BS ISO 6362-2:2014

BSI Standards Publication

Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles

Part 2: Mechanical properties

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National foreword

This British Standard is the UK implementation of ISO 6362-2:2014.

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A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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ISO 6362-2

Fourth edition
2014-09-15

Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles —

Part 2: Mechanical properties

Aluminium et alliages d'aluminium corroyés — Barres, tubes et profilés filés —

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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 6, *Wrought aluminium and aluminium alloys*.

This fourth edition cancels and replaces the third edition (ISO 6362-2:2012), which has been technically revised.

ISO 6362 consists of the following parts, under the general title *Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles*:

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

— *Part 2: Mechanical properties*

— *Part 3: Extruded rectangular bars — Tolerances on shape and dimensions*

— *Part 4: Profiles — Tolerances on shape and dimensions*

— *Part 5: Round, square and hexagonal bars — Tolerances on shape and dimensions*

— *Part 6: Round, square, rectangular and hexagonal tubes — Tolerances on shape and dimensions*

— *Part 7: Chemical composition*

INTERNATIONAL STANDARD ISO 6362-2:2014(E)

Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles —

Part 2: Mechanical properties

1 Scope

This part of ISO 6362 specifies the mechanical properties of wrought aluminium and aluminium alloy extruded rods/bars, tubes, and profiles for general engineering applications.

It applies to extruded products.

2 Normative references

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

ISO 6362-1, *Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles — 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 6362-1 apply.

4 Tensile testing

For the selection of the specimens and tensile testing, see ISO 6892-1 or ASTM B557M.

5 Mechanical properties

Values for mechanical properties of aluminium and aluminium alloys are given in Tables 1 to 3.

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.

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

Table 1 — Mechanical properties of rods/bars

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} %
1070	H112	All	55	—	15	—	—	-
1070A	H112	All	60	—	20	—	25	23
1060	H112	$3 \le D$ or $S \le 30$	60	—	30	—	—	25
1050	H112	All	65	—	20	—	—	—
1050A	H112	$D < 35$ or $S < 30$	65	—	20	—	25	23
	O H111	All	60	95	20	—	25	23
1350[b]	H112	All	60	—	—	—	25	23
1100	H112	$D < 35$ or $S < 30$	75	—	20	—	18	18
		$35 \le D$ or $30 \le S$	75	—	20	—	—	—
1200	H112	$D < 35$ or $S < 30$	75	—	25	—	20	18
		$35 \le D$ or $30 \le S$	75		20	—	—	—
2007	T4 T4510 T4511	D or $S \le 80$	370	—	250	—	8	6
		$80 < D$ or $S \le 200$	340	—	220	—	8	—
		$200 < D$ or $S \le 250$	330	—	210	—	7	—
2011	T3	$3 \le D$ or $S \le 40$	310	—	260	—	10	10
		$40 < D$ or $S \le 50$	295	—	235	—	10	12
		$50 < D$ or $S \le 75$	290	—	205	—	10	14
	T4	$3 \le D$ or $S \le 200$	275	—	125	—	14	16
	T6	$3 < D$ or $S \le 75$	310	—	230	—	8	10
		$75 < D$ or $S \le 160$	295	—	195	—	6	8
	T8	$3 \le D$ or $S \le 75$	370	—	275	—	10	10
2011A	T4	$D \le 200, S \le 60$	275	—	125	—	14	12
	T6	$D \le 75, S \le 60$	310	—	230	—	8	6
		$75 < D \le 200$	295	—	195	—	6	—
2014	O[c]	All	—	250	—	135	10	12
	T4 T4510 T4511	All	345	—	240	—	10	12
	T42[d]	All	345	—	205	—	—	12
	T6 T6510 T6511	D or $S \le 12$	410	—	365	—	—	7
		$12 < D$ or $S \le 19$	440	—	400	—	6	7
		$19 < D$ or $S, A \le 16\,000$	470	—	410	—	6	7
		$19 < D$ or S, $16\,000 < A \le 20\,000$	470	—	400	—	6	6
		$19 < D$ or S, $20\,000 < A \le 25\,000$	450	—	380	—	6	6
		$19 < D$ or S, $25\,000 < A \le 30\,000$	430	—	365	—	6	6
	T62[e]	D or $S \le 19$	410	—	365	—	—	7
		$19 < D$ or $S, A \le 16\,000$	410	—	365	—	—	7
		$19 < D$ or S, $16\,000 < A \le 20\,000$	410	—	365	—	—	6

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} %
2014A	O	$10 < D$ or $S \leq 200$	—	250	—	135	10	12
	T4, T4510 T4511	$10 < D$ or $S \leq 200$	345	—	240	—	10	12
	T6	$12,5 < D$ or $S \leq 100$	440	—	400	—	6	—
	T6510	$100 < D$ or $S \leq 120$	430	—	350	—	6	—
	T6511	$120 < D$ or $S \leq 200$	430	—	350	—	6	—
2017	O[c]	All		245		125	—-	16
	T4	$A \leq 70\,000$	345		215		—	12
	T42[d]	$70\,000 < A \leq 100\,000$	345		195		—	12
2017A	O	$10 < D$ or $S \leq 100$	—	250	—	150	10	—
	T4 T4510	$10 < D$ or $S \leq 80$	390	—	265	—	10	—
	T4511	$80 < D$ or $S \leq 200$	360	—	220	—	7	—
2024	O[c]	All	—	245	—	125	10	12
	T3510 T3511	D or $S \leq 6$	390	—	295	—	—	12
		$6 < D$ or $S \leq 19$	410	—	300	—	10	12
		$19 < D$ or $S \leq 38$	450	—	310	—	8	10
		$38 < D$ or $S, A \leq 16\,000$	480	—	365	—	7	10
		$38 < D$ or $S, 16\,000 < A \leq 20\,000$	470	—	335	—	7	8
	T3 T4	D or $S \leq 6$	390	—	295	—	—	12
		$6 < D$ or $S \leq 19$	410	—	305	—	—	12
		$19 < D$ or $S \leq 38$	450	—	315	—	—	10
		$38 < D$ or $S \leq 100, A \leq 16\,000$	480	—	365	—	8	10
		$38 < D$ or $S \leq 100, 16\,000 < A \leq 20\,000$	470	—	335	—	8	8
		$38 < D$ or $S \leq 100, 20\,000 < A \leq 30\,000$	460	—	315	—	8	8
		$100 < D$ or $S \leq 200, A \leq 16\,000$	480	—	365	—	6	10
		$100 < D$ or $S \leq 200, 16\,000 < A \leq 20\,000$	470	—	335	—	6	8
		$100 < D$ or $S \leq 200, 20\,000 < A \leq 30\,000$	460	—	315	—	6	8
	T42[d]	D or $S \leq 19$	390	—	265	—	—	12
		$19 < D$ or $S \leq 38$	390	—	265	—	—	10
		$38 < D$ or $S, A \leq 16\,000$	390	—	265	—	—	10
		$38 < D$ or $S, 16\,000 < A \leq 20\,000$	390	—	265	—	—	8
	T8510 T8511 T81	$10 < D$ or $S \leq 150$	455	—	400	—	4	—
2030	T4	D or $S \leq 80$	370	—	250	—	8	6
	T4510	$80 < D$ or $S \leq 200$	340	—	220	—	8	—
	T4511	$200 < D$ or $S \leq 250$	330	—	210	—	7	—

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} %
3102	H112	All	80	—	30	—	25	23
3003	H112	All	95	—	35	—	—	—
	O H111	All	95	135	35	—	25	20
3103	H112	All	95	—	35	—	25	20
	O H111	All	95	135	35	—	25	20
5005 5005A	H112	All	100	—	40	—	18	16
	O H111	$D \leq 80, S \leq 60$	100	150	40	—	18	16
5019	H112	D or $S \leq 200$	250	—	110	—	14	12
	O H111	D or $S \leq 200$	250	320	110	—	15	13
5049	H112	All	180	—	80	—	15	13
5051A	H112	All	150	—	50	—	16	14
	O H111	All	150	200	50	—	18	16
5251	H112	All	160	—	60	—	16	14
	O H111	All	160	220	60	—	17	15
5052	H112	All	175	—	70	—	—	—
	O	All	175	245	70	—	—	20
5154A	H112	D or $S \leq 200$	200	—	85	—	16	14
	O H111	D or $S \leq 200$	200	275	85	—	18	16
5454	H112	All	215	—	100	—	—	12
	O H111	D or $S \leq 200$	200	275	85	—	18	16
5754	H112	D or $S \leq 150$	180	—	80	—	14	12
		$150 < D$ or $S \leq 250$	180	—	70	—	13	—
	O H111	D or $S \leq 150$	180	250	80	—	17	15
5056	H112	$A \leq 30\,000$	245	—	100	—	—	—
		$30\,000 < A \leq 70\,000$	225	—	80	—	—	—
		$70\,000 < A \leq 100\,000$	215	—	70	—	—	—
5083	H112	D or $S \leq 130, A \leq 20\,000$	275	—	140	—	12	12
	O	D or $S \leq 130, A \leq 20\,000$	275	355	110	—	—	14
5086	H112	D or $S \leq 250$	240	—	95	—	12	10
	O	D or $S \leq 200$	240	320	95	—	18	15

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} %
6101	T6[f]	$3 \le D$ or $S \le 7$	195	—	165	—	—	10
		$7 < D$ or $S \le 17$	195	—	165	—	—	12
		$17 < D$ or $S \le 30$	175	—	145	—	—	14
	T7	$3 \le D$ or $S \le 17$	135	—	110	—	—	10
6101A	T6[f]	D or $S \le 150$	200	—	170	—	10	8
6101B	T6[f,g]	$S \le 15$	215	—	160	—	8	6
	T7[f,h]	$S \le 15$	170	—	120	—	12	10
6005 6005A	T6[f]	D or $S \le 25$	270	—	225	—	10	8
		$25 < D$ or $S \le 50$	270	—	225	—	8	—
		$50 < D$ or $S \le 100$	260	—	215	—	8	—
6005C	T5	D or $S \le 6$	245	—	205	—	—	8
		$6 < D$ or $S \le 12$	225	—	175	—	—	8
	T6[f]	D or $S \le 6$	265	—	235	—	—	8
6110A	T5[f]	D or $S \le 120$	380	—	360	—	10	8
	T6[f]	$D \le 120$ or $S \le 150$	410	—	380	—	10	8
6012	T6[f] T6510[f] T6511[f]	D or $S \le 150$	310	—	260	—	8	6
		$150 < D$ or $S \le 200$	260	—	200	—	8	—
6018	T6[f] T6510[f] T6511[f]	D or $S \le 150$	310	—	260	—	8	6
		$150 < D$ or $S \le 200$	260	—	200	—	8	—
6023	T6[f] T6510[f] T6511[f]	D or $S \le 150$	320	—	270	—	10	8
6351	O H111	D or $S \le 200$	—	160	—	110	14	12
	T4[f]	D or $S \le 200$	205	—	110	—	14	12
	T6[f]	D or $S \le 20$	295	—	250	—	8	6
		$20 < D$ or $S \le 75$	300	—	255	—	8	—
		$75 < D$ or $S \le 150$	310	—	260	—	8	—
		$150 < D$ or $S \le 200$	280	—	240	—	6	—
		$200 < D$ or $S \le 250$	270	—	200	—	6	—
6060	T4[f]	D or $S \le 150$	120	—	60	—	16	14
	T5	D or $S \le 150$	160	—	120	—	8	6
	T6[f]	D or $S \le 100$	190	—	150	—	10	8
	T64[f]	D or $S \le 50$	180	—	120	—	12	10
	T66[f]	D or $S \le 150$	215	—	160	—	8	6

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} %
6360	T4[f]	D or $S \leq 150$	110	—	50	—	16	14
	T5	D or $S \leq 150$	150	—	110	—	8	6
	T6[f]	D or $S \leq 150$	185	—	140	—	8	6
	T66[f]	D or $S \leq 150$	195	—	150	—	8	6
6061	O[c]	All	—	145	—	110	—	16
	T4[f] T4511	All	180	—	110	—	14	16
	T42[d]	All	175	—	85	—	—	16
	T6[f] T62[e] T6511	D or $S \leq 6$	260	—	240	—	7	8
		$6 < D$ or S	260	—	240	—	9	10
6261	O H111	D or $S \leq 100$	—	170	—	120	14	12
	T4[f]	D or $S \leq 100$	180	—	100	—	14	12
	T6[f]	D or $S \leq 20$	290	—	245	—	8	7
		$20 < D$ or $S \leq 100$	290	—	245	—	8	—
6262	T6[f]	D or $S \leq 200$	260	—	240	—	10	8
6262A	T6[f]	$D \leq 220$ or $S \leq 155$	260	—	240	—	10	8
6063	O H111	D or $S \leq 200$	—	130	—	—	18	16
	T1	D or $S \leq 12$	120	—	60	—	—	12
		$12 < D$ or $S \leq 25$	110	—	55	—	—	12
	T4[f]	D or $S \leq 150$	130	—	65	—	14	12
		$150 < D$ or $S \leq 200$	120	—	65	—	12	—
	T5	D or $S \leq 12$	150	—	110	—	7	8
		$12 < D$ or $S \leq 25$	145	—	105	—	7	8
	T6[f]	D or $S \leq 3$	205	—	170	—	—	8
		$3 < D$ or $S \leq 25$	205	—	170	—	9	10
	T66[f]	D or $S \leq 200$	245	—	200	—	10	8
6063A	O H111	D or $S \leq 200$	—	150	—	—	16	14
	T4[f]	D or $S \leq 150$	150	—	90	—	12	10
		$150 < D$ or $S \leq 200$	140	—	90	—	10	—
	T5	D or $S \leq 200$	200	—	160	—	7	5
	T6[f]	D or $S \leq 150$	230	—	190	—	7	5
		$150 < D$ or $S \leq 200$	220	—	160	—	7	—
6463	T4[f]	D or $S \leq 150$	125	—	75	—	14	12
	T5	D or $S \leq 150$	150	—	110	—	8	6
	T6[f]	D or $S \leq 150$	195	—	160	—	10	8

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} %
6065	T6[f]	$D \leq 220$ or $S \leq 155$	260	—	240	—	10	8
6081	T6[f]	D or $S \leq 250$	275	—	240	—	8	6
6082	O H111	D or $S \leq 200$	—	160	—	110	14	12
	T4[f]	$10 \leq D$ or $S \leq 80$	205	—	110	—	14	14
	T6[f]	$10 \leq D \leq 60$ or $10 \leq S \leq 50$	310	—	260	—	8	7
		$60 < D \leq 150$ or $50 < S \leq 150$	300	—	240	—	8	—
6182	T4[f]	$D \leq 220$ or $S \leq 155$	205	—	110	—	12	10
	T6[f,i]	$9 < D$ or $S \leq 100$	360	—	330	—	9	7
		$100 < D$ or $S \leq 150$	330	—	300	—	8	6
		$150 < D$ or $S \leq 220$	280	—	240	—	6	4
7003	T5	D or $S \leq 12$	285	—	245	—	—	10
		$12 < D$ or $S \leq 25$	275	—	235	—	—	10
	T6[f]	D or $S \leq 50$	350	—	290	—	10	8
		$50 < D$ or $S \leq 150$	340	—	280	—	10	8
7204	O	All	—	245	—	145	—	12
	T4[j]	All	315	—	195	—	—	11
	T6	All	335	—	275	—	—	10
7005	T6[f]	D or $S \leq 50$	350	—	290	—	10	8
		$50 < D$ or $S \leq 200$	340	—	270	—	10	—
7108	T6[f]	D or $S \leq 100$	310	—	260	—	10	8
7108A	T6[f]	D or $S \leq 200$	310	—	260	—	12	10
	T66[f]	D or $S \leq 50$	350	—	290	—	10	8
		$50 < D$ or $S \leq 200$	340	—	275	—	10	—
7020	T6[f]	D or $S \leq 50$	350	—	290	—	10	8
		$50 < D$ or $S \leq 200$	340	—	275	—	10	—
7021	T6[f]	D or $S \leq 40$	410	—	350	—	10	8
7022	T6[f] T6510[f] T6511[f]	D or $S \leq 80$	490	—	420	—	7	5
		$80 < D$ or $S \leq 200$	470	—	400	—	7	—
7049A	T6 T6510 T6511	D or $S \leq 100$	610	—	530	—	5	4
		$100 < D$ or $S \leq 125$	560	—	500	—	5	—
		$125 < D$ or $S \leq 150$	520	—	430	—	5	—
		$150 < D$ or $S \leq 180$	450	—	400	—	3	—
7050	T73511	D or $S \leq 125$, $A \leq 20\,000$	485	—	415	—	7	8
	T74511	D or $S \leq 76$	505	—	435	—	—	7
	T76510	D or $S \leq 127$	545	—	475	—	—	7

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} %
7075	O[c]	$A \leq 20\,000$	—	275	—	165	9	10
	T6, T62[e] T6510 T6511	D or $S \leq 6$	540	—	480	—	—	7
		$6 \leq D$ or $S \leq 75$	560	—	500	—	6	7
		$75 < D$ or $S \leq 110$, $A \leq 13\,000$	560	—	490	—	5	7
		$75 < D$ or $S \leq 110$, $13\,000 < A \leq 20\,000$	540	—	480	—	5	7
		$110 < D$ or $S \leq 130$, $A \leq 20\,000$	540	—	470	—	5	6
		$130 < D$ or $S \leq 150$	500	—	440	—	5	—
	T73[k]	$10 < D$ or $S \leq 25$	485	—	420	—	7	—
		$25 < D$ or $S \leq 50$	475	—	405	—	7	—
		$50 < D$ or $S \leq 70$	475	—	405	—	7	—
		$70 < D$ or $S \leq 100$	470	—	390	—	6	—
	T73510[k] T73511[k]	D or $S \leq 25$	485	—	420	—	7	5
		$25 < D$ or $S \leq 75$	475	—	405	—	7	—
		$75 < D$ or $S \leq 100$	470	—	390	—	6	—
		$100 < D$ or $S \leq 150$	440	—	360	—	6	—

[a] D (mm) = diameter for round bar.

S (mm) = width across flats for square and hexagonal bar, thickness for rectangular bar.

A (mm^2) = cross-section area.

[b] Electrical conductivity $\gamma \geq 35{,}4$ MS/m.

[c] The material of temper grade O shall be a basis for materials of temper grades T42 or T62. When requested by the purchaser, the capability to achieve T42 or T62 properties after appropriate heat treatment is demonstrated.

[d] The mechanical properties of temper grade T42 shall be applied only when the material of temper grade O has been naturally age-hardened after solution treatment by the purchaser. If the material is cold or hot worked prior to solution treatment by the purchaser, its mechanical properties can be lower than the specified values.

[e] The mechanical properties of temper grade T62 shall be applied only when the material of temper grade O has been artificially age-hardened after solution treatment by the purchaser. If the material is cold or hot worked prior to solution treatment by the purchaser, its mechanical properties can be lower than the specified values.

[f] Applicable for those after extrusion followed by controlled cooling at a rate rapid enough to hold constituents in solution.

[g] Electrical conductivity $\gamma \geq 30$ MS/m.

[h] Electrical conductivity $\gamma \geq 32$ MS/m.

[i] Properties obtained by the user, however, can be lower than those listed if the material has been formed or otherwise cold or hot worked, particularly in the annealed temper, prior to normal solution heat treatment.

[j] The mechanical properties of temper grade T4 are the values specified, based on reference values obtained by 1 month of natural ageing at room temperature (approximately 20 °C) after solution treatment.

In the case of the tensile test made before completion of 1 month of natural ageing, the tensile performance of temper grade T4 can be deemed as guaranteed if the test result of the test piece which has been artificially aged after solution treatment is confirmed to satisfy the tensile performance of temper grade T6.

[k] For materials of thickness 20 mm or above, see EN 755–1, with respect to stress corrosion cracking resistance.

Table 2 — Mechanical properties of tubes

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} %
1070	H112	All	55	—	15	—	—	—
1050	H112	All	65	—	20	—	—	—
1050A	H112	All	60	—	20	—	25	23
	O,H111	All	60	95	20	—	25	23
1350	H112	All	60	—	—	—	25	23
1100, 1200	H112	All	75	—	20	—	—	25
2007	T4 T4510 T4511	$t \leq 25$	370	—	250	—	8	6
2011, 2011A	T6	$t \leq 25$	310	—	230	—	6	4
2014	O[b]	All	—	245	—	125	—	12
	T4	All	345	—	245	—	—	12
	T42[c]	All	345	—	205	—	—	12
	T4510 T4511	$t \leq 20$	370	—	230	—	11	10
	T6	$t \leq 12$	410	—	365	—	—	7
		$12 < t \leq 19$	440	—	400	—	—	7
		$19 < t, A \leq 16\,000$	470	—	410	—	—	7
		$19 < t, 16\,000 < A \leq 20\,000$	470	—	400	—	—	6
		$19 < t, 20\,000 < A \leq 25\,000$	450	—	380	—	—	6
		$19 < t, 25\,000 < A \leq 30\,000$	430	—	365	—	—	6
	T62[d]	$t \leq 19$	410	—	365	—	—	7
		$19 < t, A \leq 16\,000$	410	—	365	—	—	7
		$19 < t, 16\,000 < A \leq 20\,000$	410	—	365	—	—	6
	T6510	$t \leq 10$	415	—	370	—	7	5
	T6511	$10 < t \leq 40$	450	—	400	—	6	4
2014A	O H111	$t \leq 20$	—	250	—	135	12	10
	T4 T4510 T4511	$t \leq 20$	370	—	230	—	11	10
	T6 T6510 T6511	$t \leq 10$	415	—	370	—	7	5
		$10 < t \leq 40$	450	—	400	—	6	4
2017	O[b]	All	—	245	—	125	—	16
	T4	$A \leq 70\,000$	345	—	215	—	—	12
	T42[c]	$70\,000 < A \leq 100\,000$	335	—	195	—	—	12

Table 2 *(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	$t \leq 20$	—	250	—	135	12	10
	T4 T4510 T4511	$t \leq 10$	380	—	260	—	12	10
		$10 < t \leq 75$	400	—	270	—	10	8
2024	O[b]	All	—	245	—	125	—	12
	T3 T3510 T3511	$t \leq 30$	420	—	290	—	8	6
	T4	$t \leq 6$	390	—	295	—	—	10
		$6 < t \leq 19$	410	—	305	—	—	10
		$19 < t \leq 38$	450	—	315	—	—	10
		$38 < t, A \leq 16\,000$	480	—	335	—	—	10
		$38 < t, 16\,000 < A \leq 20\,000$	470	—	315	—	—	8
		$38 < t, 20\,000 < A \leq 30\,000$	460	—	315	—	—	8
	T42[c]	$t \leq 19$	390	—	265	—	—	12
		$19 < t \leq 38$	390	—	265	—	—	10
		$38 < t, A \leq 16\,000$	390	—	265	—	—	10
		$38 < t, 16\,000 < A \leq 20\,000$	390	—	265	—	—	8
	T8 T8510 T8511	$t \leq 30$	455	—	380	—	5	4
2030	T4 T4510 T4511	$t \leq 25$	370	—	250	—	8	6
3102	H112	All	80	—	30	—	25	23
3003, 3203	H112	All	95	—	35	—	—	—
3103	H112	All	95	—	35	—	25	20
	O H111	All	95	135	35	—	25	20
5005, 5005A	H112	All	100	—	40	—	18	16
	O H111	$t \leq 20$	100	150	40	—	20	18
5019	H112	$t \leq 30$	250	—	110	—	14	12
	O H111	$t \leq 30$	250	320	110	—	15	13
5049	H112	All	180	—	80	—	15	13

Table 2 *(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} %
5051A	H112	All	150	—	60	—	16	14
	O H111	All	150	200	60	—	18	16
5251	H112	All	160	—	60	—	16	14
	O H111	All	160	220	60	—	17	15
5052	H112	All	175	—	70	—	—	—
	O	All	175	245	70	—	—	20
5154	H112	All	205	—	75	—	—	—
	O	All	205	285	75	—	—	—
5154A	H112	$t \leq 25$	200	—	85	—	16	14
	O H111	$t \leq 25$	200	275	85	—	18	16
5454	H112	$t \leq 130, A \leq 20\,000$	215	—	85	—	—	12
	O	$t \leq 130, A \leq 20\,000$	215	285	85	—	—	14
5754	H112	$t \leq 25$	180	—	80	—	14	12
	O H111	$t \leq 25$	180	250	80	—	17	15
5056	H112	$A \leq 30\,000$	245	—	100	—	—	—
		$30\,000 < A \leq 70\,000$	225	—	80	—	—	—
		$70\,000 < A \leq 100\,000$	215	—	70	—	—	—
5083	H112	$A \leq 20\,000$	275	—	110	—	—	12
	O	$A \leq 20\,000$	275	355	110	—	—	14
5086	H112	All	240	—	95	—	12	10
	O H111	All	240	320	95	—	18	15
6101	T6[e]	$3 \leq t \leq 12$	195	—	165	—	—	10
		$12 < t \leq 16$	175	—	145	—	—	14
6101A	T6[e]	$t \leq 25$	200	—	170	—	10	8
6101B	T6[e,f]	$t \leq 15$	215	—	160	—	8	6
	T7[e,g]	$t \leq 15$	170	—	120	—	12	10
6005, 6005A	T6[e]	$t \leq 5$	270	—	225	—	8	6
		$5 < t \leq 10$	260	—	215	—	8	6
6005C	T5	$t \leq 6$	245	—	205	—	—	8
		$6 < t \leq 12$	225	—	175	—	—	8
	T6[e]	$t \leq 6$	265	—	235	—	—	8
6008	T4	$t \leq 10$	180	—	90	—	15	13
	T6[e]	$t \leq 5$	270	—	225	—	8	6
		$5 < t \leq 10$	260	—	215	—	8	6

Table 2 *(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} %
6110A	T4[e]	$t \leq 25$	320	—	220	—	16	14
	T6[e]	$t \leq 25$	380	—	360	—	10	8
6012	T6[e] T6510[e] T6511[e]	$t \leq 30$	310	—	260	—	8	6
6014	T4[e]	$t \leq 10$	140	—	70	—	15	13
	T6[e]	$t \leq 5$	250	—	200	—	8	6
		$5 < t \leq 10$	225	—	180	—	8	6
6018	T6[e] T6510[e] T6511[e]	$t \leq 30$	310	—	260	—	8	6
6351	O H111	$t \leq 25$	—	160	—	110	14	12
	T4[e]	$t \leq 25$	205	—	110	—	14	12
	T6[e]	$t \leq 5$	290	—	250	—	8	6
		$5 < t \leq 25$	300	—	255	—	10	8
6060	T4[e]	$t \leq 15$	120	—	60	—	16	14
	T5	$t \leq 15$	160	—	120	—	8	6
	T6[e]	$t \leq 15$	190	—	150	—	8	6
	T64[e]	$t \leq 15$	180	—	120	—	12	10
	T66[e]	$t \leq 15$	215	—	160	—	8	6
6360	T4[e]	$t \leq 15$	110	—	50	—	16	14
	T5	$t \leq 15$	150	—	120	—	8	6
	T6[e]	$t \leq 15$	185	—	140	—	8	6
	T66[e]	$t \leq 15$	195	—	150	—	8	6
6061	O	All	—	145	—	110	—	16
	T4[e]	All	175	—	110	—	—	16
	T42[c]	All	175	—	85	—	—	16
	T6[e]	$t \leq 6$	265	—	245	—	—	8
	T62[d]	$6 < t$	265	—	245	—	—	10
6261	O H111	$t \leq 10$	—	170	—	120	14	12
	T4[e]	$t \leq 10$	180	—	100	—	14	12
	T5	$t \leq 5$	270	—	230	—	8	7
		$5 < t \leq 10$	260	—	220	—	9	8
	T6[e]	$t \leq 5$	290	—	245	—	8	7
		$5 < t \leq 10$	290	—	245	—	9	8
6262	T6[e]	$t \leq 25$	260	—	240	—	10	8

Table 2 *(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} %
6063	O H111	$t \leq 25$	—	130	—	—	18	16
	T1	$t \leq 12$	120	—	60	—	—	12
		$12 < t \leq 25$	110	—	55	—	—	12
	T4[e]	$t \leq 10$	130	—	65	—	14	12
		$10 < t \leq 25$	120	—	65	—	12	10
	T5	$t \leq 12$	155	—	110	—	—	8
		$12 < t \leq 25$	145	—	110	—	—	8
	T6[e]	$t \leq 3$	205	—	175	—	—	8
		$3 < t \leq 25$	205	—	175	—	—	10
	T66[e]	$t \leq 25$	245	—	200	—	10	8
6063A	O H111	$t \leq 25$	—	150	—	—	16	14
	T4[e]	$t \leq 10$	150	—	90	—	12	10
		$10 < t \leq 25$	140	—	90	—	10	8
	T5	$t \leq 25$	200	—	160	—	7	5
	T6[e]	$t \leq 25$	230	—	190	—	7	5
6463	T6[e]	$t \leq 25$	195	—	160	—	10	8
6081	T6[e]	$t \leq 25$	275	—	240	—	8	6
6082	O H111	$t \leq 25$	—	160	—	110	14	12
	T4[e]	$t \leq 25$	205	—	110	—	14	12
	T6[e]	$t \leq 5$	290	—	250	—	8	6
		$5 < t \leq 25$	310	—	260	—	10	8
7003	T5	≤ 12	285	—	245	—	—	10
		$12 < t \leq 25$	275	—	235	—	—	10
	T6[e]	$t \leq 10$	350	—	290	—	10	8
		$10 < t \leq 25$	340	—	280	—	10	8
7204	O	$1,6 \leq t \leq 12$	—	245	—	145	—	12
	T4[h]	$1,6 \leq t \leq 12$	315	—	195	—	—	11
	T6	$1,6 \leq t \leq 6$	325	—	235	—	—	10
		$6 < t \leq 12$	335	—	255	—	-—	10
7005	T6[e]	$t \leq 15$	350	—	290	—	10	8
7108	T6[e]	$t \leq 20$	310	—	260	—	10	8
7108A	T6[e]	$t \leq 20$	310		260		12	10
	T66[e]	$t \leq 20$	350		290		10	8
7020	T6[e]	$t \leq 15$	350	—	290	—	10	8
7021	T6[e]	$t \leq 10$	410	—	350	—	10	8

Table 2 *(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} %
7022	T6[e] T6510[e] T6511[e]	$t \leq 30$	490	—	420	—	7	5
7049A	T6 T6510 T6511	$t \leq 30$	610	—	530	—	5	4
7050	T73511	t or $D \leq 125$, $A \leq 20\,000$	485	—	415	—	7	8
	T74511	$t \leq 76$	505	—	435	—	—	7
	T76510	t or $D \leq 127$	545	—	475	—	—	7
7075	O[b]	All	—	275	—	165	—	10
	T6	$t \leq 6$	540	—	480	—	—	7
	T62[d]	$6 < t \leq 75$	560	—	500	—	—	7
	T6510 T6511	$t \leq 5$	540	—	485	—	8	6
		$5 < t \leq 10$	560	—	505	—	7	5
		$10 < t \leq 50$	560	—	495	—	6	4
	T73[i] T73510[i] T73511[i]	$t \leq 5$	470	—	400	—	7	5
		$5 < t \leq 25$	485	—	420	—	8	6
		$25 < t \leq 50$	475	—	405	—	8	—

[a] t (mm) = wall thickness.

D (mm) = outside diameter.

A (mm^2) = cross-section area.

[b] The material of temper grade O shall be a basis for materials of temper grades T42 or T62. When requested by the purchaser, the capability to achieve T42 and T62 properties after appropriate heat treatment is demonstrated.

[c] The mechanical properties of temper grade T42 shall be applied only when the material of temper grade O has been naturally age-hardened after solution treatment by the purchaser. If the material is cold or hot worked prior to solution treatment by the purchaser, its mechanical properties can be lower than the specified values.

[d] The mechanical properties of temper grade T62 shall be applied only when the material of temper grade O has been artificially age-hardened after solution treatment by the purchaser. If the material is cold or hot worked prior to solution treatment by the purchaser, its mechanical properties can be lower than the specified values.

[e] Applicable for those after extrusion followed by controlled cooling at a rate rapid enough to hold constituents in solution.

[f] Electrical conductivity $\gamma \geq 30$ MS/m.

[g] Electrical conductivity $\gamma \geq 32$ MS/m.

[h] The mechanical properties of temper grade T4 are the values specified, based on reference values obtained by 1 month of natural ageing at room temperature (approximately 20 °C) after solution treatment.

In the case of the tensile test made before completion of 1 month of natural ageing, the tensile performance of temper grade T4 can be deemed as guaranteed if the test result of the test piece which has been artificially aged after solution treatment is confirmed to satisfy the tensile performance of temper grade T6.

[i] For materials of thickness 20 mm or above, see EN 755–1, with respect to stress corrosion cracking resistance.

Table 3 — Mechanical properties of profiles

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} %
1070	H112	All	55	—	15	—	—	—
1070A	H112	All	60		20		25	23
1060	H112	$3 \leq t \leq 30$	60	—	30	—	—	25
1050	H112	All	65	—	20	—	—	—
1050A	H112	All	60	—	20	—	25	23
1350[b]	H112	All	60	—	—	—	25	23
1100, 1200	H112	All	75	—	20	—	—	—
2007	T4 T4510 T4511	$t \leq 30$	370	—	250	—	8	6
2014[c]	O[d]	All	—	245	—	125	—	12
	T4	All	345	—	245	—	—	12
	T42[e]	All	345	—	205	—	—	12
	T4510 T4511	$t \leq 25$ $25 < t \leq 75$	370 410	— —	230 270	— —	11 10	10 —
	T6	$t \leq 15$	415	—	365	—	6	7
		$15 < t \leq 30$	440	—	400	—	6	7
		$30 < t, A \leq 16\,000$	470	—	410	—	5	7
		$30 < t, 16\,000 < A \leq 20\,000$	470	—	400	—	5	6
		$30 < t, 20\,000 < A \leq 25\,000$	450	—	380	—	—	6
		$30 < t, 25\,000 < A \leq 30\,000$	430	—	365	—	—	6
	T62[f]	$t \leq 19$	410	—	365	—	—	7
		$19 < , t, A \leq 16\,000$	410	—	365	—	—	7
		$19 < t, 16\,000 < A \leq 20\,000$	410	—	365	—	—	6
	T6510	$t \leq 25$	415	—	370	—	7	5
	T6511	$25 < t \leq 75$	460	—	415	—	7	—
2014A[c]	O H111	All	—	250	—	135	12	10
	T4 T4510 T4511	$t \leq 25$ $25 < t \leq 75$	370 410	— —	230 270	— —	11 10	10 —
	T6 T6510 T6511	$t \leq 25$ $25 < t \leq 75$	415 460	— —	370 415	— —	7 7	5 —
2017	O[d]	All	—	245	—	125	—	16
	T4	$A \leq 70\,000$	345	—	215	—	—	12
	T42[e]	$70\,000 < A \leq 100\,000$	335	—	195	—	—	12

Table 3 *(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	T4 T4510 T4511	$t \leq 30$	380	—	260	—	10	8
2024[c]	O[d]	All	—	245	—	125	—	12
	T3	$t \leq 5$	395	—	290	—	—	12
		$5 < t \leq 15$	395	—	290	—	—	12
		$15 < t \leq 30$	415	—	305	—	9	—
	T3510 T3511	$t \leq 15$	395	—	290	—	8	6
		$15 < t \leq 50$	420	—	290	—	8	—
	T4	$t \leq 6$	390	—	295	—	—	12
		$6 < t \leq 19$	410	—	305	—	—	12
		$19 < t \leq 38$	450	—	315	—	—	10
		$38 < t, A \leq 16\,000$	480	—	365	—	—	10
		$38 < t, 16\,000 < A \leq 20\,000$	470	—	335	—	—	8
		$38 < t, 20\,000 < A \leq 30\,000$	460	—	315	—	—	8
	T42[e]	$t \leq 19$	390	—	265	—	—	12
		$19 < t \leq 38$	390	—	265	—	—	10
		$38 < t, A \leq 16\,000$	390	—	265	—	—	10
		$38 < t, 16\,000 < A \leq 20\,000$	390	—	265	—	—	8
	T81	$t \leq 5$	440	—	385	—	—	4
		$5 < t \leq 15$	440	—	385	—	—	4
		$15 < t \leq 30$	450	—	400	—	4	—
	T8 T8510 T8511	$t \leq 50$	455	—	380	—	5	4
2030	T4 T4510 T4511	$t \leq 30$	370	—	250	—	8	6
3102	H112	All	80	—	30	—	25	23
3003, 3203	H112	All	95	—	35	—	17	22
3103	H112	All	95	—	35	—	25	20
5005, 5005A	H112	All	100	—	40	—	18	16
	O H111	$t \leq 20$	100	150	40	—	20	18
5019	H112	$t \leq 30$	250	—	110	—	14	12
5049	H112	All	180	—	80	—	15	13
5051A	H112	All	150	—	60	—	16	14
5251	H112	All	160	—	60	—	16	14

Table 3 *(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	H112	All	175	—	70	—	—	—
	O	All	175	245	70	—	—	20
5154A	H112	$t \leq 25$	200	—	85	—	16	14
5454	H112	$t \leq 130, A \leq 20\,000$	215	—	85	—	—	12
	O	$t \leq 130, A \leq 20\,000$	215	285	85	—	—	14
5754	H112	$t \leq 25$	180	—	80	—	14	12
5083	H112	$t \leq 130, A \leq 20\,000$	270	—	140	—	12	12
	O	$t \leq 38, A \leq 20\,000$	275	355	120	—	—	14
		$38 < t \leq 130, A \leq 20\,000$	275	355	110	—	—	14
5086	H112	$t \leq 130, A \leq 20\,000$	240	—	95	—	—	12
	O	$t \leq 130, A \leq 20\,000$	240	315	95	—	—	14
6101	T6[g]	$3 \leq t \leq 7$	195	—	165	—	—	10
		$7 < t \leq 17$	195	—	165	—	—	12
		$17 < t \leq 30$	175	—	145	—	—	14
	T7	$3 \leq t \leq 17$	135	—	110	—	—	10
6101A	T6[g]	$t \leq 50$	200	—	170	—	10	8
6101B	T6[g,h]	$t \leq 15$	215	—	160	—	8	6
	T7[g,i]	$t \leq 15$	170	—	120	—	12	10
6005[c], 6005A[c]	T4[g] (OP)[j]	$t \leq 25$	180	—	90	—	15	13
	T4[g] (HP)[k]	$t \leq 10$	180	—	90	—	15	13
	T5	$t \leq 8$	250	—	200	—	8	—
	T6[g] (OP)[j]	$t \leq 5$	270	—	225	—	8	6
		$5 < t \leq 10$	260	—	215	—	8	6
		$10 < t \leq 25$	250	—	200	—	8	6
	T6[g] (HP)[k]	$t \leq 5$	255	—	215	—	8	6
		$5 < t \leq 15$	250	—	200	—	8	6
6005C	T5	$t \leq 6$	245	—	205	—	—	8
		$6 < t \leq 12$	225	—	175	—	—	8
	T6[g]	$t \leq 6$	265	—	235	—	—	8
6106	T6[g]	$t \leq 10$	250	—	200	—	8	6
6008[c]	T4[g] (OP)[j]	$t \leq 10$	180	—	90	—	15	13
	T4[g] (HP)[k]	$t \leq 10$	180	—	90	—	15	13
	T6[g] (OP)[j]	$t \leq 5$	270	—	225	—	8	6
		$5 < t \leq 10$	260	—	215	—	8	6
	T6[g] (HP)[k]	$t \leq 5$	255	—	215	—	8	6
		$5 < t \leq 10$	250	—	200	—	8	6

Table 3 *(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} %
6110A	T4[g]	$t \leq 25$	320	—	220	—	16	14
	T6[g]	$t \leq 25$	380	—	360	—	10	8
6012	T6[g] T6510[g] T6511[g]	$t \leq 30$	310	—	260	—	8	6
6014[c]	T4[g] (OP)[j]	$t \leq 10$	140	—	70	—	15	13
	T4[g] (HP)[k]	$t \leq 10$	140	—	70	—	15	13
	T6[g] (OP)[j]	$t \leq 5$	250	—	200	—	10	8
		$5 < t \leq 10$	225	—	180	—	8	6
	T6[g] (HP)[k]	$t \leq 5$	250	—	200	—	8	6
		$5 < t \leq 10$	225	—	180	—	8	6
6018	T6[g] T6510[g] T6511[g]	$t \leq 30$	310	—	260	—	8	6
6351[c]	O H111	All	—	160	—	110	14	12
	T4[g]	$t \leq 25$	205	—	110	—	14	12
	T5 (OP)[j]	$t \leq 5$	270	—	230	—	8	6
	T5 (HP)[k]	$t \leq 5$	270	—	230	—	8	6
	T6[g] (OP)[j]	$t \leq 5$	290	—	250	—	8	6
		$5 < t \leq 25$	300	—	255	—	10	8
	T6[g] (HP)[k]	$t \leq 5$	290	—	250	—	8	6
		$5 < t \leq 15$	300	—	255	—	10	8
6060[c]	T4[g]	$t \leq 25$	120	—	60	—	16	14
	T5	$t \leq 5$	160	—	120	—	8	6
		$5 < t \leq 25$	140	—	100	—	8	6
	T6[g]	$t \leq 3$	190	—	150	—	8	6
		$3 < t \leq 25$	170	—	140	—	8	6
	T64[g]	$t \leq 15$	180	—	120	—	12	10
	T66[g]	$t \leq 3$	215	—	160	—	8	6
		$3 < t \leq 25$	195	—	150	—	8	6
6360[c]	T4[g]	$t \leq 25$	110	—	50	—	16	14
	T5	$t \leq 25$	150	—	110	—	8	6
	T6[g]	$t \leq 25$	185	—	140	—	8	6
	T66[g]	$t \leq 25$	195	—	150	—	8	6

Table 3 *(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} %
6061[c]	O[d]	All	—	145	—	110	—	16
	T4[g]	All	175	—	110	—	14	16
	T42[e]	All	175	—	85	—	—	16
	T6[g], T62[f]	$t \leq 6$	265	—	245	—	7	8
		$6 < t$	265	—	245	—	—	10
6261[c]	O,H111	All	—	170	—	120	14	12
	T4[g]	$t \leq 25$	180	—	100	—	14	12
	T5 (OP)[j]	$t \leq 5$	270	—	230	—	8	7
		$5 < t \leq 25$	260	—	220	—	9	8
		$25 < t$	250	—	210	—	9	—
	T5 (HP)[k]	$t \leq 5$	270	—	230	—	8	7
		$5 < t \leq 10$	260	—	220	—	9	8
	T6[g] (OP)[j]	$t \leq 5$	290	—	245	—	8	7
		$5 < t \leq 25$	280	—	235	—	8	7
	T6[g] (HP) [k]	$t \leq 5$	290	—	245	—	8	7
		$5 < t \leq 10$	270	—	230	—	9	8
6262	T6[g]	$t \leq 25$	260	—	240	—	10	8
6262A	T6[g]	$t \leq 25$	260	—	240	—	10	8
6063[c]	T1	$t \leq 12$	120	—	60	—	—	12
		$12 < t \leq 25$	110	—	55	—	—	12
	T4[g]	$t \leq 25$	130	—	65	—	14	12
	T5[l]	$t \leq 12$	150	—	110	—	7	8
		$12 < t \leq 25$	145	—	105	—	7	8
	T6[g]	$t \leq 3$	205	—	170	—	—	8
		$3 < t \leq 25$	205	—	170	—	—	10
	T64[g]	$t \leq 15$	180	—	120	—	12	10
	T66[g]	$t \leq 10$	245	—	200	—	8	6
		$10 < t \leq 25$	225	—	180	—	8	6
6063A[c]	T4[g]	$t \leq 25$	150	—	90	—	12	10
	T5	$t \leq 10$	200	—	160	—	7	5
		$10 < t \leq 25$	190	—	150	—	6	4
	T6[g]	$t \leq 10$	230	—	190	—	7	5
		$10 < t \leq 25$	220	—	180	—	5	4
6463[c]	T4[g]	$t \leq 50$	125	—	75	—	14	12
	T5	$t \leq 50$	150	—	110	—	8	6
	T6[g]	$t \leq 50$	195	—	160	—	10	8
6065	T6[g]	$t \leq 25$	260	—	240	—	10	8

Table 3 *(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} %
6081	T6[g] (OP)[j]	$t \leq 25$	275	—	240	—	8	6
	T6[g] (HP)[k]	$t \leq 15$	275	—	240	—	8	6
6082[c]	O H111	All	—	160	—	110	14	12
	T4[g]	$t \leq 15$	205	—	110	—	14	12
	T5 (OP)[j]	$t \leq 5$	270	—	230	—	8	6
	T5 (HP)[k]	$t \leq 5$	270	—	230	—	8	6
	T6[g] (OP)[j]	$t \leq 5$	290	—	250	—	8	6
		$5 < t \leq 25$	310	—	260	—	10	8
	T6[g] (HP)[k]	$t \leq 5$	290	—	250	—	8	6
		$5 < t \leq 25$	310	—	260	—	10	8
7003[c]	T5	$t \leq 12$	285	—	245	—	—	10
		$12 < t \leq 25$	275	—	235	—	—	10
	T6[g]	$t \leq 10$	350	—	290	—	10	8
		$10 < t \leq 25$	340	—	280	—	10	8
7204	O	$A \leq 20\,000$	—	245	—	145	—	12
	T4[m]	$A \leq 20\,000$	315	—	195	—	—	11
	T5	$A \leq 20\,000$	325	—	245	—	—	10
	T6	$A \leq 20\,000$	335	—	275	—	—	10
7005	T53	$3 < t \leq 25, A \leq 16\,000$	345	—	305	—	9	10
	T6[g]	$t \leq 40$	350	—	290	—	10	8
7108	T6[g]	$t \leq 30$	310	—	260	—	10	8
7108A	T6[g]	$t \leq 40$	310	—	260	—	12	10
	T66[g]	$t \leq 40$	350	—	290	—	10	8
7020	T6[g]	$t \leq 40$	350	—	290	—	10	8
7021	T6[g]	$t \leq 20$	410	—	350	—	10	8
7022	T6 [g] T6510[g] T6511[g]	$t \leq 30$	490	—	420	—	7	5
7049A	T6 T6510 T6511	$t \leq 30$	610	—	530	—	5	4
7050	T73511	$t \leq 125, A \leq 20\,000$	485	—	415	—	7	8
	T74511	$t \leq 76$	505	—	435	—	—	7
	T76510	$t \leq 127$	545	—	475	—	—	7

Table 3 *(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} %
7075[c]	O[d]	All	—	275	—	165	—	10
	T6 T62[f]	$t \leq 6$	540	—	480	—	6	7
		$6 < t \leq 75$	560	—	500	—	—	7
		$75 < t \leq 110, A \leq 13\,000$	560	—	490	—	—	7
		$75 < t \leq 110, 13\,000 < A \leq 20\,000$	540	—	480	—	—	6
		$110 < t \leq 130, A \leq 20\,000$	540	—	470	—	—	6
	T6510	$t \leq 25$	530	—	460	—	6	4
	T6511	$25 < t \leq 60$	540	—	470	—	6	—
	T73[n] T73510[n] T73511[n]	$t \leq 30$	470	—	400	—	7	—

[a] t (mm) = thickness at specified measuring point; A (mm^2) = cross-section area.

[b] Electrical conductivity $\gamma \geq 35{,}4$ MS/m.

[c] If a profile cross-section comprises different thicknesses which fall in more than one set of specified mechanical property values, the lowest specified value shall be considered as valid for the whole profile cross-section.

[d] The material of temper grade O shall be a basis for materials of temper grades T42 or T62. When requested by the purchaser, the capability to achieve T42 and T62 properties after appropriate heat treatment is demonstrated.

[e] The mechanical properties of temper grade T42 shall be applied only when the material of temper grade O has been naturally age-hardened after solution treatment by the purchaser. If the material is cold or hot worked prior to solution treatment by the purchaser, its mechanical properties can be lower than the specified values.

[f] The mechanical properties of temper grade T62 shall be applied only when the material of temper grade O has been artificially age-hardened after solution treatment by the purchaser. If the material is cold or hot worked prior to solution treatment by the purchaser, its mechanical properties can be lower than the specified values.

[g] Applicable for those after extrusion followed by controlled cooling at a rate rapid enough to hold constituents in solution.

[h] Electrical conductivity $\gamma \geq 30$ MS/m.

[i] Electrical conductivity $\gamma \geq 32$ MS/m.

[j] Open profile.

[k] Hollow profile.

[l] Temper grade T5 shall be subjected to a tensile test.

[m] The mechanical properties of temper grade T4 are the values specified, based on reference values obtained by 1 month of natural ageing at room temperature (approximately 20 °C) after solution treatment.

In the case of the tensile test made before completion of 1 month of natural ageing, the tensile performance of temper grade T4 can be deemed as guaranteed if the test result of the test piece which has been artificially aged after solution treatment is confirmed to satisfy the tensile performance of temper grade T6.

[n] For materials of thickness 20 mm or above, see EN 755–1, with respect to stress corrosion cracking resistance.

Annex A
(normative)

Rules for rounding

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 of 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 remains unchanged if even and is increased by one if odd.

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.

Annex B
(normative)

List of tempers used in Tables 1 to 3

Table B.1 — Description of the tempers used in Tables 1 to 3

Temper	Description
F	as fabricated (no mechanical property limits specified)
O	annealed – products achieving the required annealed properties after hot-forming processes can be designated as O temper
H111	annealed and slightly strain-hardened (less than H11) during subsequent operations such as stretching or straightening
H112	slightly strain-hardened from working at an elevated temperature or from a limited amount of cold work (mechanical property limits specified), such as stretching or straightening
T1	cooled from an elevated-temperature shaping process and naturally aged
T3	solution heat-treated, cold worked and naturally aged
T3510	solution heat-treated, stress-relieved by stretching a controlled amount (permanent set 1 % to 3 %) and naturally aged The products receive no further straightening after stretching.
T3511	same as T3510 except that minor straightening is allowed after stretching to comply with standard tolerances
T4	solution heat-treated and naturally aged
T42	solution heat-treated and naturally aged; applies to test material heat-treated from annealed of F temper or to products heat-treated from any temper by the user
T4511	same as T4510 except that minor straightening is allowed after stretching to comply with standard tolerances
T5	cooled from an elevated-temperature shaping process and then artificially aged
T53[a]	cooled from an elevated-temperature shaping process and then artificially aged This designation is applicable to the considered alloy and stated form of product only.
T6	solution heat-treated and then artificially aged
T62	solution heat-treated and then artificially aged; applies to test material heat-treated from annealed of F temper or to products heat-treated form any temper by the user
T64[b]	solution heat-treated and then artificially aged in underageing conditions (between T6 and T61) to improve formability This designation is applicable to the considered alloy and stated form of product only.
T6510	solution heat-treated, stress-relieved by stretching a controlled amount (permanent set 1 % to 3 %) and then artificially aged The products receive no further straightening after stretching.
T6511	same as T6510 except that minor straightening is allowed after stretching to comply with standard tolerances

[a] Regional designation, quoted from ASTM B221.

[b] Regional designation, quoted from EN 755–2.

Table B.1 *(continued)*

Temper	Description
T66[b]	solution heat-treated and then artificially aged – mechanical property level higher than T6 achieved through special control of the process (6000 series alloys) This designation is applicable to the considered alloy and stated form of product only.
T7	solution heat-treated, and then artificially overaged
T73	solution heat-treated, and then artificially overaged in order to achieve the best stress corrosion resistance
T73510	solution heat-treated, stress-relieved by stretching a controlled amount (permanent set 1 % to 3 %) and then artificially overaged in order to achieve the best stress corrosion resistance The products receive no further straightening after stretching.
T73511	same as T73510 except that minor straightening is allowed after stretching to comply with standard tolerances
T74511	solution heat-treated, stress-relieved by stretching a controlled amount (permanent set 1 % to 3 %) and then artificially overaged between T76 form T73 in order to achieve the best stress corrosion resistance The products can receive further straightening after stretching.
T76510	solution heat-treated, stress-relieved by stretching a controlled amount (permanent set 1 % to 3 %) and then artificially overaged in order to achieve the best exfoliation corrosion resistance The products receive no further straightening after stretching.
T8	solution heat-treated, cold worked and then artificially aged
T81[b]	solution heat-treated, cold worked amount (reduction of section about 1 %) and then artificially aged This designation is applicable to the considered alloy and stated form of product only.
T8510	solution heat-treated, stress-relieved by stretching a controlled amount (permanent set 1 % to 3 %) and then artificially aged The products receive no further straightening after stretching.
T8511	same as T8510 except that minor straightening is allowed after stretching to comply with standard tolerances

[a] Regional designation, quoted from ASTM B221.

[b] Regional designation, quoted from EN 755–2.

Bibliography

[1] EN 755-1, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 1: Technical conditions for inspection and delivery*

[2] EN 755-2, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 2: Mechanical properties*

[3] ASTM B221-08, *Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes*

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