BRITISH STANDARD

BS EN
683-2 : 1997

Aluminium and aluminium alloys — Finstock

Part 2. Mechanical properties

The European Standard EN 683-2 : 1996 has the status of a British Standard

ICS 77.120.10

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee NFE/35, Light metals and their alloys, upon which the following bodies were represented:

Aluminium Federation
Aluminium Stockholders' Association
Association of Light Alloy Refiners Ltd.
Magnesium Industry Council
Ministry of Defence

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Association of British Welded Aluminium Tube Makers
Institution of Structural Engineers
Metal Packaging Manufacturers' Association

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on
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Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference NFE/35
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Contents

National foreword

This British Standard has been prepared under the direction of the Engineering Sector Board and is the English language version of EN 683-2 : 1996, published by the European Committee for Standardization (CEN).

Cross-references

Publication referred to	Corresponding British Standard
EN 515 : 1993	BS EN 515 : 1993 *Aluminium and aluminium alloys. Wrought products. Temper designation.* BS EN 573 *Aluminium and aluminium alloys. Chemical composition and form of wrought products*
EN 573-1 : 1994	BS EN 573 : Part 1 : 1995 *Numerical designation system*
EN 573-2 : 1994	BS EN 573 : Part 2 : 1995 *Chemical symbol based designation system*
EN 573-3 : 1994	BS EN 573 : Part 3 : 1995 *Chemical composition*
EN 683-1 : 1996	BS EN 683-1 : 1996
	BS EN 10002 *Tensile testing of metallic materials*
EN 10002-1 : 1990	BS EN 10002 : Part 1 : 1990 *Method of test at ambient temperature*

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 8, an inside back cover and a back cover.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 683-2

August 1996

ICS 77.120.10

Descriptors: Aluminium, aluminium alloys, rolled products, thin films, heat exchangers, mechanical characteristics, tension tests, tables (data)

English version

Aluminium and aluminium alloys — Finstock — Part 2 : Mechanical properties

Aluminium et alliages d'aluminium — Bandes pour échangeurs thermiques — Partie 2: Caractéristiques mécaniques

Aluminium und Aluminiumlegierungen — Vormaterial für Wärmeaustauscher (Finstock) — Teil 2: Mechanische Eigenschaften

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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.

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CEN

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

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

Foreword

This European standard has been drawn up by CEN/TC 132, Aluminium and aluminium alloys, of which the Secretariat 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 February 1997, and conflicting standards shall be withdrawn at the latest by February 1997.

This standard is part of a set of three standards which are the following:

EN 683-1 : 1996 *Aluminium and aluminium alloys — Finstock — Part 1: Technical conditions for inspection and delivery*

EN 683-2 : 1996 *Aluminium and aluminium alloys — Finstock — Part 2: Mechanical properties*

EN 683-3 : 1996 *Aluminium and aluminium alloys — Finstock — Part 3: Tolerances on dimensions and form*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

1 Scope

This Part of EN 683 specifies the mechanical properties of wrought aluminium and aluminium alloy finstock.

It applies to flat rolled products.

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

The designations of wrought aluminium and aluminium alloys and the temper designations used in this standard are specified in EN 573-1 and EN 573-2 and EN 515 respectively.

2 Normative references

This European Standard incorporates by dated or undated reference, 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 : 1993	*Aluminium and aluminium alloys — Wrought products — Temper designations*
EN 573-1 : 1994	*Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 1: Numerical designation system*
EN 573-2 : 1994	*Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 2: Chemical symbol based designation system*
EN 573-3 : 1994	*Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition*
EN 683-1 : 1996	*Aluminium and aluminium alloys — Finstock — Part 1: Technical conditions for inspection and delivery*
EN 10002-1 : 1990	*Metallic materials — Tensile testing — Part 1: Method of test (at ambient temperature)*

3 Tensile testing

The selection and number of specimens and test pieces shall be as specified in **6.1.2** and **6.1.3** of EN 683-1 : 1996.

Tensile testing shall be carried out according to EN 10002-1 noting the following:

– it applies to gauges between 80 μm and 350 μm;

– test pieces shall be either parallel sided (see figure 1) or with shoulders and a reduced parallel section.

Parallel sided test pieces shall be prepared using a double bladed cutter or guillotine (see figure 2) or a precision ground sample shear of 'punch and die' construction.

Shouldered test pieces shall have a similar sample shear or can be machined in packs using a milling-type cutter.

Parallel sided test pieces shall have a width of 15 mm $\pm$ 0,1 mm and a gauge length of 50 mm $\pm$ 1 mm or 100 mm $\pm$ 1 mm.

Shouldered test pieces shall be in accordance with EN 10002-1.

During the part of the test to determine proof stress, the strain rate shall not exceed 10 MPa/s. The strain rate can then be increased until rupture but it shall not exceed 50 % of the gauge length per minute.

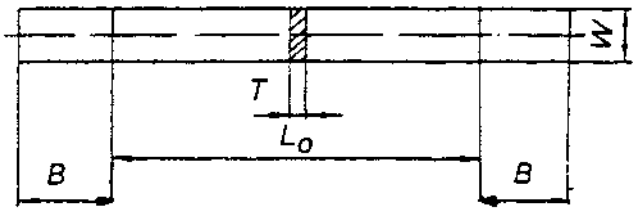
Considering the difficulty in marking thin gauge material, the gauge length may be measured by the distance between the grips of the testing machine. The elongation is then determined from the difference in the distance between the grips before testing and at fracture, or by direct reading from the load/crosshead-displacement diagram when available. This provision only applies to parallel-sided test pieces.

4 Mechanical properties

Mechanical property values for aluminium and aluminium alloys in finstock form are specified in table 1. For the elongation measurement, two different gauge lengths may be used. The choice of gauge length (either 50 mm or 100 mm) shall be at the discretion of the supplier unless otherwise agreed; nevertheless, the supplier shall inform the purchaser of the length used.

5 Rounding of test results

Test results shall be rounded in accordance with the rounding rules given in the annex A.



L_o gauge length = (50 ± 1) mm or (100 ± 1) mm
W width = (15 ± 0,1) mm
T thickness of strip
B length of grip section = minimum value 25 mm

Figure 1. Parallel sided test piece

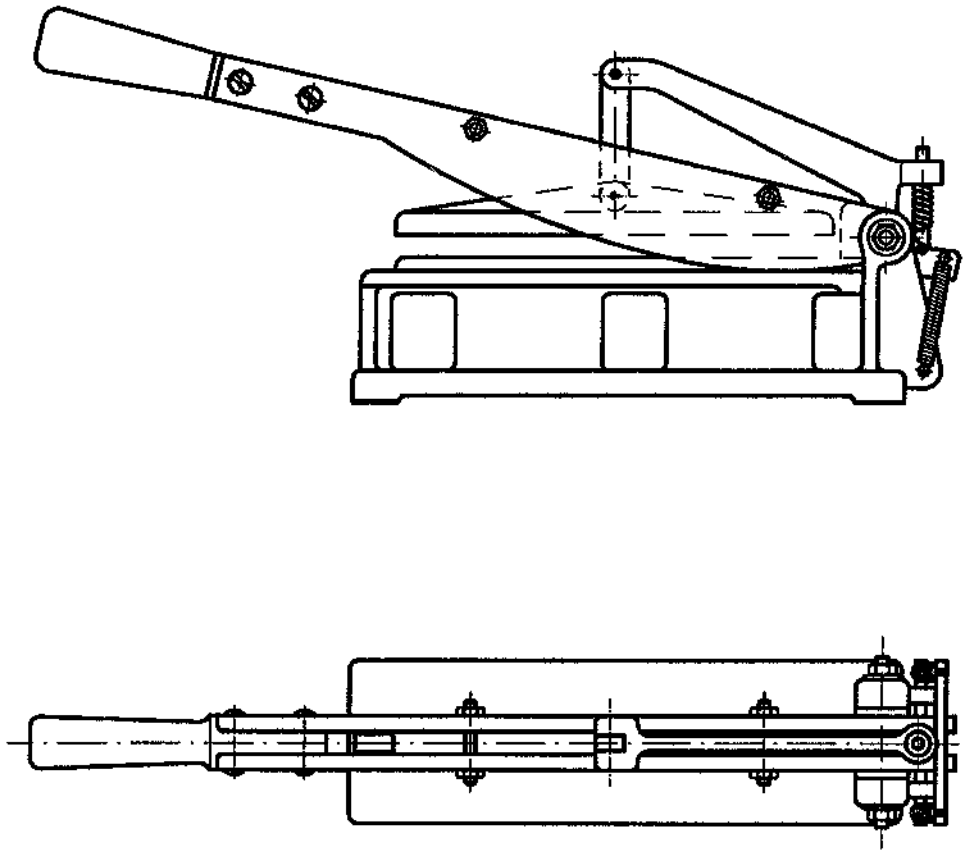


Figure 2. Example of a double-bladed cutter

Table 1. Mechanical properties for finstock

Material	Gauge range µm	Temper											
		O				H22				H24			
		Tensile strength $R_{p0,2}$ MPa	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength $R_{p0,2}$ MPa	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength $R_{p0,2}$ MPa	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %
		max.	min.	max.	min.	min.	min.	max.	min.	min.	min.	max.	min.
EN AW-1050A [Al 99,5]	80 to 139 140 to 200	55 55	50 50	95 95	6 10	55 55	85 85	125 125	6 6	75 75	105 105	145 145	4 5
EN AW-1100 [Al 99,0Cu] EN AW-1200 [Al 99,0]	80 to 139 140 to 200	60 60	60 60	105 105	10 14	65 65	90 90	135 135	6 7	95 95	110 110	160 160	4 5
EN AW-3003 [Al Mn1Cu] EN AW-3103 [Al Mn1]	80 to 139 140 to 200	80 80	80 80	130 130	12 15	80 80	120 120	160 160	11 14	105 105	140 140	180 180	8 9
EN AW-5005 [Al Mg1(B)]	80 to 139 140 to 200	80 80	100 100	150 150	8 10	— —	— —	— —	— —	— —	— —	— —	— —
EN AW-6063 [Al Mg0,7Si] EN AW-6951 [Al MgSi0,3Cu] EN AW-6060 [Al MgSi]	80 to 139 140 to 200	80 80	80 80	140 140	11 12	— —	— —	— —	— —	— —	— —	— —	— —
EN AW-8011A [Al FeSi(A)]	80 to 139 140 to 200	70 70	65 65	130 130	12 16	75 75	90 90	150 150	5 6	100 100	120 120	170 170	4 5
EN AW-8006 [Al Fe1,5Mn]	80 to 139 140 to 200	95 95	90 90	140 140	15 15	70 70	110 110	150 150	10 10	90 90	120 120	160 160	8 10
EN AW-8079 [Al Fe1Si]	80 to 139 140 to 200	60 60	60 60	110 110	13 16	65 65	95 95	135 135	7 8	— —	— —	— —	— —

Table 1. Mechanical properties for finstock *(continued)*

Material	Gauge range μm	Temper													
		H14				H16				H18			H19		
		Tensile strength $R_{p0,2}$ MPa	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength $R_{p0,2}$ MPa	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_{50mm} or A_{100mm} %	Tensile strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation A_{50mm} or A_{100mm} %
		min.	min.	max.	min.	min.	min.	max.	min.	min.	min.	min.	min.	min.	min.
EN AW-1050A [Al 99,5]	80 to 139	85	105	145	1	100	120	160	1	130	135	1	150	160	1
	140 to 200	85	105	145	1	100	120	160	1	130	135	1	150	160	1
EN AW-1100 [Al 99,0Cu]	80 to 139	100	110	160	1	115	125	180	1	135	140	1	160	180	1
EN AW-1200 [Al 99,0]	140 to 200	100	110	160	1	115	125	180	1	135	140	1	160	180	1
EN AW-3003 [Al Mn1Cu]	80 to 139	115	140	180	1	140	150	190	1	160	175	1	180	210	0,5
EN AW-3103 [Al Mn1]	140 to 200	115	140	180	1	140	150	190	1	160	175	1	180	210	0,5
EN AW-5005 [Al Mg1(B)]	80 to 139	125	145	190	1	—	—	—	—	165	185	0,5	—	—	—
	140 to 200	125	145	190	1	—	—	—	—	165	185	0,5	—	—	—
EN AW-6063 [Al Mg0,7Si]	80 to 139	110	110	160	2	—	—	—	—	150	160	1	180	200	1
EN AW-6951 [Al MgSi0,3Cu] EN AW-6060 [Al MgSi]	140 to 200	110	110	160	2	—	—	—	—	150	160	1	180	200	1
EN AW-8011A [Al FeSi(A)]	80 to 139	110	120	170	1	130	140	190	1	145	160	1	170	195	1
	140 to 200	110	120	170	1	130	140	190	1	145	160	1	170	195	1
EN AW-8006 [Al Fe1,5Mn]	80 to 139	—	—	—	—	—	—	—	—	170	190	2	—	—	—
	140 to 200	—	—	—	—	—	—	—	—	170	190	3	—	—	—
EN AW-8079 [Al Fe1Si]	80 to 139	—	—	—	—	—	—	—	—	135	150	1	155	175	1
	140 to 200	—	—	—	—	—	—	—	—	135	150	2	155	175	2

Annex A (normative)

Rules for rounding

The results of the mechanical tests shall be rounded off using the following rules, recognizing the number of significant figures required by the standard:

a) When the figure immediately after the last figure to be retained is less than 5, the last figure to be retained remains unchanged.

b) When the figure immediately after the last figure to be retained is greater than 5, or equal to 5 and followed by at least one figure other than zero, the last figure to be retained is increased by 1.

c) When the figure immediately after the last figure to be retained is equal to 5 and followed by zeros only, the last figure to be retained remains unchanged if it is even and increased by 1 if it is odd.

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