

Submission: **SR15-07**

Offshore Special Regulations - 4.26.4

Storm Sails Areas Reduction of allowed maximum area

A submission from the Norwegian Sailing Federation

Proposal:

4.26.4

c) a storm trysail which shall be capable of being sheeted independently of the boom with area not greater than ~~17.5%~~ **12%** mainsail luff length x mainsail foot length. MoMu0,1,2
The storm trysail shall have neither headboard nor battens, however a storm trysail is not required in a yacht with a rotating wing mast which can adequately substitute for a trysail;

e) a storm jib of area not greater than ~~5%~~ **3.5%** height of the foretriangle squared, with luff maximum length ~~65%~~ **50%** height of the foretriangle; MoMu0,1,2

Current Position:

N/A

Reason:

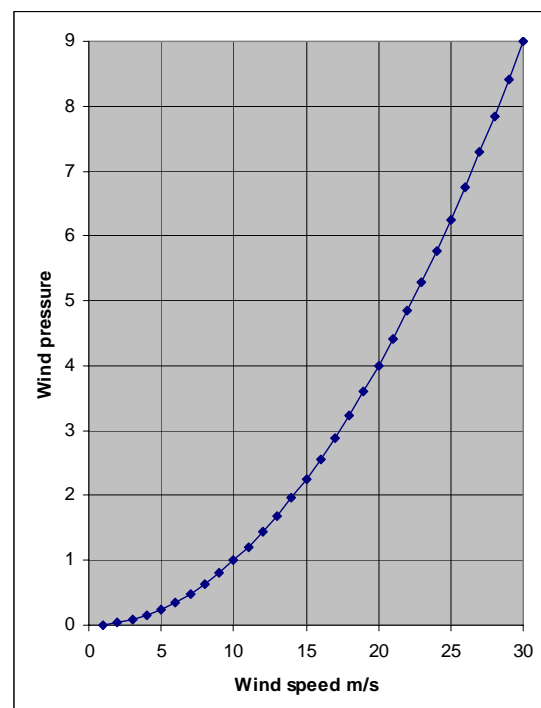
Reports from the fatal Fastenet Race 1979 and the Sydney to Hobart Race 1998 show that the storm sails were too large. It was reported that several boats sailed with storm jib or trysail only. For example the skipper of AFR Midnight Rambler reported that the boat was overpowered when they were sailing with storm jib only, and that they had to abandon an effort to use the trysail.

(Ref John Rousmaniere, Fastenet Force 10; Rob Mundle, Fatal Storm; Peter Bruce, Heavy Weather Sailing)

Experienced sailors report that they sail well with storm sails in winds of 15 m/s.

It is fairly clear why OSR storm sail limits are too large for a storm. There are five factors to consider:

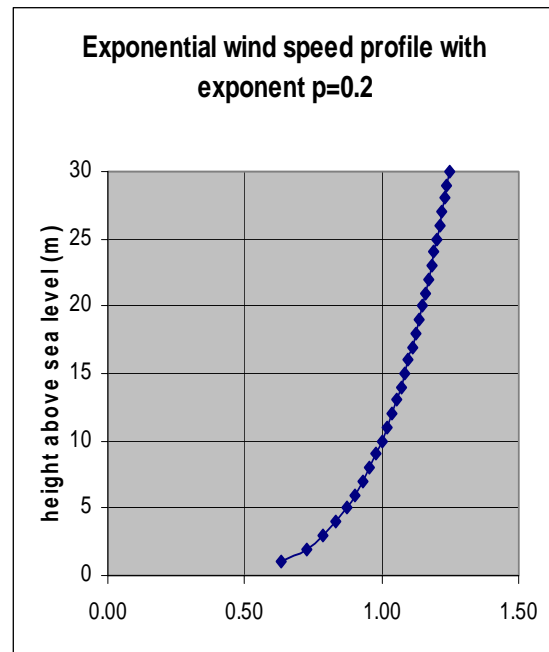
- 1) Most boats are overpowered above 10 m/s when they sail with full mainsail and 100% jib. (Reference sail plan used below)
- 2) The area of the maximum OSR storm sails are about 1/3 of full main and 100% jib
- 3) the wind pressure on the sails increase with the square of the wind speed, as shown in the attached figure.



4) the centre of gravity of the storm sails are lower than the ordinary sails. For a typical modern cruiser/racer the height of the centre of the maximum OSR storm sails above the water plane is about 2/3 as compared to full main and 100% jib (freeboard and boom above sheerline are constant).

5) the wind speed profile as a function of the height over the water as shown in the attached figure does not give any significant reduction of wind speed when the sail plan is lowered to 2/3 of the full sail plan.

The figure is based on an exponential formula with exponent $p=0.2$ (Ref. The Extrapolation of Vertical Profiles of Wind Speed within the Marine Atmospheric Surface layer Using the p Formula, M. Segal and R.A. Pielke, Department of Atmosphere Sciences, Colorado State University, Fort Collins, Colorado: "The values of p converge to about 0.2 for high wind speeds.")



In 20 m/s the wind pressure is 4 times larger, and in 30 m/s the wind pressure is 9 times larger as compared to 10 m/s.

However, the storm sails are about 1/3 of the full main and the 100% jib, and the height of the centre of the sail plane is about 2/3. Therefore in 20 m/s the wind pressure on the storm sails is 4/3 as compared to the reference sail plan, and the heeling moment is $(4/3) \cdot (2/3) = 8/9$. This may be considered acceptable.

In 30 m/s the wind pressure is $9/3 = 3$ as compared to the reference, and the heeling moment is $(9/3) \cdot (2/3) = 2$. Therefore you are grossly overpowered when you use both storm jib and trysail in 30 m/s, as reported from experience, and you can safely sail with only one of them.

Boats with one storm sail only (storm jib or trysail) are less manoeuvrable and less safe than a boat with both storm jib and trysail of the right size. A boat with storm sails according to present OSR is overpowered long before the wind speed reaches storm force 10, 24.5-28.4 m/s. Present storm sails are adequate for a gale force 8, 17.2-20.7 m/s, but not for a storm force 10.

It is proposed that the maximum size of storm sails is reduced to about 2/3 of the present limits. Considering all the factors above this will make both storm sails useful up to Beaufort 10, and they may even be adequate for violent storm force 11 (28.5-32.6 m/s), provided they are strong enough.

The length of the luff of the storm jib should also be reduced as a consequence of the reduced area, and it is proposed that the maximum luff length is reduced from 65% to 50% of the height of the foretriangle.

A grandfathering of existing sails may be considered.

It should also be noted that smaller storm sails are easier to handle, and give smaller loads on the rig, the boat and the crew, and this increases the probability that they will be used.

It is much safer to sail than to drift in heavy weather: "Without speed, acceleration and manoeuvrability a boat is a sitting duck to large waves", (Peter Bruce, Heavy Weather Sailing).

13.07.2007 Nils Nordenstrøm