Annex C

Chapter 3, Article 10 of the RCD Guidelines

Chapter 3: Marking to demonstrate conformity

Article 10: CE marking

Article 10(1)

1. Recreational craft and components as referred to in Annex II which are regarded as meeting the essential requirements referred to in Article 3 must bear the CE marking of conformity when they are placed on the market.

Article 10(2)

2. The CE marking of conformity, as shown in Annex IV, must appear in a visible, legible and indelible form on the recreational craft as in point 2.2 of Annex I and on components as referred to in Annex II and/or on their packaging.

The CE marking shall be accompanied by the identification number of the notified body responsible for implementation of the procedures set out in Annexes VI, IX, X, XI and XII.

Recreational craft must, when they are placed on the market, bear the CE marking on the builder's plate together with other information indicated in essential requirement 2.2.

The CE marking symbolises conformity to all the obligations incumbent on manufacturers in respect of the product covered by the directive.

The CE marking shall, as a rule, be affixed to the product or to its data plate. In addition, it can be affixed, for instance, to the packaging or to the accompanying documents. However, it may exceptionally be moved from the product or its data plate if this rule cannot be followed. This would be justified where affixing it to the product was impossible, or not possible under reasonable technical and economic conditions, or where the minimum dimensions could not be respected, or it could not be ensured that the CE marking was visibly, legibly and indelibly affixed. In such cases, the CE marking has to be affixed to the packaging, if it exists, and to the accompanying documents. Such an exceptional move of the CE marking from the product can only be considered in the case of components as referred to in Annex II, if the CE marking cannot be applied to a particular component. Stick-on labels on components could be admitted in such cases.

The identification number of the notified body must accompany the CE marking where it has intervened during the manufacturing process (modules D, F, G and H).

Module B

Reference to module B (Annex VII) is omitted as it refers to the role of the notified body in the design stages, that is:

— ascertains conformity with essential requirements,

— carries out tests if necessary,

— issues EC type-examination certificate.

Module B, however, is utilised in association with one of the modules C to F in the overall conformity assessment procedure. It is not explicit that the same notified body be involved in both the design and production stages. It is possible that the notified body may not be approved to carry out both the modules involved (ref. especially QA). Thus, it is the notified body carrying out conformity assessment in the manufacturing stage whose number appears or the CE marking — the CE marking being affixed after the manufacturing stage.

Module C

The identification number of a notified body is not required under module C. In this case, the manufacturer or his authorised representative is responsible for ensuring conformity with the approved prototype (EC type-examination).

Article 10(3)

3. The affixing of markings or inscriptions on the craft which are likely to mislead third parties with regard to the meaning or the form of the CE marking shall be prohibited. Any other markings may be affixed to the recreational craft and components as referred to in Annex II and/or on their packaging, provided that the visibility and legibility of the CE marking [are] not thereby reduced.

Article 10(4)

4. Without prejudice to Article 7:

(a) where a Member State establishes that the CE marking has been affixed wrongly, the manufacturer or his authorised representative established in the Community shall be obliged to end the infringement under conditions laid down by the Member State;

(b) where non-compliance continues, the Member State shall take all appropriate measures to restrict or prohibit the placing on the market of the product in question or to ensure that it is withdrawn from the market, in accordance with the procedure laid down in Article 7.

Paragraphs 3 and 4 refer respectively to the legibility of the marking and the responsibilities of the Member States with regard to surveillance of the market, in particular where the marking has been affixed wrongly. The measures are taken by the Member States without prejudice to the application of the safeguard clause.

The design of the CE marking is defined in Annex IV.

Letter confirming design compliance with ABS Guide

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TO WHOM IT MAY CONCERN

I hereby state that the series production yacht MAX FUN 35 (design no. 150) has been designed following the guidelines of the ABS Rules of Yacht Design for yachts under 24 mtrs.

Yours sincerely,

M. Voogd

International Sailing Federation's (ISAF) Offshore Special Regulations – Section 3.03 – Hull Construction Standards

Category

quickly and shall be operable at any angle of heel. It would be desirable if this system was capable of securing the keel on the centreline.

3.03 Hull Construction Standards (Scantlings) MoMu0,1,2

Table 2 MoMu0,1,2

LOA	earliest of age or series date	
all	1/86 and after	MoMu0,1
12m (39.4 feet) and over	1/87 and after	MoMu2
under 12m (39.4 feet)	1/88 and after	MoMu2

3.03.1 A yacht defined in the table above shall have been designed and built in accordance with either: MoMu0,1,2

a) the EC Recreational Craft Directive for Category A (having obtained the CE mark), or MoMu0,1,2

b) the ABS Guide for Building and Classing Offshore Yachts in which case the yacht shall have on board either a certificate of plan approval issued by ABS, or written statements signed by the designer and builder which confirm that they have respectively designed and built the yacht in accordance with the ABS Guide, MoMu0,1,2

c) except that a race organizer or class rules may accept other evidence of suitability of design and build when that described in (a) or (b) above is not available, provided that the requirements of (a) or (b) have never been refused due to unsuitability of the boat. MoMu0,1,2

3.03.2 Any significant repairs or modifications to the hull, deck, coachroof, keel or appendages, on a yacht defined in table 2 shall be certified by one of the methods above and an appropriate written statement or statements shall be on board. MoMu0,1,2

3.04 Stability - Monohulls Mo0,1,2,3,4

3.04.1 Either with, or without, reasonable intervention from the crew a yacht shall be capable of self-righting from an inverted position. Self-righting shall be achievable whether or not the rig is intact. Mo0

Properties of keel fin steel

λ

more with metals

Hot rolled Steel Plates, Sheets and Coils
Comparison tables

Ruukki is a metal expert you can rely on all the way, whenever you need metal based materials, components, systems or total solutions. We constantly develop our product range and operating models to match your needs.

Non alloy steels EN 10025-2:2004
Designations and comparisons between designations

Table 1

Yeld strength R_{eH} MPa	Tensile strength R_m MPa	Impact strength KV J	t °C	EN 10025-2 2004	EN 10025:1990 +A1:1993	EN 10025: 1990	SFS 200 1986	SS xx xx xx-xx 1987	DIN 17100 1980	BS 4360 1986	NF A 35-501 1981	Ruukki
235	360-510	27	20	–	S235JR	Fe 360 B	–	14 13 11-00	St 37-2		E 24-2	Laser 250 C
235	360-510	27	20	S235JR	S235JRG2	Fe 360 B FN	Fe 37 B	14 13 12-00	RSt 37-2	40 B	–	Laser 250 C
235	360-510	27	0	S235J0	S235J0	Fe 360 C	–		St 37-3 U	40 C	E 24-3	Laser 250 C
235	360-510	27	-20	S235J2+N	S235J2G3	Fe 360 D1	Fe 37 D		St 37-3 N	40 D	E 24-4	–
235	360-510	27	-20	S235J2	S235J2G4	Fe 360 D2	–		–			Laser 250 C
275	430-580	27	20	S275JR	S275JR	Fe 430 B	Fe 44 B	14 14 12-00	St 44-2	43 B	E 28-2	–
275	430-580	27	0	S275J0	S275J0	Fe 430 C	–		St 44-3 U	43 C	E 28-3	–
275	430-580	27	-20	S275J2+N	S275J2G3	Fe 430 D1	Fe 44 D	14 14 14-00	St 44-3 N	43 D	E 28-4	–
275	430-580	27	-20	S275J2	S275J2G4	Fe 430 D2	–	14 14 14-01	–			–
355	510-680	27	20	S355JR	S355JR	Fe 510 B	–	(14 21 72-00)	–	50 B	E 36-2	Multisteel
355	510-680	27	0	S355J0	S355J0	Fe 510 C	Fe 52 C		St 52-3 U	50 C	E 36-3	Multisteel
355	510-680	27	-20	S355J2+N	S355J2G3	Fe 510 D1	Fe 52 D	(12 21 74-01)	St 52-3 N	50 D		Multisteel
355	510-680	27	-20	S355J2	S355J2G4	Fe 510 D2	–		–			Multisteel
355	510-680	40	-20	S355K2+N	S355K2G3	Fe 510 DD1	–		–	50 DD	E 36-4	Multisteel
355	510-680	40	-20	S355K2	S355K2G4	Fe 510 DD2	–		–			Multisteel
185	310-540	–	–	S185	S185	Fe 310-0	Fe 33	14 13 00-00	St 33		A 33	–
295	490-660	–	–	E295	E295	Fe 490-2	Fe 50	14 15 50-00	St 50-2		A 50-2	–

Values at room temperature. Material thickness ≤ 16 mm.
For accurate comparison, the original standards are to be used.

Pressure purposes steel
Designations and comparisons between designations

Table 2

Steels for simple pressure vessels	High-temperature non-alloyed and alloyed steels				Normalised weldable fine grained steels		
EN 10207:2005	EN 10028-2:2003	Comparison, approximate DIN 17155	SS xx xx x-xx	ASTM	EN 10028-3:2003	Comparison, approximate DIN 17102	SS xx xx xx-xx
P235S	P235GH	H I	14 13 31-xx	A285GR C	P275NH	WStE 285	
P285S	P265GH	H II	14 14 31-xx	A516GR60	P275NL1	TStE 285	
P275SL	P295GH	17 Mn 4	14 21 02-xx	A516GR65	P275NL2	EStE 285	
	P355GH	19 Mn 6	–	A516GR70	P355N	StE 355	14 21 06-xx
	16Mo3	15 Mo 3	14 29 12	A204GR A	P355NH	WStE 355	14 21 06-xx
					P355NL1	TStE 355	14 21 07-xx
					P355NL2	EStE 355	

CODES IN DESIGNATION

Steels for simple pressure vessels:

P = steels for pressure purposes
S = steels for simple vessels
The $R_{p0,2}$ yield strength values at elevated temperatures are specified.
Impact strength:

Longitudinally t °C	KV J
-20	28

L = low operating temperature.
The $R_{p0,2}$ yield strength values at elevated temperatures are specified.
Impact strength:

Longitudinally t °C	KV J
-50	28

High-temperature non-alloyed and alloyed steels:

P = steels for pressure purposes
G = non-alloy steel
H = high operating temperature
The $R_{p0,2}$ yield strength values at elevated temperatures are specified.
Impact strength:

Steel grade	Transversally t °C	KV J
GH-steels	-20	27
16Mo3	+20	31

Normalised weldable fine grained steels:

P = steels for pressure purposes
N = normalised or normalised rolled steel
H = high operating temperature
The $R_{p0,2}$ yield strength values at elevated temperatures are specified.
L = low operating temperature
Impact strength:

Steel grade	Transversally t °C	KV J	Longitudinally t °C	KV J
P...N, ...NH	-20	30	-20	45
P...NL1	-40	27	-50	30
P...NL2	-50	27	-50	42

Transversally test specimens are used, unless otherwise agreed. The reference steels are respectively tested using longitudinal specimens.

Impact strength
Designations comparisons

Table 3

Test temperature °C	Impact strength class EN 10025-1:2004, EN 10025-2:2004, EN 10027:2005 Impact strength, longitudinally 27 J	40 J	60 J	EN 10025:1990 Impact strength, longitudinally 27 J	40 J	Quality class SFS 200, SFS 250, SFS 1100, SFS 1150 Impact strength, longitudinally 27 J
20	JR	KR	LR	B	–	B
0	J0	K0	L0	C	–	C
-20	J2	K2	L2	D	DD	D
-30	J3	K3	L3	–	–	–
-40	J4	K4	L4	–	–	(E)
-50	J5	K5	L5	–	–	–
-60	J6	K6	L6	–	–	(F)

Symbols included in designations

Table 4

EN 10025-2:2004

Symbol	Comment	
S	Structural steel	
E	Steel for engineering purposes	
C	Guaranteed flangeability	
+N	Supply condition as normalised or normalised rolled	To be delivered supply condition as normalised
+AR	Supply condition as untreated	To be delivered supply condition as untreated, As Rolled
Deoxidation		
FN	Rimming steel not permitted	JR- and J0-flat products
FF	Fully killed with nitrogen binding element	J2- and K2-flat products

EN 10025:1990 + A1:1993

Symbol G	Comment	
G1	Rimming steel, FU	Supply condition as chosen by the manufacturer, unless otherwise agreed
G2	Rimming steel not permitted, FN	Supply condition as chosen by the manufacturer, unless otherwise agreed
G3	Fully killed with nitrogen binding elements, F	Supply condition as normalised or normalised rolled
G4	Fully killed with nitrogen binding elements, F	Supply condition as chosen by the manufacturer

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Annex G

Definitions of yield strength and ultimate tensile strength

TENSILE AND YIELD STRENGTH

The tensile strength of a material is the maximum amount of tensile stress that it can be subjected to before failure. The definition of failure can vary according to material type and design methodology. This is an important concept in engineering, especially in the fields of material science, mechanical engineering and structural engineering.

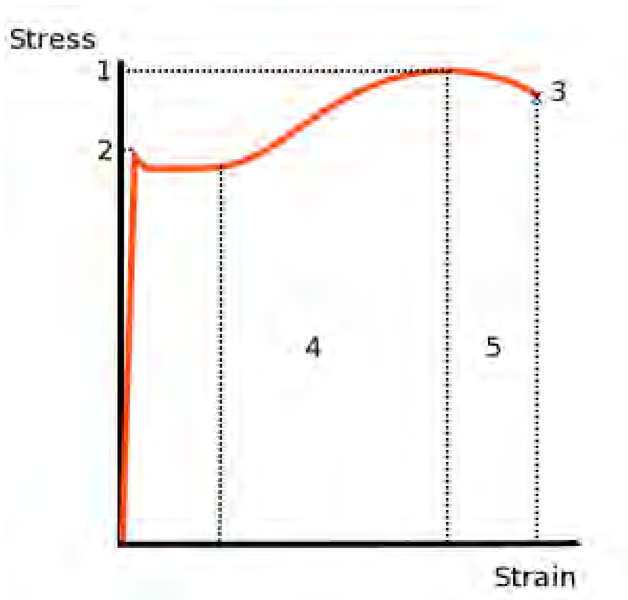
There are three typical definitions of tensile strength:

- Yield strength: The stress a material can withstand without permanent deformation. This is not a sharply defined point. Yield strength is the stress which will cause a permanent deformation of 0.2% of the original dimension.
- Ultimate strength: The maximum stress a material can withstand.
- Breaking strength: The stress coordinate on the stress-strain curve at the point of rupture.

CONCEPT

The various definitions of tensile strength are shown in the following stress-strain graph for low-carbon steel:

Stress vs. Strain curve typical of structural



1. Ultimate Strength   2. Yield Strength 3. Rupture

4. Strain hardening region 5. Necking region.

Metals including steel have a linear stress-strain relationship up to the yield point, as shown in the figure. In some steels the stress falls after the yield point. For most metals yield point is not sharply defined. Below the yield strength, all deformation is recoverable, and the material will return to its initial shape when the load is removed. For stresses above the yield point the deformation is not recoverable, and the material will not return to its initial shape. This unrecoverable deformation is known as plastic deformation. For many applications plastic deformation is unacceptable, and the yield strength is used as the design limitation.

After the yield point, steel and many other ductile metals will undergo a period of strain hardening, in which the stress increases again with increasing strain up to the *ultimate strength*. If the material is unloaded at this point, the stress-strain curve will be parallel to that portion of the curve between the origin and the yield point. If it is re-loaded it will follow the unloading curve up again to the ultimate strength, which has become the new yield strength.

After a metal has been loaded to its yield strength it begins to "neck" as the cross-sectional area of the specimen decreases due to plastic flow. When necking becomes substantial, it may cause a reversal of the engineering stress-strain curve, where decreasing stress correlates to increasing strain because of geometric effects. This is because the engineering stress and engineering strain are calculated assuming the original cross-sectional area before necking. If the graph is plotted in terms of *true stress* and *true strain* the curve will always slope upwards and never reverse, as true stress is corrected for the decrease in cross-sectional area. Necking is not observed for materials loaded in compression. The peak stress on the engineering stress-strain curve is known the **ultimate tensile strength**. After a period of necking, the material will rupture and the stored elastic energy is released as noise and heat. The stress on the material at the time of rupture is known as the *breaking stress.*

Original design keel calculations

KEEL ROOT ATTACHMENT AND DIMENSION REQUIREMENTS	150		NAME:	Maxfun 35

Materials Properties Used:

Item: Material	UTS	.2% Proof	E-Modulus	Information Source
Keelfin Jacket Steel Grade S235JR (ST 37)	510	235 Mpa	200 Gpa	Published Properties
Bolts and Nuts for Keel/Hull Attachment SS 316 Class 70 *SEE NOTE	500	250 Mpa	193 Gpa	Published Properties
Bulb Lead with 2 to 4 % Antimony (Average Compressive/Tensile Values)	N.A.	33.75 Mpa	13 Gpa	SP-Engineering Approx. Values

*NOTE
Value to fill in here is either the Proof Stress of the Material or 50% of the Tensile Strength, whichever is the LOWER figure.

General Input:

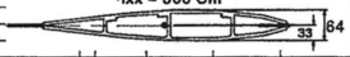
Bulb Weight	1325	Kgs.	Fill in 0 if no separate bulb
Distance Root Chord to CG Bulb.	1710	Mm.	Fill in 0 if no separate bulb
Total Fin Weight (Top Section)	101	Kgs	Keelfin section 6 mm into Hull Only
Distance Root Chord to CG Steel Fin	851	Mm.	Keelfin section 6 mm into Hull Only
Total Weight Keel+Bulb	1426	Kgs.	
Combined CG Keel+Bulb Below Root Chord at Rest	1649	Mm.	
Thickness Keelspar at Root	64	Mm.	Actual out of Drawing
Length of Keelspar at Root(Max effective length to take up Bending)	130	Mm.	Length reduced to Match MOI Calculation
Longitudinal length of Welding at Baseplate Root	500	Mm.	if applicable
Static Heel Angle of Yacht Considered	35	Degrees	
Resulting Arm at Above Heel Angle	946	Mm.	
Safety Factor Applied At Above Heel Angle.	1.50		

MANUAL INPUT

Case 1a: Bending Stress on Keel at Root under normal Sailing Conditions.

APPLICABLE TO THIS DESIGN ?	YES		Note: Section just under insertbox		
Moment of Inertia around C.L. of Fabricated Foil at Root (Ixx)	300	Cm^4	(Determined out of Drawing using MOI)		
Distance Centroid to Maximum Width	33	Mm.	(Out of Drawing)		
Length Rootchoord	550.0	Mm.	Structural length only		
Section Modulus of Fabricated Foil Section at Root	90.91	Cm^3			
Calculated Bending Stress	218	Mpa.	(Safety factor included)		
Actual Safety Factor	1.61		(Must be more than 1.00)		
Shear Load on Welding Top Baseplate (50% Height Foil)	301	KN.	(Safety factor included)		
Minimum Throat Height Welding (Taken at 50% or Rootchoord Length)	4.65	Mm.	(Safety factor included)	Not Applicable to Design 150	No Critical welding at Root
Specified(Drawn Throat Height Welding)	6.0	Mm.	(Must be more than minimu	Not Applicable to Design 150	No Critical welding at Root
Actual Safety Factor with above welding troat height	1.9		(Must be more than 1.00)	Not Applicable to Design 150	No Critical welding at Root

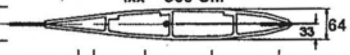
Cross Section at Rootchord
$I_{xx} = 300\ Cm^4$



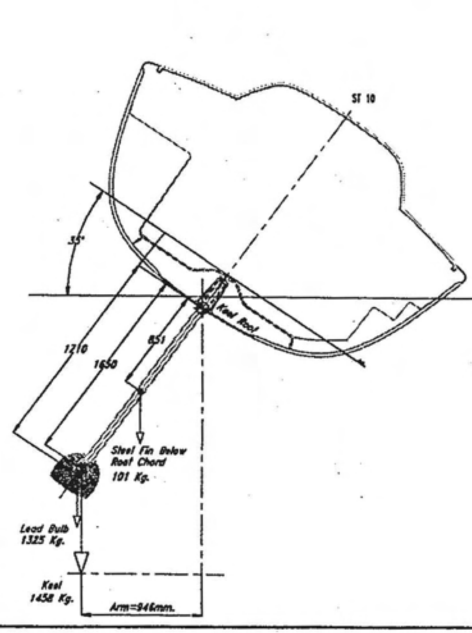
Case 1b: Bending Stress on Keel at Root under Most Extreme Sailing Condition (Knock Down at 90 Degrees Heel)

APPLICABLE TO THIS DESIGN ?	YES		Note: Section just under insertbox		
Moment of Inertia around C.L. of Fabricated Foil at Root (Ixx)	300	Cm^4	(Determined out of Drawing using MOI)		
Distance Centroid to Maximum Width	33	Mm.	(Out of Drawing)		
Length Rootchoord	550.0	Mm.	Structural length only		
Section Modulus of Fabricated Foil Section at Root	90.91	Cm^3			
Calculated Bending Stress at 90 Degrees Heel	381	Mpa.	(Safety factor included)		
Actual Safety Factor using UTS Value.	2.01		(Must 2.0 or more)		
Shear Load on Welding Top Baseplate (50% Height Foil)	524	KN.	(Safety factor included)		
Minimum Throat Height Welding (Taken at 50% or Rootchoord Length)	2.71	Mm.	(Safety factor included)	Not Applicable to Design 150	No Critical welding at Root
Specified(Drawn Throat Height Welding)	6.0	Mm.	(Must be more than minimu	Not Applicable to Design 150	No Critical welding at Root
Actual Safety Factor with above welding troat height using UTS Value	3.32		(Must 2.0 or more)	Not Applicable to Design 150	No Critical welding at Root

Cross Section at Rootchord
$I_{xx} = 300\ Cm^4$



CONDITION CASE 1A



CONDITION CASE 1B