IRC RULE APPENDIX F –LIFTING APPENDAGES

F1 – LIFTING APPENDAGE RULES

F1.1 The total lifting active surface of the lifting appendages must be less than or equal to Smax where:

Smax = 0.0046 * (BW /LWP). With BW in kg, LWP in metres, S in m^2

F1.2 When a **boat** is equipped with lifting appendages, only one lifting appendage shall be actively in use *while racing*, regardless of its shape. However, the following exceptions are accepted in addition to the lifting appendage:

F1.2.1 A canting keel (75% of the projected surface on a horizontal plane is taken into account in the Smax calculation with the **boat** upright).

F.1.2.2 A horizontal plane regulator installed on the rudder(s) with a symmetrical profile (it may have dihedral) to regulate pitch only. (The active surface is not taken into account in the Smax calculation).

F1.3 A lateral **hull appendage**, whether straight or curved, is a lifting appendage provided that, when fully extended, its angle is more than 20° with respect to the vertical axis of the **boat**.

F1.4 If a lifting appendage is retractable, its lifting active surface shall be determined when fully extended.

F1.8 The IRC rule does not limit the design of **hulls** that provide lift.

F2 – LIFTING APPENDAGE DEFINITIONS

Lifting appendage: A **hull appendage** as identified by the IRC Rule F1, attached to the outside of the **hull** and used to produce lift. ERS E.1.2.(m) **Hydrofoil** shall not apply. This excludes:

- a straight or curved centered or off-centered appendage, fixed or fully extended when retractable, with angle less than 20° with respect to the vertical axis of the boat,
- the rudder(s). In a case of a twin rudder, the angle between the 2 rudder stocks) shall be less than 50°.

No. of lifting appendages: The maximum number of lifting appendages.

Lifting appendage Span: The maximum transverse distance outside the hull shell between any two points on the lifting appendage in its fully extended position. With the **boat** upright in **flotation trim.**

Lifting appendage Chord: The longitudinal distance of the lifting appendage with the **boat** upright in **flotation trim**

Active Surface:	The horizontal projected surface of the lifting appendage used to produce lift. The active surface is calculated from the lifting appendage span and multiple lifting appendage chords at positions on the span.
Horizontal plane regulator:	**Hull appendage(s)** used to affect dynamic stability around the pitch axis.
Trailing edge flap:	a device attached to the trailing edge of a lifting appendage (wing) primarily used to affect lift.
Winglet:	ERS E.1.2.(l) **Winglet** shall not apply. A winglet is a wing attached to the extremity of a foil or/and a horizontal plane regulator primarily used to affect lift or drag.

The IRC Rating Authority reserves the right to require additional detail to be supplied and also to modify the lifting Appendage definitions on a case by case basis in accordance with IRC Rule 2.8.

IRC GUIDANCE AND NOTES RELATING TO LIFTING APPENDAGES

The aim of the IRC rule and rating system is to have different boats racing together. IRC does not wish to oppose the increase in speed potential of “Archimedean” boats rated by the IRC rule, either by their architectural forms, or by using lift appendages such as Foils, Canting keels, off-centered daggerboard or centerboard design, provided that the effect of the lift appendages is controlled.

IRC has decided to limit the lift provided by the active surface of the external lifting appendages (See Guidance Annex 1).

The calculation of the vertical lift will be made from this planar active surface. To calculate the Lift taken into account, the IRC rule will add the projected surfaces of ALL the lift appendages inventoried and authorized by the rule (See Guidance Annex 1).

This limitation will be set at 30% of BW * 9.81 expressed in Newtons.
BW being the empty Boat Weight (kg) as described in IRC rule 17.

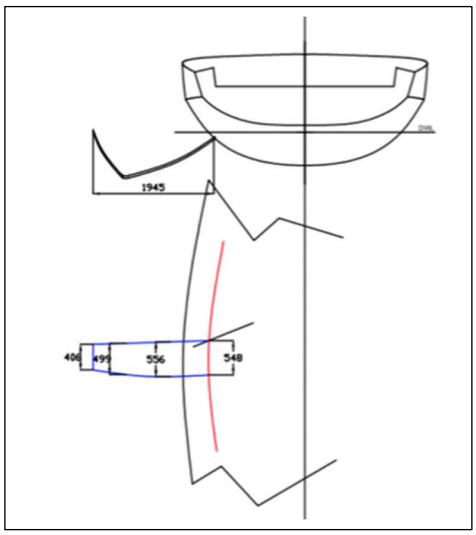
In order for a boat equipped with lifting surfaces (foils + possibly additional surfaces) as defined in Guidance Annex 1, to be eligible for IRC, the total active lifting surface shall be less than or equal to "S" below:

S max = 0.0046 * (BW /LWP). **With BW in Kg, LWP in metres, S in m^2,**

Guidance Annex 1: The lifting appendages, the active surfaces of these appendages

Lifting appendages shapes are identified by a few common names: FOIL, DALI, DSS, CHISTERA, etc.

Definition of the active surface of a lifting appendage
The IRC lifting appendage dimensions are defined in IRC definitions. The active surface is produced by the projection of the shape of the lifting appendage (outer limit of its shape) on a horizontal plane, the boat being "upright" (heel 0°).



However, regardless of its shape, only one lifting appendage must be operational during sailing.

However there are 2 exceptions described in IRC Rule F.1.2.

See Guidance Annex 2 for other examples of projected surfaces

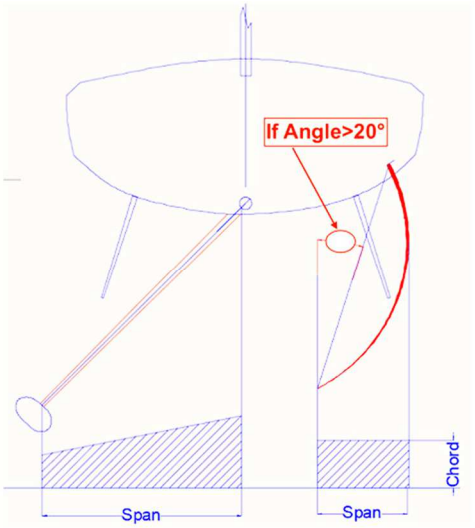
Eligibility Criteria for Foils and Lifting Appendages

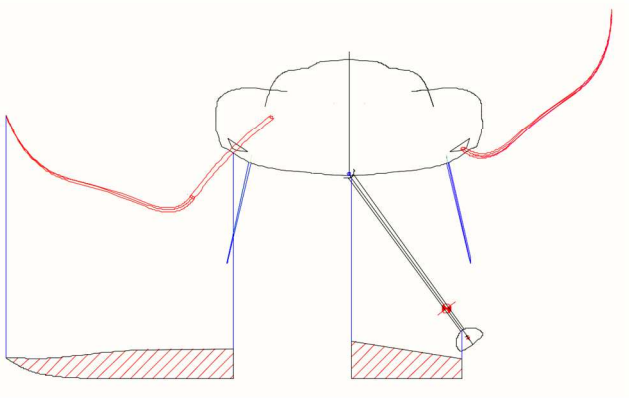
The critical speed used by IRC for the calculation of the Lift is: Vc = Fn * (g * LWP) ^ 0.5

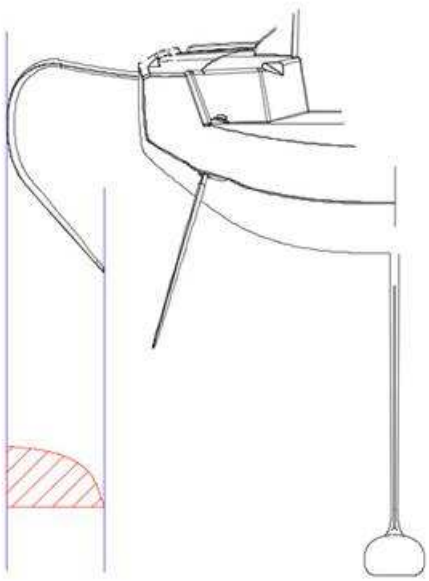
Where the Froude number (Fn) is equal to 0.65 and g = 9.81 m/s^2. LWP is expressed in m and Vc in m/s.

Lift expressed in Newtons (N) is calculated on the basis of 1025 kg/m3 for water and 0.3 for Cz.

The active surface is expressed in m^2 (active surface in red color in the drawing opposite).







Guidance Annex 2: Examples of identification of references of projected surfaces.

