INTERNATIONAL SAILING FEDERATION

STORM SAILS WORKING PARTY

November 2010

REPORT

To: the ISAF Offshore Special Regulations sub-Committee meeting at Athens

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Neil Mackley	**GBR**
David Lyons	
Thomas Nilsson	**NOR**
Jean-Baptiste Le Vaillant	**Sailmaker**

Nomenclature. *This report is written in terms of the current Offshore Special Regulations, where eg the word "jib" is used. However the sub-committee may decide to change the current terms to match those in the ERS (Equipment Rules of Sailing) and this is briefly discussed in paragraph 2.*

Terms of Reference

Minute 5 of the Offshore Special Regulations sub-committee Busan, 9th November 2009.

The Working Party had to consider:-

- submission SR 10-09 from the IRC Rating System following submission SR 04-08 from Norway proposing reductions in the sizes of storm and heavy weather sails

- submission SR 08-09 from the IRC Rating System regarding OSR 4.26.4 (mainsail capable of reefing to 40% or the carriage of a trysail) in Category 4

and to make recommendations to the OSR sub committee accordingly.

This report addresses the items raised in the above submissions and related issues brought up during the enquiry.

Summary of Recommendations

1	Retain current maximum S&HW sail sizes
2	Make available on ISAF web site results of research into optimum S&HW sail sizes
3	Consider ERS terminology but do not abandon established terms without good reason
4	Encourage use and demonstration of properly accessible trysail track or alternative system
5	Encourage use and demonstration of inner forestay for storm jib
6	Allow boats to have without penalty more than one storm jib
7	Encourage race managers to require storm sail demonstration before boats start in significant offshore races
8	Encourage boats to equip, as far as possible, with fully-coloured storm sails for improved SAR location
9	Review S&HW provisions in November 2012
10	Remove Category 4 from OSR 4.26.4(g)

1 Maximum areas

NOR submission 04-08 proposed substantial reductions in maximum areas for S&HW sails for all boats (storm trysail from 17.5% to 12%, storm jib from 5% to 3.5% and reduction of heavy weather jib from 13.5 to 10% of foretriangle height squared, and with luff no longer than ¾ of foretriangle height). The NOR proposals were based essentially on a consideration of wind pressure/sail area.

A significant body of opinion largely based on practical experience including that quoted in IRC submission 10-09 did not agree with the Norwegian proposals. In the analyses of the Hobart Race in 1998 when storm force winds were present there was no resulting recommendation either for or against an overall reduction in storm sail size.

After much consideration the WP concluded that the maximum sizes of S&HW sails should not be decided essentially on wind pressure/sail area calculations as proposed by NOR. The WP believes that there are other considerations including boat size and weight, righting moment, drag (windage), sail stretch, the physical arrangement of the sails and their handling and the amount of power needed to drive a yacht on the desired course in a variety of sea conditions which could or should be taken into account and which cannot, at least at present, be combined into one scale applicable to all boats.

Accordingly the WP has commissioned research into the foregoing by consultant Andy Claughton, Principal Research Engineer of the Wolfson Unit at Southampton University with the co-operation of the Offshore Racing Council which has kindly made data available. It is hoped that the results of this research will be available for the Athens meeting of the sub-committee.

The WP appreciates that righting moment is not a calculated feature of all rating rules and is therefore not readily available for all boats. Further it must be borne in mind that it is not only racing boats that use the OSRs but also cruising boats for which often only basic data is available. Nonetheless the WP believes that the research will be of interest to all sailors to help better understand the considerations in the selection of S&HW sails.

The WP recommends that this research, as well as a summary of that presented by NOR should be made available by ISAF on an information web site.

The WP considered carefully use of the term “storm” (starting at 48 knots in the Beaufort Scale – **Appendix E**) and the suggestion that many offshore yachts are equipped with storm sails which are really “gale sails”. However the WP notes that the words “heavy storms” are part of the definitions of OSR Categories 0 and 1.

Whilst the sub-committee could change the name of “storm sails” in OSR 4.26 to say, “severe weather sails” (“severe weather” does not have a defined wind speed) nonetheless the word “storm” will continue to feature in the definitions of categories 0 and 1 and the WP does not recommend changing the category definitions.

Further, replacement of the word “storm” by the words “severe weather” could encourage boats to plan only for gale conditions when storm conditions, although rarely encountered, may have to be faced.

The WP recommends that boats should be permitted without any penalty if they so wish for use in severe weather to carry more than one storm jib not exceeding the maximum dimensions in OSR 4.26.4(e). It may be noted that OSRs do not limit or prescribe the number of reefs in a mainsail and that some boats (eg Class 40) prefer to use a 4^{th} reef rather than a trysail.

The WP recommends that the sub-committee encourage boats to review their plans for storm management and engage in training and practice with S&HW sails in accordance with OSR 6.02.2 (storm sails), 6.02.4, 6.02.9 etc. and also that race managers be encouraged to require demonstrations of the use of storm sails as part of the qualification for significant offshore races.

The WP recommends that the sub-committee in November 2012 should review developments and experience in the design and usage of S&HW sails during the preceding period and take any further action considered appropriate.

2 ERS Terminology and methods for measurement of storm sails

The WP considers that the application of ERS terminology to the OSRs is a matter of policy for the sub-committee to decide. We have used ERS terms as much as possible but having regard for non-racing users we recommend that ERS terms (in bold italics below) together with further terms within the definitions of those terms should be included in OSR 1.03 Definitions etc.

In recommending slight changes to the measurement methods the WP is looking at more accuracy in accounting for leech curve -whether hollow or roach- and also, in the case of trysails defining a more stable reference (P & E) on the rig rather than a reference to the dimensions of another sail (eg the mainsail).

There is no reference to trysails in the current ERS and the sub-committee may wish to refer this for appropriate consideration.

3 Storm trysail

We propose the following text to replace the first sentence in 4.26.4 (c)

"A storm trysail which shall be capable of being sheeted independently of the boom with trysail area not greater that 17.5% mainsail hoist (P) x mainsail foot length (E). The storm trysail area shall be measured as (0.5 x ***leech length*** x shortest distance between ***tack point*** and ***leech***).

(existing second sentence to follow unchanged)

To apply to sails made in January 2012 and after."

4 HW and storm jib measurement

a) Most storm jibs do not have battens. It is desirable that the leech is cut with significant hollow to minimise leech hooking and flutter. The half width will thus be significantly less than 50% of LP. If this is not recognised in the calculation of area, a sailmaker may be tempted to reduce the leech hollow.

b) On some boats, the heavy weather jib also doubles as a staysail. It may then be cut with some roach on the leech supported by battens. If half width is not included in the calculation of area, the additional area generated by this roach will be unaccounted for.

We therefore propose to add after OSR 4.26.4 (b):

"Storm and heavy weather jib areas shall be calculated as:

(0.255 ***luff length*** x (***luff perpendicular*** + 2 x ***half width***))*

To apply to sails made in January 2012 and after."

5 Trysail track

A trysail is of little use unless the crew can easily set it in difficult conditions. The WP considered it desirable to strengthen the wording of 4.26.4 (j) (trysail track) and important to draw attention to the method of setting a trysail on a strop installed on the after side of the main mast. A proposed new wording and diagram are at **Appendix B**.

6 Inner forestay

The WP considered that advice should be included strongly recommending the value of setting a storm jib on an inner forestay. A proposed new wording and diagram are at **Appendix C**.

7 High Visibility

The WP considered that wherever possible storm sails should be made entirely of high-visibility material to help the SAR services and recommends revised wording for OSR 4.26.2 in **Appendix A**.

8 Cat 4 and ORC 4.26.4 (g) (IRC Submission 08-09)

Category 4 currently requires boats to have either mainsail reefing or to carry a trysail. The main purpose of a trysail (storm force) is clearly not appropriate in Cat 4 racing. If the need is to "get you home" all offshore boats have engines and virtually all have at least one jib. The WP therefore recommends that Cat 4 be removed from OSR 4.26.4 (g). Race managers can always add a requirement for a reefing main etc. if they so wish.

9 Reefing mainsail for short-handed sailors

The WP considered whether OSRs should include a strong recommendation to short-handed sailors to have at least 40% reefing in the mainsail but decided that, since there has been no request from short-handed sailors or their race organizers, such a recommendation was not appropriate.

9 Editorial

The WP has noticed that 4.26.3 (b) is repeated at 4.26.4 (i) and recommends that the second iteration should be deleted. However a new paragraph about an inner forestay is recommended in **Appendix C** to be inserted in this slot.

10 Publicising information about S&HW sails

The WP strongly recommends that ISAF should ask for the co-operation of the Councils of IRC and ORC in publicising the issues surrounding the selection and use of S&HW sails in order to help persons-in-charge, designers and sailmakers to make the most appropriate choice and to emphasise the value of training.

11 Acknowledgement

The WP wishes to thank the Norwegian Sailing Federation, the Royal Ocean Racing Club Rating Office, the Offshore Racing Congress, and many individual experts who contributed considerable time and effort to the subject of this Report in the cause of improvement to the Offshore Special Regulations and safety in offshore racing in general.

Alan Green
for the ISAF Storm Sails Working Party
November 2010.

Appendix A

4.26.2 (a) High Visibility

Present text

it is strongly recommended that every storm sail should either be of highly-visible coloured material (eg dayglo pink, orange or yellow) or have a highly-visible coloured patch added on each side; and also that a rotating wing mast used in lieu of a trysail should have a highly-visible coloured patch on each side.

Proposed text

It is strongly recommended that every storm sail should either be made of highly-visible coloured material (eg dayglo pink, orange or yellow) or when this is not possible should have on each side as large an area as practicable of highly visible colour; and also that a rotating wing mast used in lieu of a trysail should have a highly-visible coloured area on each side.

Appendix B

4.26.4 Trysail track

Present text

A trysail track should allow for the trysail to be hoisted quickly when the mainsail is lowered whether or not the mainsail is stowed on the main boom.

Proposed text with diagram on page 11:

"It is strongly recommended that a boat has either:

> *(a) a dedicated trysail track permanently installed with the entry point accessible to a person standing on the main deck or coachroof, or*
> *(b) a permanently installed wire stay on which to hank the trysail."*

Appendix C

Inner forestay for storm jib

The following new paragraph is recommended with the diagram in this Report page 12) (could replace deleted para 4.26.4 (i)):

It is strongly recommended that an inner forestay is provided either permanently installed or readily set up, on which to set the storm jib.

Appendix D

Norwegian proposals from NOR 04-08 and WP conclusions:-

1. The already decided reduced sizes of storm sails to be implemented from January 2010 - *not agreed*

2. Grandfathering of storm sails to January 2011 for boats with age or series date before January 2010. This gives ample time for existing boats to replace or recut old storm sails – *we have recommended a revised method for the measurement of S&HW sails made in or after January 2012..*

3. Heavy Weather to be defined as Fresh Gale Force 8 – *not agreed*

4. Reduction of heavy weather jib from 13.5 to 10% of foretriangle height squared, and with luff no longer than ¾ of foretriangle height, should also be decided for implementation 2011, in order to better fill the ”void” between storm sails and other sails. To be strong enough for Heavy Weather as defined above – *not agreed*

5. The OSR should strongly recommend, that for boats with an inner forestay, storm and heavy weather jibs should be set to that stay, in order to improve the balance of the sail plan – *agreed, also that yachts should be encouraged to have an inner forestay for this purpose*

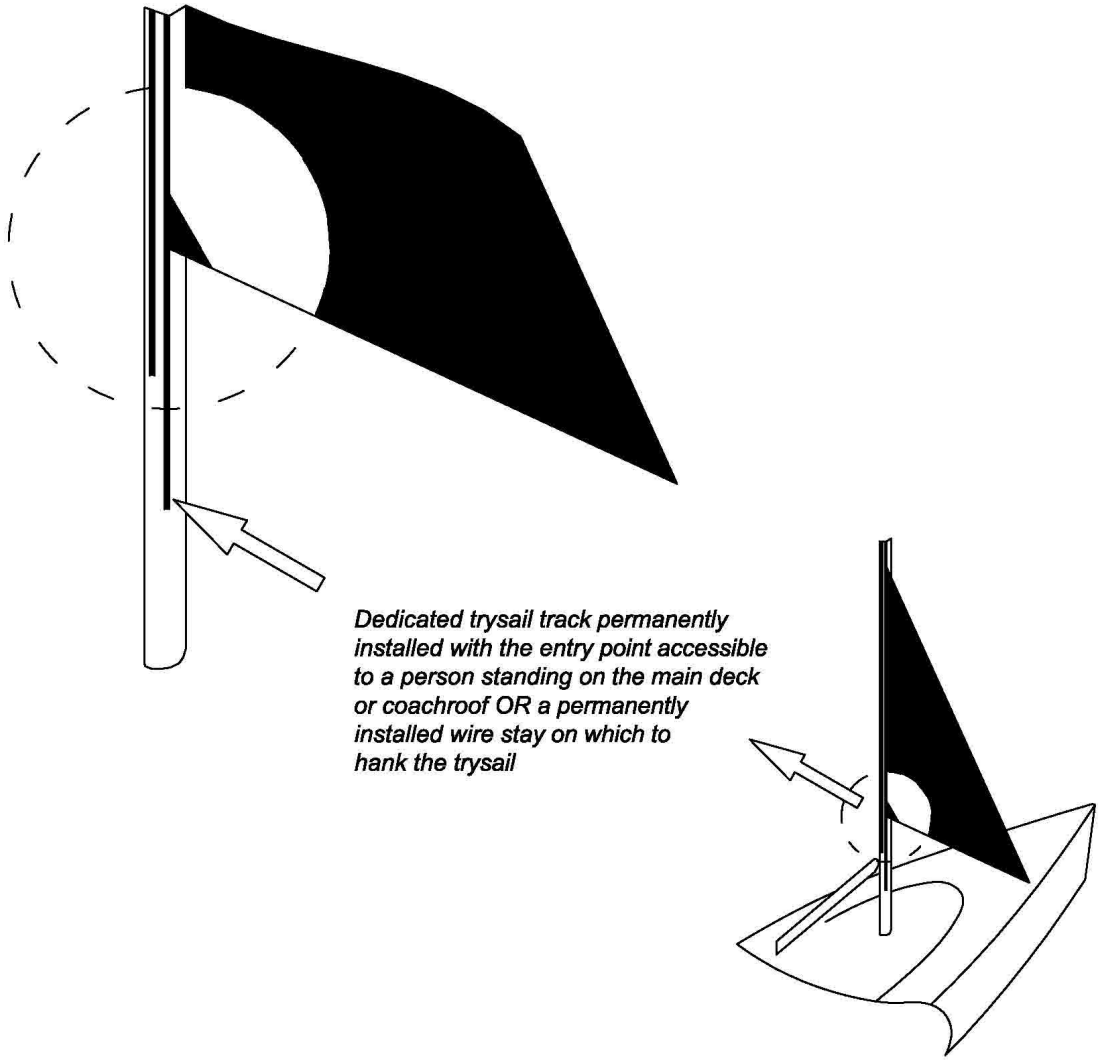
6. The OSR should strongly recommend that balance of sailplan is maintained by simultaneously using both storm trisail or reefed mainsail and storm or heavy weather jib - *not agreed, but emphasis to be encouraged on usage and training in S&HW sails agreed*

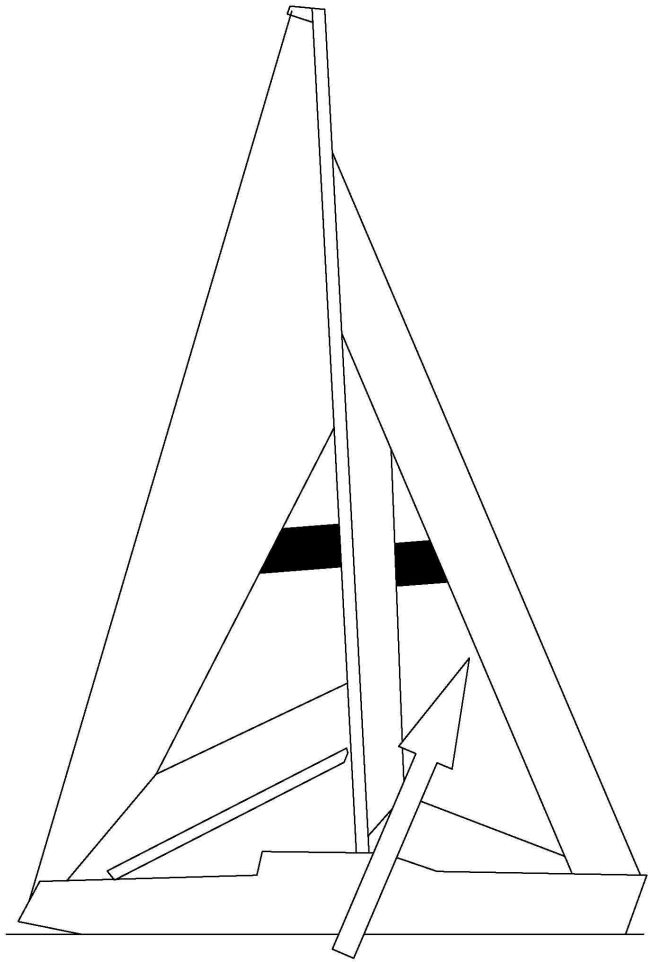
7. Mainsail with reefing as in OSR 4.26.4.g should be strongly recommended for short-handed racing (single or double-handed). The sail to be strong enough for Heavy Weather as defined above in 40% reefed condition – *not agreed*

Appendix E
Beaufort Wind Scale (Met Office 2010)

Beaufort Force	mean wind speed		wind speed range		wind description	probable wave height metres*	probable max wave height metres*	sea state	sea description
	Knots	m/s	Knots	m/s					
0	0	0	<1	0–0.2	Calm	-	-	0	Calm (glassy)
1	2	0.8	1–3	0.3–1.5	Light air	0.1	0.1	1	Calm (rippled)
2	5	2.4	4–6	1.6–3.3	Light breeze	0.2	0.3	2	Smooth (wavelets)
3	9	4.3	7–10	3.4–5.4	Gentle breeze	0.6	1.0	3	Slight
4	13	6.7	11–16	5.5–7.9	Moderate breeze	1.0	1.5	3–4	Slight–Moderate
5	19	9.3	17–21	8.0–10.7	Fresh breeze	2.0	2.5	4	Moderate
6	24	12.3	22–27	10.8–13.8	Strong breeze	3.0	4.0	5	Rough
7	30	15.5	28–33	13.9–17.1	Near gale	4.0	5.5	5–6	Rough–Very rough
8	37	18.9	34–40	17.2–20.7	Gale	5.5	7.5	6–7	Very rough–High
9	44	22.6	41–47	20.8–24.4	Severe gale	7.0	10.0	7	High
10	52	26.4	48–55	24.5–28.4	Storm	9.0	12.5	8	Very High
11	60	30.5	56–63	28.5–32.6	Violent storm	11.5	16.0	8	Very High
12	-	-	64+	32.7+	Hurricane	14+	-	9	Phenomenal

*1 these values refer to well-developed wind waves of the open sea
*2 the lag effect between the wind getting up and the sea increasing should be borne in mind
ISAF note: during gusts or squalls windspeeds may temporarily increase by 40%


Dedicated trysail track permanently installed with the entry point accessible to a person standing on the main deck or coachroof OR a permanently installed wire stay on which to hank the trysail



It is strongly recommended that an inner forestay is provided either permanently installed or readily set up, on which to set the storm jib

Draft only - final diagram to have full colour on both sails