79

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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Wrought aluminium and aluminium alloys sheets, strips and plates —

Part 2:
Mechanical properties

Tôles, bandes et tôles épaisses en aluminium et alliages d'aluminium corroyés —

Partie 2: Caractéristiques mécaniques

Reference number
ISO 6361-2 : 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6361-2 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys.*

It cancels and replaces Technical Report ISO/TR 2136 : 1977, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Wrought aluminium and aluminium alloys sheets, strips and plates —

Part 2:
Mechanical properties

1 Scope and field of application

In conjunction with ISO 6361-1, this part of ISO 6361 specifies the mechanical properties of wrought aluminium and aluminium alloys sheets, strips and plates for general engineering applications.

It applies to flat rolled products.

The chemical composition of these materials is given in ISO 209-1.

The designations of aluminium and aluminium alloys and the temper designations used in this International Standard are in accordance with ISO 2092 and ISO 2107, respectively.

2 References

ISO 209-1, *Wrought aluminium and aluminium alloys — Chemical composition and forms of products — Part 1: Chemical composition.* [1)]

ISO 2092, *Light metals and their alloys — Code of designation based on chemical symbols.* [2)]

ISO 2107, *Aluminium, magnesium and their alloys — Temper designations.*

ISO 3134-3, *Light metals and their alloys — Terms and definitions — Part 3: Wrought products.*

ISO 6361-1, *Wrought aluminium and aluminium alloys sheets, strips and plates — Part 1: Technical conditions for inspection and delivery.*

3 Definitions

For definitions of the terms *sheet*, *strip* and *plate*, see ISO 3134-3.

NOTE — In certain countries, for purposes of mechanical properties, the thickness limit may be lowered to 0,15 mm by agreement between the purchaser and the supplier, in the case of sheets and strips.

4 Tensile testing

For the selection of the specimens and tensile testing, see ISO 6361-1.

5 Mechanical properties

Values for mechanical properties of aluminium and aluminium alloys are given in tables 1 to 11. For elongation two different gauge lengths are used. The choice of the gauge length for elongation measurements A or A_{50mm} shall be at the discretion of the producer, unless otherwise agreed [3)].

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

1) At present at the stage of draft. (Partial revision of ISO/R 209 : 1971, ISO 2779 : 1973 and ISO 3335 : 1977.)

2) Under revision.

3) A: Percentage elongation on a gauge length of $5{,}65\sqrt{S_o}$.

A_{50mm}: percentage elongation on a gauge length of 50 mm.

5.1 Table 1 — Al 99,5 (1050 A)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min.[2] N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1]	65 to 95	20	35	See table 1a)
	H1D	0,35	5,0[1]	100 to 140	80	6	
	H2D	0,35	5,0[1]	100 to 140	75	8	
	HH	0,35	3,0	140 min.	120	4	
Plate	O	6,0	25	65 to 95	20	35	30

Table 1a) — Minimum elongation A_{50mm}, in per cent

Thickness mm		A_{50mm} min.		
over	up to and including	Temper O	Temper H1D	Temper HH
0,35	0,8	22	4	3
0,8	1,3	25	5	3
1,3	2,6	30	6	4
2,6	3,0	32	6	4
3,0	6,0	32	8	—

5.2 Table 2 — Al 99,0 (1200)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min.[2] N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1]	75 to 105	25	35	See table 2a)
	H1D	0,35	5,0[1]	110 to 150	95	6	
	H2D	0,35	5,0[1]	110 to 150	90	8	
	HH	0,35	3,0	150 min.	130	4	

Table 2a) — Minimum elongation A_{50mm}, in per cent

Thickness mm		A_{50mm} min.		
over	up to and including	Temper O	Temper H1D	Temper HH
0,35	0,60	17	2	1
0,60	1,20	22	3	2
1,20	3,0	30	5	4
3,0	6,0	30	5	—

1) Maximum thickness of strips: 3 mm.

2) Minimum values guaranteed only on special agreement.

5.3 Table 3 — Al 99,0Cu (1100)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min.[2] N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1]	75 to 105	25	35	See table 3a)
	H1D	0,35	5,0[1]	110 to 145	95	6	
	HH	0,35	3,0	150 min.	130	3	

Table 3a) — Minimum elongation A_{50mm}, in per cent

Thickness mm		A_{50mm} min.		
		Temper		
over	up to and including	O	H1D	HH
0,35	0,60	17	2	1
0,60	1,20	22	3	2
1,20	3,0	30	5	4
3,0	6,0	30	5	—

5.4 Table 4 — Al Mn1 (3103)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min.[2] N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1]	95 to 130	35	28	—
	H1D	0,35	5,0[1]	140 to 180	115	5	—
	H2D	0,35	5,0[1]	140 to 180	110	8	—
	HH	0,35	3,0	185 min.	165	3	—

1) Maximum thickness of strips: 3 mm.

2) Minimum values guaranteed only on special agreement.

5.5 Table 5 — Al Mn1Cu (3003)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min.[2] N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1]	95 to 130	35	28	See table 5a)
	H1D	0,35	5,0[1]	140 to 180	115	5	
	HH	0,35	3,0	180 min.	165	3	

Table 5a) — Minimum elongation A_{50mm}, in per cent

Thickness mm		A_{50mm} min.		
over	up to and including	Temper O	H1D	HH
0,35	0,60	20	2	1
0,60	1,20	22	3	2
1,20	3,0	25	5	4
3,0	6,0	25	5	—

5.6 Table 6 — Al Mg1(B) (5005)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min.[2] N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1]	105 to 145	35	24	See table 6a)
	H3D	0,35	5,0[1]	140 to 180	105	5	
	H3H	0,35	3,0	180 min.	165	3	

Table 6a) — Minimum elongation A_{50mm}, in per cent

Thickness mm		A_{50mm} min.		
over	up to and including	Temper O	H3D	H3H
0,35	0,60	16	3	2
0,60	1,20	19	4	3
1,20	3,0	21	5	4
3,0	6,0	21	5	—

1) Maximum thickness of strips: 3 mm.

2) Minimum values guaranteed only on special agreement.

5.7 Table 7 — Al Mg2,5 (5052)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min. N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1)]	170 to 215	65	20	See table 7a)
	H3D	0,35	6,0[1)]	235 to 285	180	5	
	H3H	0,35	3,0	270 min.	220	3	
Plate	O	6,0	25	170 to 215	65	16	18

Table 7a) — Minimum elongation A_{50mm}, in per cent

Thickness mm		A_{50mm} min.		
over	up to and including	Temper O	Temper H3D	Temper H3H
0,35	0,60	15	3	3
0,60	1,20	17	4	4
1,20	6,0	19	6	4

5.8 Table 8 — Al Mg3 (5754)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min. N/mm²	A %	A_{50mm} %
Sheet, strip	O	0,35	6,0[1)]	190 to 240	80	20	—
	H3D	0,35	5,0[1)]	240 to 280	190	5	—
	H2D	0,35	5,0[1)]	240 to 280	160	10	—
	H3H	0,35	3,0	290 min.	250	3	—

5.9 Table 9 — Al Mg3Mn (5454)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ min. N/mm²	A %	A_{50mm} %
Sheet, strip	O	1,6	6,0[1)]	215 to 285	85	16	16
	M	3,0	6,0[1)]	215 min.	100	16	—
Plate	O	6,0	25	215 to 285	85	16	18
	M	6,0	25	215 min.	100	16	14

1) Maximum thickness of strips: 3 mm.

5.10 Table 10 — Al Mg4,5Mn0,7 (5083)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m N/mm²	$R_{p0,2}$ N/mm²	A %	A_{50mm} %
Sheet, strip	O	1,20	6,0[1]	275 to 350	125 to 200[2]	17	See table 10a)
	H3B	1,20	6,0[1]	310 to 380	235 to 305[2]	10	
	H3D	1,20	6,0[1]	345 to 405	270 to 340[2]	6	
Plate	O	6,0	50	270 to 345	115 to 200[2]	14	
	M	6,0	12,5	275 min.	125 min.	12	
	M	12,5	25	275 min.	125 min.	10	

Table 10a) — Minimum elongation A_{50mm}, in per cent

Thickness mm		A_{50mm} min.			
over	up to and including	Temper M	O	H3B	H3D
1,2	3,0	—	16	8	6
3,0	6,0	—	16	10	8
6,0	12,5	12	16	—	—

5.11 Table 11 — Al Si1MgMn (6082)

Product	Temper	Thickness e mm		Tensile strength	0,2 % proof stress	Elongation min.	
		over	up to and including	R_m min. N/mm²	$R_{p0,2}$ min. N/mm²	A %	A_{50mm} %
Sheet, plate	TF	0,35	10	310	260	10	8

1) Maximum thickness of strips: 3 mm.

2) Minimum values guaranteed only on special agreement.

Annex

Rules for rounding

(This annex forms an integral part of the Standard.)

A.1 Rounding of results obtained by inspection and testing

A.1.1 Mechanical and chemical properties

The results of mechanical and chemical tests shall be rounded using either the rules specified in the International Standard specifying the method of test or, if the value obtained contains a larger number of significant figures than the guaranteed value, the generally accepted rules for rounding.

A.1.2 Dimensional characteristics

The results of determinations of dimensions (length, width, thickness, rounding, etc.) and shape (squaring, cambering, straightness, flatness, kinking, circularity, etc.) are not rounded. These shall comply with the specification in the relevant International Standard, taking into account permissible tolerances also given in that International Standard.

A.2 Rounding for determination of compliance

In recording test results, the number representing the result of a test to determine a given property or to determine chemical composition should be expressed to the same number of decimal places as the corresponding number in the relevant International Standard.

The following rules should be used for rounding:

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.