



SLOVENSKI STANDARD

SIST EN 1592-2:1998

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Aluminij in aluminijeve zlitine - VF varjene cevi - 2. del: Mehanske lastnosti

Aluminium and aluminium alloys - HF seam welded tubes - Part 2: Mechanical properties

Aluminium und Aluminiumlegierungen - HF-längsnahtgeschweißte Rohre - Teil 2:
Mechanische Eigenschaften

Aluminium et alliages d'aluminium - Tubes électrosoudés HF - Partie 2: Caractéristiques
mécaniques

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Ta slovenski standard je istoveten z: ^{SIST EN 1592-2:1998} EN 1592-2:1997

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ICS:

77.150.10 Alumijski izdelki Aluminium products

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EUROPEAN STANDARD

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NORME EUROPÉENNE

EUROPÄISCHE NORM

October 1997

ICS

Descriptors: aluminium, aluminium alloys, aluminium tubes, welded tubes, wrought products, mechanical properties, tension tests, flattening tests, drift expanding tests, bend tests, testing conditions

English version

Aluminium and aluminium alloys - HF seam welded tubes - Part 2: Mechanical properties

Aluminium et alliages d'aluminium - Tubes électrosoudés
HF - Partie 2: Caractéristiques mécaniques

Aluminium und Aluminiumlegierungen - HF-
längsnahtgeschweißte Rohre - Teil 2: Mechanische
Eigenschaften

This European Standard was approved by CEN on 19 September 1997.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 132 "Aluminium and aluminium alloys", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 1998, and conflicting national standards shall be withdrawn at the latest by April 1998.

Within its programme of work, Technical Committee CEN/TC 132 entrusted CEN/TC 132/WG 12 "HF Seam Welded tubes" to prepare the following standard :

EN 1592-2 Aluminium and aluminium alloys - HF seam welded tubes - Part 2 :
Mechanical properties

This standard is part of a series of four standards. The other standards deal with :

EN 1592-1 Aluminium and aluminium alloys - HF seam welded tubes - Part 1 :
Technical conditions for inspection and delivery

EN 1592-3 Aluminium and aluminium alloys - HF seam welded tubes - Part 3 :
Tolerances on dimensions and form for circular tubes

EN 1592-4 Aluminium and aluminium alloys - HF seam welded tubes - Part 4 :
Tolerances on dimensions and form for square, rectangular and shaped
tubes

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According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This Part of EN 1592 specifies the mechanical properties of wrought aluminium alloy HF seam welded tubes for general engineering applications.

It is not applicable to irrigation and heat exchanger tubes.

The chemical composition limits of these materials are given in EN 573-3.

Mechanical property limits are specified for all Class A alloys, as defined in EN 573-4. The definitions of temper designations are specified in EN 515.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 515	Aluminium and aluminium alloys - Wrought products - Temper designations (standards.iteh.ai)
EN 573-3	Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition https://standards.iteh.ai/catalog/standards/sist/a4c05ae9-b76c-43ee-9ceb-
EN 573-4	Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 4 : Forms of products
EN 1592-1	Aluminium and aluminium alloys - HF seam welded tubes - Part 1 : Technical conditions for inspection and delivery
EN 10002-1	Metallic materials - Tensile testing - Part 1 : Method of test (at ambient temperature)

NOTE : Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex B.

3 Tensile test

3.1 Specimen and test piece

The selection, preparation and number of specimens and test pieces shall be in accordance with EN 1592-1.

3.2 Testing conditions

The tensile test shall be carried out in accordance with EN 10002-1 and the following :

- during testing to determine proof stress, the rate of stress application shall not exceed 12 MPa/s. After removal of the extensometer, the rate of straining may be increased but it shall not exceed 50 % of the length of the reduced section per minute ;
- elongation shall be measured using an original gauge length $L_0 = 5,65\sqrt{S_0}$;
- for determination of compliance, proof stress and tensile strength values shall be rounded to the nearest 1 MPa and elongation values to the nearest 1 % using the rounding rules set out in Annex A.

3.3 Mechanical properties for Class A alloys

The mechanical properties of all class A alloys are specified in table 1.

HF seam welded tubes may be produced in other tempers not specified in table 1. The corresponding mechanical properties shall be agreed between the producer and purchaser.

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Table 1 : Mechanical properties for Class A alloys

Alloy designation		Temper ¹⁾	R_m	$R_{n0,2}$	A ²⁾
Numerical	Chemical symbols		MPa	MPa	%
			min.	min.	min.
EN AW-3004	EN AW-Al Mn1Mg1	Hx25	190	145	8
		Hx45	220	180	6
		Hx65	240	200	4
		Hx85	250	220	3
EN AW-3005	EN AW-Al Mn1Mg0,5	Hx45	200	175	7
		Hx65	210	185	5
		Hx85	220	195	4
EN AW-3103	EN AW-Al Mn1	Hx65	170	150	3
		Hx85	190	170	2
EN AW-5005	EN AW-Al Mg1(B)	Hx65	170	140	4
		Hx85	190	180	3
EN AW-5040	EN AW-Al Mg1,5Mn	O	170	90	14
		Hx25	190	130	12
		Hx45	210	160	10
		Hx65	230	190	7
		Hx85	250	220	5
EN AW-5049	EN AW-Al Mg2Mn0,8	Hx25	220	170	10
		Hx45	235	200	7
		Hx65	250	230	5
		Hx85	270	250	3
EN AW-5251	EN AW-Al Mg2	Hx25	210	160	8
		Hx45	230	190	6
		Hx65	245	210	5
EN AW-5454	EN AW-Al Mg3Mn	Hx65	290	260	4
		Hx85	310	280	3
EN AW-5754	EN AW-Al Mg3	O	190	70	17
		Hx25	220	170	9
		Hx65	255	225	4
EN AW-5083	EN AW-Al Mg4,5Mn0,7	O	275	115	16
		Hx85	420	380	4
EN AW-5086	EN AW-Al Mg4	O	240	100	15
		Hx25	270	170	9
		Hx45	300	220	7
		Hx65	320	260	5
		Hx85	350	320	3
EN AW-7075	EN AW-Al Zn5,5MgCu	O	190	100	15
		T6	530	460	10
		T81	550	500	8

1) The letter x stands for digit 1, 2 or 3 depending on the final operation to which the tube is subjected i.e. :

- 1 if mechanical properties are obtained directly by tubing operation ;
- 2 when mechanical properties are obtained through a partial annealing after tubing operation ;
- 3 when mechanical properties are obtained through a partial annealing at lower temperature, for high Mg content 5000 series alloys (EN AW-5083, EN AW-5086).

2) Elongation values are not guaranteed for tubes with embossed surfaces. Testing conditions are specified in 3.2.

4 Flattening test

4.1 General

The tube shall be able to withstand plastic deformation in flattening.

NOTE : The test is based on EN 10233 (see annex B, [1]).

It applies to circular tubes with an outside diameter not greater than 200 mm and a thickness not greater than 15 % of the outside diameter. It can also, if agreed between producer and purchaser at time of order, apply to square, rectangular and shaped tubes.

This test is essentially used to reveal potential defects in the weld area.

4.2 Principle

A test piece cut from a tube, is flattened in a direction perpendicular to the longitudinal axis of the tube until the distance between the platens, measured under load, reaches the value agreed between the producer and purchaser.

4.3 Testing equipment

The equipment used for the test shall be capable of flattening the test piece between two parallel rigid platens.

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4.4 Test piece

The length of the test piece shall be at least 1,5 times the outside diameter of the tube.

4.5 Procedure

4.5.1 Flatten the test piece under steadily increasing pressure, with the weld fin positioned at 90° to the flattening surfaces (see figure 1, position A), until the distance H between the platens (see figure 2) reaches the specified value, agreed between producer and purchaser.

4.5.2 A full flattening test (i.e. internal surfaces of the test piece coming into contact) can be required for a material in the fully annealed condition (O temper). In that case, the weld fin shall be positioned in the direction of flattening, that is the weld shall be in the centre of the flattened zone (see figure 1, position B).

For all other tempers, the gap between the platens shall be specified by the producer.

4.5.3 In general, the test shall be carried out at ambient temperature, between 10 °C and 35 °C.

4.5.4 In case of dispute, the controlled temperature shall be 23 °C ± 5 °C, and the rate of movement of the platens whilst flattening shall not exceed 25 mm/min.