AC72 Class Rule Version 1.1

(Updated on January 7th, 2013 to Incorporate Amendments 1-10)

Pursuant to **AC72 Class Rule** 4(b), this **AC72 Class Rule** Version 1.1 was approved on 22nd February 2011

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for the **Measurement Committee**

_____

Regatta Director

The **Regatta Director** certifies this **AC72 Class Rule** Version 1.1 has been approved by a majority of **Competitors**

TABLE OF CONTENTS

SECTION A 4

1. LANGUAGE AND DEFINITIONS 4
2. UNITS OF MEASUREMENT 7
3. INTERPRETATIONS 8
4. AMENDMENTS 8

SECTION B 9

5. GENERAL 9
6. HULLS 10
7. CROSS STRUCTURE 12
8. RUDDERS 13
9. DAGGERBOARDS 13
10. WING 14
11. RIGGING 16
12. SOFT SAILS 16

SECTION C 19

13. GENERAL LIMITS ON MATERIALS AND CONSTRUCTION 19
14. HULL LIMITS ON MATERIALS AND CONSTRUCTION 20
15. TRAMPOLINE 21
16. HARDWARE AND RIGGING LIMITS ON MATERIALS AND CONSTRUCTION 21
17. SURFACE FINISHES AND BOUNDARY LAYER INTERFERENCE 21

SECTION D 22

18. CREW 22
19. MANUAL POWER AND STORED ENERGY 22
20. AC72 YACHT IDENTIFICATION AND CLASS INSIGNIA 23

SECTION E 23

21. MEASUREMENT MARKS 23
22. DECLARATIONS 23
23. INSPECTION AND MEASUREMENT 24
24. MEASUREMENT PROCEDURES 24
25. MEASUREMENT CONDITIONS 24
26. COMPLIANCE WHILE RACING 26
27. MEASUREMENT CERTIFICATE 26

APPENDICES 28

APPENDIX A — MEASUREMENT CERTIFICATE 28
APPENDIX B — CONSTRUCTION DECLARATIONS 30
APPENDIX C — HULL SYMMETRY AND MINIMUM HEIGHT DIAGRAM 32
APPENDIX D — AC72 WING 33

APPENDIX E — MEDIA, TRACKING AND RACE COMM EQUIPMENT 35

INTRODUCTION

Competitors are responsible for the structural integrity of their **AC72 Yachts,** and compliance with the **Class Rule** does not necessarily assure structural integrity nor otherwise relieve the **Competitor** of this responsibility.

Competitors shall ensure that their **AC72 Yachts** comply with the **AC72 Class Rule** at all times while racing and, unless permitted under the **Rules**, that any alterations, replacements and repairs do not invalidate the measurement certificate once issued.

SECTION A

1. LANGUAGE AND DEFINITIONS

1.1 The official language of the **AC72 Class Rule** is English. If translated into another language, the English text shall prevail. Except for words defined herein, the meaning of any word shall be determined by reference to the Oxford English Dictionary, Second Revised Edition (2009) – CD Rom Version 4.0 (Oxford University Press 21 May 2009) or any later published version. When there is more than one definition in the Dictionary, the Measurement Committee shall determine the appropriate definition.

1.2 When a term is used in its defined sense, it is printed in bold type.

1.3 The words "shall" and "must” are mandatory. The words "can" and "may" are permissive. The word "should" is advisory.

1.4 In interpreting this **AC72 Class Rule** the definitions in Article 1 of the **Protocol** shall apply, and:

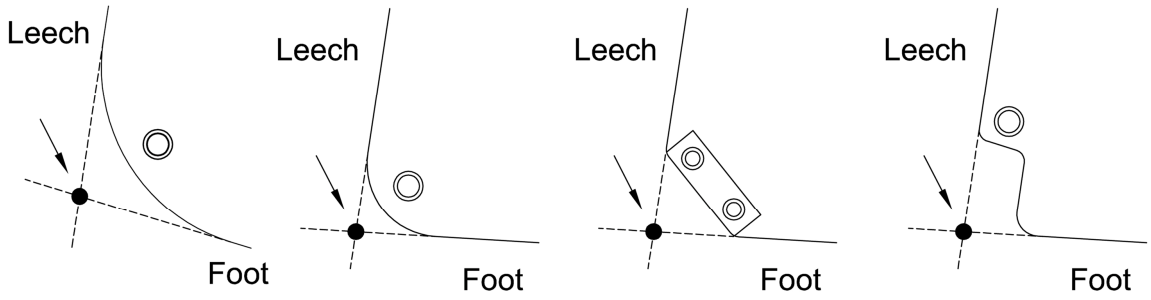
(a) **appendage** means any component that is outside the **hull**, excluding **wing** and **cross structure, daggerboard** bearings and **daggerboard** fairings (providing these bearings and fairings comply with 1.4(a)(ii)) , but including integral components that extend from outside the **hull** into the **hull**, (e.g., **daggerboard** head or **rudder** stock) that is:

i. wholly or partially submerged at any time during racing; and

ii. used to affect stability, leeway, steerage, directional stability, motion damping, trim, or displaced volume.

(b) **clew** means the area within 1.000 m of the **clew point**;

(c) **clew point** means the intersection of the **leech** and **foot**, projected as necessary;



(d) **cross structure** means structure used to connect the **hulls** or to support the **wing**, **rigging** or **soft sails**, including any part of this structure which extends into the **hull,** is removed from the **hull** when the **AC72 Yacht** is disassembled , and excluding trampolines. **Wing, rigging** or **soft sails** may also be supported from fittings attached to the **hulls**;

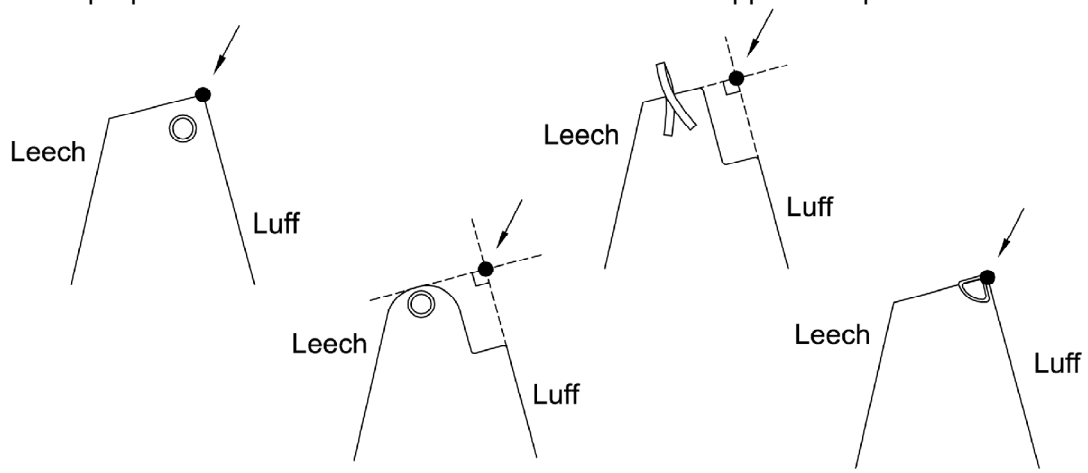
(e) **daggerboard** means a retractable **appendage** primarily used to affect leeway. The term **daggerboard** is synonymous with bilge board, centerboard, lifting keel and sliding keel;

(f) **fiber modulus** means the batch-nominal elastic modulus of the fibers in an **FRP** laminate with the modulus measured with impregnated tows, by extensometers, between 1000 and 6000 microstrains; the **Measurement Committee** will accept the following testing methods (and may accept other similar methods): SACMA-SRM16, ASTM D 4018, or JIS R 7601;

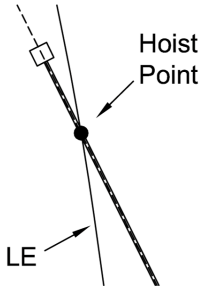
(g) **foot** means the bottom edge of the **soft sail** in its normal configuration when in use;

(h) **FRP** means fiber-reinforced polymer matrix composites;

(i) **head** means the intersection of the **luff** or the extension of the **luff** and a line perpendicular to the **luff** and coincident with the uppermost point on the **soft sail**;



(j) **hoist point** (or **Hoist Points A,** and **B** as defined herein) means a 30mm-wide painted band on the leading edge of the **wing**, whose lower edge is established per appendix D with the **wing** in **wing measurement position**, below which **soft sails** are to be flown;



(k) **hull** means a canoe body, part of which displaces 45% or more of the **AC72 Yacht's** displaced volume when floating in **measurement condition**;

(l) **hull centerplane** means the longitudinal plane of symmetry of a **hull**;

(m) **inboard beam waterline** means the shortest distance between the **hulls** at **MWP**;

(n) **interpretation** means an interpretation issued in writing by the **Measurement Committee** in accordance with rule 3;

(o) **luff** means the forward edge of the **soft sail**;

(p) **leech** means the aft edge of the **soft sail**;

(q) **LP** means the distance, measured perpendicular to the **luff**, from the **luff** to the **clew point** of a **soft sail**.

(r) **Measurement Committee** means the committee appointed under Article 4.4 of the **Protocol**;

(s) **measurement condition** means the condition of the **AC72 Yacht** as specified in rule 25;

(t) **measurement weight** means the weight of the **AC72 Yacht** in **measurement condition;**

(u) **measurer** means a person appointed by the **Measurement Committee** to perform measurement services or compliance checks; a **measurer** may or may not be a member of the **Measurement Committee**;

(v) **MWP** is the flotation plane in **measurement condition;**

(w) **rigging** means ropes, cables or rods that are primarily loaded in tension and are essentially ineffective in compression;

(x) **rudder** means a movable **appendage** primarily used to affect steerage.

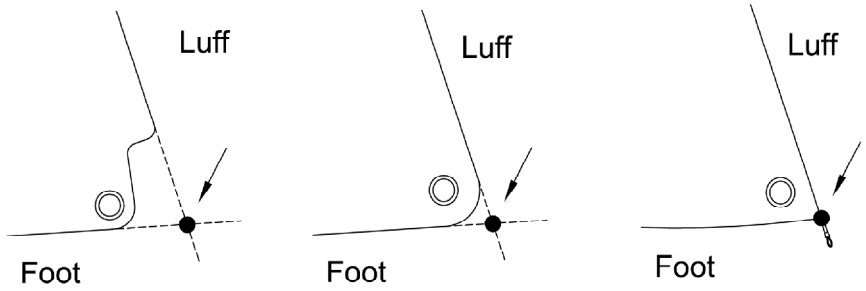
(y) **sailing weight** means the sum of the **measurement weight** and the weight of the **wing** when the **wing** is in **wing measurement condition**;

(z) **soft sail** means a sail that is not a **wing**;

(aa) **stem plane** means the vertical transverse plane that passes through the forward-most point of the **hulls** including fittings attached to **hulls**;

(bb) **stern plane** means the vertical transverse plane that passes through the aft-most point of the **hulls** including fittings attached to **hulls;**

(cc) **tack** means the point where the **luff** and **foot** meet, projected as necessary;



(dd) **tack point** (or **Tack Point A** and **Tack Point B** as further defined herein) means the point on the **cross structure** where the **rigging** or fitting that supports the **soft sail** tack is attached, per rule 12.2;

(ee) **wing** means a rigid or semi-rigid structure (encompassing a traditional yacht's mast and mainsail structures), similar to an aircraft wing fixed approximately vertically to provide propulsion from the wind;

(ff) **wing base plane** means the plane at the base of the wing grid in Appendix D perpendicular to the **wing centerplane**;

(gg) **wing centerplane** means the **wing**'s plane of symmetry parallel to the measurement grid when the wing is in **wing measurement position**;

(hh) **wing measurement condition** means the condition used to measure the weight and center of gravity of the **wing** per rule 25.3;

(ii) **wing measurement position** means the position of the **wing** used to determine its area per rule 10;

(jj) **wing rotation point** means the point about which the lowest compressive load-bearing component of the **wing** rotates relative to the **AC72 Yacht**; and

(kk) **yacht centerplane** means the vertical longitudinal plane of symmetry of the **AC72 Yacht** that is perpendicular to **MWP**.

2. UNITS OF MEASUREMENT

2.1 The Metric System shall be used for all measurements, with:

(a) length measured in meters to three decimal places, except that **soft sails** shall be measured to two decimal places unless otherwise specified herein;

(b) **sailing weight** and **wing** weight measured in kilograms to the nearest 10 kg, unless otherwise specified herein;

(c) areas related to the measurement of the wing measured in square meters to two decimal places;

(d) volumes measured in cubic meters or liters, as specified herein, to two decimal places;

(e) angles measured to the nearest 0.5 degree; and

(f) any other measurement taken to a degree of precision determined by the **Measurement Committee** as they deem appropriate.

2.2 Herein, the three major orthogonal axes of the **AC72 Yacht** are vertical, longitudinal, and transverse (vertical being normal to **MWP**, longitudinal being the intersection of the **yacht centerplane** and **MWP**, and transverse being the third).

2.3 For establishing continuing compliance with rule weight limits, the **Measurement Committee** shall determine and record the weight of any other components, modifications, repairs, additions, subtractions, and/or replacements to a degree of precision and using methodology they determine to be practical and appropriate for that purpose (including re-weighing). **Competitors** shall provide all assistance to the **Measurement Committee** required by them in tracking these changes.

2.4 The measuring equipment used by the **Measurement Committee** shall be the reference device for determining compliance with the **AC72 Class Rule**.

2.5 Herein, "between" two points or numbers means inclusive of those points or numbers, *i.e.*, "between 1.000 m and 2.000 m" means "between 1.000 m and 2.000 m inclusive."

3. INTERPRETATIONS

3.1 A **Competitor** may seek an **interpretation** by submitting a request in writing to the **Measurement Committee**, or the **Measurement Committee** may initiate an **interpretation**. The **Measurement Committee** shall issue **interpretations** publically within 30 days of the request or may request a longer period subject to agreement of the **Competitor** seeking the **interpretation**.

3.2 A **Competitor** shall not rely on any advice or opinion from a member of the **Measurement Committee** other than through an **interpretation**.

3.3 If a **Competitor** fails to obtain an **interpretation** regarding a characteristic of design or construction**,** the **Measurement Committee** with the approval of the **Regatta Director** may refuse to issue, or may withdraw, the **AC72 Yacht's** measurement certificate until such design or construction characteristic is the subject of an **interpretation** which permits it.

4. AMENDMENTS

The **AC72 Class Rule** may be amended at any time by unanimous consent of **Competitors** still competing and the Regatta Director, except that:

(a) at any time the **Measurement Committee**, with the approval of the **Regatta Director**, may amend the **AC72 Class Rule** with respect to media requirements; and

(b) prior to March 1, 2011, the **Measurement Committee**, with the approval of the **Regatta Director** and a majority of the **Competitors,** may amend the **AC72 Class Rule** in any respect.

SECTION B

5. GENERAL

5.1 The **AC72 Yacht** shall be a vessel, generally known as a catamaran, with two **hulls** connected by **cross structure** that are arranged symmetrically about the **yacht centerplane,** and that has two **rudders**, two **daggerboards,** and no other **appendages.**

5.2 The **AC72 Yacht** shall have one **wing** and the only permitted **soft sails** are jibs, code zeros and gennakers as defined herein.

5.3 The overall length between the **stem plane** and **stern plane**, not including equipment required or provided by **ACRM,** shall not be more than 22.000 m.

5.4 The **cross structure**, including fittings, shall not extend more than 26.200 m forward of the **stern plane**.

5.5 The overall beam of the **AC72 Yacht,** in **measurement condition** and with all components in the position that yields the maximum beam measurement, shall not exceed 14.000 m. **Appendages**, in any and all positions, shall not exceed the maximum permitted overall beam. Conventional tillers, tiller extensions and winch handles may exceed the maximum overall beam. Beam shall be measured between vertical planes at the transverse extents of the **AC72 Yacht** parallel to the **yacht centerplane**.

5.6 Excluding the **wing**, **soft sails** (and associated hardware), **rigging**, **rudders**, **daggerboards**, instrumentation, and ACRM-mandated equipment, an **AC72 Yacht** shall have no component that is more than 2.600 m above **MWP** that:

(a) has a chord length/thickness ratio greater than 3:1; and

(b) makes an angle of greater than 10 degrees to **MWP.**

5.7 The **inboard beam waterline** shall be not less than 11.500 m.

5.8 With **rudders**, **daggerboards** and any other component in their lowest possible positions, no part of an **AC72 yacht** in **measurement condition** shall extend more than 4.400 m below **MWP** (“draft”).

5.9 The sum of the distance from **MWP** to the **wing rotation point**, and the distance from the **wing rotation point** to C12 (per appendix D) measured parallel to the **wing** datum, shall not be greater than 40.000 m.

5.10 The **sailing weight** shall be between 5700 kg and 5900 kg.

5.11 The **sailing weight** in rule 5.10 includes an estimated weight for permanently mounted ACRM equipment of 180 kg, not including ACRM equipment in the **wing**. If the weight of this ACRM equipment exceeds or is less than 180 kg, the **Measurement Committee** may adjust the permitted **sailing weight** range as permitted by rule 4(a) to correct for the difference.

5.12 An **AC72 Yacht** shall be capable of being assembled and disassembled by a **Competitor** as follows:

(a) within 24 hours, **wings** shall be disassembled and packed in shipping boxes of the

following outside dimensions:

(i) one box of 20.000 m x 5.000 m x 2.500 m;

(ii) additional boxes that will collectively fit within 5.000 m x 1.500 m x 19.000 m no one of which shall be larger than 5.000 m x 1.500 m x 9.500 m;

(b) within the same 24 hours, **hulls** and **cross structure** shall be disassembled and packed in shipping boxes of the following outside dimensions:

(i) two of 22.500 m x 2.500 m x 2.000 m;

(ii) two of 14.500 m x 1.500 m x 1.250 m;

(c) within 48 hours**,** from packed in the foregoing shipping boxes to assembled and ready to sail.

Competitors shall satisfy the **Measurement Committee** that they are capable of meeting these requirements. If the **Measurement Committee** has doubt as to the ability of a **Competitor** to comply with the time constraints of this rule, they may require the **Competitor** to demonstrate compliance by disassembling and reassembling the **AC72 Yacht.**

5.13 When in **measurement condition**, **AC72 Yachts** shall be capable of being weighed by a single load cell and, when lifted, shall be approximately horizontal.

5.14 Devices in, on or near the surface of any **hull**, **rudder** or **daggerboard**, the purpose or effect of which is or could be to bleed off or alter the water or air flow of the boundary layer, are prohibited, including (but not limited to) holes in surfaces, textured surfaces, riblets, Large Eddy Break-Up Devices (LEBUs), and compliant surfaces. Normal through-**hull** fittings (such as self-bailers, drains, boatspeed transducers, weed-removal devices) are permitted. Attention is drawn to rule 9.10.

5.15 Electric, magnetic, sonic, thermal, chemical and other methods, the purpose or effect of which is to reduce the surface drag of the water or air in the boundary layer of any **hull**, **daggerboard**, **rudder, soft sail** or **wing**, are prohibited. See the specific exception for the surface treatment of **daggerboards** in rule 17.3.

5.16 Gases with a density less than standard atmosphere air shall not be used to reduce the weight of an **AC72 Yacht.**

6. HULLS

6.1 Other than **soft sails** and **rigging**, no component shall extend forward of the **stem plane** within 1.000 m of the **hull centerplane**.

6.2 Water, the weight of which could increase performance, shall not be retained in the bilge, any recess, or other volume. Any recess in the **hull** capable of retaining water at any heel angle less than 25 degrees or at any trim angle less than 10 degrees relative to **MWP** must be self draining with the size of the drain at least 0.006 m^2 per 1.0 m^3 of the recess volume that could contain water in **measurement condition**.

6.3 No part of a **hull** shall be adjusted or trimmed.

6.4 **Hulls** and/or **cross structure** shall not move relative to each other. This rule does not limit

normal movement or deflections caused by sailing loads but prohibits devices that allow non-linear movement.

6.5 The intersection of any **hull** with **cross structure** or **rigging** shall be at least 1.000 m forward of the **stern plane,** and shall be no further forward than the forward watertight bulkheads required under rule 6.12.

6.6 The intersection of the **hull centerplane** and the **stern plane** shall be no greater than 10 degrees from vertical.

6.7 Each **hull** shall be designed to be symmetrical and shall be symmetrical, within +/- 0.005 m, about its **hull centerplane** except **hull** surface that is:

(a) between transverse planes 1.000 m forward and 13.000 m forward of the **stern plane** that is also 0.400 m or more above **MWP** as shown in Appendix C;

(b) within 0.250 m radius from the axis of rotation of the rudder and

(c) an area on the surface of the hull not exceeding 1.000 m longitudinally by 0.400 m transverse girth within which a **daggerboard** opening is wholly contained and

(d) for local reinforcement necessary for fittings.

6.8 Between 1.000 m forward of the stern plane and 13.000 m forward of the stern plane the highest point of any transverse section through the **hull** surface, outboard of the **hull centerplane**, shall be no lower than a line joining a point 0.950 m above **MWP** at 1.000 m forward of the **stern plane**, to a point 1.100 m above **MWP** at 13.000 m forward of the **stern plane**.
See Appendix C.

6.9 The enclosed volume of the outside surface of each **hull** shall be not less than:

(a) 5.5 m^3 forward of a plane 13.000 m forward of the **stern plane**; and

(b) 8.5 m^3 aft of a plane 13.000 m forward of the **stern plane**.

For the purposes of this rule, "outside surface" refers to the watertight boundary of the **hull** bridging any hatches or permitted openings other than the **daggerboard** cases.

6.10 The **hull** between the **stem plane** and a plane between 0.900 m and 1.000 m aft of the **stem plane**, and the **hull** between the **stern plane** and a plane between 0.900 m and 1.000 m forward of the **stern plane,** shall be replaceable by “replacement sections” as follows:

(a) each **Competitor** shall have at least one forward replacement section and at least one aft replacement section available for use at the start of a regatta;

(b) the **Competitor** shall notify the **Measurement Committee** before any replacement section is installed; and

(c) an **AC72 Yacht** fitted with a replacement section must still comply with the **AC72 Class Rule**.

6.11 **Hull** surfaces that the crew operate from in their normal sailing positions, including cockpit soles, shall be no lower than a plane 0.300 m above **MWP**.

6.12 Two watertight bulkheads shall be located in each **hull**, and they shall fall entirely between:

(a) 1.000 m and 1.500 m aft of the **stem plane,** and

(b) 1.000 m and 1.500 m forward of the **stern plane**.

6.13 Hatches are permitted in the **hull** provided they shall:

(a) be closed by a cover permanently attached to the **hull** by hinges, slides or similar arrangement;

(b) be watertight, meaning a closed hatch shall prevent the ingress of water from a garden hose applied from any direction;

(c) meet the **hull** construction requirements in rule 14 or shall be compliant with ISO 12216, Area II, Design Category C; and

(d) be at least 0.600 m above **MWP**.

6.14 Ports for hand access are permitted, provided each does not exceed 0.100 m^2 and is secured by a watertight cover.

6.15 Small openings in **hulls** for **rigging** to pass through, and for attachments, are permitted provided they shall:

(a) be no larger than required for their specific task;

(b) have a rubber gaiter boot or other means of closing the opening if the area exceeds 0.005 m^2;

(c) shall be no further forward than 13.000 m forward of the **stern plane**; and

(d) be at least 0.700 m above **MWP**.

7. CROSS STRUCTURE

7.1 **Cross structure** or fittings attached to **cross structure** shall be no further aft than 1.000 m forward of the **stern plane,** except non-structural aerodynamic beam fairings that serve only as such and comply with rule 7 provided they extend no further aft than the **stern plane**. For purposes of this rule, a beam fairing is considered non-structural if its addition adds less than 1% to the strength and/or stiffness of the beam.

7.2 No part of **cross structure,** including fairings or other surfaces, shall move (translate or rotate about any axis) or be adjusted relative to any other part of the **cross structure**, except for normal deflections caused by sailing loads.

7.3 Any recess in the **cross structure** capable of retaining water at any heel angle less than 25 degrees or at any trim angle less than 10 degrees must be self draining, with the size of the drain at least 0.006 m^2 per 1.00 m^3 of the recess volume that could contain water in **measurement condition**.

7.4 No part of the **cross structure** shall be laminated or bonded to the **hulls**;

7.5 No part of **cross structure** or its fittings, external to any **hull,** shall be less than 0.150 m above **MWP** or greater than 2.400 m above **MWP**.

8. RUDDERS

8.1 Each **hull** shall have one **rudder**. The **rudder** or **rudder** stock shall penetrate the **hull**.

8.2 No part of a **rudder**, through its entire range of motion, shall be less than 1.000 m or greater than 3.000 m forward of the **stern plane.**

8.3 **Rudders** shall rotate only, and that rotation shall be about a single axis which is within 10 degrees of vertical. This rule does not prohibit the use of self-aligning **rudder** bearings.

8.4 **Rudders** shall not translate in any direction.

8.5 **Rudders** (including **rudder** stocks) shall not exceed 5.000 m in any direction, measured along a straight line.

8.6 **Rudders** shall not have components such as trim tabs or moveable winglets, that can be adjusted while racing. However, a movable or retractable device whose sole purpose is the removal of weed or debris is permitted.

8.7 While an **AC72 Yacht** is moored, **rudders** shall be capable of:

(a) freely rotating through 360 degrees; or

(b) being removed. Only equipment that is intended to be aboard the **AC72 Yacht** while racing, or other equipment that is capable of being lifted aboard the **AC72 Yacht**, and operated, by no more than two crew, shall be considered in determining compliance with this requirement.

9. DAGGERBOARDS

9.1 Each **hull** shall have one **daggerboard**.

9.2 **Daggerboards** shall penetrate the **hull** forward of the **rudder** and aft of the forward watertight bulkhead per rule 6.11.

9.3 The maximum dimension of any **daggerboard** shall be 7.000 m in any direction, measured along a straight line.

9.4 The lowest load-transferring bearing shall not translate relative to the hull.

9.5 A **daggerboard** shall not translate longitudinally more than 0.020 m within the bearing referred to in 9.4 above.

9.6 **Daggerboards** shall not have components such as trim tabs or moveable winglets that can be adjusted while racing; however, a movable or retractable device the sole purpose of which is the removal of weed or debris is permitted.

9.7 At all times when racing, **daggerboard** cases or trunks shall effectively drain within ten seconds of the hull being lifted above the water level, and shall not be designed to retain water when not immersed.

9.8 Fairings are allowed within the area defined in 6.7(c); they shall not be controllable and shall move only passively as the result of the permitted movement of **daggerboards** and their bearings. Attention is drawn to rule 5.14.

9.9 **Daggerboards** shall not be designed or used to generate force for the purpose or effect of increasing righting moment when used on the windward side of an **AC72 Yacht**.

9.10 When fully retracted, **daggerboards** shall extend no more than 0.500 m below **MWP**.

10. WING

10.1 The **wing** shall be designed to be symmetrical about the **wing centreplane** in **wing measurement position** and shall be symmetrical about the **wing centerplane** within a tolerance of 0.020 m in **wing measurement position**.

10.2 **Wing** Canting limitations:

(a) Shrouds shall be attached to the **wing** within 6.000 m of **Hoist Point B**, to the hulls or cross structure at a distance greater than 5.500 m from the **yacht centerplane**, and have an EA no less than 15MN

(b) The port and starboard shrouds referred to in 10.2(a), if adjustable, shall be connected in a master-slave relationship so they always have the same extension and attachment.

(c) An **AC72 Yacht** shall satisfy one of the following options:

(i) OPTION 1

(a) With the **wing** stepped and the yacht otherwise in **measurement condition**, the shrouds referred to in 10.2(a) and forestay between **Hoist Point B** and **Tack Point B** shall be set so that the port and starboard shrouds each have at least 5000N of tension with the forestay at its minimum adjustable length.

(b) These shrouds shall not be adjusted while racing and this forestay shall not be capable of more than 100mm of adjustment while racing, The forestay shall remain attached at **Hoist Point B** and **Tack Point B** and shall have an EA no less than 30 MN.

(ii) OPTION 2

With the **wing** stepped and the yacht otherwise in **measurement condition**, the shrouds referred to in 10.2(a) and forestay between **Hoist Point B** and **Tack Point B** shall be configured so that the port and starboard shrouds each have at least 5000N of tension through the full range of rake with the **wing** stepped and the yacht otherwise in **measurement condition**. The yacht shall race with the same configuration(s) as was demonstrated to determine compliance with this option. The forestay shall remain attached at **Hoist Point B** and **Tack Point B** and have an EA no less than 30 MN.

(iii) OPTION 3

The yacht, while racing, shall maintain tension on the windward shroud referred to in 10.2(a) greater than 2500N (based on a 10 second moving average). Compliance with this option shall be capable of being demonstrated in a manner acceptable to the **Measurement Committee**. This requirement does not apply prior to starting; within 30 seconds of

tacking or gybing; within 300m of a mark; when taking a penalty; when lowering or furling a **soft sail**; or when sailing above an upwind proper course and when sailing below a downwind proper course.

10.3 Further to Protocol Article 29.6, the **Wing Spar** shall be capable of being disassembled into two separate sections. The lower **Wing Spar** section shall be at least 18.000 m, and no more than 19.900 m in length. For the purposes of this rule, fittings shall not be considered part of the **Wing Spar**.

10.4 The **AC72 yacht** shall have a single **wing rotation point** that shall be:

(a) within 0.020 m of the **yacht centerplane**;

(b) located on the plane of symmetry of the **wing** in **wing measurement position**; and

(c) between 1.900 m and 2.400 m above **MWP.**

10.5 A **wing** measurement grid shall be established per Appendix D. The **wing**, with all movable measured **wing** surfaces oriented symmetrically about the **wing centerplane**, shall be placed over the grid with its leading edge facing "forward" as shown in appendix D, with the **wing centerplane** parallel to the grid surface. The top of the **wing** shall be positioned at C12, and the perimeter line of the **wing** shall lie between the **wing** outline inner and outer extents.

10.6 The total area enclosed within the perimeter line of the **wing** in **wing measurement position** shall not be greater than 260.00 m^2 nor less than 255.00 m^2.

10.7 The total enclosed area shall be calculated using the chord length measured at the reference chords between Appendix D C1 and C11 and integrated using Simpson's rule. **Wing** areas above C11 and below C1 shall be measured and included in the total **wing** area (see Appendix D). The perimeter line shall:

(a) be taken as a line drawn around the largest extent of the measured area of the **wing**;

(b) not have hollows (except for hollows created by fittings and local reinforcements) in its forward-most edge, and hollows elsewhere shall be bridged by the perimeter line; and

(c) not include **wing** components used to connect the **wing** to the **wing rotation point** provided the components do not have a chord length/thickness ratio greater than 3:1 and do not provide unmeasured **wing** area; and

(d) elements with a measured girth of less than 0.150 m shall not be included in the area calculation provided such elements do not increase the effective **wing** area.

10.8 If, in the opinion of the **Measurement Committee**, the **wing** area is not accurately measured by this method, they may devise and use another method.

10.9 The half-girth of the convex side of the **wing** in any chordwise plane, parallel to the **wing base plane**, shall not increase more than 1.85% in any cambered orientation from its half-girth in **wing measurement position** (see Appendix D). The maximum measured girths shall be limited by a mechanical system to the satisfaction of the **Measurement Committee**.

10.10 When the **wing** is in **wing measurement position**, and when viewed perpendicular to the **wing base plane,** the projected area of the wing, taken as the projected silhouette of all components, excluding rigging:

(a) above C10**,** shall not exceed 2.25 m^2; and

(b) below 2.000 m above the **wing base plane,** shall not exceed 5.50 m^2.

10.11 The leading edge of the **wing** shall be straight (within a tolerance of 0.003 m) below grid C3.

10.12 The weight of the **wing** in **wing measurement condition** shall be not less than 1325 kg, and the center of gravity shall be not less than 16.250 m above the **wing base plane**.

10.13 **Wing** weight and center of gravity in rule 10.12 includes a weight allowance for permanently-mounted ACRM media equipment of 21.5 kg at 22.000 m above the **wing base plane**. If the weight and center of gravity of ACRM media equipment varies from this, the **Measurement Committee** may adjust the required **wing** weight and center of gravity.

11. RIGGING

11.1 **Rigging**, including any **rigging** fairings, shall have:

(a) a chord length/thickness ratio no greater than 3:1;

(b) a girth no greater than 0.150 m except within 0.750 m of a **rigging** termination point or point of attachment of the **rigging** to the **hull**(s), **cross structure**, or **wing**.

12. SOFT SAILS

12.1 **Hoist Points**:

(a) **Hoist Point A** shall be between 36.000 m and 37.000 m above the wing base plane; and

(b) **Hoist Point B** shall be between 34.000 m and 35.500 m above the wing base plane.

(c) At all times when racing, the intersection of the **wing** and the **luff** of the **soft sail** (or extension thereof), and/or the centerline of a stay used to support the **luff** of a **soft sail**, (or extension thereof) shall fall between the limits of the relevant **Hoist Point**.

(d) Multiple halyards are permitted at each **hoist point**, provided they fall below the permitted **hoist point** and the requirements of 12.1(c) above are met.

12.2 **Tack points** shall be:

(a) for **Tack Point A,** not forward of 26.000 m from the **stern plane**, and not forward of a point that would result in a JA measurement, per rule 12.4, greater than 13.000 m;

(b) for **Tack Point B,** not forward of 22.000 m from the **stern plane**, and not forward of a point that would result in a JB measurement, per rule 12.4, greater than 9.000 m;

(c) defined at each **tack point** as the forwardmost of the attachment point of the **tack** to the top of the **cross structure**; or the centerline of a stay (if used to support the **luff** of the **soft sail**) where it intersects the top of the **cross structure**.

(d) between 1.900 m and 2.200 m above **MWP**; and

(e) within 0.030 m of the **yacht centerplane.**

(f) notwithstanding the constraints on **measurement condition** specified in Rules 25.1 and 25.2, a removable temporary device whose sole purpose is to support longitudinal centerline element(s) of the **cross structure** against the bobstay in the way of the **tack points** is permitted aboard at the time of measurement. The load applied by this temporary device shall be no greater than required to remove slack from the bobstay. The effect of this device on the weight, sink and trim of the **AC72 yacht** shall be tared out by hydrostatic calculations provided to and confirmed by the **Measurement Committee**. All details of this support device shall be submitted to the **Measurement Committee** for review. The judgment of the **Measurement Committee** shall be final in determining whether any such arrangement complies with the wording and intent of this rule.

12.3 No **soft sail** shall be set so that its **head** is above its **hoist point** or so that its **tack** is below its **tack point**.

12.4 In determining **JA** and **JB**, the measurer shall transfer the point defined by the intersection of C1 and the leading edge of the **wing** (excluding any fitting), in **wing measurement position**, to the **cross structure** (using the **wing rotation point** as a reference and aligning **MWP** and the **wing base plane**). The horizontal distance between that point and **Tack Point A** is **JA**, and between that point and **Tack Point B** is **JB**.

12.5 Jibs:

(a) shall not be tacked forward of **Tack Point B**;

(b) shall be flown within the region allowed for **Hoist Point B**;

(c) shall have an **LP** measurement no greater than 9.54 m;

(d) shall have a three-quarter width (measured as the shortest distance between the three-quarter **leech** point and the **luff**) no greater than 41% of the LP;

(e) shall have a width at the **head** not exceeding 20% of the LP;

(f) may have battens;

(g) shall have no battens below a line joining points 1.00 m above the **clew** and 1.00 m above the **tack**.

12.6 Code zeros:

(a) shall not be tacked forward of **Tack Point A**;

(b) shall be flown within the region allowed for **Hoist Point A** or **Hoist Point B**;

(c) shall have an **LP** measurement no less than 11.27 m and no greater than 12.77 m; and

(d) shall not have battens.

12.7 Gennakers:

(a) shall not be tacked forward of **Tack Point A**;

(b) shall be flown within the region allowed for **Hoist Point A**;

(c) shall have an **LP** measurement no less than 14.00 m; and

(d) shall not have battens.

12.8 Other than as required for **soft sail** hardware, intentional openings in **soft sails** are prohibited.

12.9 Local hollows or distortions in the way or measurement points on the edges of **soft sails** shall be bridged or ignore when making all measurements.

12.10 **Soft sails** shall have no more than eight battens, and battens shall be no closer than 0.50 m to each other at any point.

12.11 Artificially thickened **soft sails** are prohibited, e.g., foamed **soft sails**, rigid **soft sails**, or multiple-surface **soft sails**, whether inflated by the action of the wind or otherwise, except for battens, batten pockets, and **luff** attachment devices as provided in rules 12.12 and 12.14.

12.12 Battens:

(a) shall pass through a 0.075 m diameter circle;

(b) may consist of multiple elements that need not necessarily be attached to one another, provided the batten is fitted within a single, continuous batten pocket, and provided the multi-element array complies with (a) above and all other limits of this rule;

(c) shall not have a permanent bend or set, within a tolerance of 0.100 m over their entire length;

(d) shall not be adjusted while the **soft sail** is set;

(e) shall not be inflatable;

(f) shall be inside a pocket not exceeding 0.20 m in internal width measured normal to the longitudinal axis of the batten; and

(g) shall be oriented not less than 30 degrees to the local **luff**, with the centerline of the batten projected to the **luff** if necessary

12.13 The dimension of any **soft sail** hardware, in any direction, shall not exceed 0.750 m for a **clew** board, or 0.250 m for any other hardware.

12.14 Any **soft sail** may be attached to **rigging** along its **luff**, provided:

(a) discontinuous **luff** attachment devices (hanks) shall measure no more than 0.075 m parallel to the **luff** and 0.120 m perpendicular to and forward of the **luff**;
.

(b) continuous **luff** attachment devices (**luff** pockets) shall have an internal width no more than 0.180 m measured perpendicular to the **luff**, and shall be no thicker than required for their attachment function; and

(c) no **luff** attachment or **luff** support device shall be used to increase effective **soft sail** area.

(d) For the measurement of **LP**, the forward edge of the **soft sail** shall be taken as the forward edge of a closed **luff** pocket, or as the forward edge of any discontinuous **luff** attachment device (or projection thereof parallel to the **luff**) when such devices are closer than 1.00 m to each other at any point along the **luff** except within 1.000 m of the **head** or **tack**. Attention is drawn to rule 12.9.

12.15 No device shall control a **soft sail** except:

(a) sheets on the **clew** or **clew** board to sheeting points on the **hull** or **cross structure**;

(b) a cunningham system near the **tack**;

(c) **leech** and **foot** lines no greater than 0.010 m in diameter;

(d) a furling system;

(e) a tacking line on or near the **foot**, the purpose of which is to bring the **clew** of the **soft sail** forward during a tack or gybe, provided the tacking line is not used to sheet the **soft sail** in any way;

(f) halyards;

(g) secondary control devices on sheets, such as barber haulers; and

(h) sail ties or similar devices.

SECTION C

13. GENERAL LIMITS ON MATERIALS AND CONSTRUCTION

13.1 Limits on materials and construction methods in rule 13 apply except where altered by rules 14 through 17.

13.2 A maximum of 40 kg of **FRP** constituent parts from commercially available ex-stock material (e.g. tube, plate, etc.) may be used in the construction of the **AC72 Yacht**, provided that no single constituent part exceeds 10 kg. These constituent parts are not limited by the building methods otherwise set out in **AC72 Class Rule**.

13.3 Boron and Beryllium are prohibited except when used as an alloy in concentrations of less than 0.00042%.

13.4 The use of electron beam or any other non-thermal radiation cure of composites is prohibited. This does not prohibit the use of conductive heating with electrical current for the cure of composites.

13.5 Sandwich construction techniques are permitted. Any component materials used in the manufacture of core shall have a modulus in any direction not exceeding 75 GPa, and shall only be composed of aluminum honeycomb, meta-aramid (Nomex) honeycomb, timber or foam.

13.6 The temperature of **FRP** components, other than **soft sails**, shall not exceed 135 degrees Celsius at any time during construction and post construction.

13.7 No **FRP** component shall have **fiber modulus** greater than 395 GPa.

13.8 Isotropic materials shall have elastic modulus less than 220 GPa.

13.9 Pressure applied at any time during construction to **FRP** components, other than **soft sails**, shall not exceed 7 atmospheres, but this limitation shall not prohibit building methods including the use of clamps or mechanical fastenings, wrapping, and winding etc.

13.10 Materials with elastic modulus exceeding that specified in **AC72 Class Rule** may be used provided:

(a) the largest dimension of each particle does not exceed 1 micron; and

(b) the total weight of these materials used in any composite component does not exceed 1.0% of the weight of that composite component.

14. HULL LIMITS ON MATERIALS AND CONSTRUCTION

14.1 No **FRP** in the **hull** and its internal structure shall have **fiber modulus** greater than 245 GPa.

14.2 **Hulls** and its internal structure shall not have pressure applied at any time during construction that exceeds one atmosphere, but this limitation shall not prohibit building methods including the use of clamps or mechanical fastenings, wrapping, and winding, etc.

14.3 Skin weight of any external **hull** surface shall be not less than 0.900 kg/m^2, including fiber and resin but excluding any paint, fairing, core bond adhesive, core, and any other constituent material. This limit applies to all areas of the **hull** that are exposed to the sea and/or weather.

14.4 Core of the hull or watertight bulkheads as per rule 6.11, shall not have a density less than 50 kg/m^3.

14.5 Skin weight on each side of watertight bulkheads required by rule 6.12, shall be not less than 0.900 kg/m^2, including fiber and resin but excluding paint, fairing, core bond adhesive, core and any other constituent material. Core thickness for these bulkheads, excluding any bonding materials, shall be no less than 0.015 m.

15. TRAMPOLINE

15.1 Trampolines shall be fixed to the **hulls** and **cross structure**, and shall:

(a) be strongly secured with regular spacing on their support edges; this spacing shall not be greater than 1.000 m when tensioned but without supporting the weight of crew or **soft sails**; gaps between the trampoline and the **hulls** or **cross structure** shall not be greater than 0.200 m when tensioned but without supporting the weight of crew or **soft sails**;

(b) be able to support local loadings equivalent to the weight of the crew and **soft sails** in normal working conditions at sea;

(c) cover all open areas between the **hulls** from the **wing rotation point** aft to the aft extent of **cross structure**;

(d) cover all open areas in a triangle with a base of a 3.000 m transverse line centered on the **wing rotation point** forward to an apex of **Tack Zone B**.

(e) be constructed of a netting of rhombus-shaped cells, of a size such that a cylinder with a diameter of 0.050 m shall not easily pass through any cell of the netting while tensioned; or, be constructed of NET Systems Ultra Cross Silver™ netting of nominal mesh size 0.050 m or less meeting the requirements of (f) and (g) below;

(f) have a minimum twine diameter of 2.7 mm; and

(g) be made of material with a fiber modulus not greater than 135 GPa;

16. HARDWARE AND RIGGING LIMITS ON MATERIALS AND CONSTRUCTION

16.1 Hardware and fittings shall be constructed of wood, polymer, aluminum alloys, **FRP**, titanium, or steel and steel alloys, bronze, brass or a combination thereof.

16.2 **Rigging** shall be constructed of steel, aluminum, bronze, brass, polymer or fibrous materials (carbon, aramid, or polymer fibers that have a fiber modulus not greater than 395 GPa), or a combination thereof.

17. SURFACE FINISHES AND BOUNDARY LAYER INTERFERENCE

17.1 Only paint systems generically specified as two-component linear polyester saturated aliphatic polyurethane, two-component epoxy urethane, or two-component acrylic urethane, and manufactured by International, Awlgrip, Akzo Nobel or Resene, may be used as the outermost surface finish of the **hulls, appendages,** and immersed components such as fairings. No materials other than specified manufacturer-supplied retardants, accelerants, thinners and pigments shall be added. Similarly, the specific gravity of the paint shall not be altered with any material other than those specified above. The **Measurement Committee** may authorize the use of comparable paint products from other manufacturers provided those products meet comparable requirements for product standardization, compliance, and testing.

17.2 The application of vinyl, mylar or other plastic film over the surface of the **hull** for advertising or branding is allowed, provided that the film shall not be specially textured or otherwise manufactured in a way that could improve the character of the flow of water inside the boundary layer.

17.3 The outermost surfaces of the **hulls** or **appendages** may be sanded and cleaned with normal concentrations and quantities of detergents or similar materials. However, while afloat on a scheduled race day, no substances shall be present on the outermost surfaces of the **hull, appendages** or immersed components such as fairings other than those permitted in the rule. Exceptionally, small quantities of friction-reducing compounds (for example, McLube) may be applied only to the surface of **daggerboards** prior to racing, and solely for the purpose of reducing bearing friction while raising and lowering the **daggerboards**. A **Competitor** shall seek the approval of the **Measurement Committee** for the type and quantity of friction-reducing compounds to be used for this purpose.

SECTION D

18. CREW

18.1 There shall be eleven crew (unless reduced while racing due to accident or injury), and the total crew weight shall not be greater than 1012 kg nor less than 957 kg. Crew are to be weighed in light shorts only. If eleven crew members do not reach minimum crew weight, then corrector ballast in the form of lead shall be added to the **AC72 Yacht** to reach 957 kg. Corrector ballast shall be fixed in position while racing, and shall be located within 2.000 m of the longitudinal position of the **Wing Rotation Point**;

18.2 While racing, crew shall not be inside the enclosed volume (as per Rule 6.9) of a **hull** except during emergencies or briefly to perform inspections.

19. MANUAL POWER AND STORED ENERGY

19.1 Only manual power (the force exerted by crew) or the effect of direct contact with wind and/or water shall be used for the adjustment of **rigging**, **wing**, **soft sails**, **rudders** and **daggerboards**.

19.2 The use of stored energy and non-manual power is prohibited, except:

(a) for small springs, shockcord, and similar devices;

(b) low pressure hydraulic or gas accumulators of less than 6 bar which provide back pressure to a hydraulic system to prevent cavitation, but do no significant work themselves;

(c) batteries to power electric bilge pumps, provided the total capacity of all pumps is not greater than 200 l/min; and

(d) batteries to power instruments, on board crew communication and ACRM media equipment; and

(e) for electrical operation of

(i) hydraulic valves. These operations shall only provide the input for the position of the valve;
(ii) drive clutches in winch systems.

The valves and drive clutches referred to in (i) and (ii) above, shall be commercially available and Competitors shall have had these approved by the Measurement Committee for use via an issued interpretation.

The operation for (i) and (ii) above, shall not receive external input from any source other than manual input. Any data acquisition system, associated sensors or electronics shall be physically separate and completely isolated from any electrical

operation referred to in (i) and (ii) with the exception of the voltage supply. The manual input may latch the valve(s) or clutch(es), operate multiple valves or clutches, and /or provide variable position. Valves and clutches may be operated from multiple manual inputs.

These systems may be hard wired directly between the manual inputs and shall be hard wired between the manual inputs and the valve(s) or clutch(es). Wiring shall be clearly identifiable. Electrical energy used for this shall only be stored in batteries, including small capacitors.

20. AC72 YACHT IDENTIFICATION AND CLASS INSIGNIA

20.1 **AC72 Yacht** identification numbers shall be allocated sequentially by the **Measurement Committee**, except numbers that may be culturally objectionable may be skipped at the discretion of the **Measurement Committee**. When an **AC72 Yacht's** ownership is transferred, it shall retain the same identification number.

20.2 A new identification number (in sequence) may be reserved by a team when construction of an **AC72 Yacht's hull** has commenced.

20.3 A new identification number shall be issued to the **AC72 Yacht** when its original measurement certificate is issued, or when otherwise required by the **Protocol**.

SECTION E

21. MEASUREMENT MARKS

21.1 The **Measurement Committee** may place measurement marks on **AC72 Yachts**. Such marks include, but are not limited to, reference screws or punch marks, measurement bands on spars, and **measurers**' signatures and/or seals or stickers on any component.

21.2 Measurement marks of any type placed or otherwise confirmed by a member of the **Measurement Committee** shall not be moved, removed, altered, or replaced without their written permission.

22. DECLARATIONS

22.1 **Competitors** shall provide the **Measurement Committee** declarations signed by the relevant designer(s), builder(s) and **Competitor's** representative affirming that:

(a) **hull(s)** have been constructed from materials (including surface finishes) and using the methods permitted by the **AC72 Class Rule;**

(b) **cross structure** has been constructed from materials and using the methods permitted by the **AC72 Class Rule;**

(c) **rudders** and **daggerboards** have been constructed from materials (including surface finishes) and using the methods permitted by the **AC72 Class Rule;** and

(d) the **wing** and **rigging** have been constructed from materials and using the methods permitted by the **AC72 Class Rule.**

The form of this declaration shall be as shown in **AC72 Class Rule** Appendix B. The **Measurement Committee** may require additional declarations of a similar form to confirm compliance with any other aspect of the **AC72 Class Rule**.

22.2 **Competitors** shall provide a material usage schedule and the material manufacturer's certificate of compliance for **FRP** used in each component described in rule 22.1 to the **Measurement Committee**. However, documentation is not required for wet-laminate **FRP** materials used in the construction of any component, provided that the total quantity of wet-laminate **FRP** is less than 5% by weight of the total **FRP** materials used in the construction of that component. Nonetheless, wet-laminate **FRP** mechanical properties shall comply with the **AC72 Class Rule** governing the component. Details of the documentation required shall be published by the **Measurement Committee** per rule 24.1.

23. INSPECTION AND MEASUREMENT

23.1 **Competitors** shall permit and assist all inspections and measurements by a **measurer** and the **Measurement Committee** and shall afford all reasonable facility to carry out such measurements and inspections, including during construction. **Competitors** shall provide measurement information reports to **measurers** as requested.

23.2 The **measurer** shall take at least four hull laminate samples per hull no larger than 0.065 m in diameter from a location of their choosing.

23.3 The **Measurement Committee** reserves the right to take samples of the paint or vinyl from the **hull** and/or **appendages** for analysis by the manufacturer to ensure that only the specified paint systems have been used

23.4 An **AC72 Yacht** may be re-measured in whole or in part at the discretion of the **Measurement Committee.**

23.5 A **measurer** who becomes aware that a **Competitor** may have failed to comply with any **AC72 Class Rule** shall advise the **Measurement Committee**.

23.6 The specific gravity of the seawater shall be measured and recorded at the time of measurement afloat. When specific gravity of the water varies from 1.025, the **measurer** shall correct floatation measurements as necessary;

23.7 Weights shall be corrected for local gravitational effects to the geographic datum of San Francisco, California, USA..

23.8 When carrying out measurement ashore, the **measurer** shall allow a reasonable time to drain water from the **AC72 Yacht** equipment and allow the substitution of wet **rigging** with equivalent dry **rigging**.

24. MEASUREMENT PROCEDURES

24.1 Measurement equipment specifications and measurement methodology are determined by the **Measurement Committee** and will be available to all competitors.

25. MEASUREMENT CONDITIONS

25.1 The **AC72 Yacht** shall be brought to **measurement condition** to determine the **measurement weight**. The **measurement condition** includes everything aboard the **AC72 Yacht** during a race except the following:

(a) the **wing** as it was weighed in **wing measurement condition**;

(b) ACRM personnel, guests and ACRM equipment that is not permanently installed on the **AC72 Yacht**;

(c) crew;

(d) crew clothing and equipment that is normally carried on the person while racing but limited to a maximum of 6.00 kg per crewmember;

(e) **soft sails** (including **soft sail** bags, luff cables and hanks) ; and

(f) food and drinks.

25.2 **MWP** shall be determined when the **AC72 yacht** is floating in **measurement condition** and:

(a) all movable equipment is approximately centered, transversely and 11.000 m forward of the **stern plane**;

(b) **rudders** and **daggerboards** shall be in their lowest possible positions (per rule 5.8);

(c) **rudder** and **daggerboard** cases shall be flooded to **MWP**, and net total flooded volume of all cases combined shall be no greater than 50.0 liters; and

(d) no other part of the **AC72 Yacht** shall be flooded.

25.3 The **wing** in **wing measurement condition** shall**:**

(a) be capable of being weighed by horizontal suspension from no more than two points;

(b) be oriented as per **wing measurement position**;

(c) include all **rigging**, spreaders, jumpers and jumper systems, diamonds, all backstays, runner fly blocks (but excluding runner tails), check stays, instruments, instrument sensors, cameras, cables, permanently-installed ACRM media equipment, hydraulic rams, and pipework;

(d) include all wing fittings required to sail the yacht, including mast jacks if an integral part of the wing, halyard locks, spreader fittings;

(e) exclude all halyards, however, halyards may be replaced with light weight mouse lines not exceeding 0.004 m diameter;

(f) have all **rigging** in place and pulled down tight along the **wing**; and

(g) be the configuration which achieves the lowest center of gravity.

25.4 Any component that remains attached to the **wing** when the **wing** is removed from the **AC72 Yacht** is deemed to be part of the **wing** for measurement purposes, and equipment (including halyards) not weighed, as part of the **wing** weight and center of gravity shall be included in the **measurement weight.**

26. COMPLIANCE WHILE RACING

While racing**:**

(a) the **sailing weight** of the **AC72 Yacht** shall not be less than the **sailing weight** on its certificate, nor more than 100 kg greater than the **sailing weight** on its certificate;

(b) dead weight, ballast, **soft sails** and other equipment shall not be moved for the purpose of changing trim or stability; however, bilge water shall be promptly removed;

(c) no more than three **soft sails** are allowed on board, at least one of which shall be a jib. The total weight of **soft sails** on board (including **soft sail** bags, **luff** cables, **luff** attachments, battens, and **soft sail** hardware) shall not exceed 250 kg. No **soft sail** bag shall exceed 12 kg in weight, and no more than one **soft sail** bag shall be carried for each **soft sail** on board. **Soft sail** bags shall not be designed to retain water;

(d) and the total weight of consumable stores shall be not greater than 20 kg.

27. MEASUREMENT CERTIFICATE

27.1 When the **Measurement Committee** concludes that the **AC72 Yacht** complies with the **AC72 Class Rule**, having successfully completed all the measurement checks and compliance inspections requested by the **Measurement Committee**, and the **Competitor** having supplied all the requested documentation and declarations, it shall issue to the **Competitor** a measurement certificate as in Appendix A and shall retain a copy for its own records. The **Measurement Committee** shall provide a copy of the front page to the **Regatta Director** for public dissemination.

27.2 Except for repair of, or replacement for, unintended damage, the measurement certificate ceases to be valid if there is any change to:

(a) any information recorded on the **AC72 Yacht**'s measurement certificate, except that when not racing the following changes are permitted:

(i) **rudder** or **rudder** stock movement as a result of the adjustment of a self-aligning bearing mechanism, provided that the total adjustment between bearings shall not exceed 0.010 m, and provided that after the movement the **rudder** complies with rule 8;

(ii) changes to **wing** weight and **wing** CG, provided those changes are still within the limits of rule 10.12; and

(iii) changes in **measurement weight** or the distribution of **measurement weight**, provided that **MWP** would not change more than 0.004 m at the **stern plane** or **stem plane**, and provided that after the change, the **AC72 Yacht** still complies with the limits of rule 26(a).

(iv) changes in other numerical values recorded on the measurement certificate that are solely the result of changes permitted in (i), (ii) and (iii) above, provided that all the resultant changes still fall within the limits of the **AC72 Class Rule**.

(b) the shape of the **hull** surface;

(c) the shape of the **appendage** surfaces;

(d) the shape of the **cross structure** (excluding fittings); or

(e) the shape of the measured **wing** surface area in **wing measurement position**.

27.3 **Competitors** shall obtain written approval of the **Measurement Committee** prior to making any repairs or replacements which, individually or cumulatively, could impact on the **AC72 Yacht**'s compliance with her measurement certificate or any other aspect of the **AC72 Class Rule**.

27.4 The **Measurement Committee** will only give written approval to replace an item when they are satisfied that the damaged item cannot be repaired in a reasonable regatta-constrained timeframe.

27.5 After repair or replacement, **Competitors** shall satisfy the **Measurement Committee** that the **AC72 Yacht** complies with the **AC72 Class Rule.**

27.6 The **Measurement Committee** shall withdraw an **AC72 Yacht's** measurement certificate when they have reason to believe it no longer complies with this **AC72 Class Rule**.

27.7 An **AC72 Yacht** shall have only one valid measurement certificate at any one time.

27.8 The **Measurement Committee** shall hold **AC72 Yacht** data and information in strict confidence. This shall not be construed to prevent the **Measurement Committee** from supplying data or information to the **Regatta Director** or the **Jury** if requested, who shall also hold this data in strict confidence.

APPENDICES

APPENDIX A — MEASUREMENT CERTIFICATE

AC72 Yacht
Measurement Certificate

Name of Yacht: _____

Yacht Identification Number: _____

Measurement Certificate Number: _____

Designer(s): _____

Builder(s): _____

Owner(s): _____

VALIDATION

We confirm that this yacht has been measured in accordance with the **AC72 Class Rule**, and has been found to be in compliance with the rule.

Signatures of issuing Measurers: _____

(on behalf of the Measurement Committee)

_____

Date of certification: _____

Supersedes Certificate No. & Date: _____

Certificate Number		Yacht ID number	

General

Overall length (5.3)	m	Max overall beam (5.5)	m
Draft (5.8)	m	Inboard beam waterline (5.7)	m
Wing above MWP (5.9)	m	Measurement weight (25.1)	kg
Sailing Weight (5.10)	kg		

Hulls

P centerplane / stern plane angle (6.6)	deg	S centerplane / stern plane angle (6.6)	deg

Rudders

Designated Rudder Port		Designated Rudder Starboard	
P rudder distance forward (8.2)	m	S rudder distance forward (8.2)	m
P rudder distance aft (8.2)	m	S rudder distance aft (8.2)	m
P straight line distance (8.5)	m	S straight line distance (8.5)	m

Daggerboards

Designated daggerboard Port		Designated daggerboard Starboard	
P straight line distance (9.3)	m	S straight line distance (9.3)	m
P retracted draft (9.12)	m	S retracted draft (9.12)	m

Wing

Designated wing			
Rotation point above MWP (10.4)	m	Max. half girth differential (10.9)	%
wing weight (10.12)	kg	Wing cg (10.12)	m
Wing projected area (10.6(a))	m^2		
		Wing constraint option (10.2(d))	

Sails

Hoist point A (12.1(a))	m	Hoist point B (12.1(a))	m
Tack point A from the stern (12.2(a))		Tack point B from the stern (12.2(b))	
Tack point A above MWP (12.2(d))		Tack point B above MWP (12.2(d))	
JA (12.4)		JB (12.4)	

Measurer:		Signature:	
Measurer:		Signature:	

APPENDIX B — CONSTRUCTION DECLARATIONS

HULL CONSTRUCTION DECLARATION

DESIGNER'S DECLARATION

I, the designer of the yacht _____

declare that the hull has been designed and to the best of my knowledge, built, only from materials, and using building methods, as permitted in the AC72 Class Rule.

Designer (Block Letters) _____

Signature _____ Date _____

BUILDER'S DECLARATION

I, the builder of the yacht _____ declare that the hull has been built only from materials, and using building methods, as permitted in the AC72 Class Rule.

Builder (Block Letters) _____

Signature _____ Date _____

OWNER'S DECLARATION

I, the owner of the yacht _____ declare that the hull has been built only from materials, and using building methods, to the best of my knowledge as permitted in the AC72 Class Rule.

Owner (Block Letters) _____

Signature _____ Date _____

This declaration is to be preceded by a completed material usage schedule as set out in AC72 Rule 22.2.

COMPONENT DECLARATION

Yacht _____

Component _____ Date _____

DESIGNER'S DECLARATION

I declare that the component named and referenced above has been designed, and to the best of my knowledge, is constructed only from materials, and using building methods, as permitted in the AC72 Class Rule.

Designer (Block Letters) _____

Signature _____ Date _____

BUILDER'S DECLARATION

I declare that the component named and referenced above, is constructed only from materials, and using building methods, as permitted in the AC72 Class Rule.

Builder (Block Letters) _____

Signature _____ Date _____

OWNER'S DECLARATION

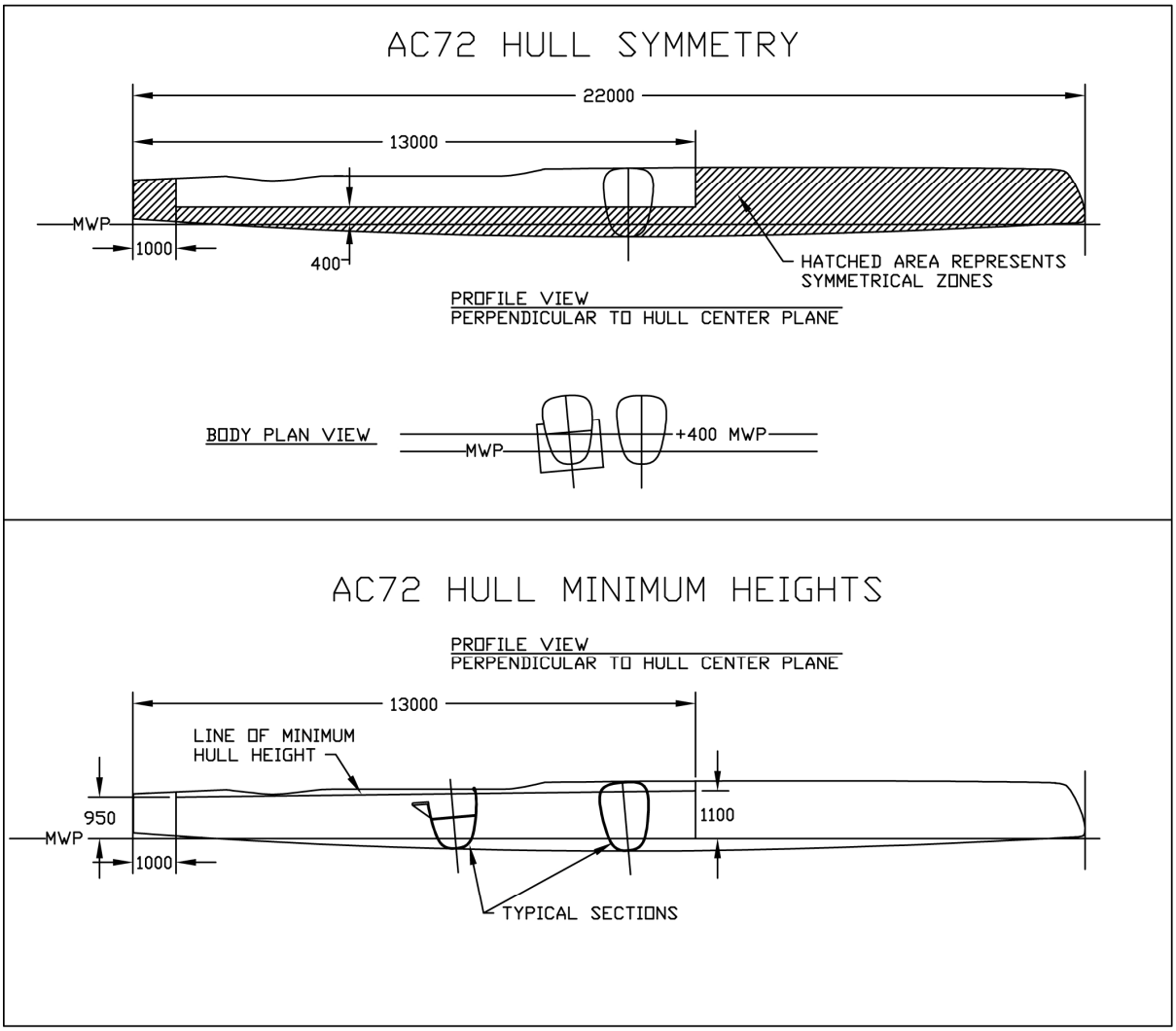
I declare that the component named and referenced above, is constructed from materials, and using building methods to the best of my knowledge as permitted in the AC72 Class Rule.

Owner (Block Letters) _____

Signature _____ Date _____

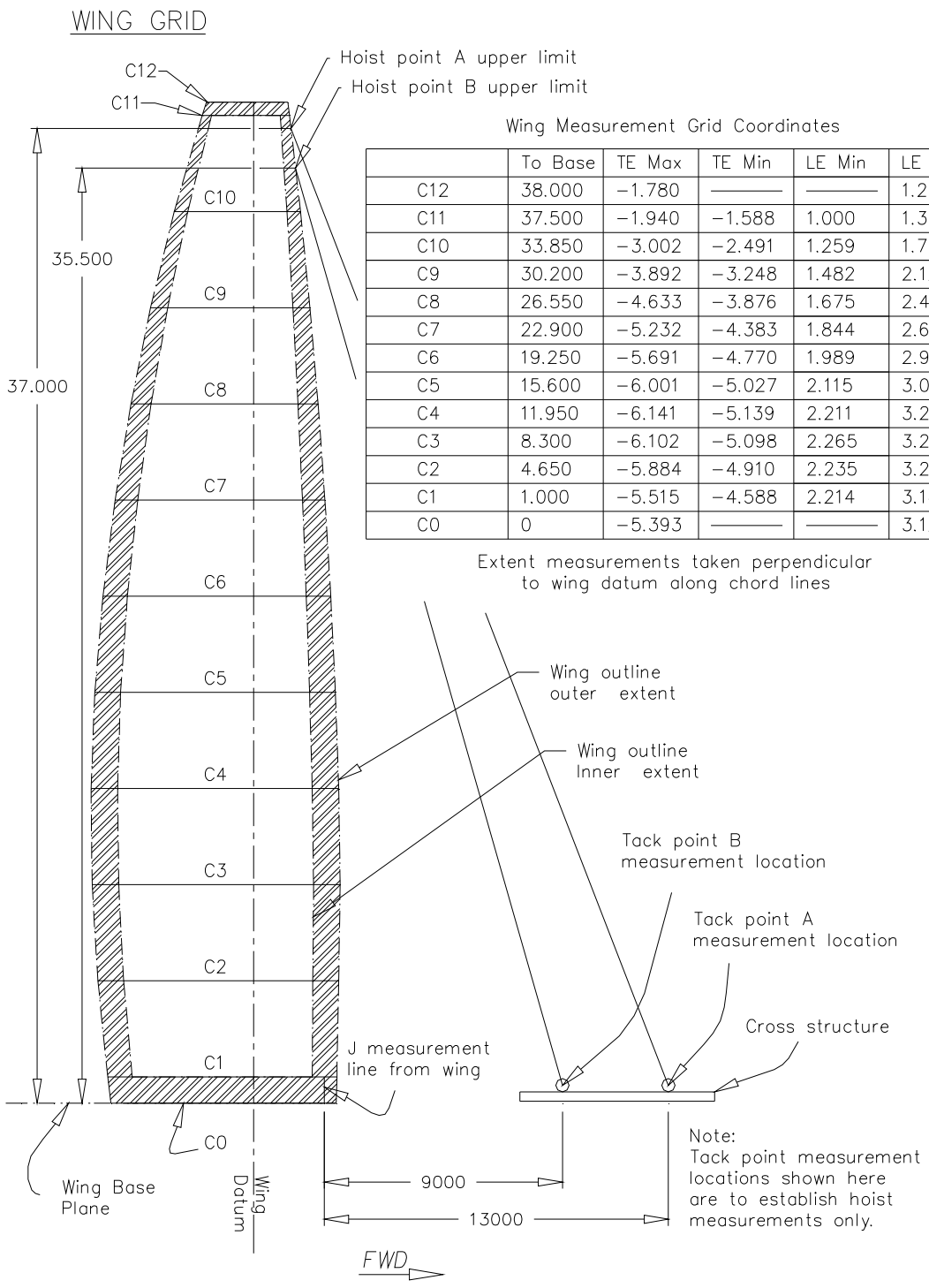
This declaration is to be preceded by a completed material usage schedule as set out in AC72 Rule 22.2.

APPENDIX C — HULL SYMMETRY AND MINIMUM HEIGHT DIAGRAM



HULL SYMMETRY AND MINIMUM HEIGHT REQUIREMENTS

APPENDIX D — AC72 WING

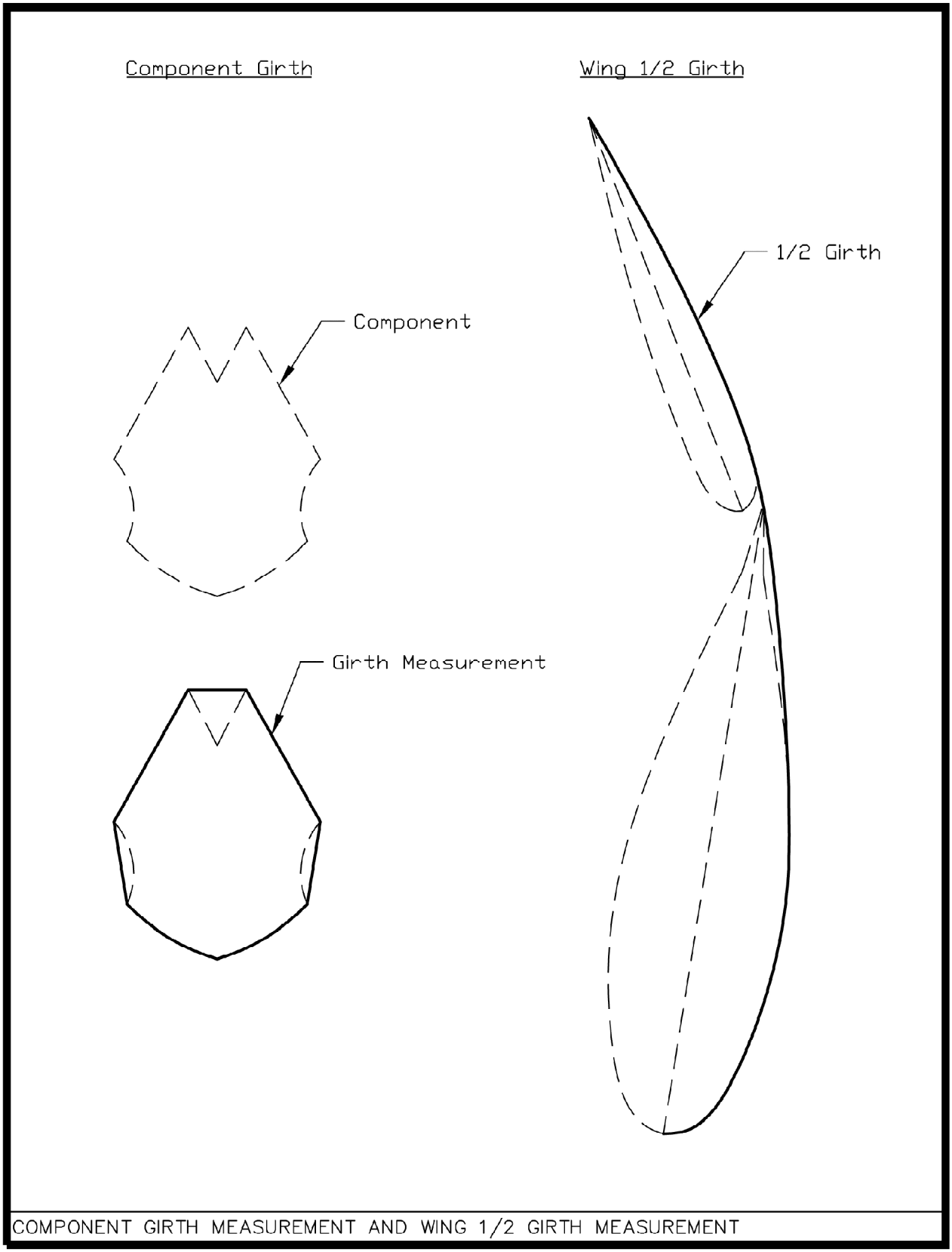


Wing Measurement Grid Coordinates

	To Base	TE Max	TE Min	LE Min	LE Max
C12	38.000	−1.780	———	———	1.290
C11	37.500	−1.940	−1.588	1.000	1.353
C10	33.850	−3.002	−2.491	1.259	1.770
C9	30.200	−3.892	−3.248	1.482	2.127
C8	26.550	−4.633	−3.876	1.675	2.432
C7	22.900	−5.232	−4.383	1.844	2.693
C6	19.250	−5.691	−4.770	1.989	2.911
C5	15.600	−6.001	−5.027	2.115	3.088
C4	11.950	−6.141	−5.139	2.211	3.213
C3	8.300	−6.102	−5.098	2.265	3.269
C2	4.650	−5.884	−4.910	2.235	3.210
C1	1.000	−5.515	−4.588	2.214	3.142
C0	0	−5.393	———	———	3.122

Extent measurements taken perpendicular to wing datum along chord lines

AC72 Wing Measurement Grid



COMPONENT GIRTH MEASUREMENT AND WING 1/2 GIRTH MEASUREMENT

APPENDIX E — MEDIA, TRACKING AND RACE COMM EQUIPMENT

1. GENERAL REQUIREMENTS

The media payload for the AC72 consists of three main components, the TV and Audio System, the Tracking System, and the RO-Comms System.

General information outside the rule will be posted on the Americas Cup Web pages http://www.americascup.com/en/Discover/Documents/Onboard-Media-Equipment/

1.1 **Competitors** shall provide all reasonable access to their **AC72 Yacht** for ACTV to install, remove, inspect, or service equipment, including but not limited to adjusting haulout or launch schedules if required.

1.2 **Competitors** shall provide drawings of their AC72 Yacht and/or any proposed media equipment installation as requested by ACTV, **ACRM**, or the **Measurement Committee** to evaluate the suitability or functionality of all installations.

2. CAMERAS

2.1 The **AC72 Yacht** shall be fitted with **up to** seven HD agile cameras (provided by ACTV and/or **ACRM**).

2.2 Each agile camera has approximate dimensions 250mmx166mmx180mm, weighing between 2.75kg and 3.5kg. In addition:

(a) Each camera has an adapter base plate that the camera is locked into for operation. The adapter base place will be required to be secured to the yacht's structure or to an additional bracket in a position approved by ACTV's On-board media Manager. Installation drawings will be available on America's Cup web site, as per the link in section 1.

(b) The camera will be connected via a coax cable with a molded connector to the media module. Minimum diameter for cable access for the cable with a connector is 22mm (An additional washer control cable may be added. It has a connector of 15mm diameter)

2.3 Agile cameras shall be mounted at the following locations:

(a) One mounted on the camera post fixed to the aft face of the Media Module (See Appendix E Item 7)

(b) Two attached to the forward **cross structure**, approximately in line with the wing rotation point on either side of the **yacht centerplane**. These shall be positioned to allow for filming of the crew, with each location inboard no more than 25% of the yacht's local transverse beam.

(c) On the **yacht centerplane**, within 1.5m of the forward most point on the **cross structure**. The cable from this camera and the 3-boats lengths indicator will require an internal run, or an external conduit to a local interconnect hub in the vicinity of the wing base.

(d) On each hull, approximately in line with the aft cross beam, or on the aft cross beam near the intersection of the cross beam and each hull. These may be required to be mounted on vertical posts to achieve the correct camera angle. ACTV and/or **ACRM** may specify an essentially "one-design" post, in such a case, details of the required post will be posted on the Americas Cup web site as link in section 1.

(e) On the **yacht centerplane** 1-4m aft of the **wing rotation point**, at the approximate height of the **wing rotation point**.

2.4 Due to differences in platform and wing design all camera locations must be approved by the ACTV onboard media manager prior to installation. If the ACTV or **Measurement Committee** deems any of the above camera locations to be impractical, they may specify alternate camera locations, including but not limited to the following:

(a) On the **yacht centerplane**, approximately in line with the after most point of the **wing**;

(b) on the **yacht centerplane**, below the **cross structure** which supports the **wing rotation point**; and

(c) on the uppermost surface of each **hull** forward of the forward watertight bulkhead.

(d) In a position on the **cross structure** forward of the helmsman that can view the helmsman in his normal steering position while under sail on both port and starboard tacks.

3. MICROPHONES

3.1 Each yacht will carry a surround sound microphone, 3 to 5 effect microphones and individual crew microphones.

(a) One custom built surround sound microphone will be located on the central camera post attached on the Media Module (see Appendix E Item 7).

(b) Between three and five effects microphones will be located around the platform, locations will include, but are not limited to, the following: internal to the **hull**, in the vicinity of winches and grinding pedestals, within the cockpit, co-located with a camera, and in the vicinity of the **wing rotation point**.

(c) Wireless mono microphones system on each crew member. The wireless transmitter is to fit in a dedicated pocket in the crewmember's life jacket, per RRSAC 40(c). The microphone may be external to the pocket and positioned to provide a clear voice signal from the individual crew member.

4. PLATFORM - MOUNTED MEDIA EQUIPMENT BATTERY CASES

4.1 Provision shall be made for the mounting of the two removable media "Battery Peli" cases in a protected but accessible location approved by ACTV and the **Measurement Committee**. These items weighing approximately 22kg each, need to be removed on a daily basis and need to be accessible between races.

4.2 Battery Peli cases are Pelican model 1450 or similar, and are configured to mount on a flat vertical surface using a V-bracket system similar to that used in the AC45 class. A Horizontal surface would also be considered.

4.3 Adequate space must be provided between cases for installation, removal, and cable connections. An installation drawing showing the required spacing and mounting surface dimensions will be posted on Americas Cup web site as per the link in section 1.

4.4 **Competitors** shall submit drawings of proposed media equipment battery case mounting locations and arrangements for approval by ACTV and the **Measurement Committee**.

4.5 With the approval of ACTV and the **Measurement Committee**, battery cases may be mounted on internal hull components, rather than on purpose-built mounting surfaces.

4.6 Access openings to the interior of each hull must be provided for installation, removal, and servicing of the media equipment battery cases if they are mounted inside the **hull**. Access shall be via watertight hatches with minimum clear inside dimensions of 0.46m by 0.36m,

located to provide easy access to the media equipment battery case(s). These hatches may be the normal access hatches to the interior of the hull, provided they meet the requirements of **AC72 Class Rule** 6.13. Location and design of media equipment battery case access hatches shall be submitted to ACTV and the **Measurement Committee** for approval.

4.7 If mounted elsewhere on the platform, access openings must be provided for installation, removal, and servicing of the media equipment battery cases. Drawings shall be submitted to ACTV and the **Measurement Committee** for approval.

4.8 Media equipment battery cases shall be mounted so that they are not vulnerable to damage by the normal operation and maintenance of the yacht.

4.9 Media equipment battery cases shall be mounted symmetrically about the **yacht centerplane**, between the **stern plane** and the forward **cross structure**.

5. CABLING

5.1 One full set of media equipment including cabling, lights, displays, camera brackets, media module, etc will be installed on each competitor's **AC72 Yacht** by ACTV / **ACRM**. Replacements for damaged equipment, equipment for installation on second yachts, and equipment for additional wings must be purchased from ACTV or from an ACTV/**ACRM** approved vendor.

5.2 Cables will be supplied in the form of pre-made harness /looms. All cable access will need to consider that connectors are pre terminated.

5.3 5.3 Cable paths shall include:

(a) Between primary media equipment and interconnect locations
  (i) Battery Peli case Locations
  (ii) Port and Starboard **hulls**
  (iii) Aft Media Module
  (iv) **Wing** base interconnect HUB
(b) to camera locations;
(c) to microphone locations
(d) to **Competitor** electronics and audio
(e) RO-Comm Display Modules
(f) Auxiliary RO-Comm Warning and Indicator lights
(g) **Wing** base to **Wing** tip equipment via a cable sock

5.4 Cabling shall be routed to the media equipment cases via routes approved / specified by the ACTV and/or the **Measurement Committee**.

5.5 If due to yacht configuration cable weight is different between yachts the **Measurement Committee** may require the installation of suitable corrector weights.

5.6 Cable length shall not be changed without the permission of ACTV and the **Measurement Committee**.

5.7 Cable runs, raceways, and connectors must be readily accessible for service by ACTV technicians.

5.8 Internal cable runs are preferred provided they are readily accessible for service.

5.9 Detailed drawings of required dimensions and locations of access holes and cable raceways will be posted on the Americas Cup website in link provided.

5.10 Cable raceways and conduits containing ACTV-specified wiring shall not contain wiring for a competitor's own electronic or electrical equipment unless specifically authorized by ACTV and approved by the **Measurement Committee**.

6. INSTRUMENTS AT TOP OF WING AND RF EMISSIONS FROM TEAM EQUIPMENT

6.1 The **AC72 Yacht** will have two antennas, (provided by ACTV / **ACRM**) located at the highest extent of the **wing**. Details of these installations will be provided in drawings posted on the America's Cup web site via the link in Section 1.

6.2 Unless specifically permitted or required by ACTV and/or **ACRM**, no other devices producing radio emissions of any type are permitted atop the **wing** or in any other location on the **wing** that might interfere with the operation of ACTV equipment.

6.3 Wind instrumentation at or near the top of the **wing** is permitted, but the specific installation must be submitted to ACTV for approval. If a Vertical MHU is used this must be RF Transparent, e.g. made of Kevlar or fiberglass for the first meter above the top of the wing.

6.4 Wind instrumentation at or near the top of the **wing** shall not utilize wireless telemetry.

6.5 Team electronics that emits RF energy shall require prior consultation with ACTV. Teams shall provide ACTV with details on the frequency, bandwidth, power level, antenna gain, antenna pattern, and antenna locations, and make the proposed equipment available to ACTV for test to confirm that there will be no interference with media equipment. No emissions in the 2.4 GHz Wi-Fi band in channels 1-4 will be permitted.

7. AFT MEDIA MODULE

7.1 The **AC72 Yacht** shall be fitted with a “Media Module” located aft of the aft-most **cross structure**, centered on the **yacht centerplane**. This Media Module shall be able to accommodate the following ACTV and/or **ACRM** provided media equipment:

(a) up to two TV Peli cases with associated cables
(b) one Audio Peli cases with associated cables
(c) one Telemetry Peli case with associated cables
(d) four wireless microphone receiver antennas
(e) one GPS antenna
(f) one agile camera
(g) one Surround Sound 5.0 to be mounted below the agile camera
(h) one warning light stack, consisting of the penalty indicator, Y flag indicator and 3 boat length to limit and mark boat indicator.
(i) Other equipment as required by ACTV and/or **ACRM**

7.2 ACTV/**ACRM** will specify and supply the one design Media Module. Details will be posted on the Americas Cup web site as per the link in Section 1

7.3 Drawings showing the location of each component required and supplied by **ACRM**/ACTV will be posted on the America's Cup web site as per the link in section 1.

7.4 A **competitor**'s own electrical or electronic equipment and/or other devices, equipment shall not be mounted on/in the ACTV/**ACRM** Media Module or other ACTV/**ACRM** supplied equipment.

8. RACE OFFICER COMMUNICATION EQUIPMENT (RO-COMMS)

8.1 8.1 The Race Officer communications package consists of:

(a) Display modules consisting of a display and 3 push buttons with accompanying small LED indicators. One shall be positioned within easy reach of each helm station/position. Final location to be determined by teams provided it meets **ACRM**/ACTV approval.

(b) Aft warning light stack, 3 layered stack of 360deg flashing LED. To indicate Penalty, Y Flag Pressed, 3 boat lengths to limit and mark boat indicator.

(c) A course limits indicator and penalty indicator in a forward beam location.

(d) Bow 3 boat lengths to limit and mark boat indicator located under the forward camera position.

(e) Other equipment to be determined,

(f) Team streaming data feed will be available to the **competitors** as per the system documentation posted on the Americas cup website. http://www.americascup.com/en/Discover/Documents/Race-Data/Race-Data-Documentation/

(g) Specific team yacht data shall be made available to the Event Authority as per Protocol article 38.2 and detailed in the team streaming data feed as item 8.1(f)

8.2 The **Measurement Committee** will request from each **competitor's** designer a set of precise (+/- 2mm) three-dimensional reference dimensions that are required for the PRO, tracking and umpiring applications. The **Measurement Committee** will check to confirm that they comply with the competitor-supplied coordinates. Drawings for some of the specific dimensions will be posted on America's Cup web site as link in section 1.