



2021 – MODIFICATIONS IRC

The purpose of this note is not to cover the full IRC 2021 Rule and software amendments, but the major ones only which means changes of the rule that may affect the TCC of a boat next year. We hope this note to be useful for an owner to understand the potential evolution of a boat's TCC.

Voir : <https://ircrating.org/irc-rule/>

NEW APPENDIX F – LIFTING APPENDAGES

This new appendix presents the IRC eligibility criteria of a lifting appendage. It defines what is a lifting appendage for the IRC Rule, and it makes clear the parameters of the appendages the TCC is calculated from.

When the owner of a lifting appendage(s) fitted boat applies for an IRC certificate, or when the project to design such a boat is considered, the Centre de Calcul will come back to the owner, designer and shipyard, for complementary information.

SPINNAKER POLE LENGTH (SPL) :

The 2021 IRC software includes changes to the rating of spinnaker poles and whisker poles, with the intention of rating poles more equitably. The IRC Rules now read:

*21.3.5 Boats will be rated according to whether they use a **spinnaker pole** and/or a **bowsprit** according to the following configurations:*

- (a) No **spinnaker pole** (spinnaker tacked on deck) or a centre line **bowsprit** only.*
- (b) An articulating **bowsprit** only.*
- (c) **Spinnaker pole(s)** either with or without a **bowsprit**.*

A new definition of Spinnaker Pole Length (**SPL**) has been added to enable IRC to better rate boats with bowsprit AND spinnaker poles where previously the maximum STL was used for rating purposes. The spinnaker pole has been removed from the STL definition and IRC Appendix A4 now includes:

*SPL The greatest horizontal distance from the forward face of the **mast spar**, ignoring any **fittings** and tracks, measured on or near the centreline of the **boat**, to the extremity of the **spinnaker pole**.*

To fully benefit from the changes owners are asked to confirm the pole configuration of their boat, and SPL as well as STL if applicable when applying for a certificate. For revalidation SPL should be supplied if it is different from the previous rated STL. If SPL is not supplied then STL will automatically be used for spinnaker pole length if applicable, which may result in a higher TCC. Boats may see a change in their TCC for 2021 and the rating effect will depend on the specific configuration of the boat.

WHISKER POLES

In 2020 IRC introduced whisker poles into the rating scope for spinnaker poles; this resulted in some boats having a substantial increase in TCC and was reviewed for 2021. Now there is a definition of whisker pole in the 2021-2024 Equipment Rules of Sailing (ERS) the 2021 IRC software includes changes to the rating of whisker poles with the intention of rating them more equitably.

IRC Rules now read:

*21.3.6 A **boat** shall declare using any **spar** as a **whisker pole** to set a headsail or a flying headsail.*

To fully benefit from the changes owners are asked to confirm the configuration of their boat, and if no declaration is made then default inputs will be used based on previous declarations which may result in a higher TCC. Boats previously rated with a spinnaker and/or whisker pole may see a change in their TCC for 2021 and the rating effect will depend on the specific configuration of the boat.

FLYING HEADSAIL

Recognizing the evolution of sail types, IRC has introduced a new IRC definition of “Flying Headsail” with several rules in regards to the half width ratio to the foot length (greater than or equal to 62.5%), a maximum tack point position (STLFHmax), battens or stiffening of the sail are not permitted and several other rule requirements. The Flying Headsail definition encompasses some ‘Code0’ sails that do not satisfy the Racing Rules of Sailing, Equipment Rules of Sailing or IRC definition of a spinnaker (SHW > or = 75%SFL). Previously these sails rated as large headsails. Note that Code0s that are defined as a spinnaker are not impacted by this change.

See <https://ircrating.org/irc-rule/> for the full rules and definitions relating to Flying Headsails.

Owners declaring a Flying Headsail within the IRC definition will see a change in rating for 2021. Some representative examples are shown below; these are for guidance only as the rating effect will depend upon the rig configuration and many other boat factors.

Boat Design	Flying Headsail Area (m ²)	Number of Flying Headsails		
		1	2	3
		increase	increase	increase
Farr 30	45	0.008	0.014	0.023
A31	45	0.006	0.013	0.023
J 109	60	0.008	0.014	0.024
JPK 10.80	65	0.007	0.015	0.025
Volvo Open 70	330	0.014	0.021	0.038

For a presentation of the Flying Headsail in IRC:

04.Introduction_Flying_Headsail_IRCRule2021_CCIRC_Eng.pdf

And

05.Flying Headsail Summay.pdf

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www.ircrating.org - Décembre 2020



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 S_{max} where:

$$S_{max} = 0.0046 * (BW / LWP). \quad \text{With BW in kg, LWP in metres, S in m}^2$$

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 S_{max} calculation with the **boat** upright).

F1.2.2 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 S_{max} 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 40°.

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.(I) **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:

$$S_{\max} = 0.0046 * (BW / LWP). \quad \text{With BW in Kg, LWP in metres, S in m}^2,$$

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.

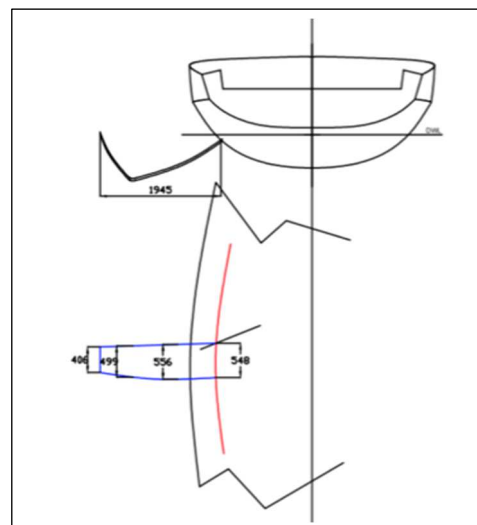
Definition of the active surface of a lifting appendage

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



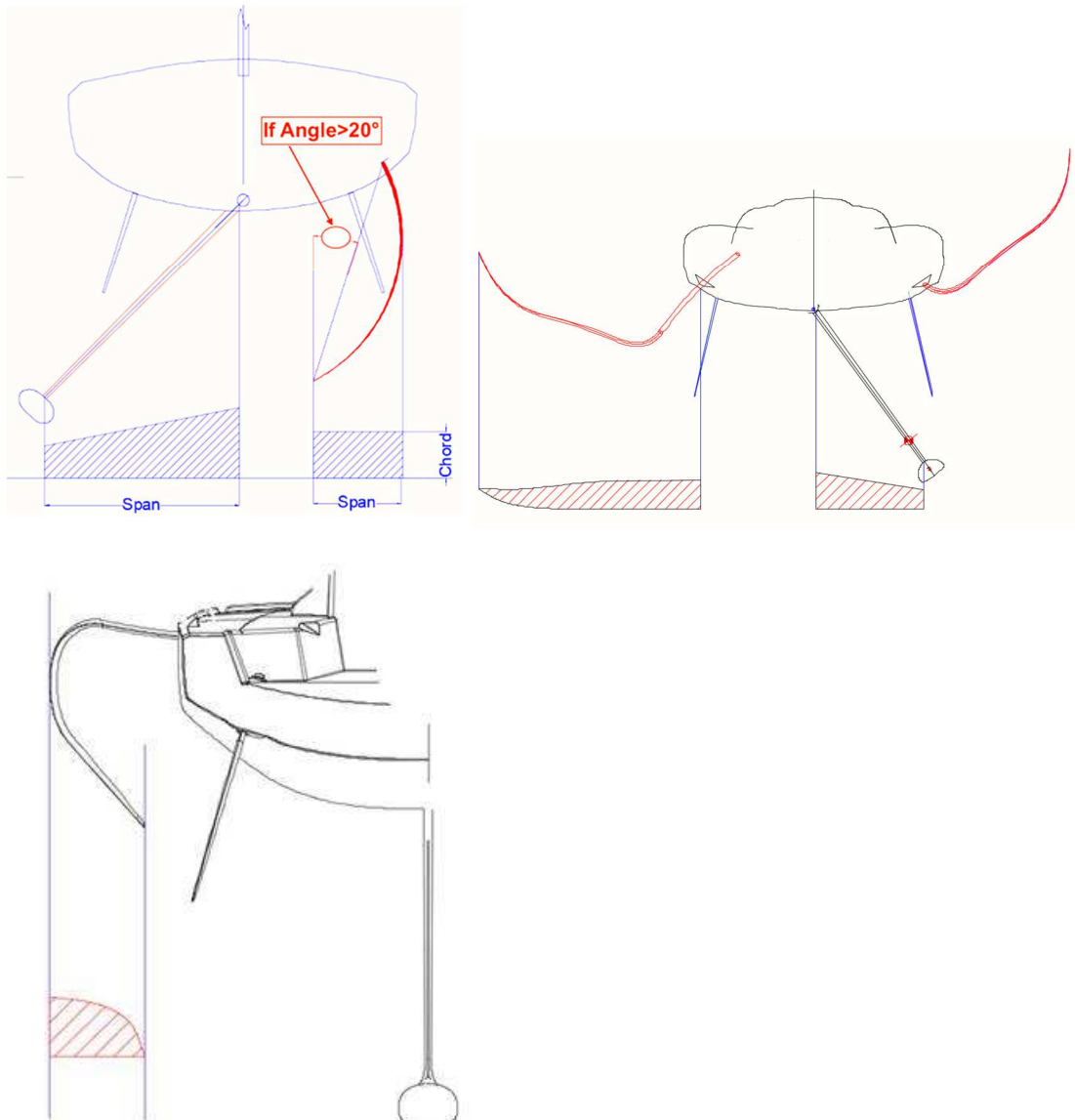
Eligibility Criteria for Foils and Lifting Appendages

The critical speed used by IRC for the calculation of the Lift is: $V_c = F_n * (g * LWP)^{0.5}$

Where the Froude number (F_n) is equal to 0.65 and $g = 9.81 \text{ m/s}^2$. LWP is expressed in m and V_c in m/s.

Lift expressed in Newtons (N) is calculated on the basis of 1025 kg/m^3 for water and 0.3 for C_z .

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.

