.

##### 3.2.2 **Construction and measurement datum**

- (i) The 'aft measurement point' (AMPt) shall be the intersection of the underside of the hull on the centreline with the transom, both extended if necessary.
- (ii) The 'aft measurement plane' (AMPn) shall be a transverse plane through the AMPt perpendicular to the base line. It is vertical.
- (iii) The 'base line' shall be as shown on the measurement diagram. It is horizontal.
- (iv) For the purpose of rule 3.2.2(i) the transom is an imaginary surface enclosed by the aft end of the underside of the hull shell and a line joining the port and starboard sheer lines at the aft end of the hull shell.
- (v) The centreline plane is a vertical plane through the baseline. For measurement purposes the hull should be arranged so that this plane goes through the AMPt and the top of the underside

of the hull at station 3. For hulls first measured before 1st March 1997 and subsequently re-measured, the first and second sentences of Rule 3.2.2(v) are not mandatory. Unless otherwise specified, dimensions are taken parallel to the major planes.

### 3.2.3 Hull shell

The outside surface of the hull shall be a fair curve as defined by the lines:

- (i) Aft of station 4 the curve shall be convex or flat except that concavities of not more than 1.0mm measured below a fore and aft straight edge of any length are permitted.
- (ii) Forward of station 4 the curve shall be convex, flat or concave except that concavities, measured below a straight edge in the horizontal plane shall be not more than 2.5mm and in any other plane shall be not more than 18mm.
- (iii) The radius of the stem, measured in the horizontal plane, is optional.
- (iv) The width and position of the centreboard slot shall be as shown on the measurement diagram. A recess is permitted extending not more than 30mm from each side of and not more than 50mm from each end of the centreboard case slot to accommodate the slot gasket. The depth of the recess is optional.
- (v) Rubbing strakes shall be not wider than:
  - (a) 20mm at the stem.
  - (b) 40mm at transom, including inwale and transom, but shall not extend more than 20mm aft of the AMPn.
  - (c) 40mm elsewhere.
- (vi) The depth of the rubbing strake shall be not more than 25mm, except that the underside may be faired to the hull shell by a fillet or fairing of radius not more than 25mm provided that, when hull measurement templates are correctly positioned, any such fillet or fairing is entirely within the minimum rubbing strake cut-out area of the templates.
- (vii) Holes in the transom are permitted but shall be not more than  $0.02m^2$  in total area. These holes may be covered by hinged flaps or fixed windows of any material.
- (viii) Stiffening webs or stringers of any material permitted for hull construction may be fitted to the inner surface of the hull forward of the main bulkhead and inside the side tanks.
- (ix) No part of the outer face of the transom shall be more than 20mm from the AMPn.

### 3.2.4 Cockpit and deck

The external surface of the deck, side tanks, main bulkhead and centreboard case shall have a fair profile as shown on the drawings except where varied by these rules.

- (i) Main bulkhead.
  - (a) There shall be a main bulkhead at  $2000mm \pm 20mm$  from the AMPn.
  - (b) The bulkhead shall have not more than 2 hatches with watertight covers. A hatch whose opening has an area more than a circle of 150mm diameter shall be for maintenance access only. It shall be bolted, screwed or securely clipped into place at other times.
  - (c) The bulkhead may have not more than two drain-holes with watertight plugs or non-return valves which allow water to flow out of but not into the compartment forward of the bulkhead.

- (d) The bulkhead may have not more than eight lead holes for control lines provided they are not in a part of the bulkhead which forms a boundary of the forward buoyancy unit or tank required by rule 3.2.6. Each hole shall be not more than 7mm in diameter and shall be within an area enclosed by lines 100mm from the floor of the hull, the side tanks and the line of the foredeck. Any such holes not occupied by control lines shall be plugged.
- (ii) Side tanks.
 

The side tanks shall extend from the main bulkhead to the transom. The shape shall be as defined by the lines:

  - (a) The distance between the vertical faces of each side tank shall be 660mm  $\pm$  20mm at the inner face of the transom and 740mm  $\pm$  20mm at the main bulkhead.
  - (b) The radius of curvature between the top and sides shall be 130mm  $\pm$  20mm.
  - (c) Each side tank shall have at least one drain hole, with watertight plug, and / or hatch with watertight cover.
- (iii) Centreboard Case.
  - (a) The centreboard case shall have sides of single skin or sandwich not more than 12mm thick. It shall be rigidly fixed to the bulkhead at its forward end over not less than 25mm of its depth measured from the top of the case.
  - (b) The centreboard case capping shall be not more than 65mm wide each side, measured from the slot, and not more than 65mm deep.
  - (c) A step to accommodate mainsheet blocks may be added to the centreboard case, which shall be not more than 200mm from the slot, and not more than 100mm deep and wide.
  - (d) The upper, aft end of the slot shall be not less than 1510mm from the AMPn.
  - (e) The width of the slot shall be 20mm  $\pm$  2mm.
  - (f) The distance, measured along the keel from the AMPt, to the aft end of the slot at the keel line shall be not less than 1465mm and to the forward end shall be not more than 2005mm.
  - (g) At station 7 the distance from top of the case to the height of the sheer line shall be 184mm  $\pm$  10mm.
  - (h) The top of the centreboard case shall be parallel to the base line within a tolerance of 10mm.
  - (i) Pads of any resilient material may be fitted inside the top and bottom of each end of the slot to protect the edges of the centreboard.
  - (j) Strips of any material may be fitted inside the top and/or bottom of the case to reduce friction and/or to match the slot width to the centreboard thickness provided the permitted dimensions of the case are not infringed.
- (iv) Thwart.
  - (a) A thwart of width 105mm  $\pm$  45mm and depth 25mm  $\pm$  10mm shall connect any part of the vertical face of each side tank, abreast the aft end of the centreboard case, with the upper part of the centreboard case at the after end.  
In wooden construction the thickness shall be not less than 15mm; in GRP construction the thickness shall be not less than 3mm.
  - (b) The thwart may be integral with the centreboard case capping.
  - (c) Support struts and stiffening webs are optional.
  - (d) As an alternative to (iv) (c), in GRP construction only, the forward and aft vertical faces of the thwart moulding may extend down the vertical face of the side tanks as stiffening webs not more than 45mm wide and with a radius of not more than 100mm between the web and the underside of the thwart.
- (v) Foredeck.

The foredeck shall have a fair profile as shown on the drawings except that on each side of the centreline not more than one step in the profile, of not more than 5mm in height, is permitted within the overall profile limits set by the tolerances for the sheer height and the deck camber at the main bulkhead. The deck camber at the main bulkhead shall be  $52\text{mm} \pm 10\text{mm}$  and at station 3 shall be not more than 30mm.

- (vi) Shaped pads, which may be an integral part of the moulding in GRP boats, are permitted on curved surfaces of the deck, side tanks and cockpit floor to accommodate flat based, permitted, fixed fittings. No part of a pad shall be more than 20mm from the line of the curved surface on which it provides a flat base. One vacant pad may be provided on each side of the boat as an alternative position for over deck or under deck control line cleats.
- (vii) Stiffening webs, stringers or beams of any material permitted for hull construction may be fitted to the inner surface of the foredeck and side tanks.
- (viii) Centreline and other battens or pads for stiffening or support of hiking straps are optional. They shall be not more than 30mm deep.
- (ix) Except where otherwise specified the radius of any fairing, flange or fillet between hull components (e.g. main bulkhead, side tanks, centreboard case, transom, thwart, foredeck) shall be not more than 25mm. The width of flanges used to secure hull components to each other is optional provided the 12mm sandwich thickness limitation is not infringed.
- (x) Spare number.
- (xi) A centreline knee or strut of any material may be fitted between the inside face of the transom and the floor of the cockpit. No part of it shall extend more than 200mm from the transom nor more than 50mm from the centreline of the hull. In GRP hulls it may be moulded integrally with a centreline-stiffening batten permitted by rule (viii) above.
- (xii) A stiffening beam (inwale) not more than 25mm deep may be fitted to the top of the inside of the transom. The overall width of inwale, transom and rubbing strake shall be not more than 40mm.

### 3.2.5 Fitting and equipment

- (i) Permitted fixed fittings are:
  - (a) Hatches, hatch covers, drains, drain plugs and non-return valves as permitted or required elsewhere in these rules.
  - (b) 2 gudgeons on the stern to connect the rudderstock so that every rudderstock fits every hull. See Class Rule 3.4.5(iv) and Rudder Blade Measurement Diagram for details of fittings and grandfather clause.
  - (c) A rudderstock-retaining device.
  - (d) not more than 3 hiking straps, which may be padded, and an adjustment system for each comprising not more than 2 single sheave blocks and 1 cleat.
  - (e) A mainsheet block, which may be a ratchet type.
  - (f) A mainsheet traveller system comprising track, carriage, mainsheet block, 4 single sheave control line blocks and 2 cleats.
  - (g) Control systems for Cunningham, clew outhaul, tack inhaul and boom kicker (vang) each comprising not more than 6 single sheave blocks and 2 cleats.
  - (h) Not more than 8 lead eyes or sheaves and sheave boxes fitted in main bulkhead for control lines.
  - (i) A painter/towing line fairlead fitting at the stem head, which is mandatory.
  - (j) A mast heel fitting, which may incorporate an adjustment system for the fore and aft position of the heel of the mast provided no part of the adjustment system can extend

aft of a plane 500mm forward of the main bulkhead and the fore and aft movement of the heel of the mast in any setting of the adjustment system is not more than 5mm.

- (k) A deck-bearing ring for the mast, which shall be fixed and shall have no moving parts.
- (l) Not more than 4 automatic (self) bailers.
- (m) Not more than 2 retaining devices for water bottles.
- (n) Fastenings, including shackles where appropriate, for fittings listed.

- (ii) Fitting types and material are optional except that the use of fittings which are oversize, relative to their specific function, to add or concentrate weight is prohibited.
- (iii) Fittings and equipments not defined as fixed in Rule 3.2.5(i) are optional except that any electronic or electrically powered fitting or equipment other than timing devices are prohibited. They shall be removed for weighing and weight distribution tests.
- (iv) Rigging. Any form of standing rigging is prohibited. Except where otherwise specified in these rules the type, material, size and length of line, rope or wire used for running rigging is optional.

### 3.2.6 Buoyancy

- (i) There shall not be less than three separate buoyancy units, which shall comprise the two side tanks, and a forward buoyancy unit.
- (ii) The forward buoyancy unit may be provided by any one or combination of the following: watertight compartment(s); closed cell foam block(s); air bag(s). Not less than 30 litres of the unit's total volume shall be forward of the mast. The forward buoyancy unit, if it is a compartment or compartments, shall be:
  - (a) Isolated from the mast position by a watertight bulkhead or bulkheads.
  - (b) Fitted with not less than one inspection hatch with watertight cover and/or drain hole with watertight plug.
- (iii) Buoyancy tanks shall be watertight. On first measurement the measurer shall carry out tests on each tank as follows; super or sub-atmospheric air pressure shall be applied to the tank sufficient to produce a differential reading of 130mm on a water gauge. The pressure differential shall not reduce from 130mm to less than 50mm in less than 30 seconds.
- (iv) After satisfying the buoyancy test detailed in 3.2.6.(iii) a pressure equalising hole, made with a nominal 1mm drill, may be provided in not more than one hatch cover or drain hole plug in each buoyancy unit. Sailing Instructions may require that any such hole be sealed.

### 3.2.7 Weight

- (i) The hull in dry and clean condition, with permitted fixed fittings, as defined in rule 3.2.5(i) shall weigh not less than 45kg. Mainsheet and control lines, except those forming part of the hiking strap or traveller control systems, shall be removed for weighing.
- (ii) If the hull is found to weigh less than 45kg, but not less than 40kg, a metal corrector weight, or weights, shall be securely fastened to the forward or aft face of the main bulkhead not lower than 200mm from the bottom of the hull. The weight (kg, g) and ISAF plaque number of the boat shall be stamped or engraved on each corrector weight.
- (iii) The hull weight, without correctors, and the weight and number of corrector weights shall be recorded on the certificate.

### 3.2.8 Weight Distribution

- (i) Any attempt to concentrate the weight of the hull is prohibited.
- (ii) The weight distribution, as defined by the fore and aft mass moment of inertia ( $I$ ) and the location of the centre of gravity (CG) relative to the aft measurement plane, i.e. horizontal CG (CGH) and the underside of the hull on the centreline vertically below the CG, i.e. vertical CG (CGV), shall be determined, for the hull in the same condition as for weighing. ' $I$ ' shall be calculated from a radius of gyration (RG) measured using the method detailed on measurement diagram, sheet (vii) and the hull weight.
- (iii) If ' $I$ ' is less than  $35.5\text{kg/m}^2$  (which is the ' $I$ ' given by a radius of gyration of 888mm and a hull weight of 45kg) metal corrector weights, marked as in Rule 3.2.7, shall be securely fitted on the centreline, 50% forward of station 3 and 50% aft of station 10.
- (iv) The CGH shall be not less than 1500mm from the aft measurement plane.
- (v) The CGV shall be not less than 200mm above the underside of the hull on the centreline.
- (vi) If CGH and/or CGV is outside the limits specified lead corrector weights, marked and positioned as in Rule 3.2.7, shall be fitted.
- (vii) Corrector weights required to bring weight, weight distribution and centre of gravity within permitted limits shall be applied in that order. Weights required to correct weight distribution and centre of gravity shall be additional to those required to correct for weight.
- (viii) For boats certified after 15.03.2010, only (iv) has to be controlled during fundamental measurement, unless there are reasons to believe that the hull is not conforming to rule 3.2.8.

### 3.2.9 Tolerances Hull

The tolerances for hulls and the sheer lines at fundamental measurement are  $\pm 10\text{mm}$  related to the Drawing and the Table of Offsets. For prototypes the tolerances of the hull and the sheer lines are  $\pm 7\text{mm}$ .

## 3.3 CENTREBOARD

### 3.3.1 Materials

The centreboard shall be made of wood, which may be laminated, of plywood or GRP with or without a plastic foam core, or of any combination of these materials. If of hollow construction there shall be an expansion/drain hole, which shall not be covered, at not more than 80mm from an upper corner.

3.3.2 The profile, cross section and dimensions shall comply with those specified on the centreboard measurement diagram and/or the measurement form.

3.3.3 The weight of the centreboard shall be not less than 2kg.

## 3.4 RUDDER AND TILLER

### 3.4.1 Materials

The rudder blade shall be made of wood, which may be laminated, of plywood or GRP with or without a plastic foam core, or of any combination of these materials. If of hollow construction there shall be a drain/expansion hole, which shall not be covered, at not more than 80mm below the top of the blade.

3.4.2 The profile, cross section and dimensions shall comply with those specified on the rudder blade measurement diagram and/or the measurement form.

3.4.3 The rudder blade, fitted to the rudder stock, hung on the pintles, in the fully down position and aligned fore and aft, shall have its lower edge not more than 600mm below a horizontal plane through the AMPt and its trailing edge not more than 280mm from the AMPn.

3.4.4 The weight of the rudder blade shall be not less than 0.9kg.

#### 3.4.5 Rudder Stock and Tiller

The materials, type and shape of rudderstock, tiller and tiller extension and associated fittings are optional except that:

- (i) The rudder blade shall be able to pivot about its axis in the rudderstock so that it may be lifted during launching and recovery of the boat. A fixed rudder blade is prohibited.
- (ii) A lanyard, locking pin and / or clamping screw and nut shall be fitted to secure the rudder blade in the fully down position.
- (iii) The profiles, cross sections and dimensions of the fittings shall comply with those specified on the rudder fittings measurement diagram and the measurement form.
- (iv) The fittings to connect the rudderstock to the hull shall be made so that every rudderstock fits every hull. This shall apply for new rudderstocks and boats first measured after 1st March 1998.
- (v) The weight of the complete rudderstock, tiller and tiller extension assembly, but excluding rudder blade, shall be not less than 1.25kg.

#### 3.5 MAST

##### 3.5.1 General

- (i) The intention of these rules is that masts should be of reasonable cost, reliable, and as uniform as possible, whilst allowing sufficient variation in stiffness to suit a wide range of helm body weights. The rules are framed to discourage the use of expensive materials and production methods, and to prevent developments in the aerodynamic shape.
- (ii) Concentration of weight of the mast by the use of Fittings, Materials or Laminates, even if otherwise permitted within these rules, is prohibited.
- (iii) In case of doubt the ISAF and the IECU may prescribe any tests and investigations, (including, but not limited to, destructive tests) to check rule compliance of the mast at manufacturer's expense.

##### 3.5.2 Mast Builders

- (i) Masts may be built only by manufacturers who have been authorised by the IECU with the approval of ISAF. Authorised Manufacturer status will be granted to applicants based on their technical ability to produce good quality masts in accordance with these rules. Each Authorised Manufacturer will be issued with a unique Authorised Manufacturer Code (AMC), which must be shown on each mast made in accordance with rule 3.5.4(ix).
- (ii) Prototype measurement is obligatory for all manufacturers to ensure that any prototype mast measures correctly before series production commences. Prototypes shall only be measured by measurer specifically authorised by ISAF and IECU.
- (iii) The ISAF and or IECU will require specification and samples of laminates to check compliance with class rules. A manufacturer shall permit a measurer or class representative, authorised by IECU, to inspect work at any time during production of masts or fittings.

### 3.5.3 Permitted Mast Material

(i) The basic mast section (including sail track but without fittings) shall be made of FRP (Fibre Reinforced Plastic)

(ii)

Permitted Mouldable fibres	Shall be carbon-fibres, glass-fibres, aramid-fibres or any combination thereof. The fibre volume fraction of the laminate shall be > 50%.
Resin	Shall be either: polyester, vinyl ester, epoxy or polyurethane. Shall only be used as a matrix to enclose the fibres.
Coating	A coating of any paint may only be used at the outer skin of the mast.

No other materials as prescribed above shall be used to construct the basic mast section.

(iii) The mast Fittings and Fasteners shall only be made of: stainless steel, brass, copper, aluminum alloys, plastic, FRP or any combination thereof.

(iv) Metal or plastic washers and backing plates to fasten fittings shall be of max. thickness 2mm, and of max. diameter: 3 x nominal diameter of its fastener. Below station 4500 a metal plate of alloy max. dimension 4 x 30 x 400mm is allowed for fasten corresponding fittings at the aft face of the mast.

(v) An inflatable plastic tube weighing not more than 70 g/m<sup>2</sup> is permitted to remain inside the mast section.

### 3.5.4 Construction and Measurement

(i) The mast shall comply with the dimensions and requirements specified on the mast design specifications and measurement diagrams and/or the measurement form, except that the triangular sail track at elder SCS / Marström masts is grandfathered for all events. The limit marks shall be of minimum 20mm width, indelibly painted in a contrasting colour.

(ii) A divisible, two part mast is allowed. If divisible no part should be longer than 3100mm and the outer shape should not exceed the basic FRP profile figures of the Mast Design Specification for more than 6mm in a length of 100mm in aggregate in one or more pieces. The inner shape may be modified as suitable, but not more in length overall than 800mm measured when the parts are connected together. Change of one piece is considered to create a new mast.

(iii) The tolerances on the design shape are as stated in the mast design specifications and measurement diagrams

(iv) The mast heel fitting and deck ring shall be mounted concentric to the mast section within ± 1mm.

(v) The mast shall be hollow throughout its whole length. In order to facilitate inspection of the internal mast section, the heel fitting shall be open or removable without damage.

(vi) To provide class statistics and information for sailors, 10 mast bend measurements (5 transverse and 5 fore-&aft) shall be obtained as prescribed on the mast measurement diagram.

(vii) The mast shall pivot on its heel. It shall be supported only at the heel and the deck ring.

(viii) The mast shall be secured in position in the boat when sailing so that the heel cannot be lifted out of the mast step in any mast position.

(ix) A manufacturer shall issue with each mast a measurement form issued by IECU. This form shall have two sections, i.e.:

- a) an Authorised Manufacturers Declaration (AMD) duly signed and filled out by the manufacturer, stating that the mast complies with the relevant class rules.
- b) a manufacturer's measurement section duly signed and filled out by the authorised manufacturer.

(x) Each mast (near the gooseneck), shall have:

- a) permanently fixed a unique identifying numbered Authorised Manufacturer Sticker (AMS) issued by ISAF and distributed by IECU. Procedure for AMS fee and fee apportioning shall be similar as stated in Class Rules 2.2.4(i & ii) for ICF.
- b) an Authorised Manufacturer Code (AMC), allocated by IECU following approval of each prototype by ISAF, clearly legible and indelibly marked next to the AMS in figures not less than 6mm high. This code may be invalidated if it is established that masts have deviated from the class rules after prototype approval.

SCS / Marström masts up to production Number 2292 need not to be marked with an Authorised Manufacturer Code (AMC) and an Authorised Manufacturer Sticker (AMS).

Confirmation that such mast complies with the rules may either be by:

- endorsement by an official measurer of the existing old Measurement Form to the effect that the mast complies with the Class Rules with respect to items 3.5.3 through to 3.5.4(vii) and 3.5.5. or
- remeasurement and issue of a new Measurement Form signed by an official measurer.

### 3.5.5 Weight

The weight of the mast shall be not less than 5.5kg and the centre of gravity shall be not more than 3500mm below the lower edge of the upper measurement band. If the mast weighs less than 5.5kg but not less than 5.0kg and/or the centre of gravity is more than 3500mm below the lower edge of the upper measurement band, both measured with the halyard removed, metal corrector weight(s), of maximum length 250mm, shall be permanently attached to the outer face of the mast. They shall be positioned so that measurement at the stations shown in the measurement form are not obstructed. The weight shall be permanently marked on the corrector weight(s).

### 3.5.6 Grandfathering

Any boat may use any mast, which complies with any previous Class Rules, except:

- a) at the Olympic Games after March 2000.
- b) after March 2006
  - (i) at World Championships.
  - (ii) at Continental Championships.
  - (iii) at Regional Championships and events.
  - (iv) at any event where the Organizing Authority in its notice of race, states that masts shall comply with current Class Rules.

## 3.6 BOOM

### 3.6.1 Boom Builders

- (i) Booms may be built only by manufacturers who have been authorized by the IECU with the approval of ISAF. Authorized Manufacturer status will be granted to applicants based on their technical ability to produce good quality booms in accordance with these rules. Each Authorized Manufacturer will be issued with a unique Authorized Manufacturer Code (AMC) which must be shown on each boom made in accordance with rule 3.6.3 (vii).

- (ii) Prototype measurement is obligatory for all manufacturers to ensure that any prototype boom measures correctly before series production commences. Prototypes shall only be measured by a measurer specifically authorised by ISAF and IECU.
- (iii) The ISAF and or IECU will require specification and samples of materials to check compliance with class rules. A manufacturer shall permit a measurer or class representative, authorised by IECU, to inspect work at any time during production of booms or fittings.

### 3.6.2 Permitted Boom Materials

- (i) The basic boom section shall be made of wood, laminated wood or aluminium alloy, or any combination of these materials. No other materials as prescribed above shall be used to construct the basic boom section.
- (ii) The boom fittings and Fasteners shall only be made of stainless steel, brass, copper, aluminium alloys, plastic, FRP or any combination thereof. This shall apply for booms fundamental measured after 1st March 1998 and all booms after 1 March 2000.

After 1<sup>st</sup> March 2000 National Class Unions may give a limited permission to use old carbon booms for national events only. Provided these carbon booms have passed fundamental measurement before 1st March 1998.

### 3.6.3 Construction and Measurement

- (i) The boom shall comply with the dimensions and requirements specified on the mast and boom measurement diagrams and / or the measurement form. The limit mark shall be minimum 20 mm width, indelibly painted in a contrasting colour.
- (ii) A stop shall be fitted to the boom to prevent the sail being hauled out beyond the inner edge of the measurement band.
- (iii) The boom shall be straight but a permanent set due to distortion of 20mm shall be permitted.
- (iv) The boom shall be fitted to the mast so that they rotate together.
- (v) There shall be a track or groove on the upper side of the boom for the foot boltrope of the sail.
- (vi) A manufacturer shall issue with each boom a measurement form issued by IECU. This form shall have two sections, i.e.:
  - a) an Authorised Manufacturers Declaration (AMD) duly signed and filled out by the manufacturer, stating that the boom complies with the relevant class rules.
  - b) a manufacturers measurement section duly signed and filled out by the authorised manufacturer.
- (vii) Each boom (near the gooseneck), shall have:
  - a) permanently fixed a unique identifying numbered Authorised Manufacturer Sticker (AMS) issued by ISAF and distributed by IECU. Procedure for AMS fee and fee apportioning shall be similar as stated in Class Rules 2.2.4(i & ii) for ICF.
  - b) an Authorized Manufacturer Code (AMC), allocated by IECU following approval of each prototype by ISAF, clearly legible and indelibly marked next to the AMS in figures not less than 6mm high. This code may be invalidated if it is established that booms have deviated from the class rules after prototype approval.

### 3.6.4 Weight

If the weight of the boom, without sheet blocks and shackles, but with securing eyes, kicker (vang) system and its running rigging in their racing position (loose and movable ends fixed vertically), is

less than 3.30kg but not less than 3.00kg and/or the centre of gravity is less than 1250mm from the gooseneck end, metal corrector weights, permanently marked with the weight, shall be fitted permanently to the outside of the profile.

### 3.7 SAIL

#### 3.7.1 PARTS

##### 3.7.1.1 MANDATORY

- (a) **Mainsail**

#### 3.7.2 GENERAL

##### 3.7.2.1 RULES

- (a) **Sails** shall comply with the **class rules** in force at time of **certification**.

##### 3.7.2.2 CERTIFICATION

- (a) The **official measurer** shall **certify mainsails** in the **tack** and sign and date the **certification mark** with the date of **certification control** of the **sail** and complete the IECU measurement form.
- (b) An ISAF In-House Certification (IHC) Authorizing Authority may appoint one or more **In-House Official Measurers** at a sailmaker to measure and **certify sails** produced by that manufacturer in accordance with ISAF guidelines.

##### 3.7.2.3 USE

- (a) The **sail** shall be hoisted on an external **halyard**. The system shall permit hoisting and lowering of the **sail** from the cockpit whilst afloat.
- (b) The highest visible point of the **sail**, projected at 90 degree to the mast **spar**, shall not be set above the lower edge of the mast **upper limit mark**.
- (c) The aft most visible point of the **sail**, projected at 90 degree to the top of the boom **spar**, shall not be set behind the fore side of the boom **outer limit mark**. A stop shall be fitted to the **boom** to prevent the **sail** being hauled out over this mark.
- (d) **Luff** and **foot** bolt ropes shall be inside the spar grooves or tracks.
- (e) Leech lines, if fitted, shall be fixed only by knots and shall not be adjusted whilst *racing*.

##### 3.7.2.4 SAILMAKER

No license is required.

#### 3.7.3 MAINSAIL

##### 3.7.3.1 IDENTIFICATION

- (a) An IECU sail label carrying a unique identification number shall be sewn on to the starboard side of the sail not more than 400mm from the **tack point**.
- (b) The Class Insignia, national letters and sail numbers shall comply with RRS Appendix G except where prescribed otherwise in these **class rules**.
- (c) The National Letters shall be placed between the centerlines of the Nr. 1 (uppermost) and Nr.2 **batten pockets**, both extended to the **luff**.
- (d) The sail numbers shall be placed between the centerlines of the Nr. 2 and 3 **batten pockets**, both extended to the **luff**.
- (e) The class insignia shall be placed above the centerline of the Nr.1 (uppermost) **batten pocket**. The insignia may be placed back to back provided no part of the insignia is translucent.
- (f) National Letters and Sail Number minimum dimensions:

Height	295 mm
Width, except for I and 1	200 mm
Thickness	40 mm
Spacing between characters on the same and opposite sides and between a character, the class insignia and the edge of the sail	60 mm

(g) Class Insignia, see Sail Measurement Diagram.

### 3.7.3.2 MATERIALS

- (a) The **body of the sail** shall consist of **woven ply** of the same specification throughout with the exception that the bottom panel that may be of **woven ply** of a different specification.
- (b) **Secondary reinforcements**, excluding **batten pocket patches** and **flutter patches**, shall be of **ply** of the same specification as the **ply** used in the main part of the **body of the sail**.
- (c) The material of the headboard, if fitted, and the battens is not restricted
- (d) **Sail reinforcement** shall consist of **woven ply**.

### 3.7.3.3 CONSTRUCTION

- (a) The construction shall be: **soft sail, single ply sail**
- (b) Spare number.
- (c) **Primary reinforcement, batten pockets, batten pocket patches** and **flutter patches** may be of a different **woven ply** to that of the **body of the sail**.
- (d) The sail shall have 4 **batten pockets** in the **leech**.
- (e) The following are permitted, stitching, glues, tapes, bolt ropes, corner eyes, headboard with fixings, Cunningham eye, **batten pocket patches**, batten pocket elastics, batten pocket end caps, mast and boom slides, leech lines secured with knots, **windows**, tell tales, sail shape indicator stripes and items permitted or prescribed by other applicable **rules**.
- (f) The **leech** shall not extend more than 5 mm aft of a straight line between the **aft head point** and the upper edge of the nearest **batten pocket**.

### 3.7.3.4 DIMENSIONS

		Minimum	Maximum
1	<b>Leech length</b>		5320 mm
2	<b>Foot length</b> , not restricted, but limited by the booms outer mark. Distance aft face of mast to booms outer mark.		2740 mm
3	<b>Luff length</b> , not restricted, but limited by the <b>masts limit marks</b> . Distance between <b>mast limit marks</b>		4570 mm
4	<b>Top Width</b>		130 mm
5	<b>Head point</b> to intersection of the centerline of the top <b>batten pocket</b> with the <b>leech</b>	1000 mm	
6	<b>Upper width at upper leech point</b> 1250mm from the <b>head point</b>		960 mm
7	Distance between a point on the <b>leech</b> 2500mm from the <b>head point</b> and the nearest point on the <b>luff</b> .		1650 mm
8	<b>Primary reinforcements at head, clew, tack</b> and Cunningham position		295 mm
9	<b>Secondary reinforcements</b> , not restricted		
10	<b>Luff</b> bolt rope and <b>foot</b> bolt rope shall not be less than 80 % of their respective lengths and may be elastic.		
11	Combined <b>Windows</b> area		0.3 m <sup>2</sup>

12	<b>Windows</b> distances to <b>foot</b> and <b>luff</b>	150 mm	
13	Headboard, if fitted:		
	Width		130 mm
	Height	95 mm	158 mm
14	<b>Batten pocket length:</b>		
	Inside		2400 mm
15	<b>Batten pocket width:</b>		
	Inside		50 mm
16	<b>Batten pocket</b> distance to <b>luff</b>	150 mm	

### 3.8 ALL UP WEIGHT

The all up weight is not controlled.

### 3.9 EFFECTIVE DATES

Rules and when they became mandatory

\* National Class Unions may give a limited permission

\*\* Only if stated in the notice of race

<u>Rule first published or applicable</u>	<u>Fundamental measurement</u>	<u>Racing Olympic</u>	<u>Racing major championships</u>	<u>Other</u>
Boom no carbon	1. 3. 98	1. 3. 00	1. 3. 00	* 1. 3. 00
Mast and boom standardised gooseneck 1. 6. 97	1. 3. 98	1. 3. 00	1. 3. 00	1. 3. 00
Mast one design SCS shape 1. 3. 99	1. 3. 00	1. 3. 00	1. 3. 06	** 1. 3. 06
Sail, top and centre girth, top batten intersection with leech 1. 3. 98	1. 3. 98	1. 3. 99	1. 3. 99	1. 3. 99
Rudderstock and hull standardised pintles 1. 6. 97	1. 3. 98	-	-	-
Weight distribution only CGH 1500	15.3.10	-	-	-
Hull upper and lower rudder pintles max. 5mm	1. 3. 04 1. 3. 01	-	-	-
Boom max diameter 77 mm	1. 3. 00	-	-	-
Hull deck ring diameter 81-83mm	1. 1. 90	-	-	-

## 4. ADDITIONAL RULES WHICH APPLY WHEN RACING

### 4.1 AT ALL TIMES WHEN RACING

- (i) All covers to hatches and plugs to drainage holes shall be in place.

- (ii) The mast heel adjuster setting shall not be altered.
- (iii) The rudder blade shall be secured in the fully down position. However, the sailing instructions may prescribe an exception to this rule for racing in shallow water.
- (iv) The following equipment shall be on board:
  - (a) Spare number.
  - (b) A hand bailer, if the boat has no self-bailer fitted.
  - (c) A painter, of diameter not less than 6mm and length not less than 14m unless otherwise prescribed in the sailing instructions. The painter shall be of buoyant line having a nominal breaking-strain of not less than 450kg. The painter shall be secured around the mast at the deck ring.
- (v) Weight of clothing and equipment.
  - (a) Clothing worn by a competitor shall be solely to provide protection from the environment and not to increase weight. Water absorbent garments worn for example, on top of a dry suit or spray top shall be considered as a deliberate attempt to infringe this rule.
  - (b) A competitor's clothing and equipment shall not weigh more than 10 kilograms excluding clothing (and footwear) worn only below the knee.
  - (c) Spare number
- (vi) Hiking pads, cushions or similar which are attached to the boat are prohibited.

#### 4.2 In alteration to Racing Rule 42

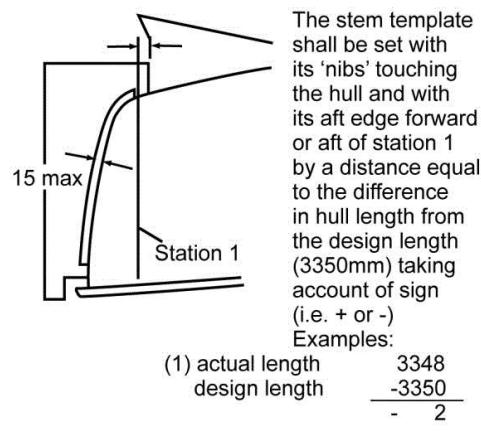
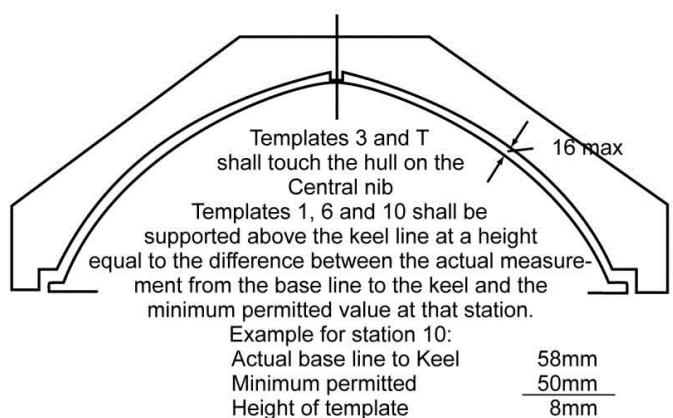
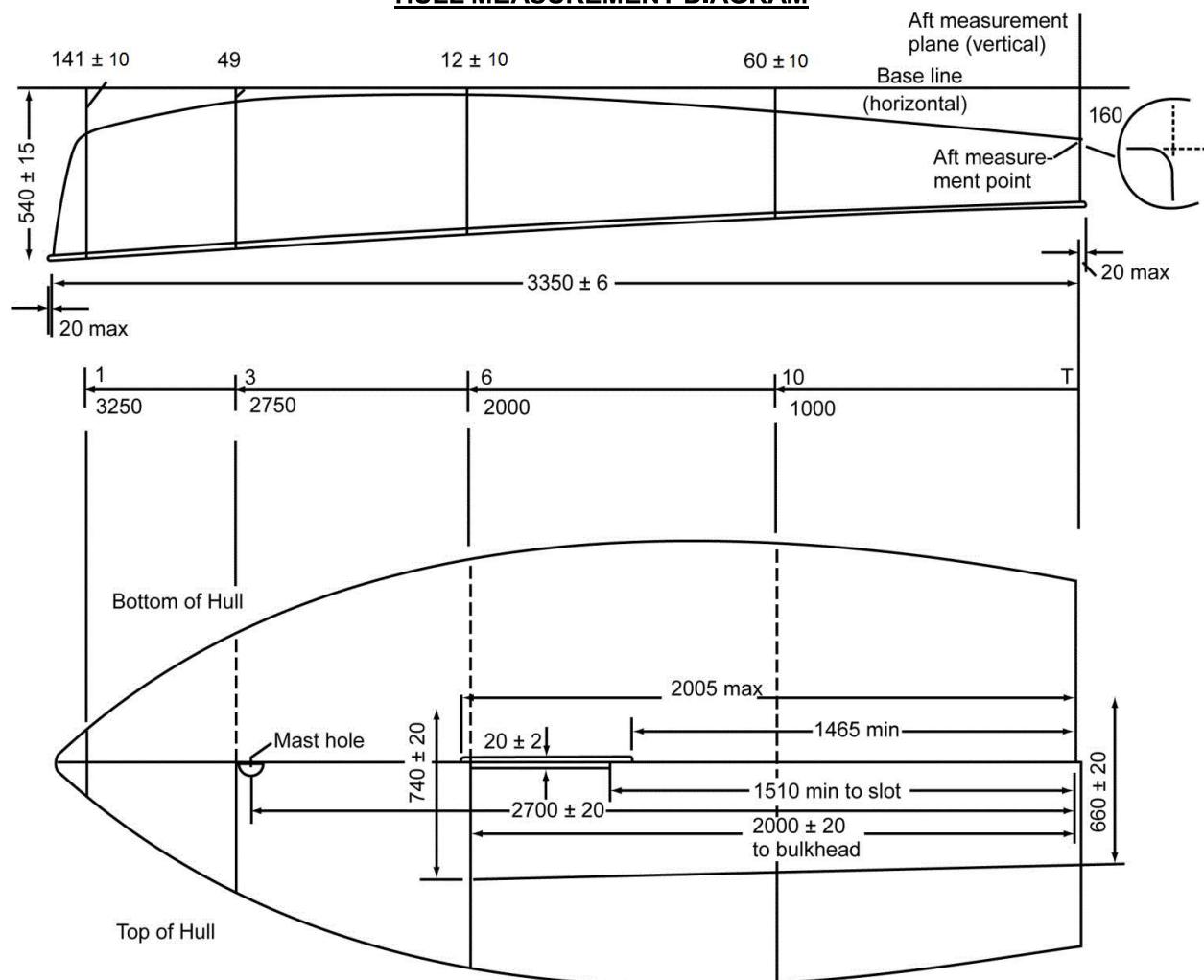
- (a) The Race Committee may permit pumping, rocking and ooching, after the starting signal and except on a beat to windward (change of RRS 42.2(a), RRS 42.2(b), RRS 42.2(c)). The signals will be made according to RRS P5.
- (b) The Europe Class recommends that race committees apply Rule 4.2(a) in winds of 12 knots and above, measured at deck level.

#### 4.3 Advertising

Unrestricted Category C applies in accordance with ISAF regulation 20.

### 5. **ADDITIONAL RULES WHICH APPLY WHILST AFLOAT**

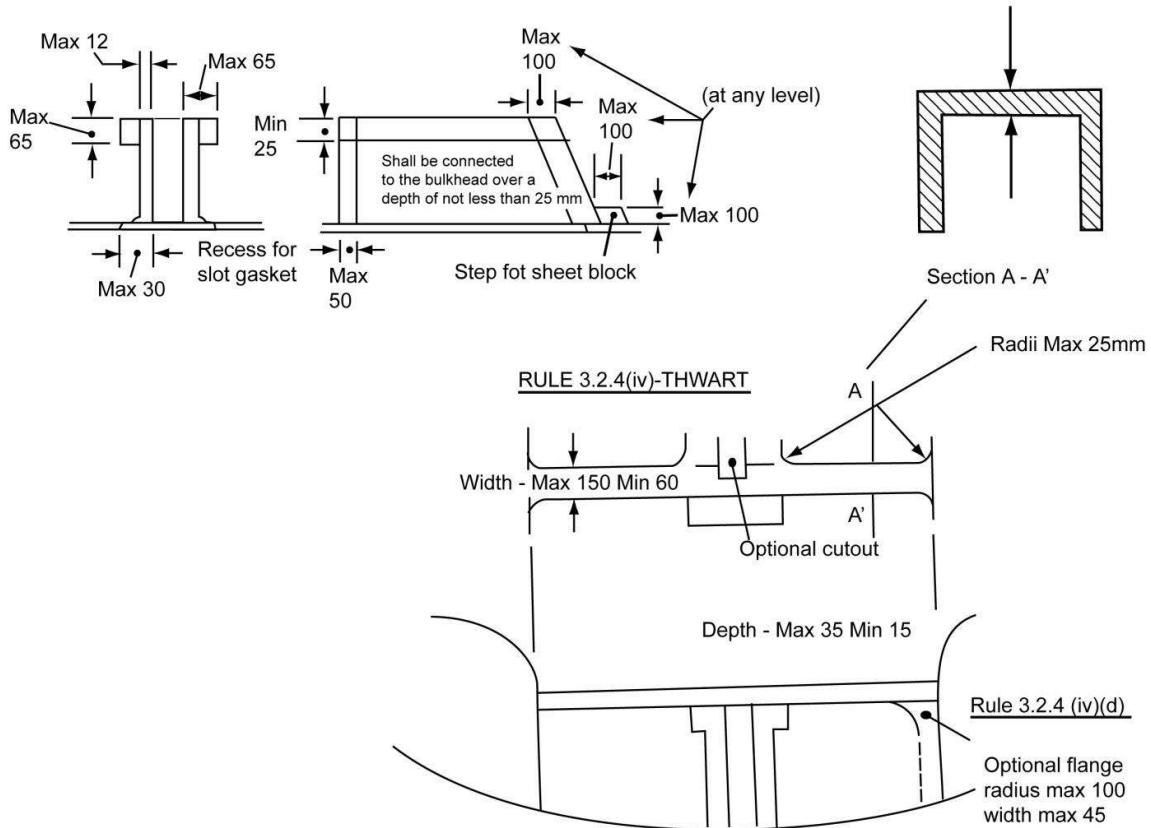
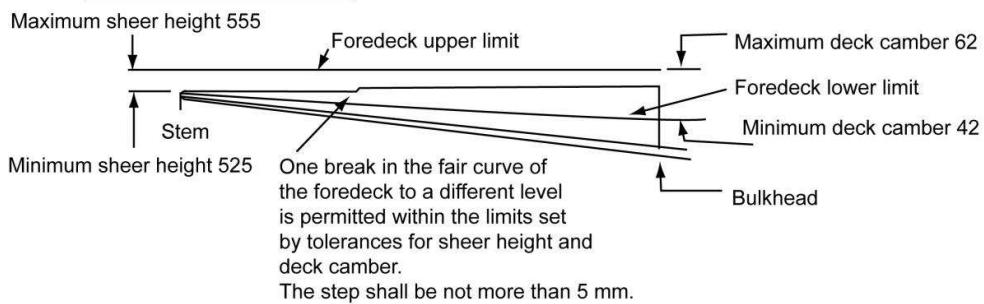
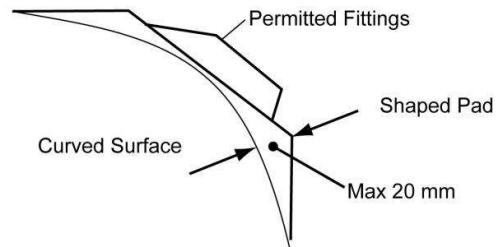
- (a) In alteration to RRS 1.2 a Personal Flotation Device shall be worn at all times whilst afloat except while changing or adjusting clothing or personal equipment. The Personal Flotation Device shall meet EN 393 or ISO 12402-5 (Level 50) standards. Alternative or additional standards may be prescribed in the NOR.

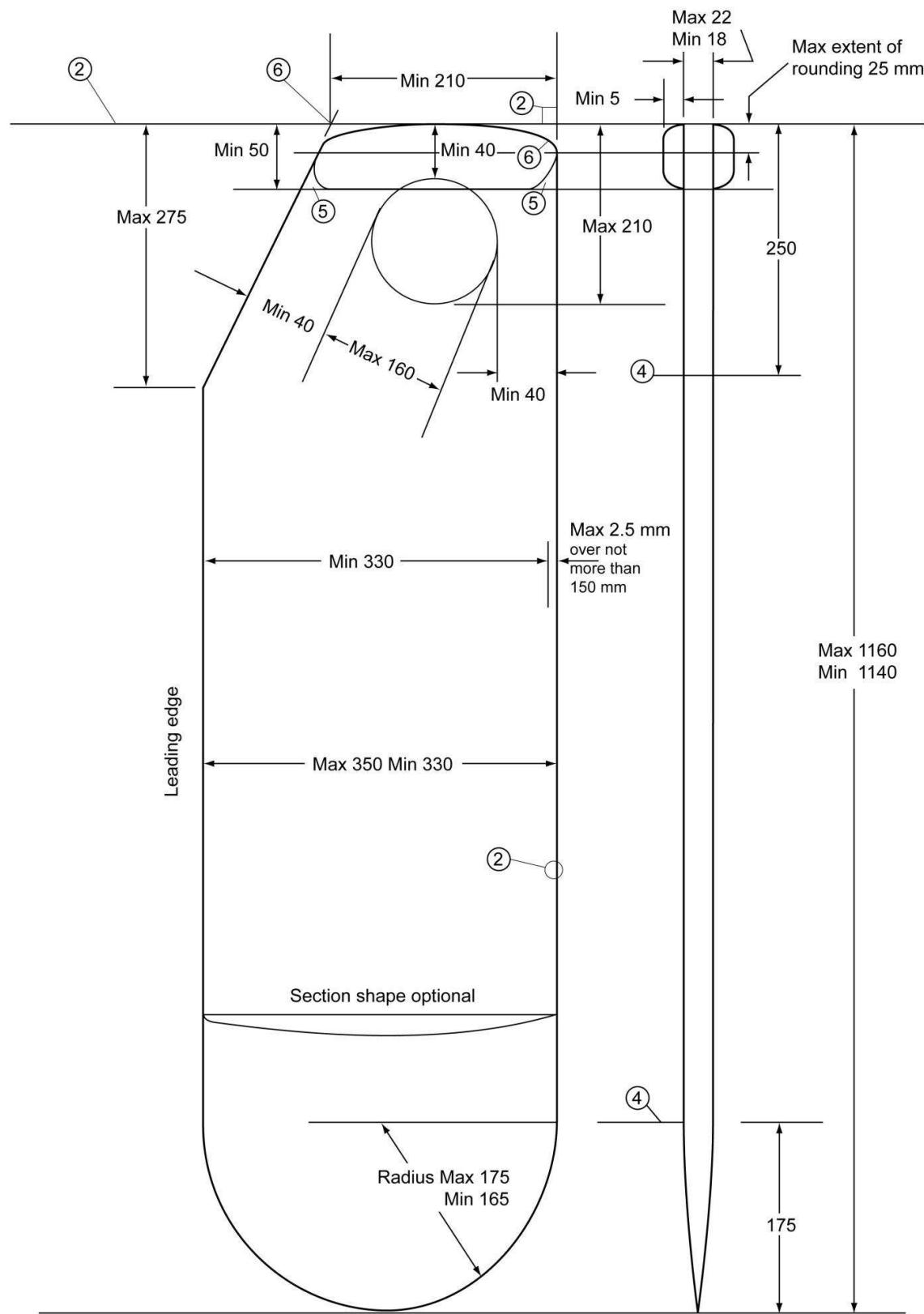
**HULL MEASUREMENT DIAGRAM**

Af edge 2mm aft of station 1

(2) actual length	3356
design length	3350
<hr/>	
	+ 6

Aft edge 6mm forward of station 1

HULL DETAIL MEASUREMENT DIAGRAMRULE 3.2.4(iii) - CENTREBOARD CASERULE 3.2.4(v) - FOREDECKRULE 3.2.4 (vi) - SHAPED PADS

**CENTREBOARD MEASUREMENT DIAGRAM**

### **CENTREBOARD MEASUREMENT NOTES**

1. The profile of the centreboard shall comply with the diagram. When positioned over a template of the maximum and minimum permitted profiles it shall concurrently be not greater than the maximum nor smaller than the minimum.
2. Except where otherwise shown the datum lines for profile measurement are:
  - (i) for width, a straight edge placed against the trailing edge of the board.
  - (ii) for length, a straight edge placed against the highest point of the board and at right angles to the width datum line.
3. The trailing and leading edges of the blade between the limits of the top corner or radius and the bottom radius, as shown on the diagram, shall be straight except that concavities of not more than 2.5mm, which in aggregate are not more than 150mm, are permitted. For measurement of width any such concavities in the profile shall be bridged. The overall profile shall be a fair curve.
4. The shape of the cross section is optional except that:
  - (i) below 175mm from the bottom edge the thickness shall be not more than 22mm.
  - (ii) above a line 250 mm below the top of the centreboard the thickness shall be 20mm  $\pm$  2mm. It shall not vary by more than 1mm except that within 20mm of each edge the board may be shaped to a thickness of less than 18mm.
  - (iii) between the limits in (i) and (ii) the thickest part of the board in any section shall be 20mm  $\pm$  2mm.

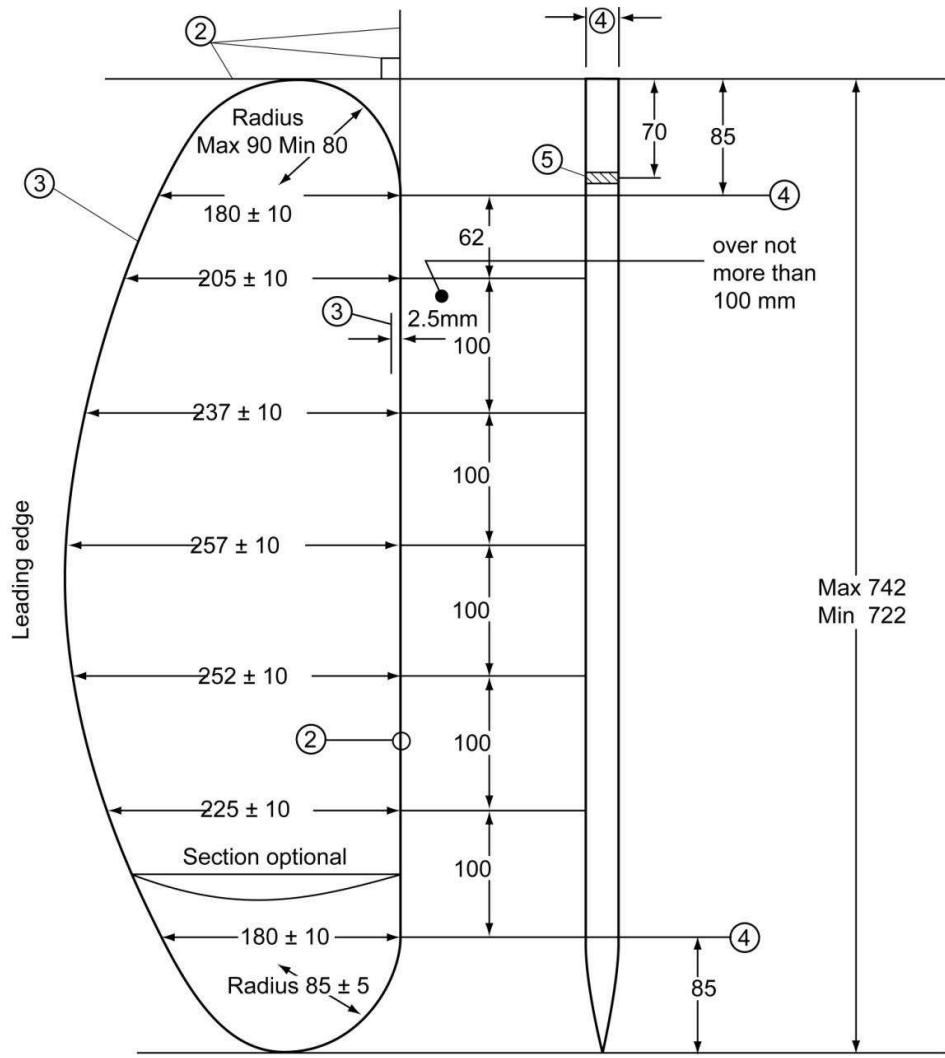
If of hollow construction the thickness limits shall not be exceeded if sub or super atmospheric pressure is applied at the drain hole by blowing or sucking.
5. A batten of wood or GRP, or stops of wood, rubber or plastic, not less than 5mm thick shall be fitted to each side of the top of the board. They shall be positioned so that even if compressed no part of the board less than 50mm from the top, except at less than 20mm from each edge, can enter the centreboard case slot.
6. The upper edge of the board may be rounded. Any such rounding shall not extend more than 25mm below the length datum line (see Note 2(ii)).
7. A handgrip hole is permitted. It shall be not more than 160mm across in any direction. No part of the hole shall be more than 210mm from the top of the board nor less than 40mm from the top or either edge.

### **RUDDER BLADE MEASUREMENT NOTES**

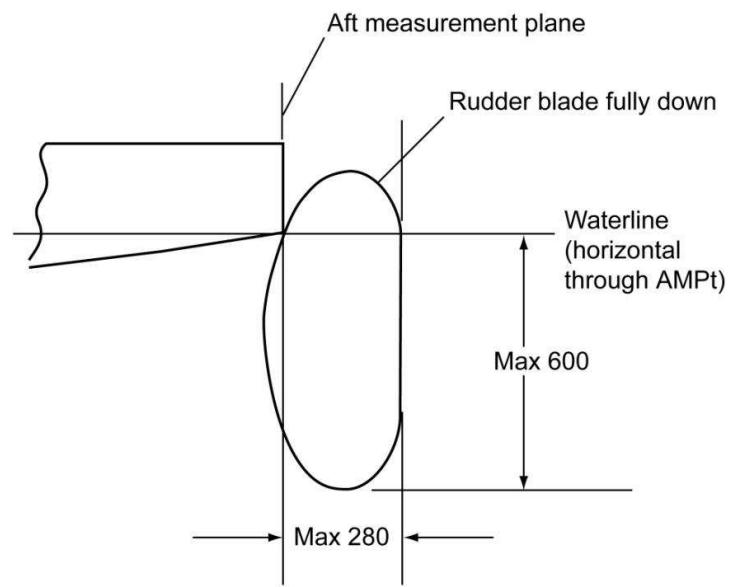
1. The profile of the rudder blade shall comply with the diagram. It shall be a fair curve. When positioned over a template of the maximum and minimum permitted profiles it shall concurrently be not greater than the maximum nor smaller than the minimum.
2. The datum lines for profile measurement are:
  - (i) for width; a straight edge placed against the trailing edge.
  - (ii) for length; a straight edge placed against the highest point of the blade and at right angles to the width datum line.
3. The trailing edge of the blade between the lower and upper limits of the top and bottom radii respectively, as shown on the diagram, shall be straight except that concavities of not more than 2.5mm, which in aggregate are not more than 100mm, are permitted. For measurement of width any such concavities in the profile shall be bridged. The overall profile shall be a fair curve.
4. The shape of the cross section is optional except that:
  - (i) below 85mm from the bottom edge the thickness shall be not more than 22mm.
  - (ii) above a line 85mm below the top of the centreboard the thickness shall be 20mm  $\pm$  2mm. It shall not vary by more than 1mm except that within 20mm of each edge the board may be shaped to a thickness of less than 18mm.
  - (iii) between the limits in (i) and (ii) the thickest part of the board in any section shall be 20mm  $\pm$  2mm.

If of hollow construction the thickness limits shall not be exceeded if sub or super atmospheric pressure is applied at the drain hole by blowing or sucking.
5. The centre of the pivot hole shall be not less than 70mm from the top of the blade.

## **Rudder Blade Measurement Diagram**

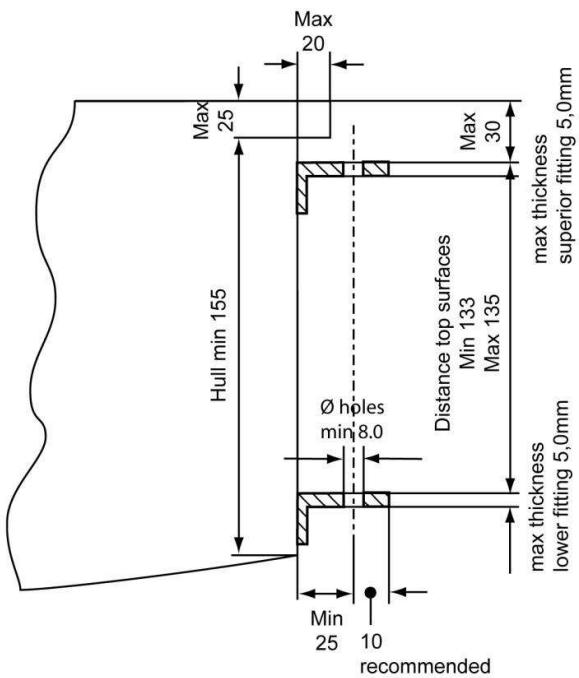
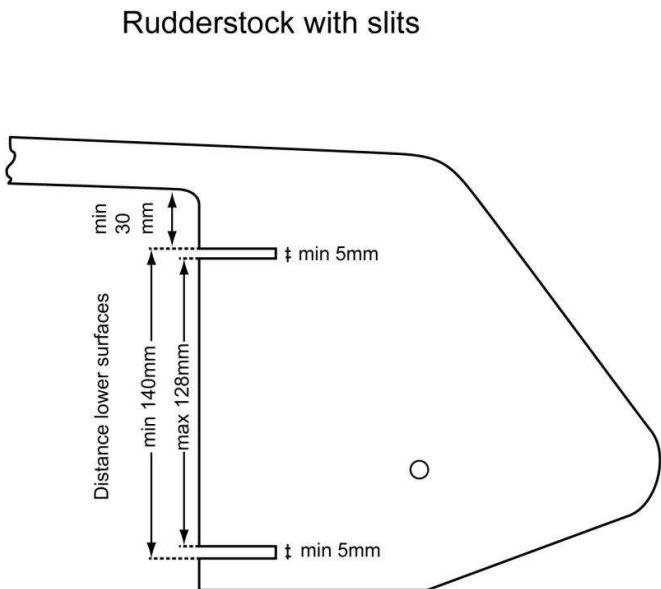


### Rule 3.4.3 - Rudder Fully Down

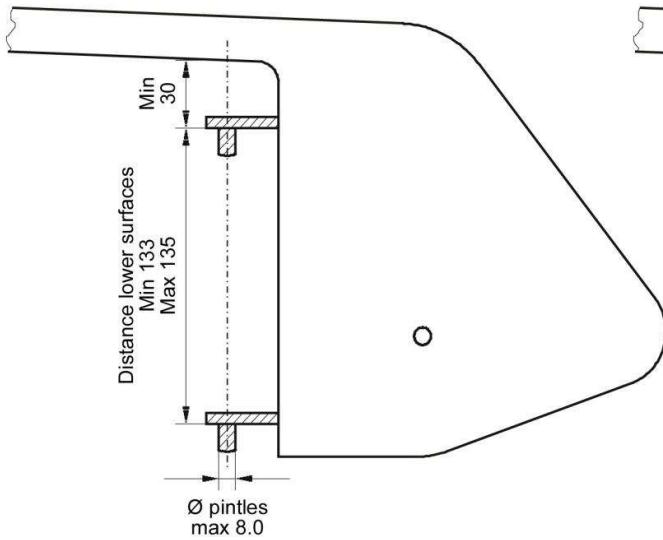


## **Rudder Fittings Measurement Diagram**

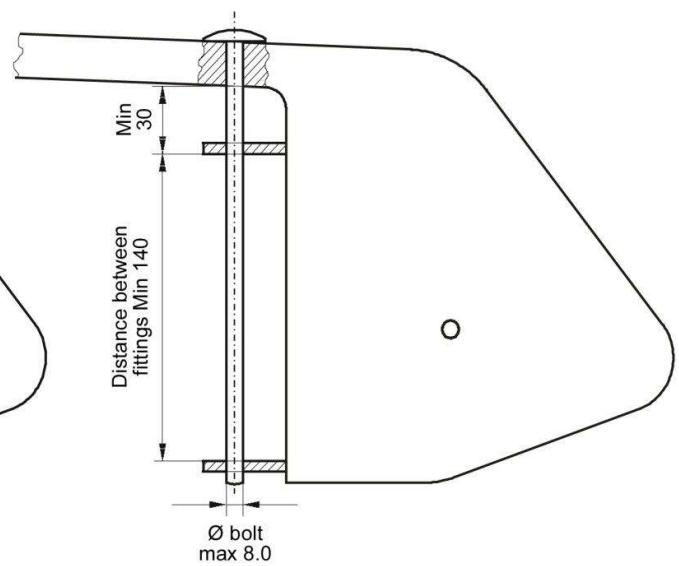
## Rudderstock with slits

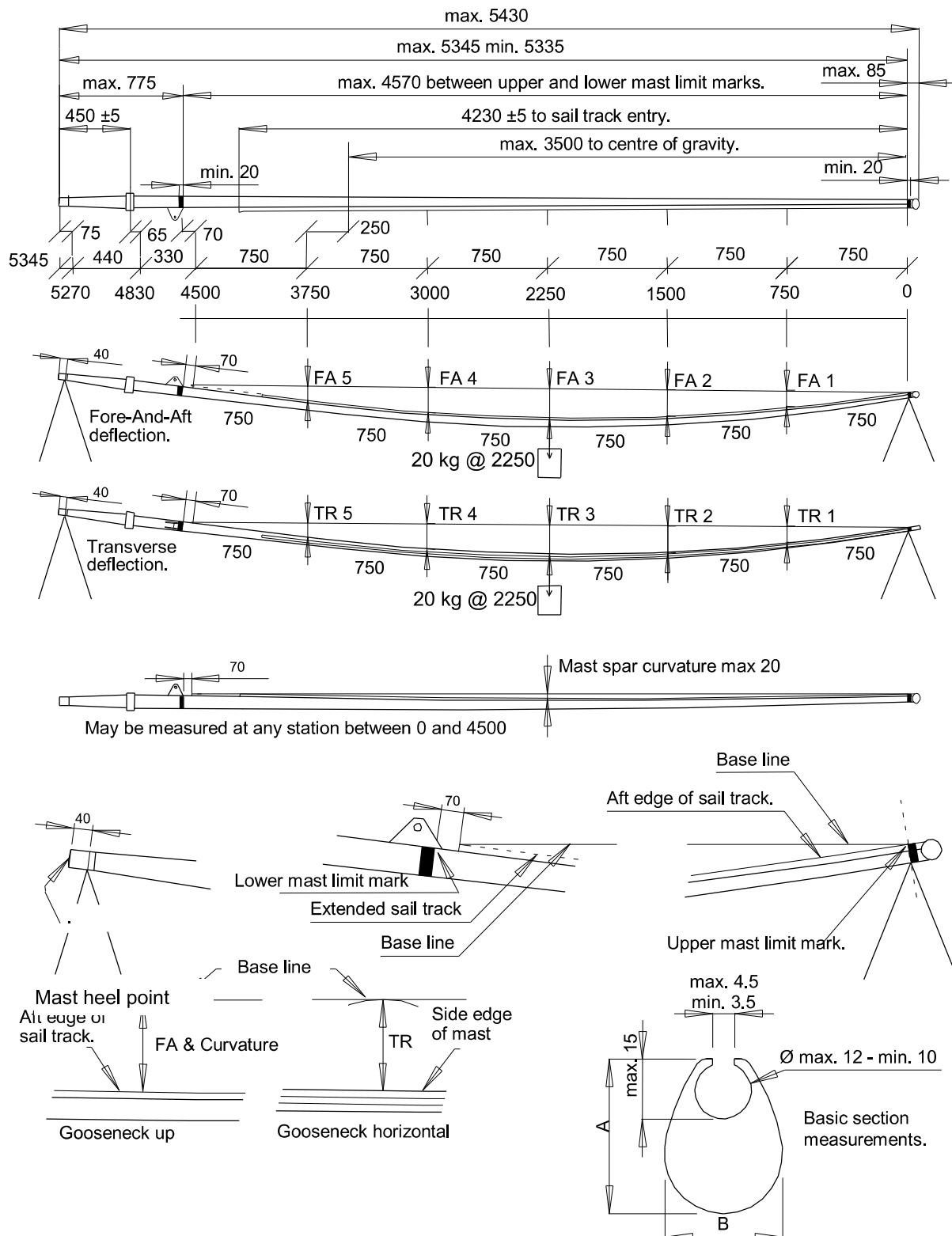


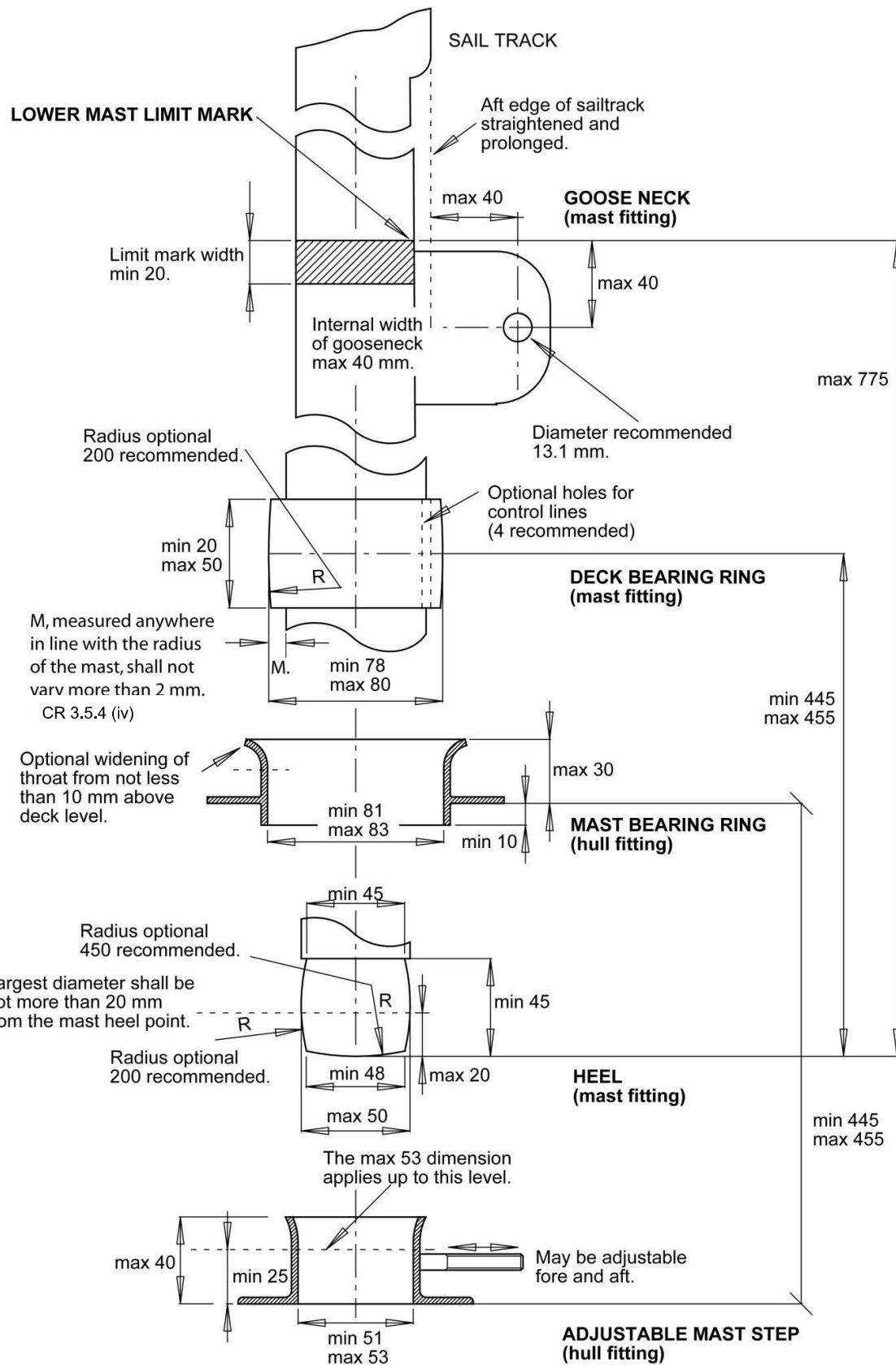
Rudderstock with both fittings going on the top surfaces



Rudderstock with fittings  
going outside the hull fittings



**MAST MEASUREMENT DIAGRAM SHEET 1 OF 2.**

**MAST MEASUREMENT DIAGRAM SHEET 2 OF 2.**

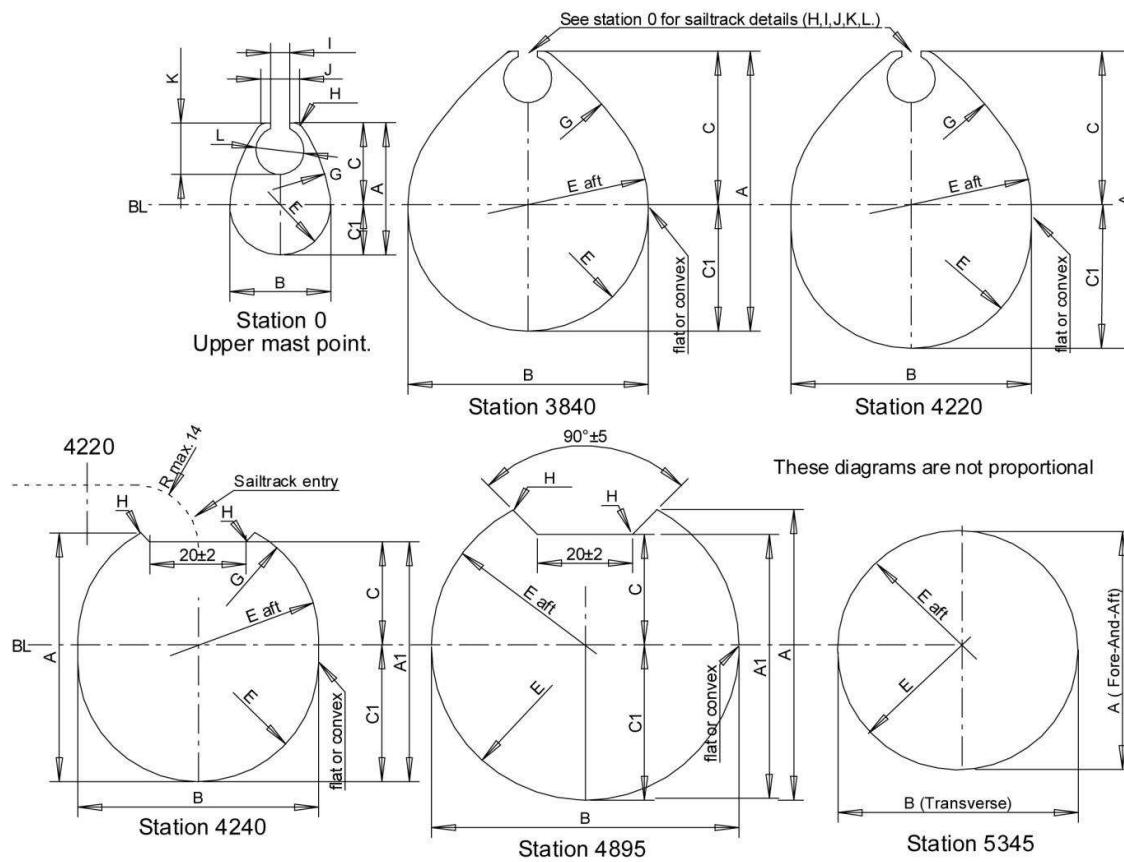
**MAST DESIGN SPECIFICATIONS.**

Basic FRP profile incl. sail track, without fittings, see CR 3.5.4.(i)

Table of offsets:

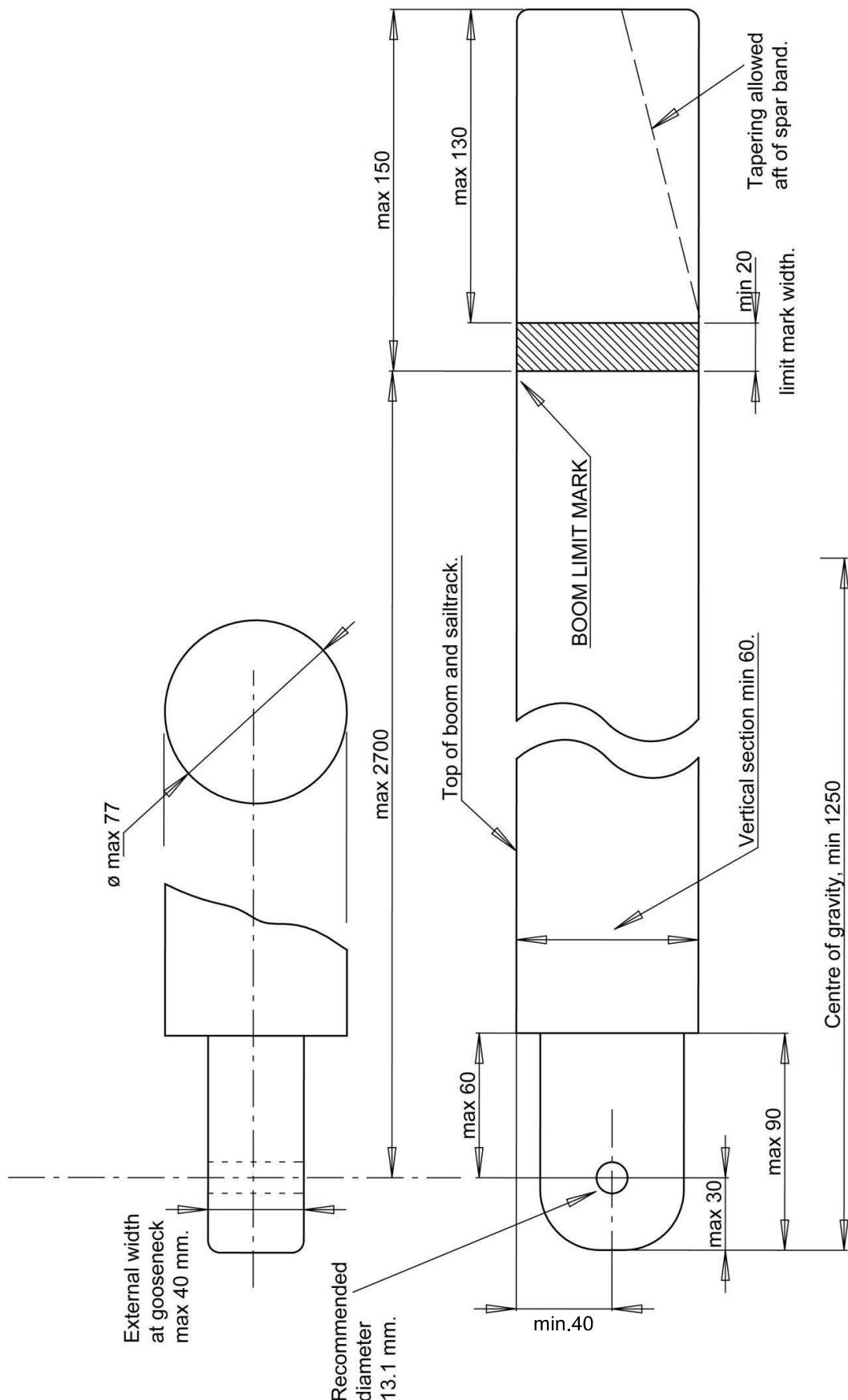
Position	Station	A	B	A1	C	C1	E	G	H	I	J	K	L
Measurement tolerance.	$\pm 1$	$\pm 2$	$\pm 1$	$\pm 2$	$\pm 2$	$\pm 2$	$r \pm 2$	$r \pm 5$	$r \text{ max.}$	$\pm 0,5$	$\text{max.}$	$\text{max.}$	$\emptyset \pm 1$
Upper end of top or top fitting	<b>-85</b>	-	-	-	-	-	-	-	-	-	-	-	-
Top of design shape.	<b>-20</b>	28.1	22.2	-	17.04	11.08	11.08	38.8	3	4	9	15	11
Upper mast limit mark.	<b>0</b>	28.3	22.3	-	17.10	11.18	11.15	39.0	3	4	9	15	11
Section.	<b>750</b>	34.3	28.5	-	19.75	14.52	14.25	48.0	3	4	9	15	11
Section.	<b>1500</b>	40.3	34.7	-	22.40	17.87	17.35	57.0	3	4	9	15	11
Section.	<b>2250</b>	46.3	40.9	-	25.04	21.21	20.45	66.0	3	4	9	15	11
Section.	<b>3000</b>	52.3	45.9	-	27.69	24.56	22.95	74.9	3	4	9	15	11
Section.	<b>3750</b>	58.2	49.8	-	30.34	27.90	24.90	83.9	3	4	9	15	11
Section.	<b>3840</b>	59.0	50.0	-	30.66	28.31	25.00	85.0	3	4	9	15	11
Sail track entry high.	<b>4220</b>	62.0	50.5	-	32.00	30.00	25.25	85.0	3	4	9	15	11
Sail track entry low.	<b>4240</b>	52.2	50.5	50.1	20.40	29.70	25.25	83.4	3	-	-	-	-
70 above lower mast limit mark	<b>4500</b>	55.5	55.9	52.2	21.48	30.76	27.95	63.0	3	-	-	-	-
260 below lower mast limit mark	<b>4830</b>	59.7	62.9	55.0	22.86	32.11	31.45	37.1	3	-	-	-	-
Centre of bearing ring.	<b>4895</b>	60.5	64.0	55.5	23.13	32.37	32.00	-	3	-	-	-	-
75 above heel point.	<b>5270</b>	51.8	51.9	50.9	24.75	25.98	25.95	-	-	-	-	-	-
Bottom of design shape, heel.	<b>5345</b>	50.0	50.0	50.0	25.00	25.00	25.00	-	-	-	-	-	-

Shapes shall vary gradually between stations without any sudden changes; parameters for any other station can be obtained by interpolation. Fore and aft and sail track measurements between stations 4220 and 4240 may deviate to suit entry-entry fittings. Shape above -20 shall be extrapolated design shape or may deviate to suit top fitting. Shape between 5270 and 5345 may deviate to suit heel fitting. Joints between arcs shall be at their mutual tangent. When a straight line (flat) connects arcs it shall be at their mutual tangent. 'E aft' shall be centred at the baseline. Value for 'E aft' see E.



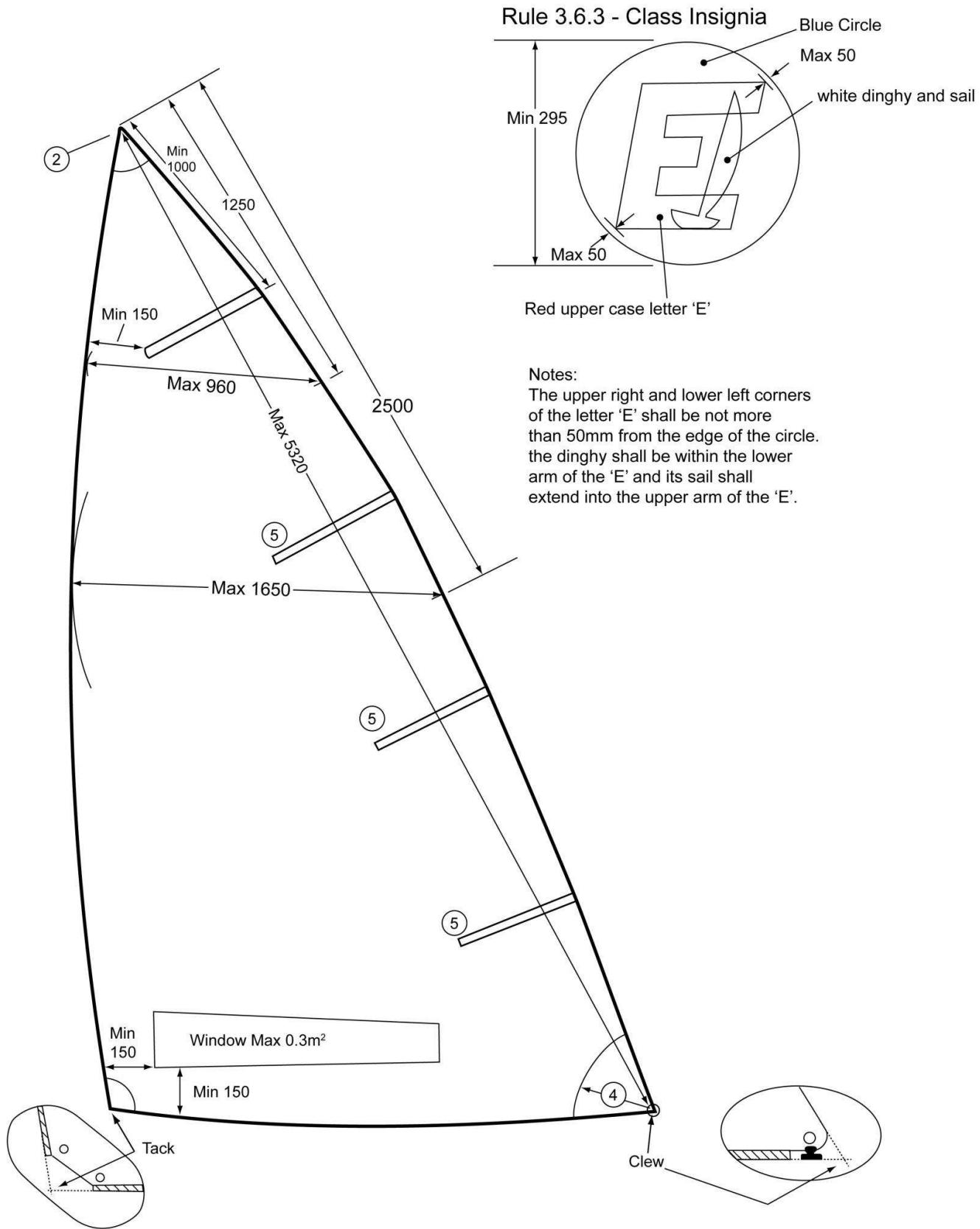
**BOOM MEASUREMENT DIAGRAM**

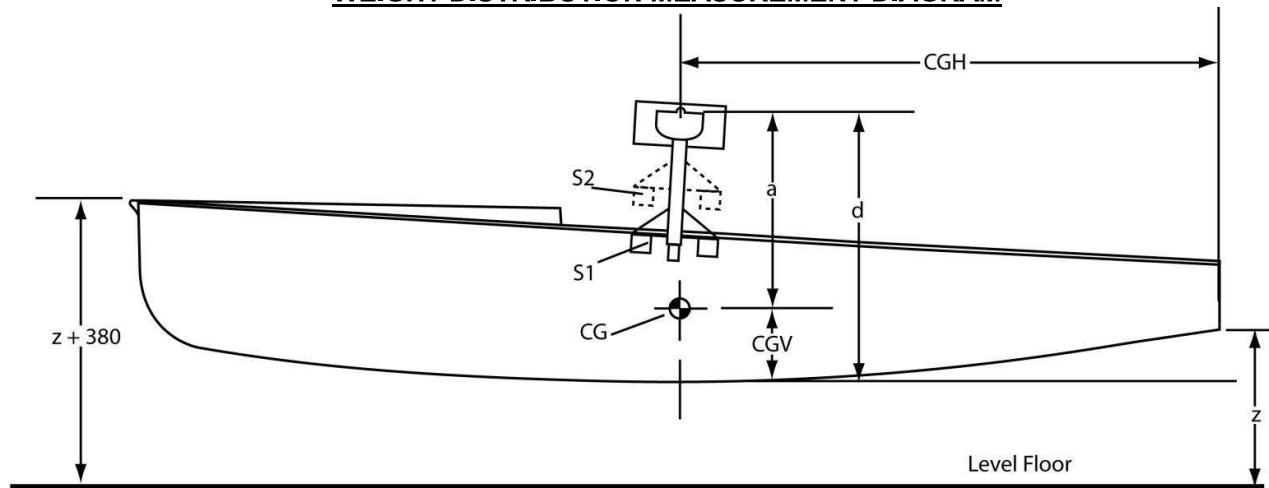
(see mast and boom measurement notes referring to this boom measurement diagram.)



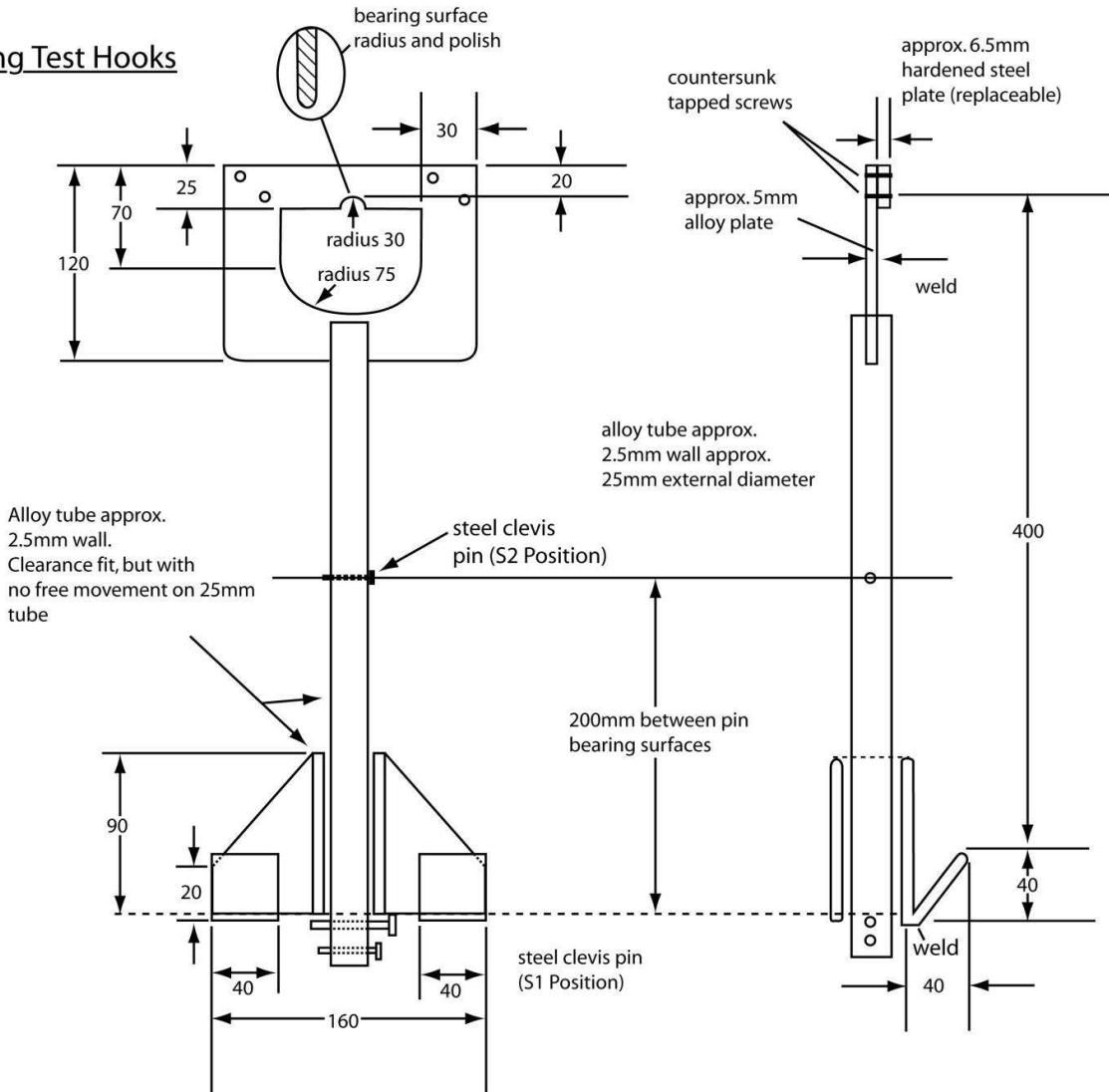
**MAST AND BOOM MEASUREMENT NOTES**

1. A number inscribed in a circle is a reference to the note of that number.
2. The type of permitted fittings used on mast and boom are optional. Permitted are: gooseneck; mast deck bearing ring, which shall have no moving parts; mast heel fitting, which shall have no moving parts; halyard sheave and housing, halyard lock, halyard tail cleat or other securing arrangement, not more than 3 halyard tail locating clips on the foreside of the mast burgee and/or wind direction indicator, control line sheaves, housings and / or blocks, sheet blocks and securing eyes, boom kicker (vang) system, mast retaining system.
3. No fittings should be positioned so that measurement at the stations shown in the measurement form may be obstructed.
4. The gooseneck fittings of the mast and boom shall be made so that every boom fits every mast and both can be measured separately. The profiles, cross sections and dimensions of the fittings shall comply with those specified on the mast and boom measurement diagram and the measurement form.
5. The position of the inner edge of the mast and boom measurement bands shall be permanently marked with a scribed line or not less than two indentation marks. If correctly positioned, of sufficient width and of a contrasting colour, the gooseneck and halyard sheave case on the mast and / or the end fitting/outhaul sheave case on the boom shall be used in lieu of any other form of measurement band. If so used scribed lines or indentations are not required.
6. The surface of the basic mast section without heel, top, gooseneck and other fittings shall be as shown in the Table of Offsets (MAST DESIGN SPECIFICATION), within the tolerances stated. (For the intended prototype measurement the tolerances are half the figures given in the Tables of Offsets).
7. The mast shall be straight. A permanent set of not more than 20mm, measured to a taut line touching the surface of the profile at the lower edge of the upper measurement band and at station 4500 at the height of the extended aft face of the sail track, is permitted.
8. The horizontal movement of the mast at the bearing surfaces on the boat shall be not more than 5mm at the deck and not more than 5mm at the heel including movement of the mast heel position adjustment system.
9. The mast bend measurements shall be obtained as given in the mast measurement diagram, sheet 1 of 2.
10. Measurement marks. Masts and booms shall have indented marks at those stations shown in the measurement form, where figures or controls have to be taken.
11. The boom, without fittings, shall be capable of passing through a 77mm diameter circle. The cross section shall be constant, with a tolerance of 2mm, from 90mm from the foremost point of the boom part of the gooseneck to the outer edge of the measurement band.

**SAIL MEASUREMENT DIAGRAM**

**WEIGHT DISTRIBUTION MEASUREMENT DIAGRAM**

A 90 degree knife edge for support beam pivot axis is recommended

**Swing Test Hooks**

### **WEIGHT DISTRIBUTION (SWING TEST) MEASUREMENT NOTES**

1. The procedure for the swing test is based on the 'Lamboley Test' used by the International Finn Class. The hull is suspended from brackets hanging from a transverse beam, which forms the swing axis. The brackets locate on the hull below the rubbing strake. The bracket design allows the hull to be supported at 2 different heights relative to the swing axis. The swing period is measured at each height.
2. The swing period may be measured using either:
  - (i) a stopwatch with 1/100-second readout.
  - (ii) an electro-optical device, such as a photoelectric cell linked to an electronic timer or microcomputer. These notes assume the manual, stopwatch method is used.
3. If the weight of the hull is not known, weigh the hull in conditions as defined in rule 3.2.7. Record as 'M' kg.
4. Suspend the hull, supported on the brackets in position S1 as shown in the diagram, so that it is level fore and aft in condition as for weighing. When level the height of the sheer line at the stem will be 380mm more than the height of the Aft Measurement Point (AMPt) above a level floor. Assuming a level floor the error in fore and aft level will be not more than 15mm in 3350mm, i.e. less than 0.5%. If the true sheer height at the stem is known, from either the measurement form or when the swing test is conducted as part of hull measurement, apply a correction to the 380mm height as follows:  
Subtract 540 from the sheer height. Add result to 380.  
e.g. sheer height = 530:  $530 - 540 = -10$ :  $380 + (-10) = 370$   
sheer height = 555:  $555 - 540 = +15$ :  $380 + (+15) = 395$   
Ensure that the suspension axis is at right angles to the fore and aft line of the hull. When it is, the distance from the aft end of each bracket to the transom will be the same. Mark the bracket position on the hull.
5. Measure:
  - (i) the horizontal distance from the vertical plane through the pivot point of the transverse beam and the transom. Record as 'CGH'.
  - (ii) the height of the support axis above the underside of the hull. Record as 'd'.
6. Set up a support post for a reference pointer close to the bow. Ensure it is just clear of the hull when the hull is swung.
7. Mark a level datum on the reference post aligned to a clearly defined mark or feature on the hull, e.g. the underside of the rubbing strake. Mark a swing start point on the post 50mm below the level datum.
8. Depress the bow to the start position and release. Allow at least 1 complete cycle for the system to settle.
9. Start the stopwatch as the bow passes the level reference. Count and time not less than 10 complete cycles. Record as 'TTI'.
10. Calculate the mean period for the number of cycles completed, e.g. record mean period as 'T1'.
11. Repeat steps 6 to 9 with the hull suspended on the brackets in position S2. It is important that the brackets are set at the same fore and aft position on the hull as for S1, using the marks made in the procedure of paragraph 4. Record mean period as 'T2'.
12. Calculations:
  - (i) Calculate the height of the swing axis (a) above the centre of gravity [CG] and radius of gyration [RG] by either:
    - (a) solving the following equations:
$$a = \frac{0.2 \times b \times T2^2 + 0.04}{b \times (T2^2 - T1^2) + 0.4} \quad RG = \sqrt{(b \times T1^2 \times a) - a^2} \quad \text{where } g = 9.815$$

$$PI = 3.142$$

$$b = g/(4 \times PI^2)$$

$$= 0.2486 \text{ (constant)}$$

or

(b) entering T1 and T2 in the tables in the Europe Measurement Manual. Calculator and computer programs for calculating 'a' and 'RG' from 'T1' and 'T2' are given in the IYRU Measurement Manual.

(ii) Calculate the Mass Moment of Inertia (I) as follows:

$$I = M \times RG^2 \quad \text{where } M \text{ is the mass of the hull}$$

(iii) Calculate the height of CG above the underside of the hull (CGV) as follows:

$$CGV = (d - a) \times 1000\text{mm}$$

13. Record data on the measurement form.

### **OFFICIAL PLANS, FORMS and REGULATIONS**

1. Table of Offsets.	12.05.2003
2. Lines Plan.	September 1976
3. Stern Profile.	September 1976
4. Full Size Section Hull.	September 1976
5. Measurement Forms 2010	24.4.2010
6. International Europe Class Rules 2010	24.4.2010
7. Prototype Hull Measurement Form Supplement – revised 2010.	Mai 2010
8. Prototype Mast Design Measurement Form.	November 2002
9. Application Form for Authorized Manufacturer Code for Masts.	October 2001
10. Application Form for Authorized Manufacturer Code for Booms.	October 2001
11. Procedural for becoming an Authorized Manufacturer for Masts.	October 2001
12. Procedural for becoming an Authorized Manufacturer for Booms.	October 2001
13. Application for Licence to Build.	October 2001
14. Form Aft Race Controls	17.12.2006
15. Measurement entry Forms.	August 2007
16. Measurement Instruction for Major Events.	13.5.2003
17. Rules for World Championship and Major Events	November 2004

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