INTERNATIONAL TECHNICAL COMMITTEE

Meeting

October 21st-23rd Trieste, YC Adriaco

Present :

Andy Claughton (GBR - Chairman), Alessandro Nazareth (ITA – Deputy Chairman) Nicola Sironi (ITA - ORC Deputy Chief Measurer), Antoine Cardin (FRA),
Robert Ranzenbach (USA), Matteo Polli (ITA),), Manolo Ruiz de Elvira (ESP)
Zoran Grubisa (CRO - ORC Chief Measurer), David Lyons (AUS), Marcus Mauleverer (GBR)
Panayotis Papapostolou (GRE-ORC Programmer), Jason Ker (GBR), Jim Schmicker (USA),
Davide Battistin (ITA-ORC Programmer).

Registered Observers:

Vasilii Alekseev (RUS) , Bertil Balser (GER), Johannes Christophers (GER), Bruno Frank (SWI)
Pablo Ferrer (ESP), Kim Henriksen (DEN), Sydney Hough (USA), Robert Jacobsen (GER)
Ab Pasman (NED), Arthur Peltzer (NED), Michael Quist (DEN), Johan Tuvstedt (SWE)
Chris Tutmark (USA), James Teeters (USA), Karl-Hannes Tagu (EST), Vygantas (LIT)

Minutes

1 Chairman's Introduction.

The Chairman welcomed the Committee to the second face to face meeting of the year and thanked the members for their support of ORC during the year. The Chairman offered the following observations.

"The ORC VPP is a remarkably sophisticated performance prediction tool, that would bear comparison with the best commercial offerings. Its purpose is to provide handicap polars for any type of yacht based on mathematical force models that are rooted in sound physics. Having developed VPP's for superyachts, multihulls, and foiling boats there is no pressing necessity to add more capability to the VPP. Careful refinement of the existing infrastructure will continue using the most modern methods, but attention must also be focused on the whole ORC system. The user experience rests on 3 pillars - VPP, Scoring and Measurement, and each needs to function well to make the ORC system easily used by our growing customer base. That is not to say the VPP will be frozen, there is still a meaningful research agenda for us to execute."

2 Chief Measurers Report.

Zoran Grubisa presented his report on the measurement issues that had arisen during the season.

The following actions were agreed:

2.1 Fairing in front of the strut drive.

Add "Skeg" as new type of appendage in offset 2.0. that is separated from the canoe body calculations. Calculate the viscous resistance of the skeg based on its WSA using the canoe body viscous resistance coefficient. There is no change to PIPA provided the strut drive is not modified from the manufacturer's specifications. (IMS Rule D 3.2)

2.2 Inner HSF as "blooper"

The committee considered options to mitigate future development of a highly specialized inner HSF but since it did not appear to show any performance advantage on the boat "Xini Freedom" at the ORC Europeans and given concerns about unintended consequences to existing sail configurations, the committee decided that no changes will be made to the existing rules.

2.3 Forced "Cruiser/Racer" division

No changes will be made to the existing rules, which the ITC recommend be enforced to the full extent of the rule text.

2.4 Lowered upper P mark.

No changes will be made to the existing rules, the expectation is that changes to the 2023 VPP will prevent this trend.

2.5 PD limits for inclining test.

Rule E2.10 will be amended to read:
Boat shall be inclined for angles in range of:

a) 1 – 4 degrees on one side for boats with LOA ≥ 24.0 m

b) 2 – 4 degrees on one side for boats with LOA < 24.0 m

2.6 Sheerline construction and effect on LPS and SI calculations

Sheerline definition in the offset file may influence LPS and SI calculations. All new offset files are reviewed and approved by the ORC staff. Also, existing offset files are reviewed periodically in the process of the offset database clean up with focus on boats entering World and Continental Championships.

No changes will be made to the process

2.7 Deck sweeper mainsail.

The "invention" of inclined boom with increased mainsail area did not show any rating or performance advantage on boat "Xini Freedom" at the ORC Europeans.

No changes will be made to the existing rules.

2.8 Rotating mast

Currently, rotating masts are allowed for multihulls, but not for monohulls. There are monohulls with Cat rigs and rotating masts that should be rated accordingly.

The VPP will be changed to introduce the multihull rotating mast force model for monohulls.

2.9 RM measured shown on the certificate

DSPM (Measured Displacement) shown on the certificate is calculated from displacement coming from the freeboard measurement with deduction of the deductible items recorded in the measurement inventory.

In the future the VCG will be calculated on the same basis and the Measured RM will be shown on the certificate. (The actual results of the inclining test will no longer be shown)

2.10 IMS L and LSM0 calculation with rudders in offset 2.0 format

To get the same results of the offset files having rudders defined both in the offset 2.0 (separate appendage definition) and with stations in the offset file (the traditional method), the IMS L and LSM0 calculation will be performed for the canoe body only.

2.11 Non-manual power for operating hydraulic valves.

The committee agreed that the use of non-manual power to operate valves for an hydraulic cylinder operated by a manual pump should not be considered as the use of non-manual power.
RRS 52 will be modified accordingly.

2.12 Articulated bowsprit.

An articulated bowsprit is considered by the VPP as a spinnaker pole with SPL = TPS.
No changes will be made to this rule

2.13 VCG estimated for fully crew and DH certificate

The Default RM is currently calculated with the IMS L derived for the sailing trim. With different sailing trim in fully crewed and DH configurations, the Default RM calculation is different for each. The calculation of Default RM will be changed to avoid having any sensitivity to the Crew Weight.

2.14 HSF tacked on pole

There was a question if tacking an HSF on a pole should be allowed and should this be treated as an articulated bowsprit.
The committee agreed to make no changes to the current rule

2.15 CEXT (Crew Extension)

At the recent Sports boat championships there was a discussion about the position of the crew's centre of gravity relative to the sheer line for boats with slack lifelines and hiking straps. The Committee agreed to review the situation and amend the CEXT calculation.

3 VPP Development.

3.1 VPP and Manager code housekeeping.

The ORC Staff programmers reported that;

- The ORCsy (SuperYacht) VPP is nearly 90% migrated to the "new code". When this is completed all the VPP's will share a contemporary framework.
- The replacement of the traditional .DAT file with the xml .DXT file is 50% completed.
- Rudders in Offset 2.0 no longer create inconsistencies.
- A single system for the tracking and manipulation of inventories will be implemented.

3.2 2023 VPP items

The proposed changes to the VPP force model are in three parts;

1. the residuary resistance formulation and,
2. the aerodynamic de-powering methodology.
3. modified HSF coefficients.

3.3 Residuary Resistance.

Jason Ker, Marcus Mauleverer and Davide Battistin presented their continued work on the Neural Network force model for the residuary resistance. The current formulation is based on a very simple parameter set; Speed/Length ratio (Froude Number (Fn)), Length/Volume ratio (LVR) and Beam/Draft ratio (BTR).

The new neural network uses the following network input parameters:
Fn, LVR, LVR4, LVR6, BTR, (LVR4 and LVR6 are LVR's calculated at different flotation planes)

LSM1RATIOXYA, LSM4RATIOXYA, LSM1RATIOXYB, LSM4RATIOXYB, these parameters are LSM's derived from the depth attenuated volume distribution.
X location of the maximum section area (X_MAX_SECT_AREA),
Longitudinal centre of buoyancy (LCB), Longitudinal centre of flotation (LCF),

Waterplane area coefficient (CWPA) and midship area coefficient (CM).

The proposed residuary resistance formulation is the combination of the existing (2022) formulation and the new model using an equal contribution from both. This mathematical construct creates the best residuary resistance predictor that the ITC has created during their last two years of work, as described in section 3.1.5.

3.4 Aerodynamic de-powering

For several years there has been a proposal on the table to improve the "de-powering" of the sails as wind speed rises. This was developed based on CFD studies on typical sail plans. It embodied the following effects:

Delete the phi_up and Default RM functions and replace them with
Reduction of the minimum FLAT parameter from 0.62 to 0.42,
Reduction of Effective Rig Height (heff) loss as FLAT reduces,
Twist parameter remodulation to increase lowering of CE with decreasing FLAT

The tuning of the de-powering package is now at a stage where it can be introduced with equitably across the fleet. This change removes the last of the artificial measures previously introduced to encourage designers away from artificially tender boats.

3.5 Discussion of the 2023 VPP proposal.

The residuary resistance and depowering changes are complimentary in their effects on the predicted speeds and must be considered as a single package.

The residuary resistance change produces a better prediction than the existing formulation when judged on all the objective metrics available.

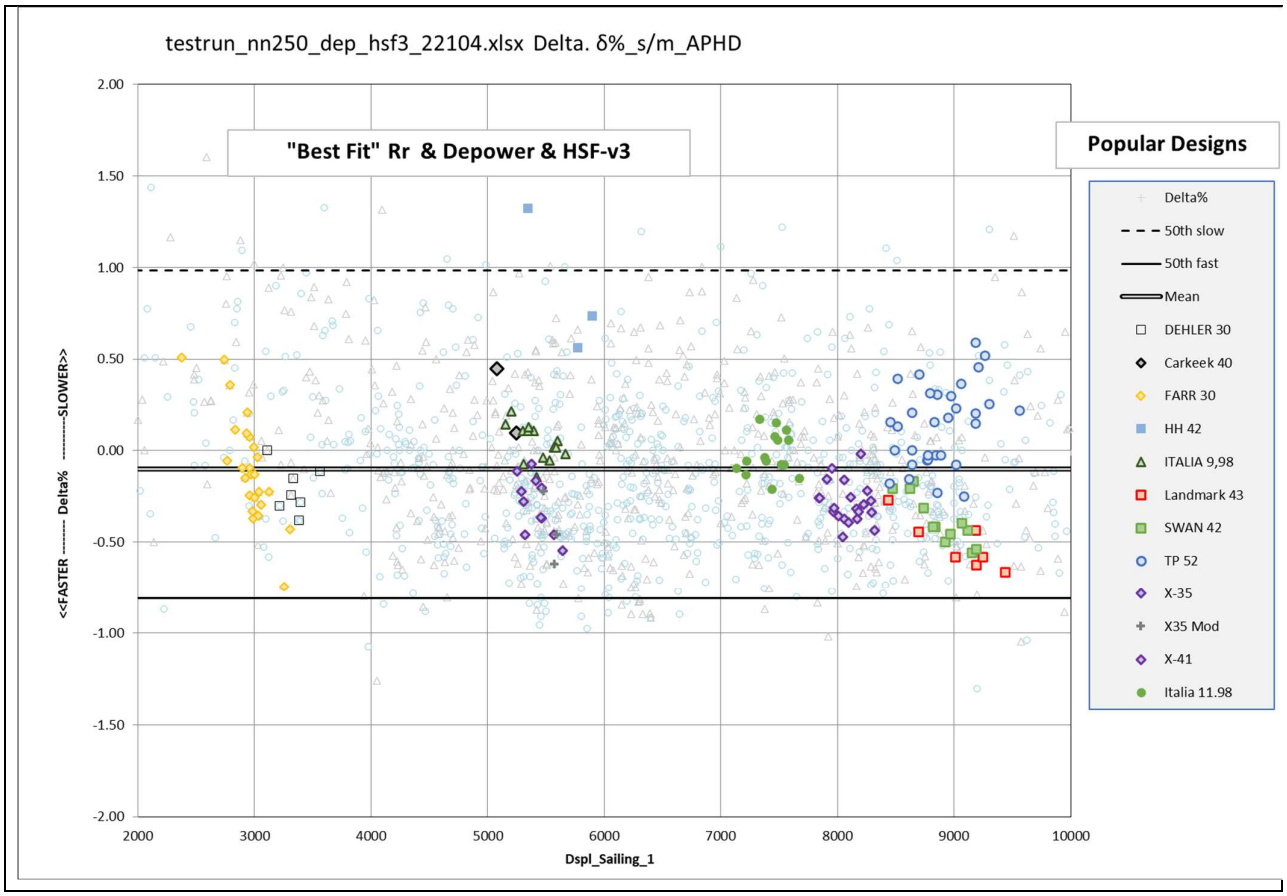
- The fit of the model to the test set of CFD data is improved.
- Existing sensitivities to LVR and Cp are reduced
- The "Mini Test Fleet[1]" data shows that the new formulations reduce the differences between the VPP predictions and the boat specific CFD data.
- The fleet is sped up, particularly upwind, which improves correlation with the observed performance database.
- Designs which lie away from the fleet norms (ULDB Sleds, Class 40') are much more fairly treated

After two years diligent work the ITC believe this change to the VPP is the best that can be achieved with the available data, and the adjustments to the relative handicaps are broadly appropriate.

The active designers on the ITC are fully supportive of the change.

Test run on 2022 database. Best Fit Rr + De-power + HSF

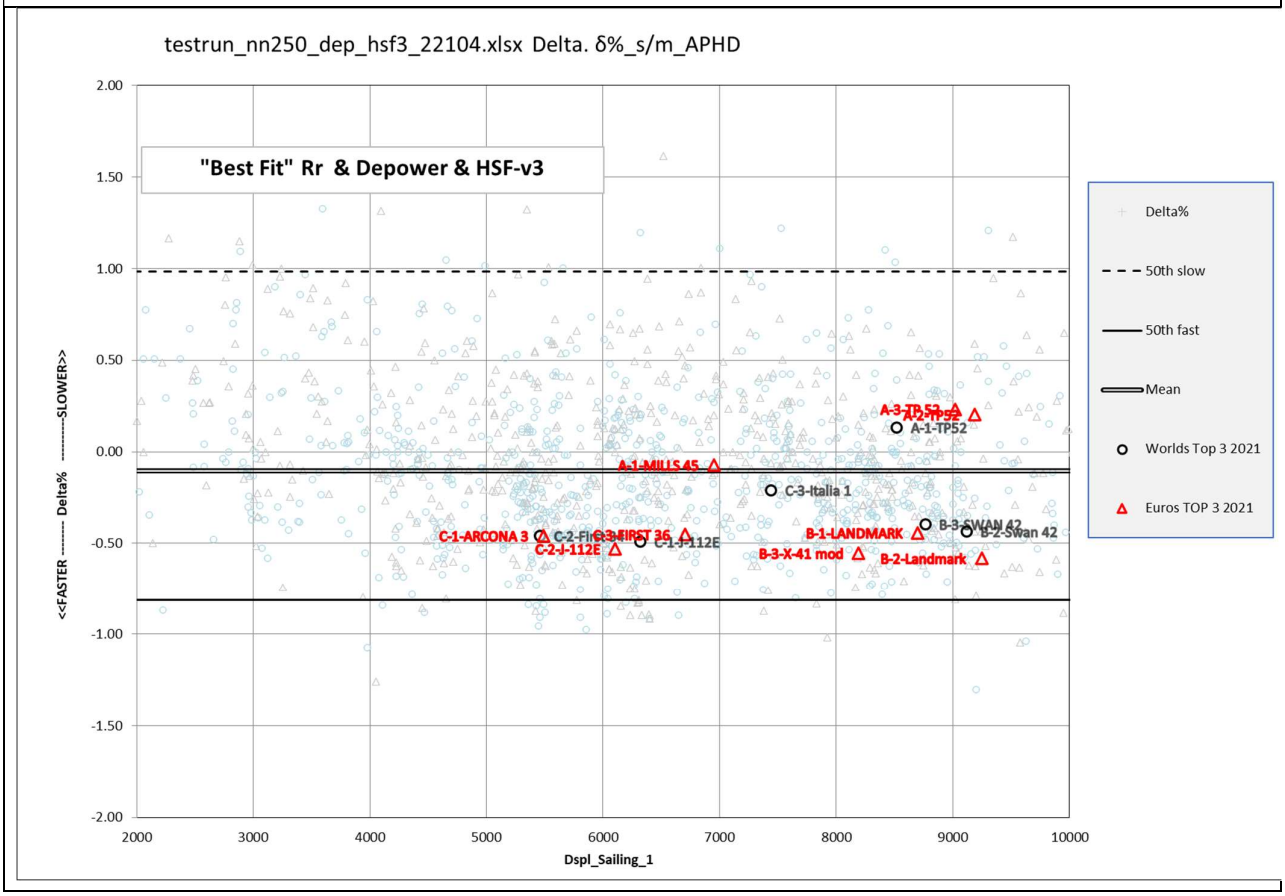
[1] The Residuary Resistance force model is based on the analysis of CFD tests on a range of generic hull shapes. The Mini Test Fleet is a collection of data for real boats that have been run through the same CFD code at conditions that correspond to the sailing speeds and heel angles predicted by the VPP. This provides a measure of how well the NN force model predicts actual boats.



The effect of the revised residuary resistance formulation and de-powering scheme on the yachts that reached the podium in the ORC World and European championships is highlighted in the figure below.

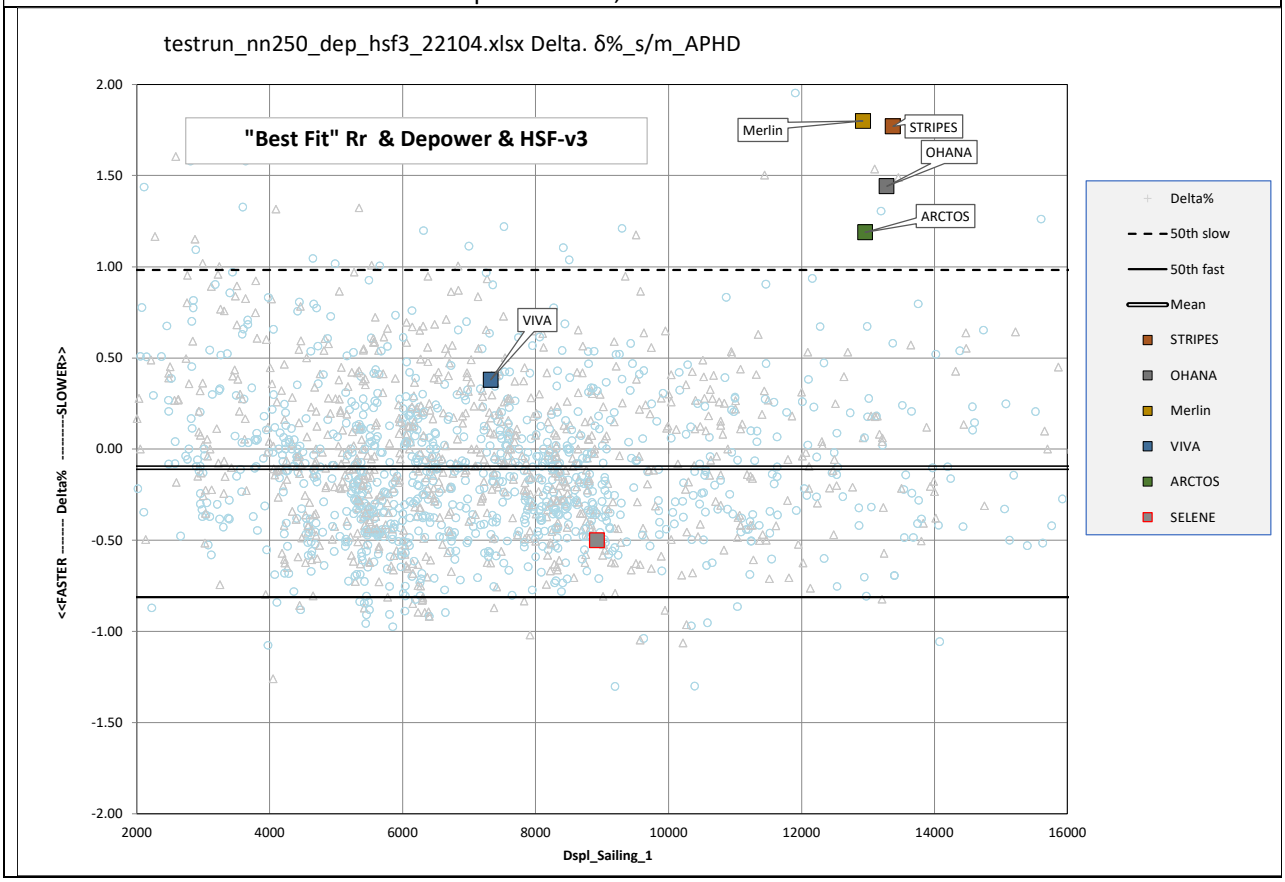
The winning boats generally lie below the median line indicating that the new formulations increase their VPP predicted speeds relative to the fleet.

Test run on 2022 database. “Best Fit Rr + De-power + HSF, Championship Podium places Classes A,B,C



A particular feature of the 2023 VPP proposal is that the ULDB sleds sailed in California and the Great Lakes are predicted slower, as shown in the figure below, where they lie in the upper right corner of the plot.
The new formulation does a much better job of predicting the performance of boats that lie away from the mainstream of designs.

Test run on ULDB Sleds “Best Fit Rr + De-power + HSF,

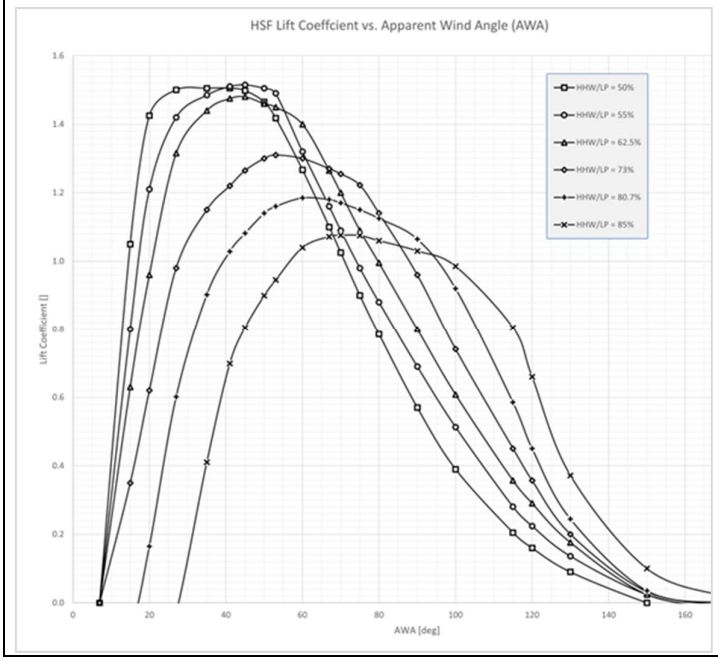


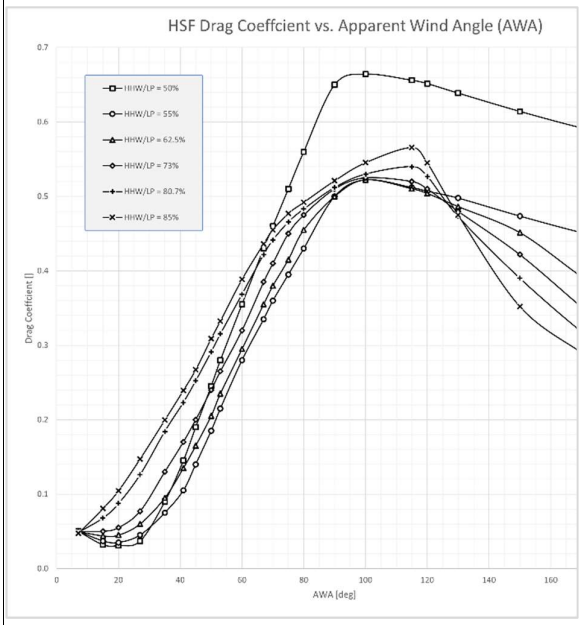
3.6 Headsail Set Flying force coefficients.

The ability to handicap all sails with mid girth ratios from 50% to 85% has been welcomed by the sailors and sailmakers. These sails form part of both the racing and cruising inventory, and providing equitable handicaps based on a yacht's available sail wardrobe has been a big step forward. During 2022 the family of force coefficients used in the VPP has been tuned so that the VPP sets the appropriate sail for each apparent wind angle. Other changes are planned to further refine the sail choice algorithm to avoid having the HSF flying in the VPP when the physical limitations of mid-girth, area, shroud base and sheeting base prevent it's use on the water.

Robert Ranzenbach presented the updated coefficients which were developed through consultations with the ITC Research Associates.

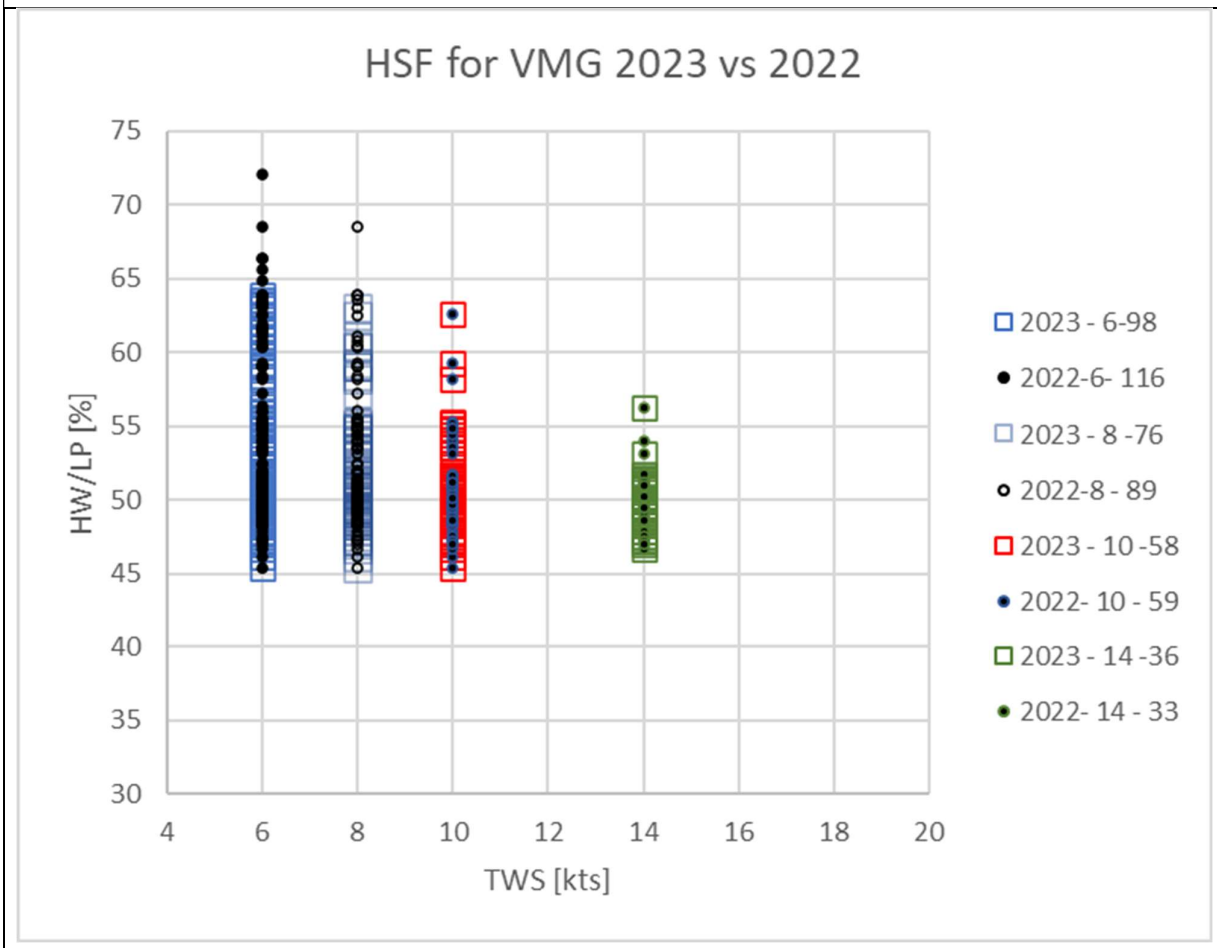
2023 HSF Sail Force Coefficients





The changes in the use of HSF's as wind speed increases can be seen in the Figure below. The dots are the 2022 VPP and the open symbols the 2023 proposal. The legend shows YEAR – TWS[kts]-the number of boats using HSF's in this TWS. The number of occasions when an HSF is set is reduced and the largest mid girth ratio used is lower. This responds appropriately to the feedback from the fleet.

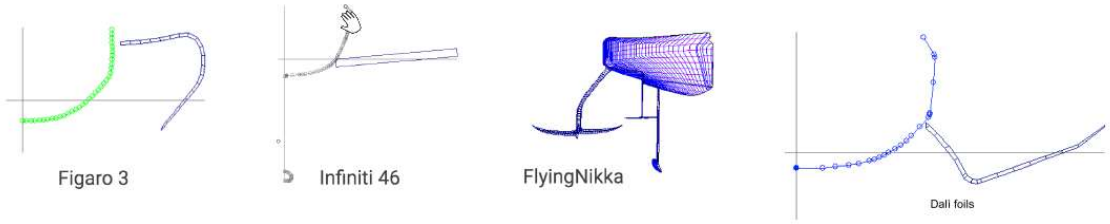
Change in HSF use upwind 2022-2023 VPP



3.7 Foiling Force Model.

Throughout 2022 the ITC have been developing the VPP to accommodate the effect of lifting foils. For 2023 this will be handled using a two-phase approach; one for yachts where the foils can produce a vertical force up to 50% of the boat weight (semi-foiling), and a second where the yacht can fully foil. This, admittedly artificial, separation has been adopted temporarily to ease the programming burden.

Semi-foiling yachts are characterised by yachts like the Figaro 3, Infiniti yachts with DSS and yachts with curved daggerboards.



The semi foiling model adds the vertical force balance to the longitudinal force (thrust/ drag) and the longitudinal moment (heeling/ righting moment) balance. The vertical force is computed as for the fully- foiling model:

The boat hydrostatic calculations are carried out for several different drafts, up to a submerged volume reduction of about 50% of the sailing displacement volume. The trim is kept parallel to the sailing trim. So, the hydrostatic

$$F_z = c_L \cdot A_{foil} \cdot (0.5\rho v^2)$$

variables, like wetted area, waterplane area, prismatic coefficient etc... can be computed at any draft between the sailing trim and the one corresponding to 50% of the sailing trim displacement.

The solution is computed balancing the vertical force because this equation is decoupled from the rest. Given a lift coefficient, the vertical force (Fz) of the foil is computed and the requirement for a net zero Fz is satisfied with the hull at a reduced draft so that the buoyancy force added to the foil lift balances exactly the boat weight.

Once this draft is found, the longitudinal force and moments are computed. The solution proceeds iteratively, in terms (draft, velocity, heel), and also having the optimization parameters (Flat, reef, foil lift), that are set so to maximize the boat velocity.

Like the full foiling case, an upper boundary is established for the vertical lift coefficient, equal to 1:0.

Fully Foiling

The starting assumption is that the vertical force produced by the foils balances the weight of the boat. Therefore, the boat is already flying, it's completely out of the water but for its appendages and is assumed at zero heel. The solution at equilibrium is to achieve a net zero vertical force (Fz), a net zero driving force in the plane of the water surface (Fx) and a net zero Heeling moment (Mx) and equations, describing forces and moments of the three degrees of freedom of the system:

The usual VPP has only two degrees of freedom, describing the balance in heeling-righting moment and in thrust/drag force. Here the vertical force balance is added. The vertical force is produced by the foil:

The vertical force balance is very simple and is used also for obtaining what is called the take-off speed. This is the

$$F_z = c_L \cdot A_{foil} \cdot (0.5\rho v^2)$$

minimum speed where the boat can lift out of the water and begin flying in full foiling regime. For doing this, a maximum lift coefficient has to be established (CL_{max}) which can be produced by the foiling surfaces. Then, because the vertical force must be equal to the boat weight the following relation is obtained:

The actual value set for CL_{max} is 1.0. Clearly, the greater it is, the lower is the take-off speed. The take-off speed

$$v_{takeoff} = \sqrt{\frac{W}{A_{foil} \cdot 0.5\rho \cdot c_{Lmax}}}$$

represents the target velocity that must be reached in standard (or semi foiling) sailing mode for being able to fly. At some wind speeds it is evident that there are two sets of solutions, one for the standard mode and the other

for the full foiling. This last solution is considered feasible at that windspeed only if at some true wind angle the boat is able to reach the take-off speed in standard (or semi foiling) sailing mode.

For example, at TWS=12 knots the boat may be able to keep flying, but the boat speed in non-flying mode may be always below the take-off speed. As a result, the polar at TWS=12 will consider only the solutions in non-flying mode, but in a race with dying wind the boat will keep staying up on the foils even at TWS=12.

Solution details: variables and optimization parameters.

The state variables and optimization parameters are different from the standard case, where we have the unknows velocity and heel, and the optimization parameters flat and reef. When fully foiling there is no role for heel to play. The heeling moment equilibrium has to be found acting by manipulating the aero force and center of effort. Because the hydro side force is constant: the foil force is constant, and also its location, so the longitudinal moment of the foils is constant, and it is the aero part that must be adjusted in order to match the hydro moment.

Therefore, the system of three equations is solved iteratively in terms of velocity, sail depowering and vertical lift coefficient.

The vertical equilibrium is always satisfied exactly, first giving a lift coefficient that produces a vertical force equal to the boat weight. This first equation is decoupled from the other two. Once the vertical balance is done, the forces along the longitudinal axis and the longitudinal moment are computed. The balance is not satisfied exactly, and a new velocity and depower are computed ready for the next iteration, until convergence of the solution is reached.

3.8 Super Yachts

Alessandro Nazareth reported his observations on the 2022 regattas.

With the fleets recovering from the Pandemic disruption there have been a number of events (7 events Antigua, Bucket, Armani Cup, Palma Superyacht, Newport, MYRC, Ibiza and only the NZ Millennium Cup was cancelled) and a good number of competitors (about 90 certificates issued for 65 boats).The SYR[2]A secretariat has suggested several adjustments to try and equalize the fleet. It has been agreed that the following features of the VPP will see adjustment for 2023:

a. DA (Dynamic Allowance)to have more size related allowance, an attempt to equalize “size” effects in a fleet that ranges from 30-80m LOA.
b. TA (Tacking Allowance) to increase.
c. Increase the aerodynamic efficiency of ketches with tall mizzens and large mast separation by an adjustment to the effective rig height (Heff) based on the EB and PY/P ratio
d. Improve the calculation of the drag of centreboard and daggerboard slots.
e. Induced drag increase for very shallow draft keels and short chord keels with deep extensions.
f. Windage increase for superstructures
g. Winch speed allowance for tacking, gybing and hoisting.
h. Evaluate the effect of leeway during 2023.

The Committee support the SYRA’s efforts to grow the Super Yacht fleet through its support of ORCsy. However, the Committee would over time like to see some of the more subjective components of the VPP replaced by sound force models. This ambition will we are sure be supported by SYRA and their technical members.

[2] Super Yacht Racing Association.

3.9 Performance database

ORC have continued to collaborate with owners and navigators to gather high fidelity sailing polars for yachts handicapped under ORC. The data is processed through KND and is used to judge the effect of VPP changes against real performance.

The following boats are scheduled for addition to the database:

Carkeek 40 with HSF

Botin Partners 44 with HSF, TP 52 with HSF,

Beneteau 36.7 with non-overlapping jib, Beneteau 36.7 with overlapping genoa

Hyperion (superyacht), J109, M37, GL70

3.10 Aerodynamic force model development

The development of the aerodynamic force model has been on the Committees agenda for several years, awaiting the resource to produce a thoroughgoing revision. The current approach has proved remarkably durable, but it is time to start planning a new approach. The following effects are becoming more pressing:

- Overlap
- Shroud base and sheeting angle
- Jib sheeting via whisker poles set to leeward
- Leeway effects on apparent wind angle.

The broad proposal is to engage with North Sails to provide some typical sail flying shapes for say the Beneteau 36.7[3]. These base shapes will be manipulated by Ker Design to create a family of flying shapes to produce a Sobel series for neural network analysis. It is also proposed to engage with the Wolfson Unit (University of Southampton) to provide technical and computational support.

The Research Associates are willing to join in the planning process.

3.10.1 Cat Rig force model.

Preliminary CFD has been run on single sail rigs, this will analysed to create a rational set of single sail force coefficients. These will differ from the current mainsail coefficients which are only appropriate for use when combined with headsail coefficients.

3.10.2 ORC Club sail force coefficients for boats carrying a single spinnaker.

Club racers that only carry a single all purpose spinnaker are disadvantaged when competing against boats with a reacher and a runner. It is proposed to develop a set of force coefficients for boats carrying a single spinnaker.

3.11 Flying Nikka correlation.

Flying Nikka (fully foiling offshore yacht) has completed two regattas this season. She was able to sail on the same course as conventional monohulls with causing alarms. ORC issued an experimental certificate whose scoring polars included foiling and non-foiling conditions. The Committee are hopeful that the Flying Nikka team will be able to share their performance data in due course.

The Committee would like to thank Mark Mills (Flying Nikka's designer) for his helpful contributions about foiling yachts through the ITC Research Associates meetings.

3.12 VPP changes to help small boats.

There was a productive discussion with the observers about the effect on relative handicaps caused by having to carry life rafts for category 3 races. The situation is understood, but it is not feasible to have handicap certificates related to the race category. No changes in this respect are proposed.

[3] This will tie in with a boat slated for inclusion in the performance database.

3.13 Feedback from US Fleets.

The Committee discussed reports from the USA about dissatisfaction with the scoring at some regattas. The ORC invited the competitors to submit any race logged data that might justify their conclusions. We are hopeful that this data will be forthcoming over the winter.

4 Submissions.

The Committee discussed the submissions at some length. The Chairman was pleased to note that the submissions related to the VPP code were small in number, and in most cases, adjustments were already in train to address the matter.

The submissions and responses are presented in Appendix A.

5 ORCmh (Multihull)

In 2022 the ORC Multihull Rule made its debut, where the Armani Cup and the Multihull Cup were both scored using ORCmh. Whilst there were only a handful of entries, the handicaps worked well in fleets whose LOA ranged from 52-80 feet. Seven valid ORCmh certificates were issued in 2022, and despite this modest start, the ORC MH group is confident that ORCmh will expand in use next year both in the marquee regattas and offshore races.

The VPP is now at a similar level of development as the other ORC rules, and the emphasis next year will be to grow the fleet of "club" style boats through liaison with existing fleets (e.g., MOCRA and Multi 2000) using our database of standard hulls, which now numbers over 100. The handicap polars produced by the VPP match the observed polars which the OMA (Offshore Multihull Association) gathered over for their 20 members over several seasons.

The development of ORCmh has been a major effort for the ORC staff to create not only a viable VPP that can produce reliable results for multihulls that can fly a hull and use lifting foils to fly (e,g. the modified MOD 70's), but also a new Lines Processing Program (LPP) and a measurement system for these yachts.

For multihulls the difference in performance as wind speed and point of sail changes are dramatic. Upwind in light air it's typically slower than a monohull, but as the wind speed increases and the true wind angle widens the boats rapidly speed up, and the transition from tortoise to hare happens differently for every boat. This is captured in the scoring polar curves that offer much greater equity than a single number TCF. This is similar to the situation with foiling monohulls.

ORCmh is proving to be a fair and easily used handicap rule for the growing class of luxury performance multihulls and has been acknowledged by the IMA (International Maxi Association) as a candidate for use in their regattas should they adopt multihull classes. During the season several offshore MOCRA races have been shadow scored with ORCmh. Whilst for offshore racing the condition specific handicaps are less appropriate, ORC is keen to see to what degree the more sophisticated handicapping approach affects the results.

6 Keel failures. ISO12215 Part 9 Sailing Craft Appendages

There continue to be an alarming number of incidents involving sailing yachts losing their ballast keels. This is occurring not only with older boats, but occasionally with newly built yachts. This problem has been on the agenda of the World sailing and ORC Special Regulations Committees. A protocol for annual keel inspection was implemented last year. The Committee are of the view that inspection does not tackle the problem of unsatisfactory design and construction.

The ISO TC188[4] have now convened a Working Group[5] under the chairmanship of ITC member David Lyons to carry out a systematic review of ISO12215 Part 9 Sailing Craft Appendages[6].

WG 35 has held two meetings, and it's first reporting milestone is February 2023. Details of the discussions of the WG remain confidential to ISO.

The Committee welcome the formation of this working group and offer its full support.

7 Research Associates

In 2022 the ORC refreshed the membership of the ITC Research Associates group. Traditionally this was a group of retired ITC members who wanted to keep in touch with the ITC's work. This year the ITC were delighted to welcome 8 new members to join Lex Keuning: Stu Bannatyne (Doyle Sails), Adolfo Carrau (Botin & Partners), Jeremy Elliott (North Sails), Antoine Lauriot Prevost (VPLP), Mark Mills (Mills Design), Bruce Nelson (Nelson/Marek YD), Adam Scott-Mackie (Malcolm Mckeon YD), and Chris Williams (North Sails).

This group have a different purview to the ITC: they are at regattas, sailing boats, and wrestling with the practicalities of preparing boats to race: this was a move to let the ITC get its head out of the bottom of the technical boat!

It has worked very well with three 90-minute, virtual meetings held this year and the interaction on practical matters from flying headsails to centerboards has proved very valuable. The ITC is very grateful for donating their time, despite the myriad of other calls on their time. This initiative will continue.

8 A.O.B

8.1 Race Management Support.

The Committees discussion of the USA 2 submission (FORECAST / ROUTING BASED SCORING SYSTEM) led on to wider debate about how best to support inexperienced race managers who were starting to use ORC handicap systems.

The Committee re-iterated their conviction that using handicaps based on wind conditions and course type offered the most equitable way to score races. In a single race categorizing the relative performance of two boats by a single number will always be less equitable than using the polar curves, wind speed and course mix. This inequality magnifies with high performance boats, e.g. multihulls and foil assisted yachts. But it adds to the burden of the race committee, it requires more than measuring each boats elapsed time. You need to have a value for the True wind speed, and True wind direction, and the length and heading of each leg of the course. The challenge for the ORC is to make getting and processing this information as quick and easy as possible.

The course geometry is easy to acquire if the mark positions are known, but the determination of wind speed and direction is problematic. Post hoc analysis of the boat speeds around the course can deliver a very good estimate of wind speed, but this precludes competitors being able to calculate their mid race position in the fleet, and it delays the calculation of results. To give competitors scratch sheets that are valid during the race it has become common to provide scratch sheets for 3 or 5 wind bands for an assumed course mix. This can be unsatisfactory; the course mix may not be what is actually sailed, the wind speed may not be what was predicted before the start, and it's unsatisfactory to have the race managers declare a change in ratings at any time after the race has started, even if there has been a "significant change in conditions," as some race managers have stated to justify

[4] ISO/TC 188 Small craft.
Scope: Standardization of equipment and construction details of recreational craft, and other small craft using similar equipment, up to 24 metres length of the hull.

[5] Working Group 35. Small Craft: Hull Construction and Scantlings

[6] Note that compliance with ISO12215 is required for OSR Categories 0, 1 and 2, for boats withan Age or Series date after 01 July 2010, as well as replacement appendages.

this action.. Both these errors result in the wrong handicaps being calculated, and there is inevitably a lively discussion as to whether the wind was as predicted before the start.

In the view of the Committee the simplifications of using the wind speed bands, and pre-calculated courses is obscuring the merits of the handicap polar curves which are displayed on the certificate. It seems that neither dividing the wind speeds into smaller bands, nor pre-calculating more varied course types is satisfying the users.

Submission USA 2 proposes using a wind speed and direction derived from a high-fidelity weather model. The Committee have no objection to this, it does not contradict the ORC's procedures in any way, and it has the merit of being non-subjective and consistent.

After discussing this issue, the Committee agreed to develop a prototype process to facilitate the preparation of race specific polars based on a weather forecast and course geometry. This will initially be a web-based tool for the ITC to evaluate potential methods before sharing with the wider community. Once a process has been devised the manner of presentation to potential users can be tackled.

9 Next meeting.

The Committee agreed to adopt a meeting cycle of face-to-face meetings in spring and autumn, interspersed with 3 virtual meetings during the year.

The next meeting will be held before Easter 2023.

10 Closing remarks.

The Chairman thanked; the observers for their perseverance and input during the meeting and the Yacht Club Adriaco for their hospitality, and excellent cuisine.

11 2023 Research Agenda.

- Aerodynamic Force model studies
    - Cat Rig,
    - Overlap and sheeting base
    - Leeway
- Foiling force model
    - Unify foiling and semi-foiling solutions
    - Updates to LPP for better definition of foil geometry
    - Develop better induced drag formulation
- Develop appendage viscous drag formulation based on more detailed geometry
- ORCmh
    - HSF restrictions due to rig geometry
- Race management
    - Develop tools to facilitate Polar Curve Scoring
- Develop information exchange with Research Associates.

Appendix A: Submissions to ITC 2022

Submission: ESP 1

Reporting committee: ITC

MEASUREMENT COMMITTEE

HEELING CORRECTION

PROPOSAL

Modify, extend, and add the IMS Rule B4.1(a) or modify B4.4(c)(i).

RATIONALE

Sometimes in medium and large boats the internal distribution of weight is asymmetric according to the owner's preferences and the boat heels to one side. The solution is to add weight on the other side to correct this heeling.

This weight should not be treated as ballast or corrector weight because its placement is not for getting any advantage on the certificate, it is only to correct the symmetry of the heeling.

If we follow the IMS rule B4.1(a) it says: "Internal ballast, if any, which shall be fixed below the cabin sole, or as low as possible at any station and fixed to the hull structure to prevent movement."

The amount of weight needed to correct heeling in boats this size would be enormous for the small righting arm used. Probably a solution would be to explain better the problem on B4.1(a) and to add some wording to rule B4.4(c)(i) to reflect that this weight is there and is always fixed or laminated to the hull, as there are many boats with this issue.

ITC Response:

IMS Rule B4.1a is clear, attention is drawn to the second sentence.

B4.1 a) **Internal ballast**, if any, shall be permanently fixed below the cabin sole, or as low as possible. **Permanently fixed is considered as firmly secured by bolting or gluing that prevents any movement while racing.**

Positioning ballast inside the hull and above the cabin sole beside the unwanted effect of reducing boat's stability may have a serious impact on safety.

No changes are recommended.

Submission: ESP 2

Reporting committee: ITC

MANAGEMENT COMMITTEE

CREW WEIGHT LIMIT IN DH CERTIFICATES

PROPOSAL

Modify the low limit of 120 kg on DH Certificates to allow less than 120 kg.

RATIONALE

On Club or International certificates you can use any crew weight without a lower limit.

In Spain we have many single-handed regattas (1 Crew member only) that we apply the DH format but this does not allow a declared crew weight of less than 120 Kgs.

It is incongruous that in standard certificates low declared crew weights are allowed while in DH certificate they are not.

ITC Response:

The current DH certificate has a VPP run with two crew members with one positioned on the centerline and one on the rail. Running the VPP for single handed configuration with only one crew member will require an additional VPP run and additional type of certificate that is not feasible at this moment. Therefore, submission is not supported.

No changes are recommended.

Submission: ESP 3

Reporting committee: MANAGEMENT COMMITTEE
RATING OFFICERS COMMITTEE ITC

RELEASE OLD OFFSETS FROM CONFIDENTIALITY

PROPOSAL

Associated with every OFF file there are one or more designers, and we propose to lift the confidentiality protections of these files for boats over 50 years old in design.

RATIONALE

The ESP Rating Officer has strictly implemented the prohibition of delivering OFF files to anybody without the written permission of its designer, even when the designer is no longer available to contact and no one has inherited the copyrights.

The designer field in the DXT file is not strictly associated in the database with an OFF file. Given the big change in OFF file format implemented this year, we can now add a lot of information in these files for which confidentiality could be enforced.

ITC Response:

The Committee received legal advice that the offset files are copyright protected, and there is no ability on the ORC's part to waive that without the designer's permission.

It may also be noted that Sailor Services are allows running of test certificates without any need to have an offset file.

The Submission is not supported.

Submission: FIN 1

Reporting committee: ITC

MANAGEMENT COMMITTEE

SUSTAINABILITY THROUGH AGE ALLOWANCE

PROPOSAL

Promote competitive sustainability through a significant increase of age allowance, such as by 10 times compared to existing rule, and extend the maximum allowance applied from 15 to 25 years.

RATIONALE

As the world is facing worsening climate crisis and over-exploitation of Earth's natural resources, ORC should not take a passive role in its sustainability commitments. The rule should encourage and enable significantly more competitive racing by older yachts. This would also encourage broader participation in events.

ITC Response:

The Committee considered the proposition at some length. The current age allowance was considered an early example of an incentive to be sustainable in the use of existing hardware.

The current allowance has been in place for several decades, and for fear of unintended consequences the recommendation is to make no change.

Submission: FIN 4

Reporting committee: ITC

HEADSAIL SET FLYING EFFECT IN THE VPP CALCULATIONS

PROPOSAL

Headsails set flying are not reflected correctly in the VPP and should be reviewed.

RATIONALE

On numerous boats the headsail set flying is incorrectly penalized in the VPP calculations and does not take into account the purpose / shape of the sail.

For e.g., on a Landmark 43 a JibZero, which can be used only in very light wind (4 – 8 kts) upwind angles or for moderate 8-14 kts reaching angles, the rating impact is ~20s per mile in 6 kts of wind and 16s in 8 kts at upwind angles yet there is no real rating impact at reaching angles in moderate winds.

Almost a similar effect is shown with a 30% smaller JibTop if it is set flying. In this case the sail is purely a reaching sail for 14-20+ kts of wind.

Since 2021 this has been impacting both W/L and Offshore / coastal race ratings, even though HSF's are not intended to be used in W/L races. The added weight of scoring offshore and coastal races makes this an important issue.

As a simple correction, restricting usage of flying headsails only to Coastal and Offshore races and thus impacting only the Offshore / Coastal ratings would already improve the situation.

The impact of the HSF should be also looked at from the CDL point of view, as that should remain unchanged.

ITC Response:

The aerodynamic coefficients for HSF's and asymmetric spinnakers will be revised in the 2023 VPP. See ITC minutes item 3.2.3.

Submission: FIN 8

Reporting committee: ITC

DOWNWIND SAIL COEFFICIENTS

PROPOSAL

Check the accuracy of the current downwind sail coefficients at different apparent wind angles.

RATIONALE

Almost all World and European medals were won with asymmetric spinnakers tacked on CL. The VPP seems to rate this configuration quite slow for 14-20 knots of wind in W/L racing (high AWA conditions), and much slower than a clearly smaller sail with a spinnaker pole.

Thus many boats originally designed for symmetric spinnakers have been converted to much larger asymmetric spinnakers with long TPS's. Asymmetric sails with spinnaker poles seems to have vanished totally.

ITC Response:

The ITC revised the balance of SYM vs. ASYM aerodynamic coefficients at broad AWA in 2022 and are monitoring the effects on the fleet before making any additional changes.

Submission: GRE 1

Reporting committee: ITC

RACE MANAGEMENT COMMITTEE

EFFECT OF DECLARED CREW WEIGHT ON DYNAMIC ALLOWANCE

PROPOSAL

Remove or minimize the effect of declared crew weight on dynamic allowance.

RATIONALE

Dynamic allowance is applied mainly to cruiser/racers and therefore is considered a measure of the cruising characteristics of the boat. These characteristics clearly do not change with the variation of crew weight, hence similarly there should be no change in dynamic allowance.

This effect was introduced in 2022 and is profound for Double Handed certificates of small cruiser/racer boats (example attached) which have low crew weight.

In the Greek fleet, dynamic allowance has been used successfully for several years as a class divisor for the ranking list. This task now seems impossible.

ITC Response:

The Submission is supported, and sensitivity of DA to crew weight will be eliminated in the 2023 VPP.

Submission: NED 2

Reporting committee: ITC

CLARIFICATION OF TERMS FOR DSPM, VCG AND RM

PROPOSAL

DSPM, VCG and RM are frequent called properties in the ORC Rating Rules, in the IMS Rule or on certificates. However, they do not always cover the same content. It's proposed to review current terminology to make these terms more specific and transparent to laymen readers.

RATIONALE

The implementation of "Declared and Default crew weight" last year caused questions about the precise content of terms DSP(M), VCG and RM. Some examples are

1) Rating Rule 106.1: DSPM or DSPS??
2) VCGDe as entered for a Club certificate (slightly) differs from VCGD on certificate??
3) Rating Rule 107.4 default RM: DSPM or DSPS???
4) Measured RM on Club certificates (page 2) is confusing as in most cases RM is not measured.

After discussion it was agreed that a fresh look was needed.

Among others it is suggested to have a clear distinction between measurement properties and properties used for rating purposes, like with sails.

Another suggestion is that direct displacement, VCG or RM inputs for a Club certificate shall always be the measurement trim ones and copied exactly the same on the certificate. It is not proposed to add more data to the certificates, in contrast to current practice.

ITC Response:

The Submissions is supported in 2) and 4) while 1) and 3) are clearly defined in the rules. The ORC Manager software will be updated where the VCGDe (default VCG) is entered and the VCGD as printed on the certificate. The measured RM will not appear on the certificate if it is not measured.

Submission: NED 5

Reporting committee: OFFSHORE CLASSES AND EVENTS COMMITTEE
ITC

FUTURE CLASS DIVISIONS ON APH

PROPOSAL

Base the 2024 class divisions on APH rather than on CDL. The class divisions based on the 2022 rating numbers would then be:

Class A 415 - 480

Class B 480 - 535

Class C 535 - 575

RATIONALE

CDL was introduced as a better way to divide classes in 2014. It is primarily designed for W/L races and as a number that was more difficult to manipulate or to adapt your boat to. It also allowed for small and faster race boats to compete in a class with less big boats since their performance was influenced by taking too long to get clear wind and start sailing to their potential.

The drawback for this was that bigger heavier boats with much slower speed potential were forced in faster classes where they did not belong based on the real speed bands.

In the meantime, a lot of development has occurred, and new designs have come out that prove that CDL can also be manipulated.

While ORC championships are moving more and more towards Offshore and Coastal/around the can racing, APH is a more appropriate figure for a Class Division number.

Note: This proposal is done on the basis that owners like to compete in classes with similar speed potential (with more boat-on-boat racing). The numbers correlate roughly to a GPH 460- 545 / 545 – 600 / 600 – 645

ITC Response:

CDL was introduced several years ago as primary method of defining classes with mostly windward/leeward races as requested at that time for ORC World and Continental championships. There is nothing change since than that may justify change of this approach. However, APH may be better option for the offshore race only and in fact, it is used for the newly established DH Championships.

Therefore, this submission is not supported

Submission: NED 6

Reporting committee: OFFSHORE CLASSES AND EVENTS COMMITTEE
ITC

OPT-IN FOR BOATS OUTSIDE A CLASS RATING BAND

PROPOSAL

If the 2024 and future class divisions continue to be based on CDL, boats that fall outside of a certain rating band may opt to be entered in a class that better suits their speed potential.

Based on the 2022 rating numbers of boats could opt for this class if APH:

Class A < 470

Class B 485-530

Class C > 535

RATIONALE

CDL was introduced as a better way to divide classes in 2014. It is primarily designed for W/L races and as a number that was more difficult to manipulate or to adapt your boat to. It also allowed for small and faster race boats to compete in a class with less big boats as the performance was influenced because it took too long to get clear wind and start sailing to potential.

The drawback for this was that bigger heavier boats with much slower speed potential were forced in faster classes where they did not belong based on the real speed bands.

This Submission is made to resolve this drawback and keep as many as possible owners enthusiastic for our competitions.

Examples are:

Bavaria C57 (competed in EU2021) in class A with a GPH of 552.6

Grand Soleil 45 (Competed in EU2021) in class A with a GPH 565.8

Two Tonner (Competed in WC2021) in Class B with a GPH 607

A Dehler 39 (Competed in WC2018) in Class B with a GPH of 617

These boats and many more like them should be allowed to compete in a class that better fits their rating band.

ITC Response:

See NED 5. Submission is not supported

No changes proposed.

Submission: RUS 3

Reporting committee: ITC

ACCOMMODATION AREAS IN C/R REGULATIONS

PROPOSAL

To re-word the last sentence of the IMS Regulations as follows:

“Living areas and sleeping areas should be separated by means of rigid bulkheads or partitions, accessible through a rigid door.”

RATIONALE

When doors are not required, we can see boats when required partitions only imitated, with wide passage in it, that is contrary to the idea of the true Cruiser / Racer. For example, I have seen a TP-52 classified as Cruiser/Racer.

ITC Response:

The current regulations defining all the rules for the Cruiser/Racer division. The requirements for separating living and sleeping areas by rigid bulkheads are only one of these. Contemporary interior designs may have a more “open plan” approach that still can fit with all other C/R rules, while it is hard to expect that TP 52 can meet these rules without substantial modifications (seats in the cockpit, number of berths, cabin sole etc…).

Therefore, the submission is not supported

Submission: SWE 4

Reporting committee: ITC

ADJUSTING RATING WHEN SAILING CAT 3 + LIFERAFT

PROPOSAL

Reduce the unfair advantage of heavier boats regarding weight of safety equipment by adding a similar weight to each boat certificate in races where safety equipment is mandatory.

RATIONALE

A light displacement boat is forced to carry roughly the same unmeasured weight of safety equipment as a heavier displacement boat (anchors, rafts, extra water etc.), thereby suffering a larger performance loss than the heavier boat.

This is in direct conflict with the objective of promoting fair sailing.

ITC Response:

The Committee understands the rationale behind the submission but can find no practical way to address the issue. ORC certificates can be used for any race and it is impossible to add the SR Category of the race as an input parameter for the rating calculations.

Therefore, this submission is not supported

Submission: USA 1

Reporting committee: MEASUREMENT COMMITTEE
ITC

SUPPLEMENTARY MEASUREMENT PROCEDURES FOR WIDE LIGHT HULL FORMS

PROPOSAL

Establish a baseline measurement of any boat that meets the criteria of being Wide Light (as defined below): an offsets file of hull and appendages; freeboards and displacement; inclining and stability; and scale weight for confirmation of displacement. For subsequent configuration changes that effect the weight of the boat, primarily ballasting, and at the discretion of the rating authority; permit the use of calculated displacement, LCG and VCG as inputs to the ORC VPP as an alternative to conducting new in-water measurements. Those calculated values are to be based on certified measurement of any such changes: weight as well as

longitudinal/vertical/transverse locations.

RATIONALE

There is always some degree of uncertainty in the measurements of freeboard heights. This uncertainty correlates with environmental conditions of wind and waves. In an ideal environment, no wind and waves, the measurements and subsequent calculations can be quite accurate. It is, however, quite common to face less than ideal conditions, especially in the lead- up to a race. There might be a limited window of opportunity for measuring with less than ideal conditions. The result can be freeboard measurements with less accuracy and, on an ORCi certificate, new values of displacement and stability that are not what is expected from the weight changes.

Simply stated: the direct use of measured weight additions and removals is generally more accurate than the calculations of the same using in-water measurement of freeboards. It would likely lower the cost of measurement as well as reduce the stress on boat and measurer. It is quite easy and straightforward to take existing, trusted, values of displacement, LCG and VCG and calculate new values given simple, verified weight changes.

And it is easy to enter them into the VPP. The ORC VPP has this capability now, it is applied only to ORC Club certificate processing. The criterion for being Wide Light would be based on the waterplane area relative to the displacement. As an example, the waterplane area multiplied by 2 mm yields a volume to be compared to the volume of displacement.

ITC Response:

The rationale behind the submission is understood by the Committee.

However, ORC International certificates are based on complete measurement and the rules define when a new measurement is needed, and the rating tolerance allowed between two certificates. Alternatively, an ORC Club certificate may be issued with design declared or calculated data and this option is available in cases like those described in the submission.

The Submission is not supported

Submission: USA 2

Reporting committee: **RACE MANAGEMENT COMMITTEE**
MANAGEMENT COMMITTEE
ITC

FORECAST / ROUTING BASED SCORING SYSTEM

PROPOSAL

To offer a new ORC scoring system that uses objective forecasts of wind speed and current, in conjunction with polar data and routing software to generate TCF's for scoring the race. This option should be web-based to ensure access, accuracy and transparency for both Race Committees and competitors.

RATIONALE

Wherever wind speed estimates are being used for scoring (eg, Triple Number) the RC must select an appropriate wind band for scoring the race. This choice is typically based on their observations and may be different than the expectations of the competitors. By using modern forecast models (such as NOAA's HRRR, Meteo France's Arome or Arpege), a course description, and each entry's polars, an ORC website tool could be developed to generate a single TCF for each boat. Specifically, the tool would route each boat around the course computing each boat's route time.

The fastest boat gets a TCF of 1.0. All other boats get a TCF of 0.9xxx so that every boat's corrected route time around the course is the same as the fastest boat. The RC distributes these TCF's an hour before the start, via email, web posting, txt, WhatsApp, etc. so that time allowances are known in advance by all. Advantages of this system include:

Every boat gets their TCF and their competitor's TCF's before the start. The sailors enjoy simple, understandable ToT standings and scoring. This approach takes advantage of the fidelity of each boat's ORC polar file, forecasts, and course, and so is more fair for a wide range of boat types. Finally, a significant advantage is that this system is objective, and the process can be disclosed in the SI's in advance.

ITC Response:

This approach is entirely consistent with the methods described in the ORC rating Systems document. Using a constructed course and a wind direction and strength taken from a forecast provides a non-subjective route to scoring races.

ORC will develop its documentation as required to support this.

Submission: USA 4

Reporting committee: MEASUREMENT COMMITTEE
ITC

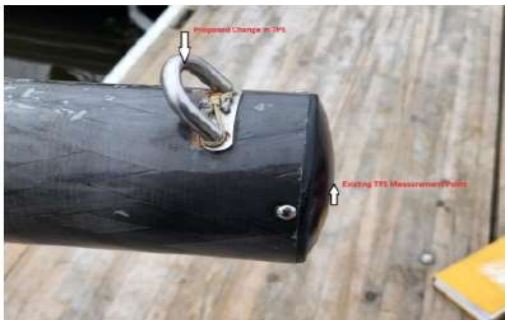
IMS RULE F7.2 MODIFICATION

PROPOSAL

Delete IMS rule F7.2(b).

RATIONALE

On many production boats the tack point on the bow sprit may be 50mm or more from the end of the bow sprit. Removing F7.2(b) will allow more accurate representation of TPS and not unduly penalize boats. Examples would be J105s and J120s.



In the case of a J109 (see photo above), the new TPS dimension would be 80 mm shorter and the GPH and APH both increase by 0.2 with the change in TPS measurement. This change will not impact most custom boats such as TP52s which use a “pig nose” trumpet bowsprit tip.

It is intended to address the inequity, real or perceived, of measuring many production boats using the existing protocol. As the existing TPS measurement rule likely came from the SPL measurement rule, we also looked at the implications of changing SPL from the extreme end of the spinnaker pole to the bearing point as this has a related measurement procedure. In the case of a Santa Cruz 70, an SPL change of 50mm results in no change to GPH or APH. Making the same change to a J35 of 50mm results in a change of 0.3 (slower) for both APH and GPH.

ITC Response:

TPS measurement is follows the ERS definition as well as the UMS concept. SPL and TPS measurements match those in IRC. It may be noted that SPL is also measured up to the foremost part of the spinnaker pole.

Therefore, submission is not supported.

Submission: USA 5

Reporting committee: ITC

ASYMMETRIC SPINNAKER FLOWN TO WINDWARD

PROPOSAL

Amend ORC Rating Rule 209.4 to allow flying asymmetrical spinnakers to windward.

RATIONALE

ORC Rating Rule 209.4 currently prohibits flying an asymmetric spinnaker to windward, yet this wing-on-wing configuration is commonly practiced in medium flat water conditions for many cruiser/racers. An investigation on how to fairly rate this configuration would be popular with this class of boats in the ORC fleet.

ITC Response:

The ITC do not support a rule change as it will require significant update of the aero model and open possible loopholes. Flying an asymmetric spinnaker to windward is permitted during maneuvers.

The Submission is not supported.

ENDS