World Leader In Rating Technology

ITC – INTERNATIONAL TECHNICAL COMMITTEE

Meeting of the **International Technical Committee** of the Offshore Racing Congress held on 21st to 23rd of October 2016 in TU Delft (Holland)

Present: Alessandro Nazareth (Chairman)
Jason Ker (UK)
Nicola Sironi (ORC Chief Measurer)
Zoran Grubisa (CRO-ORC Staff)
Panayotis Papapostolou (GRE-ORC Programmer)
Davide Battistin (ITA-ORC Programmer)
Jim Schmicker (USA)
Lex Keuning (Research Associate)
Tobias Kohl (GER)

Observers:

Rob Ranzenbach (USA- Quantum Sailmakers)
Gennaro Aveta (ITA-FIV - ORC)
Simon Forbes (UK – World Sailing)
Per Boymo (NOR RATING)
Sverre G. Eaniwesen (NOR RATING
Stefan Qviberg (Yacht Designer - Swe)
Arthur Peltser (NED – KNWV)
Peter De Jong (NED – KNWV)
Ab Pasman (NED Noordzee Club)
Wick Hillege (NED – TU Delft)
Javier Cela (ESP – RFEV)
Leo Van Raam (Noordzee Club)
Michiel Voor (NEED KNWV)

Apologies for absence were received from committee members Andy Claughton (UK) and David Lyons (AUS)

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1. **WELCOME, MEETING LOGISTICS**

The Committee thanks TU Delft for hosting the meeting, and Lex Keuning for hosting the entire ITC and all observers for the Saturday dinner and for his assistance during the meeting.
ITC would like also to thank Wick Hilleje for assisting for the full duration of the meeting.

2. **PREVIOUS MEETING MINUTES APPROVAL.**

The minutes of the last meeting in Hamburg of September 2016 were approved with no further discussion.

3. SUBMISSIONS REVIEW

3.1 Submission **AUS 1 - STABILITY AND BALLAST LEEWARD RECOVERY INDEX (BLRI)**

The committee had already checked the current format of both certificate and Stability Data Sheet certificates in Hamburg.
Last year's decision to remove any stability screening from the IMS/ORC rule led to the decision of just printing the values of LPS and IMS Stability Index on ORC INT certificates for info for Rating Offices and National Authorities (on CLUB certificates these values are showed with the label "ESTIMATED" since the stability is not measured).
BLRI was removed as no screening is in the OSR based on this factor.
The current Stability Data Sheet is still showing the value of BLRI and this will be retained through 2017 but with an added warning (that will be extended also to LPS and IMS Stability Index) that the computation of the above three factors is made not taking into account deck shape, cockpit, coachroof and superstructures.

3.2 Submission **GRE 3 - WEIGHT DEDUCTION FOR PRE-2013 MEASURED BOATS**

The committee believes that adding this automatic weight deduction to boats measured prior to January 2013 will oblige all such boats (eg, boats normally not racing at a very high level) to re-measure to avoid a handicap disadvantage, and this is not the aim of the ORC policy.
Since the advantage (if present) is very small, the committee decided to not support this submission.

3.3 Submission **ITA 2 – DEFAULT MAST WEIGHT FOR SMALL BOATS**

The committee checked the current formulation of default mast weight versus the actual measured weight in the 2016 ORC INT fleet.
The default weights calculated with the current formulation are not so far from the measured weights, even in small boats.
The revision of added resistance (see par 5.2 below) will further smooth this effect.
Since the current default weight is based on a formulation introduced in 1996, the committee agreed to inspect this and compare it in 2017 to a new formulation proposed by Jason Ker.

3.4 Submission **ITA 4 – OFF FILES VALIDATION**

ITC discussed this issue at length. The list of prescriptions that the current rule 301.1 already requires for Designer Offset files seems adequate. The correspondence of freeboard points between the design offset file and the real boat, the shape of the transom and the location of the appendages are the likely points where designer offset files differ from real measured ones.
The current rule is already requiring a certain amount of checks on the boat to validate the offset file, and requires to get approval from the Chief Measurer, but this is seldom performed, so it seems useless to add further checks but rather to enforce what is already in the Rule.
However, when the checks prescribed by the rule are fully applied, the amount of time needed gets close to what is needed to fully scan the boat, so no time substantial time saving is obtained by this method.

3.5 Submission **ITA 6 – USE OF FIXED IMPLIED WIND**

The submission was already discussed during the Hamburg meeting, and last year
The committee still believes, after two years since its introduction and as reiterated last year, that the use of fixed IW is the best way of applying the concept of Performance Curve Scoring.

The rationale from the Italian Submission claims that in particular situations the application of this kind of scoring alters substantially the results, meaning that in those cases the PCS should not be applied (such as when the wind is dying or changing when only part of the fleet has already finished). The rule currently requires the application of this system for all races scored with Implied Wind, yet in many countries and races the old – variable - IW is still applied. The committee suggests to remove this obligation and just leave in the rule that the recommended scoring system for PCS is the fixed IW.

During discussions the ITC drafted some possible improvements of the fixed IW scoring that would improve this concept but would complicate its application, requiring the scoring software to be updated as well.
Among those the following were proposed:

- Use the average IW of the first 5 boats or 25% of the fleet as fixed wind
- Use a different and lower IW for the second half (or whatever percentage of the fleet)

These options will be further studied during 2017.

3.6 Submission **MANCOM 1 – SAIL LIMITATION**

ITC agrees that the table of sail limitations in ORC rule 206 should be related to CDL instead of GPH, to be consistent with current class divisions (made on CDL), and would avoid strange situations as explained in the rationale.

Based on the current CDL limits (2016) the table could be changed in this way:

CDL	Above 17.01	17 – 11.61	11.6 – 9.71	Below 9.71
Mainsail	1	1	1	1
Headsails	8	7	6	5
Spinnakers	4	4	3	3
Mizzen Staysail	1	1	1	1
Mizzen	1	1	1	1

If the CDL limits are adjusted in 2017 according to the new VPP then the limits should be changed accordingly.

3.7 Submission **NED 1 – CORRECTION PIPA DEFAULT CALCULATION**

Last year the Default PIPA calculation was changed to avoid situations where the estimated PIPA (based only on the kind of installation and propeller diameter PRD) was higher than the actually measured value.

This concept should be retained so the submission is not supported.

The committee suggests that if a boat considers its PIPA unfair they could :

a) Measure the installation completely
b) Provide drawings where the Rating Office could compute (for ORC CLUB certificates only) a more correct PIPA value
c) Ask the Rating Office to insert the measured values of a sistership

3.8 Submission **NED 2 – SPECIFICATION OF MATRESSES**

The committee still believes that the current Regulations for the C/R division should remain as they are without adding complications (as the mattresses thickness or foam density).

They were re-written for the sake of simplification and we should not come back on them
Changing the weight of mattresses after the measurement is cheating (like changing the weight of installed gear or item on board) and is obviously forbidden by the rule.

The submission is not supported

3.9 Submission **POL 1 – CDL CHANGES DUE TO DOWNWIND SAILS CHANGE**

CDL formulation, based on rated length and upwind VMG speed with TWS=12, should not be affected by spinnaker area. A test run made on the world fleet increasing the spinnaker area of 10% for each boat was prepared and no CDL change was observed.
After the Hamburg meeting the Polish Rating Office was asked to provide the cases where this problem arose and to double check this issue, but no further reply was received.

The submission is therefore not supported.

3.10 Submission **POL 3 – STABILITY ESTIMATION FOR ORC CLUB**

The committee believes the current formulation is not returning a poor estimate of stability, and a Bias was introduced some years ago on the estimated RM for ORC CLUB (+3%) to avoid unwanted advantages over ORC INT measured boats.
The committee has in its 2017 agenda (see Par.15 below) the revision of the Default RM calculation, to change to a component weight method to estimate VCG.

3.11 Submission RUS 1 – RESISTANCE IN WAVES

The committee is continuously working on the Added Resistance in Waves formulation.
Last year a modification was introduced to obtain a more balanced evaluation for small boats.
This year the added resistance has been thoroughly inspected (see below par. 5.2) and a revised formulation has been proposed for 2017.

Lex Keuning announced that a long-term research on Added Resistance in Waves will be made at TU Delft. ITC will try to send feedback about possible issues to be included in the research that could be useful to further improve the current Added Resistance model.
Lex made a presentation during the meeting of a possible issue related to the added resistance and the concept he explained will be retained as a reference for the long term research.
This topic will be kept in ITC agenda for 2017.

3.12 Submission **RUS 3 – HEADSAILS WITH BATTENS**

The treatment of luffed headsails is currently the same for all different overlapping ratios.
A faster set of coefficients is introduced for overlapping sails when battens are installed, but there is a smooth transition (from 110% to 130%) between the two sets of coefficients to avoid big jumps between 110% and 111% luffed jibs.

A check over the entire fleet of ORC INT boats showed a very small amount of boats with battens in overlapping jibs with LPG> 110% , and the majority of the above boats seems to have some mistakes in their input regarding the battens (it may be that battens are in the smaller overlapping jib or in some headsails set flying).

The committee then made a test on the above boats unifying the coefficients to the current non-overlapping jibs (or overlapping without battens) and the result were showing very low differences in handicap. The ITC will thus propose to unify all the coefficients for luffed headsails without battens.

3.13 Submission **RUS 4 – STABILITY DATA SHEET**

ITC confirmed again the decision taken last year. LPS and IMS Stability Index will be printed on the certificate for information purposes but no limit will be introduced again in the ORC rule.
The safety screening criteria are left for the World Sailing OSR to define for the various categories of races.

The submission is therefore not supported.

3.14 Submission **RUS 5 – RESISTANCE CURVE**

The committee is not in favor of providing Resistance Curves in Sailor Services, because the purpose of the VPP is to use it for the handicapping of racing boats, and not as an engineering tool or naval architecture function.
The submission is therefore not supported and is deferred to Mancomm.

3.15 Submission **RUS 9 – ORC SPORTBOAT CLASS RULES**

The rationale of this submission is not clear in the intent.
After Hamburg meeting some members of the Sportboat working group sent some mails with very different indications on the direction the class would like to go.
Suggesting divisions in the sub group is also a difficult task given the wide variety of boats below 9.5 m that have very different characteristics.
The only suggestion that ITC would make is to separate boats with trapezes and hiking straps from normal keelboats where the crew sits inside the sheer, as prescribed by WS OSR for Cat.4 and above.

Given this situation the submission is deferred to the Offshore Classes committee, but if the Working Group and this committee will make a more clear definition of what they want to achieve in their class then ITC is available to provide possible technical solutions.

3.16 Submission **SUI 2 – FLYING HEADSAILS SET ON A NOT FULLY EXTENDED BOWSPRIT**

The committee recognizes that this submission would require the introduction of a new measurement.
The TPS is already taking into account the tacking point of the flying headsails, and nothing prohibits to tack them in any place along the bowsprit, provided it's on centerline.

The submission is therefore not supported.

3.17 Submission **GER 2 – HEADSAIL HEADBOARDS**

ITC has no concern about the possible issues claimed in this submission.
The introduction of the same requirements of the mainsail to the headsail for the definition of the upper girth measurement is complicating the measurement process, so the submission is not supported and deferred to the Measurement Committee.

4. AERODYNAMICS

4.1 Upwind Aero Model research status update

In Hamburg Jason Ker presented an Interim Report about the research in progress being made together with Wolfson Unit.

In the past month the research has made progress and another report describing the activities performed was prepared and presented (attached to these minutes).
It is expected that before the first 2017 ITC meeting in March the research will be concluded and in 2017 ITC will utilize the results to revise and modify the upwind aero model.

4.2 Flying headsails coefficients revision

During the season some concerns have been raised about the use of small headsails set flying (code0's) because some boats exploit their use in not having their VMG upwind allowance increased in light winds.
The ITC revised the sail coefficients for these headsails set flying, taking into account that 2 years ago an opposite complaint was raised and the coefficients were lowered as the headsails set flying were considered unfairly treated.
Since the previous set of coefficients was derived from wind tunnel tests it was decided to come back to these and the test run prepared was in the expected direction with upwind VMG handicap slightly increasing in light winds.

This modification will thus be included in the 2017 VPP.

4.3 Heeled Hull windage formulation

On the discussion about the hull sheerline and corresponding windage the ORC programmer explained that for evaluation of windage only the upright surface of the hull is taken into account with just a cos(heel angle) attenuation.
The ITC decided then to modify the LPP to compute the correct hull lateral area at every heel angle to better evaluate the windage of wide boats that when heeled are increasing the lateral surface area much more than that of narrow hulls.
A test run was prepared and the results were in the expected direction.

This modification will thus be included in the 2017 VPP.

5. HYDRODYNAMICS

5.1 Effective span in heeled conditions – $F_{unsteady}$ function revision

The effective span of hull in heeled conditions has been thoroughly checked by the committee against both Tank and CFD data.
A set of tank tests performed for the Whitbread Maxi and W60 designs have been provided by Jim Schmicker from Farr Yacht Design and their values compared with the ORC VPP's effective draft.
Jason Ker also compared appended CFD tests for a cruiser-racer and two different racers with the ORC VPP's effective drafts.
The correlations were remarkably good, so it has been decided that no short term intervention is necessary. However ITC believes that this validation exercise should be extended to heavy boats as well, so this item will be kept in the agenda for 2017.

Finally the programmer advised that he found an LPP clipping problem that affected the rated effective span of a small number of yachts, which will be solved by introducing a canoe body draft inferred from IMSb and IMSbtr for the effective span algorithms, which continues the direction in recent years of de-sensitizing the rule to offset file irregularities.
On this regard he advised that the implementation in the new LPP of the double poke-through treatment is not supported by the current LPP, on which he has been working for the past year.
The issue of the "double poke through" was discussed because during the season some boats were found with this feature in the keel shape.

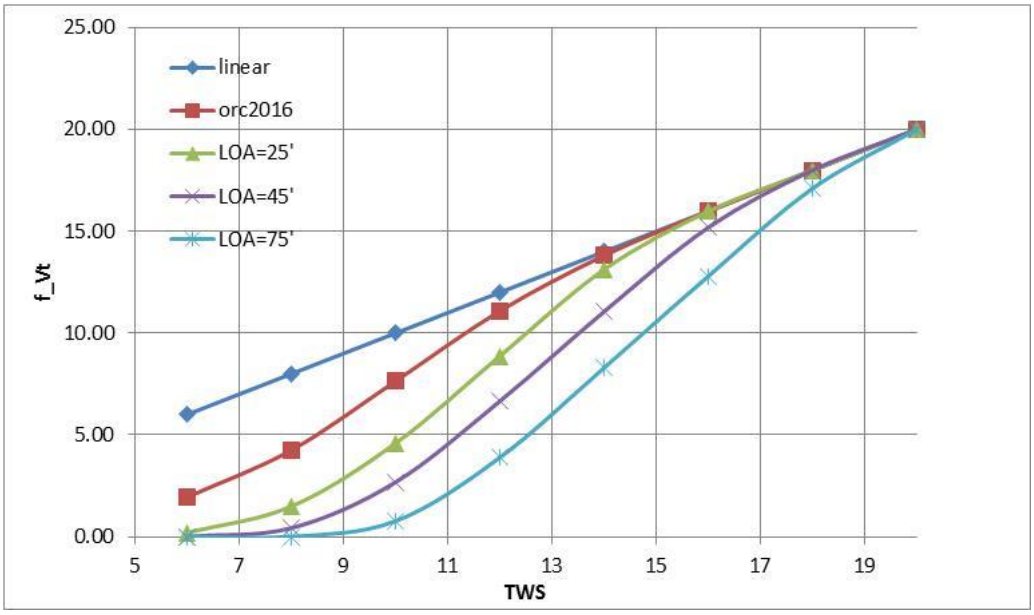
Further investigation on the $F_{unsteady}$ formulation is planned during 2017

5.2 Added resistance in waves.

See above para. 3.10 submission **RUS 1 - ADDED RESISTANCE IN WAVES**

A thorough analysis of the current formulation of added resistance in waves (see VPP Documentation 2016 chapt. 6.8 p. 77) was performed by the committee.

First of all the wave energy spectrum has been revised taking into account the different way the waves affect boats of different sizes, smoothing the energy for bigger boats and reducing the energy at low wind speed when the sea state is almost flat.



The above plot shows how the energy curve has been corrected for boats with LOA=25', 45', and 75'.
For intermediate lengths the energy is interpolated between the two adjacent curves, while below 25' the lower curve is retained and above 75' the higher curve is retained.

Then the R_{aw} formula that computes the boat added resistance with reference to a base boat with all his terms was reviewed as follows:

$$Raw = fs \bullet 2gL \bullet f(VT)\ 0.55 \bullet f(\beta_T)\ f(L30)\ [0.00146 + f(Fn) + f(K_{YY}) + f(L/B) + f(B/T)]$$

The term:

$$f(K_{YY}) = 0.01575(GY\ R - 0.28)$$

was modified reducing the multiplier from 0.01575 to 0.01 to reduce the effect of gyradius in R_{aw}.

The term :

$$f(LCB - LCF) = 0.115((LCB - LCF) - (-0.03)) + 0.0578((LCB - LCF)^2 - (-0.03)^2)$$

was removed as there is no relationship between the relative LCB and LCF position and R_{aw} .

Also the ranges of the various parameters (that were deactivated in the past) have been re-introduced:

PARAMETER SERIES	RANGE	BASE VALUE
GYR	0.17-0.29	0.25
B/TC	1-9	4.443
L/B	2.77 – 4.16	3.327
B/T		4.443
Fn	0.14 – 0.45	0.325

In addition the issue of the GYR calculation was discussed.
It is now based on a base gyradius (0.22 * IMS L), then adding the effects of mast weight and CG and of the construction material of the hull.
The committee agrees that construction materials are not affecting the gyradius of a boat since all the weight saved is put in the keel and not in the bilge as was happening when this adjustment was introduced more than 10 years ago, so it was decided to remove the gyradius adjustment due to the construction materials as reported in VPP Documentation 2016 p. 80):

SOLID:	$0.016 \cdot CANOEL$ is added to Gyradius
CORED:	$0.008 \cdot CANOEL$ is added
LIGHT:	No adjustment
CARBON:	$0.005 \cdot CANOEL$ is subtracted
CARBON FOR C/R:	$0.010 \cdot CANOEL$ is subtracted
HONEYCOMB:	$0.006 \cdot CANOEL$ is subtracted where applicable in addition to adjustments listed above;

A discussion developed to find an alternative, concluding that stiffer materials make the boat longer upwind when tension on the fore and aft stays is applied, so a new routine is applied – only upwind - that makes a boat longer and hence faster according to the following table:

CARBON construction , 0% increase in upwind speed due to length
LIGHT construction , 0.2% decrease in upwind speed due to length
CORED construction, 0.4% decrease in upwind speed due to length
SOLID construction, 0.6& decrease in upwind speed due to length

This will allow construction materials to retain a different VPP treatment that will keep similar speed differences between the listed categories, but distributed in a different way along the TWS range.

Single and combined test runs were prepared and the results were in the expected direction, so the committee will propose to include this new formulation for added resistance in 2017 VPP.

6. DEFAULT VCG DETERMINATION IN LIEU OF DEFAULT RM – COMPONENT WEIGHTS FORMULATION

No progress was done on this project but the item will be retained on 2017 agenda.

7. NEW DEFAULT MAST WEIGHT EVALUATION

No progress was done on this project so the item will be retained on 2017 agenda.

8. PERFORMANCE LINE SCORING

Following the submission ITA 1 (not addressed to ITC) the committee fully support the inclusion of Triple Number ToD allowances in the certificate format - they are currently not shown but scoring programs are already programmed to use it using the formula ToD allowance = 600/TMF for offshore and 675/TMF for inshore allowances. Many races in the

Mediterranean region are scored ToD and the triple number could be a valid way of replacing the PLS, which ITC believes should be removed from the available scoring options.
In fact, the committee discussed at length the application of PLS, which is based on performance values at 8 and 16 kts, because it can return large errors in light and strong winds but also in the medium range (10-12 kts).
PLS can be replaced using the triple number ToD (or ToT) or Ocean for PCS.

9. BULWARK / SHEERLINE DEFINITION REVISION.

The chairman reported that more and more boats (especially among SuperYachts) are featuring bulwarks extending the topsides above the deck level.
The offset files are normally measured with stations extending up to the top of the bulwark, and not stopping where the hull intersects the deck.
This offset configuration allows consideration of the entire hull surface for windage purposes.
So it was decided to amend IMS rule B.2 accordingly expanding the various different sheerline definitions, and decouple the position of measurement freeboard points from the sheerline identification.

10. CENTERBOARD MEASURES DEFINITION REVISION

Another item discussed was the definition of KCDA (IMS rule C2.3) in some particular centerboard designs.
The chairman presented some sketches to be added to the rulebook that will be refined for publication.

11. VPP DOCUMENTATION RELEASE

Davide Battistin completed the transfer of the current Documentation to the LATEX platform.
He circulated a draft during the summer and the committee was invited to give feedback.
The new 2017 VPP modifications will be included too in this new format.

12. 2017 VPP - PREPARATION OF AN "ALL EFFECTS" TEST RUN AND A BETA VPP FOR IMMEDIATE RELEASE

An "all effects" test run including the following modifications has been prepared:

- REVISED ADDED RESISTANCE IN WAVES see 5.2
- CONSTRUCTION MATERIALS LENGTH REDUCTION see 5.2
- FLYING HEADSAILS REVISED COEFFICIENTS see 4.2.
- HEELED HULL WINDAGE see 4.3
- OVERLAPPING HEADSAILS WITH BATTENS NEW COEFF see 3.11

A beta VPP with the above modifications is ready for distribution to DVP users and rating offices for their review.

13. COMPLETION OF RECOMMENDATIONS TO THE CONGRESS

a) New formulation for the added resistance in waves (see 5.2)
b) New length assessment for different construction materials (see 5.2)
c) New flying headsails coefficients (see 4.2)
d) Revision of Hull windage in heeled conditions (see 4.3)
e) Adoption for Overlapping headsails with battens of the same coefficients of non-overlapping headsails (see 3.11)

f) New LPP with double poke-through treatment and housekeeping modifications for appendage clipping (see 5.1)
g) New wording about flying Headsails (see 17)
h) New wording about Mainsail head point (see 17)
i) PLS scoring option removal (see 8)
j) New table on sail limitations based on CDL (see 3.6)
k) Interpretation on KCDA measurement of centerboards (see 10)
L) Clarification about sheerline and bulwarks (see 9)

14. ORC RESEARCH FUND BUDGET PLANNING FOR 2017

The committee discussed possible new research projects that could be established for 2017 after the completion of the upwind aero model project now in progress.

As a main project a broad hydro research using CFD could be established covering the following subjects:

- Effective length assessment
- Transom drag
- Residuary Resistance at high Fn (>0.7)

A more complete project will be prepared before the next meeting.

The ITC also discussed some possible future projects that are not a priority:

- CFD research on the downwind aero model
- An advanced tracking system to be installed on boats during major regattas to return real data log useful for VPP tuning and validation

TU Delft will go on with a long-term research project on added resistance (see above para. 5.2).

The chairman will discuss research funding with Mancomm in Barcelona.

15. STRATEGIC PLANNING FOR WORK AFTER THIS MEETING

Looking at items already in the agenda and other items coming from submissions deferred to next year, this is the list of possible projects for 2017:

i. Revision of upwind aero model based on CFD research results
ii. Added resistance in waves
iii. Effective span of hulls
iv. New Default Mast Weight
v. Default VCG determination in way of default RM – Component weights formulation.
vi. Frictional resistance of long chord keels

ITC members will make their availability to be part of working groups known to the chairman, with work needed on one or more projects by each member. A priority list will be established, with each item having nearly equal importance.

16. NEXT MEETINGS SCHEDULING

The next meeting (first of the 2017 season) is scheduled in one of the following week ends:

- 25th – 26th March
- 1st – 2nd April

The possible location could be at the World Sailing offices in Southampton. Simon Forbes, who was participating at the meeting, will confirm availability soon.

17. ANY OTHER BUSINESS

A case was brought to the attention of the committee in Hamburg for a spinnaker used by the MAXI 72 PROTEUS in the World Championship in Porto Cervo (scored IRC).
The picture below shows the spinnaker flying:

As is shown, the missing forward part near the tack of the sail is artificially reduces ASF to allow the sail to be measured as a spinnaker having a midgirth of 0.75ASF.
To avoid a similar sail being presented for measurement in ORC, ITC proposes an amendment to ORC rule 208.1 with the following:

208.1 Spinnakers shall be set flying from no more than 3 external attachment points

Zoran Grubiza pointed out that in the new World Sailing ERS there is a new definition of "set flying":
ERS Set flying definition is modified to read "**A sail set with no sail edge attached to the forestay."**

So he proposed to add the following to the 208.1:

208.1 Spinnakers shall be set flying. If there is a luff wire, the luff shall be completely attached to it.

A discussion followed but no consensus was reached, so the decision is deferred to the Measurement Committee.

The ITC discussed in both meetings (Hamburg and Delft) a particular case of a mainsail presented for measurement during the season with an added triangular head that was folded down (the halyard was attached at the folding point):

This triangular head moves all the girths up, thus reducing the rated area.
The chief measurer issued an interpretation in July to forbid this kind of sail, that served the purpose, but ITC suggests introducing the following new wording in the IMS rules to avoid future similar exploitations:

"For purposes of measurement the Head point shall be the highest point of the mainsail as flown below the mast upper limit mark."

Zoran Grubiza pointed out that in new World Sailing ERS there is a new definition of Mainsail Head Point:

G2.3 ERS G.4.2(a) Head Point (MAINSAIL) is modified by adding "**excluding any attachment and any part of the sail above the hoisting point."**

This new definition could help in further develop the wording for the IMS rules and for this reason the matter is deferred to Measurement Committee.

Finally a major issue occurred when checking the winner of the European Championship in Greece - this was also discussed already in Hamburg.
There was an evident difference in trim between the measurement and sailing conditions, yet even after being checked twice during the event nothing was discovered.
The measurement trim was deeply sunk aft and compared to the previous trim (before modifications), and the resulting weight added was in a position (aft and inside the boat) where no ballast was declared nor found and not congruent with the modifications declared by the owner.
For this reason the chairman proposed to introduce a rule that could be enforced when a boat has very different trim in two subsequent floatations and the differences are not congruent with the modifications declared.
This could be included as further reinforcement of ORC rule 303.3, but especially through some automatic checks in the Manager.

30th October 2016