



# AC75 CLASS RULE

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## *Contents*

1	Introduction	2
2	Language	2
3	Reference frames and units	3
4	General arrangement	4
5	Component limits and modifications	5
6	Materials	8
7	Construction methods	10
8	Surface finishes	12
9	Mass	13
10	Hull	15
11	Deck fittings	18
12	Foils	20
13	Foil Arms	23
14	Foil Flaps	24
15	Rudder	25
16	Bowsprit	26
17	Sails (General)	27
18	Headsails	28
19	Mast and mainsail	31
20	Control systems	38
21	Hydraulic control circuits	40
22	Electrical and electronic systems	41
23	Electronic control circuits	43
24	Instrumentation and logging system	44
25	Crew information system	45
26	Foil cant system	47
27	Crew	48
28	Guest racer	49
29	Branding	49
30	Measurement	50
31	Interpretation	52
32	Amendment	53
33	Dates	53
34	Definitions	54

# 1 Introduction

- 1.1 This document defines the rules which govern an **AC75 Class Yacht**, the class of **yacht** chosen to compete in the 36<sup>th</sup> America's Cup.
- 1.2 The **AC75 Class Yacht** is a 75 foot high-performance monohull intended to:
- promote head-to-head match racing and close competition;
  - permit technological development to spearhead the development of sailing and maintain the America's Cup as the world's premier sailing event;
  - ensure the class is relevant to the sport of sailing with connection to the community of sailors;
  - be demanding to sail, rewarding the top level of skill for all sailors on the **yacht**;
  - provide competitive racing in light and stronger wind conditions;
  - provide a safe position for a guest racer on board the **yacht**; and
  - incorporate practical requirements for the launching, retrieval and transportation of the **yacht**.
- 1.3 An **AC75 Class Yacht** shall comply with the **AC75 Class Rule** when racing, and at other times as required by the **AC75 Class Rule** and the **Protocol**.
- 1.4 **Competitors** are ultimately and solely responsible for the safety and structural integrity of the whole (and any part or parts) of their **AC75 Class Yacht**. No express or implied warranty of safety and/or structural integrity shall result from compliance with the whole or any part of this **AC75 Class Rule**. Any structural testing required for compliance with the **AC75 Class Rule** does not guarantee safety or structural integrity nor does it relieve the **Competitor** of this responsibility.

# 2 Language

- 2.1 The official language of the **AC75 Class Rule** is English.
- 2.2 Within the **AC75 Class Rule**, the word "Rule" is a reference to a rule of this **AC75 Class Rule**.
- 2.3 Where words or phrases are printed in bold type their meaning shall be as defined in Rule 34. Bold terms defined as singular may be used in their defined sense as plurals, and vice versa.
- 2.4 In some document viewers, the definition of terms in bold may be seen as a tooltip. Although these tooltips are intended to provide the correct and full definitions, they should not be relied upon; the text printed in Rule 34 is the only authoritative source.
- 2.5 The interpretation of words not defined in bold shall be made with reference to the **Official Dictionary**. The **Rules Committee** shall determine the appropriate definition and may do so by consulting other references.
- 2.6 The words "can" and "may" are permissive. The words "will", "must", and "shall" are mandatory.
- 2.7 Details marked as "TBA" will be provided as soon as possible in accordance with Rule 32.1 (a).

### 3 *Reference frames and units*

- 3.1 The Measurement Waterline Plane, **MWP** is defined as the horizontal reference plane of the yacht.
- 3.2 The Longitudinal Centre Plane, **LCP** is defined as the vertical reference plane, orthogonal to **MWP**.
- 3.3 The Transom Reference Plane, **TRP**, is defined as the vertical reference plane, orthogonal to **MWP** and **LCP**.
- 3.4 The reference planes **MWP**, **LCP** and **TRP** are fixed to the **yacht**, translating and rotating as the yacht moves in space.
- 3.5 Except where otherwise specified, terms such as “above”, “below”, “forward” and “aft” refer to relative positions in the yacht-fixed coordinate system.
- 3.6 The aftmost point on the **hull surface** shall lie on **TRP**.
- 3.7 The **hull** shall have three measurement reference points. These points shall be located:
  - (a) on **MWP** and on **LCP**, at 20.700 m from **TRP**; and
  - (b) on **MWP** and on **TRP**, offset 2.000 m either side of **LCP**.
- 3.8 Three screws shall be installed on the **hull surface** for the purpose of locating the reference points. If a reference point does not lie on the **hull surface**, the screw shall be installed at declared offsets from the reference point, as close as reasonably possible to the reference point.
- 3.9 The **hull IGES** shall include the three measurement reference points and the exact locations of the three screws in Rule 3.8.
- 3.10 The following tolerances shall be applied to all dimensions specified in this **AC75 Class Rule**:
  - (a) where a measurement is required to be a specific value:
    - (i) where decimal places for a unit are given, the measurement shall be accurate to the least significant figure indicated. For example, if a Rule states that a length must be 5.0 m, that length must be at least 4.95 m and less than 5.05 m;
    - (ii) where decimal places for a unit are not given, the measurement shall be accurate to within 1% of the figure indicated. For example, if a Rule states that a component must weigh 1000 kg, that component must weigh between 990 kg and 1010 kg inclusive; and
  - (b) where a measurement is required to be “at least”, “at most”, “a minimum”, “a maximum”, “between”, “within a range”, or other equivalent wording, no tolerance beyond that limit or outside that range is permitted, but the permitted measurement is inclusive of the limit value. For example, if a Rule states that a length must be less than 5 m, that length must be no more 5.000000 m to the accuracy of the equipment referred to in Rule 30.8.

## 4 *General arrangement*

4.1 The **AC75 Class Yacht** shall have:

- (a) one **hull**;
- (b) two **foils**;
- (c) one **rudder**;
- (d) one **bowsprit**;
- (e) one **mast**;
- (f) one set of **supplied rigging**;
- (g) one **mainsail**;
- (h) one **jib** or equivalent ballast (see Rule 9.5);
- (i) one **code zero** or equivalent ballast (see Rule 9.5); and
- (j) other systems, hardware, fittings and rigging except where prohibited herein.

4.2 The **AC75 Class Yacht** shall be propelled by sails only.

## 5 Component limits and modifications

5.1 The components in the table below are restricted as detailed in the following rules:

Component	Rule	Quantity	Change allowance
<b>Hull surfaces</b>	Open	2	† 0% & 25% area
<b>Foil arms</b>	Supplied	4	-
<b>Foil arm</b> trailing edges	Open	6	20% mass
<b>Foil wings</b>	Open	6	20% mass
<b>Foil flaps</b>	Open	20	20% mass
<b>FCSS</b>	Supplied	2	-
<b>Rudder</b> uppers	Open	4	20% mass
<b>Rudder</b> lowers	Open	4	20% mass
<b>Mast tubes</b>	Specified	3	20% mass
<b>Supplied rigging</b> sets	Supplied	3	-
<b>Mainsails</b>	Open	*10	25% area
<b>Headsails</b>	Open	*29	25% area

†With reference to the **Protocol**, a **Competitor** may modify one of its **hulls** but not the other.

\*See Rule 5.11.

COR/D is considering a Protocol change that could allow some change of second hull.

5.2 In Rule 5.1, the terms in the column “Rule” have the following meaning:

- (a) *Open*: The shape and construction is open to design, within the constraints specified for that component within this **AC75 Class Rule**.
- (b) *Specified*: The outer shape and some aspects of construction are specified by this **AC75 Class Rule**, but other aspects of construction are open to design.
- (c) *Supplied*: The component is supplied as standard to all **Competitors**. Modifications to the components are prohibited except where specifically permitted by this **AC75 Class Rule**.

5.3 **Competitors** may request clarification of the construction or operational requirements of items marked as “Specified” or “Supplied” from the **Rules Committee** who, after consultation with the designers of those parts, will issue a clarification notice to all **Competitors**.

5.4 In accordance with Rule 33, a template spreadsheet will be issued to track components listed in Rule 5.1, including fields for identifying a specific component, recording the date each component was first installed, the modification status of each component, and where applicable the component’s weight.

5.5 When a component listed in Rule 5.1 is:

- (a) first installed on an **AC75 Class Yacht**; or
- (b) modified and re-installed on an **AC Class Yacht**,

and that **yacht** is afloat, the **Competitor** shall declare that component to the **Measurement Committee** within 24 hours by emailing an updated version of the spreadsheet described in Rule 5.4.

5.6 A component must be declared and counted in the limits described in Rule 5.7 regardless of whether that component satisfies the specific Rules controlling its parameters in this **AC75 Class Rule**. Any component that serves or partly serves the purpose of a listed component shall be counted.

- 5.7 In Rule 5.1, the values in the column “Quantity” are the maximum numbers of each component that a **Competitor** may declare.
- 5.8 When a **hull** is first afloat, or modified and afloat according to Rule 5.5, the **Competitor** must submit a corresponding **hull IGES** to the **Measurement Committee**, as described in Rule 10.2.
- 5.9 The **Protocol** states that a **Competitor** may modify the exterior shape of one of its **hulls** as determined when the respective hull was launched (“Original Hull Surface”). The “exterior shape”, or “Original Hull Surface” is defined herein as the **hull surface**.
- 5.10 For a **hull surface** that may be modified by up to 25% of its area, when all declared **hull IGES** files for that **hull** are aligned according to the reference points required by Rule 3.9, at least 75% of the area of original **hull IGES** must simultaneously be coincident with all of the other **hull IGES** surfaces; that is, all of the **hull IGES** geometries must share a common area with the original **hull IGES** which must be at least 75% of the original **hull IGES** area.
- 5.11 Beyond the allowances specified in Rule 5.1, the **Defender** is permitted to install on either of its **AC75 Class Yachts**:
- (a) 2 additional **mainsails**; and
  - (b) 6 additional **headsails**,
- provided that the **sail skins** that make up these sails are built to the same original designs as **sail skins** that have already been installed on one of its **AC75 Class Yachts**. Any subsequent modifications to the **sail skins** of these additional sails, as permitted by Rule 5.12, are not required to be the same modifications that were made to the **sail skins** of the original sails.
- 5.12 Up to 25% of any **sail skin** may be replaced and the replaced area is cumulative. For example, one 12.5% area of a **sail skin** can be replaced twice only. Addition of material for repairs shall not count as replaced area provided the original **sail skin** remains. Any modification to a **sail skin** shall not alter any girth measurement by more than 15%. The limits on sails in Rule 5.1 apply only to the **sail skins** that make up the **mainsail** or **headsail**, replacement of components such as **control systems**, **sail hardware** or **battens** is not limited.

*Continued overleaf...*

5.13 When a component is first declared according to Rule 5.5 that has an “Change allowance” mass percentage in Rule 5.1:

- (a) The **Competitor** must declare to the **Measurement Committee**:
  - (i) a component mass;
  - (ii) an IGES file of an exterior component shape; and
  - (iii) construction drawings showing the internal structure of the component.
- (b) At all times when that component is installed on an **AC75 Class Yacht** with that **yacht** afloat:
  - (i) at least 80% of the mass of the component must match the original declared component; and
  - (ii) at least 80% of the mass of the original declared component must match the component.
- (c) The percentage of mass by which two versions of a component match is determined by aligning the unmodified portion of the original and modified component, then identifying all regions where the original and modified component differ, including:
  - (i) surface geometry, where a surface is present; and
  - (ii) material specification, e.g. fibre type, fibre orientation, ply sequence, resin type. Where repairs are permitted by Rule 5.15, material specification need not be identical, as long as it is equivalent to the satisfaction of the **Measurement Committee**; e.g. dry fibre may be substituted for an equivalent pre-preg fibre, or two plies of 150 g may be substituted for one ply of 300 g.

The percentage of mass by which two components match is then the mass of all regions where geometry and construction is identical, as a percentage of the total component mass.

- (d) In determining whether two regions of a component match, the **Measurement Committee** may make an allowance for unintended distortion of a component during manufacture, as long as in any local region the two regions of the component can be matched, and the position of one region relative to an adjacent region has not changed at all.

5.14 For components with a “Change allowance” mass percentage, it is permitted to declare a hypothetical “original component” which must comply with the relevant rules for that component type, but is not required to be identical to the component when it is first installed and afloat. In this case, the hypothetical component declaration becomes the “original component”, and the component as first launched and subsequently modified must have corresponding declarations, which must satisfy the permitted changes with respect to the hypothetical “original component”.

5.15 Except for **mainsails** and **headsails**, it is permitted to repair or replace any component marked in Rule 5.1 as “Open” or “Specified” to restore it to a previously permitted state, where:

- (a) any construction forming part of the repair or replacement is built or prepared only once that component has been taken out of service, and that component is not installed again on a **yacht** afloat until that repair is complete;
- (b) the restriction in Rule 5.15 (a) does not apply to the construction of **commercially available components** used within a repair, but does apply to any incorporation of those components within a repair;
- (c) a **Competitor** must inform the **Measurement Committee** when commencing any repair or replacement, and must provide the **Measurement Committee** with documentation they require; and
- (d) a **Competitor** alone shall decide whether to repair or replace a component, and no evidence of damage is required.

5.16 Components marked in Rule 5.1 as “Supplied” may be repaired to their original condition, but such repair must be approved by the **Measurement Committee**. If a “Supplied” part is damaged beyond repair, as demonstrated to the **Measurement Committee**, that part may be replaced by a new “Supplied” part.



## 6 Materials

6.1 Rule 6 applies to all components except:

- (a) supplied components, such as the supplied parts of the **foil arms**, the **FCS** and the **supplied rigging**;
- (b) material specified in the supplied **mast** drawing package;
- (c) electrical and electronic components, and their enclosures or housings, provided they have no significant structural contribution; and
- (d) **commercially available components**.

However, components in the four categories above must have a maximum density of 11,400 kg/m<sup>3</sup> when taken over each part as a whole, and materials with a density greater than 11,400 kg/m<sup>3</sup> cannot be used in volumes that have any significant effect on the distribution of mass throughout the **yacht**.

6.2 Material property values detailed herein are to be evaluated at 20°C and 1 atmosphere pressure.

6.3 Materials shall have a maximum density of 11,400 kg/m<sup>3</sup>.

6.4 Materials shall have a maximum elastic modulus as detailed below:

Material category	Maximum Modulus (GPa)	Certificates Required
Fibre reinforcement in <b>foils, rudders, masts</b> and <b>bowsprits</b>	395	Yes
*Fibre reinforcement in thermoplastic components	Unlimited	No
*Fibre reinforcement in uncontrolled components	Unlimited	No
Fibre reinforcement in components not listed above	300	Yes
<b>Core</b> material in all components	75	Yes
Surface treatments	Unlimited	No
Other material	220	No

*\*As described in Rules 7.3 and 7.4.*

6.5 Fibre modulus in Rule 6.4 is to be measured by one of the following methods, or an equivalent method approved by the **Rules Committee**:

- (a) SACMA-SRM16;
- (b) ASTM D 4018;
- (c) JIS R 7601; or
- (d) ISO 10618.

6.6 For the avoidance of doubt, modulus limits on fibre and other materials in Rule 6.4 apply to **FRP** resin additives, such as nanoparticles and microspheres.

6.7 The limit on **core** material in Rule 6.4 refers to the maximum solid compressive modulus of elasticity, in any direction, of the constituent material. For example:

- (a) for aluminium honeycomb, the limit applies to the modulus of aluminium, approximately 70 GPa; and
- (b) for a composite **core**, the limit applies to the modulus of the **core** laminate, not the individual fibres or matrix.

- 6.8 **Core** materials must be **commercially available**. Unexpanded honeycomb may be expanded, and **core** material may be cut and shaped for its intended purpose, but it may not be processed to alter its fundamental structure (e.g. it is not permitted to 3D print a **core** material from plastic, since this would be changing the structure of the material). Only the following **core** materials are permitted:
- (a) aluminium honeycomb (3000 or 5000 series only, which may be surface treated to prevent corrosion);
  - (b) meta-aramid (Nomex or equivalent) honeycomb;
  - (c) timber; or
  - (d) plastic foam.
- For the avoidance of doubt, para-aramid **cores** (N636 or equivalent) are prohibited.
- 6.9 The “Surface treatment” category in Rule 6.4 only applies to material that is:
- (a) contained in a surface layer not more than 0.5 mm thick; and
  - (b) for the purpose of:
    - (i) improving resistance to wear, fatigue, or corrosion; and/or
    - (ii) fairing or modifying the appearance of a surface.
- 6.10 The limit on “Other material” in in Rule 6.4 applies to all materials that do not fall into the other categories, and refers to the maximum modulus in any direction.
- 6.11 Where certificates are required for a category in Rule 6.4, **Competitors** must submit copies of material certificates for each roll of fibre used for that category, together with a declaration that all components of that category only used fibre for which certificates have been supplied. It is not necessary to submit documentation indicating which rolls of material have been used in each individual part.
- 6.12 For all categories in Rule 6.4, **Competitors** must submit a declaration that the material used in all components satisfies Rule 6.
- 6.13 Further details relating to the information required by Rules 6.11 and 6.12 will be issued according to Rule 33.
- 6.14 Boron and Beryllium are prohibited except where used in alloys in concentrations of less than 0.00042%.
- 6.15 Gases shall have a minimum density of 1.1 kg/m<sup>3</sup>, except for nitrogen used within hydraulic systems.

## 7 Construction methods

7.1 Rule 7 applies to all components except:

- (a) supplied components, such as the supplied parts of the **foil arms**, the **FCS** and the **supplied rigging**;
- (b) electrical and electronic components, provided they have no significant structural contribution; and
- (c) **commercially available components**.

7.2 Temperatures and compaction pressures of **FRP** material shall not exceed the following values at any stage during construction, or after construction:

Category	Maximum Temperature (°C)	Maximum Compaction Pressure (bar)
<b>FRP</b> material in <b>hulls</b>	135	1.1
<b>FRP</b> material in <b>sail skins</b>	Unlimited	Unlimited
Thermoplastic <b>FRP</b> material	450	Unlimited
Uncontrolled <b>FRP</b> material	Unlimited	Unlimited
<b>FRP</b> material not listed above	135	7.0

7.3 Thermoplastic **FRP** material in Rule 7.2:

- (a) may be used within any component, including the **hull**;
- (b) is restricted to a maximum total mass of 15.0 kg, combining all such material within the **yacht** except that excluded by Rule 7.1; and
- (c) may be sourced as either:
  - (i) constituent material (e.g. pre-preg tape or cloth); or
  - (ii) **commercially available** pre-consolidated solid laminates in standard shapes (e.g. plate, bar, rod, tube, but not honeycomb), in which case the temperature limit applies only after delivery of the component from the manufacturer.

7.4 Uncontrolled **FRP** construction material in Rule 7.2:

- (a) may be used within any component, including the **hull**;
- (b) is restricted to a maximum total mass of 50.0 kg, combining all such material within the **yacht** except that excluded by Rule 7.1; and
- (c) must be constructed from **commercially available** pre-consolidated and cured solid laminates in standard shapes (e.g. plate, bar, rod, tube, but not honeycomb).

7.5 The maximum pressures in Rule 7.2 refer to the average pressure applied over the surface of a component, or to that part of a component under pressure. Local regions of higher pressure may be applied, for example by hand clamps or mechanical fastenings, provided the average is not exceeded.

7.6 The component of pressure applied by conventional wrapping and winding methods (for construction around a mandrel, or similar) is excluded from the pressure limits given in Rules 7.2.

7.7 Electron beam or other non-thermal radiation cure of **FRP** components is prohibited. This does not prohibit curing **FRP** components by passing electrical current through them to generate heat.

- 7.8 Construction of a **hull** must meet at least two of the following criteria (where the mould refers to the mould or moulds for at least 80% of the outside skin of the **hull surface**):
- (a) the mould plug is constructed of recyclable material (e.g. PET), with that plug being delivered to a recycling plant by 1st January 2021;
  - (b) the mould plug is constructed of recycled material;
  - (c) the mould plug is constructed of sustainably sourced material (e.g. timber);
  - (d) at least 10% of the carbon reinforcement used in the mould is from recycled sources;
  - (e) the mould is constructed from fibres with low embodied energy (e.g. basalt);
  - (f) a life-cycle analysis is performed on the **hull** to the satisfaction of the **Measurement Committee**.
- 7.9 **Competitors** must submit a declaration giving details of how this Rule is satisfied.

## 8 Surface finishes

8.1 Except as permitted in Rules 8.6 and 8.7, the outermost layer of the **hull, foils** and **rudder** must be an approved paint, where approved paints are:

- (a) AWLGrip Awlcraft 2000;
- (b) Cromax 3050S cromaclear;
- (c) Nautix L2;
- (d) Nautix NX194;
- (e) Resene Durepox;
- (f) Resene Durepox Extreme Clear; and
- (g) Resene Durepox High Performance Clear.

Competitors: Please submit paints that you would like added to this list.

8.2 The **Rules Committee** may approve further paints on request, but shall only approve **commercially available** paints which are comparable to products in Rule 8.1. The **Rules Committee** shall inform all **Competitors** when a new paint is approved.

8.3 Paints that contain additives designed to reduce surface friction (such as PTFE) are prohibited.

8.4 **Competitors** may not alter the chemistry of paints except with products supplied by the paint manufacturer and used in compliance with the manufacturer's standard guidelines.

8.5 After painting, surfaces may be sanded, polished and cleaned, providing no substance that does not satisfy Rule 8.1 remains on the surface when the **yacht** is afloat.

8.6 **Competitors** may apply vinyl or plastic film over the paint for the purpose of branding, providing it complies with Rule 8.8.

8.7 On areas of the **deck** where crew operate, or on fittings attached to the **deck**, **Competitors** are permitted to apply non-skid products or coatings. These areas shall be no larger than necessary and shall not extend into areas that crew do not access during racing.

8.8 Devices and finishes whose primary purpose is to reduce friction drag by altering the structure of the boundary layer are prohibited. This prohibition includes, but is not limited to, electric, magnetic, sonic, thermal and chemical devices, patterned or textured finishes and LEBUs. This rule does not prohibit passive surface features, such as fences or vortex generators, which extend outside the local boundary layer. The thickness of the boundary layer  $\delta$  shall be determined using the formula:

$$\delta = \frac{0.37x}{Re_x^{0.2}}$$

where

$x$  is the local distance from the forward most point of the object;

$Re_x$  is the local reynolds number (based on  $x$ );

and the following properties and speeds shall be used:

	Velocity (knots)	Density kg/m <sup>3</sup>	Dynamic viscosity (Pa.s)
Air	30	1.225	$1.789 \times 10^{-5}$
Water	30	1025	$1.103 \times 10^{-3}$

## 9 Mass

The masses and centres of mass in this rule are likely to be updated according to Rule 32.1.

9.1 The mass of components and crew on an **AC75 Class Yacht** shall be:

Component	kg
<b>Platform, mast and mainsail assemblies</b>	<b><math>m_p + m_m</math></b>
<b>*Platform assembly</b>	<b><math>m_p</math></b>
<b>Hull, rudder, bowsprit, systems &amp; equipment</b>	$m_{H\&R}$
<b>*Port foil</b>	1175
<b>*Starboard foil</b>	1175
Supplied media equipment	125
<b>*Mast &amp; mainsail assembly</b>	<b><math>m_m</math></b>
<b>Mast &amp; mainsail</b>	—
<b>Supplied rigging</b>	50
Supplied media equipment	15
<b>Sails</b>	<b>155</b>
<b>*Jib</b>	55
<b>*Code zero</b>	100
<b>Crew &amp; guest racer</b>	<b>1120 – 1150</b>
<b>*Crew</b>	960 – 990
<b>*Crew's carried equipment</b>	55
<b>*Guest racer</b>	100
<b>*Guest racer's carried equipment</b>	5
<b>Total</b>	<b>7470 – 7500</b>
	<i>*Measured</i>

9.2 In Rule 9.1, items or assemblies marked with an asterisk will be weighed. Items not marked are not weighed individually, but included in an overall assembly weigh. The **Measurement Committee** will issue procedures for weighing the specified components and assemblies.

9.3 It is not permitted for any weighed component or assembly to have a greater mass than that given in Rule 9.1. Where a mass number is not indicated, there is no mass requirement for that specific assembly.

9.4 Crew must have a mass between the minimum and maximum values shown in Rule 9.1.

- 9.5 If one of the components listed below has a mass lower than that shown in Rule 9.1, ballast equal in mass to the deficit shall be attached to the top of the **hull surface** at the following locations:

Component	Ballast location
<b>Jib</b>	On <b>LCP</b> , 11.0m forward of <b>TRP</b>
<b>Code Zero</b>	On <b>LCP</b> , 14.0 m forward of <b>TRP</b>
Crew's <b>carried equipment</b>	On <b>LCP</b> , 5.0 m forward of <b>TRP</b>
Guest racer and their carried equipment	On <b>LCP</b> , 1.0 m forward of <b>TRP</b>

- 9.6 Except for crew, if a component or assembly not listed in Rule 9.5 has a mass lower than that shown in Rule 9.1, ballast shall be added to that component to achieve the required mass and/or centre of mass.
- 9.7 The **longitudinal** centre of mass of the **platform assembly** (as detailed in Rule 9.1), with:
- (a) both **foils** canted to their lowest positions;
  - (b) all **foil flaps** set to the centre of their range of motion;
  - (c) the symmetry plane of the **rudder** aligned to **LCP**; and
  - (d) the **rudder** rake set to the centre of its range of motion;
- shall lie between 9.000 m and 9.600 m forward of **TRP**.
- 9.8 The vertical centre of mass of the combination of the **hull**, **rudder**, **bowsprit**, **mast** and **mainsail** assemblies (as detailed in Rule 9.1 and with total mass ( $m_{H\&R} + m_M$ )) shall not be above 2.900 m above **MWP**. In computing this vertical centre of mass:
- (a) the mass  $m_{H\&R}$  shall be deduced by subtracting the **foil** and media equipment masses from  $m_p$ ;
  - (b) the vertical centre of mass of  $m_{H\&R}$  shall be assumed to lie 0.365 m above **MWP**; and
  - (c) the vertical centre of mass of the **mast** and **mainsail** assemblies shall be as measured.
- 9.9 The centre of mass of each **foil** shall lie outside a 3.500 m circle centred on the **cant** axis as shown in Figure 12.1.
- 9.10 When racing, nothing shall be aboard the **AC75 Class Yacht** that is not included in Rule 9.1.
- 9.11 Water may not held or used for the purpose of increasing weight or righting moment.

## 10 Hull

- 10.1 Whenever a **hull** is afloat, the **Measurement Committee** must be in receipt of a **hull IGES** file that the **hull surface** was designed to, and must match the **hull surface** (with the **hull** unloaded and supported in cradles) within a tolerance of 5 mm when the measurement reference points described by Rule 3.7 are exactly aligned.
- 10.2 The declared **hull IGES** geometry shall form a single closed volume, and:
- (a) penetrations shall be closed with surfaces that connect their edges and are fair with respect to the surrounding **hull surface**;
  - (b) internal structure within the closed volume shall not be included, but the positions of bulkheads required to satisfy Rule 10.14 shall be included as separate IGES surfaces.
- 10.3 The minimum areal density of any part of the **hull surface** shall be 2 kg/m<sup>2</sup>. (Note that this Rule does not imply any stiffness, strength or robustness targets; it exists only to ensure that a **hull surface** is a solid structure and not, for example, a film-covered space frame structure.)
- 10.4 The **hull** shall be a **linear component**.
- 10.5 The **hull lower surface** shall be **symmetric** about **LCP**.
- 10.6 The maximum length of the **hull** shall be no less than 20.600 m and no greater than 20.700 m.
- 10.7 The maximum distance of the **perimeter line** from **LCP** shall be no less than 2.400 m and no more than 2.500 m.
- 10.8 At its intersection with **TRP**, the distance of the **perimeter line** from **LCP** shall be at least 2.000 m.
- 10.9 At any **transverse** cross-section through the **hull lower surface**:
- (a) a path traced from the lowest point on **LCP** to the **perimeter line** must never have a component that points down or towards **LCP**; and
  - (b) no vertical line shall cut the cross-section more than once below **MWP**,  
except inside regions defined by cylinders of length 4.000 m and diameter 1.250 m centred on each **foil cant reference point** and whose axes are aligned with the **foil cant** axes.
- 10.10 Inside regions defined by cylinders of length 1.600 m and diameter 1.250 m centred on each **foil cant reference point** and whose axes are aligned with the **foil cant** axes, movable hull surfaces are allowed for the purpose of fairing the intersection of the **hull** and **foil arms**, provided these surfaces are attached to the **foil arms** and only move as a result of **foil cant** movement.
- 10.11 On the **hull surface**, forward of a plane that is:
- (a) 17.000 m forward of **TRP**, no point shall be more than 1.600 m from **LCP**; and
  - (b) 19.000 m forward of **TRP**, no point shall be more than 1.000 m from **LCP**.
- 10.12 The **perimeter line projected** on to **MWP** shall be convex; i.e. any line that connects two points on the **projected perimeter line** shall lie on or inside the **perimeter line**.
- 10.13 The second moment of area of the **hull surface's** waterplane at **MWP** about the intersection of **MWP** and **LCP** shall be at least 20.000 m<sup>4</sup>.
- 10.14 The **hull surface** shall enclose a volume of at least 70 m<sup>3</sup>, which must include:
- (a) an enclosed watertight volume of at least 40 m<sup>3</sup>, situated entirely forward of plane that is 9.500 m forward of **TRP**, which may be subdivided; and
  - (b) a watertight bulkhead situated between 17.000 m and 19.000 m forward of **TRP**.



- 10.15 The enclosed volumes of the **hull surface** referred to in Rule 10.14 must be watertight except for penetrations:
- (a) within 0.200 m of **LCP** and within 1.500 m of **TRP** in order to permit **rudder** rotation;
  - (b) within the region defined in Rule 10.10 in order to permit **foil cant**;
  - (c) on the **deck** and covered by watertight hatches which must not be opened while racing; or
  - (d) for the passage of systems or rigging, which must be kept watertight by some means while racing.
- 10.16 Any volume inside the **hull surface** and exposed to the penetrations allowed in Rule 10.15 (a) shall:
- (a) be separated from the remainder of the enclosed volume by a watertight boundary which need not satisfy Rule 10.3;
  - (b) have a total combined volume of no more than 50 litres; and
  - (c) shall be self-draining and shall self-drain in under 20 seconds at any orientation described in Rule 10.22.
- 10.17 Any volume inside the **hull surface** and exposed to the penetrations allowed in Rule 10.15 (b) shall:
- (a) be entirely above **MWP**;
  - (b) be entirely within the region defined in Rule 10.10;
  - (c) be separated from the remainder of the enclosed volume by a watertight boundary which need not satisfy Rule 10.3;
  - (d) have a total combined volume of no more than 400 litres; and
  - (e) shall be self-draining and shall self-drain in under 20 seconds at any orientation described in Rule 10.22.
- 10.18 The **hull surface** shall satisfy flotation Rules 10.19 and 10.20 (a) with:
- (a) the **platform assembly's** measured mass applied at:
    - (i) the **platform assembly's** measured LCG;
    - (ii) **LCP**; and
    - (iii) an assumed vertical centre-of-mass of 1.000 m below **MWP**;
  - (b) buoyancy resulting only from the **hull surface** (not the **foils, rudder** or other components);
  - (c) the effect of any flooded volumes not included in the **hull surface** neglected; and
  - (d) an assumed water density of 1025 kg/m<sup>3</sup>.
- 10.19 When floated to equilibrium, the measurement reference points required by Rule 3.7 shall lie no more than 25.0 mm above or below the flotation waterplane.
- 10.20 When constrained to 90° of heel (such that **MWP** is held perpendicular to the free surface) and left free to float to equilibrium in the other degrees of freedom:
- (a) the centre of buoyancy of the **hull surface** shall be at least 0.830 m above **MWP**; and
  - (b) the angle between **LCP** and the flotation waterplane shall be no more than 5°.
- 10.21 Any surface that can support the crew must be at least 0.100 m above **MWP**, and any volume below that surface must be watertight.

10.22 Any recess or cockpit in the **hull surface** must be self-draining at any orientation resulting from:

- (a) up to  $\pm 20^\circ$  of rotation about a **longitudinal** axis; followed by
- (b) up to  $\pm 5^\circ$  of rotation about a (rotated) **transverse** axis.

Openings for self-draining must be at least  $0.006 \text{ m}^2$  in cross-section per  $1.000 \text{ m}^3$  of recess or cockpit volume.

10.23 Geometric and flotation requirements pertaining to the **hull surface** within Rule 10 will be measured using the **hull IGES** and must be satisfied exactly with no tolerance.

10.24 When the forestay is loaded to 10,000 kg by tensioning either the port or starboard running backstay, neither the **deck** at **TRP** nor the **rudder** yaw axis shall rotate by more than  $\text{TBA}^\circ$  relative to a station on the **deck** 12 m forward of **TRP**. The procedure for measuring this will be issued according to Rule 33, but is anticipated to be as follows:

- (a) the **yacht** shall be afloat;
- (b) the **foils** shall be in their lowest position;
- (c) the rig shall be pretensioned and at a rake specified in the rig plan;
- (d) the running backstay deflectors shall be at the fully deflected positions;
- (e) the **transverse** angle between two stations on the **deck**, at **TRP** and 12 m forward of **TRP** is measured;
- (f) one running backstay is loaded until a forestay load of 10,000 kg is achieved;
- (g) the **transverse** angle between the two stations is measured again, and the difference when loaded must be less than  $\text{TBA}^\circ$ ;
- (h) the procedure is repeated, loading the other running backstay.

The **Rules Committee** or **Measurement Committee** may adjust the procedure or angle measuring stations to ensure that it accurately measures the twist that is restricted by this Rule.

## 11 Deck fittings

- 11.1 A ball fitting to support the **mast** shall be positioned at **MRP** as shown in Figure 19.3. The position of the mast ball shall not be adjusted whilst racing.
- 11.2 Chainplates shall be positioned as shown in the rig plan (see Rule 19.1 (e)) and shall not be adjusted whilst racing.
- 11.3 The **yacht** shall be capable of being lifted from a primary lifting point located forward of **MRP**, with secondary lines led aft.
- 11.4 No part of the **yacht** except the **foils** and the **rudder** shall lie below the **hull lower surface**.
- 11.5 No part of the **yacht** except the **mast**, sails, rigging, supplied media equipment and wind instrumentation shall lie more than 0.200 m above **MRP**.
- 11.6 When **projected** on to **MWP**, no part of the **yacht**, other than the **foils**, **mast**, sails, rigging, a **code zero** furling unit (if fitted), supplied media equipment and wind instrumentation, shall lie outside of an area that combines:
- (a) an area **projected** by the **hull** on to **MWP**; and
  - (b) a rectangular area bounded by:
    - (i) **TRP**;
    - (ii) a plane 22.860 m forward of **TRP**; and
    - (iii) planes 0.400 m either side of **LCP**.
- 11.7 Wind instrumentation that falls outside of the area described in Rule 11.6 must be attached only to the **bowsprit** and shall be entirely:
- (a) aft of a plane 23.900 m forward of **TRP**; and
  - (b) below a plane 1.500 m above **MRP**.
- 11.8 Apart from permitted movement of **foils** and **control surfaces**, parts of the **yacht** shall only be moved:
- (a) to control movement of a **control surface**;
  - (b) in preparation of controlling a **control surface** (e.g. setting a **headsail** car prior to hoisting; turning an unloaded winch to check it is connected to a drive train);
  - (c) to organise rigging or deck gear after controlling a **control surface** (e.g. stowing sheets; stowing a winch handle);
  - (d) to open or close access panels;
  - (e) within electrical systems (e.g. a cooling fan); or
  - (f) for safety reasons.
- 11.9 Other than the movement of **foils** or **control surfaces**, movement of parts of the **yacht** permitted by Rule 11.8 shall have no significant effect on:
- (a) aerodynamic loads;
  - (b) hydrodynamic loads; or
  - (c) the centre of mass of the **yacht**.

- 11.10 When viewed from above and orthogonal to **MWP**, neither the crew nor the guest racer shall be covered at any time by any part of the **yacht** except the **mast**, sails and rigging, or occasionally by other components provided that only a small part of any crew member is covered, and this covering is not designed to provide an aerodynamic fairing.
- 11.11 The **hull** shall have stanchion sockets along the full length of its sides and across the transom, at a maximum spacing of 2.200 m, for the attachment of lifelines when the **yacht** is ashore. Sockets shall be on the edge of the working deck and to suit 31.8 mm (1¼") stanchions with a minimum depth of 100 mm. The stanchion sockets may be plugged when sailing, providing such plugs can be quickly removed.
- 11.12 Lines parallel to **TRP**, at least 50 mm wide and of a colour contrasting to the **deck** shall be marked across the **deck** such that their aft edges are no more than:
- (a) 2.00 m forward of **TRP**;
  - (b) 9.00 m forward of **TRP**; and
  - (c) 11.00 m forward of **TRP**.
- 11.13 The following items shall be secured and distributed at locations that would be easily accessible in the event of a capsize:
- (a) at least six blades with lengths of no more than 150 mm;
  - (b) at least six personal air supplies containing compressed air equivalent to at least 40 litres uncompressed volume each, which do not require the use of hands when in use.
- 11.14 Areas or volumes that will be reserved for media equipment, including, but not limited to cameras, microphones, sensors, processors, cabling and batteries, will be specified according to Rule 33.

## 12 Foils

12.1 Each **foil** must comprise:

- (a) a **foil arm** attached to a **foil arm** trailing edge and a **foil wing**, which must form a single **linear component**;
- (b) two **foil flaps**, each of which must be a **linear component**; and
- (c) one or more **foil flap** systems used to rotate the **foil flaps**.

12.2 For the purposes of Rule 5:

- (a) except for parts of **foil flap** systems, any fittings, fastenings, fairing compound or other parts or materials which do not move relative to a **foil wing** or a **foil flap** must be part of that **foil wing** or **foil flap**; and
- (b) **foil flap** systems shall be only mechanical, electrical and hydraulic components specifically required to connect **foil wing** to **foil flaps** and control their movement, and shall not include any parts which contribute significantly to the structure or surface area of the **foil wings** or **foil flaps**.

12.3 With the **foil arm** lowered to its minimum **cant** angle, and at all **foil flap** rotation angles, the **foil wing** and **foil flaps**, **projected** to **TRP**, must lie entirely within the area shaded in Figure 12.1.

12.4 The entire **foil** must lie between planes 10.000 m and 12.000 m forward of **TRP**.

12.5 A **foil wing** must be **symmetric** about the **foil wing** symmetry plane, as defined in Figure 12.1, with a build tolerance of 3.0 mm.

12.6 The only **foil arm** movement permitted relative to the AC75 yacht is **cant**, being a rotation about the **foil arm cant** axis, a **longitudinal** axis whose position is defined in Figure 12.1.

12.7 A **foil** may touch no part of the **yacht** except:

- (a) the **FCS**; and
- (b) moveable hull surfaces permitted in Rule 10.10.

12.8 Except for the permitted rotation of **foil flaps**, no device shall be used to induce deformation in the **foil**; any deformation may only be the result of **external forces** and reactions by components permitted in Rule 12.7.

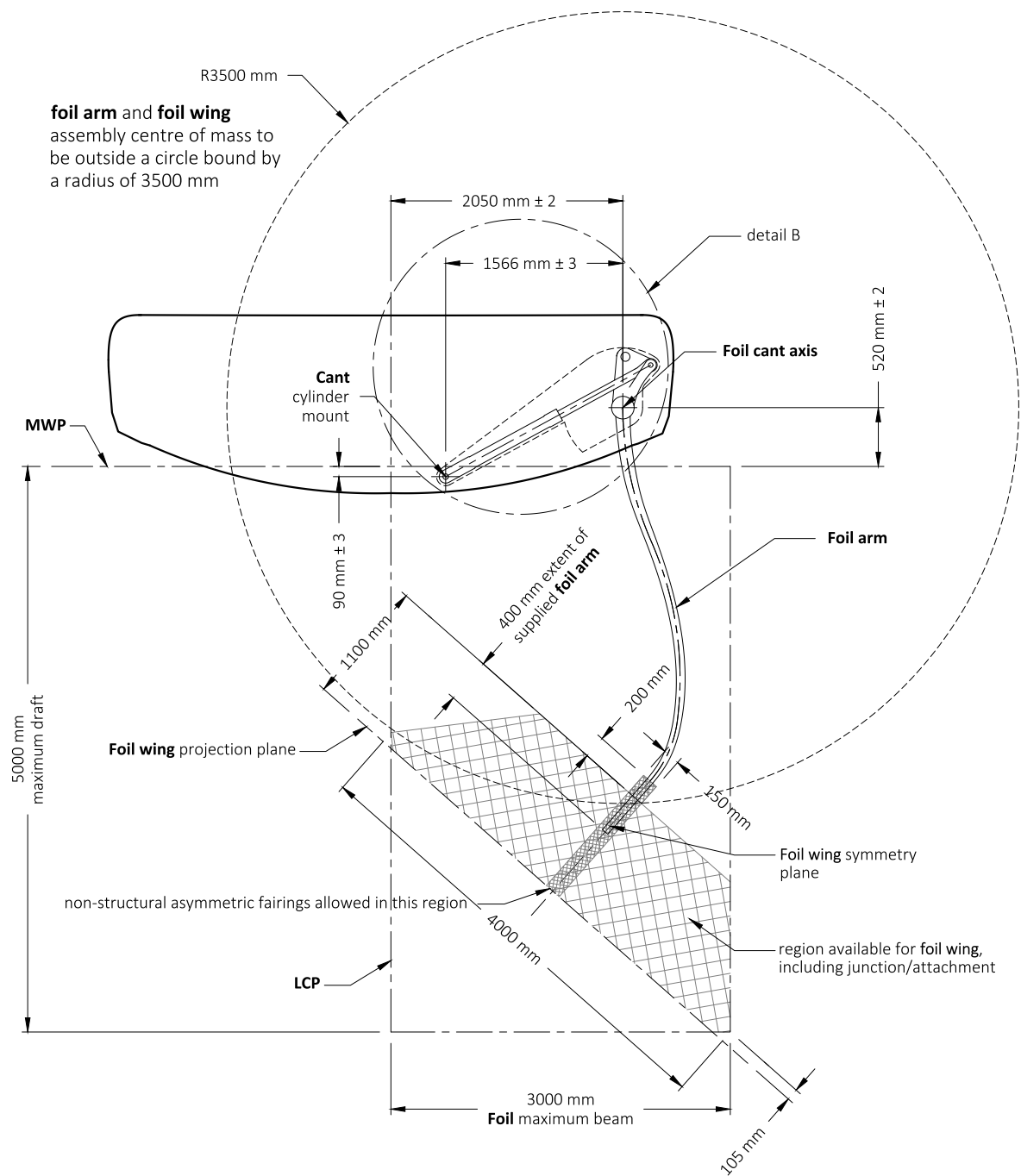


Figure 12.1: Foil geometry

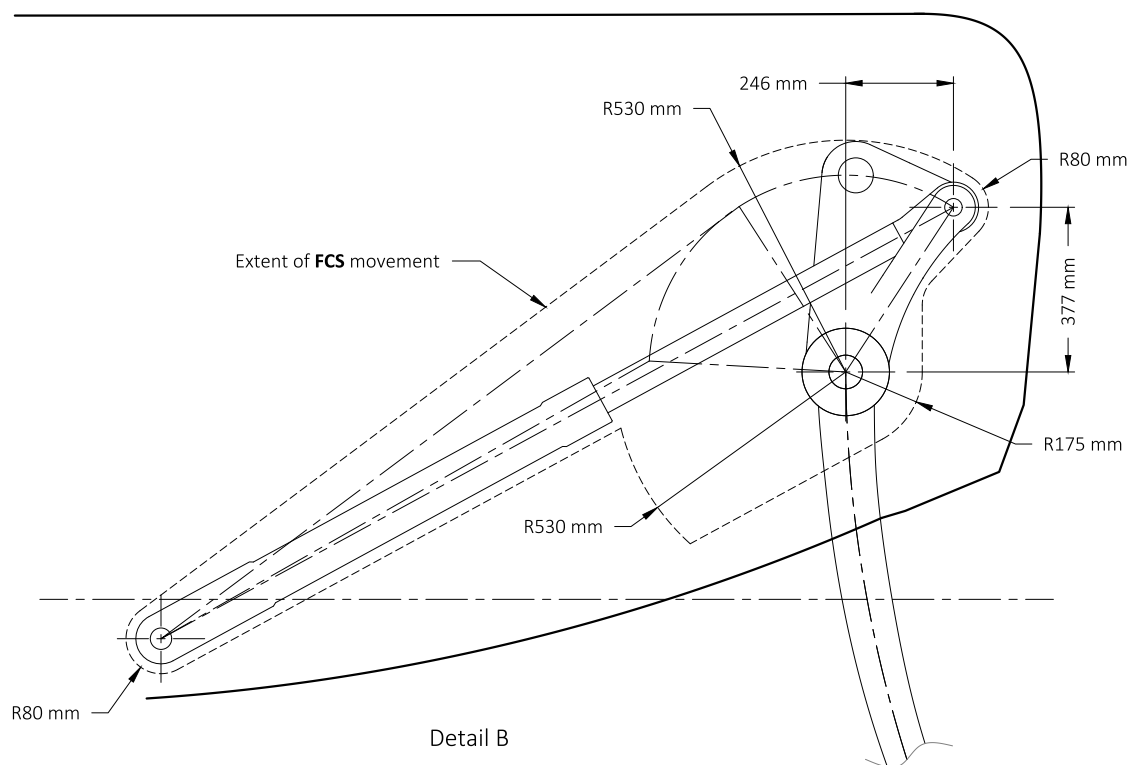


Figure 12.2: Foil geometry detail B

## 13 Foil Arms

13.1 Further details of the supplied **foil arms** will be provided according to Rule 33.

Further to Rule 32.1, if there are any significant geometrical variations between manufactured foil arms, the AC75 Class Rule may be amended to require adjustments to be made in some part of the FCS to compensate for these differences.

13.2 Each **foil arm** assembly shall only be constructed from:

- (a) one supplied **foil arm**; and
- (b) one **foil arm** trailing edge.

13.3 At all **cant** positions that can be achieved, a **foil arm** must not touch any part of the **yacht** except:

- (a) the supplied **FCS**;
- (b) the **foil wing**;
- (c) the **foil flaps**;
- (d) the **foil flap** systems; and
- (e) a moveable hull surfaces as permitted by Rule 10.10.

13.4 No modification of a supplied **foil arm** is permitted, except:

- (a) for the surface finish (sanding, painting and other details to be specified in accordance with Rule 13.1);
- (b) minor modifications, approved by the **Measurement Committee**, to attach the **foil arm** trailing edge to the **foil arm**. Such modifications must be limited to the aft face and to the recess (see Figure 13.1) of the supplied **foil arm**;
- (c) minor modifications, approved by the **Measurement Committee**, necessary to attach the non-structural fairing authorised within a distance of 0.075 m of the foil wing symmetry plane (see Figure 12.1);
- (d) minor modifications, approved by the **Measurement Committee**, necessary to attach non-structural leading edge fairing within a radius of 670 mm of the **foil cant** axis; and
- (e) for repairs that return the **foil arm** to its original state after being damaged in accordance with Rule 5.16.

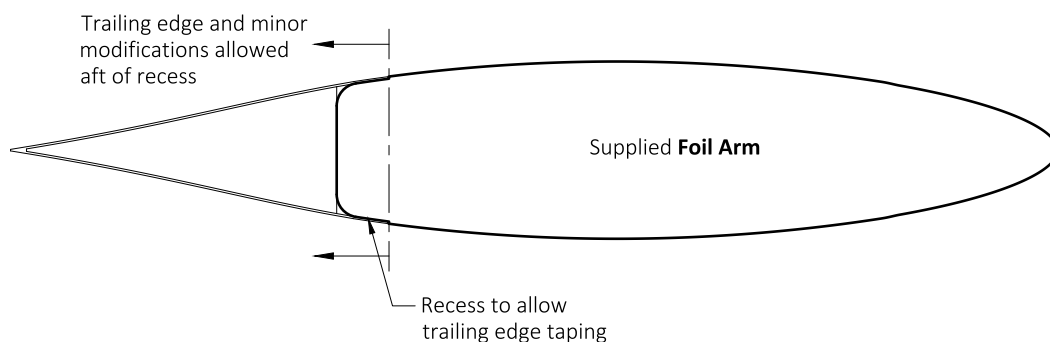


Figure 13.1: Foil arm modification limits



## 14 *Foil Flaps*

- 14.1 A **foil flap** must be a **linear component** connected to a **foil wing** by a **foil flap** system.
- 14.2 Each **foil** shall comprise two **foil flaps**, one lying entirely on one side of the **foil wing** symmetry plane, and one lying entirely on the other side of the **foil wing** symmetry plane.
- 14.3 **Foil flap** systems used to rotate the **foil flaps** must be contained within the **foil wing**, **foil arm** and/or the **foil flaps** such that there are no significant fluid dynamic forces on any parts of those systems.
- 14.4 For the purposes of Rule 14:
- (a) a “cross-section” is defined locally at any spanwise location along the **rondure** of the **foil wing** as a section through a **foil wing** and **foil flap**, on a plane perpendicular to the **rondure** at that spanwise location; and
  - (b) the “chord length” at a given cross-section and a given **foil flap** rotation angle is the distance between the most forward point and the most aft point on the cross-section, when **projected** on to the **foil wing** projection plane shown in Figure 12.1.
- 14.5 At any cross-section, the only permitted movement of a **foil flap** relative to a **foil wing** is a rotation about an axis which remains approximately stationary with respect to the **foil wing** at that cross-section. This axis must be designed to be stationary, but is permitted to have some movement resulting from:
- (a) play in a mechanical bearing; or
  - (b) a flexure or soft hinge, such as a thin flexible material joining the **foil flap** to the **foil wing**.
- 14.6 In the absence of **external forces**, the angle of rotation of a **foil flap** must be the same at all cross-sections within a tolerance of 0.5°.
- 14.7 Both **foil flaps** of a **foil** shall have the same range of angular rotation. With both **foil flaps** of a **foil** at the same angle of rotation, each **foil flap** shall be **symmetric** with respect to the other about the **foil wing** symmetry plane, with a build tolerance of 3.0 mm (i.e. one of the **foil flaps** shall be a mirror image of the other, but each **foil flap** need not be symmetric with itself.).
- 14.8 At any cross-section and all **foil flap** rotation angles, when **projected** on to the **foil wing** projection plane, the length of a **foil flap** must not be greater than 50% of the chord length. Hinges or other parts of a component which occur at occasional cross-sections for connection purposes can be excluded from the **projected** lengths.
- 14.9 A **foil flap** may contact a **foil wing**, and in the absence of **external forces**, and at any cross-section and rotation angle, either may cause deformation in the other in a single zone covering not more than 20% of the local chord length. Outside this zone, neither may cause deformation in the other.

## 15 Rudder

- 15.1 A **rudder** must be a single **linear component**, constructed only from:
- (a) one **rudder** upper that must penetrate the **hull**; attached to
  - (b) one **rudder** lower that must not penetrate the **hull**.
- 15.2 Any fittings, fastenings, fairing compound or other parts or materials which do not move relative to the **rudder** must be part of the **rudder** upper or the **rudder** lower. Parts or materials which are in contact with both the **rudder** upper and the **rudder** lower must be nominated to be part of one or the other for the purpose of Rule 5.1.
- 15.3 No part of the **yacht** may touch or be attached to the **wetted** part of the **rudder**.
- 15.4 The **wetted** part of the **rudder** must be **symmetric** about the **rudder** centre plane, with a build tolerance of 3.0 mm.
- 15.5 With the **rudder** centre plane aligned with **LCP**, and at all rake angles that can be achieved, no **wetted** part of the **rudder** shall extend:
- (a) below a waterline plane 3.500 m below **MWP**;
  - (b) aft of **TRP**; or
  - (c) forward of a **transverse** plane 1.500 m forward of **TRP**.
- 15.6 At all yaw and rake angles that can be achieved, no **wetted** part of the **rudder** shall extend further outboard than planes offset from **LCP** by 1.500 m both to port and to starboard.
- 15.7 Only the following **rudder** movements are permitted relative to the AC75 **yacht**:
- (a) yaw, being a rotation about an axis joining the lower and upper **bearing centres**; and
  - (b) rake, being a rotation about a **transverse** axis through the lower **bearing centre**.
- 15.8 The **rudder** may touch no part of the **yacht** except:
- (a) a lower bearing, whose **bearing centre** must lie on **LCP** and cannot translate;
  - (b) an upper bearing, whose **bearing centre** can translate, but must always lie on **LCP**;
  - (c) a device whose only purpose is to react yaw moment and control yaw angle, connected to a steering system; and
  - (d) the **hull lower surface** within 0.500 m of any yaw axis as defined in Rule 15.7 (a).
- 15.9 **Rudder** yaw angle shall be controlled through a steering system by a steering wheel or wheels which have an outside diameter of at least 0.600 m. These wheels, which shall be **force input devices**, shall be the only input devices for controlling rudder yaw angle.
- 15.10 The lower and upper **bearing centres** must be vertically separated by at least 600 mm.
- 15.11 No device shall be used to induce deformation in the **rudder**; any deformation may only be the result of **external forces** and reactions by components permitted in Rule 15.8.

## 16 Bowsprit

- 16.1 The **bowsprit** shall extend from the **hull** to at least 22.760 m forward of **TRP**.
- 16.2 No part of the **bowsprit** shall be:
- (a) forward of a plane 22.860 m forward of **TRP**;
  - (b) below a plane 0.900 m above **MWP**; or
  - (c) more than 0.400 m from **LCP**.
- 16.3 No part of the **yacht** shall be forward of the **hull** and less than 0.900 m above **MWP** except a bobstay connecting the **hull** to the **bowsprit**, which shall:
- (a) have a maximum chord to thickness ratio of 3:1 at any cross-section perpendicular to its length; and
  - (b) fit within a tube of 40 mm diameter, except at terminations extending no more than 200 mm from either end.
- 16.4 The **bowsprit** shall not be bonded to the **hull** and must be removable for easy replacement.
- 16.5 The following requirements may be specified in accordance with Rule 33:
- (a) camera attachment details that must be provided on the **bowsprit**; and
  - (b) cable conduits from the camera attachment points into the **hull**.
- 16.6 The **bowsprit** shall be load tested to ensure it meets a minimum load rating. The procedure for measuring this will be issued according to Rule 33, but is anticipated to be as follows:
- (a) the **yacht** shall be afloat;
  - (b) the **foils** shall be in their lowest position;
  - (c) the rig shall be pretensioned and at a rake specified in the rig plan;
  - (d) the running backstay deflectors shall be at the fully eased positions;
  - (e) a **code zero**, which may be furled, shall be hoisted and locked at the **head**;
  - (f) the **code zero** tack line and one running backstay shall be tensioned until a load of 8,000 kg is achieved at the tack.

## 17 Sails (General)

- 17.1 Other than as required for **sail hardware**, intentional openings through **sail skins** are prohibited. This rule should not prohibit access panels that are covered or closed whilst racing.
- 17.2 Local hollows or distortions of **sail skin** edges shall be bridged for all sail measurements.
- 17.3 Stiff **sail skin** reinforcements are permitted within 1.0 m of **head points, peak points, clew points, tack points**. Elsewhere **sail skins** shall be flexible and capable of being folded without damage.
- 17.4 **Battens:**
- (a) shall pass through a 75 mm diameter circle;
  - (b) shall be single piece components without hinges or other mechanisms;
  - (c) shall have a straight central axis to a tolerance of 5 mm over any 1000 mm length and 25 mm over their entire length;
  - (d) shall not be inflatable; and
  - (e) shall be inside a sail pocket not exceeding 260 mm in internal width measured normal to the length-wise axis of the **batten**.
- 17.5 The 25%, 50% and 75% **sail skin** girths are taken from the 25% , 50% and 75% **leech points** to the nearest point on the **luff** as illustrated in Figures 18.1 and 19.2.
- 17.6 Sails may be required to have defined areas of transparent windows to improve visibility. The rule will be amended by the **Rules Committee** under Rule 32.1 (c) (ii) if this is deemed necessary.

## 18 Headsails

- 18.1 **Headsails** shall have no more than one **sail skin**.
- 18.2 Apart from control devices permitted in Rule 18.11, the only components permitted to be attached to or assembled with the **sail skin** of a **jib** are:
- (a) up to 8 **battens**, which can terminate on any sail edge, and shall not be adjusted while the **jib** is hoisted;
  - (b) **sail hardware**;
  - (c) **luff** attachment devices permitted in Rule 18.9;
  - (d) **head pennants**;
  - (e) soft fairings around **head pennants** and the local forestay;
  - (f) instrumentation; and
  - (g) pieces of light fabric or wool for flow visualisation.
- 18.3 Apart from control devices permitted in Rule 18.11, the only components permitted to be attached to or assembled with the **sail skin** of a **code zero** are:
- (a) **sail hardware**;
  - (b) **luff** cables no greater than 40 mm in diameter, excluding end fittings and sail attachments;
  - (c) **head pennants**;
  - (d) soft fairings around **head pennants** and the local **luff** cable;
  - (e) instrumentation; and
  - (f) pieces of light fabric or wool for flow visualisation.
- 18.4 Fairings permitted in Rules 18.2 (e) and 18.3 (d) shall be capable of being folded flat along their leading edge and shall have a maximum internal width of 100 mm measured perpendicular to the leading edge.
- 18.5 With the exception of **battens**, the largest dimension of any **sail hardware** for a **headsail** shall not exceed 250 mm.
- 18.6 **Headsails** shall be hoisted and lowered without assistance from crew aloft. This should not prevent crew going aloft to resolve occasional issues.
- 18.7 The **head** of any **jib** shall be below **IG** and the **head** of any **code zero** shall be below **IZ**.
- 18.8 **Jibs**, when hoisted, shall be connected to the forestay by hanks or luff pockets or a combination of both.
- 18.9 Hanks, for connection of the **jib** to the forestay, shall extend no more than 75 mm forward of the **luff**, measured perpendicular to the **luff**, and shall be no more than 100 mm in length, measured parallel to the **luff**. Hanks shall be no closer than 200 mm to each other, anywhere along the **luff** of a **jib**.
- 18.10 Other than within 100 mm of **supplied rigging** fittings, **luff** pockets of **headsails**, shall be:
- (a) capable of being folded flat along the leading edge; and
  - (b) no more than 150 mm wide, when measured internally, perpendicular to the **luff**.

- 18.11 No **control system** shall be attached to, or bear upon a **headsail** except:
- (a) sheets attached to a single piece of **sail hardware** within 400 mm of the **clew point**;
  - (b) a halyard attached near the **head point**;
  - (c) a cunningham system or tackline near the **tack point**;
  - (d) the forestay;
  - (e) **luff, leech, head** and **foot** lines no greater than 8 mm in diameter and their associated purchase systems; and
  - (f) a furling system.
- 18.12 Self tacking systems such as tracks or cables traversing from the port and starboard **headsail** sheeting positions are forbidden.
- 18.13 The outermost **headsail** set shall be operated with sheets primarily controlled by winches and no other actuator may be directly attached to the sheet. Secondary devices that deflect the sheet such as barber haulers are not restricted by this rule. Sailors must load and unload the sheets of the outermost **headsail** set to tack or gybe the **headsail**. Captive winches, where the sheets are permanently loaded are forbidden. This rule does not prohibit the use of self tailing winches and does not apply immediately prior to, or immediately after a sail has been hoisted.
- 18.14 **Headsail** sheeting systems and associated secondary control devices such as barber haulers shall transmit the primary sheet loads to the **hull** no further forward than 10.150 m in front of **TRP**. This rule should not prevent sheets being led forward of this point after the first point of contact with the **hull** is made.
- 18.15 Maximum **headsail** measurements shall be as follows:

	<b>Jibs with LL ≤ 18.0 m</b>	<b>Jibs with LL &gt; 18.0m</b>	<b>Code zeros</b>
<b>LP</b>	7.050 m	7.050 m	12.000 m
50% girth	0.59 <b>LP</b>	(0.869-0.0155 <b>LL</b> ) <b>LP</b>	0.58 <b>LP</b>
75% girth	0.40 <b>LP</b>	(0.859-0.0255 <b>LL</b> ) <b>LP</b>	0.31 <b>LP</b>
<b>Head girth</b>	0.17 <b>LP</b>	(0.699-0.0294 <b>LL</b> ) <b>LP</b>	0.120 m

- 18.16 **Code zeros** shall be tacked forward of 26.760 m in front of **TRP**.

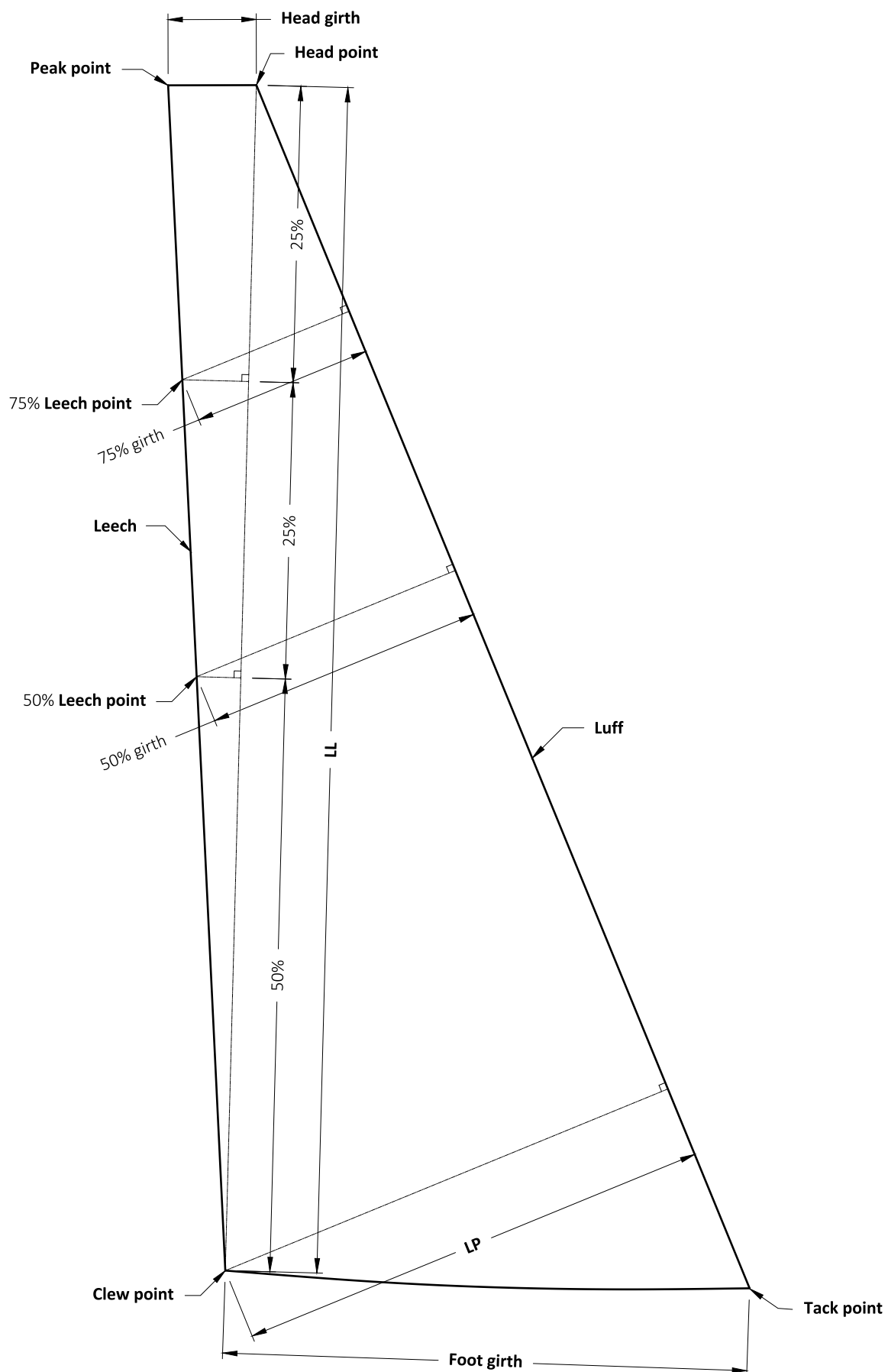


Figure 18.1: Headsail Measurement

## 19 Mast and mainsail

- 19.1 A drawing package for the **mast** will be issued according to Rule 33. This **mast** drawing package will include:
- (a) the **mast surface**;
  - (b) the minimum required **mast tube** laminate and construction details;
  - (c) details of the **supplied rigging**;
  - (d) details of the one-design **mast** fittings and spreaders; and
  - (e) the rig plan, including required chainplate positions on the **hull**.
- 19.2 The external surface of the **mast tube** shall be built to match the **mast surface** and shall be within 3 mm for any cross-section parallel to the **mast lower plane**. The aft face of the **mast tube** shall be straight to a tolerance or 10 mm along the length of the **mast tube**. The **mast tube** may deviate from the **mast surface** within the **mainsail** attachment zones. Rebates for the attachment of components are permitted as long as such rebates are filled to match the **mast surface** within the aforementioned tolerances.

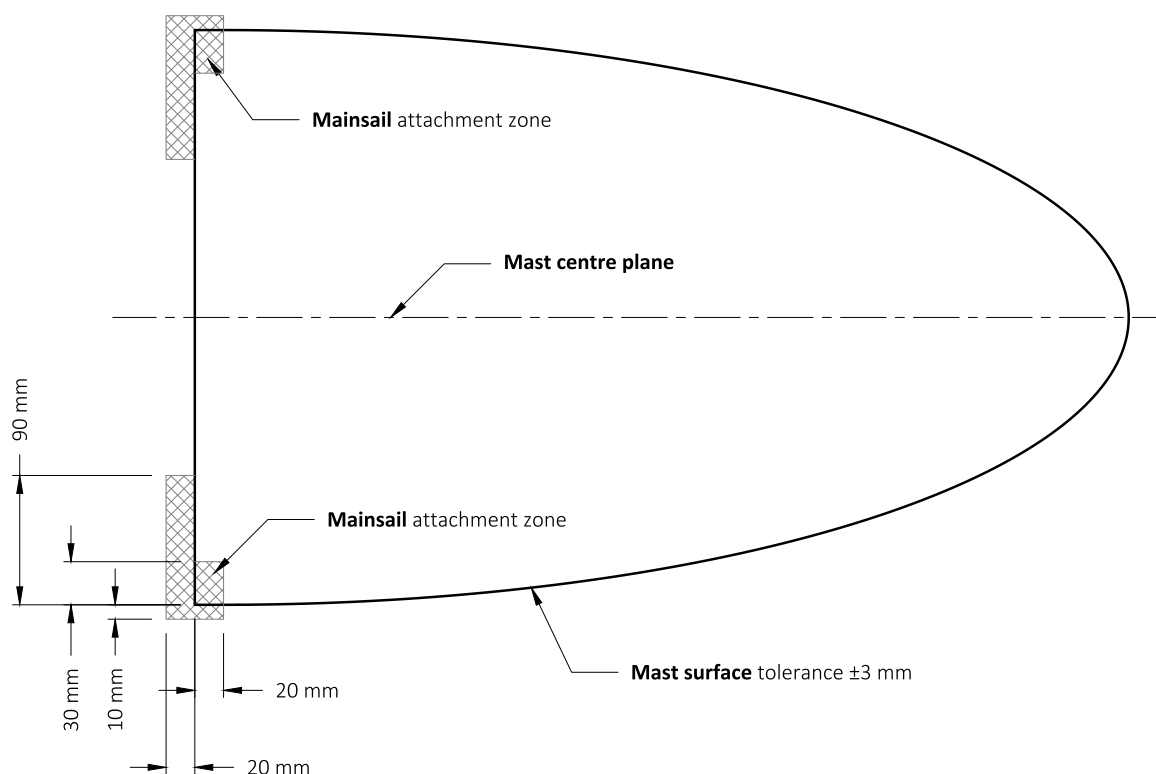


Figure 19.1: Mast Tube Cross-section

- 19.3 Openings in the aft face of the **mast tube**, in addition to those already defined in the **mast surface**, are permitted for access to permitted systems as well as penetrations for **control systems** and instrumentation cables. Openings in the aft face shall be no larger than required and shall have a maximum dimension of 150 mm and the maximum area of 0.018 m<sup>2</sup>. The combined total area of all openings shall be less than 0.1 m<sup>2</sup> and the boundaries of any two openings shall have at least 250 mm between them.



- 19.4 The **mast tube** laminate provided by Rule 19.1 (b) is a minimum required laminate. Laminates resulting in greater fibre weight, resin content, **core** density, and/or **core** thickness than specified in the **mast** drawing package are permitted. Additional structural components and reinforcements are permitted and may be external to the **mast surface** but must remain within the tolerances given in Rule 19.2. The outer laminate of the **mast tube** shall not be sanded other than for local repairs and reinforcements performed after the **mast tube** has been cured. This shall not prevent the **mast tube** being painted or covered in branding material such as vinyl.
- 19.5 The **mast** shall be positioned and tensioned on the **hull** in any of the configurations specified in the rig plan described in Rule 19.1 (e). The forestay may be disconnected when the **code zero** is hoisted.
- 19.6 All one-design **mast** fittings and spreaders shall be built and installed according to the supplied **mast** drawings provided in accordance to Rule 19.1 (d).
- 19.7 One fairing or vibration mitigation device is permitted per **supplied rigging** element. Such fairings and vibration mitigation devices on any **supplied rigging** elements and their terminations are limited to a maximum length of 600 mm and shall fit within a cylinder of 100 mm diameter when installed on a **supplied rigging** element.
- 19.8 The **supplied rigging** shall not be modified other than the addition of fairings and vibration mitigation devices permitted in Rule 19.7. Shock cords or ropes may be attached to **supplied rigging** to manage slack and prevent sails being fouled.
- 19.9 No components of the **mast**, other than spreaders and rigging are permitted to extend more than 100 mm aft of the **mast surface** with the exception of:
- (a) the **mast upper zone** where the components of the **mast** may extend up to 300 mm aft of the **mast surface**; and
  - (b) the **mast lower zone** where the components of the **mast** may extend up to 7700 mm aft of the **mast surface**.
- 19.10 The **mast** shall not be adjusted whilst sailing except for:
- (a) control of the forestay;
  - (b) control of the running backstay or running backstay deflector;
  - (c) control of **mast** rotation about **MRP** by action of a device attached to the **mast** within the **mast lower zone**; and
  - (d) movement of **control systems** within the **mast upper zone** and **mast lower zone** for the purpose of controlling the **mainsail**.
- 19.11 Fairings may be attached to the **mast** including the **mast tube** and any **control systems** permitted in Rule 19.10 (d) and such fairings may be extended to the **hull surface** within the **mast lower zone**. Fairings below the **mainsail** may not extend aft of a projection of the aft most **leech** of the **mainsail**. Incidental movements of such fairings due to external loads, adjustment of the **mast** or **mainsail** or transition of the crew are permitted.

- 19.12 The components that may make up a **mainsail** are limited to:
- (a) any number of **sail skins**;
  - (b) **battens** as described in Rule 19.24 and their associated connections as described in Rule 19.25;
  - (c) **sail hardware**;
  - (d) a single **leech**, **head** and **foot** line per **sail skin** no greater than 8 mm in diameter;
  - (e) **luff** attachment devices such as bolt ropes;
  - (f) **control systems** and structures as permitted in Rule 19.22;
  - (g) fairings as permitted in Rule 19.23;
  - (h) instrumentation; and
  - (i) pieces of light fabric or wool for flow visualisation.

19.13 For a specific **mainsail** measurement length or girth, the greatest value from all **sail skins** shall be taken.

19.14 When calculating a **mainsail** girth, the offset between the local **luff** of a **sail skin** and the aft face of the **mast surface** shall be added (if the **luff** is aft of the aft face) or subtracted (if the **luff** is forward of the aft face) from the girth measurement.

19.15 **Mainsail** girths shall be limited as follows:

		Minimum	Maximum
$G_F$	<b>Foot girth (m)</b>	7.000	7.400
$G_{25}$	25% girth (m)	6.175	6.725
$G_{50}$	50% girth (m)	5.200	5.900
$G_{75}$	75% girth (m)	3.975	4.825
$G_H$	<b>Head girth (m)</b>	2.600	3.600

19.16 **Mainsails** shall comply with:

$$135.0 < \frac{26.5}{12} \times (G_F + 4G_{25} + 2G_{50} + 4G_{75} + G_H) < 145.0$$

19.17 With the exception of **battens**, the largest dimension of any **sail hardware** for a **mainsail** shall not exceed 650 mm.

19.18 All **sail skins** of the **mainsail** shall be continuously attached to the **mast tube** from 1.5 m above **MRP** to 1.0 m below the highest **mainsail head point**.

19.19 Wind instrumentation, if fitted, shall extend no higher than 1.5 m above the **mast upper plane**, measured orthogonal to the **mast upper plane**. Any wind instrumentation extending above the **mast upper plane** must not interfere with the supplied media equipment, and shall be submitted to the **Measurement Committee** for approval. Wind instrumentation shall have a maximum chord to thickness ratio of 3:1 at any cross-section perpendicular to its local lengthwise axis in the region between the **mast upper plane** and 100 mm from the uppermost extent of wind instrumentation.

19.20 The **mainsail** shall be lowered to the **deck** without assistance from crew aloft. This should not prevent crew going aloft to resolve occasional issues.

19.21 The **mainsail** shall be capable of being removed from the **mast** with the **mast** stepped without damage to either the **mast** or **mainsail**.

- 19.22 Other than the **leech** lines of the **mainsail**, **control systems** of the **mainsail** shall only be attached to or bear upon the **mainsail** in the **mast upper zone** and **mast lower zone**. Such **control systems** may include structures and mechanisms that are hoisted with the **mainsail** and such **control systems** are not limited by Rule 19.17. This rule should not prevent adjustment of the **mast tube** and the effect it has on **mainsail** shape.
- 19.23 **Mainsail** fairings are permitted within the **mast upper zone** and **mast lower zone** for the purpose of fairing **control systems** or sealing the area between the **heads** of **sail skins**. Such fairings may be flexible and shall not be considered to be **sail skins**.
- 19.24 Between the **mast lower zone** and **mast upper zone** **sail skins** of **mainsails** may have up to 6 **battens** that run from **luff** to **leech** and 6 **battens** shorter than 1.0 m that have one edge terminating at the **leech**. Additional **battens** are permitted in the **mast lower zone** and **mast upper zone** and such **battens** are not restricted by Rule 17.4
- 19.25 **Battens** may be connected to a **batten** on any other **sail skin** however such connections are restricted as follows:
- (a) rigid or linked connections between **battens** are permitted only within 0.400 m of the **leech** or **luff** of any **sail skin**;
  - (b) tethered connections between **battens**, or **battens** pockets, are permitted anywhere provided such connections are no longer than 600 mm and can not take compressive forces; and
  - (c) with the exception of **battens** that are entirely within the **mast lower zone** and **mast upper zone**, **batten** connections shall not be adjusted.
- 19.26 The **mainsail** shall be equipped with solid buoyant material or inflated air bags in order to provide positive buoyancy near the top of the **mast**. There shall be at least 300 kgs of buoyancy from all combined **mainsail** buoyancy systems when submersed in salt water with an assumed water density of 1025 kg/m<sup>3</sup> and the combined weight of these systems shall be at least 3kgs. The centre of volume of all **mainsail** buoyancy systems shall be within 1.5 m from the uppermost **head** of the **mainsail** and if this centre of volume is greater than 0.5 m from the uppermost **head** then the minimum buoyancy and minimum weight of the combined buoyancy systems shall be increased by 100kg and 1kg respectively per metre below beyond this limit. Any ballast required to meet the minimum weight requirement of this rule shall be added at the same height above **MRP** on the **mast tube** as the centre of volume of the combined buoyancy systems.
- 19.27 **Mast/mainsail** measurement condition shall be the representative condition of the **mast** and **mainsail** whilst sailing but with the **mast** supported horizontally and the **mainsail** hanging below. **Mast/mainsail** measurement condition shall:
- (a) include the **mainsail** hoisted to its highest sailing position;
  - (b) have all rigging pulled tight down the **mast**;
  - (c) include all halyards, positioned as they would be with all sails hoisted; and
  - (d) exclude man lines, however, man lines may be replaced with polyester mouselines no larger than 4 mm in diameter.
- 19.28 In **mast/mainsail** measurement condition, with the exceptions of wind instrumentation permitted in Rule 19.19 and supplied media equipment, no part of the **mast** or **mainsail** shall extend beyond, or be capable of being extended beyond, the **mast upper plane**.

- 19.29 In **mast/mainsail** measurement condition the only components of the **mast** and **mainsail** permitted to extend wider than 250 mm from the **mast centre plane** are:
- (a) **supplied rigging** and associated strops;
  - (b) spreaders;
  - (c) instrumentation; and
  - (d) structures for rotating the **mast** about **MRP** as described in Rule 19.10 (c).
- 19.30 In **mast/mainsail** measurement condition the **projected** shape of the **mainsail** on to the **mast centre plane** shall extend no further than:
- (a) 25 mm beyond of the aft most **leech**;
  - (b) 100 mm beyond the uppermost **head**; and
  - (c) 100 mm beyond the lowermost **foot**.

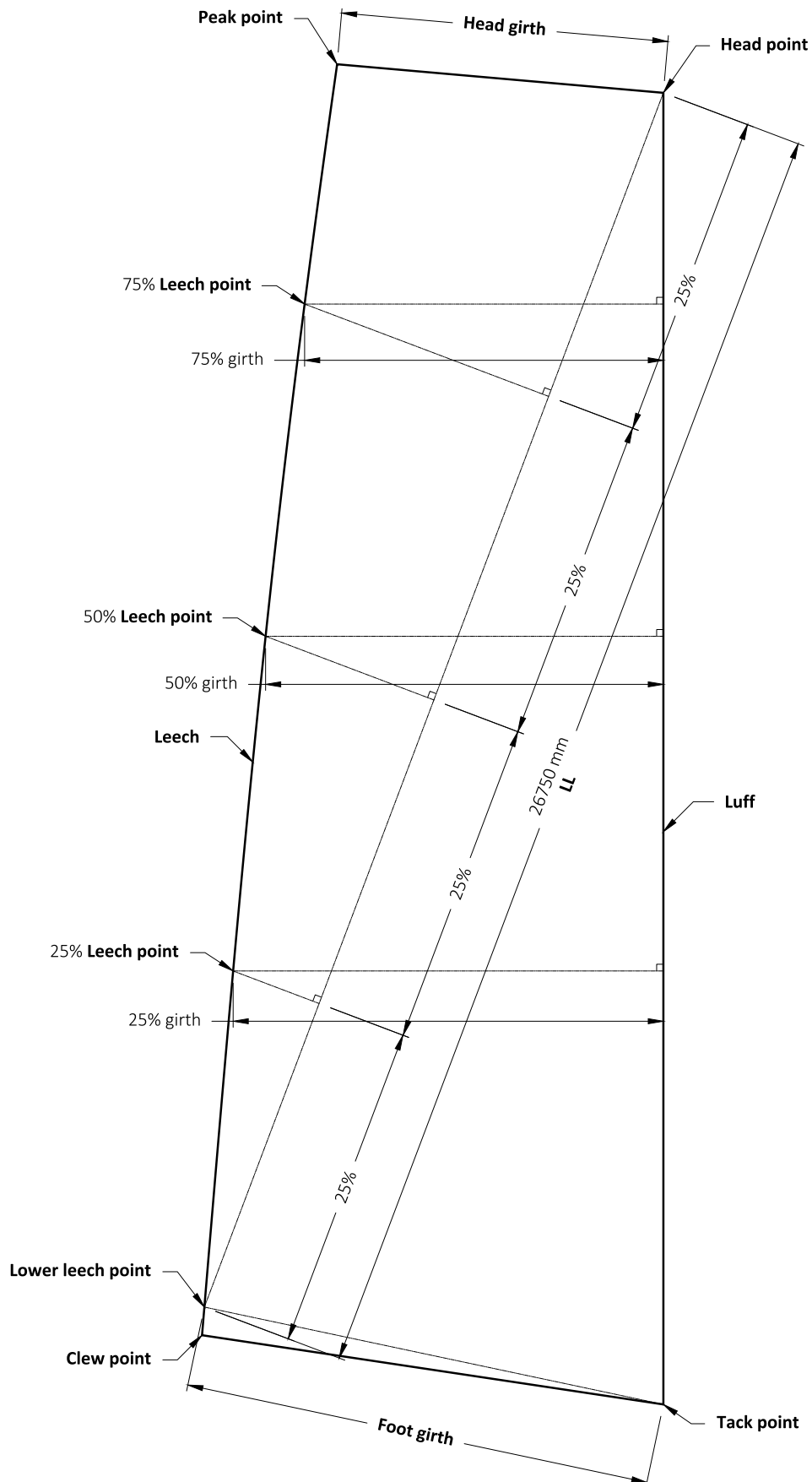


Figure 19.2: Mainsail Measurement

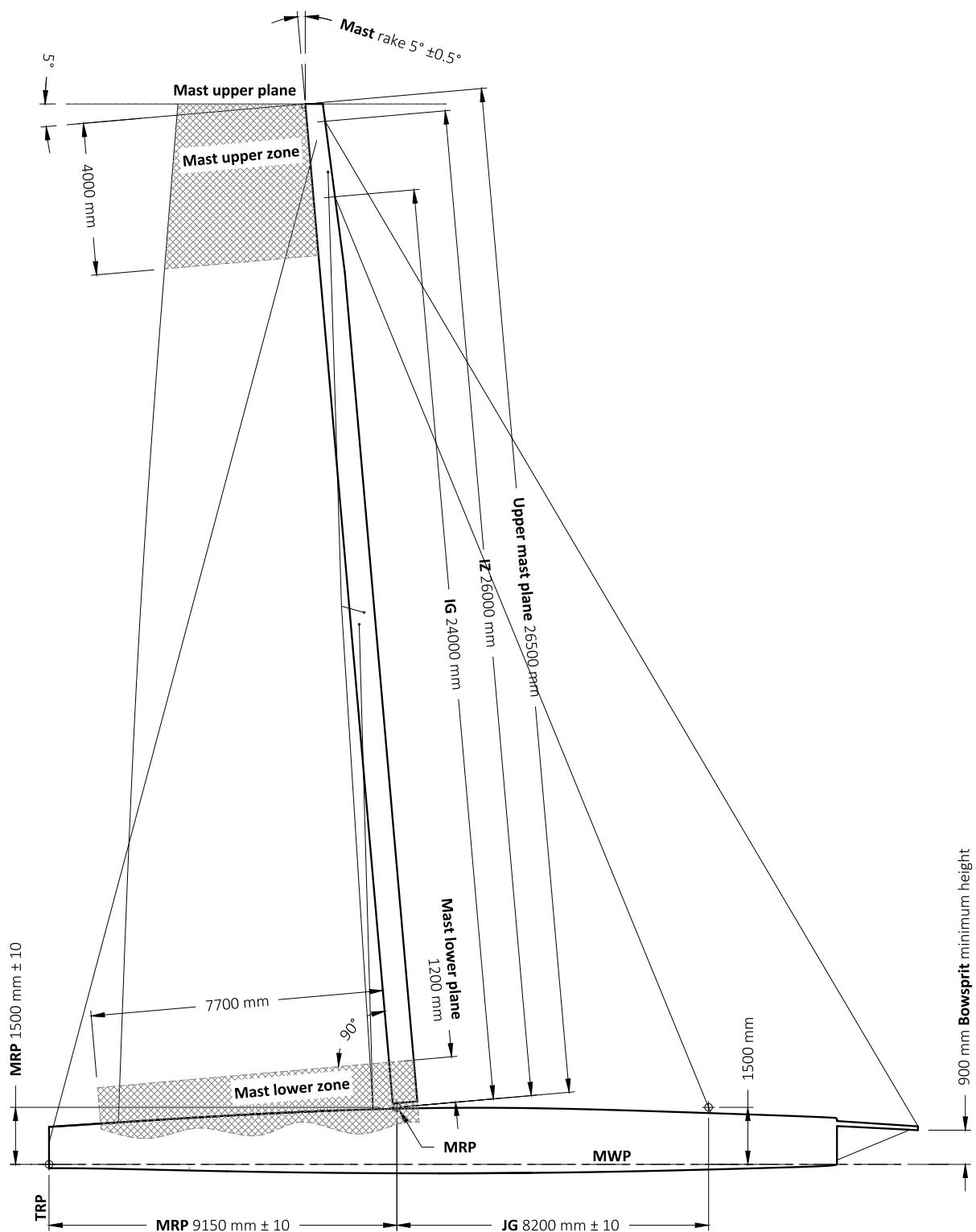


Figure 19.3: Rig Plan

## 20 *Control systems*

- 20.1 The adjustment of **control surfaces**, where permitted in Rules 14, 15, 18 and 19 must only be controlled by crew:
- (a) by direct contact of the crew on a **control surface**; or
  - (b) using one or more **control systems**.
- 20.2 No part of a **control system** may be capable of using feedback from the **yacht state** to control a **control surface**, except:
- (a) the extent of travel of a **control function** can be restricted by:
    - (i) ratchets, providing they are not controlled by an **ECC** or **HCC**; and
    - (ii) stops or locks, subject to Rule 20.3;
  - (b) one or more **force input devices** may be connected **mechanically** and/or through an **HCC** to a single **control surface**; forces acting on that **control surface** can only be transmitted to those **force input devices**;
  - (c) one or more **force input devices** may be connected **mechanically** and/or through an **HCC** to common mechanical drive trains or common pressure supply lines that provide power to multiple **control surfaces**; forces acting on those **control surfaces** can be transmitted through those mechanical drive trains or pressure supply lines to those **force input devices**;
  - (d) as permitted within an **HCC** by Rule 21.4 (d); and
  - (e) as permitted within an **ECC** by Rule 23.
- For the avoidance of doubt, a **control surface** can move passively as the result of **external forces**.
- 20.3 Stops or locks acting on a single **control function** may be permanently in place (e.g. in the case of end stops on a **hydraulic actuator**), or if not permanently in place, may only be engaged and/or disengaged:
- (a) directly by the crew;
  - (b) through a **mechanically** connected **force input device**; or
  - (c) by an **ECC** and/or **HCC**, providing the device is only capable of locking the **control function**:
    - (i) in a maximum of two defined positions; or
    - (ii) from moving at all, regardless its position.
- 20.4 Stops or locks permitted by Rule 20.3 (c) shall not be combined to provide more control than two defined positions, or to achieve the effect of indexed control.
- 20.5 Power that does work on a **control surface** to adjust its shape, position or orientation can only be supplied by:
- (a) **external forces**;
  - (b) the crew, via **force input devices**, only as expressly permitted in Rule 20.2;
  - (c) the **FCS** as permitted by Rule 26; or
  - (d) elastic energy less than 50 J stored within springs or lines (or collections thereof).
- 20.6 Power supplied by the crew to do work on a **control surface** must be used directly without being stored, except where permitted by Rule 21.11 within **HCCs**.
- 20.7 Energy supplied by the crew to move **control surfaces** must primarily be transmitted through the crew's hands; any contact between other parts of the crew and **force input devices** must not transmit any significant power.

- 20.8 One or more **force input devices** that are designed to allow more than one crew member to supply power to a common mechanical drive train, a common pressure supply line or a common **control function** must be grinding pedestals or winches that are operated by turning handles in a rotary motion with the hands. This does not prohibit the use of other **force input devices** that occasionally allow more than one crew member to provide simultaneous power (e.g. helm wheels), providing that is not their usual mode of operation.
- 20.9 The use of flywheels or gyroscopes to store energy or mechanically stabilise the **yacht** is prohibited. Any rotating mass on the **yacht** shall be no larger than required for its permitted purpose.



## 21 *Hydraulic control circuits*

- 21.1 Hydraulic circuits and components are permitted only as part of an **HCC**.
- 21.2 Hydraulic circuits and components are permitted only for the purpose of adjusting **control surfaces** with **hydraulic actuators**, and for safely managing the flow of hydraulic fluid to and from these actuators.
- 21.3 Components in an **HCC** must be sized appropriately for their permitted use. It is prohibited to use oversized components, superfluous reservoirs, etc. in order to control the mass distribution on the **yacht**.
- 21.4 Flow of hydraulic fluid through an **HCC** shall only be controlled by:
- (a) **force input devices**, only as expressly permitted in Rule 20.2;
  - (b) manually operated mechanical (non-electrical) valves;
  - (c) valves controlled by an **ECC**; and
  - (d) two port devices, not controlled by an **ECC**, that limit flow to one direction, regulate flow or regulate pressure, such as:
    - (i) two port pressure relief valves;
    - (ii) two port check valves; and
    - (iii) two port pressure-compensated flow control valves.
- 21.5 For the avoidance of doubt, the following types of components are prohibited as they are capable of using feedback from the **yacht state** and are not listed within the permitted exceptions of Rule 21.4 (d):
- (a) external pilot-operated sequence valves;
  - (b) external pilot-operated counter balance valves;
  - (c) external pilot-operated pressure relief valves; and
  - (d) valves that use internal feedback to control flow rate in proportion to an electrical input.
- 21.6 A **hydraulic actuator** within an **HCC** may only be **mechanically** connected to one **control surface**.
- 21.7 Hydraulic fluid may only be discharged from an **actuator chamber** (via tubing and permitted valves) to:
- (a) a **low-pressure circuit**;
  - (b) another **actuator chamber** of the same **hydraulic actuator**; or
  - (c) an **actuator chamber** of a different **hydraulic actuator**, where both **hydraulic actuators** are connected to the same **control surface**.
- 21.8 The pressure in a **low-pressure circuit** must never exceed 6 bar.
- 21.9 Hydraulic reservoirs in a **low-pressure circuit** may provide back-pressure to **high-pressure circuits**.
- 21.10 Pressure relief valves set to no more than 600 bar must be present immediately downstream of all pressure sources, such as pumps, connected to **force input devices**. A standard type or minimum flow rate for these valves may be specified in accordance with Rule 33.
- 21.11 Elastic energy may be stored in **high-pressure circuits**, providing that when all such circuits are pressurised to maximum pressure, no more than 0.25 litres of hydraulic oil is discharged from drain ports when those ports are opened to atmosphere.
- 21.12 For the avoidance of doubt, Rule 20.5 does not prohibit hydraulic cylinders with a gas spring return, providing the expansion of the gas volume cannot do work on a **control surface**. Such gas volumes may be physically separate from the cylinders they operate on, but may only be shared between cylinders that act on a common **control function**.

- 21.13 Tubing containing more than trace quantities of titanium is prohibited, but this does not preclude the use of titanium in **hydraulic actuators**, hydraulic pumps or fittings.

## 22 *Electrical and electronic systems*

- 22.1 Electrical or electronic components or circuits are permitted only as:
- (a) part of an **ECC**, **ILS**, or **CIS**;
  - (b) standalone **crew indication devices**, such as wristwatches, that are incapable of measuring or receiving any part of the **yacht state**;
  - (c) standalone **hardwired** cameras and screens mounted on the **yacht** to aid visibility of different parts of the **yacht**, providing no information other than raw audio and video from the **yacht** is transmitted, played or displayed; and
  - (d) supplied and required by **COR/D**, the **Rules Committee** or the **Measurement Committee**, including permitted devices connected to these supplied components.
- 22.2 No information exchange in between **ECCs**, the **ILS**, the **CIS** and other systems is permitted except via the specified communication channels through the supplied **FCS** and **Media System** in accordance with Figure 22.1
- 22.3 A **Crew indication device**:
- (a) must only provide visual and/or audio feedback to the crew; tactile or other non-audio visual feedback is not permitted;
  - (b) must be incapable of measuring any part of the **yacht state**, unless it contains no electronic parts; and
  - (c) must be incapable of significantly affecting the **yacht state**.
- 22.4 Batteries or regulated power supplies are permitted to be shared between **ECCs**, the **ILS**, the **CIS**, cameras and screens provided that isolated wiring begins immediately beyond these supplies.
- 22.5 **ECCs**, the **ILS** and the **CIS** must be powered by DC supplies operating at a voltage less than 60 volts, except where and if expressly permitted by the **FCS** specification.

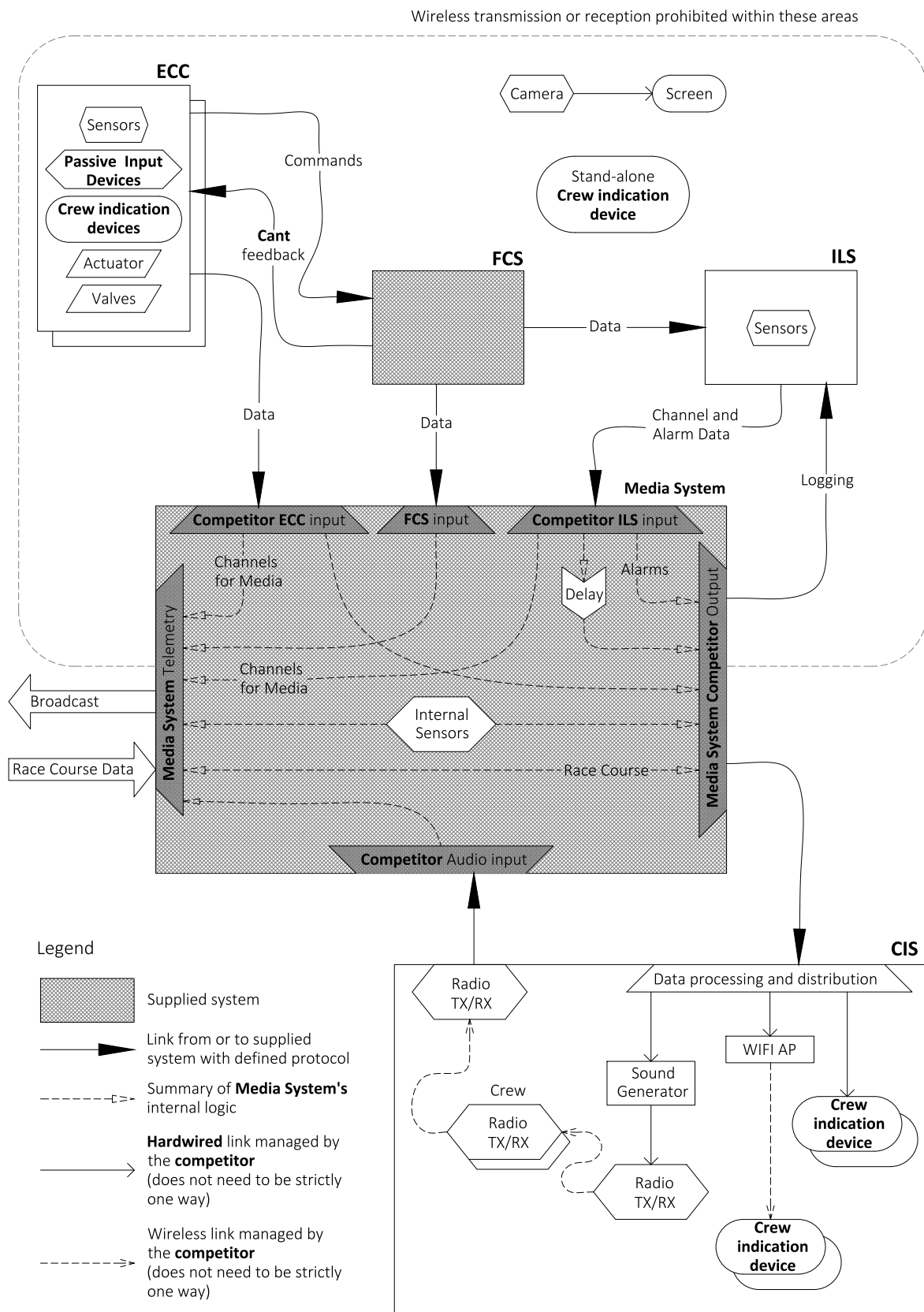


Figure 22.1: Permitted communication between electronic systems

## 23 *Electronic control circuits*

- 23.1 Only the following sensors within, or inputs to an **ECC** are permitted:
- (a) outputs from **passive input devices**;
  - (b) one sensor per **foil** measuring **foil flap** angle relative to the **foil wing**, or a proxy for it;
  - (c) one sensor measuring **rudder** rake angle relative to the **yacht**, or a proxy for it;
  - (d) sensors measuring the internal state of the **ECC**, such as voltage, current, CPU temperature, so long as those sensors provide no **yacht state** information, and are not used to estimate **yacht state** information;
  - (e) sensors measuring the internal geometric state of a **drive clutch** or **HCC** component, so long as those sensors do not directly measure **yacht state** information, and are not used to estimate **yacht state** information, for example:
    - (i) a sensor measuring the orientation of a spool in a hydraulic valve can be measured in order to drive that spool to a desired position, as long as the orientation of the spool is not used to estimate pressure or flow; but
    - (ii) a sensor measuring the position of a plunger in a pressure relief valve cannot be measured, as it provides direct information about pressure in the system; and
  - (f) a sensor measuring the pressure of an accumulator permitted by Rule 26.9 (b).
- 23.2 Except through outputs permitted in Rule 23.3, an **ECC** must be incapable of having any significant effect on the **yacht state**.
- 23.3 An **ECC** can only provide a data output, or provide power to:
- (a) electrical actuators of hydraulic valves within an **HCC**;
  - (b) electrical actuators of **drive clutches**;
  - (c) electrical actuators of stops or locks permitted by Rule 20.2 (a);
  - (d) electrical actuators that rotate the **foil flaps**;
  - (e) electrical actuators that rotate the **rudder** about its rake axis;
  - (f) **crew indication devices**;
  - (g) the **FCS**; and
  - (h) outputs as shown in Figure 22.1.
- 23.4 An **ECC** shall:
- (a) be **hardwired**;
  - (b) have wiring that is clearly isolated from other devices and systems, except for:
    - (i) connections shown in Figure 22.1; and
    - (ii) connections from common power supplies permitted by Rule 22.4; and
  - (c) be incapable of wireless communication.

## 24 *Instrumentation and logging system*

24.1 The **ILS** shall:

- (a) be **hardwired**;
- (b) have wiring that is clearly isolated from other devices and systems, except:
  - (i) connections shown in Figure 22.1; and
  - (ii) connections from common power supplies permitted by Rule 22.4;
- (c) be incapable of wireless communication;
- (d) not be capable of having any significant effect on the **yacht state**; and
- (e) not include any **crew indication devices**.

24.2 The **ILS** must provide a single data stream to the **Media System**, which:

- (a) must use a specified protocol;
- (b) must include specified data channels for broadcast and/or verification of **AC75 Class Rule** compliance, and these data channels must be:
  - (i) the most accurate data available to the **ILS**, or the best estimate available if the required data is not measured; and
  - (ii) at a specified frequency;
- (c) may include any other data channels measured, calculated or logged by the **ILS**; and
- (d) may include alarm event messages generated by the **ILS**, which may only contain:
  - (i) an alarm category ID code, being an integer between 1 and 10; and
  - (ii) a single floating point number representing the magnitude of an alarm value.

## 25 Crew information system

- 25.1 The **Media System** will make an output available for transmitting data to the **CIS**, and optionally to the **ILS** for logging. This output will use a specified protocol and will include:
- (a) the data stream supplied by the **ILS**, delayed by between 0.5 s and 1.0 s, this delay either being fixed or variable, to be specified;
  - (b) non-delayed alarm event messages supplied by the **ILS**, which:
    - (i) once dispatched for a particular category ID, will not be dispatched again for the same category ID for 10 s; and
    - (ii) will be limited when racing to a maximum total number of alarms of 20 per race;
  - (c) non-delayed information from an **ECC**; and
  - (d) non-delayed information generated by the **Media System**, including:
    - (i) time of day, and race start time;
    - (ii) latitude and longitude, but not altitude;
    - (iii) heading and/or track, but not heel or trim;
    - (iv) boat speed;
    - (v) race course information, which may include start time, boundary lines, mark positions, penalties, and other information relevant to racing; and
    - (vi) possibly some information about other competing **yachts**, which might include a time or distance to a potential collision (or collision of a virtual bounding box around a **yacht**), but will not include position, speed or heading information about those **yachts**.
- 25.2 The **CIS**:
- (a) shall be incapable of measuring any part of the **yacht state**;
  - (b) shall not be capable of having any significant effect on the **yacht state**;
  - (c) may use short range wireless communication in **crew indication devices** and associated interface hardware (e.g. access points); and
  - (d) may include microphones and speakers to allow direct voice communication between crew, and to play audio signals from **CIS** devices.
- 25.3 As an exception to Rule 22.3 (b), **crew indication devices** in the **CIS** containing sensors such as accelerometers or solid-state gyroscopes may be considered incapable of measuring any part of the **yacht state** if a **Competitor** can demonstrate to the satisfaction of the **Measurement Committee** that those sensors cannot be accessed, e.g. by installation of custom firmware verified by the **Measurement Committee**.
- 25.4 Additional constraints on **crew indication devices** may be specified, including, but not limited to:
- (a) standard display hardware (e.g. mobile phone model) for any **crew indication device** capable of receiving WiFi communication;
  - (b) custom firmware in standard display hardware (e.g. that disables sensors within a mobile phone);
  - (c) the display of a time-varying checksum on **crew indication devices** for verification of custom firmware;
  - (d) installation of screen reading software on **crew indication devices**; and
  - (e) installation of supplied audio visual recording equipment (e.g. small action cameras) to monitor **crew indication devices** at points requested by the **Measurement Committee**.

- 25.5 The **Media System** may specify reserved radio frequency bands which must not be used by other systems on the **yacht**.
- 25.6 Further details and requirements mentioned in the above Rule 24 and 25 will be provided according to Rule 33.

## 26 *Foil cant system*

- 26.1 Details of a **FCS** to control the **cant** rotation of the **foils** will be specified in accordance with Rule 33. This system will allow **cant** to be changed during manoeuvres and to make low-frequency **cant** setting changes, but the system will not be designed to provide high-frequency **cant** adjustment.
- 26.2 The supplied **FCS** cannot be modified except as expressly permitted in the supplied specification.
- 26.3 The **FCS** will provide, using specified protocols:
- (a) an input for commands to be received from an **ECC**;
  - (b) an output for feedback such as **cant** angles to be sent to an **ECC**; and
  - (c) an output for system information to be sent to the **ILS**.
- 26.4 The **foil** shall not intentionally be used to generate net downforce (combining gravitational and hydrodynamic loads) unless:
- (a) the foil is at its fully raised position (maximum **cant** angle);
  - (b) the foil is at its fully lowered position (minimum **cant** angle); or
  - (c) the **FCS** is being commanded to drive the foil to a prescribed **cant** angle.
- If the **foil** is not in one of these conditions and generates a net downward moment, the **FCS** shall not support the foil at a fixed **cant** angle and shall move the **foil** downwards.
- 26.5 If an **FCS** is frequently being commanded to drive the **foil** to a more raised position, and that **foil** is generating net downforce, the **FCS** may:
- (a) reduce the operation of the **cant** movement, or drive the **foil** to a lowered position; and/or
  - (b) provide information to the **Media System** for the provision of racing penalties.
- 26.6 The **FCS** will include supplied batteries, and may permit expansion of the battery pack with a specified battery model to increase overall power capacity. The supplied batteries are exempt from the requirements of Rule 5.16 and may be replaced as required.
- 26.7 The **cant** rotation of a **foil** can only be controlled using the supplied **FCS**.
- 26.8 Unless otherwise indicated in the **FCS** specification, the following systems may be powered by the **FCS's** batteries:
- (a) **ECC** systems, the **ILS** and the **CIS**;
  - (b) systems required by **COR/D**, the **Rules Committee** or the **Measurement Committee**, and devices permitted to be connected to those system;
  - (c) electrical actuators used to rotate the **foil flaps** and/or rotate the **rudder** about its rake axis; and
  - (d) one or more pumps supplying **high-pressure circuits** within one or more **HCCs** that control only the rotation of the **foil flaps** and/or the rotation of the **rudder** about its rake axis.
- 26.9 If the **FCS's** batteries are used to drive a pump within an **HCC** permitted by Rule 26.8 (d):
- (a) that **HCC** must be entirely self-contained and hydraulically disconnected from any other **HCC**; and
  - (b) a high-pressure accumulator is permitted to be installed in line with the pump.
- 26.10 Following sailing trials, **COR/D** may specify updates to the system which must be installed by all **Competitors**, these updates being frozen according to Rule 33.



## 27 Crew

- 27.1 There shall be eleven crew members, unless reduced by accident, who shall all be human beings.
- 27.2 The total mass of the crew, dressed only in light underwear, shall be no greater than specified in Rule 9.1.
- 27.3 When racing, each crew member shall wear:
- (a) a buoyancy aid that meets the flotation standard of ISO 12402-5 or ISO 12402-6 (CE 50 Newtons) and that is capable of being removed or deflated in the water within five seconds;
  - (b) a helmet to a minimum standard of CE EN 1077, CE EN 966, ASTM 2040, or Snell S-98 and with at least 300 cm<sup>2</sup> of the exterior surface brightly coloured. **Competitors** shall satisfy the **Measurement Committee** that the brightly coloured region can be seen from above the water with the crew lying face down or face up in the water;
  - (c) a blade with a length of no more than 150 mm;
  - (d) at least one personal air supply containing compressed air equivalent to at least 40 litres uncompressed volume each, which does not require the use of hands when in use;
  - (e) a pocket for carrying media equipment with minimum dimensions 80 mm x 200 mm x 30 mm; and
  - (f) media equipment as required by **COR/D** according to Rule 33.
- 27.4 The total mass of **carried equipment** worn or carried by each crew member shall weigh between 3.0 kg and 5.0 kg, with clothing and equipment weighed dry. The lower limit must apply at the start of a race, but can be reduced during a race due to consumption of food or drink. Any **carried equipment** brought aboard by a crew member must be carried by that crew member at all times when racing.
- 27.5 Clothing and equipment shall not be designed to retain water for the purpose of increasing mass.
- 27.6 A crew weighing schedule and procedure will be published in accordance with Rule 33.
- 27.7 Crew shall not enter the watertight volume of the **hull**.
- 27.8 Crew shall remain entirely aft of a plane 9.0 m forward of **TRP** except briefly to cross the boat, handle sails or resolve unforeseen issues.
- 27.9 Any crew that go forward of a plane 11.0 m forward of **TRP** may only do so as permitted by Rule 27.8, and must be tethered to the **hull** by a harness and safety line that complies with ISO 12401, the safety line being no longer than 2 m.
- 27.10 No part of the crew shall be in a sustained position outside an extrusion of the **perimeter line** perpendicular to **MWP**.

## 28 *Guest racer*

- 28.1 At the discretion of the **Regatta Director**, **Competitors' yachts** may carry a guest racer, whose mass will be limited and equalised according to Rule 9. If a guest racer is not aboard, equivalent ballast will be applied according to Rule 9.
- 28.2 Rules 27.3, 27.4, 27.5, 27.7 and 27.10 shall also apply to the guest racer.
- 28.3 The guest racer shall remain entirely behind a line 2.0 m forward of **TRP**.
- 28.4 The **Regatta Director** may require the guest racer to be tethered to the **yacht**.
- 28.5 Except by moving within the region permitted by Rule 28.3, the guest racer shall not contribute in any way to the racing of the **yacht**.

## 29 *Branding*

- 29.1 Parts of the **yacht** may be reserved for **event** branding, class insignia, national flags, etc. This Rule will be amended in accordance with Rules 32.1 and 33 to specify requirements for such branding.

## 30 Measurement

- 30.1 Measurement procedures and requirements for measurement documentation will be published according to the schedule provided in Rule 33.
- 30.2 The **Measurement Committee** may place measurement marks or seals on **yacht** components during construction or upon their completion. These marks or seals may include, but are not limited to, reference screws, punch marks, measurers' signatures, cable ties and stickers, on components or component tooling. **Competitors** shall permit inspections, allow such marks to be placed, and shall not move, remove or alter any such marks or seals without the express consent of the **Measurement Committee**.
- 30.3 **Competitors** shall permit the **Measurement Committee** to take samples of material from components of the **yacht** to ensure compliance with Rule 6.
- 30.4 **Competitors** shall permit the **Measurement Committee** to take samples of paint or vinyl from components of the **yacht** to ensure compliance with Rule 8.
- 30.5 If requested, or required by a measurement procedure, **Competitors** shall provide the **Measurement Committee** with source code and/or compiled executables of any software installed on the **yacht**, and shall assist them in the understanding of such code.
- 30.6 The **hull** of an **AC75 Class Yacht** shall be allocated a sail number by the **Measurement Committee** when it is first launched. **Competitors** shall inform the **Measurement Committee** when this occurs, and sail numbers will be allocated sequentially, except that culturally objectionable numbers may be skipped at the discretion of the **Measurement Committee**.
- 30.7 Leading up to **events**, the **Measurement Committee** will publish dates of measurement periods, during which **Competitors** may present their **yachts** for measurement. The **Measurement Committee** will inspect the **yachts** for compliance with this **AC75 Class Rule**, and **Competitors** shall provide whatever assistance is requested by the **Measurement Committee** to facilitate this process.
- 30.8 The **Measurement Committee** shall use its own equipment for measuring a **Competitor's yacht**, except that a **Competitor's** equipment may be used at the discretion of the **Measurement Committee** if it is calibrated against the **Measurement Committee's** equipment and sealed to their satisfaction.
- 30.9 When weighing components of a **yacht**, **Competitors** shall be permitted to dry any water on the surface of those components and replace wet rigging with equivalent dry rigging.
- 30.10 The **Measurement Committee** shall issue a measurement certificate for a **yacht** when they have:
- (a) concluded that she complies with this **AC75 Class Rule**;
  - (b) received completed declarations as required by this **AC75 Class Rule** and as additionally required by the **Measurement Committee** or the **Rules Committee** at their discretion; and
  - (c) received all documentation as required by this **AC75 Class Rule** and by other notices published by the **Measurement Committee** or the **Rules Committee**, and confirmed that the documentation is satisfactory.

Schedule of when a Competitor is permitted to change Measurement Certificates TBA.

- 30.11 Information on a **yacht's** measurement certificate shall include, but is not limited to, her:
- (a) name;
  - (b) **hull** identification number and **hull IGES** reference;
  - (c) builder(s);
  - (d) owner(s);
  - (e) mass and LCG; and
  - (f) **foil, rudder** and **mast** configuration.
- 30.12 The measurement certificate will be invalidated if:
- (a) any details of the **yacht** listed in Rule 30.11 change;
  - (b) the **Measurement Committee** believe that the **yacht** no longer complies with the **AC75 Class Rule**; or
  - (c) the **Measurement Committee** believe that the certificate was issued in error.
- 30.13 **Competitors** shall inform the **Measurement Committee** immediately if they make any changes or repairs to the **yacht** that could affect her measurement certificate or her compliance with the **AC75 Class Rule**.
- 30.14 The **Measurement Committee** reserve the right to re-measure or inspect any aspect of a **yacht** at any time, before or after sailing, and may publish procedures for regular measurement inspections.
- 30.15 When a measurement period is open:
- (a) if the **Measurement Committee** believes there is ambiguity as to whether an element of a **Competitor's yacht** satisfies the **AC75 Class Rule**, they may seek the advice of the **Rules Committee**. If the ambiguity remains, the **Rules Committee** shall rule confidentially on the compliance or otherwise of the **yacht**, based on the information presented to them by the **Measurement Committee**, after which a measurement certificate may be issued or withheld;
  - (b) decisions on the compliance of a **yacht** made by the **Measurement Committee** and/or the **Rules Committee** may subsequently be changed by the **Measurement Committee** or the **Rules Committee** if new information comes to light, or if they believe the original decision was made in error. Only an interpretation shall provide a **Competitor** with a guarantee of continuing compliance of an ambiguous design element; and
  - (c) if a measurement certificate is withheld from a **Competitor**, the **Measurement Committee** shall explain in full the reasons why the **yacht** does not comply with the **AC75 Class Rule**, including the detail of decisions made or advice given by the **Rules Committee**.

## 31 Interpretation

- 31.1 A **Competitor** may seek an interpretation of this **AC75 Class Rule** by submitting a request to the **Rules Committee**. The **Measurement Committee** or the **Rules Committee** can also initiate an interpretation, providing that the interpretation does not reveal a design characteristic that may not have been considered by some **Competitors**.
- 31.2 When a request for interpretation is received by the **Rules Committee**, the following process shall be followed:
- (a) as soon as practicable, the interpretation is anonymised and circulated by the **Rules Committee** to all **Competitors**;
  - (b) within 5 days of receipt, **Competitors** may supply comments and/or a proposed interpretation response to the **Rules Committee**;
  - (c) within 7 days of the feedback from **Competitors** being due, the **Rules Committee** agree on a draft interpretation and circulate this to the **Competitors**;
  - (d) within 3 days from the draft being sent, **Competitors** may respond to the **Rules Committee** with comments on the draft;
  - (e) within 3 days of feedback from **Competitors** being due, the **Rules Committee** then either issues the previous draft as final, or modifies and recirculates the draft, in which case the process reverts to step 31.2 (d).
- 31.3 The **Rules Committee** may, at their discretion, shorten any of the times allowed in Rule 31.2, particularly leading up to or during **events**.
- 31.4 Interpretations shall be based on the following principles:
- (a) interpretations shall consider only the words in this **AC Class Rule**, not their possible intent;
  - (b) where wording is ambiguous, the most reasonable and natural interpretation of the written words shall be taken;
  - (c) interpretations shall not contradict any part of this **AC Class Rule** unless a part thereof is found to directly contradict another part, in which case a part that refers to more detail shall take precedence over a part that is more general; and
  - (d) where, after the above Rules are applied, there remains ambiguity or contradiction as to whether a particular feature is permitted, an interpretation shall be permissive.
- 31.5 The **Rules Committee** may seek the advice of independent experts, including a member of the **Measurement Committee**, when considering an interpretation.
- 31.6 Once an interpretation has been issued as final, it cannot be modified without the explicit agreement of all **Competitors**.
- 31.7 Advice or opinions on the meaning of a Rule, from a member of the **Measurement Committee** or **Rules Committee**, are not binding except through an interpretation.

## 32 Amendment

32.1 The **AC75 Class Rule** may be amended:

- (a) before 29<sup>th</sup> June 2018, by **COR/D** for any reason;
- (b) at any time by unanimous consent of **Competitors** still competing;
- (c) at any time by the **Rules Committee**, with the agreement of **COR/D** and the **Regatta Director**, for changes relating to:
  - (i) supplied or specified components;
  - (ii) safety;
  - (iii) safety equipment;
  - (iv) media equipment;
  - (v) **event** branding; or
  - (vi) guest racers,including their impact on masses controlled by Rule 9.

## 33 Dates

33.1 The following items shall be specified no later than the dates specified:

Date	Rule	Who	Item
TBA	5.4	<b>Rules Committee</b>	Template spreadsheet to track components.
TBA	6.13	<b>Rules Committee</b>	Material certificates and declaration requirements.
TBA	10.24, 16.6	<b>Rules Committee</b>	Measurement procedures for loads tests.
TBA	13.1	<b>COR/D</b>	Further details of the <b>foil arms</b> .
TBA	11.14, 16.5	<b>COR/D</b>	Reserved area for the supplied <b>Media System</b> .
TBA	19.1	<b>COR/D</b>	The <b>mast</b> drawing package.
TBA	21.10	<b>Rules Committee</b>	Standard types and positions for pressure relief valves.
TBA	25.6	<b>COR/D</b>	<b>Media System</b> details and protocols.
TBA	26.1	<b>COR/D</b>	Details of the <b>FCS</b> .
TBA	26.10	<b>COR/D</b>	<b>FCS</b> system updates frozen.
*TBA	27.3 (f)	<b>COR/D</b>	Media equipment worn by crew.
*TBA	27.6	<b>Rules Committee</b>	Crew weighing schedule.
*TBA	29	<b>COR/D</b>	<b>Event</b> branding.
*TBA	30.1	<b>Rules Committee</b>	Measurement procedures and documentation.

*\*These specifications may be amended provided they are published at least 180 days prior to the first day of racing of the **Event** in which these specifications apply.*

## 34 Definitions

### 34.1 AC75 Class Rule

The rule governing the yachts to be used in the America's Cup World Series, the Christmas Cup, the America's Cup Challenger Selection Series and the Match and/or in any other regattas sailed in AC75 Yachts (if any), including all amendments to, interpretations of and rulings regarding such class rule.

### 34.2 AC75 Class Yacht

A yacht that complies with or could comply with the **AC75 Class Rule**.

### 34.3 Actuator chamber

A volume occupied by hydraulic fluid within a **hydraulic actuator** and extending until the first valves in connected lines.

### 34.4 Batten

A beam used to locally stiffen a sail.

### 34.5 Bearing centre

The centre of rotation of a bearing.

### 34.6 Bowsprit

A spar projecting forward from the bow to which the **code zero** can be attached.

### 34.7 Cant

Rotation of a **foil** about the **foil arm** rotation axis.

### 34.8 Carried equipment

Clothing, safety equipment, other equipment, food and drink carried aboard by the crew.

### 34.9 Challenger of Record

As defined in the **Protocol**.

### 34.10 CIS

Crew information system: an electronic system connected to the **Media System** to display the raw or processed **Competitor** data output from the **Media System** to the crew, and to provide voice communication between the crew.

### 34.11 Clew point

The intersection or projected intersection of the **leech** and **foot** of a **sail skin**. The intersection shall be projected when the **leech** or **foot** curvature reduces below a radius of 1.0 m.

### 34.12 Code zero

A **headsail** set forward of the forestay from the **bowsprit**.

### 34.13 Commercially available

This definition is TBA.

34.14 **Commercially available component**

This definition is TBA.

34.15 **Competitor**

As defined in the **Protocol**.

34.16 **Control function**

A permitted degree-of-freedom of motion, or deformation, of a **control surface**. All **control functions** of a **control surface** must be distinct from each other, with no significant overlap in their functionality, and that functionality must relate to a clear **control surface** motion or deformation. Examples include each **foil flap** rotation, **rudder** rake rotation, **rudder** yaw rotation, and permitted sail controls such as **headsail** sheet, sheeting position, cunningham, and **mainsail** sheet, traveller, head twist, etc.

34.17 **Control surface**

One of the following:

- (a) The combination of a **mast** and a **mainsail** acting together;
- (b) A **foil flap**;
- (c) A **rudder**; or
- (d) A **headsail**.

Where position, orientation or movement of a **control surface** is mentioned herein, that position, orientation or movement is implied to be relative to the **yacht**, or in the case of a **foil flap**, relative to the **foil wing** to which it is attached.

34.18 **Control system**

A system used for the adjustment of **control surfaces**.

34.19 **COR/D**

The **Challenger of Record** and the **Defender** jointly.

34.20 **Core**

Material that is bonded between two structural skins in a sandwich construction, primarily to transfer shear. **Core** includes any material which is bonded to both skins, such as a corrugated laminate between two skins, but excludes solid laminate or metal used within edge, taper or local reinforcement details.

34.21 **Crew indication device**

Any device which:

- (a) provides information to the crew;
- (b) is worn or installed on the **yacht**;
- (c) can be seen or heard by the crew, directly or indirectly; and
- (d) may process data internally,

such as a display, LED or speaker.

34.22 **Deck**

The upper of a **hull surface** that is divided by the **perimeter line**.



- 34.23 **Defender**  
As defined in the **Protocol**.
- 34.24 **Drive clutch**  
A device which engages and disengages a common mechanical drive train to or from a device supplying power to a **control function**.
- 34.25 **ECC**  
Electrical control circuit: an electrical and/or electronic circuit within a **control system**.
- 34.26 **Event**  
Any regatta that forms part of the 36<sup>th</sup> America's Cup.
- 34.27 **External forces**  
Forces applied from outside the **yacht** to the **yacht**, such as fluid pressure, fluid dynamic friction and gravity.
- 34.28 **FCS**  
Foil cant system: a system for controlling the rotation of the **foils** about **longitudinal** axes in the **hull**.
- 34.29 **Foil**  
An appendage that provides side force and vertical lift.
- 34.30 **Foil arm**  
Part of a **foil** that connects the **hull** to the **foil wing**.
- 34.31 **Foil cant reference point**  
The point at the intersection of the **foil cant** axis and the **FCS transverse** reference plane, as defined in the one-design **FCS** drawings.
- 34.32 **Foil flap**  
A component attached to a **foil wing** that moves to control the **foil's** lift.
- 34.33 **Foil wing**  
Part of a **foil** which, in conjunction with a maximum of two **foil flaps**, produces most of the **foil's** lifting force.
- 34.34 **Foot**  
The bottom edge of a **sail skin**.
- 34.35 **Foot girth**  
The distance from the **tack point** to the **clew point** for a **headsail sail skin** or **tack point** to the **lower leech point** for a **mainsail sail skin**.

34.36 **Force input device**

A device which is moved by a crew member to provide control and/or power input, and whose movement, resistance to movement or response can, where expressly permitted within the **AC75 Class Rule**, be affected by certain parts of the **yacht state**. Examples are a sheet or winch connected to a sail, a grinding pedestal connected to a mechanical drive train or hydraulic pump, and a helm wheel connected through cables to a **rudder**.

34.37 **FRP**

Fiber-reinforced polymer matrix composite.

34.38 **Hardwired**

Physically connected by electrical wires, including localised electromagnetic or optical coupling between system components (e.g. galvanic isolation of protocol bus, optical isolation of IO device) provided information exchange is confined to the wiring circuit.

34.39 **HCC**

Hydraulic control circuit: a hydraulic circuit within a **control system**.

34.40 **Head**

The top edge of a **sail skin**.

34.41 **Head girth**

The distance from the **head** point to the **peak point** of a **sail skin**.

34.42 **Head pennant**

A cable used as an extension of a halyard to accommodate a sail with reduced **luff** length.

34.43 **Head point**

The intersection or projected intersection of the **luff** and **head** of a **sail skin**. The intersection shall be projected when the **luff** or **head** curvature reduces below a radius of 1.0 m.

34.44 **Headsail**

A sail set forward of the **mast**.

34.45 **High-pressure circuit**

All hydraulic circuits within an **HCC** that are not **actuator chambers** or **low-pressure circuits**.

34.46 **Hull**

The main body of the **yacht**, including the bottom, sides, transom, **deck**, cockpit and internal structure but not the **mast**, rigging, sails, appendages or fittings.

34.47 **Hull IGES**

A geometry file representing the as-designed **hull surface**.

34.48 **Hull lower surface**

The lower part of a **hull surface** that is divided by the **perimeter line**.

34.49 **Hull surface**

The external surface of a **hull**, where:

- (a) fittings such as pedestals, helm wheels and deck gear shall be excluded; and
- (b) local details may be excluded, provided they have no significant aerodynamic, hydrodynamic or hydrostatic effect. Examples of such details that may be excluded are:
  - (i) local reinforcements for deck hardware;
  - (ii) recesses for winches; and
  - (iii) local foot rests.

The **hull surface** is divided into the **deck** and **hull lower surface** by the **perimeter line**.

34.50 **Hydraulic actuator**

A hydraulic ram, hydraulic motor or functionally equivalent device that converts hydraulic pressure and flow into force and translation, and/or torque and rotation.

34.51 **IG**

The intersection of the centre line of the forestay with the leading edge of the **mast**, as shown in Figure 19.3.

34.52 **ILS**

Instrumentation and logging system: an electronic instrumentation circuit including devices such as sensors, processing units and logging systems.

34.53 **IZ**

The intersection of the centre line of the **code zero** halyard with the leading edge of the **mast**, as shown in Figure 19.3.

34.54 **JG**

The distance between **MRP** and the intersection of the centreline of the forestay and a plane 1.500 m above MWL with the rig at dock tune as defined in Figure 19.3.

34.55 **Jib**

A **headsail** hoisted on the forestay.

34.56 **LCP**

**Longitudinal** centre plane.

34.57 **Leech**

The aft edge of a **sail skin**.

34.58 **Leech points**

For any **sail skin** a **leech point** is the intersection of **leech** and a line perpendicular to the line from the **lower leech point** to the **head point** taken at the corresponding percentage of **LL** from the **lower leech point**. **Leech points** are illustrated in Figures 18.1 and 19.2.

34.59 **Linear component**

A component of the **yacht**:

- (a) that has no moving parts or mechanisms;
- (b) for which any two points on or within it must either always be in contact, or never be in contact;
- (c) whose overall deformation in response to normal sailing loads is approximately linear; and
- (d) that always returns to the same state in the absence of applied load.

Such components may be constructed from multiple parts and fastened together **mechanically**, but such fastening must be such that the final component satisfies the above conditions.

34.60 **LL**

The distance from the **head point** to the **clew point** for a **headsail sail skin** or the lower **leech point** for a **mainsail sail skin**.

34.61 **Longitudinal**

Orthogonal to **TRP**.

34.62 **Low-pressure circuit**

Hydraulic circuits within an **HCC** that return hydraulic fluid to reservoirs and supply hydraulic pumps with hydraulic fluid from reservoirs.

34.63 **Lower leech point**

For any **sail skin** of the **mainsail** the **lower leech point** is the intersection of a 26.750 m diameter circle centred at the **head point** and the **leech** or the projection of the **leech**. For any **headsail** the **lower leech point** is at the **clew point**.

34.64 **LP**

The distance, measured perpendicular to the **luff**, from the **luff** to the **clew point** of a **sail skin**.

34.65 **Luff**

The forward edge of a **sail skin**.

34.66 **Mainsail**

The combination of **sail skins** and associated components that are hoisted on the **mast**.

34.67 **Mast**

All components of the rig that are not hoisted with the **mainsail** or **headsails**. This includes **mainsail** support structures and **control systems** such as booms that are not part of the **mainsail** as well as halyards, rigging, spreaders, fittings, fairings, instrument displays, instrument sensors, cameras, cables, flotation systems and hydraulic rams that remain as part of the rig whilst sailing. Sheets shall be considered as part of the **mast** if they cannot be easily disconnected from **mast** structures and **control systems**.

34.68 **Mast centre plane**

The plane perpendicular to the aft face of the **mast surface** and coincident to the lengthwise centre line of the aft face of the **mast surface** as shown in Figure 19.1.

34.69 **Mast lower plane**

The plane perpendicular to the aft face of the **mast surface** at a height along the aft face of the **mast surface** of 1.200 m above the **MRP** as shown in Figure 19.3.

34.70 **Mast lower zone**

The lower **mast** zone as illustrated in Figure 19.3.

34.71 **Mast surface**

The external surface of the **mast tube** as given in the **mast** drawing package described in Rule 19.1.

34.72 **Mast tube**

The principal spar of the rig.

34.73 **Mast upper plane**

The plane oriented at 5° to the **mast lower plane** at a height along the aft face of the **mast surface** of 26.5 m above **MRP** as shown in Figure 19.3.

34.74 **Mast upper zone**

The upper **mast** zone as illustrated in Figure 19.3.

34.75 **Measurement Committee**

A committee responsible for ensuring a **yacht** satisfies the **AC75 Class Rule**.

34.76 **Mechanically**

Only through contact of components, without the use of hydraulic, pneumatic, magnetic or electrical components.

34.77 **Media System**

A supplied system for managing the flow of data, audio and video around the **yacht** and off the **yacht** for broadcast.

34.78 **MRP**

**Mast** rotation point. The point about which the mast base rotates relative to the **hull**.

34.79 **MWP**

Measurement waterline plane.

34.80 **Official Dictionary**

The Oxford English Dictionary as it exists in the official online dictionary available at [www.oed.com](http://www.oed.com) (or such later official website of the Oxford English Dictionary).

34.81 **Passive input device**

A device which is moved by a crew member to produce an electrical control signal, where that control signal relates only to the crew member's manual input and is not significantly affected by the **yacht state** (except for unintended manual input caused, for example, by a crew member falling on to a button). Examples are buttons, joysticks, sliders or touch screens.

34.82 **Peak point**

The intersection or projected intersection of the **leech** and **head** of a **sail skin**. The intersection shall be projected when the **leech** or **head** curvature reduces below a radius of 1.0 m.

34.83 **Perimeter line**

The line on the **hull surface** which forms the perimeter of the **hull surface** when **projected** on to **MWP**. Where the **hull surface** is vertical on its perimeter, the **perimeter line** shall pass through the highest points on that vertical surface.

34.84 **Platform assembly**

The **hull, foils, rudder, bowsprit** and other systems, hardware, fittings, rigging and supplied equipment that is weighed with those components.

34.85 **Projected**

The **projected** shape of a part is the shape of a shadow cast by that part on the specified plane from a parallel light source acting normal to that plane.

34.86 **Protocol**

The Protocol of the 36th America's Cup between the Royal New Zealand Yacht Squadron and Circolo Della Vela Sicilia.

34.87 **Regatta Director**

The person appointed pursuant to Article 20 of the Protocol.

34.88 **Rondure**

A line formed by the leading edge of an appendage **projected** on to **TRP**.

34.89 **Rudder**

An appendage positioned on the centreline of the **hull** which is rotated to affect yaw and trim.

34.90 **Rules Committee**

A committee responsible for ruling on **AC75 Class Rule** interpretations and producing measurement procedures.

34.91 **Sail hardware**

Components of a sail for the purpose of attachment or applying pre-tension of sail controls and **battens**. If two or more components are rigidly connected together then they will be considered as a single piece of **sail hardware**.

34.92 **Sail skin**

The thin, flexible membrane of a **headsail** or one of the thin, flexible membranes that may make up a **mainsail**. **Sail skins** include stickers, branding, **batten** pockets, **luff** pockets as well as any reinforcements such as edge tapes or corner patches.

34.93 **Supplied rigging**

The supplied forestay, cap shrouds, lower shrouds, and running backstays.

34.94 **Symmetric**

A component that is required to be **symmetric** must be designed to be exactly **symmetric**, and the built shape must lie within the specified tolerance of the designed shape everywhere on its surface. Such a component must be designed to be almost exactly **symmetric** in its structure, where any structural asymmetry can only be to allow reasonable stagger in ply lay-up, use right-handed screw threads, etc., and not to deliberately induce asymmetric structural behaviour.

34.95 **Tack point**

The intersection or projected of the **luff** and **foot** of a **sail skin**. The intersection shall be projected when the **luff** or **foot** curvature reduces below a radius of 1.0 m.

34.96 **Transverse**

Orthogonal to **LCP**.

34.97 **TRP**

Transom reference plane.

34.98 **Wetted**

The **wetted** part of a component is that part of a component which extends or can extend outside of the **hull's** outer skin.

34.99 **Yacht**

**AC75 Class Yacht.**

34.100 **Yacht state**

The specific condition of the **yacht**, comprising all of the following:

- (a) the position and orientation of the **yacht** in space;
- (b) the position and orientation of any **control surface**;
- (c) the position and orientation of a **foil**;
- (d) the position and orientation of any **force input device**;
- (e) the stress, strain, tension and force in any part of the **yacht**;
- (f) other force-related quantities in any part of the **yacht**;
- (g) the volume, velocity, flow rate or pressure of fluid within, or acting on, any part of the **yacht**;
- (h) all absolute measures of the above and quantities measured relative to each other;
- (i) the water or wave height or velocity relative to the **yacht**;
- (j) all time derivatives of the above;
- (k) all quantities derived from any of the above; and
- (l) all quantities from which the above can be derived or approximated.