



Royal Ocean Racing Club Rating Office

STIX, AVS, Design Category Information and Application Forms

1. Preamble

Terminology used below is shown by Appendix 1.

STIX is the **ST**ability **IndeX** derived by the International Standard for the stability and buoyancy of boats, ISO 12217-2. 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 SSSN system, a higher value suggests greater seaworthiness. STIX is the product of a number of different safety/stability related features: Length, Dynamic Stability, Inversion Recovery, Knockdown Recovery, Displacement Length, Beam Displacement, Wind Moment, Downflooding, and Reserve Buoyancy.

AVS, **A**ngle of **V**anishing **S**tability, sometimes referred to as LPS, **L**imit of **P**ositive **S**tability is the angle of heel beyond which a boat becomes unstable and will capsize to an inverted position. In the calculation of minimum AVS for Design Categories A and B, m is the weight of the boat in Minimum Operating Condition.

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 Offshore Special Regulations Categories. Each design category has a minimum qualifying STIX value **and in addition** a minimum qualifying AVS.

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

When an Organising Authority wishes to use STIX and AVS to screen entries for suitability for a race, it sets minimum qualifying values for STIX and AVS or simply specifies the Design Category in the Notice of Race.



2. Assessment and Sources of Information

It is a legal requirement that any boat (other than a boat sold for racing only) sold within the EU since 1998 must have been assessed under the RCD into a Design Category, including stability assessment which since 2003 is usually by calculation of STIX and AVS. Many boats with Series Dates prior to 2003 have also been assessed and assigned STIX and AVS. It is then a legal requirement that the original seller of a boat must provide the purchaser with proof of the assessment. This latter is generally satisfied by a statement in the owner's manual.

Assessment for the RCD relates to a design, not an individual boat. All boats built to that design are therefore classified the same. A single assessment applies to all boats of that design. Where however there are variants of a basic design, it is a requirement that each variant is individually assessed. Additionally, any individual boat that has been modified to the extent that it is a new design, previously assessed STIX, AVS and Design Category (either ISO or IRC) will be null and void until reviewed.

The RORC rating Office holds standard data for many designs. This list does not currently include your boat. Please therefore choose the most appropriate option from paragraphs 3. – 5. below.

3. ISO Data

In the great majority of cases, boat builders use ISO 12217-2 to satisfy the RCD requirements in respect of stability. In all of these cases, ISO STIX and AVS will thus be readily available. In many cases however, the owner's manual includes only ISO Design Category, omitting ISO STIX and AVS. In these cases, owners should contact the original builder/agent (**NOT the Notified Body**) requesting that the information defined by Appendix 2 is forwarded to the RORC Rating Office.

4. Calculation by the RORC Rating Office

For designs not assessed under the RCD, owners may apply to the RORC Rating Office for calculation of IRC STIX and IRC Design Category by the Rating Office by completion of the form at Appendix 3.

5. Calculation by a Designer

Direct calculation of STIX and Design Category by a boat's designer or other suitably qualified person may be submitted by completion of the form at Appendix 4.



Appendix 1: Terminology and Nomenclature

Recreational Craft Directive	RCD. The EU law which requires boats sold into the EU to be certified.
Notified Body	NB. An official certifying body for the RCD. eg, International Marine Certification Institute (IMCI), Lloyds, Det Norske Veritas (DNV), Royal Yachting Association (RYA). NOT the RORC Rating Office.
ISO 12217-2	The ISO Standard normally used to assess boats for stability and buoyancy for the RCD.
STIX	ST ability I nde X generated by ISO 12217-2.
ISO STIX	On IRC certificates, means that STIX has been calculated by a Notified Body.
IRC STIX	On IRC certificates, means that STIX has been calculated by the RORC Rating Office or by a third party.
AVS	A nge of V anishing S tability. The angle of heel beyond which a boat will capsize to an inverted position. Sometimes referred to as Limit of Positive Stability.
MMOC	M ass in M inimum O perating C ondition used for the calculation of minimum qualifying AVS.
Assessment Module	The methodology used by a NB when assessing a boat under the RCD.
Design Category	One of four categories to which a design may be assigned following assessment for the RCD.
Hull Identification Number	HIN. The unique number assigned to each boat by the builder which identifies the model and any variations from standard.



Appendix 2

Application for Inclusion of Notified Body Data on a Boat's IRC Certificate

The inclusion on a boat's IRC certificate of ISO STIX, AVS and ISO Design Category is free of charge when applied for at the time of IRC initial application or annual revalidation. At any other time the appropriate fee for an amended certificate should be included. Data will be shown on a boat's certificate as ISO STIX, AVS, and ISO Category.

All of the information below must be provided. The RORC Rating Office will NOT accept and use incomplete data.

Data shall clearly identify which model/version of a design it is applicable to. In cases of doubt, data will not be shown on IRC certificates until the doubt is resolved

Data shall be supplied in a form and from a source which enables the RORC Rating Office to have confidence that it genuinely emanates originally from a Notified Body.

Please also include copies of relevant Notified Body certificates.

Section A - Data

Source of Information (Builder/Notified Body, etc):

Boat design Type:

Model/Version:

LOA:

Draft:

Name of Notified Body:

Date of Assessment:

Assessment Modules(s) used:

STIX:

AVS:

Design Category:

Section B – Declaration

To be completed by the individual or organisation submitting the data above.

I/we confirm that to the best of our knowledge the above information is correct. If any errors or omissions are found, I/we will promptly advise the RORC Rating Office. I enclose the appropriate fee (if applicable).

Name: Signature:

Company/Organisation Date



Appendix 3

Application for Calculation of IRC STIX

The calculation of IRC STIX is free of charge when applied for at the time of IRC initial application or annual revalidation. At any other time the appropriate fee for an amended certificate should be included. Data will be shown on a boat's certificate as IRC STIX, AVS, and IRC Category.

Section A - Boat

Boat name: Sail number:

Design: Model/Version:

LOA: Draft:

Section B - Data

TO BE COMPLETED BY A NAVAL ARCHITECT OR OTHER QUALIFIED PERSON.

Questions 1 to 3 must be answered in all cases and may include design data.

Questions 4 and 5 must be answered if no IMS certificate is supplied and may include data from a design hull offset file and either measured stability data from an approved inclining test or data calculated by the designer based on an analysis of weights. If calculated data is used then in accordance with ISO 12217-2, Annex C, para C.2.2 Vertical Centre of Gravity, calculation shall be based on the calculated mass and centres of gravity of individual components, raised by the addition of 5% of (Fm + Tc) where Fm is Freeboard Amidships and Tc is Draught of Canoe Body, both in Minimum Operating Condition. Question 6 must be answered in all relevant cases and may include calculated data as above.

1. Depth of Canoe body below empty waterline: m.
2. Maximum beam at empty waterline: m.
3. Downflooding angle: degrees.
4. Righting Moment in kilogram metres per degree at:
 1 degree: 20 degrees: 40 degrees:
- 60 degrees: 90 degrees:
5. Angle of Vanishing Stability (AVS): degrees.
6. Is the boat fitted with Moveable and/or Variable ballast? Yes / No
 If Yes, please supply worst case values of: FKR: FIR:

Name: Signature:

Company/Organisation: Date:

Section C - Declaration

TO BE COMPLETED BY THE OWNER OR REPRESENTATIVE OF THE BOAT.

(If righting moment data and AVS is not supplied at section B, then a copy of the boat's IMS certificate must be included with this application)

I, as the owner or representative of the above named boat, confirm that the boat and her equipment will remain unaltered from the condition when assessed for either the data supplied at B above or for her IMS certificate. If I make changes that might affect the calculated IRC STIX or AVS, I will advise the RORC Rating Office. I enclose the appropriate fee (if applicable).

Name: Signature:

Date:



Appendix 4

Application for Inclusion of Designer calculated STIX, AVS, and Design Category on a Boat's IRC Certificate

The inclusion of designer calculated STIX, AVS, and Design Category on a Boat's IRC Certificate is free of charge when applied for at the time of IRC initial application or annual revalidation. At any other time the appropriate fee for an amended certificate should be included. Data will be shown on a boat's certificate as IRC STIX, AVS, and IRC Category.

Section A – Boat

Boat name: Sail number:
Design: Model/Version:
LOA: Draft:

Section B - Data

TO BE COMPLETED BY A NAVAL ARCHITECT OR OTHER QUALIFIED PERSON.

All questions must be answered in all cases and may include design data from a design hull offset file and either measured stability data from an approved inclining test or data calculated by the designer based on an analysis of weights. If calculated data is used then in accordance with ISO 12217-2, Annex C, para C.2.2 Vertical Centre of Gravity, calculation shall be based on the calculated mass and centres of gravity of individual components, raised by the addition of 5% of (Fm + Tc) where Fm is Freeboard Amidships and Tc is Draught of Canoe Body, both in Minimum Operating Condition. Question 6 must be answered in all relevant cases and may include calculated data as above.

1. MMOC: kg
2. AVS: degs
3. Downflooding angle: degs
4. FDS:
5. FIR:
6. FKR:
7. FDL:
8. FBD:
9. FWM:
10. FDF:
11. STIX:
12. Is the boat fitted with Moveable and/or Variable ballast? Yes / No
If Yes, please supply worst case values of: FKR: FIR:
13. Design Category:

Name: Signature:
Company/Organisation: Date:

Section C – Owner Declaration

TO BE COMPLETED BY THE OWNER OR REPRESENTATIVE OF THE BOAT.

I, as the owner or representative of the above named boat, confirm that the boat and her equipment will remain unaltered from the condition when assessed for the data supplied at B above. If I make changes that might affect the calculated STIX, AVS, or Design Category I will advise the RORC Rating Office. I enclose the appropriate fee (if applicable).

Name: Signature:
Date: