



2018
OFFSHORE RACING RULE Multihull
(ORR-MH™)

A Handicap Rating System for Multihull Boats

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ORR-MH OWNER'S QUICK START GUIDE*

(*The Quick Start Guide is meant to be used as a help guide for owners and for informational purposes only; it is not to be considered part of the ORR-MH Rule Book).

Brief

The Offshore Racing Rule Multi Hull (ORR-MH) is owned and administered by the Offshore Racing Association (ORA). The ORA is the Rule and Measurement Authority.

The ORR-MH predicts relative time allowances between multihulls of different sizes, types and ages to compete with the fairest ratings possible.

The ORR-MH is an objective rule. Its ratings are based on the measurement of the speed-related features of sailing multihulls and on the use of the ORR-MH Velocity Prediction Program (VPP) that then calculates the speed potential of each boat at any combination of wind speed and course direction by assessing the measured data. The ORR-MH VPP is a set of algorithms developed through the latest scientific research which is used in its ongoing development.

ORR-MH is intended to be a non-type forming measurement rule that fairly rates properly designed and prepared boats which are equipped for racing. ORR-MH is updated on a regular basis by using the latest research to keep ahead/abreast of the latest design developments.

The ORR-MH Rulebook provides details about measurement, rule restrictions, ratings and the requirements to race under ORR-MH. Owners, Persons In Charge (PIC), sailors, designers, sail-makers and builders should consult the rulebook in preparation to be rated and scored under ORR-MH. This Quick Start Guide provides an overview to help those interested individuals understand what is needed to race under ORR-MH.

1. Scope of Rule

The ORR-MH is intended to rate a broad diversity of sailing multihulls for competition. ORR-MH purposely imposes some limits to ensure reasonably close racing or because there is insufficient science.

2. Certificates

Valid ORR-MH measurement certificates are required to compete and be scored. ORA, the Rule Authority is also the rule owner and administrator, **and reserves the right to subcontract contracted or designate and independent entity to train and certify measurers, collect and process boat data.** The guide along with the rulebook is written to help owner/PIC's and all interested individuals through the process of measurement and certification.

3. Getting Started

The ORR-MH requires a full description of the geometry of hull, rig, and sails; how the boat sits in the water (to get length, weight, wetted area, etc.) .

The owner/person in charge should contact ORA or the designated representative who will provide necessary information and refer them to a trained and certified measurer in their geographic area. The owner/PIC should familiarize himself with this guide and contact the measurer to begin the measurement process.

4. Hull Measurement Ashore

The owner/person in charge is responsible for preparing the boat for measurement ashore. The surface of the hull will be surveyed with an instrument that provides the detailed description necessary for the calculations in the VPP (*Reference: Rule 3.02.1*). If the boat has a "sistership" that has been fully measured, the requirement for hull surveying may be waived by the ORR-MH chief measurer. Hull surveying may also be waived if the designer of the boat supplies the "lines" in a suitable electronic format. In the latter case, measurement checks can be conducted to verify accuracy.

5. Weight

The owner/person in charge is responsible for preparing the boat for measurement and getting the lightship weight of the boat with or without the mast in place. This means following the instructions for Measurement; basically a list of what shall and shall not be on board when weighed.

6. Rig and Sail Measurement

The owner/person in charge is responsible for declaring to the ORA or the ORA approved measurer all spars and sails that he proposes to carry on the boat and make them available for measurement, if needed or supply sail certificates. The principal dimensions of the rig: masts, booms, poles, sprits and sail attachment points shall be measured. The dimensions of the sails will be measured to derive the sail areas used for rating calculation.

7. Configuration Changes

If there are any changes to the canoe body, the appendages, the rig, the sails and/or equipment carried on board, or anything that might change the boat's rating, the owner/person in charge is responsible to declare those changes to the Rating Authority. Any existing certificate becomes invalid if a change is declared.

8. Restrictions While Racing

The purpose is to prevent boats being raced in hull, rig and/or sail configurations that are different from how the boat was measured and rated or are out of the scope of what the ORR-MH rule permits.

Specific examples include:

- Movement of fixtures and accommodation
- Running the engine for propulsion
- Changes in fuel and water tankage beyond normal use
- Use of stored energy in ways other than those explicitly permitted
- Altering the location of the mast step
- Trim and use of sails not consistent with how they were measured and rated

9. Measurement Types

Fully measured boats bear the notation "FULL MEASUREMENT". If the boat has a "sister ship" that was measured in-water, those measurements may be used, subject to a review by ORR-MH administration. In such a case the resulting ORR-MH certificate will be labeled "PARTIAL MEASUREMENT" These certificates are based on sister ship (Partial Measurement) supplemented by a recent freeboard measurement ("recent" as determined by the chief Measurer) and sail certificates from either the sail loft or measurer.

Please be aware that some regattas may require "FULL MEASUREMENT" certificate

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PART I – GENERAL

1.01 Administration.

The Offshore Racing Association (herein denoted as ORA) is the rule owner and the designated Rule Authority for administration of the Offshore Racing Rule Multihull (ORR-MH). The ORA is responsible for the development and promotion and implementation of the rule. **ORA will retain the right to designate a separate entity to collect boat data for ORA. Any data collected or supplied will become the property of ORA and be used for rule administration, certificate production, rule development, research and use in ORA products.**

1.02 Rule Philosophy.

The ORR-MH predicts relative time allowances between multihulls to permit boats of different sizes, types and ages to compete with the fairest ratings possible.

The ORR-MH is an objective rule. Its ratings are based on the measurement of all the speed-related features of multihull sailboats and on a prioritized Velocity Prediction Program (VPP) (ORR-MH) that calculates the speed potential of each boat at any combination of wind speed and course direction. The VPP is a set of mathematical algorithms that have been developed through systematic research and use fundamental scientific methodology.

ORR-MH is intended to be a non-type forming measurement rule that fairly rates properly designed and prepared multihulls which are equipped for racing.

1.03 ORR-MH Certificates

Valid certificates are required for racing in ORR-MH. The ORR-MH certificate will provide the most basic information about a boat, its measurements, and its ratings. Certificates are issued by ORA. A rating certificate is automatically invalidated by a change of ownership or to a change to any of the rated dimensions, weights or parameters of the yacht. Contact the ORA office for information on restoring the certificate to valid status..

Trial certificates are available. The purpose of experimental/trial certificates is to assist owners in making informed decisions on how to configure their boats. **The purpose is not to reverse-engineer the methods in the ORR-MH VPP. Therefore, the number of certificates that can be acquired can be limited, at the discretion of ORA or the ORR-MH Chief Measurer.**

There are two levels of measurement for certificates:

1.03.1 Measurement Level.

1.03.1.1 Full Measurement.

ORR-MH Certificates issued on the basis of full ORR-MH measurement shall bear the notation "FULL" on the certificate.

1.03.1.2 Partial Measurement

Any certificate which is based on less than full ORR-MH measurement shall bear the notation "SISTER/PARTIAL" or after 1 January 2018 "PARTIAL" on the certificate.

To obtain a Partial Measurement ORR-MH certificate, the following information shall be provided:

- 1) All sails submitted for inclusion in an ORR-MH Certificate shall have sail certificates measured and signed by an ORA designated measurer for the mainsail, largest jib, and largest area asymmetrical spinnaker(s) and sail certificates for all sails with a mid girth measurement between 50% and 75% of the foot length. The dimensions described in ORR-MH Rule 10 shall be provided. Most sail lofts have approved measurers

3) Rig (Spar) dimensions, rotations, and rig cant angles may be owner/PIC declared. The rig weight and CG will be measured.

4) Prop type and number of blades. E.g. folding, feathering, fixed may be owner/PIC declared

5) Maximum crew weight. If left blank, an ORR-MH default maximum weight will be supplied.

1.03.2 Certificate Types. There are two categories of ORR-MH certificates.

1.03.2.1 Inshore Certificate and Offshore Certificate

1.04 Measurement

Boats shall be measured by official measurers certified by the **ORA**. No Measurer, assistant, nor Rating Office staff shall participate in the measurement or processing of measurements of a yacht owned, designed or built, wholly or partly, by himself or in which he is an interested party, or in which he has acted as a consultant or has a vested interest. Except for reasonable and brief clarification of points in the Rules, this applies to any consultation or advice on rating values regardless of whether or not any payment is involved.

- Survey using an HMI, Hull Measuring Instrument, or by using a scanning device approved by ORA and administered through the **ORA or its designated representative**.
- Designer supplied lines, in ORA approved format, which will be checked for validity by an ORR-MH authorized measurer following procedures specified by ORA **and administered by ORA or its designated representative**. Rig dimensions shall be measured by **an official ORA designated measurer**.
- Sails can be measured by a **ORA designated or trained mesurer or a** certified employee of a sail loft. Standard certificates will be provided to **ORA or its designated representative** for all sails and are subject to validation by an official measurer.

Boats will be weighed, subject to the conditions and requirements specified by the ORA for ORR-MH. No Measurer, assistant, nor Rating Office staff shall participate in the measurement or processing of measurements of a boat owned, designed or built, wholly or partly, by himself or in which he is an interested party, or in which he has acted as a consultant or has a vested interest. Except for reasonable and brief clarification of points in the Rules, this applies to any consultation or advice on rating values regardless of whether or not any payment is involved.

1.05 Rule Dates. All rule dates shall be recorded and maintained on the Rating Certificate.

1.05.1 Age Date. This date shall be the month and year of launching unless the owner provides documentary evidence that the boat was launched at an earlier date, completed and equipped for sailing.

1.05.2 Series Date. **ORA** may authorize a Series Date, being earlier than the age date, for an unmodified series-produced boat if it is satisfied that the boats of the series are built to close tolerances in moulds or jigs. The Series Date shall be the Age Date of the earliest boat of the series. Series Dates shall be based on boats of a series built in the production moulds or jigs and not on prototypes which were not built in the same moulds or jigs. The Series Date may be changed as a result of a boat being modified from the original model, or conversely built on an older design.

1.05.3 Keel/Centerboard/Foil Date. This date shall be the month and year of the manufacture of the keel, foils or centerboard. Generally this will be the same as the Age Date of Series Date except when the keel, centerboard or foil is replaced or modified. The ORR-MH Chief Measurer has the final authority to rule on whether any such modification is sufficient to change the "Date".

1.05.4 Hull Modifications. Hull modifications shall require plan review by the chief measurer and will require hull re-measurement as determined by the Chief Measurer. Modifications except as permitted below shall result in the assignment of a new Age Date which shall be as defined in 1 above, following the completion of the modifications. The following are permitted without a change of Age Date:

- Changes that do not affect the canoe body.
- New appendages or fairing of existing ones.
- Filling of hollows.
- Forward or aft extensions or reductions of the fair surface of the hull, limited to modifications only within **0.10*LOA of the forward and/or aft end(s) of LOA.**

The total of modifications to the canoe body surface shall not exceed 20% of the total surface prior to modification as determined by the Chief Measurer. After review by the ORA-MH Chief Measurer, the onsite Measurer shall verify on the boat the boundaries of the proposed changes before and after the work.

1.05.5 Measurement Inventory sail weight formula based on default crew weight, crew gear based on declared crew

1.05.6 Measured Date. Measured Date shall be the date that the most recent measurement was completed.

1.05.7 Issued Date. Issued Date shall be the date that the current certificate was issued from the Rating Office.

1.05.8 Dimensional Units. **Metric**

PART II – GENERAL LIMITS AND EXCLUSIONS

2.01 Hull Type

This rule is intended to be used for the rating of multihull boats only.

2.03 Appendages

Boats may race under ORR-MH subject to the following limitations on appendages:

2.03.1 The keel may have an end plate, winglets, a midline centerboard and/or a trim tab.

2.03.2 The keel/centerboard/daggerboard may be canting (keel rotating around root hinged to hull at boat centerline), lifting and/or hinged at a fixed point and the boat will then be subject to restrictions pertaining to boats with canting keels.

2.03.3 Keels/centerboards/foils may have trim tabs.

2.03.5 The boat may have a skeg, one or two normal rigid-surface midline rudders or off-midline, coupled, twin rudders.

2.03.5.1 Flexible fairings between a rudder and nearby canoe body or skeg are permitted

2.03.6 Off centerline dagger boards are permitted.

2.03.7 The boat may have a propeller connected to an engine and the usual instrument transducers.

2.03.8 Centerboard and dagger board movement is not restricted.

2.03.8.1 Flexible centerboard or dagger board slot fairing closures are permitted.

2.03.9 Bilge Boards

Bilge boards are permitted. The location and vertical extension of bilge boards shall be taken as part of the machine hull measurement procedure (see Part VI) and their draft determined from the Hull Offset File (see 6.02) at various angles of heel and at various angle of attack.

2.04 Speed Under Power

Boats shall be capable of speed under power with racing propeller in smooth water without assistance of wind, in knots, of not less than $1.811 * L^{0.5}$ knots where L is ORR-MH L in meters or $L^{0.5}$ knots where ORR-MH L is in feet in order to qualify for any Propeller Installation Projected Area (**PIPA**) greater than zero.

2.05 Propeller Shaft

The propeller shaft exposed to water flow is circular in cross section.

2.06 Weights and Ballast

2.06.1 Except for the stability and trim ballast of the hull, all weights measured under this rule shall be the true weight associated with proper structural engineering and no weights shall be artificially increased through ballasting.

2.06.2 No boat shall be rated under ORR-MH if any material having a density greater than that of lead (specific gravity = 11.35) is used as ballast in any form or location on or within the boat.

PART III – OWNER/PERSON IN CHARGE (PIC) RESPONSIBILITIES

3.01 Owner or Person In Charge (PIC) Signature

Before any certificate under this rule is valid it must be signed by the owner or the PIC of the boat which may or may not be the same person, the term owner or PIC may be used interchangeably through the Rule Book. The name of the individual who signs the Certificate shall also be printed on the Certificate. By this signature the owner or PIC signifies that he or she understands their responsibilities under all parts of the ORR-MH Rule.

Responsibility for Compliance - The owner or PIC shall have the primary responsibility for ensuring compliance with the ORR-MH rules.

Owner/PIC responsibilities are divided into three categories.

- Responsibilities prior to and during measurement.
- Responsibilities after measurement.
- Responsibilities while racing.

3.02 Owner/PIC Responsibilities: Measurement.

The owner/PIC is responsible for arranging measurement with the **ORA or designated representatives for:**

3.02.1 Measurement Ashore

- a) He shall present the boat for measurement ashore in an accessible location, clear of obstructions, properly chocked and leveled.
- b) If the boat is of a class for which "sister ship" hull measurements are available, hull measurement may not be required. The owner/PIC shall inform the measurer of any modifications that have been made so that the measurer may determine whether, and to what extent, the hull standard applies to the boat. The owner shall make the boat available ashore for the checking of any measurements that the measurer may require.
- c) If the boat is of a class for which designer lines hull measurements have been validated, full hull measurement may not be required. The owner/PIC shall inform the measurer of any modifications that have been made so that the measurer may determine whether, and to what extent, the designer lines hull standard applies to the boat. Certain minimum measurement verification is required. This includes measurement of the as-built freeboard to centerline of the canoe body plus any additional measurements as **determined by ORA**. The owner/PIC shall make the boat available ashore for the checking of these measurements or any others that the measurer may require.

3.02.2 Sail Areas He is responsible for declaring to the measurer all spars and sails that he proposes to carry on the boat and the location in which he proposes to set them, so that they may be properly measured

3.02.3 Hull Construction and Spar Material He is responsible for declaring to the measurer the type of hull construction and material of which the hull and spars are built.

3.03 Owner/PIC Responsibilities after Measurement.

3.03.1 It is the Owner/PIC responsibility to declare to the rating authority any changes made to the boat, its rig, or its equipment which could change any of its measurements under the rule. All changes of tankage, fixed or portable, must be reported and appear on the measurement inventory.

Such changes could be:

- a) Changes of ballast in amount or location or configuration.
- b) Change of tankage, fixed or portable, in size or location.
- c) Any changes in the engine and/or propeller installation.
- d) Addition, removal or change of location of gear or equipment, or structural alteration to the hull that affects the trim or flotation of the boat.
- e) Movement of any measurement bands used in sail area measurement, or any changes in spars, spar location or headstay position.
- f) He shall be responsible for ensuring that all sails other than storm sails have been measured by an official measurer (Full Measurement and Measurer Verified) and do not contravene the values stated or permitted for them on the Rating Certificate.
- g) Changes to the shape of the boat's hull and/or appendages.
- h) Changes to spars or standing rigging configuration, including elements of rigging identified as adjustable while racing.

PART IV – ORR-MH RESTRICTIONS WHILE RACING

The owner/PIC is responsible for ensuring that the ORR-MH Rule Book is aboard the boat and that all members of the crew fully understand and comply with the limitations which apply while racing.

4.02 Crew Weight Limit.

The owner/PIC shall be responsible for insuring that the weight of the crew, weighed in light street clothes, on board the boat for any race does not exceed the Maximum Crew Weight printed on the Rating Certificate and any excess shall automatically suspend validity of the Certificate.

4.04 Shipping, Unshipping or Shifting of Ballast, Fixtures and Accommodation.

The removal for racing of fixtures and items of accommodation which were aboard for the original weighing of the boat and mast is not allowed.

Attention is called to Rule 51 of the Racing Rules of Sailing (RRS) - Moving Ballast: "All movable ballast shall be properly stowed, and water, dead weight or ballast shall not be moved for the purpose of changing trim or stability. Floorboards, bulkheads, doors, stairs and water tanks shall be left in place and all cabin fixtures kept on board".

Note that unwarranted quantities of stores, including fuel and water, shall be considered as ballast under this rule.

4.05 Movement from Stowage While Racing.

Portable equipment, gear, sails and stores may only be moved from stowage for use in their primary purpose. Stowage in this respect is the position for any item of equipment or stores, to be maintained for the duration of a race or series, when such item is not in use for its primary purpose. Note: Moving sails or equipment with the intention of improving performance is prohibited and shall be considered a contravention of RRS 51.

4.06 Engine and Propeller.

The owner/PIC is responsible for ensuring that when the engine is run for any purpose the propeller does engage in propelling the boat forward while racing.

4.07 Movable Appendages.

The owner is responsible for ensuring that any locating device for a movable appendage, called for by the rule, is at all times in place while racing. If for any reason such a device is removed during a race the owner shall declare the fact to the race committee and withdraw on completion of the race.

4.08 Tankage.

Tanks which are always to be empty when racing may be declared as such and shall be empty at the time of measurement providing each declaration is entered on the rating certificate and the owner accepts responsibility that these limitations will be observed.

Tankage, fixed or portable, located within fifteen percent LOA of the stern shall be declared "empty when racing" for boats not rated with moveable ballast.

4.09 Energy Storage

Unless modified by the Race Organizing Authority the use of stored energy while racing - RRS 52 Manual Power - shall not apply.

PART V – PREPARATION FOR MEASUREMENT

FREEBOARD MEASUREMENT PROCEDURE

To secure an accurate and fair measurement, it is necessary to have close co-operation between owner and Measurer. It is desirable, therefore, that the owner be reasonably familiar with the requirements below.

5.01 Measurement Ashore.

The hull and appendage measurements (Part VI) and propeller installation measurements (Part VII) shall be taken ashore with the boat exactly level athwartships and approximately in the same longitudinal trim which it might reasonably be expected to assume when afloat in measurement trim.

5.01.1 The boat shall be presented for measurement ashore in an accessible location, clear of obstructions (see 5.01.2 below), properly and firmly chocked and leveled as above. The weight of the boat shall rest on the outriggers except as is necessary to chock the hull as above. A centerboard locked to prevent movement for racing shall be in its locked position and measured as a keel. Rigging shall be slack. All appendages shall be fitted and any fairings, as permitted under 2.03.7.3, shall be in place.

5.01.2 The hull will be surveyed with a Hull Measuring Instrument (HMI) or approved laser scanner (LS). In either case the machine will be set abeam the hulls and relocated fore and aft along the length of the hull, both port and starboard. Measurement points will be recorded from the deepest part of the hull or appendage up to the sheer line.

5.01.3 Clearance for the operation of the HMI or Laser System must be provided around the hull, in the construction of the cradle and the means of supporting the keel. Nominally, clear areas (including the ground surface) are required 1.5m (4 ft.) forward and abaft the hull and 2.0m (6 ft.) on either side of the hull. With some HMIs the minima are 60cm (2 ft.) forward and abaft the hull and 1m (3 ft.) on either side. The Measurer should be consulted for details. Cradle support struts and athwartships cradle bulkheads can usually be accommodated, but longitudinal cradle bulkheads and keel support channels prohibit reaching required measurement points.

5.01.4 Sheer Point. At any measured station, the sheer point is the highest point, in the vicinity of the hull/deck join, where a tangent at 45 degrees can be rested on the hull. See Appendix 3.

5.01.5 Sheer Line. The sheer line is defined as the line passing through the sheer points defined above.

5.02 Measurement Continued

5.02. Measurement Trim: The owner or his representative will put the boat in measurement trim by following the procedure defined below before weighing the boat. The Measurement Inventory set out in Appendix 2 shall be used to ensure and record compliance with the requirements. No substitutions are permitted during measurement afloat.

5.02.3 Boats shall be dry in light ship condition without crew and shall include the following:

- a) Internal ballast, if any, shall be fixed as low as possible at any station and fixed to the hull structure to prevent movement.
- b) Batteries
- c) Fixed and/or essentially permanent interior accommodation, hatch covers and floor boards.
- d) Fixed and/or essentially permanent machinery, electrical and plumbing systems
- e) Outboard motor when it is stowed aboard in appropriate stowage
- f) Mast, boom, spinnaker pole and/or sprit, if any, fully rigged as for racing. Masts shall be raked aft to the limit of their adjustment. Where this limit is forward of the vertical the mast shall be set vertical.

- g) Standing rigging and fittings. All standing rigging and related fittings used whilst racing shall be attached in their normal positions. Running rigging forward of the mast and all halyards and lifts shall be taken to the foot of the mast and hauled tight. All other pieces of running rigging abaft the mast shall be taken to their aftermost position and hauled tight. All halyard tails shall be taken to their normal working positions. If the halyard weight varies significantly along its length, the tail shall be on the cabin floor for the inclining experiment, with the halyard fully hoisted and attached to a light messenger line. A halyard may be used as a topping lift.
- h) Rudder, wheel/tiller and steering gear, fitted complete as for racing.
- i) Keel, centerboard and oils fitted complete as for racing.
- j) Centerboard(s) and foils shall be fully raised. If any movable appendage is to be locked when racing it shall be so locked and the locking device shall be in place.
- k) All fixed electronics, instruments, compasses, lights, antennas and masthead devices.
- l) All halyards as for racing.
- m) Boom running rigging and any vang, as for racing. Booms shall be secured at the low points of P.
- n) Hydraulic systems including hydraulic tanks shall be full for measurement and shall remain full when racing.
- o) Pulpits, stanchions and lifelines.
- p) Mattresses, berth cushions, settee seat cushions and backrests, and permanently installed tables, doors on/in their normal position.
- q) Permanently installed stoves, heaters or other electrical devices.

5.02.4 Specifically excluded from Measurement Trim is the following/

- a) Water and the liquid contents of any tanks or voids in the keels or any other appendage. Fuel tank shall be as empty as possible (recommended) or filled to its capacity, distance from stem and condition at measurement recorded. Any liquid recorded in the tank is deducted from the displacement, and the trim recalculated, and freeboard measurements are adjusted accordingly.
- b) Any sails, including storm and emergency sails.
- c) Sheets, blocks, winch handles and other running rigging, except as in 5.02.3 above.
- d) All portable safety gear, including fire extinguishers and liferaft(s).
- e) Decorative throw pillows, sleeping pillows and any other bedding, towels, etc.
- f) All cooking and eating utensils, portable heaters and compressed gas bottles
- g) Any food or stores.
- h) All tools, spares and stores.
- i) Miscellaneous portable and personal gear, books, navigation tools, etc.
- j) Anchors and anchor ropes, including both chain and fiber.
- k) Dock and mooring lines and any other cordage.
- l) Outboard engines without appropriate stowage and portable fuel containers.

5.02.5 For boats with LOA > 24.0 m (79 ft.) items listed in 5.02.6 when impracticable to be removed from the boat, may remain aboard with their weight recorded. Freeboards measurements shall then be adjusted by subtracting recorded items. This procedure shall be verified and approved by the ORR-MH Chief Measurer.

5.02.6 Measurement inventory shall be recorded as follows:

- a) If any Interior Ballast: description, weight, distance from stem, height from the waterline.
- b) Batteries: description, weight, distance from stem, height from the waterline.
- c) Engine: manufacturer, model.
- d) Tanks: Use, type, capacity, distance from stem, height from the waterline, condition at measurement.
- e) Miscellaneous: description, weight, distance from stem, height from the waterline (boiler, air- conditioning, heating etc.).

The following additional items are weighed and inventoried for all boats:

- a) 1-Anchor: weight.
- b) Anchor chain and rode: weight.
- c) Tools: max weight 20lbs.
- e) Safety equipment: weight- PFD"s, harnesses, emergency signaling, ditch bag, EPIRB, throw-able/MOM/Lifesling, 1-first aid kit.
- f) Deck equipment: weight - One set of sheets and guys and any running rigging not carried permanently on spars, winch handles, Six (6) deck blocks, used in sailing the boat.
- g) Fire Extinguishers.

5.03 Mast and Rig Weight

Assessment of pitch gyradius (Part VIII) requires measurement and/or the classification of various features of the boat. It is strongly encouraged that masts be measured for total rig weight and vertical center of gravity, prepared as specified in 9.14. Other elements of pitch gyradius require counting of spreaders, jumpers and runners, the classification of hull construction, rudder construction and accommodation.

PART VI – HULL

HULLs MEASUREMENT

6.01 Principle of Hull Measurement.

It is the principle of hull measurement under the ORR-MH that the "lines" of the hulls and appendages are recorded in considerable detail so as to yield, in combination with measurements afloat, hydrostatic data sufficiently accurate for rating purposes.

6.02 Hull Offset File.

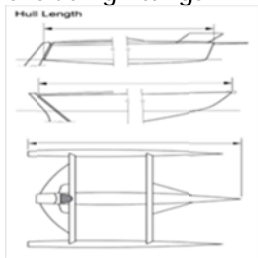
The Hull Offset File as processed by the ORA/Rating Authority shall define the boat's hull for the purpose of calculating a valid ORR-MH Certificate until such time as there may be a change to the actual hull (including appendages).

6.03 Remeasurement.

A hull which has been modified will normally require hull re-measurement. A hull which has not changed shall not be re-measured and processed except where the Rating Authority is satisfied that reasonable evidence of error exists.

6.04 Length Overall (LOA) (Hull Length).

The length overall of a boat will be measured to include the whole hull, but not spars or projections fixed to the hull such as chainplates, bowsprits, boomkins, pulpits, pushpits, outboard rudders etc. Hull Length Is defined as the longitudinal distance between the aftermost point and the foremost point on the hull(s), excluding fittings.



6.05 Maximum Beam (MB).

The maximum beam of the boat as taken from the measured offset file.

HULL DERIVED CHARACTERISTICS

6.08 Measurement Trim.

Measurement Trim for rating calculations is the trim derived in the VPP by converting flotation at local SG to a normalized flotation at a standard SG equal to 1.02528 (nominal seawater).

6.09 Sailing Trim.

Sailing Trim shall be the plane of flotation derived from Measurement Trim by the addition of weight to represent a crew (8.11) and a practical minimum of gear.

6.10 Sailing Length (L).

The Sailing Length (L) is an effective sailing length which takes into account the hull form at the ends of the boat, both above and below the plane of flotation in Sailing Trim.

6.11 Displacement (DSPM & DSPS).

DSPM and DSPS are the weight of the boat in Measurement Trim and Sailing Trim respectively.

6.12 Wetted Surface (WSS).

WSS is the area of the immersed hull surface in upright Sailing Trim.

6.13 Maximum Draft (DHK).

The maximum draft of the hull including the keel (DHK) shall be the vertical distance from the Sailing Trim plane of flotation to the lowest point of the hull or fixed keel, whichever is deeper.

6.14 Maximum Draft Adjusted for Centerboard/Foil (DHKA).

DHKA is the maximum draft of the hull including the keel adjusted for the **centerboard or foil** and is the draft used for rating purposes.

PART VII – PROPELLER

7.01 General Requirements.

The hydrodynamic drag of the propeller installation shall be taken into account by the Velocity Prediction Program and will be determined from the Propeller Installation Projected Area (PIPA) only if the propeller is at all times ready for use and shall not be retracted, housed, or shielded except by a conventional strut or aperture nor in such a position as to be clear of the water under normal sailing conditions.

7.02 Propeller Types.

7.02.1 Folding Propeller. To qualify for measurement a "folding" propeller shall be a standard model in series production, unaltered, having a minimum of two blades that fold together pivoting on an axis at right angles to the shaft line when not being used for propulsion.

7.02.2 Feathering Propeller. To qualify for measurement a "feathering" propeller shall be a standard model in series production, unaltered, having a minimum of two blades that pivot so as to substantially increase pitch when not being used for propulsion.

7.02.3 Solid Propeller. To qualify as "solid" a propeller shall be a standard model in series production, unaltered, having a minimum of two fixed blades of normal elliptical shape and a maximum width of not less than .25 times the propeller diameter measured across the driving face of the blade on a chord at right angles to the radius of the blade. Pitch shall not be greater than the propeller diameter. Hub and blade area projected into a plane at right angles to the shaft line shall not be less than .2 times the propeller diameter squared. If any of these conditions are not fulfilled the propeller is to be measured as a folding propeller except that if the projected area requirement is confirmed by template and the pitch requirement is confirmed by inspection, all other conditions shall be deemed to have been fulfilled.

7.03 Installation Types.

The propeller installation shall be classified according to the following rules:

7.03.1 In Aperture. To qualify as an "in aperture" installation, the propeller must be solid or three-bladed and entirely surrounded (in the vertical plane of the shaft line) by the keel, skeg, and/or rudder.

7.03.2 Strut Drive. To qualify as "strut drive" the drive train shall be enclosed in a strut and the unit incorporating drive train and strut shall be of a standard model in series production. The surface and shape of the unit may be faired (e.g., with fillers) provided that its function is in no way impaired and none of the dimensions required for measurement of the unit are reduced relative to those as manufactured.

7.03.3 Out of Aperture. All other propeller installations qualify as "out of aperture".

PART IX – RIG

9.01 Rig Restrictions

9.01.1 Boats shall have substantial, bona fide mainsails. No boat shall be rated under ORR-MH if P+BAS is less than the greater of $.96*IG$ or $.96*ISP$.

9.01.2 Rotating and/or pivoting masts are allowed under ORR-MH.

9.01.3 A boat must have a bona-fide forestay. That forestay may be adjusted while racing if declared as such on the rating application and will be rated as an adjustable forestay. **The forestay shall remain attached at all times while racing.**

9.01.4 Adjustment of Rigging. Adjustment of rigging while racing is not permitted with the exception of the following which are permitted to be adjusted while racing. All rig elements stated below shall be declared as fixed or adjustable for rating purposes.*

- a) Forestays.
- b) Main Backstays.
- c) Runner Backstays.
- d) Checkstays.
- e) Side stays for canting masts
- f) Forestays attached to the foremost mast above $0.225*IG$ above the sheerline
*For the purposes of safety, i.e. an exceptional adjustment of a stay to cure a fault is allowed

9.01.5 Rigging Plan.

Stays which are declared as adjustable while racing shall be confirmed by the Measurer and shall be recorded as follows:

9.01.6 Adjustable Forestay. When the forestay itself is adjustable this shall be recorded as “adjustable forestay”.

9.01.7 Adjustable Backstay. When the uppermost backstay is adjustable this shall be recorded as “backstay adjustable”.

9.01.8 Adjustable Forestay and Backstay. There is no restriction on having simultaneously an adjustable forestay and an adjustable backstay. There is an appropriate rating adjustment in the VPP.

9.01.9 Running Backstays. Where there are one or more pairs of backstays below the uppermost backstay (inner backstays, runners, checkstays, etc.), these shall be recorded as “runners”. The number of pairs, based on the attachment points on the mast, shall also be recorded (see also 8.13.6). A secondary runner tension adjuster, leading to the mast approximately perpendicular to the runner itself, shall not be counted.

9.01.10 No boat shall be rated under ORR-MH if any spar is built wholly or in part of any material other than wood, aluminum alloys, steel alloys or fiberglass reinforced plastic, except as provided below:

- a) The restrictions of this section do not apply to booms or spinnaker prods.
- b) If the mast is constructed substantially of carbon in section throughout its entire length. In such case carbon fiber reinforced plastic is permitted for masts as well as integral moldings, spreaders, and jumpers.

9.01.11 Permanently bent spars are not permitted. A spar that will straighten when stresses imposed by the rigging are removed does not constitute a permanently bent spar.

9.01.12 Movement of Mast at Deck or Step. Altering the location of the mast at the step or deck while racing is not permitted.

RIG MEASUREMENT

9.02 Sail and Rig Measurement.

All spars and standing rigging, adjustable or fixed, must be available to the Measurer for measuring or checking marked dimensions and declarations made as to the use of these while racing.

9.03 Painted Measurement Bands.

Measurements may be taken to locations defined by painted bands, of black or other contrasting color, only when these bands are in place at the time of measurement. Where measurements are taken to such bands any movement of the bands or a failure to display them while racing shall invalidate the rating certificate.

FORETRIANGLE

9.04. Base of Foretriangle (J).

J shall be the foretriangle base measured horizontally from the foreside of the mast at its lowest point above the deck or coach-roof to the center line of the foremost tack point on which jibs are set (the center line of the luff of the foremost jib, if the jib is to be set flying), extended if necessary, to intersect the level of the sheer line, or to a bowsprit if used. Where there is the capacity for the mast to be moved at the deck, J shall be measured with the mast at the aftermost limit of adjustment unless a 1 in. (25mm) contrasting band is provided. In this case J shall be measured to the aft edge of the band and the forward face of the mast may not move aft of this point.

9.04.1 Stem to Forward End of J (SFJ)

SFJ shall be the horizontal distance from the forward end of J to the forward end of LOA (negative if a bowsprit is used).

9.05 Spinnaker Tack Point (TPS).

9.05.1 The boat's spinnaker configuration shall be declared by the owner and recorded as one of the permitted types:

Centerline Asymmetric: any spinnaker to be tacked only on the centerline of the boat.

9.05.2 Tack Point of Spinnaker (TPS). TPS shall be the horizontal distance from the foreside of the mast at its lowest point above the deck or coach roof to the point of attachment at deck level of the foremost tacking point of an asymmetric spinnaker or to the extreme forward end of any bowsprit in its maximum extended position.

MAIN MAST AND BOOM

9.06 Mast Measurements.

Measurements shall be taken parallel to the axis of the spar with the spar straight.

9.06.1 Height of Genoa Halyard (IG). For masthead and "normal" fractionally rigged boats IG shall be the genoa height measured from the point of attachment of the forestay to the mast structure, or the intersection of the center line of the forestay with the foreside of the mast where the point of attachment is internal, to the level of the deck as defined in 9.08.

- 9.06.1.1 Height of Upper Genoa Halyard (IGA).** For fractionally rigged boats that have masthead and fractional attachment points. IGA shall be the highest genoa attachment point to the mast structure at the foreside of the mast to the level of the deck as defined in 9.08. Both IG and IGA will be used in calculating the rating.
- 9.06.2 Height of Spinnaker Halyard (ISP).** For masthead and “normal” fractionally rigged boats ISP shall be the height of the uppermost spinnaker halyard. It shall be measured from the underside of the spinnaker halyard, when drawn horizontally forward from the mast, to the level of the sheer line abreast the mast as defined in 9.08.
- 9.06.2.1 Height of lowest Spinnaker Halyard (ISPA).** ISPA shall be the height of the lowest spinnaker halyard attached to the mast structure. For fractionally rigged boats that have masthead (ISP) and fractional (ISPA) attachment points for spinnakers, both attachment points shall be measured from the underside of the spinnaker halyard, when drawn horizontally forward from the mast, to the level of the sheer line abreast the mast as defined in 9.08. Both ISP and ISPA will be used in calculating the rating.
- 9.06.3 Forestay Outrigger (GO).** GO shall be the horizontal distance from the upper point of measurement used to determine IG to the after side of the mast or vertical projection of the after side of the mast.
- 9.06.4 Mast Width (MW).** MW shall be the minimum fore and aft width of the mast to be found at any point below the top of IG and above the lower spreader.
- 9.06.5 Maximum Transverse Dimension of Mainmast (MDT1).** MDT1 shall be the maximum thickness of the mast in the athwartships direction occurring above $0.5 * P$.
- 9.06.6 Maximum Longitudinal Dimension of Mainmast (MDL1).** MDL1 shall be the maximum thickness of the mast in the fore and aft direction occurring above $0.5 * P$.
- 9.06.7 Taper Length (TL).** TL shall be the distance from the highest point at which MDT1 or MDL1 occurs, whichever is lower, to the upper measurement point for P.
- 9.06.8 Upper Transverse Dimension of Mainmast (MDT2).** MDT2 shall be the minimum thickness of the mast in the athwartships direction below the upper measurement point for P.
- 9.06.9 Upper Longitudinal Dimension of Mainmast (MDL2).** MDL2 shall be the minimum thickness of the mast in the fore and aft direction below the upper measurement point for P.

If the thickness of a mast (constructed of materials other than wood) in the athwartships direction is less than MDT1, or in the fore and aft direction is less than MDL1, at any point below the highest points at which they occur, the smallest athwartship value found shall be substituted for MDT1 and the smallest fore and aft value found shall be substituted for MDL1, except that any bona fide luff groove shall always be included. Any such substitution shall not affect the definition of TL. Excluding a luff groove device, no hollows in section are permitted. Any addition of material to the base mast section shall consist of the same primary structural material as the mast itself. The MDL measurements shall include any bona fide luff groove or track attached directly to or integral with the mast. Any secondary luff groove device otherwise attached shall not be included and the relevant boom and mainsail measurements shall be increased by the longitudinal dimensions of the device as determined by the Measurer.

9.07 Mainsail Hoist (P).

P shall be the measured length of the hoist of a jib headed mainsail. It is the distance along the afterside of the mainmast from the highest level to which the head of the sail, or any part of a headboard carriage abaft the track or mast groove, may be set to the lowest position of the tack. The highest point shall be taken as the top of the highest sheave used for the main halyard, or to the lower edge of a one-inch measurement band. The lowest position of the tack shall normally be the fair extension of the top of the boom or any external track or groove.

9.07.1 If a sliding gooseneck is used, measurement is to be made with the boom at the extreme bottom of the slide unless the lowest sailing position of the foot of the sail (boom or boom track) is marked by the upper edge of a one-inch measurement band around the mast. The top of the boom (or track) shall not be carried below this point when the mainsail is set, except when actually putting in or shaking out a reef in the mainsail.

9.07.2 In the event that the tack of the sail is carried below the boom, its lowest position shall be marked by the upper edge of a one-inch measurement band around the mast from which the low point of P shall be measured.

9.08 Height of Deck.

The height of deck used as a datum for sail area measurements shall be the sheer line abreast the mast.

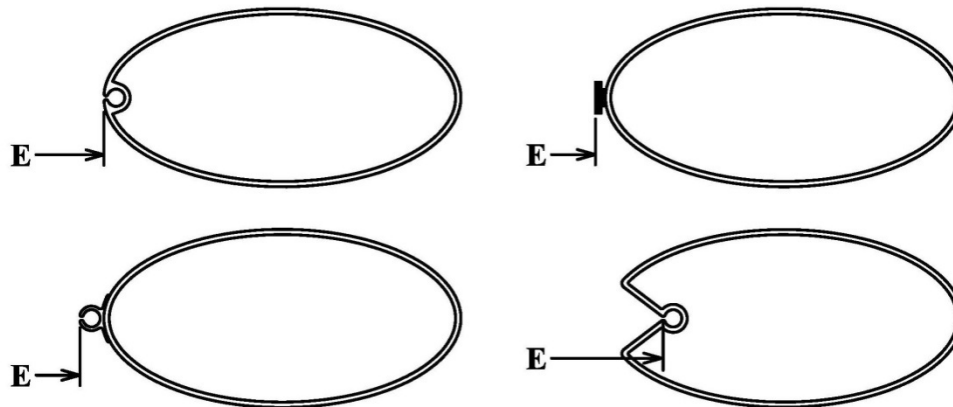
9.09 Boom above Sheerline (BAS).

BAS shall be the distance between the low point used in the determination of P and the level of the deck as defined in 9.08.

9.10 Foot of Mainsail (E & BAL).

9.10.1 Foot of Mainsail (E). E shall be the length measured along the boom from the aft side of the mast including any external track or groove, or its fair extension parallel to the axis of the mast, to the aftermost position to which the sail is permitted to extend. Where this latter point is inside of the boom end, it shall be located by the inner edge of a one inch measurement band around the boom.

Any part of the mast which extends abaft the aft side of the track or mast groove shall be ignored in determining E.



9.10.2 Sheeting Limit (BAL). BAL shall be the distance from the outer measurement point of E to a contrasting measurement band denoting the limit on the boom beyond which no lead for the sheeting of headsails shall be attached. In the absence of such a band BAL shall be measured to the boom end. BAL shall not exceed 0.152 m (0.50 ft.).

9.11 Boom Diameter (BD).

BD shall be the maximum dimension of the main boom measured in section inclusive of any structure used to stiffen the boom. A boom with a BD in excess of $0.05 * E$ is not permitted.

9.12 Rig Weight and Center of Gravity (MWT, MCG & WB).

Rig Weight and Center of Gravity (MWT, MCG & WB) as outlined in 9.14 is optional for all masts. However, ORA strongly encourages the mast be weighed together with its standing rigging and recorded as MWT for accuracy; otherwise a default weight is used for the calculations.

The main mast, together with its standing rigging, shall be weighed and the weight found recorded as **MWT**.

- 9.12.1 The vertical center of gravity shall be determined relative to the lower measurement point of P and recorded as **MCG**.
- 9.12.2 As appropriate to the size of the mast, the values for MWT and MCG may be found either by measurement at the single point of the center of gravity of the mast and rigging or by measurement of tip and butt weights separately, followed by calculation of the values to be recorded.
- 9.12.3 The Boom construction shall be noted as "light" or "heavy" depending on the material and method used in construction and recorded as **WB**.
- 9.12.4 All measurements above shall be taken with the components dry and the spars fitted only with components with which the boat will actually race as specified below.
- 9.12.5 The mast shall be completely rigged with standing rigging, running backstays, permanent backstays, spreaders, jumpers, lights, antennae, instrument displays and their mounting brackets, wiring, luff groove device and all other permanently attached fittings, including those turnbuckles which are not permitted to be adjusted while racing.
- 9.12.6 Excluded from measurement shall be running rigging (except the backstay), checkstays, rigging adjusters of any type (hydraulic or otherwise) and any associated blocks and tackle, boom vang and reefing tackle. Halyard messengers of not more than 4mm diameter and weighing not more than 15 grams per meter and only sufficient for convenient re-leading may be used to replace internal portions of running rigging.
- 9.12.7 All wiring, messengers and standing rigging shall be in their proper attached positions, and any slack stretched down and secured along the length of the mast with light material, such as lanyards or tape, with any tails hanging free at the butt.
- 9.12.8 Headboard, luff slides, spinnaker pole cars and any other adjustable devices shall be at their lowest limit of travel.

PART X - SAILS

All sails must be available to the Measurer for measuring or checking marked dimensions and declarations made as to the use of these while racing (see also 3.02.3 & 9.01).

SAIL RESTRICTIONS

10.01 Construction.

10.01.1 The term "sail" shall be taken to include the headboard, tabling, bolt and foot rope or tapes. It shall not include cringles which are wholly outside the sail.

10.01.2 Openings in the sail, in addition to the normal cringles and reefing eyelets, are permitted provided that the sail is flat in the vicinity of the openings.

10.02 Sail Inventory

A boat while racing shall not be limited in the number of sails carried on board unless modified by the Race Organizing Authority.

10.03 Trimming of Sails.

All sails must be set and trimmed in a manner consistent with the way they are measured. A sail shall not be constructed in such a manner that any portion may be completely detached.

10.05 Restrictions on Setting and Sheeting of Spinnakers

- a) A bona fide jib for which the boat has been measured may be set and sheeted as a spinnaker:
- b) Spinnakers shall be sheeted from only one point on the sail.
- c) A spinnaker may be sheeted to any part of the rail or deck or to the main boom, within the measurement limits, but to no other spar or outrigger.

10.06 Restrictions on Setting and Sheeting of Mainsails

- a) Mainsails shall be either fully secured at the foot or fully loose footed and shall remain so while racing. A mainsail secured at the foot shall be provided with a bolt rope, track or tunnel slides, or similar boom attachment that prevents the foot from lifting away from the boom. A loose-footed mainsail shall be sheeted only from a single clew.
- b) Spare mainsails are not permitted to be carried on board.
- c) Storm trysails, as distinguished from loose-footed mainsails, must be materially smaller than a normal close-reefed mainsail and of strength consistent with their purpose for use in extremely severe weather. (see World Sailing Offshore Special Regulations 4.26.3: aromatic polyamides, carbon and similar fibers shall not be used in a trysail or storm jib but spectra/dyneema and similar materials are permitted).
- d) Headboard carriages are permitted only if the sail is set and trimmed in a manner consistent with the way HB was measured (see 10.30).

SAIL MEASUREMENTS

10.09 Tension and Wrinkles in Sails

When measuring sails it is required that sufficient tension be applied between measurements points as to remove all wrinkles across the line of measurement and must include the fabric length between measurement points.

10.10 Measurement Points at Corners of Sails

Measurement points at the corner of a sail shall found as below. Measurement points shall be at the extreme outside of a bolt rope, wire or fabric at the sail edge.

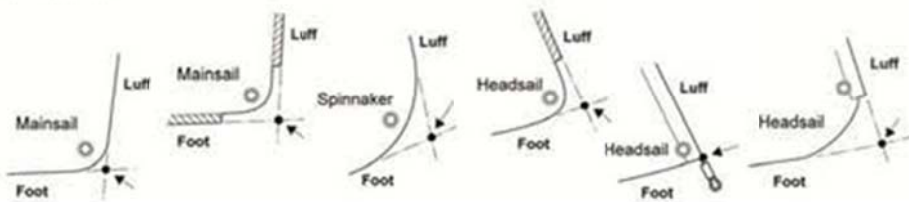
- a) Tack. The intersection of the foot and the luff, each extended as necessary.
- b) Clew. The intersection of the foot and the leech, each extended as necessary.
- c) Head.

(1) Mainsail: The intersection of the luff, extended as necessary, and the line through the highest point of the sail at 90° to the luff.

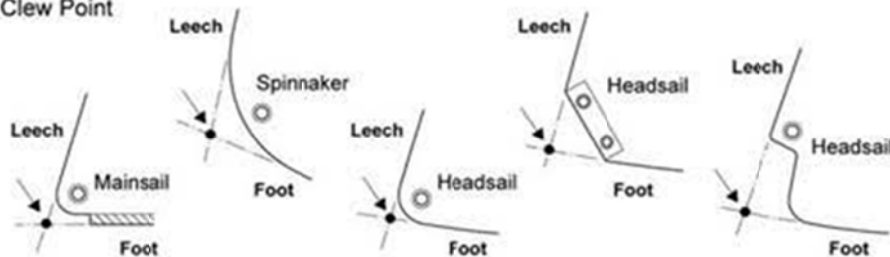
(2) Jibs: The intersection of the luff, extended as necessary, and the line through the highest point of the sail, excluding attached pennants, strops, etc., at 90° to the luff.

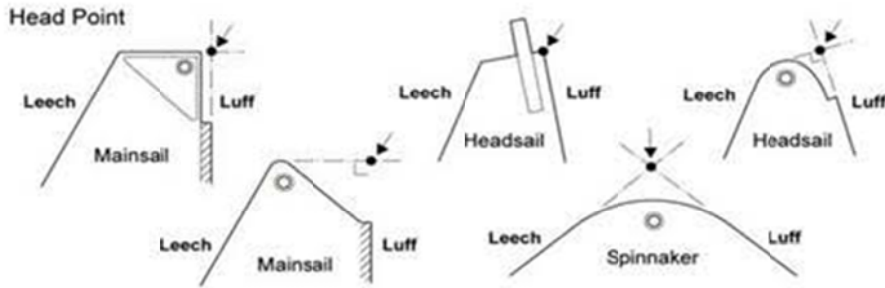
(3) Spinnaker: The intersection of the luff and the leech, extended as necessary.

Tack Point



Clew Point





10.11 Reserved for future use.

MEASUREMENT OF JIBS

10.12 Longest Perpendicular of Jibs (LPG).

10.12.1 Jibs shall be measured on the perpendicular from the luff (outside edge of the sail and/or luff rope) to clew (intersection of the lines of the foot and leech). A wrap-around jib shall be measured on the perpendicular from the line of junction of the wrap-around parts to the clew.

10.12.2 LPG shown on the rating certificate shall be the value for the largest area jib carried on the boat.

10.13 Jib Girths and Jib Roach (JR).

10.13.1 From any specified point on the leech of a jib, the mid-girth is defined as the distance from that point to the nearest point on the luff of the jib.

10.13.2 JMGL, JMGM, JMGU shall be the mid-girths, as defined in 10.13.1 above, from respectively 25%, 50%, and 75% of the leech length from the clew.

10.13.3 JLE shall be the straight line distance from the jib head to jib clew.

10.13.4 JLU, JLE, LPG, JMGL, JMGM, and JMGU shall be measured for each jib and recorded on that jib's sail certificate.

10.13.5 Jib Roach (**JR**) is defined as the maximum excess of the three girths JMGL, JMGM, JMGU over the base girths of respectively 75%, 50%, 25% of LPG. 75% of JR shall be multiplied by JLE for the purpose of calculating the roach area.

10.13.6 For jibs with $LP < 110\%$ of J at each mid girth the girth excess, as defined in 10.13.5, shall not exceed 12% of its respective base girth.

10.13.7 Jibs with $LP > 110\%$ of J shall not have girth excess (Roach).

10.13.8 The JR and JLE for the largest area jib shall be shown on the certificate.

10.14 Forestay Perpendicular (FSP).

FSP shall be the larger of either:

1. Twice the maximum dimension, measured at right angles to the longitudinal axis, of a luff groove device; or
2. The largest dimension of the doubled portion of a wrap-around jib measured at right angles to the luff line when opened out.

10.15 Longest Luff of Jibs (JL).

The length of the luff shall normally be the distance between the lowest part of the sail on the luff at the tack and the highest point of the sail on the luff at the head. JL shall be recorded as the largest such dimension found on the jibs carried on the boat.

MEASUREMENT LIMITATIONS ON JIBS

10.16 All jibs are subject to the following limitations:

- 10.16.1 The mid-girth of a jib measured from mid-luff to mid-leech shall not exceed 75% of the length of the foot.
- 10.16.2 Except in non-overlapping self-tacking jibs no clew boards may be used in jibs.
- 10.16.3 No headboards may be used in jibs.
- 10.16.4 Except that battens are not permitted in jibs of LPG greater than $1.1 * J$, battens may be used in jibs of less than $1.1 * J$.
- 10.16.5 A boat may use a luff groove device provided that such luff groove device is of constant section throughout its length and is either essentially circular in section or is free to rotate without restraint. Any permitted device on the forestay other than hanks shall be measured for FSP (see 10.14).
- 10.16.6 Jibs may be sheeted from only one point on the sail except in the process of reefing the sail. (Thus quadrilateral or similar sails or sails in which the sailcloth does not extend to the cringle at each corner are excluded.)

DEFINITION OF SPINNAKERS

10.17 Asymmetric Spinnakers.

To be classified as an asymmetric spinnaker a sail must meet the following criteria:

- 10.17.1 The luff shall be at least 5 percent longer than the leech (see 10.21).
- 10.17.2 The mid girth (see 10.23) shall not be less than 75 percent of the foot length (see 10.22).

MEASUREMENT OF SPINNAKERS

10.18 Spinnaker Headboard (HBS).

HBS shall be the maximum width of a spinnaker headboard, which shall not exceed $0.05 * J$.

10.19 Spinnaker Maximum Width (SMW).

10.19.1 Asymmetric Spinnaker Luff (ASL).

- a) SLU shall be the length of the longer edge (luff) of an asymmetric spinnaker measured along the edge of the sail from head to tack.
- b) SLE shall be the length of the shorter edge (leech) of an asymmetric spinnaker measured along the edge of the sail from head to clew.
- c) ASL shall be calculated from the following formula:

$$ASL = 0.5 * SLU + 0.5 * SLE$$

10.20 Spinnaker Foot Length (ASF).

Spinnaker foot length shall be the distance from tack to clew measured in the shortest path on the surface of the sail. For an asymmetric spinnaker, the distance shall be recorded as ASF.

10.21 Asymmetric Spinnaker Mid Girth Length (AMG).

AMG shall be the distance between the midpoints of luff and leech measured in the shortest path on the surface of the sail.

10.22 Measurements for Spinnaker Area

For calculation of sail area the dimensions of HBS, SMW, AMG, SF, ASF, SL and ASL shall be from the spinnaker with the largest area carried on the boat, but also see 10.43.5 for rated minimum SMW, AMG, SF, ASF, SL and ASL.

MEASUREMENT LIMITATIONS ON SPINNAKERS

10.23 All spinnakers are subject to the following limitations:

10.23.1 A sail shall not be measured as a spinnaker unless the mid girth is 75 per cent or more of the foot length.

10.23.2 Battens (including the inflatable type) shall not be used in spinnakers.

MEASUREMENT OF MAINSAILS

10.24 Mainsail Head – see Rule 10.10 Measurement Points at Corner of Sails.

10.25 Mainsail Clew – see Rule 10.10 Measurement Points at Corner of Sails.

10.26 Mainsail Cross Widths - The cross measurements shall be the distance from the leech measurement points, as defined below, to the nearest point on the fore edge of the sail including their bolt rope. The points on the leech from which the cross measurements are taken shall be determined bridging any hollows in the leech with straight lines.

10.27 Mainsail Mid-Point of Leech - The mid-point of the leech shall be determined by folding the head to the clew and the quarter and three-quarter leech points by folding the clew and the head to the mid-point leech. The seven-eighth leech point is determined in a similar fashion.

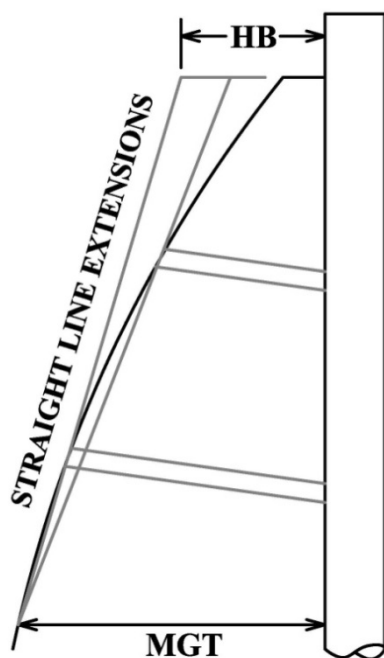
10.28 Mainsail Headboard (HB).

Where the center line of the top batten pocket is not situated above the MGT leech measurement point, HB shall be the maximum fore and aft dimension from the luff of the mainsail, projected if necessary, to the extreme aft edge of the leech measured across the widest part of the headboard. If the widest point of the headboard is in doubt, the highest of the widest points shall be used. If no headboard is fitted, then HB shall be the dimension taken perpendicular to the luff of the mainsail, or its fair projection, to the extreme aft edge of the leech, or its fair projection, across the bearing surface of the head cringle or strop. Any stiffening used to extend the leech beyond a reasonable roach shall be added to HB. HB has as a limit the greater of $0.04 * E$ or 0.152m (0.5 ft.).

10.29 Top Batten Upper Limit – Determination of HB

Where the center line of a batten pocket is situated above the MGT leech measurement point, HB shall be measured as diagrammed below and recorded to the nearest cm (metric) or nearest tenth of a foot (imperial) as

for sails. A straight line extension of a line from the leech measurement point of MGT through the outer tip of the batten above MGT giving the greatest value for HB shall determine the aft measurement point for HB.



10.30 Mainsail Girths (MGT, MGU, MGM, & MGL).

10.30.1 MGT, MGU, MGM and MGL shall be the length of the girths of the mainsail taken at points 7/8, 3/4, 1/2 and 1/4 of the leech from the clew respectively, measured in accordance with 10.28. The values recorded for MGT, MGU, MGM and MGL shall be the largest to be found on any mainsail used on the boat.

10.31.2 ORR-MH a mainsail is rated on both its actual area and the vertical distribution of that area.

10.32 Mainsail weight (MSW).

MSW shall be the dry weight of the mainsail not including battens (see also 2.06.1). The value of MSW for any calculation shall be the smallest found on any mainsail used for racing.

10.33 Batten Adjustment

No device other than a normal leech line shall be employed to adjust the curvature of any batten.

RATED ELEMENTS OF THE AERODYNAMICS MODEL

Sail and rig dimensions are used by the Velocity Prediction Program to create an aerodynamic model of the sail plan and rig from which it calculates lift and drag factors to determine the heeling and propulsive force of the sails in different wind velocities and points of sailing.

10.34 Sail Plan Rated Areas.

For the purpose of the aerodynamic model, areas are calculated as follows.

10.34.1 Foretriangle: The area of the foretriangle is determined as $IM \cdot J/2$.

10.34.2 Jib: The area is determined as $JL \cdot LP/2 + 0.75 \cdot JR \cdot JLE$.

10.34.3 Spinnakers:

Asymmetric Spinnaker: For the purpose of the aerodynamic model, the area of an asymmetric spinnaker is determined as $ASL \cdot (0.5 \cdot ASF + 2 \cdot AMG)/3$.

10.34.4 Main Mainsail area is determined by trapezoidal integration of P, E, MGT, MGU, MGM, MGL and HB:

$$\text{Area} = (P/4 \cdot (E + MGL)/2) + (P/4 \cdot (MGL + MGM)/2) + (P/4 \cdot (MGM + MGU)/2) + (P/8 \cdot (MGU + MGT)/2) + (P/8 \cdot (MGT + HB)/2)$$

Where the value for any girth has not been recorded, the cORR-MHesponding girth limit is substituted.

10.35 Foretriangle Height (IM).

$$IM = (IG + IG \cdot (GO - MW)/(J - GO + MW))$$

10.36 Longest Perpendicular of Jibs, Rated (LP).

LP shall be taken as the greatest of LPG + FSP or J.

10.43 Rated Limits

For the purpose of calculating the aerodynamic model, the following limits apply.

10.43.1 IM: shall not be taken as less than $0.65 \cdot (P + BAS)$.

10.37.2 J: J shall not be taken as less than $IM/4$.

10.37.3 LP: LP shall not be taken as less than J.

10.37.4 Minimum Jib Area: Jib Area (10.40.2) of a boat's largest jib shall not be taken as less than Foretriangle Area (10.40.1).

10.37.5 Minimum Spinnaker Area: Spinnaker area shall not be taken as less than:

$$\text{Minimum area} = 1.1875 \cdot (ISP^2 + TPS^2)^{0.5} \cdot SPL$$

This minimum area is the same as a spinnaker with $SL = 0.95 \cdot (ISP^2 + SPL^2)^{0.5}$ and $SMW = SF = AMG = ASF = 1.5 \cdot (SPL \text{ or } TPS)$."

10.37.6 ISP-ISPA ISP shall not be taken as less than IG on masthead boats or "normal" fractionally rigged boats. ISPA shall not be taken as less than IG on fractionally rigged boats that have masthead and fractional attachment points for spinnakers and/or genoas.

10.38 Aerodynamic Drag of Masts.

The aerodynamic drag of the masts shall be taken into account by the Velocity Prediction Program and will be determined from the Effective Height of Mainmast (EHM), the Effective Diameter of Mainmast (EDM).

10.39 Aerodynamic Drag of Rigging and Spreaders.

The aerodynamic drag of the rigging is calculated by deriving an effective diameter from the rigging default weight (see 7.25.6), divided by the specific gravity of steel and four times IM. This value is then multiplied by IM

to obtain an effective rigging windage area which is corrected to take into account the effect of spreaders. Where the mast does not have bona fide spreaders, the drag for spreaders is omitted and that for rigging reduced.

10.40 Effective Height of Mainmast (EHM).

EHM is the greater of P + BAS or IM

10.47 Effective Diameter of Mainmast (EDM).

$$EDM = (0.5*(EHM-TL)*(MDT1+MDL1)+0.25*TL*(MDT1+MDL1+MDT2+MDL2))/EHM$$

For the purpose of calculating EDM, the following limits apply:

MDL1 shall not be taken as greater than MDL1max.

MDL1max shall equal the lesser of $0.036*(RM25*IG)^{0.25}$ or $2*MDT1$.

MDT1 shall not be taken as greater than $(0.036*(RM25*IG)^{0.25})*(MDT1/MDL1)$.

MDL2 shall not be taken as greater than $2*MDT2$.

Where the measured value of MDL1 exceeds MDL1max, the value of any excess shall be added to the mainsail girths MGL, MGM, MGU and MGT for the purpose of calculating mainsail area (see 10.42.4).

Where, in the taper of any mast presented for measurement and built after 1/1/97, a hollow is found in the fore and aft profile (see **TH** on the Certificate), EDM shall be calculated as follows:

$$EDM = (0.5*(EHM-TL)*(MDT1+MDL1)+0.25*TL*(MDT1+MDT2+2.2*MDL2))/EHM.$$

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APPENDIX 1 - ORR-MH RATING CERTIFICATE

APPENDIX 2 - MEASUREMENT TRIMS CONDITION CHECK LIST & INVENTORY

This check list is intended to help the owner and measurer prepare the yacht for measurement and to document measurement inventory items.

Each item will be initialed by the owner and measurer. The completed document will be returned to the US Offshore Office for retention.

The boat shall be dry, in light ship condition, and fully rigged without crew. The details of paragraphs 5.02.2, 5.02.3, 5.02.4, 5.02.6, 8.01.2 have precedence if discrepancies exist with this list.

No equipment, gear or other items are to be aboard during measurement.

Boat Name: _____ Sail Number: _____	Initials	
	Owner	Measurer
Measurement Trim - Equipment/gear included and required to be aboard (5.02.3):		
1. Internal ballast, if any, securely installed.		
2. Batteries securely installed.		
3. Fixed and/or essentially permanent interior accommodation, hatch covers, floor boards installed.		
4. Fixed and/or essentially permanent machinery, electrical and plumbing systems installed.		
5. Outboard motor when it is stowed aboard in appropriate stowage installed.		
6. Mast, boom, spinnaker pole and/or sprit, if any, fully rigged as for racing. - Masts raked aft to the limit of their adjustment. - Mast (P/PY) band and boom (E/EY) band PAINTED on. - Spinnaker pole not on board if not used for inclining. (8.01.2)		
7. Boom running rigging and any vang, fitted complete as for racing. - Booms secured at the low points of P and PY. - Booms horizontal and on the centerline.		
8. Standing rigging / fittings, fitted complete as for racing, attached in their normal positions.		
9. Running rigging and fittings, fitted complete as for racing. - All halyards as for racing. - Running rigging, halyards, lifts forward of mast taken to mast foot and hauled tight. - Running rigging abaft the mast taken to their aftermost position and hauled tight. - All halyard tails taken to their normal working positions. - If halyard weight varies significantly along its length, the tail shall be on the cabin floor during inclining, with the halyard fully hoisted and attached to a light messenger line.		
10. Rudder, wheel/tiller and steering gear, fitted complete as for racing.		
11. Keel and any bulb, fitted complete as for racing.		

12. Centerboard(s) and drop keels fitted and fully raised. - If locked when racing, it shall be so locked and the locking device shall be in place.		
13. Fixed electronics, instruments, compasses, lights, antennas, masthead devices. installed.		
14. Pulpits, stanchions and lifelines fitted.		
15. Hydraulic systems, including hydraulic tanks, full.		
16. Mattresses / cushions (dry) and permanently installed table, doors in their normal position.		
17. Permanently installed stoves, heaters or other electrical devices fitted.		
Measurement Trim - Additional items to be checked:		
1. ALL toilets, bowls, sinks, etc. DRY .		
2. ALL bilges, sumps and other possible areas where liquid may collect DRY .		
3. ALL lockers, drawers, cabinets, refrigerator/freezers, storage areas, shelves, etc. EMPTY .		
Measurement Trim - Equipment/gear excluded (5.02.4):		
1. NO crew or personnel on board..		
2. NO liquid in any tank (except hydraulic systems as above) or in any voids in the keel or any other appendage. - Fuel tank to be as EMPTY as possible (recommended) or FULL .		
3. NO sails, including storm and emergency sails.		
4. NO sheets, guys or other running rigging, except as in 5.02.3.; repeated in 6 - 9 above.		
4. NO blocks, winch handles, etc. or other portable deck, rig or sail handling equipment.		
5. NO portable safety or emergency gear of any type or category, including fire extinguishers, liferaft(s), emergency tiller, etc.		
6. NO decorative throw or sleeping pillows or any other bedding, towels, etc.		
7. NO cooking or eating utensils: pots, pans, plates, glasses, cutlery, etc.		
8. NO compressed gas bottles: propane/LPG. CNG, etc.		
9. NO portable heaters.		
10. NO food or stores.		
11. NO tools, spares or stores.		
12. NO clothing or personal effects.		
13. NO miscellaneous portable equipment or gear, books, navigation tools, etc.		
14. NO anchors, chains or rodes, of any type.		
15. NO fenders, dock lines, mooring lines or any other cordage.		
16. NO outboard engines without appropriate stowage.		
17. NO portable fuel containers.		

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Measurement Inventory						Initials		
1. Internal Ballast								
	Description	Weight	Dist fm Stem	Ht above WL	Owner	Meas.		
a								
b								
c								
d								
e								
f								
2. Batteries								
	Description	Weight	Dist fm Stem	Ht above WL	Owner	Meas.		
a								
b								
c								
4. Engine			Manufacturer	Model				
5. Tanks	Use	Type	Capacity	Condition	Dist fm Stem	Ht above WL	Owner	Meas.
a								
b								
c								
d								
e								
f								
3. Miscellaneous (boiler, air-conditioning, heating etc.)								
	Description	Weight	Dist fm Stem	Ht above WL	Owner	Meas.		
a								
b								
c								
d								

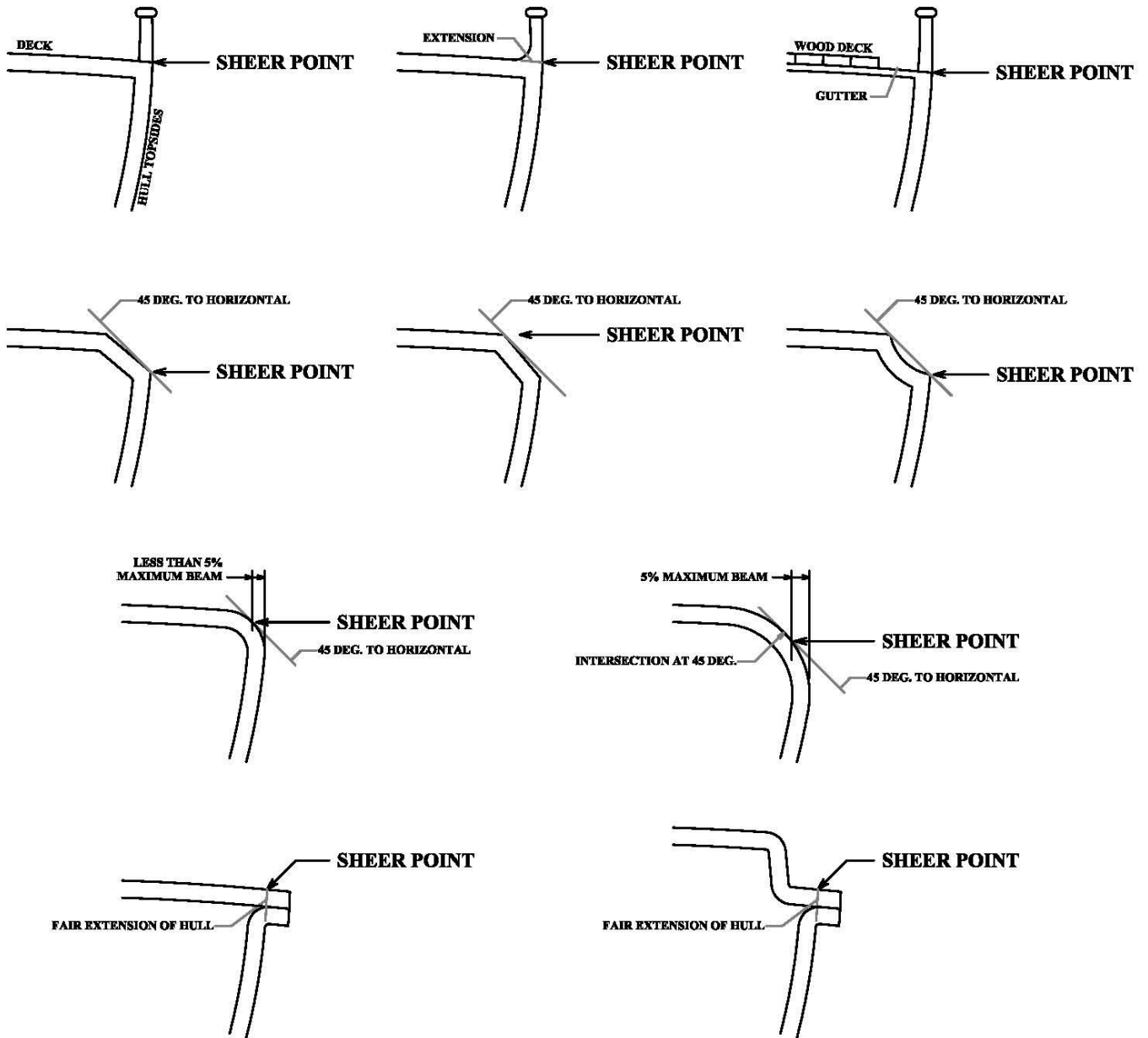
Additional Items to be Weighed and Inventoried			Initials		
Description			Weight	Owner	Meas.
a	Anchor (one only):				
b	Anchor chain and rode:				
c	Tools (max 15 lbs. / 6.8 kg):				
d	Safety equipment:				
	- PFDs				
	- Harnesses				
	- Emergency signaling				
	- Ditch bag				
	- EPIRB				
	- Throwable PFB/MOM/Lifesling				
	- First aid kit (one only)				
	- Fire Extinguishers				
e	Deck equipment:				
	- One set of sheets and guys and any				
	- Running rigging not carried permanently on spars				
	- Winch handles				
	- Deck blocks (max four)				

Signatures:

Owner: _____ Date: _____

Measurer: _____ Date: _____

APPENDIX 3 - Various Sheer Points



APPENDIX 4 - RULES AND PROCEDURES FOR RACE ADMINISTRATION

Unless otherwise prescribed by the Sailing Instructions, the following shall apply to races conducted under the ORR-MH.

1. Pre-race Inspection or Measurement.

When, as a result of any pre-race inspection or measurement, it is determined that a boat does not conform to its ORR-MH certificate:

- a) When the nonconformance is considered to be minor and can be easily corrected, the boat may be brought into conformance with her certificate, or, when necessary, a new certificate may be issued.

The measurer appointed for the series shall report all such corrections to the protest committee.

- b) When the protest committee considers that the nonconformance is major (even if it can be corrected) or that it cannot be corrected without requiring significant remeasurement, they shall act in accordance with RRS.

2. During a Race or Series.

When, as a result of an inspection, measurement, or protest during a race or series, it is determined that a boat does not conform to its certificate, the facts shall be referred to the protest committee which shall act in accordance with the RRS.

- a) When the nonconformance is considered to be minor (whether or not the boat is issued with a new certificate), the original certificate shall be considered valid throughout the race or series.
- b) When the nonconformance is not considered to be minor the boat shall receive a 50% place penalty in any race in which her rating was incorrect.
- c) When a boat's Certificate is withdrawn by a Rating Authority the matter shall be referred to the protest committee which shall act in accordance with the RRS and may disqualify the boat from all races in the series or take such other action as it deems proper.
- d) The results of a race or series shall not be affected by measurement protests lodged after the prize-giving or such other time as the Sailing Instructions shall prescribe. Nothing in this paragraph shall bar action under the RRS concerning a boat deliberately altered.

3. General.

- a) When a boat is checked at an event or as a result of a protest, the measurement shall be checked using the rule as it was in effect at the time of measurement upon which the certificate is based (see 6.03 for hull re-measurement).
- b) The Rating Authority in whose waters the boat is racing would normally be the "authority qualified" referred to in the RRS to resolve questions involving ORR-MH certificates. A protest committee considering a protest involving an ORR-MH certificate may submit questions to the Rating Authority which shall provide all reasonable advice and assistance to resolve the protest. The measurements resulting from a protest re-measurement shall be used to issue any new Certificate.

4. Investigation and Reporting of Rating Irregularities.

- a) When, as a result of an action in a race or series or the withdrawal of a certificate by a Rating Authority, a boat is remeasured and her resulting General Purpose Handicap (GPH) is faster by 0.75% or more, the boat's National Authority shall investigate the circumstances and report its findings to the ORA which may take such further action as it deems proper.
- b) Race and protest committees are asked to report all actions arising under 1(b), 2(b) and 2(c) above to the ORR-MH Chief Measurer. Such reports may be made through the National Authority of the organizing authority.

5. Other Actions.

This Appendix only concerns actions with respect to boats. It does not limit in any way the rights and responsibilities of race and protest committees and of National Authorities to investigate or act with respect to individuals.

APPENDIX 5 - ADMINISTRATIVE RATING PROTESTS

1. The Offshore Racing Association shall be the Rating Authority referred to in the World Sailing Rules to resolve questions involving ORR-MH Certificates. A protest committee considering a protest involving an ORR-MH certificate may submit questions to that Rating Authority which shall provide all reasonable advice and assistance to resolve the protest.
2. Administrative Protests.
 - a) The administrative protest procedure permits protests involving a boat's certificate without regard to whether the boat was racing. An administrative protest shall be lodged with the Rating Authority in whose water the boat is lying.
 - b) Any person or organization which has a valid interest in a boat's certificate may lodge an administrative protest, provided that:
 - The protest is in writing and is signed and dated by the protestor;
 - The protest includes a detailed description of the alleged defects and a full statement identifying the protestor as having a valid interest;
 - The protest is accompanied by a copy of the certificate of the boat being protested and the address and telephone number of the protested boat's owner;
 - The protest includes a statement of the issues the protestor wishes to have resolved, identification of the applicable rules and any relevant evidence.
 - c) The owner of the protested boat shall file a reply with the Rating Authority as soon as possible. If he elects to concede the protest or refuses to cooperate in providing for re-measurement when required, the Rating Authority shall invalidate the boat's certificate and so advise all concerned; including the local organization within whose jurisdiction the boat normally races.
 - d) The Rating Authority may consult or refer the matter to the ORR-MH Chief Measurer for advice and assistance. It shall make its decision based on the available evidence and may order re-measurement of the boat in whole or in part (see 6.03 for hull re-measurement).
 - e) The decision of the Rating Authority shall determine any measurement and processing costs of deciding the protest and determine which party will pay, as follows:
 - When the ORR-MH General Purpose Handicap (GPH) of the protested boat is faster than the protested GPH by not more than 0.25%, the protestor will be responsible for the measurement and processing costs. The filing fee will not be counted toward payment of costs.
 - When the ORR-MH GPH is faster than the protested GPH by more than 0.25%, the measurement and processing costs will be borne (or shared) by the owner or the boat's Revalidating Authority depending upon the determination of responsibility for the defect. The filing fee will be returned to the protestor.

3. Redress from Actions of the Rating Authority.
 - a) When an owner believes that his boat's certificate is being withheld unreasonably or that any related actions of the Rating Authority are unreasonable, he may seek redress by following the applicable procedures set out in 2. Administrative Protests above, stating the relevant facts and the relief or redress requested.
 - b) The Rating Authority concerned shall appoint a committee to investigate, hear, and decide on the request following the procedures of the World Sailing Racing Rules. In the event that there is reasonable doubt as to the interpretation or application of the ORR-MH, the ORA Chief Measurer shall be the "authority qualified" to resolve such questions.