Offshore Special Regulation - 3.29.1

Introduce a Minimum Masthead Antenna Length

A submission from the US Sailing

Purpose or Objective

Add a minimum length, and therefore minimum performance, for the required masthead VHF antenna.

Proposal

3.29.1 b)
ii it shall have a masthead antenna not less than 381 mm (15 inches) in length, and co-axial feeder cable with not more than 40% power loss. MoMu0,1,

Current Position

As above.

Reason

- The objective of requiring a masthead vhf antenna with a specified maximum loss coax feeder is to ensure that offshore racing boats have a reasonable ability to hear distress calls from others, and to have a reasonable range of communications to those in distress. These distress calls may come from handheld radios at deck level or at water level so the requirement to have the antenna at the masthead is sensible. Given the long coax run to the masthead, the maximum loss specification for the coax is similarly sensible. We have not had a requirement for antenna performance, which is an omission that this submission proposes to correct. Some race boats are using very small “rubber ducky” antennas at the masthead that are only a few cm long which have very poor performance and so undermine the objective of having a masthead vhf antenna. So this submission proposes a minimum length for a masthead antenna, which is easily measured and will lead to a minimum performance.

- Various specifications are used to characterize the performance or “gain” of antennas: dBi (dB relative to an isotropic radiator) and dBd (dB relative to a dipole in free space) are technically well defined and used for commercial antennas. For marine antennas “marine dB” or just simply “dB” is often seen but is meaningless because dB is a ratio and without specifying what the ratio is relative to, the spec has no meaning. Even worse, some marine antenna manufacturers use well-defined technical terms such as dBi, but claim obviously false specifications with thin marketing rationale. So specifying the minimum performance...
of an antenna in the OSR’s using technical performance specifications isn’t possible because there is no standard for performance measurement that is used consistently by marine antenna manufacturers.

- It turns out, however, that for vertical antennas, the gain or performance of the antenna increases with the length of the antenna. A very common masthead vhf antenna used on cruising boats is a half-wave antenna, 1 m in length, typically end fed with a transformer or other coupling network. These antennas have 2.15 dBi gain, (equivalent to 0 dBd), and have a half-power vertical beam width of +- 35 degrees. These antennas are a good choice and don’t depend on the mast itself as a counterpoise. Many marine manufacturers claim that these are “3 dB” antennas or have a gain of “3 marine dB”. These antennas are unpopular with race boats, however, because of the windage of the long whip and the weight of the matching network at the base of the antenna.

- This submission requires a vertical antenna at the masthead with a minimum length of 381 mm (15 inches), which permits a quarter-wave antenna (18 inches long) or a slightly shorter antenna with a loading coil. Both types are widely available from existing manufacturers (e.g. Shakespeare 5216, Larsen PQ, or Farallon Ultrawhip). The reason to have a minimum length is that it can be easily measured by an inspector, and for vertical antennas a minimum length will lead to a minimum level of performance. These 381 mm minimum length antennas don’t perform as well as the half wave antennas due their dependence on the mast as a counterpoise, but their performance is reasonable, they have a half-power vertical beamwidth of +-45 degrees which is sensible for a race boat, and the antennas are light with little or no matching necessary.