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Class Rules

International Tornado Class Association

The Tornado was designed in 1966 by Rodney March as a high-performance catamaran for competitive sailing and was adopted as an International Class in 1967. It served as Olympic multihull class from 1976 until 2008.

sport / nature / technology

World Sailing
Class Association

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INTRODUCTION

This is a one-design class. The intention of these rules is to ensure that the boats are as alike as possible in all respects affecting performance. Everything that is not actually stated as permitted or optional shall be prohibited.

Hulls, Hull Appendages, Rigs and Sails are measurement controlled. Variations are permitted within the specifications in "Section F – Rig" and "Section G – Sails".

Tornado hulls and masts shall be manufactured for sale by licensed manufacturers.

A Tornado shall be equipped in accordance with "Section C- Conditions for Racing" of these class rules.

Owners and crews should be aware that compliance with rules in Section C is NOT checked as part of the hull and mast certification process.

Rules regulating the use of equipment during a race are contained in Section C of these class rules, in ERS Part I and in the Racing Rules of Sailing.

This introduction only provides an informal background, and the International Tornado Class Rules begin on the next page.

PART I – ADMINISTRATION

Section A – General

A.1 LANGUAGE

A.1.1 The official language of the class is English and in case of dispute over translation the English text shall prevail.

A.1.2 The word “shall” is mandatory and the word “may” is permissive.

A.1.3 Except where used in headings, when a term is printed in “**bold**” the definition in the ERS applies and when a term is printed in “*italics*” the definition in the RRS applies

A.2 ABBREVIATIONS

A.2.1 WS World Sailing
MNA WS Member National Authority
ITA International Tornado Association
NTA National Tornado Association
ERS Equipment Rules of Sailing
RRS Racing Rules of Sailing

A.3 AUTHORITIES

A.3.1 The international authority of the class is the World Sailing which shall co-operate with the ITA in all matters concerning these **Class rules**.

A.3.2 Notwithstanding anything contained herein, the **certification authority** has the authority to withdraw a **certificate** and shall do so on the request of the World Sailing.

A.3.3 The World Sailing and the ITA accept no legal responsibility in respect of these class rules or any claim arising there from.

A.4 ADMINISTRATION OF THE CLASS

A.4.1 World Sailing has delegated its administrative functions of the class to MNAs. The MNA may delegate part or all of its functions, as stated in these **class rules**, to the ITA.

A.4.2 In countries where there is no MNA, or the MNA does not wish to administrate the class, its administrative functions as stated in these class rules shall be carried out by the ITA which may delegate the administration to an NTA.

A.4.3 **Official measurers** or **international measurers** who carry out **certification control** and/or **equipment inspection** of the Tornado class shall be registered with the ITA.

A.5 WORLD SAILING RULES

A.5.1 These **class rules** shall be read in conjunction with the ERS and RRS.

A.6 CLASS RULES CHANGES VARIATIONS

A.6.1 World Sailing Regulation 10.11 applies.

A.7 CLASS RULES AMENDMENTS

A.7.1 Amendments to these **class rules** shall be proposed by the ITA and are subject to the approval of the World Sailing in accordance with the World Sailing Regulations.

A.8 CLASS RULES INTERPRETATION

A.8.1 Interpretations of **class rules**, except as provided by A.8.2, shall be made in accordance with World Sailing Regulations.

A.8.2 In the event of a conflict between the text of a **class rule** and Section H.1 Official Plans or the measurement form, the text of the class rule shall take precedence.

A.9 INTERNATIONAL CLASS FEE AND WORLD SAILING PLAQUE

A.9.1 The licensed **hull** builder shall pay the International Class Fee, which shall be 3% of the builder's selling price (without VAT) for a standard Tornado without sails, on every pair of **hulls**, or **hull** kit, built whether or not the boat is subsequently measured and registered.

A.9.2 Half of the amount of the International Class Fee shall be paid on any single **hull** built for replacement or other purpose.

A.9.3 The ITA shall, having received the International Class Fee, send two numbered World Sailing Building plaques and a measurement form to the licensed **hull** builder.

The plaques shall be permanently affixed to the hull transoms by the builder prior to delivery to the owner.

A.9.4 An official International Class Fee receipt shall be issued to the builder by the Association. These shall be numbered consecutively.

A.9.5 The International Class Fee receipt shall be delivered by the builder to the owner on delivery of the **hulls**, or **hull** kit.

A.10 SAIL NUMBERS

A.10.1 **Sail** numbers shall be issued by the MNA, unless otherwise delegated per A.4.1 or A.4.2.

A.10.2 **Sail** numbers shall be issued in consecutive order starting at “1”.

A.10.3 No two **boats** in the class registered in the same country shall have the same **sail** number.

A.10.4 Personal **sail** numbers that are issued in compliance with RRS G.1.1(c) and registered with the ITA are permitted.

A.11 HULL CERTIFICATION

A.11.1 A **certificate** shall record the following information:

(a) Class

(b) **Certification authority**

(c) Sail number issued by the **certification authority**

(d) Owner

(e) **Hull** identification

(f) Builder/Manufacturers details

(g) Date of issue of initial **certificate**

(h) Date of issue of **certificate**

A.11.2 Templates used for certification shall be issued by World Sailing.

A.12 INITIAL HULL CERTIFICATION

A.12.1 For a **certificate** to be issued to hulls not previously **certified**:

(a) **Certification control** shall be carried out by an **official measurer** who shall complete the appropriate documentation.

(b) The documentation and certification fee, if required, shall be sent to the **certification authority.**

(c) Upon receipt of a satisfactorily completed documentation and **certification** fee, if required, the **certification authority** may issue a **certificate.**

(d) Payment for the **official measurer's** service is the responsibility of the boat owner.

A.13 VALIDITY OF CERTIFICATE

A.13.1 A **certificate** becomes invalid upon:

(a) the change to any items recorded on the **hull certificate** as required under A.11.

(b) the date of expiry.

(c) any structural alteration, replacement of components or **repair** to the hulls other than permitted routine **maintenance.**

(d) any alteration to **corrector weights** (see C.6.1 WEIGHT).

(e) withdrawal by the **certification authority.**

(f) the issue of a new **certificate.**

A.14 HULL RE-CERTIFICATION

A.14.1 The **certification authority** may issue a **certificate** to previously **certified hulls**:

(a) when it is invalidated under A.13.1(a), (b), (c), or (d) after receipt of the old **certificate**, and **certification fee** if required

(b) when it is invalidated under A.13.1 (e), at its discretion

(c) in other cases, by application of the procedure in A.12

A.15 RETENTION OF CERTIFICATION DOCUMENTATION

A.15.1 The **certification authority** shall:

(a) retain the original documentation upon which the current **certificate** is based

(b) upon request, transfer this documentation to the new **certification authority** if the **hulls** are exported.

Section B – Boat Eligibility

For a boat to be eligible for racing, the rules in this section shall be complied with. **Certification control** and **equipment inspection** shall be carried out in accordance with the **ERS** except where varied in this part.

B.1 CLASS RULES AND CERTIFICATION

B.1.1 It is the responsibility of the owner to see that the **boat**, its **spars**, **sails** and equipment are correctly measured and to ensure that they thereafter comply with the **class rules**.

B.1.2 The **boat** shall:

(a) be in compliance with the **Class Rules.**

(b) have a valid **hull certificate**.

(c) have a valid **mast certificate**.

(d) have valid **certification marks** as required.

(e) have a completed, signed and dated Measurement Form.

B.1.3 A **certificate** may be refused even if the specific requirements of the **class rules** are satisfied. The **official measurer** shall report on the Measurement Form anything which he considers, departs from the intended nature of the design on the **boat**, and shall not sign the Form. A copy of the incomplete Form together with a full explanation of the points in question shall be immediately sent to the ITA Secretariat and the World Sailing for a ruling in writing.

B.1.4 A **boat** may be disqualified or have its **certificate** withdrawn if low resistivity is found, which the **official measurer** believes cannot be explained by normal metal fastenings or fittings.

B.1.5 All certified boats shall be liable to re-measurement at the discretion of the **certification authority** or by an international jury constituted in accordance with the RRS at an event, but only by an **official measurer**. Any **boat**, remeasured and found not to comply with the **class rules**, may be disqualified.

B.2 FLOTATION CHECKS

B.2.1 The **hulls** shall carry a satisfactorily flotation check confirmation.

B.3 CLASS ASSOCIATION MARKINGS

B.3.1 A valid class association sticker, if required by the ITA or and NTA, shall be affixed to the **hull** in a conspicuous position.

B.3.2 The **sail** number and national letters of the **boat** shall be indelibly marked in letters with minimum height of 50mm on to the outside of the port transom.

B.4 NON-COMPLYING BOATS

B.4.1 **Boats** built using prohibited materials shall remain non-compliant. However, they shall be permitted to race in the club, local or international events for evaluation purposes, provided that they are registered with ITA (not the MNA) and also provided:

1) Both **hulls** are indelibly marked on the outside of the transoms with a letter `X' and with a number allocated by the ITA.

2) The mainsails have a letter `X' of size and position in accordance with boat the **class rules**. The letter `X' shall be either in addition to or instead of national letter(s).

B.4.2 The International Class Fee as stated in A.9 shall be paid in respect of each experimental **boat** although such a **boat** remains non-compliant.

PART II – REQUIREMENTS AND LIMITATIONS

The **crew** and the **boat** shall comply with the rules in Part II when *racing*. In case of conflict Section C shall prevail.

The rules in Part II are **closed class rules**, where anything that is not specifically allowed in **Class Rules** is prohibited.

Equipment control and **equipment inspection** shall be carried out in accordance with the ERS except where varied in this Part.

Section C – Conditions for Racing

C.1 GENERAL

C.1.1 RULES

(a) The ERS Part I – Use of Equipment shall apply.

(b) The Appendix C - ITA Championship Rules shall apply.

(c) RRS 49.1 is changed as follows:

Competitors may use trapeze systems to position their bodies outboard. When using a trapeze system, a competitor shall keep at least one of his feet in contact with the hull.

(d) RRS 55.4 shall not apply.

C.1.2 LIMITATIONS

(a) After **equipment inspection** at an event, **Modifications** permitted in these rules require the approval of the Event Technical Committee

C.2 CREW

C.2.1 LIMITATIONS

(a) The **crew** shall consist of two persons.

C.2.2 MEMBERSHIP

During all International events each **crew** member shall be a current member of the ITA.

C.3 PERSONAL EQUIPMENT

C.3.1 MANDATORY

(a) For use:

(i) Each **crew** member shall wear at all times when racing, a **personal floatation device** to the minimum standard ISO 12402-5, or USCG Type III, or AS 4758 Level 50 or equivalent. Inflatable buoyancy vests are not permitted.

C.3.2 OPTIONAL

(a) For use:

(i) **Crew harnesses** of maximum 2.4kg for each **crew** member.

(ii) Each **crew** member may carry a cutting device with a blade length of no more than 150mm.

(iii) Each **crew** member may wear a helmet that shall be to the minimum standard EN1385, EN1077, EN 966, ASTM 2020, Snell S98 or equivalent.

C.4 ADVERTISING

C.4.1 LIMITATIONS

(a) Advertising shall only be displayed in accordance with World Sailing Advertising Code.

(b) For the purpose of the World Sailing Advertising Code, the **gennaker** shall be deemed a **spinnaker**.

(c) The area above the 4th batten of the **mainsail** shall be kept free of competitor advertising and shall be reserved for the Class Insignia and national flag, as specified in C.10.

C.5 PORTABLE EQUIPMENT

C.5.1 OPTIONAL

(a) For use:

(i) Boat heading function in one device using magnetic input. If digital/electronic, the device with magnetic input may combine and store boat heading direction together with wind shift detection and timing functions.

(ii) The device display letters and numerals shall be not more than 30 mm high and show only;

- boat heading (damping may be adjusted manually),
- Calculated wind direction determined from manual input and adjustment of tacking angles manually for windshift detection,
- time,
- race timing information,
- identification,
- battery condition, system error, adjustment and calibration.

(iii) Magnetic compasses having no electronics

(iv) Camera recording equipment and attachments and/or race tracking equipment (GPS) where permitted by the Notice of Race and/or Sailing Instructions.

(v) Spare parts, tools, shockcord, rope, blocks, rings, and plastic balls.

C.6 BOAT

C.6.1 WEIGHT

(a) The minimum total weight of the Assembled Hulls, Hull Appendages, and Rig, as defined in Sections D, E, & F of these class rules, shall be 155 kg, when in dry condition.

C.6.2 CORRECTOR WEIGHTS

(a) **Corrector weights** of lead shall be fastened to the inside of the dolphin Striker (V Bar) at locations avoiding the intersection of the front cross beam and the dolphin striker rod and shall be removable for the purposes of measurement when the **boat** weight, as specified in C.6.1, is less than the minimum requirement. The location must allow application of event limitation marks and allow visual inspections.

(b) The total corrector weight shall not exceed 5kg. This shall apply to **boats** first registered after February 1977.

C.6.3 FLOTATION

(a) The builder shall **certify** that the **boat** with full racing equipment, and with both hulls swamped, shall support 160kg. If the **boat** is found at any time not to comply with this requirement, the **certificate** shall be invalid.

C.7 HULL

C.7.1 FITTINGS

(a) Use

(i) Any device for adjusting the main beam strut or tie shall remain locked while racing.

C.8 HULL APPENDAGES

C.8.1 FITTINGS

(a) **Rudder** retention devices

(b) **Rudder** pins or pintles

(c) **Rudder** gudgeons

C.8.2 LIMITATIONS

(a) Only two **centreboards** and two **rudders** shall be used during an event, except when a hull appendage has been lost or damaged beyond **repair**. Such replacement may be made only with the approval of the race committee. The race committee shall then remove or cross out any **event limitation mark** attached to the replaced hull appendage.

(i) The two **centreboards** shall be fitted in the **centreboard** cases, one in each **hull**.

(ii) The two **rudders** shall be hung on the transoms, one on each transom

(iii) The **rudder** retention devices shall retain the **rudders**, in the event of capsize.

(iv) The **rudders** shall, when fore/aft, be in the centreplane of each **hull**.

C.9 RIG

C.9.1 MODIFICATIONS, MAINTENANCE AND REPAIR

(a) The **rig** shall not be altered in any way except as permitted by these class rules

C.9.2 FITTINGS

(a) **Forestay** tension/rake adjustment device or fitting

(b) **Shroud** tension/rake adjustment devices or fittings

C.9.3 LIMITATIONS

(a) Only one set of **spars** and **standing rigging** shall be used during an event, except when an item has been lost or damaged beyond **repair**.

(b) Replacement may be made only with the approval of the race committee. The race committee shall then remove or cross out any **event limitation mark** attached to a replaced **spar**.

C.9.4 MAST

(a) For use:

1) The **mast** shall be stepped on the centreline of the boat

2) When stepped, the **mast datum point** shall be not more than **90mm** above the top of the main beam.

3) The vertical centreline shall intersect the main beam in any position to which the **mast** may be rotated.

4) There shall be a mechanical stop to prevent the **tack** of the mainsail from coming below the upper edge of the **lower limit mark**.

C.9.5 BOOM

SPARE NUMBER

C.9.6 BOWSPRIT

(a) Use

1) The **bowsprit** shall be attached to the main beam either on the front edge or the underside at the center of the beam.

2) The **bowsprit** shall be fixed in a fore and aft position and stayed from the **gennaker** tack block position and it's mid-section to the hulls. It shall not be adjusted while racing.

3) The **bowsprit** may be attached to the forestay by means of a forestay extension strut.

4) The **bowsprit** tip shall not be moved off the centreline while racing.

C.9.7 STANDING RIGGING

(a) Use

1) **Standing rigging** shall not be adjusted while racing.

C.9.8 RUNNING RIGGING

(a) Use

1) **Running rigging** shall be led externally to the **mast**.

2) Except as limited in C.9.8.a.1 above, **running rigging** may be led at the option of the **crew**.

C.10 SAILS

C.10.1 LIMITATIONS

(a) The **sail** plan shall consist of 1 **mainsail**, 1 **jib** and 1 **gennaker**.

(b) 1 **mainsail**, 1 **jib** and 1 **gennaker** shall be used during an event, except when a **sail** has been lost or damaged beyond **repair**. Such replacement may be made only with the approval of the race committee. The race committee shall then remove or cross out any event limitation mark attached to a replaced **sail**.

(c) Tell tales are permitted; their number, placement, and materials are optional.

C.10.2 MAINSAIL

(a) IDENTIFICATION

The Class Insignia, national letters and **sail** numbers shall comply with the RRS Appendix G except where specified otherwise below.

(1) The Class insignia shall conform to the dimensions and requirements as detailed in RRS Appendix G and as specified in Figure 1 below. The Class Insignia shall be placed back-to-back with the ‘tail’ aft. This amends RRS Appendix G1.3(b).

(2) The national letters and numbers which are on the same side of the sail shall be applied according to the dimensions as defined in Figure 1.

(3) Personal sail numbers that are issued in compliance with RRS G.1.1(c) and registered with the ITA are permitted.

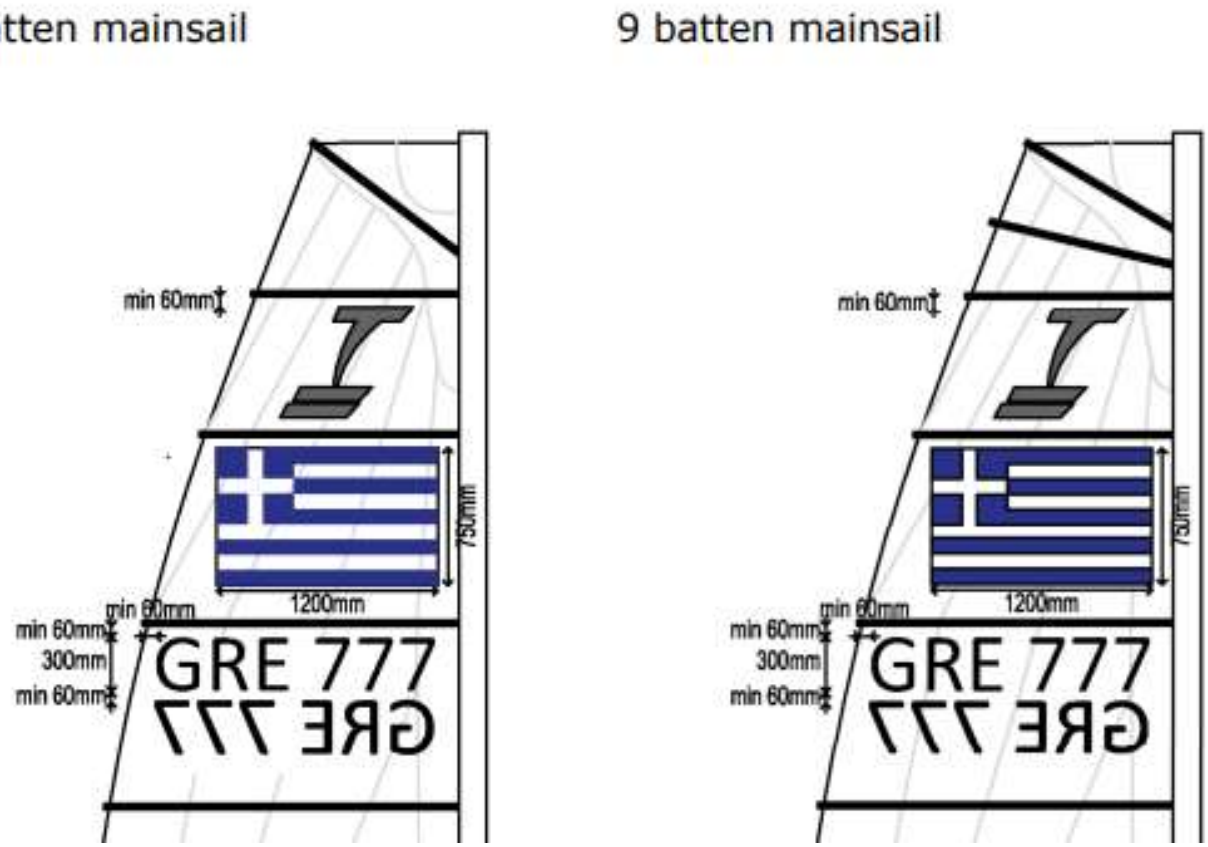


Figure 1. Mainsail Identification

(b) NATIONAL FLAGS

At International events, the national flag corresponding to the national letters shall be applied on the starboard side of the mainsail specified in Figure 1 above. The national flag is optional at all other events.

The flag shall be nominally 1200mm wide x 750mm high, positioned approximately central on the panel.

(c) USE

1) The **sail** shall be hoisted on a halyard. The arrangement shall permit hoisting and lowering of the **sail** at sea.

2) The **luff** bolt rope shall be in the **spar** sail groove.

3) The **sail** shall not have a **double luff** or other fairing device.

4) The **sail** shall be set within the **limit marks** on the **mast**.

5) The **sail** shall be loose footed.

C.10.3 JIB

(a) USE

1) The **sail** shall be set on the forestay.

2) The **tack** shall not extend more than 500mm below the intersection of the **forestay** with the **forestay** strops. A device shall be used to prevent adjustment of the **tack** below this point

C.10.4 GENNAKER

(a) USE

1) The **sail** shall be set between the **mast** and **bowsprit**.

Section D – Hulls

D.1 PARTS

D.1.1 MANDATORY

(a) **Hulls**

(b) Front Beam

(c) Rear Beam

(d) Trampoline

D.1.2 OPTIONAL

(a) Bulkheads

(b) Sub-decks

D.2 GENERAL

D.2.1 RULES

(a) The **hulls** shall comply with the **class rules** in force at the time of initial **certification**.

D.2.2 CERTIFICATION

(a) See Rule A.13

D.2.3 MODIFICATIONS, MAINTENANCE AND REPAIR

(a) The **hulls**, bulkheads, and sub-decks shall not be altered in any way except as permitted by these **class rules**.

(b) Holes for the installation of fittings may be made in the deck; such holes shall not be bigger than necessary to attach the fitting.

(c) **Maintenance** such as filling, **sanding**, painting and polishing is permitted without re-measurement and re-**certification.**

(d) Limited by compliance with class rule E.3, **fairing** the forward bottom end of the **centreboard** slot to fit the leading edge of the **centreboard** is permitted without re-measurement and re-certification.

D.2.4 DEFINITIONS

(a) The **hull** datum point shall be the centre of the hole in template No. 5, when template No. 5 is placed as described in D.6.4.a.ii.

D.2.5 IDENTIFICATION

(a) Each **hull** shall carry the World Sailing Plaque permanently placed on the transom.

D.2.6 BUILDERS

(a) Professional builders of the Tornado shall be only those recognised and registered by the World Sailing; and **hulls**, or **hull** kits shall only be built for sale by these builders.

(b) Recognition shall be subject to review and withdrawal by World Sailing. Professional builders shall be required to satisfy the World Sailing through the ITA and the relevant National Authority of their competence to build the Tornado.

(c) Additional professional builders may be recognised by World Sailing at the recommendation of the ITA and the relevant National Authority, provided that a requirement can be shown for an additional source.

(d) Bona fide amateur builders shall be permitted to build not more than one **boat** a year, and this **boat** shall be for their own use.

D.3 HULLS

D.3.1 MATERIALS

(a) The **hulls** shall be made only of one or more of the following materials: wood, glass fibre, foam plastics, plastic fibres with a modulus of elasticity less than 100.000 kg/cm2, resins, paints, glues and metal fastenings.

(b) Aramid (Kevlar) or other high modulus core materials require prior approval of World Sailing. The criteria for permitting these materials shall include: structural properties, cost, and durability

(c) Metal fastenings shall be of stainless steel or aluminum.

D.3.2 CONSTRUCTION

(a) The skin shall not project beyond the transoms, which shall be flat and square across the **hulls**

(b) The **centreplane** of each hull and its **centreboard** case shall coincide.

(c) Each **hull** shall have

1) one **shroud** attachment point on the outer topsides
2) one **forestay** strop attachment point
3) one **bowsprit** attachment point

D.3.3 DIMENSIONS

(a) The **hulls** shall be inverted. The bow template shall be applied with the projections touching the skin, and:

1) Template No. 5 shall be positioned 5 meters from the aft edge of the bow template and shall touch the skin at the keel and be equidistant from the **sheerlines**.
2) The bow template shall be adjusted to bring the inscribed datum line in coincidence with a base line, which shall be horizontal and pass through the datum point at the centre of the hole in template No. 5.
3) The remaining measurement templates shall be positioned 0, 1, 2, 3.3 and 4.2 metres from the aft edge of the bow template. Each template shall touch the skin at the keel and at each station the template shall be equidistant from the **sheerlines**.

(b) Each of the templates positioned 0, 1, 2, 3.3, 4.2 and 5 meters from the aft edge of the bow template shall touch the **hull** at, either the centerline inscribed on the template, or within the raised section on the template, and on both sides of the inscribed centreline.

(c) The base line shall pass through the holes in the templates and shall clear template positions 1, 2, 3.3 and 4.2.

(d) The **sheerlines** at all stations shall not be above or below the tolerance marks on the templates.

(e) The major axis of the sections shall be parallel to the sheer.

(f) With the deck crown template normal to the deck and square across the **hull**, the clearance between deck and template shall be not more than 5mm except in way of recesses or pads for ports and fittings

Hulls inverted and horizontal, with templates in place, the clearance between skin and:	Minimum	Maximum
stem template		10mm
any template above central projection		10mm
central projection of template position 0		3mm

central projection of templates positions 1; 2; 3.3; 4.2 and 5 (per D.6.4.b)		2mm
Aft most point of hull to aft end of bow template	5085mm	5096mm
Aft surface of the transom, at **sheerline** level, forward of the aft most point of the **hull**	30mm	50mm
Hulls - upright and assembled		
Difference between deck centreline separation and keel centreline separation immediately aft of main beam		10mm
Deck centreline separation	2610mm	2630mm
Difference between diagonal lengths, measured from the tip of each bow to the aft edge of the opposite transom at the inner sheerlines		25mm
Clearance between deck and template at any point along length of **hull**		5mm
Radius at **sheer**, measured perpendicular to both the deck and the topside datum, as inscribed on the bow template	3095mm	3115mm
Aft edge of main beam from stem head length plate		
Forward edge of rear beam from stem head length datum, as inscribed on the bow template	5324mm	5344mm
Shroud attachment point distance aft of aft most edge of main beam, measured along the **sheer** to the point of intersection with the plane of the **shrouds**	708mm	728mm
Distance between the outer surface of shroud chain plate and the outer surface of the topside		15mm
Forestay strop attachment point forward of aft edge of main beam	1965mm	1980mm
Forestay strop attachment points from **sheerline**		50mm
The main beam and rear beam lower surfaces below the inner **sheerlines**	25mm	35mm

D.4 BEAMS

D.4.1 PARTS

(a) MANDATORY

1) Main beam
2) Main Beam Strut and Tie
3) Mast step
4) Aft Beam

(b) OPTIONAL

1) Main and rear beam bulkheads
2) Main and rear end caps

D.4.2 MATERIALS

(a) The main beam and rear beam extrusions shall be made of aluminum alloy.

(b) The strut and the tie shall be made of either stainless steel or aluminum.

(c) The materials for beam attachment straps and compass holders are optional.

D.4.3 CONSTRUCTION

(a) The main beam and rear beam shall each be one continuous straight tube of constant section along their lengths.

(b) The main beam shall be oval in section with a common radius front and rear.

(c) A rear beam extrusion incorporating an integral mainsheet track shall only be permitted if the design has been submitted to and approved by World Sailing.

(d) An aluminum or epoxy composite bulkhead casting is permitted inside the main beam at the position of the mast step.

(e) Aluminum longitudinal or transverse bulkheads are permitted at any point within the main and rear beams.

(f) The **mast** step shall be in a fixed position. (Not a jack or adjustable)

(g) Holes for the installation of fittings may be made in the beams; such holes shall not be bigger than necessary to attach the fitting.

(h) The ends of the main and rear beams shall be perpendicular to their length.

(i) The main beam shall be fitted with a strut and tie

1) The tie shall be flat stock, the leading edge of which may be rounded but not sharpened.

2) The strut shall be of circular cross-section.

D.4.4 DIMENSIONS

Main Beam	Minimum	Maximum
Wall thickness	2mm	2,35mm
Major Diameter	130mm	135mm
Minor Diameter	90mm	91mm
Corner Radius	45mm	
Strut diameter	24mm	
Deflection w/o **mast** being stepped		15mm
Tie thickness	3mm	
Tie leading edge radius		1,5mm
Distance of underside of the tie below the strut	235mm	255mm
Distance of junction of tie and main beam from centreline	1000mm	1100mm

Rear Beam	Minimum	Maximum
Wall thickness, excluding traveller track	2mm	2,35mm
Major Diameter	130mm	135mm
Minor Diameter w/o traveller track	89mm	91mm
Minor Diameter w/ traveller track	106mm	108mm

D.5 TRAMPOLINE

D.5.1 MATERIALS

(a) Materials for the trampoline are optional, except that Aramid (Kevlar) or any similar fiber shall not be used.

D.5.2 CONSTRUCTION

(a) A single trampoline shall cover the area between the main beam, rear beam and inner **sheerlines**. The trampoline may be wrapped around the beam to form a sleeve, which shall not incorporate any padding.

(b) Lacing eyes are permitted.

(c) Holes are allowed in the trampoline.

1) The area of each hole shall be taken as the area of the enclosing rectangle. This area shall exclude the total area of the spaces that accrue between the woven elements, the warp and the weft, of the trampoline.

2) The intersection of warp and weft shall not be knotted, welded, or in any

other way treated to space the warp and weft apart 16 Tornado Class Rules 2015 Version 1.0

(d) A gennaker bag is permitted. If it is integrated into the trampoline and has an opening in the top of the trampoline, it shall be considered a bag and is not subject to Rule D.5.2 (a), and is not included in the area limitation of Rule D.5.2 (d).

(e) Storage bags or pouches, subject to Rule D.5.2 (a), are permitted and are not included in the area limitation of Rule D.5.2 (d).

D.5.3 DIMENSIONS

	Minimum	Maximum
Gap around the trampoline perimeter	-	130mm
Total area of holes in trampoline	2mm	0,1sqm
Distance of trampoline and any lacing from the nearest surface of the beam	-	185mm

D.6 ASSEMBLED HULLS

D.6.1 CONSTRUCTION

(a) The **hulls** shall be joined by a main beam and a rear beam without fairings.

(b) There shall be no beam or strut attached to the **hulls** other than the main beam and rear beam and there shall be no beam or strut connecting the main beam and rear beam.

(c) The main beam and rear beam shall be let into the deck and rigidly attached to the **hulls**; but shall be easily removable.

(d) There shall be no trampoline or other covering whatsoever in front of the main beam or behind the rear beam except that the trampoline material may be wrapped round the beams. The trampoline shall not overlap the inner **sheerlines** of either **hull**.

(e) Sealing strips of any suitable material for the **centreboard** slots are permitted.

(f) A mainsheet traveller system is permitted if the traveller runs in a substantially straight line vertically and horizontally along the rear beam only. The track shall be considered to be substantially straight if the departure from a straight line is not more than 10mm.

(g) A jib sheet traveller system is permitted to be attached to the main beam. The jib traveller system is free of material restrictions

(h) The line of each half of the **forestay** strop shall not pass above the inner sheerlines when the **boat** is rigged.

D.6.2 FITTINGS

(a) MANDATORY

1) **Shroud** attachment fittings
2) **Forestay** strop attachment fittings
3) **Bowsprit** attachment fittings
4) Trampoline attachment fittings

(b) OPTIONAL

1) Foot loops, toe straps, trapeze gear, and any line for retaining **crew** position on the boat.
2) **Centreboard** retention fittings
3) **Running rigging** blocks, fairleads, and cleats
4) Compass holders

5) Inspection hole(s) provided that the watertight integrity of the hulls is maintained, and covers are capable of resisting accidental dislodgement.

Section E – Hull Appendages

E.1 PARTS

E.1.1 MANDATORY

(a) **Centreboards**

(b) **Rudders**

(c) Tillers

(d) Tiller connecting bar

E.1.2 OPTIONAL

(a) Tiller extension

E.2 GENERAL

E.2.1 RULES

(a) **Hull appendages** shall comply with the **class rules**.

E.2.2 MODIFICATIONS, MAINTENANCE AND REPAIR

(a) **Hull appendages** shall not be altered in any way except as permitted by these **class rules**.

(b) **Maintenance** such as filling, **sanding**, painting and polishing is permitted without re-measurement and re-certification.

E.2.3 CERTIFICATION

(a) An **official measurer** shall **certify** the **centreboards** and **rudders**.

(b) No **certification** is required for tiller connecting bars and tiller extensions.

E.2.4 MANUFACTURERS

(a) No license is required.

E.3 CENTREBOARDS

E.3.1 RULES

(a) **Centreboards** shall comply with the current **class rules**.

E.3.2 MATERIALS

(a) The **centreboards** shall be made only of one or more of the following materials: wood, glass fibre, foam plastics, plastic fibres with a modulus of elasticity less than 100.000 kg/cm2, resins, paints, glues and metal fastenings

(b) The pivot bushing materials are optional

E.3.3 CONSTRUCTION

(a) The **centreboards** shall have no moving parts.

(b) The cross-section of each **centreboard** shall be symmetrical about its fore and aft **centreline**.

(c) The pivot point in the **centreboard** shall be aft of the line of the underwater leading edge of the centreboard.

(d) Each **centreboard** shall be capable of being raised completely so that the **centreboard** does not project below the line of the bottom of the hull.

(e) The central plane of the **centreboard** case shall coincide with the central plane of the hull.

E.3.4 FITTINGS

(a) Pivot bushings

E.3.5 DIMENSIONS

	Minimum	Maximum
Centreboard height from head to tip	1150mm	
Centreboard thickness at any point		29 mm
Centreboard thickness at keel line	25mm	29mm
Centreboard width measured from forward corner to aft corner		600 mm
Distance aft of pivot point from leading edge E.3.3.c		100mm
With **centreboard** fully lowered		maximum
Distance from aft end of bow template to intersection of keel line and **centreboard** leading edge	2465mm	2485mm
Clearance of the underwater profile of each **centerboard** from the **centreboard** template, both ends of which shall touch the hull at the **centreline** of the bottom of the **hull**	0mm	10mm

E.3.6 WEIGHTS

	Minimum	Maximum
The weight of each centreboard		5 kg

E.4 RUDDERS & TILLERS

E.4.1 LIMITATIONS

(a) **Rudders** and Tillers shall comply with the current **class rules**.

E.4.2 DEFINITIONS

(a) The forward top edge of the template shall be on the centreline of the bottom of the **hull** or the extension of that line.

(a) The leading edge of the **rudder** shall not be in front of the transom at the centreline of the bottom of the hull.

E.4.3 MATERIALS

(a) Materials for the **rudder** blade are optional, except that Aramid (Kevlar) or any similar fiber shall not be used.

(b) Materials for **rudder** heads, **tillers**, and **tiller** connecting arm are optional.

(c) Metal fastenings shall be of stainless steel or aluminum.

E.4.4 CONSTRUCTION

(a) **Rudder** blades shall pivot to the full down position.

E.4.5 FITTINGS

(a) Mandatory

1) 2 gudgeons

2) 2 pins or pintles

3) 2 rudder retention fittings

(b) Optional

1) Pivot and pivot lock fittings

E.4.6 DIMENSIONS

	Minimum	Maximum
Clearance of the profile of each **rudder** blade from the rudder blade template, measured with rudder in fully down, centred fore-and-aft position	0 mm	10 mm
Distance from the face of the transom to the pivot line of the **rudder**		50 mm

E.4.7 WEIGHTS

	Minimum	Maximum
The minimum weight of each complete **rudder** assembly comprising blade, stock and tiller	3 kg	

SECTION F – RIG

F.1 PARTS

F.1.1 MANDATORY

(a) **Mast**

(b) **Boom**

(c) **Bowsprit**

(d) **Standing Rigging**

(e) **Running Rigging**

F.1.2 OPTIONAL

(a) **Bowsprit**-to-**forestay** extension strut

(b) **Gennaker** retrieval system

F.2 GENERAL

F.2.1 RULES

(a) The **mast** and its fittings shall comply with the **class rules** in force at the time of **certification** of the **mast.**

(b) The **boom**, **bowsprit**, standing and running **rigging** shall comply with the **class rules.**

F.2.2 MODIFICATIONS, MAINTENANCE AND REPAIR

(a) **Spars** shall not be altered in any way except as permitted by these **class rules.**

(b) Holes for the installation of fittings may be made in the **mast spar**; such holes shall not be bigger than necessary to attach the fitting.

(c) **Spars** may be painted, varnished, anodized, powder coated or coated in any way depending on their materials with a protective or UV protective coat provided that it does not change the bend characteristics of the **spar**.

(d) **Maintenance** is permitted without re-measurement and re-**certification.**

F.2.3 CERTIFICATION

(a) An **official measurer** shall **certify** the **mast.**

(b) Each **mast** shall have a permanent, unique, and clearly visible identifying code on the starboard side of the mast **spar.**

(c) No **certification** is required for the **boom**, **bowsprit**, standing and running **rigging.**

F.2.4 MANUFACTURER

(a) **Mast** manufacturers shall be licensed by World Sailing.

(b) All **mast** moulds shall be approved by World Sailing.

(c) No licence is required for the manufacture of **booms**, **bowsprits**, standing and running **rigging.**

F.3 MAST

Aluminium **Masts** built before 1 December 2004 are not governed by this section F.3 **Mast.** See instead, Section III, Appendix B – Aluminium **Masts.**

F.3.1 MATERIALS

(a) **Mast Spars** and **spreaders** shall be made of commercial grade HT T600 or T700 carbon fibres.

(b) The materials for a **mast** tiller are optional

F.3.2 DEFINITIONS

(a) The **mast datum point** shall be the lowest point of the **mast spar**.

(b) The **sail** groove heights shall be measured from the **mast datum point**.

(c) The mast **spar** taper point shall be at the forestay **rigging point**.

(d) The diamond stay height shall be the distance between the **mast datum point** and the diamond stay upper **rigging point**.

(e) The diamond stay lower **rigging point** shall be measured from the **mast datum point**.

(f) The diamond stay upper and lower **rigging points** shall be positioned fore and-aft by measuring from the aft edge of the **mast spar**.

(g) The **spreader rigging** points shall be positioned for-and-aft by measuring from the aft edge of the **mast spar**.

(h) The location of the **mast** tiller is optional and may be either above or below the gooseneck.

F.3.3 CONSTRUCTION

(a) The mast **spar** shall include a fixed **sail** groove, which shall be integral with the **spar** and shall be of the same material.

(b) The mast **spar** shall have one web.

(c) The mast **spar** shall be adequately sealed against water between the **upper limit mark** and **lower limit mark**.

(d) The **mast spar** cross-section dimensions shall be constant from the **mast datum point** to the **mast spar** taper point.

(e) The **mast spar** shall be tapered along the leading edge from the **mast spar** taper point to the **upper point**.

(f) The **mast spar** taper shall be constant from beginning to end.

(g) The **mast spar** taper cross-section dimensions shall be measured at the **upper point**.

(h) The **mast spar** shall have a stainless steel through-bar tapped into the **mast spar** section to provide the **spreader rigging points**. This through-bar shall be centred on the centreline of the **mast spar**.

(i) The upper end of each diamond stay shall be attached to this through-bar by means of a 6mm stainless steel bolt on each side of the **mast spar**.

(j) The **mast spar** shall have a stainless steel through-bar tapped into the **mast spar** section to provide the diamond stay upper **rigging points**.

(k) The **mast spar** base shall be fitted with a 10mm stainless steel centre bolt to provide the diamond stay lower **rigging point**. Diamond stay tension shall be adjusted by turning this centre bolt.

(l) The gooseneck fitting shall be fastened to the **mast spar** with the upper edge of the gooseneck fitting in line with the **lower point**. The gooseneck fitting shall prevent the sail from coming below the **lower point**.

(m) A **mast** tiller fitted to the **mast** shall be removable. The **mast** tiller location is optional.

(n) The **mast spar** may have integral reinforcement sufficient for mounting the gooseneck, Cunningham cleats, **gennaker** halyard cleat, or **mast** tiller.

(o) The lower part of the carbon **mast spar** tube may be reinforced with a ring-shaped construction of carbon fibers or stainless steel. The reinforcement shall start at the lowest part of the carbon **mast spar** and have a maximum

length of 50mm and a maximum thickness of 5mm. Sharp edges shall be rounded. Along it's height to the top, tapering of the reinforcement to the original mast surface is allowed.

F.3.4 FITTINGS

(a) Mandatory:

1) one pair of foil section **spreaders** with round adjustable rake arms and fittings
2) one masthead fitting, which shall include the mainsail halyard sheave and locking device
3) **gennaker** halyard guide
4) **gennaker** halyard block with attachment
5) gooseneck fitting
6) heel fitting
7) diamond stay attachment fittings
8) diamond stay adjustment fittings

(b) Optional:

1) **mast** tiller
2) mechanical wind indicator(s)
3) **mast** may have reinforcement pads at fitting attachment points

F.3.5 DIMENSIONS

	Minimum	Maximum
Upper point height		9294mm
Lower point height	379mm	
Forestay height	7230mm	7240mm
Sail groove lower point height	758mm	762mm
upper point height	838mm	842mm
Shroud height	7230mm	7240mm
Diamond stay **height**	6698mm	6702mm
lower **rigging point**	-31mm	-35mm
upper **rigging point** fore / aft location	60mm	64mm
lower **rigging point** fore / aft location	40mm	45mm
Trapeze height	7230mm	7240mm
Spreader		
length, measured from the centre of the attachment hole for **rigging point** to inner edge of the bearing surface for the diamond stay	394mm	
height, measured to the **spreader rigging point**	3398mm	3402mm
distance between port and starboard **rigging points**	95mm	97mm
rigging point fore / aft location	111mm	113mm
Gennaker		
hoist height		8180mm
halyard bearing surface distance from **mast spar**		100mm
Gooseneck fitting height above **datum point**	375mm	379mm
Mast **spar** fore-and-aft dimension	134mm	135,5mm
Mast **spar** transverse dimension	72mm	73mm

Distance from fore side of the **mast spar** to aft side of **mast spar** web	115.8mm	117.3mm
Mast **spar** taper fore-and-aft dimension	98mm	99mm
Mast **spar** taper transverse dimension	56mm	57mm
Mast **spar** taper divergence from string line	-0,5mm	0,5mm
Mast **spar** deflection when loaded with 50 kg at the diamond stay upper **rigging point**		
Transverse:		
at **gennaker hoist height** + - 20mm	53mm	57mm
at diamond stay height + - 20mm	102mm	106mm
at **spreader height** + - 20mm	94mm	98mm
Fore-and-aft:		
at **gennaker hoist height** + - 20mm	21mm	25mm
at diamond stay height +- 20mm	41mm	45mm
at **spreader rigging point** +- 20mm	38mm	42mm

F.3.6 WEIGHTS

(a) The **mast** shall be weighed for **certification** in a horizontal position supported at the **lower point** and the **upper point.**
1) with mandatory **mast fittings** attached
2) with diamond stays attached
3) with Cunningham lines coiled at the **mast** heel

	Minimum	Maximum
Mast tip	6.3kg	
Mast	14.4kg	

F.4 BOOM

F.4.1 MATERIALS

(a) The boom **spar** shall be made of an aluminium alloy.

(b) The boom **spar** maybe be anodized, painted or powder coated

F.4.2 CONSTRUCTION

(a) The **boom spar** shall be an inherently straight continuous extrusion of constant section throughout its length.

F.4.3 FITTINGS

(a) The following fittings are permitted:
1) Mainsheet system
2) **Clew** attachment
3) Outhaul system
4) Gooseneck attachment
5) **Mast** rotation controls

F.4.4 DIMENSIONS

	Minimum	Maximum
Boom spar, excluding fittings, shall pass through a circle of diameter		100mm

F.5 BOWSPRIT

F.5.1 MANUFACTURER

(a) Manufacturer is optional.

F.5.2 MATERIALES

(a) **Bowsprit** materials are optional.

(b) **Bowsprit** spar stay materials are optional.

(c) **Bowsprit**-to-forestay extension strut materials are optional

(d) **Gennaker** retrieval system materials are optional.

F.5.3 CONSTRUCTION

(a) The forward end of the bowsprit spar shall be plugged or capped, and blunt.

F.5.4 FITTINGS

(a) MANDATORY

1) **Gennaker tack** block

2) Stays from the **bowsprit spar gennaker tack** block position and the **bowsprit** mid-section to the **hulls**

3) Attachment point fittings for the jib **tack** and/or jib **luff** tension

(b) OPTIONAL

1) Attachment point fittings for the **bowsprit**-to-forestay extension strut and jib sheet.

2) A **gennaker** retrieval system may be attached to the **bowsprit** or be integral to the construction of the **bowsprit**. It shall be suitable solely for the purpose of containing the **gennaker** and shall not violate rule **D.6.2.d.**

F.5.5 DIMENSIONS

	Minimum	Maximum
Bowsprit spar diameter	38mm	
Distance of bearing surface of the **gennaker tack** lead from the forward edge of the main beam, measured with the **gennaker halyard** pulled tight and the bowsprit fitted to the **boat** in its normal sailing position		4000mm

F.5.6 WEIGHT

	Minimum	Maximum
Bowsprit spar, **gennaker** retrieval system, fasteners, **tack** block, halyard/tack line block, internal tack line and brace stays	2,2kg	

F.6 STANDING RIGGING

F.6.1 MATERIALS

(a) The standing **rigging** shall be of stainless steel; and except for diamond stays rod **rigging** is not permitted.

(b) All **standing rigging** shall be circular in section and shall have no **fairings**.

(c) Diamond stays shall be of stainless-steel rod **rigging**.

F.6.2 PARTS

(a) MANDATORY

1) one **forestay**, **shroud**, and trapeze line **attachment** fitting

2) one **forestay**

3) one **forestay** strop, which shall lie on the centreline of the boat

4) one pair of **shroud** wires (2 shroud wires)

5) one pair of diamond stays (2 stays).

F.6.3 FITTINGS

(a) MANDATORY

1) **rigging** link or screw for each shroud
2) two 6mm rigging bolts for diamond stay upper ends
3) one 10mm centre rigging bolt for the diamond stay lower ends.

(b) OPTIONAL

1) **rigging** screws or turnbuckles
2) shackles
3) shroud adjuster plates
4) lashings

F.6.4 DIMENSIONS

	Minimum	Maximum
Diamond Stay Rod **Rigging** Diameter	2.9mm	3.1mm
Shroud, **Forestay**, and Forestay Strop Diameter	3mm	
Point of intersection of the lines of the **forestay** and each half of the **forestay** strop from a straight line joining the inner **sheerlines** where they intersect the plane of the **forestay** bridle. This measurement shall be taken with the **forestay** strop in a vertical plane and with an upward force of not less than 2kg and not more than 6kg applied vertically at the **centreline** of the **boat**.	838mm	

F.6.5 WEIGHT

	Minimum	Maximum
Forestay, **forestay** strop, **shrouds** and shackles, **rigging** links and shroud adjusters used to attach these to the **mast** and the **hulls**	1,7 kg	

F.7 RUNNING RIGGING

F.7.1 MATERIALS

(a) Materials are optional.

F.7.2 PARTS

(a) MANDATORY

1) Mainsail halyard
2) Mainsail sheet
3) **Jib** halyard
4) **Jib** sheets
5) **Gennaker** halyard
6) **Gennaker** sheets
7) **Gennaker tack** line
8) Trapeze lines
9) Cunningham lines

(b) OPTIONAL

1) **Mast** rotation control lines
2) All other running **rigging** is optional

F.7.3 FITTINGS

(a) **fitting** locations are optional
(b) **fitting** materials are optional
(c) blocks.

SECTION G – SAILS

G.1 PARTS

G.1.1 MANDATORY

(a) Mainsail

(b) Jib

(c) Gennaker

G.2 GENERAL

G.2.1 RULES

(a) **Sails** shall comply with the **class rules.**

(b) The ITA will accept proposals for new sailcloth materials to be added to "Appendix A – Approved Sailcloth List" once each year.

G.2.2 **MODIFICATIONS, MAINTENANCE** AND **REPAIR**

(a) **Sails** shall not be altered in any way except as permitted by these **class rules**.

(b) Routine **maintenance**, such as **repairing** minor tears, is permitted without re-measurement.

G.2.3 SAILMAKER

(a) No licence is required.

(b) The sailcloth manufacturer and sailcloth type of the **body of the sail** shall be indelibly marked near the **head point** by the sailmaker, together with the date and his signature or stamp.

G.2.4 CERTIFICATION

(a) An **official measurer** shall **certify** the **sails**.

(b) An MNA may appoint one or more persons at a manufacturer to **certify sails** built by that manufacturer in accordance with the World Sailing Inhouse Certification Guidelines.

G.2.5 SAIL ROYALTY LABEL

Sails certified after 21st January 2014 shall have permanently fixed at the tack, a class royalty label. Labels shall be purchased from the ITA and the label shall not be transferred from one sail to another.

G.3 MAINSAIL

G.3.1 MATERIALS

(a) The **body of the sail** and **secondary reinforcement** shall be of polyester **woven ply** and/or **laminated ply** listed in "Appendix A – Approved Sailcloth".

(b) **Primary reinforcement**, **batten pockets**, and tabling may be of any polyester woven ply and/or **laminated ply**.

(c) **Stiffening** may be of any material, except that Aramid (Kevlar) and carbon fibre are not permitted.

(d) **Windows** may be of any transparent polyester **ply**. The **ply** may have polyester reinforcement threads.

(e) **Attachments** may be of any material, except that aramid (Kevlar) or other high modulus tape or rope is permitted for reinforcement only within 80mm of the **luff.**

G.3.2 CONSTRUCTION

(a) The construction shall be: **Soft sail**, **single-ply sail**.

(b) The **sail** may have a maximum of ten (10) **batten pockets**.

(c) **Stiffening**

1) A maximum of ten (10) battens are permitted, which
   i) shall not be of more than 30mm in width
   ii) shall not protrude more than 100mm beyond the **leech** of the **sail**
   iii) shall have no moving parts
2) A headboard is permitted

(d) The following are permitted: Stitching, glues, tapes, Cunningham eye and/or block, **batten pocket** patches, batten pocket elastic, batten pocket end caps, **leech** line with cleat, **sail** shape indicator stripes and items as permitted or prescribed by other applicable rules.

(e) The **foot** shall not be convex.

(f) The **sail** shall be loose footed.

(g) The **leech** shall not extend aft of straight lines between the **batten pockets**. Any hollows in the **leech** between width measurement points shall be bridged with straight lines for measurement.

(h) The **sail** shall have least one window. Additional windows are permitted.

Window shape and size are optional provided that:

1) One **window** shall be of a size and shape that encloses a rectangle of minimum dimensions 800mm X 300mm. When so enclosed, the rectangle shall fit below a line 1500mm from, and parallel to, the **foot**.
2) The maximum height for any part of a **window** shall be a line 2000mm from, and parallel to, the **foot**.

G.3.3 DIMENSIONS

	Minimum	Maximum
Luff length	-	-
Leech length	-	8700mm
Top width	-	800mm
Quarter width	-	2260mm
Half width	-	2000mm
Three-quarter width	-	1500mm
Extension of headboard from **head point** in any direction		220mm
Sail reinforcement, measured from **sail corner measurement points**		
Primary reinforcement,		595mm
Secondary reinforcement		2380mm
Distance from point on **luff** 1300mm below **head** to nearest point on **leech**	-	1270mm
Luff Perpendicular	-	2355mm
Window safety rectangle height parallel to **foot**	-	1500mm
Window height parallel to **foot**		2000mm

G.4 JIB

G.4.1 MATERIALS

(a) The **body of the sail** and **secondary reinforcement** shall be of polyester **woven ply** and/or **laminated ply** listed in “Appendix A – Approved Sailcloth”.

(b) **Primary reinforcement**, **batten pockets**, and **tabling** may be of any polyester **woven ply** and/or **laminated ply.**

(c) **Stiffening** may be of any material, except that Aramid (Kevlar) and carbon fibre are not permitted.

(d) **Windows** may be of any transparent polyester **ply**. The **ply** may have polyester reinforcement threads.

(e) **Attachments** may be of any material, except that Aramid (Kevlar) or other high modulus tape or rope is permitted for reinforcement only within 80mm of the **luff**.

G.4.2 CONSTRUCTION

(a) The construction shall be: **Soft sail**, **single-ply sail**.

(b) **Sail reinforcement**

1) Chafing patches are permitted.

(c) The **sail** may have a maximum of three (3) **batten pockets**.

(d) **Stiffening**

1) a maximum of three (3) **battens** are permitted, which

i) shall not be of more than 20mm in width

ii) shall have no moving parts.

1) a corner board is permitted at the **clew**

(e) The following are permitted: Stitching, glues, tapes, Cunningham eye and/or block, corner eyes, zips, Velcro and sleeve **luffs**, **batten pocket** patches, **batten pocket** elastic, **batten pocket** end caps, **leech** line with cleat, **sail** shape indicator stripes and items as permitted or prescribed by other applicable rules.

(f) The **leech** shall in no place be convex.

(g) The **sail** shall have least one **window**. Additional **windows** are permitted. **Window** shape and size are optional provided that:

1) One **window** shall be of a size and shape that encloses a rectangle of minimum dimensions 400mm X 300mm. When so enclosed, the rectangle shall fit below a line 1000mm from, and parallel to, the **foot**.

2) The maximum height for any part of a **window** shall be a line 1500mm from, and parallel to, the **foot**.

G.4.3

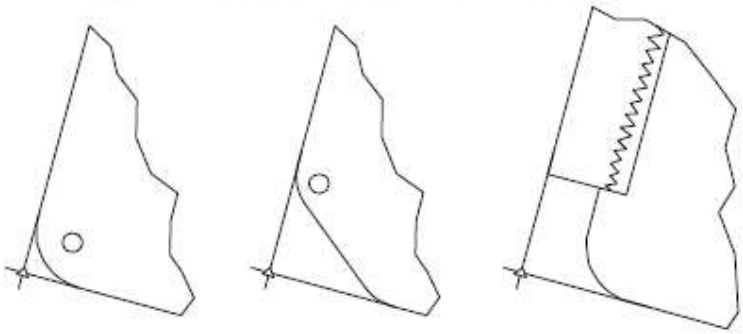
	Minimum	Maximum
Luff length	-	6300mm
Luff Perpendicular	-	1680mm
Foot round, as the maximum **perpendicular distance** from the straight line connecting the tack and clew points to the lowest point along the sail's foot edge.	-	80mm
Sail reinforcement, measured from **sail corner measurement points**		
Primary reinforcement		440mm
Secondary reinforcement		1760mm

If the width of the **sail** at the **head** exceeds 50mm, the **luff** length shall be measured by extending both the **luff** and **leech** lines until they intersect at a point where the **head** width is no more than 50mm. The distance from the **tack** to this intersection point shall be taken as the effective **luff** length.

The width at the **head** shall be measured at right angles to the **luff** through the highest point of the **sail** on the **luff** to the line of the **leech** extended if necessary.

Regarding the **foot** round measurement, if the **tack** and/or **clew** points are not distinctly defined by sharp corners, their positions shall be determined by extending the **foot** and **leech** edges as straight lines until they intersect to define the **clew** point, and by extending the foot and **luff** edges to define the **tack** point.

Examples of tack measuring point locations.



G.5 GENNAKER

G.5.1 MATERIALS

(a) The **body of the sail** and **secondary reinforcement** shall be of nylon or polyester **woven ply** listed in "Appendix A – Approved Sailcloth".

(b) **Primary reinforcement** and **tabling** may be of any nylon or polyester **woven ply**.

(c) **Attachments** may be of any material, except that Aramid (Kevlar) or other high modulus tape or rope is permitted for **reinforcement** only within 80mm of the **luff**.

G.5.2 CONSTRUCTION

(a) The construction shall be: soft sail**, single-ply sail**.

(b) **Primary** and **secondary reinforcement** is permitted at the **sail corners** and the recovery points.

(c) The following are permitted: Stitching, glues, tapes, corner eyes, recovery point eyes or webbing, and items as permitted or prescribed by other applicable rules.

(d) The number of recovery point eyes or webbing is optional.

G.5.3 DIMENSIONS

	Minimum	Maximum
Luff length	-	9150mm
Leech length	-	8050mm
Foot length	-	4250mm
Head to **Mid-foot point**	-	8750mm
Half width – as defined by ERS G.7.5(b)	-	3450mm

SECTION H - OFFICIAL PLANS & TEMPLATES

OFFICIAL PLANS

The set of Official Plans is comprised of:

1b - Construction details: (1 MAY 1968 amended 19 SEP 1968 and SEP 1975)
2b - Panel offsets and deck jig: (2 APR 1968 amended 27 FEB 1968 and SEP 1975)
3b - Details of fittings: (10 MAR 1968 amended 19 SEP 1968 and SEP 1975)
4a - Bulkheads, rudder, and centreboard: (4 APR 1968)
5a - Sail shape: (7 MAY 1968 amended SEP 1975)
6a - Details of stitch and glue: (15 APR 1968 amended SEP 1975)

OFFICIAL TEMPLATES

The set of Official Templates is comprised of:

1. Bow template
2. Deck camber template
3. Hull templates #s 0, 1, 2, 3.3, 4.2 and 5
4. Centreboard template; Rudder template

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PART III – APPENDICES

Appendix A - Approved Sailcloth LIST

MAINSAIL & JIB			
Manufacturer	**Cloth**	**Description**	**Weight/Film**
ANY	Woven Polyester	Single Ply/Woven Ply	3.8 oz/NA
Bainbridge	Diax 90 & 130 LSP	Pentex Laminate	1.5 mil
Challenge	MPX 06P	Pentex Laminate	1.5 mil & 2.5 mil
Conteder	APEN 06	Pentex Laminate	1.5 mil & 3.0 mil
Conteder	APEN 06, 09 & 12	Pentex Laminate	1.5 mil
Conteder	MAXX Pen 09 & 15	Pentex Laminate	1.75 mil
Dimension Polyant	PE 05, 10 & 15	Pentex Laminate	1.5 mil
Dimension Polyant	FLEX 8 & 13	Pentex Laminate	1.5 mil
GENNAKER			
Manufacturer	**Cloth**	**Description**	**Weight/Film**
Bainbridge	MP70	Nylon	N/A
Bainbridge	AIRX 650N, 700N, 720NS	Nylon / Polyester	N/A
Challenge	ELITE 40, 45 & PL42	Nylon	N/A
Conteder	DYNALITE/DYNAKOTE 75	Nylon	N/A
Conteder	SUPERKOTE 75, 80, & 90	Nylon	N/A
Dimension Polyant	7722 UCP	Polyester	N/A
Dimension Polyant	F50, F60, F75	Nylon	N/A

Sailcloth List Policies

1. Only general availability versions of the cloths will be permitted; exclusive versions for particular sail lofts will not be permitted.
2. Sailcloth manufacturers shall provide a sample of each cloth to the ITA.
3. Sailcloth manufacturers shall notify the ITA of any change in cloth production:
   a. The ITA will determine if the cloth will remain on the List
   b. If the cloth remains on the List, a new cloth sample shall be provided to the ITA prior to its use by Tornado sail makers

Grandfathering

1. Until 1 January 2007, sails made of sailcloth not [ever] listed in Appendix A - Approved Sailcloth may be used as follows:
   a. Sails measured, signed and dated prior to 1 January 2004 may be used without restriction
   b. Sails measured, signed and dated between 1 January 2004 and 1 December 2004
      i. and made of the following discontinued sailcloth may be used without restriction: Dimension Polyant 6611/6633 SCP and UCP 7722 SCP, or SCN 75 and 90

ii. and not covered by (b)(i) above, may be used except at Continental Championships, World Championships, Olympic Qualification Events, Pre-Olympic Test Events

2 Sails made of sailcloth that has been deleted from the Approved Sailcloth List are legal for use in competition without restriction, provided that:

a. the sail has made prior to the date that the sailcloth was deleted from the Approved Sailcloth List; and has been properly labelled as required by class rule G.2.4.b

b. the sail has been certified by an official measurer as required by class rule G.2.5

Appendix B – Aluminium Masts

Aluminium Mast Spars built before 1 December 2004:

1 Masts may be extruded only of aluminium alloys approved by World Sailing.

2 The mast shall be an inherently straight continuous aluminium alloy extrusion of constant section, with no cuts or added stiffening, such as to affect its stiffness or flexibility, with integral track, and of general shape shown in the diagrams. The exterior and interior surface shall be designed to be smooth. There shall be one web only, which shall be predominantly flat across the section. Dimension AC shall be not less than 132mm or more than 135mm and dimension DE shall be not less than 74mm or more than 76mm. The ratio of AB:AC shall not be less than 0.140 or more than 0.180. Dimensions AB and AC shall be measured from the aft edge of the extrusion "A", to forward surface of the web "B" or the forward surface of the extrusion "C". Dimension DE shall be measured externally. The wall thickness shall be not less than 1.8mm.

3 The extrusion may be tapered above a point 7190mm from the lower end of the mast extrusion and the track opened or cut away below a normally positioned sail entry point, but the shape shall be not otherwise altered.

4 Tapering shall be only achieved by cutting a single “V’ slot down the front of the section, closing it and making a single continuously welded butt joint. The girth of the mast at the bottom edge of the top measurement band shall be not less than 240mm and the taper shall not be allowed:

a. When viewed from the side, by more than 5mm from a string line stretched taut along the leading edge of the tapered section of the mast between the bottom edge of the top measurement band and the lower edge of the taper. This measurement shall be taken when the mast is horizontal with the major axis of the section horizontal.

b. When viewed from forward, by more than 3mm from a string line stretched taut along the side of the tapered section of the mast, at its widest points, between the bottom edge of the measurement band and the lower edge of the taper. This measurement shall be taken when the mast -is horizontal with the major axis of the section vertical.

5 The forestay and shrouds shall be attached to the mast at a single point, within 20mm of the extrusion surface and not more than 7180mm nor less than 7165mm from the lower end of the mast extrusion.

6 The trapeze wires shall be attached to the mast and not to the standing rigging. The attachment point shall be not more than 50mm from the attachment point for the shrouds and forestay and may be the same point.

7 The mast shall be stepped on the centreline of the boat and its vertical centreline shall intersect the main beam in any position to which the mast may be rotated.

8 A measurement band shall be painted round the mast with its top edge not more than 390mm nor less than 375mm from the lower end of the mast tube extrusion. A second measurement band shall be painted with its bottom edge not more than 8915mm above the sop edge of the first. (Measurement bands shall be in a colour contrasting with that of the spar).

9 When stepped, the lower end of the mast extrusion shall be not more than 90mm above the top of the main beam.

10 The mast shall be weighed in the following condition:

a. Spinnaker halyard sheaves, Spinnaker halyard guides, gooseneck, and base fittings, which rotate with the mast shall remain attached to the mast.

b. Running rigging and normally attached diamond rigging shall remain attached to the mast
c. Shrouds, forestay and trapeze wires and their shackles shall be removed from the mast.
d. Halyards shall be fully hoisted and their tails shall be coiled and attached to the mast heel.
e. Sail attachment fittings shall touch the upper halyard sheaves.

11 The mast, in the condition given in 14(i), shall weigh not less than 23kg.

12 With the mast in the condition given in 14(i), in a horizontal position supported at the bottom end of the extrusion and at the bottom edge of the top measurement band, the weight measured at the top band shall be not less than:
   a. 10.5kg for masts with internal jib halyards.
   b. 10.25kg for masts with external jib halyards and locking devices that are not connected to the mast in any way.

13 Mast jacks and adjustable mast steps are prohibited.

14 All masts manufactured from March 1st, 1997 shall be adequately sealed between the black bands to prevent water entering the section shown in the diagram as BC. All main halyards shall pass only up and down the mast track AB.

15 The bearing surface of the Spinnaker halyard lead shall be no higher than 1000mm above the bearing point of the forestay and shroud attachment point.

16 The mast shall carry one pair of diamond stays only, which shall be rigged below the hounds, and which shall pass over a spreader of unfaired round tube or rod of diameter 15mm minimum.

17 The diamonds shall be rigged between external tangs fastened to the outside of the mast. Diamond stays may be passed through a fairlead, permanently fixed to the mast above the lower tangs. The distance between the diamond attachment point on the upper tangs and the attachment point on the lower tangs, or the fairlead, shall not be less than 6000mm. The distance between the diamond attachment point on any tang and the nearest fastening of that tang to the mast shall be not more than 75mm.

18 The materials for spreaders are optional.

19 The points of intersection of the diamond wires and the spreaders shall be not less than 790mm apart measured in a straight line.

20 Rod rigging is not permitted.