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1. INTRODUCTION

The purpose of this guide is not to 'teach grannies to suck eggs'! Rather it is to point Race Organisers at issues that they might need to consider when planning and then running their events. It is therefore intended to be 'thou might....' rather than 'thou shalt...!'

At the simplest level, all a Race Committee need say in its sailing instructions is: "The IRC Rules, Parts 1, 2, and 3 (or 4) shall apply". At the end of the race they then calculate each boat's corrected time (CT) to the nearest second by multiplying her elapsed time (ET) by her TCC ($CT=ET*TCC$) and publish a set of results with the lowest corrected time winning. In many circumstances, this will suffice. There are however other related issues which a race organiser might wish to consider and to include as appropriate.

The following lists some of these and where appropriate gives suitable wording that might be used. In many places, the detail will need tailoring to suit the specific circumstances. Race Committees are of course free to do this. The Rating Office is happy to provide advice and detail if required. The Rating Office is also able to provide copy certificates and regularly updated computer listings of all boats' certificate details.

Further relevant information can also be found on our website at www.rorcrating.com.

2. NOTICE OF RACE AND SAILING INSTRUCTIONS

Before getting to the race course, various issues within IRC rules need consideration and possible incorporation within the Notice of Race and/or Sailing Instructions for an event. IRC Rule 11, Changes to Class Rules, draws attention to many these. Others however are outside IRC Rules directly.

2.1 Advertising

Since 2001, IRC has included two separate but very nearly identical sections. Part 3, IRC-C is IRC with advertising (Category C). Part 4, IRC-A, is IRC without advertising (Category A). It is up to Organising Authorities to specify in their Notices of Race which shall apply. Parts 1 and 2, the common Parts of the IRC Rule, will always apply. Thus for example, for IRC racing with advertising:

The IRC Rules Parts 1, 2, and 3 shall apply.

and without advertising:

The IRC Rules Parts 1, 2, and 4 shall apply.

Organising Authorities are advised to consider carefully before invoking Part 4, IRC-A. Noting that IRM racing is under Category C and that overseas entrants may have defaulted to category C, it is recommended that racing under IRC-A is generally restricted to locally based racing at which competitors are largely all members of the same club or affiliation of clubs. If visiting competitors from further afield than the immediate locality are expected, it is recommended that racing should be held under Part 3, IRC-C.

Additionally, if it is likely that any "Class" boats will be competing, note should be taken of the advertising status of those Classes in deciding the appropriate IRC Rules. If for instance one or more Classes have decided Category C, then to run racing under IRC Part 4, IRC-A, might debar those boats from competing.

The Rating Office are happy on request to advise Organising Authorities in more detail.

2.2 Rating Changes

It is generally undesirable to allow boats to change rating shortly before or during a regatta or short series of races. Allowing this to happen offers a competitor the opportunity to refine his rating by for instance the inclusion/omission of sails depending on anticipated weather conditions. Additionally, and from a logistical and administrative point of view, it is desirable for ratings to have been submitted prior to the start of the event. Suitable wording might be:

Notice of Race:

*x.0 "Boats shall submit a copy of their IRC certificate not later than
No alteration in a boat's TCC will be permitted after this date, except as a result of a rating protest, or to correct rating office errors."*

Sailing Instructions:

x.0 "Except as a result of a rating protest, or to correct a rating office error, no changes to a boat's TCC will be permitted after"

2.3 RRS 52 Manual Power

Rule 14.1 amends RRS 52, Manual Power, to permit boats of longer than 24m to use stored power for the adjustment and operation of sails and movable appendages. Boats shorter than 24m are bound by RRS 52 unless this is amended by the Notice of Race. A suitable amendment might be:

Notice Of Race:

- x.0 *IRC rule 14.1 is amended to the extent that powered winches or other sail or rig handling equipment may [not be used] [be used by all boats] [be used by boats of LOA greater than Xm] [other].*

2.4 Crew Number/Weight

As prescribed by rule 27.4.1, except for boats rated as strict One-Designs or in races requiring Endorsed certificates, IRC imposes no crew number or weight limitations. Race Committees may of course remove even these restrictions. A suitable clause would be:

Notice Of Race and Sailing Instructions:

- x.0 *IRC rule[s] 27.4.2 [and/or 27.4.3] shall not apply.*

Alternatively, Race Committees may wish to apply additional limitations. It is recommended that when any crew number or weight limitations are in force, race management authorities should publish a list of crew limits. There are many options, a few of which follow:

Option 1

Notice Of Race:

- x.0 *IRC rule 27.4.1 is modified by the addition of the following:*
- EITHER x.1 *Maximum Crew Number.*
The maximum number of crew that may sail aboard a boat shall be the Crew Number [plus/minus x] printed on her certificate.
- OR x.1 *Maximum Crew Weight.*
The maximum total weight of crew in kilograms that may sail aboard a boat shall not exceed the product of the Crew Number printed on her certificate multiplied by 80 (or other suitable value).
- AND x.2 *In the case of a boat rated as a One-Design, and when her IRC crew limitation exceeds her One-design Class crew limitation, a boat shall comply with her One Design Class rules.*
[x.3] [There shall be no restriction on crew changes.] [The following crew change restrictions shall apply:]

Option 2

Notice Of Race:

- x.0 *IRC rule 27.4.1 is modified by the addition of the following:*
- x.1 *Each boat shall declare her 'Initial Crew Number' prior to the first race in which she competes.*
- x.2 *Variation in a boat's crew number shall be limited according to the following table, based upon her Initial Crew Number:*

<i>Initial Crew Number</i>	<i>Limit of Variation</i>
<i>Up to 4</i>	<i>-1 +2</i>
<i>5 -12</i>	<i>-2 +2</i>
<i>13 - 20</i>	<i>-3 +2</i>
<i>21 or more</i>	<i>-4 +3</i>

There are of course many other options a race committee might choose.

Generally, except for safety reasons crew number minima are not recommended. If these are included for any reason, then attention is drawn to IRC Rule 27.4.6 permitting a boat to declare a lower maximum crew number.

2.5 Crew Classification

New in 2003 is an explicit IRC Rule that clarifies that IRC contains no restrictions on Crew Classification, in other words professionals and amateurs. The Rule continues to explicitly state that a Notice of Race may impose restrictions. If an Organising Authority wishes to impose any restrictions, it is strongly recommended that the ISAF Sailor Classification Code is

used. In International events invoking Crew Classification, the use of this particular Code will be almost a prerequisite.

Noting the variety of restrictions that might be included it is not possible to frame a specific clause for a Notice of Race. The Rating Office are happy to give detail advice if requested.

The code itself may be found through the ISAF website, www.sailing.org/isafsailor.

2.6 IRC Classes

Apart from the obvious splits by TCC, Race Committees might consider splitting boats into classes by type. One of the problems IRC suffers from is its acceptance of such a wide variety of boats ranging from elderly heavy cruisers through ex-IOR types to the modern 'racers' and 'sports boats'. Each of these has its own performance profile resulting in race results becoming increasingly dependent on conditions and course type. As a general principle, when fleets are large enough, splitting boats into classes defined by boat type and/or size or speed can be to the benefit of all and is highly recommended. Splitting the 'sportsboats' from the 'cruisers' is to the benefit of all.

Alternatively, as was successfully used at Ford Cork Week in 2002, the physical parameters of boats can be used to define particular boats for the creation of a 'racing' class raced either under IRC or (as was the case in Cork) under perhaps IRM.

The following outlines some of the options:

Displacement Length Ratio (DLR)

Within the IRC fleet as a whole, average DLR is around 200. Typical modern cruisers are generally in the range 200 to 300 with anything over this being regarded as 'heavy'. Modern cruiser/racers fall largely between 150 and 200, with boats below 150 being modern racers, racer/cruisers and sports boats. A simple split by DLR alone may however be unsatisfactory. A second, and possibly third, criterion may better define a class. A sports boat class might for instance be: "Boats with DLR less than 150, LOA less than 10m, and TCC more than 0.950.". In the specific case of sports boats however, a better alternative might well be the RYA/RORC Sportsboat Rule (SBR). Please contact the Rating Office for further detail.

Hull Factor

Probably the best use of hull factor is in separating the cruisers from the racers. Genuine cruisers have lower hull factors than racers. Typically, boats with hull factors of 7.5 and below will be cruisers. Again a secondary factor may be needed to remove anomalies. In this context, an associated minimum DLR can work to define a cruising class.

Age

Probably the best use of age is in identifying 'classic' boats. Qualifying dates are of course totally at the discretion of race committees.

DAYBOATS

Ideally, Dayboats should not race with cruiser/racers. Their performance characteristics are often so different as to make good racing difficult. In practice, except in areas with large fleets, it is inevitable that Dayboats will race with cruiser/racers. In these latter circumstances, it would be unfortunate to exclude dayboats from racing; permitting them to race with cruiser/racers then becomes the best available option. Dayboats are identifiable by the 'D' printed on their certificates adjacent to TCC.

A clause to encompass some of the above might read:

Notice of race:

- x.0 *Boats shall race in the following classes:*
- | <i>Class</i> | <i>Rule/Type</i> | <i>Parameters</i> |
|--------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | IRM/Racing | LOA: Greater than 9.0m and less than 16.5m.
IRC Series Date: 1995 and later.
IRC Hull Factor: 10.4 and higher.
IRC DLR: 145 and lower.
IRC TCC: Greater than 1.000 and less than |
| 1 | IRC | TCC 1.100 to 1.199. |
| 2 | IRC | TCC 1.000 to 1.099. |
| 3 | IRC | TCC 0.999 and below. |
| 4 | IRC/Cruisers | IRC Hull Factor 7.5 or less. |
| 5 | IRC/Classic | IRC Age (Series) Date of 1970 or earlier. |
| 6 | IRC/DAYBOATS | IRC DAYBOAT. |
| 7 | SBR/Sports Boats | All sportsboats |
- x.1 *A boat which meets all the requirements for class 0 shall race in class 0.*
- x.2 *A boat which meets the requirements for both classes 4 and 5 shall race in class 5.*
- x.3 *An IRC DAYBOAT shall race in class 6.*
- x.4 *A boat which meets all the requirements for class 7 shall race in class 7.*
- x.5 *Classes may be altered, amalgamated or divided at the discretion of the race committee. Specifically, all boats of a particular design shall race in the same class at the direction of the race committee.*

2.7 Endorsed Certificates

Race Committees should consider carefully before requiring all entrants to hold Endorsed certificates. Many less serious competitors will simply find this a disincentive to participation at all, while the more serious are in all likelihood already measured. In these circumstances, option 2 may be more appropriate.

Notice of race:

- x.0 *Boats in classes 0, 1, and 2 (3, 4, 5 etc) shall hold IRC ENDORSED certificates.*
- OR x.0 *To obtain class and/or overall points and/or club championship points, a competing boat shall (at the time of the race for which points are being awarded) hold an IRC ENDORSED certificate. Boats not holding ENDORSED certificates shall not be included in any points calculations.*

The second option allows an 'unendorsed' boat to compete in an individual race, but bars her from gathering points for an overall trophy.

2.8 Non Spinnaker Ratings

IRC certificates for all boats also show a non spinnaker TCC. Race Committees attention is drawn to rule 9.6.2 which restricts the use of this TCC to races specifically defined as non spinnaker. This restriction is deliberate and is to prevent abuse of the non spinnaker TCC. Note however that IRC Rule 11.1 permits Sailing Instructions to modify this class rule.

2.9 Protest limits

IRC Rules 19 and 20 address rating reviews and protests. Linked to these, Rule 11.1 permits a Race Committee to amend Rules 19.6, 19.7 and 19.8. It is not recommended that major changes should be made without first consulting the Rating office. However, for higher level events it may be appropriate to reduce the 0.005 limit for certificate invalidity defined in Rules

19.6 and 19.7. If this is done, it is recommended that it should be included in the Notice of Race as well as the Sailing Instructions. It is recommended that this limit should never be increased.

Notice of race and Sailing Instructions:

x.0 IRC Rules 19.6 [and/or 19.7] are amended to the extent that 0.005 is reduced to 0.00x.

2.10 Sail Limitations

The limitations on sails carried are defined by IRC Rule 26.1.5. While Rule 11.1 permits a race committee to amend this, amendments are not generally recommended except in very specific circumstances.

It is however worthwhile clarifying whether or not Rules 26.1.5 (d) and (e) which address regattas run on consecutive days apply. A suitable clause might read:

Notice of race:

x.0 For the purpose of IRC Rules 26.1.5 (d) and (e) this regatta is [is not] on consecutive days and the sails carried shall [shall not] remain the same..

2.11 Discards

Incorporating an excessive number of discards into a series can lead to distortions in the series result. For instance, if a particular boat is very competitive in a narrow range of conditions and uncompetitive in other conditions, if she has the opportunity to discard all those races outside 'her' conditions, this may produce a result which does not properly reflect her overall performance relative to others in the fleet. It is recognised that a large number of discards is appropriate in a long series. A small reduction however may be appropriate in some circumstances.

2.12 Safety Qualification

All IRC certificates currently incorporate a SSS Numeral and also, when the data is available to us a STIX Number and Angle Of Vanishing Stability (AVS). Race Organisers should consider the application of one or both of these to screen entries for their suitability for the particular event. Full detail is available in sections 6 and 7 of this guide.

3. MEASUREMENT AND POLICING

Measurement generally is beyond the scope of this guide. However, an IRC Measurement Manual is available on the Rating Office website, www.rorcrating.com. A list of GBR and IRL RORC IRC measurers is given in section 10 of this guide. For measurement overseas, please contact the local IRC representative given by section 11.

Policing at a regatta is however within the remit of a Race Committee. It is a thorny subject! As with the rest of sail boat racing, certification has to some extent to be self policing. There are however steps race committees can take to help and occasions when a more pro-active stance is appropriate.

The first and perhaps most important issue to get across is that 'measurers do it in public!' A large part of policing is sailors believing that their competitors have been checked. So....



Sail Measuring in a bar at Ford Cork Week 2002

Before a regatta or series starts, race committees should require that all competitors show the original of their certificate to the regatta office. It is good practice to take copies a) for the file and b) so that a complete set of all competitors certificates can be made available to the fleet. As well as (obviously!) the TCC, particular points to note on a certificate are:

- The date Is it valid? Is it after the cut-off date for certificate lodging?
- Crew Number Relevant if crew number/weight restrictions are in force.
- Headsails Is the boat rated for multiple headsails or for a single roller furling headsail with/without a heavy weather jib?

All of the above is also contained in fleet listings available from the Rating Office. Please E-Mail info@rorcrating.com for further detail.

It is obviously generally both impractical and undesirable to fully re-measure boats. However, some simple checks can increase individual competitor's confidence that the rest of the fleet is correctly rated and reduce 'bar talk'.

The primary issue, and the easiest to check is sails. Certificates show all the relevant data for each boat. Note that for both spinnakers and now headsails, certificates now show the

maximum permitted area for each. In the case of headsails, note that in addition to maximum rated area, there is also a maximum rated headsail luff length.

Other useful and simple issues that can be checked are rig details (No. of spreaders etc.), rig material, and internal ballast.

Finally, IRC Rule 19.2 includes the phrase '*Anyone who has a valid interest in a boat's certificate may also request rating review from the Rating Authority*'. To be clear, the Rating Office has interpreted this to include clubs and race committees with whom a boat is racing.

4. COURSES

With the ever increasing range of boat types racing under IRC, it is inevitable that courses and conditions will have an effect on race results. Race Committees can go a considerable way towards minimising these effects by considering carefully the types of courses set. Conditions are of course beyond the control of a race committee, but even then course location may be significant. Some of the issues that a race committee might then consider are:

Course Type.

Courses without runs and with only reaches will inevitably favour bowsprit rigged boats and lighter boats generally. Conversely, all runs will favour boats with conventional spinnaker poles and the heavier boats. Including both types of course will give everybody a chance on their day, but over a series a balanced range of courses is very desirable.

Current.

Beats against the current will tend to favour faster more windward oriented designs and vice versa. In the limit, an all downwind, down current course will almost inevitably produce a winner from the small slow end of the fleet. When possible, selecting courses to minimise these effects will produce more equitable results generally.

A second issue with current is that boats will inevitably try to minimise (or maximise as appropriate) current effects. This becomes particularly relevant when there are current gradients across a course and boats are trying to get out of a foul current. Unless the shoreline is very steep to, the smaller (shallower draft) boats will be able to do this more effectively. In these circumstances, it can be worth considering either moving the whole course away from the shore so that everybody is in the full current all the time or alternatively including a series of passing marks to force boats into the current.

Weather Conditions.

No race committee can influence the weather! They can however influence where the course is positioned. If it is particularly rough, larger heavier boats will be favoured upwind. So if a series features a number of heavy air races, it might if possible be worth considering a less exposed course area on occasion if this is a possibility. Similarly, very constricted course areas (narrow channels for instance), particularly in light airs will favour the lighter and more nimble boats in the fleet.

5. DUAL SCORING

At the 2003 IRC Council meeting, Councillors again noted the Irish Sailing Association policy that whenever possible club races should be dual scored under both ECHO (the ISA's personal performance handicap rule) and IRC for boats holding certificates for both. The logic of this is that a personal handicap facilitates entry into racing for the less experienced and enables them to compete against and gauge their performance against the more experienced sailors while at the same time not discouraging the latter group (who will probably have penal personal handicaps) by offering this group parallel IRC results. The RYA's Handicap Group have now reviewed this long standing and successful ISA policy and noting that IRC is complementary to personal handicaps have agreed that this should also be RYA policy. Rather therefore than splitting fleets into IRC and PY or local for club racing, clubs are therefore recommended to consider dual scoring under IRC and PY or local (personal) handicap as an alternative. Further advice is available from the Rating Office for any clubs wishing to adopt this policy.

6. RORC SAFETY AND STABILITY INDICES (SSI)

6.1 SSSN, STIX, and AVS

Since the late 1980s, IRC certificates have incorporated a SSS Numeral for use by race committees in determining suitability of a particular boat for a race. In future, they will in addition carry a STIX (**ST**ability **I**nde**X**) value and AVS (Angle of Vanishing Stability). For further information on these latter, see the Q&As below.

6.2 SSSN

An SSS Numeral value, specific to that particular boat, is printed on each boat's IRC certificate issued by the RORC Rating Office. A high value indicates that the system evaluates a boat as being more seaworthy. SSSN is the sum of Base Value and Adjustment Value with the two values arrived at as follows.

The Base Value for the hull, rig and appendages is computed from the boat's dimensions and rated parameters. It is the product of several factors, each representing a different safety related feature. A Base Size factor, calculated from the boat's principal dimensions, is modified by each of the other specific factors to take account of variations from the norm. The modifying factors are: displacement/length, beam/displacement, sail area/displacement, beam/length, self righting, rig, keel, engine, and dayboat.

SSSN Adjustment Value (Table 1) allows for recognition of safety related features, principally compliance with a Category of ISAF Special Regulations, not already evaluated by the rated parameters. Its application is optional and a zero value will be applied unless a request is made by an owner.

Table 1

Full compliance with	may be rewarded by Adjustment Value (unless restricted as shown by Table 2)
ISAF Cat 4	+ 3
ISAF Cat 3	+ 5
ISAF Cat 2	+ 6
ISAF Cat 1	+ 7
ISAF Cat 0	+ 8

Owners may only apply for adjustment based on one of the above ISAF Categories if the boat complies all the time when racing IRC/IRM. Alternatively, if the boat does not comply fully with any of the ISAF Categories, adjustment for compliance with specific may be claimed. The maximum adjustment in this case is +3. A maximum limit determined by the calculated base value is imposed on the extent of adjustment, as shown by Table 2.

Table 2

Base Value range	Maximum Adjustment Value
less than 8	zero (no adjustment allowed)
8 - 14	+ 3
15 - 23	+ 5
24 - 32	+ 6
33 - 41	+ 7
more than 41	+ 8

6.3 STIX and RORC STIX

In a similar manner to SSSN, STIX or RORC STIX is a number representing the perceived 'seaworthiness' of the design, with again a higher value reflecting a more 'seaworthy' boat.

Each boat's STIX or RORC STIX is calculated in accordance with ISO 12217 Part 2 by the combination of factors related to dynamic stability, inversion recovery, knockdown recovery, displacement-length, beam-displacement, wind moment and downflooding, with the following additions and variations:

RORC STIX Numbers are calculated using declared or measured IRC and/or IRM data. Each boat shall be inclined in accordance with RORC Rating Office procedures or by an approved alternative method except that boats of approved one-design classes may use class standard inclining data and true sisterships of designs already inclined may make use of sistership data. In such cases, stability data may be reduced. Subject to approval by the RORC Rating Office, a lines plan from any reasonable source may be used for the calculation of hydrostatic data.

Owners are responsible for the supply of righting moment data from a source acceptable to the RORC Rating Office in the form required by ISO 12217, Part 2, Paragraph 6. In addition to RORC STIX, certificates for boats for which a hull offset file has been used in the calculation of righting moment data will show the *calculated* angle of vanishing stability. Designs for which a hull offset file is unavailable will have angle of vanishing stability, positive area under righting lever curve, and righting lever at 90⁰ heel estimated. In such cases, RORC STIX will show *estimated* AVS.

6.4 Application of SSI by Organising Authorities

Important Notice

Organising Authorities may incorporate a minimum qualifying SSSN value and/or STIX and/or RORC STIX for entry to a race. Responsibility for selection of which is to be used, for the minimum qualifying value(s), and for any AVS requirement(s), lies with the Organising Authority for a race. It is not possible for the RORC Rating Office, nor any other body remote from the organisation of a race, to lay down firm recommendations or guidance. Only the organisers of a race can be fully aware of the circumstances of a particular race.

6.5 SSSN or STIX or RORC STIX?

Immediately, for many races, SSSN will continue to be an entirely valid method by which Organising Authorities may screen the suitability of particular boats for a race. The RORC has however reviewed the use of screening indices and agreed that:

ISO 12217-2, STIX and AVS, will be adopted in parallel with SSSN for qualification of boats for RORC races for a period of two years commencing 1 January 2003. For this period, a boat may qualify under either SSSN or STIX/AVS. While qualification by either method will be considered satisfactory, technically more rigorous STIX and AVS will be used whenever practicable. At the conclusion of this two year period, a review will be conducted with the current intention that STIX/AVS will become the only available qualification

Organising Authorities are therefore recommended to incorporate qualification for races using STIX and AVS into their race rules, particularly if there is doubt as to the suitability of a boat, or when Organising Authorities wish to apply more rigorous criteria, including in every case some direct knowledge of a boat's stability.

It should be clearly noted that if categorisation of races is by definition of the required ISO design category (A, B, C, or D), that boats must satisfy **both** the STIX and AVS requirements for that design category. Alternatively, Organising Authorities may instead specify the numerical minimum qualifying requirements for STIX and AVS. Organising Authorities might also require for specific races that each boat's certificate shall show **calculated** AVS. Calculated AVS is only shown when STIX or RORC STIX has been calculated using full

righting moment data. In other words, approximations have not been made in the calculation of the various stability related STIX factors.

6.6 SSS Numerals

As examples only, the RORC typically uses the SSSN values shown in Table 3. There are however circumstances when the RORC will use different SSSN minima for a variety of reasons.

Table 3

Minimum SSSN	Typical course	Example/ISAF Race Category
10	Short day race usually with time limit	Typical Solent race/Cat 4
20	Passage race along or near populated coast	RORC cross Channel races/Cat 3
30	Between 250-600 miles	Fastnet Race/Cat 2
40	1000 miles in all weather	Plymouth to Gibraltar/Cat 1
50	2500 miles, continent to continent	Trans Atlantic race/Cat 0

6.7 STIX and RORC STIX

ISO 12217 Part 2 defines 4 Design Categories broadly related to ocean, offshore, coastal and local sailing. These 4 Design Categories are analogous (but not directly related) to the ISAF Special Regulations Categories. The minimum permitted values of STIX and AVS for each design category is shown by Table 4, below. RORC STIX is directly compatible with STIX.

ISAF Special Regulations note that: *ISO 12217-2 is expected to be capable of being used as a guide to general suitability for competition in Special Regulations race categories.* This comparison is also shown by Table 4.

Table 4

ISO Design Category	A	B	C	D
Minimum STIX or RORC STIX:	32	23	14	5
Minimum AVS	130-0.002*m	130-0.005*m	90	75
ISAF Special Regulations Category	1	2-3	4	N/A

7. SSSN & STIX QUESTIONS & ANSWERS

Q: What is STIX?

A: It is the **ST**ability **I**nde**X** derived by the new International Standard for the stability and buoyancy of boats. STIX is calculated from the physical characteristics of each boat and is a number generally in the range 5 to 50. In a similar manner to the existing SSSN system, a higher value suggests greater seaworthiness.

Q: How does STIX work?

A: The International Standard defines 4 Design Categories for boats broadly related to ocean, offshore, coastal and local sailing. These are analogous (but not directly related) to the ISAF Special Regulations Categories. Each design category has a minimum qualifying STIX value and also a minimum qualifying AVS (see below) which is linked to the minimum sailing weight (m in kg) of the boat:

Design Category	A	B	C	D
Wave height (metres) up to	approx 7 significant	4 significant	2 significant	0.5 maximum
Typical Beaufort wind force	up to 10	up to 8	up to 6	up to 4
Calculation wind speed (m/s)	28	21	17	13
Minimum STIX Value	32	23	14	5
Minimum AVS (degrees)	130-0.002*m	130-0.005*m	90	75

Q: What is 'AVS'?

A: **A**ngle of **V**anishing **S**tability, also known as LPS, **L**imit of **P**ositive **S**tability. It is the angle beyond which a boat becomes unstable and will capsize to an inverted position.

Q: How is STIX calculated?

A: In a similar manner to the calculation of SSSN, STIX is the product of a number of different safety/stability related features. These are: Length, Dynamic Stability, Inversion Recovery, Knockdown Recovery, Displacement Length, Beam Displacement, Wind Moment, Downflooding, and Reserve Buoyancy.

Q: Will the calculation of STIX and AVS involve any additional measurement?

A: Since 1998, the European Union's Recreational Craft Directive (RCD) has required that all new boats (except pure racing boats) sold in the EU must have been assessed for STIX/AVS by a Notified Body – an officially recognised assessment agency. Many boats pre-dating this have also been assessed. None of these boats will require any further measurement.

Other boats may require some measurement. However, any which have been inclined (ie had their stability measured) for any purpose or for which a sistership has been inclined and for which a hull file (a computerised lines plan) is available will be assessed by the Rating Office on receipt of a request by the owner accompanied by the required data. In this case, certificates will use the nomenclature RORC STIX to show that the calculation has been carried out by us rather than a Notified Body.

Q: A boat has a 'sistership' which has a different keel. Can the same data be used or will the boat have to be measured?

A: 'Sisterships' are boats that are to all intents and purposes identical. So model variants require individual assessment.

Q: How do I know if a boat has been officially assessed or if the required data is available?

A: The RYA are surveying the manufacturers/suppliers of currently produced boats with the resulting stability information being posted on the RYA's website (www.rya.org.uk). If the information is not available there, please then contact the manufacturer. If they

cannot supply the information, please contact us. We also hold a list of designs that have been assessed which will be regularly updated and posted on our website (www.rorcrating.com).

Q: *What happens if some of the data is not available for a boat?*

A: It will depend exactly what data is missing. Provided that inclining data is available for the design, routines are available that enable RORC STIX to be calculated using default 'safe' values even if a hull file is not available. In this case however a low value of RORC STIX will result and AVS will be estimated. If inclining data is not available, then neither RORC STIX nor AVS can be calculated or estimated and the certificate will show SSSN only.

Q: *How do I get a boat inclined and what does this cost?*

A: The RORC Rating Office and other National Authorities have measurers trained to carry out inclinings. A paper is available from our website (www.rorcrating.com) detailing how the inclining is carried out and specifying the required condition of the boat. The Rating Office charges £20/m LOA for the inclining itself. The owner will then need to consult the boat's designer or other qualified person to calculate the stability at the required angles of heel and supply the other required data.

Q: *Will STIX and AVS be automatically calculated for a boat?*

A: Yes, provided that the Rating Office holds all the necessary data and the owner has completed and returned the appropriate form.

Q: *The RORC STIX value for a boat on her IRC certificate is very low and AVS is 'estimated'. Why?*

A: The Rating Office has inclining data for the boat but does not hold a hull file for the design. Please contact the boat's designer and ask for the information to be forwarded to the Rating Office.

Q: *What happens if a boat I is modified?*

A: Modifications to rig and sails will not generally require any additional re-measurement for STIX/AVS. Modifications to ballasting may require that the boat is re-inclined. Modifications to the hull, keel or rudder may require a new hull file. Please contact the Rating Office with specific detail.

Q: *How are the STIX number and AVS value on my IRC certificate used?*

A: Exactly as with SSSN, the Race Committee will set minimum qualifying values for each parameter depending on the nature of the race.

Q: *If a boat does not qualify for a race under STIX/AVS, can it still qualify under SSSN? And vice versa?*

A: The RORC has recommended that for an initial two year period starting 1st January 2003 STIX/AVS and SSSN are run in parallel and that qualification may be by either method. IRC certificates will therefore continue to show SSSN for at least two years. The RORC has however recommended that when STIX/AVS data is available that this should take precedence.

Q: *Are STIX and SSSN values directly related?*

A: No. Although the two methods are aimed at answering the same general question, they use different data and functions to arrive at the answer. So while the two values will be broadly compatible, they are not in any way linked.

Q: *Why is STIX/AVS needed when we already have SSSN?*

A: SSSN was developed in the 1980s before computerised stability analysis was readily available for all boats. STIX/AVS makes much greater use of this analysis and is technically more rigorous than SSSN. Now that the International Standard has been formalised, owners and race organisers alike ignore it at their peril.

Q: I have more questions. What do I do?

A: Please contact the Rating Office.

Q: Where can I find out more about the International Standard and how it is applied?

A: A more detailed paper is available on the RORC Rating Office website (www.rorcrating.com). Alternatively, please contact the International Standards Organisation (www.iso.ch) for a copy of the Standard, ISO 12217-2.

8. ARE WE WINNING?

The IRC Yearbook 2003 contained a deceptively simple section on how IRC works on the race course ("So how does it all work?" – page 23). This read as follows:

"It is very simple to work out how much time difference boats give each other. Take the two ratings and deduct one from the other. Each 0.001 difference = approximately 3.6 seconds per hour – eg Boat A rates 1.010, Boat B rates 0.995. The difference is 0.015. $15 \times 3.6 = 54$ so Boat A gives Boat B about 54 seconds per hour."

Like most pronouncements from the Rating Office, this has been interpreted as if on tablets of stone and applied slavishly in many events throughout the season. The main result of this has been a rash of complaints to race organisers, usually along the lines of "The results are wrong" or "Your computer must have made a mistake".

The truth is less dramatic and infinitely more reassuring to the hard-pressed results personnel. The most important word in the paragraph quoted above (hint – it's underlined) is "approximately". The rating examples have been carefully chosen because the 3.6 seconds only applies when the ratings of the two boats are at or very close to 1.000. As the ratings increase above 1.000, the time difference decreases which is only reasonable as these boats are meant to take less time to complete the course. Below 1.000, the opposite applies and the time per 0.001 increases.

So how can you tell if you are beating your rivals on the race course? If we look at the same two boats in the above example, if Boat A sails for one hour, her corrected time will be 1.010 hours which is 1:00:36 (1 hour 0 minutes 36 seconds). Boat B will beat Boat A if her corrected time is less than that.

To find out what this means in terms of time, you want to find Boat B's maximum elapsed time and to do this you divide Boat A's corrected time by Boat B's rating - $1:00:36 / 0.995 = 1:00:54$. In other words Boat B can sail for up to an extra 54 seconds and still have a better corrected time. As you will see this apparently complicated way of doing things has produced the same answer as above – 54 seconds.

But things change if the boats are bigger or smaller but before we try those calculations it will help that there is an easier way of doing the calculations. We can get the same result if we **divide the rating of Boat A by the rating of Boat B** – ie $1.010/0.995 = 1.015$ and 1.015 hours is 1:00:54.

If Boat C rates 1.110 and Boat D rates 1.095 (the same rating difference of 0.015) the time difference for an hour's racing is $1.110/1.095 = 1.0137$ which is 1:00:49 – equivalent to 3.27 seconds for each 0.001.

Looking instead at smaller boats, Boat E rates 0.910, Boat F rates 0.895 (again 0.015 less). The time difference for an hour's racing by Boat E is $0.910/0.895 = 1.0168$ which is 1:01:00 – equivalent to 4.0 seconds for each 0.001.

Quite reasonably, your navigator tells you he can't carry all these figures in his head and stop you from running aground so the answer is to find out your rivals' ratings in advance (remember to check for any last minute rating changes!) and prepare a little table showing all the time differences. Here I am indebted to Colm Barrington of the Corby 36 *Gloves Off* whose crew at the Bell Lawrie Scottish Series in May 2003 were one of the first to draw this problem (and the note in the 2003 Handbook) to my attention. They had a nifty table of all the boats in their class with the time differences calculated for various lengths of race. The trouble was all the differences had been calculated on exactly 3.6 seconds per hour and as the whole class rated above 1.100 the truth was substantially different.

With Colm's permission I have reproduced the table here. The first column shows their calculations for one hour's racing (which we now know are wrong) while the next columns

show the correct differences for 1 and 2 hours and 10, 20 and 30 minutes of racing calculated as I have described above. The differences may be small but we all know that races can be won and lost by the smallest margins. You can set up the table quite easily on a spreadsheet but I will leave it to you to work out how!

		Wrong	Correct (differences in secs)				
Yacht	IRC	1 hr	1 hr	2 hr	10 min	20 min	30 min
Crackerjack	1.190	248	222	443	37	74	111
Azure	1.169	173	154	308	26	51	77
Blue Belle	1.158	133	119	238	20	40	59
Playing FTSE	1.137	58	51	103	9	17	26
Big Brother	1.134	47	42	83	7	14	21
Desperado	1.132	40	35	71	6	12	18
Gloves Off	1.121	0	0	0	0	0	0
Little Princess	1.121	0	0	0	0	0	0
Cracklin' Rosie	1.108	-47	-42	-83	-7	-14	-21
Matata	1.108	-47	-42	-83	-7	-14	-21
Nimmo	1.105	-58	-51	-103	-9	-17	-26
Absolutely 2	1.103	-65	-58	-116	-10	-19	-29
Ovington Boats	1.092	-104	-93	-186	-16	-31	-47

Ian Macdonald
IRC Council member for Scotland

And a comment from the Office:

Ian (as usual!) is quite right. The underlying reason is that to be mathematically correct, the 3.6 seconds per hour relates to *corrected* time, not elapsed time. On the race course, everybody is of course dealing in elapsed time; hence the errors that creep in as TCCs move away from 1.000.

Colm's table (above) is probably the ideal way to deal with this. For occasions when you do not have that for whatever reason, another simple way of dealing with it is to divide 3.6 by your TCC. eg, $3.6/1.100 = 3.3$ seconds or $3.6/0.900 = 4.0$ seconds. The answer in each case will then be closer to the correct time allowance per 0.001 rating difference between your boat and a reasonably closely rated competitor. The answer will still be approximate, but rather less so!

9. FURLING HEADSAIL – DOS AND DON'TS

Probably the most commonly 'misunderstood' IRC rule is Rule 26.8, Furling Headsails. Based on your application for rating, the Rating Office will determine your eligibility. It is then your responsibility to comply while racing.

On a boat's certificate, you will find one of the following:

Multiple headsails permitted	means	The boat is not receiving the furling headsail rating credit and may carry and use any number of headsails.
Or:		
Single furling headsail only	means:	The boat is receiving the furling headsail rating credit and may use only one headsail during a race. No other headsail may be used.
Or:		
Single furling headsail plus H/W jib	means:	The boat is receiving the furling headsail rating credit at the reduced rate and may use only one headsail or a heavy weather jib during a race. No other headsail may be used.

For boats receiving the rating credit, other points to note are:

The boat must be fitted with a complete headsail furling system.
There is no restriction on carrying additional headsails on board, just in not using them.
A #3 headsail is **NOT** a 'heavy weather jib'. See IRC Definitions.
A storm jib (See IRC Definitions) may be used by all boats at any time.
A boat competing in a series of races must use the same headsail for all races in the series.

If a boat has applied for the rating credit but her certificate shows 'Multiple headsails permitted', the most likely reason is that rated LP is less than the qualifying limit of 130% of J.

10. MEASURERS

Measures and their contact telephone numbers

RORC MEASURERS

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ISA MEASURERS

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11. IRC REPRESENTATIVES

11.1 GBR IRC representatives and councillors

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Guernsey	Martin Ozard, les Sapins, Les Buttes, St Saviours. Tel 01481 65027. E-mail ozard@ukgateway.net

11.2 Overseas regional representatives and councillors

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Ireland - West Coast	Niall Quinn, Middle Third, Maree, Oranmore, Co Galway. Tel 091 794955, Fax 091 757801 Email niall.quinn@creganna.ie
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