SLOVENSKI STANDARD
SIST EN 2070-5:2001

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Aerospace series - Aluminium and aluminium alloy wrought products - Technical specification - Part 5: Tube used under pressure

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Luft- und Raumfahrt - Halbzeug aus Aluminium und Aluminium-Knetlegierungen - Technische Lieferbedingungen - Teil 5: Innendruckrohre

Série aérospatiale - Demi-produits corroyés en aluminium et alliages d'aluminium - Spécification technique - Partie 5: Tubes pour canalisation sous pression

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English version

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This European Standard was accepted by CEN on 1988-07-20. CEN members are bound to comply with the requirements of CEN 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 CEN 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 CEN Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat : Rue Bréderode 2, B—1000 Bruxelles

Brief history

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

According to the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Contents

1 Scope and field of application

The present standard specifies the particular requirements of tubes of round section for use under pressure in aluminium and aluminium alloys, manufactured by extrusion or extrusion and drawing.

This standard shall be used in conjunction with EN 2070-1.

2 References

EN 2002-1, Aerospace series - Test methods for metallic materials - Part 1 - Tensile testing at ambient temperature 1)

EN 2002-8, Aerospace series - Test methods for metallic materials - Part 8 - Micrographic determination of grain size 1)

EN 2002-9, Aerospace series - Test methods for metallic materials - Part 9 - Tube drift expanding test 1)

EN 2002-10, Aerospace series - Test methods for metallic materials - Part 10 - Tube flattening test 1)

EN 2002-16, Aerospace series - Test methods for metallic materials - Part 16 - Dye penetrant testing 1)

EN 2002-17, Aerospace series - Test methods for metallic materials - Part 17 - Integrity test for tubes 1)

EN 2002-18, Aerospace series - Test methods for metallic materials - Part 18 - Hydraulic distention test for tubes 1)

EN 2002-20, Aerospace series - Test methods for metallic materials - Part 20 - Eddy current test on pipes under pressure 1)

EN 2070-1, Aerospace series - Aluminium and aluminium alloy wrought products - Technical specification - Part 1 - General requirements.

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1) In preparation

3 Manufacture

Unless otherwise specified, the method of manufacture to be employed shall be at the discretion of the manufacturer, however, the following requirements shall be observed :

- The use of bridge or multi-hole dies or die-quenching is only permissible when agreed in writing between the manufacturer and purchaser.

- Tubes shall not be subjected to cold drawing or straightening after precipitation hardening unless required by the material standard.

4 Batch

4.1 Batch definition

Batch definition shall conform to EN 2070-1 except that aggregation of casts is not permitted.

4.2 Batch size

The maximum batch size shall be 250 kg.

5 Dimensions

Dimensions and tolerances shall conform to the relevant semi-finished product standard or drawing.

The frequency of examination adopted by the manufacturer shall be sufficient to permit him to certify compliance with the requirements.

6 External defects

Tubes shall not be ground or polished however, local dressing of scratches by polishing is permitted.

6.1 Unless otherwise required on the order or the inspection schedule, the condition of the internal and external surfaces of the tubes shall conform with table 1 and be determined by visual examination.

Dye penetrant testing may be applied in accordance with EN 2002-16, to verify the extent or existence of surface defects.

Examination of the internal surface shall be carried out as follows :

- either, visual inspection of 200 mm long pieces, slit in the longitudinal direction,

- or by any other method agreed between purchaser and manufacturer, for example boroscope examination.

The frequency of examination adopted by the manufacturer shall be sufficient to permit him to certify compliance with the requirements of table 1.

Table 1

Type of defect	Acceptance criteria
Score marks	Allowable defect depth : ⩽ 3 % of a [1] or 0,04 mm max. (⩽ 5 % allowable for 6 XXX *) alloy series)
Handling or Seizure marks Smears	Allowable defect depth : ⩽ 3 % of a [1] or 0,04 mm max. (⩽ 5 % allowable for 6 XXX *) alloy series) For D [2] < 38 mm : Max. 1 defect per metre of length. For D [2] < 38 mm : Max. 2 defects per metre of length.
Extrusion or drawing stoppage and resumption marks Embedded particles Cracks Blisters Superficial corrosion	Rejected
1) a = nominal wall thickness. 1) D = nominal external diameter.	

*) "Aluminum Association" designation

6.2 Surface finish

The surfaces of the tube shall be smooth. Where the dimensions make it possible the measurement of the roughness shall be carried out. The readings shall meet the following requirements :

- Ra $\leq$ 0,8 µm for outside surface

- Ra $\leq$ 1,6 µm for inside surface.

The "capability clause" may be applied to this requirement.

7 Tensile test

In accordance with EN 2002-1.

The number of tests per batch is specified in table 4.

The test results shall meet the requirements of the material standard.

8 Batch uniformity

Batch uniformity shall be demonstrated by either :

8.1 Eddy current testing in the same operation as required by 12.2 - Tube leakage test - Method 2.

8.2 By any other method agreed between the manufacturer and purchaser (e.g. hardness testing, an increase in the frequency of tensile testing, ...) and specified on the order or in the inspection schedule.

9 Flattening test

Tubes shall be tested in accordance with EN 2002-10, so that the height under load is equal to the value required by the material standard.

The number of tests to be carried out is given in table 4.

After flattening samples shall be free from cracks.

Discontinous surface ruptures shall be regarded as cracks if their total length exceeds 80% of the length of the deformed edge.

10 Drift test

Tubes shall be tested in accordance with EN 2002-9. The mandrel angle shall be $\beta = (74 \pm 1)°$.

The external diameter of the expanded portion shall be in accordance with the figure and table 2.