BRITISH STANDARD

BS EN
546-2:2006

Aluminium and aluminium alloys — Foil —

Part 2: Mechanical properties

The European Standard EN 546-2:2006 has the status of a British Standard

ICS 77.150.10

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National foreword

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A list of organizations represented on NFE/35 can be obtained on request to its secretary.

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Foreword

This document (EN 546-2:2006) 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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

This document supersedes EN 546-2:1996.

Within its programme of work, Technical Committee CEN/TC 132 entrusted CEN/TC 132/WG 6 "Foil and finstock" to revise EN 546-2:1996.

The following modifications have been made:

— Clause 4: Table 1 and Table 2 amended. Alloy EN AW-8021B added in Table 1.

EN 546 comprises the following parts under the general title "*Aluminium and aluminium alloys - Foil":*

— *Part 1: Technical conditions for inspection and delivery*

— *Part 2: Mechanical properties*

— *Part 3: Tolerances on dimensions*

— *Part 4: Special property requirements*

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1 Scope

This document specifies the mechanical properties of wrought aluminium and aluminium alloy foil.

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

The designations of aluminium and aluminium alloys and the temper designations used in this standard are specified in EN 573-3 and the temper designation are defined EN 515.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

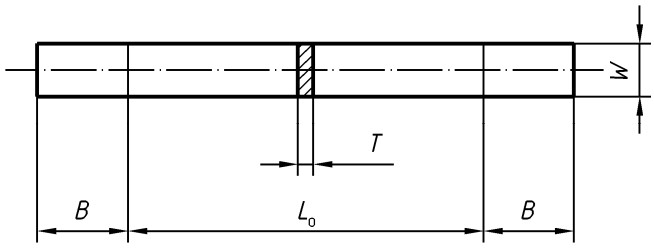
EN 546-1, *Aluminium and aluminium alloys — Foil — Part 1: Technical conditions for inspection and delivery*

3 Tensile testing

The selection and number of specimens and test pieces shall be as specified in EN 546-1. Preparation of test pieces shall be carried out as follows:

— parallel sided test pieces (see Figure 1) with a width of 15 mm ± 0,1 mm and a gauge length of 50 mm ± 1 mm or 100 mm ± 1 mm shall be used. They shall be prepared using a double-bladed cutter (see Figure 2) or a precision ground sample shear of "punch and die" construction;

— the tensile test shall be carried out on suitably calibrated equipment. The test speed shall be in the range 5 % to 25 % of the gauge length per minute.



Key

L_0 = 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

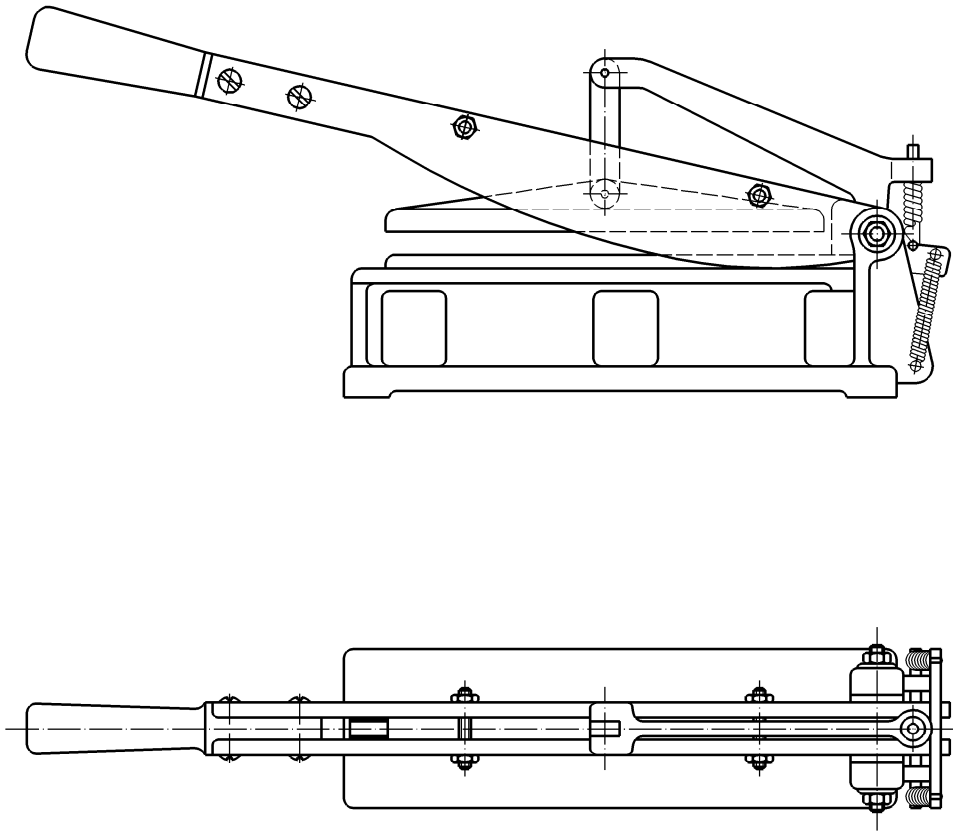


Figure 2 — Example of double-bladed cutter

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 vs-crosshead displacement diagram when available. This provision only applies to parallel-sided test pieces.

4 Mechanical properties

Mechanical properties of foil for converter/household as specified in Table 1 and for container foil as specified in Table 2. For the elongation measurement, two different gauge lengths may be used. The choice of the gauge length, either 50 mm or 100 mm, shall be at the discretion of the manufacturer 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 Annex A.

Table 1 — Longitudinal mechanical properties for converter/household foil

Material	Gauge range [a] μm		Temper			
			O			H18 [a]
			Tensile strength R_m MPa		Elongation $A_{50\ mm}$ or $A_{100\ mm}$ %	Tensile strength R_m MPa
	Over	Up to and including	min.	max.	min.	min.
EN AW-1050A [Al 99,5]	≥ 6	10	35	80	1	135
	10	25	40	85	1	135
	25	40	45	90	2	135
	40	90	50	95	4	135
	90	140	50	95	6	135
	140	200	50	95	10	135
EN AW-1200 [Al 99,0]	≥ 6	10	40	95	1	140
	10	25	45	100	1	140
	25	40	50	105	3	140
	40	90	55	105	6	140
	90	140	60	105	10	140
	140	200	60	105	14	140
EN AW-8006 [Al Fe1,5Mn]	≥ 6	10	80	135	1	190
	10	25	85	140	2	190
	25	40	85	140	6	190
	40	90	90	140	10	190
	90	140	90	140	15	190
	140	200	90	140	15	190
EN AW-8011A [Al FeSi(A)]	≥ 6	10	50	110	1	160
	10	25	55	115	1	160
	25	40	55	120	3	160
	40	90	65	130	7	160
	90	140	65	130	12	160
	140	200	65	130	16	160
EN AW-8014 [Al Fe1,5Mn0,4]	≥ 6	10	70	130	1	170
	10	25	75	135	2	170
	25	40	75	135	6	170
	40	90	80	135	10	170
	90	140	80	135	14	170
	140	200	80	135	15	170
EN AW-8021B [Al Fe1,5]	≥ 6	10	60	100	2	160
	10	25	65	105	3	160
	25	40	70	110	7	160
	40	90	75	110	12	160
	90	140	75	110	14	160
	140	200	75	110	16	160
EN AW-8079 [Al Fe1Si]	≥ 6	10	45	100	1	150
	10	25	50	105	1	150
	25	40	55	110	4	150
	40	90	60	110	8	150
	90	140	60	110	13	150
	140	200	60	110	16	150
EN AW-8111 [Al FeSi(B)]	≥ 6	10	55	105	2	160
	10	25	60	110	3	160
	25	40	70	120	11	160
	40	90	70	130	12	160
	90	140	70	130	14	160
	140	200	70	130	16	160

NOTE If no values are available, this should be agreed between supplier and purchaser.

[a] In H18 temper, maximum values for tensile strength and minimum values for elongation shall be subject to agreement between supplier and purchaser, if required. H18 can be replaced by the supplier in agreement with the purchaser into H19 temper.

Table 2 — Longitudinal mechanical properties for container foil [a]

Material	Gauge range μm		Temper														
			O			H22			H24			H26			H18		
			Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %	Tensile strength R_m MPa		Elongation A_{50mm} or A_{100mm} %
	Over	Up to and including	min.	max.	min.	min.	max.	min.	min.	max.	min.	min.	max.	min.	min.	max.	min.
EN AW-1200 [Al 99,0]	≥ 35	40	50	105	3	90	135	2	110	155	2	125	180	1	140	200	1
	40	90	55	105	6	90	135	4	110	155	3	125	180	1	140	200	1
	90	140	60	105	10	90	135	6	110	155	4	125	180	2	140	200	1
	140	200	60	105	14	90	135	7	110	155	5	125	180	2	140	200	1
EN AW-3003 [Al Mn1Cu]	≥ 35	40	85	135	5	120	160	5	145	185	6	150	190	2	190	230	1
	40	90	85	135	6	120	160	6	145	185	7	150	190	3	190	230	1
	90	140	85	135	10	120	160	8	145	185	8	150	190	4	190	230	1
	140	200	85	135	13	120	160	9	145	185	9	150	190	4	190	230	1
EN AW-3005 [Al Mn1Mg0,5]	≥ 35	40	125	165	8	-	-	-	180	225	3	-	-	-	-	-	-
	40	90	125	165	9	-	-	-	180	225	3	-	-	-	-	-	-
	90	140	125	165	10	-	-	-	180	225	3	-	-	-	-	-	-
	140	200	125	165	10	-	-	-	180	225	4	-	-	-	-	-	-
EN AW-3103 [Al Mn1]	≥ 35	40	80	130	7	115	155	5	140	180	6	150	190	2	185	230	1
	40	90	80	130	8	115	155	6	140	180	7	150	190	3	185	230	1
	90	140	80	130	12	115	155	8	140	180	8	150	190	4	185	230	1
	140	200	80	130	15	115	155	9	140	180	9	150	190	4	185	230	1
EN AW-8006 [Al Fe1,5Mn]	≥ 35	40	85	140	6	-	-	-	110	170	3	-	-	-	-	-	-
	40	90	90	140	10	-	-	-	110	170	4	-	-	-	-	-	-
	90	140	90	140	14	-	-	-	110	170	5	-	-	-	-	-	-
	140	200	90	140	15	-	-	-	110	170	7	-	-	-	-	-	-
EN AW-8008 [Al Fe1Mn0,8]	≥ 35	40	80	140	8	120	155	5	140	175	3	150	190	2	180	250	1
	40	90	80	140	10	120	155	8	140	175	5	150	190	4	180	250	1
	90	140	80	140	14	120	155	12	140	175	8	150	190	6	180	250	1
	140	200	80	140	15	120	155	13	140	175	10	150	190	8	180	250	1
EN AW-8011A [Al FeSi(A)]	≥ 35	40	55	120	4	90	150	2	110	165	2	140	185	1	160	220	1
	40	90	65	130	7	90	150	4	110	165	3	140	185	2	160	220	1
	90	140	65	130	12	90	150	5	110	165	4	140	185	2	160	220	1
	140	200	65	130	16	90	150	6	110	165	5	140	185	3	160	220	1

[a] Single rolled (35 μm to 200 μm).

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 one;

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 even and is increased by one if odd.

Bibliography

EN 515, *Aluminium and aluminium alloys — Wrought products — Temper designations*.

EN 573-3, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition*.

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