INTERNATIONAL STANDARD

ISO 6363-2

Third edition
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Wrought aluminium and aluminium alloys — Cold-drawn rods/bars, tubes and wires —

Part 2: Mechanical properties

Aluminium et alliages d'aluminium corroyés — Barres, tubes et fils étirés à froid —

Partie 2: Caractéristiques mécaniques

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 6, *Wrought aluminium and aluminium alloys*.

This third edition cancels and replaces the second edition (ISO 6363-2:2012), which has been technically revised. The main changes are as follows:

— in Clause 5, ISO 6362-7 and ISO 2107 have been added as references for the alloys and tempers listed in this document;

— in Clause 5, alloys 2033 and 6026 have been added in Table 1;

— errors have been corrected and expressions modified throughout.

A list of all parts in the ISO 6363 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Wrought aluminium and aluminium alloys — Cold-drawn rods/bars, tubes and wires —

Part 2: Mechanical properties

1 Scope

This document specifies the mechanical properties of wrought aluminium and aluminium alloy rods/bars, tubes and wires for general engineering applications (except aeronautical rivets).

It is applicable to products which are extruded and then cold drawn.

It does not apply to:

— products which are rolled and then cold drawn, including seam-welded tubes;

— forging stock, wire for drawing stock;

— drawn wires for aeronautical application, electrical or welding purposes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 6363-1, *Wrought aluminium and aluminium alloys — Cold-drawn rods/bars, tubes and wires — Part 1: Technical conditions for inspection and delivery*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ASTM B557M, *Standard Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6363-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Tensile testing

The selection of the specimens and tensile testing shall be in accordance with ISO 6892-1 or ASTM B557M.

5 Mechanical properties

Values for mechanical properties of aluminium and aluminium alloys are given in Tables 1 and 2.

For elongation, two different gauge lengths are used. The choice of the gauge length for elongation measurements (A or A_{50mm}) is at the discretion of the producer, unless otherwise agreed.

NOTE A is the percentage elongation on a gauge length of $5{,}65\sqrt{S_o}$. A_{50mm} is the percentage elongation on a gauge length of 50 mm.

Alloys mentioned in this document are listed in ISO 6362-7.

Temper designations used in this document are in accordance with ISO 2107. Test results shall be rounded in accordance with the rules given in Annex A.

A list of tempers used in Tables 1 and 2 is given in Annex B.

Table 1 — Mechanical properties of rods/bars and wires

Alloy	Temper	Dimensions[a]	Tensile strength R_m MPa		0,2 % proof stress $R_{p0,2}$ MPa		Elongation min.	
			min.	max.	min.	max.	A %	A_{50mm} %
1050	O	D or $S \leq 3$	60	100	—	—	—	—
		$3 < D$ or $S \leq 100$	60	100	20	—	—	25
	H14	D or $S \leq 10$	95	—	—	—	—	—
	H18	D or $S \leq 10$	125	—	—	—	—	—
1050A	O	D or $S \leq 30$	60	—	20	—	25	—
	H14	D or $S \leq 30$	100	—	70	—	6	5
	H16	$D \leq 15$ or $S \leq 5$	120	160	105	—	4	3
	H18	D or $S \leq 10$	130	—	110	—	3	—
1070	O	D or $S \leq 3$	55	95	—	—	—	—
		$3 < D$ or $S \leq 100$	55	95	15	—	—	25
	H14	D or $S \leq 10$	85	—	—	—	—	—
	H18	D or $S \leq 10$	120	—	—	—	—	—
1080A	O	$D \leq 20$	—	80	—	—	—	—
	H14	$D \leq 18$	90	—	—	—	—	—
	H18	$D \leq 10$	120	—	—	—	—	—
1098	O	$D \leq 20$	—	70	—	—	—	—
	H14	$D \leq 18$	85	—	—	—	—	—
	H18	$D \leq 10$	115	—	—	—	—	—
1100	O	D or $S \leq 3$	75	110	—	—	—	—
		$3 < D$ or $S \leq 100$	75	110	20	—	22	25
	H14	D or $S \leq 30$	110	—	80[b]	—	5	—
	H18	D or $S \leq 10$	150	—	130[b]	—	3	—
1200	O	D or $S \leq 3$	75	110	—	—	—	—
		$3 < D$ or $S \leq 30$	75	110	30	—	20	25
		$30 < D$ or $S \leq 100$	75	110	20	—	—	25
	H14	D or $S \leq 30$	110	—	80	—	5	—
	H16	$D \leq 15$ or $S \leq 5$	135	170	115		3	3

Table 1 *(continued)*

Alloy	Temper	Dimensions[a]	Tensile strength R_m MPa		0,2 % proof stress $R_{p0,2}$ MPa		Elongation min.	
			min.	max.	min.	max.	A %	A_{50mm} %
2007	T3	D or $S \leq 30$	370	—	240	—	7	5
		$30 < D$ or $S \leq 80$	340	—	220	—	6	—
	T351	D or $S \leq 80$	370	—	240	—	5	3
2011	T3[g]	$3 < D$ or $S \leq 38$	310	—	260	—	9	10
		$38 < D$ or $S \leq 50$	295	—	235	—	10	12
		$50 < D$ or $S \leq 80$	280	—	205	—	10	14
	T8[g]	$3 \leq D$ or S ≤ 80	370	—	270	—	8	10
	H13	$D \leq 18$	155	225	—	—	—	—
	H18	$D \leq 10$	240	—	—	—	—	—
2011A	T3	D or $S \leq 40$	320	—	270	—	10	8
		$40 < D$ or $S \leq 50$	300	—	250	—	10	—
		$50 < D$ or $S \leq 80$	280	—	210	—	10	—
	T8	D or $S \leq 80$	370	—	270	—	8	6
2014	O	$3 \leq D$ or S ≤ 100	—	245	—	—	—	12
	T3	D or $S \leq 80$	380	—	290	—	8	6
	T351	D or $S \leq 80$	380	—	290	—	6	4
	T4 T42[c] T451	$3 \leq D$ or S ≤ 100	380	—	220	—	10	16
	T6 T62[d] T651	$3 \leq D$ or S ≤ 100	450	—	380	—	7	8
2014A	O H111	D or $S \leq 80$	—	240	—	125	12	10
	H13[e]	$D \leq 18$	210	280	—	—	—	—
	H18	$D \leq 10$	295	—	—	—	—	—
	T3	D or $S \leq 80$	380	—	290	—	8	6
	T351	D or $S \leq 80$	380	—	290	—	6	4
	T4 T451	D or $S \leq 100$	380	—	220	—	10	10
	T6	D or $S \leq 50$	440	—	360	—	7	8
	T651	D or $S \leq 100$	450	—	380	—	7	8
2017	O	D or $S \leq 3$	—	245	—	—	—	—
		$3 < D$ or S ≤ 100	—	245	—	—	—	16
	H13	$3 \leq D$ or S ≤ 10	205	275	—	—	—	—
	T4	D or $S \leq 3$	380	—	—	—	—	—
	T42[c]	$3 < D$ or S ≤ 100	380	—	225	—	—	12

Table 1 *(continued)*

Alloy	Temper	Dimensions[a]	Tensile strength R_m MPa		0,2 % proof stress $R_{p0,2}$ MPa		Elongation min.	
			min.	max.	min.	max.	A %	A_{50mm} %
2017A	O H111	D or $S \leq 80$	—	240	—	125	12	10
	H13[e]	$D \leq 18$	210	300	—	—	—	—
	H18	$D \leq 10$	315	—	—	—	—	—
	T3[g]	D or $S \leq 80$	400	—	250	—	10	8
	T351[g]	D or $S \leq 80$	400	—	250	—	8	6
	T4	D or $S \leq 50$	380	—	220	—	10	—
	T451	$50 < D$ or $S \leq 100$	390	—	235	—	10	—
2117	H13[e]	D or $S \leq 18$	170	240	—	—	—	—
	H15	$3 < D$ or $S \leq 10$	195	245	—	—	—	—
	H18	$D \leq 18$	260	—	—	—	—	—
	T4	$3 < D$ or $S \leq 10$	265	—	125	—	—	18
2024	O[f]	D or $S \leq 3$	—	245	—	—	—	—
	H111	$3 < D$ or $S \leq 100$	—	245	—	—	—	16
	H13[e]	$D \leq 18$	230	300	—	—	—	—
	H18	$D \leq 10$	320	—	—	—	—	—
	T3	D or $S \leq 10$	425	—	310	—	10	8
		$10 < D$ or $S \leq 80$	425	—	290	—	9	7
	T351	$12,5 < D$ or $S \leq 100$	425	—	310	—	9	—
	T4	D or $S \leq 3$	425	—	—	—	—	—
	T451	$3 < D$ or $S \leq 12$	425	—	310	—	10	10
		$12 < D$ or $S \leq 100$	425	—	290	—	9	10
	T42[c]	D or $S \leq 3$	430	—	—	—	—	—
		$3 < D$ or $S \leq 100$	430	—	275	—	—	10
	T6	D or $S \leq 80$	425	—	315	—	5	4
	T651	D or $S \leq 80$	425	—	315	—	4	3
	T62[d]	D or $S \leq 3$	410	—	—	—	—	—
		$3 < D$ or $S \leq 100$	410	—	315	—	—	5
	T8	D or $S \leq 80$	455	—	400	—	4	3
	T851	D or $S \leq 80$	455	—	400	—	3	2
2030	T3	D or $S \leq 50$	370	—	250	—	7	—
		$50 < D$ or $S \leq 100$	340	—	210	—	7	—
	T351	D or $S \leq 80$	370	—	240	—	5	3
2033	T3	D or $S \leq 30$	370	—	240	—	7	—
		$30 < D$ or $S \leq 80$	340	—	220	—	7	—
	T351	D or $S \leq 80$	370	—	240	—	5	—
	T8	D or $S \leq 80$	370	—	270	—	8	—
2219	T851	$10 < D$ or $S \leq 50$	400	—	275	—	3	—
		$50 < D$ or $S \leq 100$	395	—	270	—	3	—

Table 1 *(continued)*

Alloy	Temper	Dimensions[a]	Tensile strength R_m MPa		0,2 % proof stress $R_{p0,2}$ MPa		Elongation min.	
			min.	max.	min.	max.	A %	A_{50mm} %
3003	O	D or $S \leq 3$	95	125	—	—	—	—
		$3 < D$ or $S \leq 100$	95	125	35	—	22	25
	H12	D or $S \leq 10$	115	—	80[b]	—	7[b]	—
	H14	D or $S \leq 10$	135	—	110[b]	—	6[b]	—
	H16	$D \leq 15$ or $S \leq 5$	160	—	130[b]	—	3[b]	—
	H18	D or $S \leq 10$	180	—	145[b]	—	2[b]	—
3103	O	D or $S \leq 50$	95	—	35	—	22	19
	H14	D or $S \leq 30$	130	—	90	—	6	4
	H16	$D \leq 15$ or $S \leq 5$	160	195	130	—	4	3
	H18	D or $S \leq 10$	160	—	130	—	4	3
5005	O H111	$D \leq 80$ or $S \leq 60$	100	145	40	—	18	16
	H14	$D \leq 40$ or $S \leq 10$	140	—	110	—	6	4
	H18	$D \leq 15$ or $S \leq 2$	185	—	155	—	4	2
5005A	O H111	$D \leq 80$ or $S \leq 60$	100	145	40	—	18	16
	H14	$D \leq 40$ or $S \leq 10$	140	—	110	—	6	4
	H18	$D \leq 15$ or $S \leq 2$	185	—	155	—	4	2
5019	O H111	$D \leq 80$ or $S \leq 60$	250	320	110	—	16	14
	H12 H22 H32	$D \leq 40$ or $S \leq 25$	270	350	180	—	8	7
	H14 H24 H34	$D \leq 25$ or $S \leq 10$	300	—	210	—	4	3
5041	O	D or $S \leq 25$	225	—	—	—	—	20
5050	O	D or $S \leq 10$	125	180	—	—	25	22
	H32	D or $S \leq 10$	150	—	—	—	—	—
	H34	D or $S \leq 10$	170	—	—	—	—	—
	H36	D or $S \leq 10$	185	—	—	—	—	—
	H38	D or $S \leq 10$	200	—	—	—	—	—
5051A	O	$D \leq 20$	—	195	—	—	—	—
	H12	$D \leq 18$	170	220	—	—	—	—
	H14	$D \leq 18$	195	245	—	—	—	—
	H18	$D \leq 10$	245	—	—	—	—	—

Table 1 *(continued)*

Alloy	Temper	Dimensions[a]	Tensile strength R_m MPa		0,2 % proof stress $R_{p0,2}$ MPa		Elongation min.	
			min.	max.	min.	max.	A %	A_{50mm} %
5052	O	D or S ≤ 3	170	220	—	—	—	—
	H111	3 < D or S ≤ 100	170	220	65	—	22	25
	H32	3 < D or S ≤ 10	215	255	—	—	—	—
	H14	D or S ≤ 3	235	—	—	—	—	—
		3 < D or S ≤ 30	235	—	180	—	5	—
	H34	D or S ≤ 3	235	—	—	—	—	—
		3 < D or S ≤ 30	235	—	180	—	6[b]	—
	H16 H26 H36	D or S ≤ 15	250	290	200	—	3	3
	H18	D or S ≤ 10	270	—	220	—	2	—
	H38	D or S ≤ 10	270	—	220[b]	—	2[b]	—
5056	O	D or S ≤ 3	—	315	—	—	—	—
		3 < D or S ≤ 100	250	320	110	—	16	20
	H12 H32	D or S ≤ 10	300	—	—	—	—	—
	H34	D or S ≤ 10	345	—	—	—	—	—
	H38	D or S ≤ 10	380	—	—	—	—	—
5083	O	D or S ≤ 3	275	355	—	—	—	—
		3 < D or S ≤ 100	275	355	110	—	14	14
	H111	D or S ≤ 50	270	—	140	—	12	—
	H12	D or S ≤ 30	300	—	200	—	4	—
5086	O	D or S ≤ 50	240	—	95	—	16	—
	H12	D or S ≤ 25	270	—	190	—	4	—
	H32	D or S ≤ 25	270	—	190	—	5	—
5154	O	D or S ≤ 10	205	285	75	—	20	16
	H32	D or S ≤ 10	250	—	—	—	—	—
	H34	D or S ≤ 10	270	—	—	—	—	—
	H36	D or S ≤ 10	290	—	—	—	—	—
	H38	D or S ≤ 10	310	—	—	—	—	—
5251	O H111	D ≤ 80 or S ≤ 60	150	200	60	—	17	15
	H14 H24 H34	D ≤ 30 or S ≤ 5	200	240	160	—	5	4
	H18 H28 H38	D ≤ 20 or S ≤ 3	240	—	200	—	2	2

Table 1 *(continued)*

Alloy	Temper	Dimensions[a]	Tensile strength R_m MPa		0,2 % proof stress $R_{p0,2}$ MPa		Elongation min.	
			min.	max.	min.	max.	A %	A_{50mm} %
5754	O	D or $S \leq 50$	180	—	80	—	16	—
	H14	D or $S \leq 30$	250	—	180	—	4	—
	H34	D or $S \leq 30$	250	—	180	—	5	—
	H18	D or $S \leq 10$	280	—	240	—	2	—
	H38	D or $S \leq 10$	280	—	240	—	3	—
6012	T4[g]	D or $S \leq 80$	200	—	100	—	10	8
	T6[g]	D or $S \leq 80$	310	—	260	—	8	6
6026	T6	D or $S \leq 80$	370	—	300	—	8	—
	T8	D or $S \leq 80$	345	—	315	—	4	—
	T9	D or $S \leq 80$	360	—	330	—	4	—
6056	H13[d]	$D \leq 18$	160	240	—	—	—	—
	H18	$D \leq 10$	240	—	—	—	—	—
	T39[i]	$D < 6$	400	—	—	—	—	—
	T39[i]	$D \geq 6$	360	—	—	—	—	—
	T4	$D \leq 20$	300	380	—	—	—	—
	T6	$D \leq 20$	400	—	—	—	—	—
	T89[i]	$D < 6$	420	—	—	—	—	—
6060	T39[g,i]	$D \geq 6$	220	—	—	—	—	—
	T39[i]	$D < 6$	270	—	—	—	—	—
	T4[g]	D or $S \leq 80$	130	—	65	—	15	13
	T6[g]	D or $S \leq 80$	215	—	160	—	12	10
	T89[g,i]	$D < 6$	260	—	—	—	—	—
6061	O[f]	D or $S \leq 3$	145	—	—	—	—	—
		$3 < D$ or $S \leq 100$	145	—	—	—	—	18
	H13[h]	$3 \leq D$ or $S \leq 10$	155	205	—	—	—	—
	H18	$D \leq 10$	210	—	—	—	—	—
	T39[g]	$D < 6$	310	—	—	—	—	—
		$6 \leq D$	260	—	—	—	—	—
	T4	D or $S \leq 3$	205	—	—	—	—	—
		$3 < D$ or $S \leq 100$	205	—	110	—	16	18
	T42[c]	D or $S \leq 3$	205	—	—	—	—	—
		$3 < D$ or $S \leq 100$	205	—	95	—	—	18
	T6	D or $S \leq 3$	290	—	—	—	—	—
	T62[d]	$3 < D$ or $S \leq 100$	290	—	240	—	9	10
	T89[g,i]	$D < 6$	300	—	—	—	—	—
6063	T39[i]	$D \geq 6$	230	—	—	—	—	—
	T39[g,i]	$D < 6$	280	—	—	—	—	—
	T4[g]	D or $S \leq 80$	150	—	75	—	15	13
	T6[g]	D or $S \leq 80$	220	—	190	—	10	8
	T66[g]	D or $S \leq 80$	230	—	195	—	10	8
	T89[g,i]	$D < 6$	270	—	—	—	—	—

