# INTERNATIONAL STANDARD

## ISO
## 6362-2

# 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 6362-2 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 6362-2:1990), 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*

# 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 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.

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.

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**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 | $3 \leq D$ or $S \leq 30$ | 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 |
| | | $35 \leq D$ or $30 \leq S$ | 75 | - | 20 | - | - | - |
| 1200 | H112 | $D < 35$ or $S < 30$ | 75 | - | 25 | - | 20 | 18 |
| | | $35 \leq D$ or $30 \leq S$ | 75 | - | 20 | - | - | - |
| 2007 | 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 | - |
| 2011 | T3 | $3 \leq D$ or $S \leq 40$ | 310 | - | 260 | - | 10 | 10 |
| | | $40 < D$ or $S \leq 50$ | 295 | - | 235 | - | 10 | 12 |
| | | $50 < D$ or $S \leq 75$ | 290 | - | 205 | - | 10 | 14 |
| | T4 | $3 \leq D$ or $S \leq 200$ | 275 | - | 125 | - | 14 | 16 |
| | T6 | $3 < D$ or $S \leq 75$ | 310 | - | 230 | - | 8 | 10 |
| | | $75 < D$ or $S \leq 160$ | 295 | - | 195 | - | 6 | 8 |
| | T8 | $3 \leq D$ or $S \leq 75$ | 370 | - | 275 | - | 10 | 10 |
| 2011A | T4 | $D \leq 200, S \leq 60$ | 275 | - | 125 | - | 14 | 12 |
| | T6 | $D \leq 75, S \leq 60$ | 310 | - | 230 | - | 8 | 6 |
| | | $75 < D \leq 200$ | 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 $S \leq 12$ | 410 | - | 365 | - | - | 7 |
| | | $12 < D$ or $S \leq 19$ | 440 | - | 400 | - | 6 | 7 |
| | | $19 < D$ or $S, A \leq 16\ 000$ | 470 | - | 410 | - | 6 | 7 |
| | | $19 < D$ or $S, 16\ 000 < A \leq 20\ 000$ | 470 | - | 400 | - | 6 | 6 |
| | | $19 < D$ or $S, 20\ 000 < A \leq 25\ 000$ | 450 | - | 380 | - | 6 | 6 |
| | | $19 < D$ or $S, 25\ 000 < A \leq 30\ 000$ | 430 | - | 365 | - | 6 | 6 |
| | T62[e] | $D$ or $S \leq 19$ | 410 | - | 365 | - | - | 7 |
| | | $19 < D$ or $S, A \leq 16\ 000$ | 410 | - | 365 | - | - | 7 |
| | | $19 < D$ or $S, 16\ 000 < A \leq 20\ 000$ | 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 $S \le 200$ | - | 250 | - | 135 | 10 | 12 |
| | T4, T4510 T4511 | $10 < D$ or $S \le 200$ | 345 | - | 240 | - | 10 | 12 |
| | T6 | $12,5 < D$ or $S \le 100$ | 440 | - | 400 | - | 6 | - |
| | T6510 | $100 < D$ or $S \le 120$ | 430 | - | 350 | - | 6 | - |
| | T6511 | $120 < D$ or $S \le 200$ | 430 | - | 350 | - | 6 | - |
| 2017 | O[c] | All | | 245 | | 125 | - | 16 |
| | T4 | $A \le 70\ 000$ | 345 | | 215 | | - | 12 |
| | T42[d] | $70\ 000 < A \le 100\ 000$ | 345 | | 195 | | - | 12 |
| 2017A | O | $10 < D$ or $S \le 100$ | - | 250 | - | 150 | 10 | - |
| | T4 T4510 T4511 | $10 < D$ or $S \le 80$ | 390 | - | 265 | - | 10 | - |
| | | $80 < D$ or $S \le 200$ | 360 | - | 220 | - | 7 | - |
| 2024 | O[c] | All | - | 245 | - | 125 | 10 | 12 |
| | T3510 T3511 | $D$ or $S \le 6$ | 390 | - | 295 | - | - | 12 |
| | | $6 < D$ or $S \le 19$ | 410 | - | 300 | - | 10 | 12 |
| | | $19 < D$ or $S \le 38$ | 450 | - | 310 | - | 8 | 10 |
| | | $38 < D$ or $S$, $A \le 16\ 000$ | 480 | - | 365 | - | 7 | 10 |
| | | $38 < D$ or $S$, $16\ 000 < A \le 20\ 000$ | 470 | - | 335 | - | 7 | 8 |
| | T3 T4 | $D$ or $S \le 6$ | 390 | - | 295 | - | - | 12 |
| | | $6 < D$ or $S \le 19$ | 410 | - | 305 | - | - | 12 |
| | | $19 < D$ or $S \le 38$ | 450 | - | 315 | - | - | 10 |
| | | $38 < D$ or $S$, $A \le 16\ 000$ | 480 | - | 365 | - | 8 | 10 |
| | | $38 < D$ or $S \le 100$, $16\ 000 < A \le 20\ 000$ | 470 | - | 335 | - | 8 | 8 |
| | | $38 < D$ or $S \le 100$, $20\ 000 < A \le 30\ 000$ | 460 | - | 315 | - | 8 | 8 |
| | | $100 < D$ or $S \le 200$, $A \le 16\ 000$ | 480 | - | 365 | - | 6 | 10 |
| | | $100 < D$ or $S \le 200$, $16\ 000 < A \le 20\ 000$ | 470 | - | 335 | - | 6 | 8 |
| | | $100 < D$ or $S \le 200$, $20\ 000 < A \le 30\ 000$ | 460 | - | 315 | - | 6 | 8 |
| | T42[d] | $D$ or $S \le 19$ | 390 | - | 265 | - | - | 12 |
| | | $19 < D$ or $S \le 38$ | 390 | - | 265 | - | - | 10 |
| | | $38 < D$ or $S$, $A \le 16\ 000$ | 390 | - | 265 | - | - | 10 |
| | | $38 < D$ or $S$, $16\ 000 < A \le 20\ 000$ | 390 | - | 265 | - | - | 8 |
| | T8510 T8511 T81 | $10 < D$ or $S \le 150$ | 455 | - | 400 | - | 4 | - |

**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. | $A$ % | $A_{50mm}$ % |
| 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 | - |
| 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 | - | - | - |

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

**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. | $A$ % | $A_{50mm}$ % |
| 6063A | O H111 | $D$ or $S \le 200$ | - | 150 | - | - | 16 | 14 |
| | T4[f] | $D$ or $S \le 150$ | 150 | - | 90 | - | 12 | 10 |
| | | $150 < D$ or $S \le 200$ | 140 | - | 90 | - | 10 | - |
| | T5 | $D$ or $S \le 200$ | 200 | - | 160 | - | 7 | 5 |
| | T6[f] | $D$ or $S \le 150$ | 230 | - | 190 | - | 7 | 5 |
| | | $150 < D$ or $S \le 200$ | 220 | - | 160 | - | 7 | - |
| 6463 | T4[f] | $D$ or $S \le 150$ | 125 | - | 75 | - | 14 | 12 |
| | T5 | $D$ or $S \le 150$ | 150 | - | 110 | - | 8 | 6 |
| | T6[f] | $D$ or $S \le 150$ | 195 | - | 160 | - | 10 | 8 |
| 6065 | T6[f] | $D \le 220$ or $S \le 155$ | 260 | - | 240 | - | 10 | 8 |
| 6081 | T6[f] | $D$ or $S \le 250$ | 275 | - | 240 | - | 8 | 6 |
| 6082 | O H111 | $D$ or $S \le 200$ | - | 160 | - | 110 | 14 | 12 |
| | T4[f] | $10 \le D$ or $S \le 80$ | 205 | - | 110 | - | 14 | 14 |
| | T6[f] | $10 \le D \le 60$ or $10 \le S \le 50$ | 310 | - | 260 | - | 8 | 7 |
| | | $60 < D \le 150$ or $50 < S \le 150$ | 300 | - | 240 | - | 8 | - |
| 6182 | T4[f] | $D \le 220$ or $S \le 155$ | 205 | - | 110 | - | 12 | 10 |
| | T6[f,i] | $9 < D$ or $S \le 100$ | 360 | - | 330 | - | 9 | 7 |
| | | $100 < D$ or $S \le 150$ | 330 | - | 300 | - | 8 | 6 |
| | | $150 < D$ or $S \le 220$ | 280 | - | 240 | - | 6 | 4 |
| 7003 | T5 | $D$ or $S \le 12$ | 285 | - | 245 | - | - | 10 |
| | | $12 < D$ or $S \le 25$ | 275 | - | 235 | - | - | 10 |
| | T6[f] | $D$ or $S \le 50$ | 350 | - | 290 | - | 10 | 8 |
| | | $50 < D$ or $S \le 150$ | 340 | - | 280 | - | 10 | 8 |
| 7204 | O | All | - | 245 | - | 145 | - | 12 |
| | T4[j] | All | 315 | - | 195 | - | - | 11 |
| | T6 | All | 335 | - | 275 | - | - | - |
| 7005 | T6[f] | $D$ or $S \le 50$ | 350 | - | 290 | - | 10 | 8 |
| | | $50 < D$ or $S \le 200$ | 340 | - | 270 | - | 10 | - |
| 7108 | T6[f] | $D$ or $S \le 100$ | 310 | - | 260 | - | 10 | 8 |
| 7108A | T6[f] | $D$ or $S \le 200$ | 310 | - | 260 | - | 12 | 10 |
| | T66[f] | $D$ or $S \le 50$ | 350 | - | 290 | - | 10 | 8 |
| | | $50 < D$ or $S \le 200$ | 340 | - | 275 | - | 10 | - |
| 7020 | T6[f] | $D$ or $S \le 50$ | 350 | - | 290 | - | 10 | 8 |
| | | $50 < D$ or $S \le 200$ | 340 | - | 275 | - | 10 | - |
| 7021 | T6[f] | $D$ or $S \le 40$ | 410 | - | 350 | - | 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. | $A$ % | $A_{50mm}$ % |
| 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 | 73511 | $D$ 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 |
| 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 $S \leq 130, A \leq 13\ 000$ | 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 | - |

**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. | $A$ % | $A_{50mm}$ % |

[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 may 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 may 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, may 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 may 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 |

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**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. | $A$ % | $A_{50mm}$ % |
| 2014 | O[b] | All | - | 245 | - | 125 | - | 12 |
| | T4 | All | 345 | - | 245 | - | - | 12 |
| | T42[c] | All | 345 | - | 205 | - | - | 12 |
| | T4510 T4511 | $t \square 20$ | 370 | - | 230 | - | 11 | 10 |
| | T6 | $t \le 12$ | 410 | - | 365 | - | - | 7 |
| | | $12 < t \le 19$ | 440 | - | 400 | - | - | 7 |
| | | $19 < t, A \le 16\,000$ | 470 | - | 410 | - | - | 7 |
| | | $19 < t, 16\,000 < A \le 20\,000$ | 470 | - | 400 | - | - | 6 |
| | | $19 < t, 20\,000 < A \le 25\,000$ | 450 | - | 380 | - | - | 6 |
| | | $19 < t, 25\,000 < A \le 30\,000$ | 430 | - | 365 | - | - | 6 |
| | T62[d] | $t \le 19$ | 410 | - | 365 | - | - | 7 |
| | | $19 < t, A \le 16\,000$ | 410 | - | 365 | - | - | 7 |
| | | $19 < t, 16\,000 < A \le 20\,000$ | 410 | - | 365 | - | - | 6 |
| | T6510 | $t \le 10$ | 415 | - | 370 | - | 7 | 5 |
| | T6511 | $10 < t \le 40$ | 450 | - | 400 | - | 6 | 4 |
| 2014A | O H111 | $t \le 20$ | - | 250 | - | 135 | 12 | 10 |
| | T4 T4510 T4511 | $t \le 20$ | 370 | - | 230 | - | 11 | 10 |
| | T6 T6510 T6511 | $t \le 10$ | 415 | - | 370 | - | 7 | 5 |
| | | $10 < t \le 40$ | 450 | - | 400 | - | 6 | 4 |
| 2017 | O[b] | All | - | 245 | - | 125 | - | 16 |
| | T4 | $A \le 70\,000$ | 345 | - | 215 | - | - | 12 |
| | T42[c] | $70\,000 < A \le 100\,000$ | 335 | - | 195 | - | - | 12 |
| 2017A | O H111 | $t \le 20$ | - | 250 | - | 135 | 12 | 10 |
| | T4 T4510 T4511 | $t \le 10$ | 380 | - | 260 | - | 12 | 10 |
| | | $10 < t \le 75$ | 400 | - | 270 | - | 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. | $A$ % | $A_{50mm}$ % |
| 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 |
| 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 |

**Table 2** *(continued)*

| Alloy | Temper | Dimensions[a] | Tensile strength $R_m$ MPa min. | max. | 0,2 % proof stress $R_{p0,2}$ MPa min. | max. | Elongation min. $A$ % | $A_{50mm}$ % |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

**Table 2** *(continued)*

| Alloy | Temper | Dimensions[a] | Tensile strength $R_m$ MPa min. | max. | 0,2 % proof stress $R_{p0,2}$ MPa min. | max. | Elongation min. $A$ % | $A_{50mm}$ % |
|---|---|---|---|---|---|---|---|---|
| 6014 | T4[e] | $t \le 10$ | 140 | - | 70 | - | 15 | 13 |
| 6014 | T6[e] | $t \le 5$ | 250 | - | 200 | - | 8 | 6 |
| | T6[e] | $5 < t \le 10$ | 225 | - | 180 | - | 8 | 6 |
| 6018 | T6[e] T6510[e] T6511[e] | $t \le 30$ | 310 | - | 260 | - | 8 | 6 |
| 6351 | O H111 | $t \le 25$ | - | 160 | - | 110 | 14 | 12 |
| | T4[e] | $t \le 25$ | 205 | - | 110 | - | 14 | 12 |
| | T6[e] | $t \le 5$ | 290 | - | 250 | - | 8 | 6 |
| | T6[e] | $5 < t \le 25$ | 300 | - | 255 | - | 10 | 8 |
| 6060 | T4[e] | $t \le 15$ | 120 | - | 60 | - | 16 | 14 |
| | T5 | $t \le 15$ | 160 | - | 120 | - | 8 | 6 |
| | T6[e] | $t \le 15$ | 190 | - | 150 | - | 8 | 6 |
| | T64[e] | $t \le 15$ | 180 | - | 120 | - | 12 | 10 |
| | T66[e] | $t \le 15$ | 215 | - | 160 | - | 8 | 6 |
| 6360 | T4[e] | $t \le 15$ | 110 | - | 50 | - | 16 | 14 |
| | T5 | $t \le 15$ | 150 | - | 120 | - | 8 | 6 |
| | T6[e] | $t \le 15$ | 185 | - | 140 | - | 8 | 6 |
| | T66[e] | $t \le 15$ | 195 | - | 150 | - | 8 | 6 |
| 6061 | O | All | - | 145 | - | 110 | - | 16 |
| | T4[e] | All | 175 | - | 110 | - | - | 16 |
| | T42[c] | All | 175 | - | 85 | - | - | 16 |
| | T6[e] | $t \le 6$ | 265 | - | 245 | - | - | 8 |
| | T62[d] | $6 < t$ | 265 | - | 245 | - | - | 10 |
| 6261 | O H111 | $t \le 10$ | - | 170 | - | 120 | 14 | 12 |
| | T4[e] | $t \le 10$ | 180 | - | 100 | - | 14 | 12 |
| | T5 | $t \le 5$ | 270 | - | 230 | - | 8 | 7 |
| | T5 | $5 < t \le 10$ | 260 | - | 220 | - | 9 | 8 |
| | T6[e] | $t \le 5$ | 290 | - | 245 | - | 8 | 7 |
| | T6[e] | $5 < t \le 10$ | 290 | - | 245 | - | 9 | 8 |
| 6262 | T6[e] | $t \le 25$ | 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 | $t \le 25$ | - | 130 | - | - | 18 | 16 |
| | T1 | $t \le 12$ | 120 | - | 60 | - | - | 12 |
| | | $12 < t \le 25$ | 110 | - | 55 | - | - | 12 |
| | T4[e] | $t \le 10$ | 130 | - | 65 | - | 14 | 12 |
| | | $10 < t \le 25$ | 120 | - | 65 | - | 12 | 10 |
| | T5 | $t \le 12$ | 155 | - | 110 | - | - | 8 |
| | | $12 < t \le 25$ | 145 | - | 110 | - | - | 8 |
| | T6[e] | $t \le 3$ | 205 | - | 175 | - | - | 8 |
| | | $3 < t \le 25$ | 205 | - | 175 | - | - | 10 |
| | T66[e] | $t \le 25$ | 245 | - | 200 | - | 10 | 8 |
| 6063A | O H111 | $t \le 25$ | - | 150 | - | - | 16 | 14 |
| | T4[e] | $t \le 10$ | 150 | - | 90 | - | 12 | 10 |
| | | $10 < t \le 25$ | 140 | - | 90 | - | 10 | 8 |
| | T5 | $t \le 25$ | 200 | - | 160 | - | 7 | 5 |
| | T6[e] | $t \le 25$ | 230 | - | 190 | - | 7 | 5 |
| 6463 | T6[e] | $t \le 25$ | 195 | - | 160 | - | 10 | 8 |
| 6081 | T6[e] | $t \le 25$ | 275 | - | 240 | - | 8 | 6 |
| 6082 | O H111 | $t \le 25$ | - | 160 | - | 110 | 14 | 12 |
| | T4[e] | $t \le 25$ | 205 | - | 110 | - | 14 | 12 |
| | T6[e] | $t \le 5$ | 290 | - | 250 | - | 8 | 6 |
| | | $5 < t \le 25$ | 310 | - | 260 | - | 10 | 8 |
| 7003 | T5 | $t \le 12$ | 285 | - | 245 | - | - | 10 |
| | | $12 < t \le 25$ | 275 | - | 235 | - | - | 10 |
| | T6[e] | $t \le 10$ | 350 | - | 290 | - | 10 | 8 |
| | | $10 < t \le 25$ | 340 | - | 280 | - | 10 | 8 |
| 7204 | O | $1,6 \le t \le 12$ | - | 245 | - | 145 | - | 12 |
| | T4[h] | $1,6 \le t \le 12$ | 315 | - | 195 | - | - | 11 |
| | T6 | $1,6 \le t \le 6$ | 325 | - | 235 | - | - | 10 |
| | | $6 < t \le 12$ | 335 | - | 255 | - | - | 10 |
| 7005 | T6[e] | $t \le 15$ | 350 | - | 290 | - | 10 | 8 |
| 7108 | T6[e] | $t \le 20$ | 310 | - | 260 | - | 10 | 8 |
| 7108A | T6[e] | $t \le 20$ | 310 | | 260 | | 12 | 10 |
| | T66[e] | $t \le 20$ | 350 | | 290 | | 10 | 8 |
| 7020 | T6[e] | $t \le 15$ | 350 | - | 290 | - | 10 | 8 |
| 7021 | T6[e] | $t \le 10$ | 410 | - | 350 | - | 10 | 8 |

**Table 2** *(continued)*

| Alloy | Temper | Dimensions[a] | Tensile strength $R_m$ MPa min. | Tensile strength $R_m$ MPa max. | 0,2 % proof stress $R_{p0,2}$ MPa min. | 0,2 % proof stress $R_{p0,2}$ MPa max. | Elongation min. $A$ % | Elongation min. $A_{50mm}$ % |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 7050 | T74511 | $t \leq 76$ | 505 | - | 435 | - | - | 7 |
| 7050 | T76510 | $t$ or $D \leq 127$ | 545 | - | 475 | - | - | 7 |
| 7075 | O[b] | All | - | 275 | - | 165 | - | 10 |
| 7075 | T6 T62[d] | $t \leq 6$ | 540 | - | 480 | - | - | 7 |
| 7075 | T6 T62[d] | $6 < t \leq 75$ | 560 | - | 500 | - | - | 7 |
| 7075 | T6510 T6511 | $t \leq 5$ | 540 | - | 485 | - | 8 | 6 |
| 7075 | T6510 T6511 | $5 < t \leq 10$ | 560 | - | 505 | - | 7 | 5 |
| 7075 | T6510 T6511 | $10 < t \leq 50$ | 560 | - | 495 | - | 6 | 4 |
| 7075 | T73[i] | $t \leq 5$ | 470 | - | 400 | - | 7 | 5 |
| 7075 | T73510[i] | $5 < t \leq 25$ | 485 | - | 420 | - | 8 | 6 |
| 7075 | T73511[i] | $25 < t \leq 50$ | 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 may 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 may 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 may 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 min. | max. | 0,2 % proof stress $R_{p0,2}$ MPa min. | max. | Elongation min. $A$ % | $A_{50mm}$ % |
|---|---|---|---|---|---|---|---|---|
| 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 | $t \leq 25$ | 370 | - | 230 | - | 11 | 10 |
| | T4511 | $25 < t \leq 75$ | 410 | - | 270 | - | 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 | $t \leq 25$ | 370 | - | 230 | - | 11 | 10 |
| | | $25 < t \leq 75$ | 410 | - | 270 | - | 10 | - |
| | T6 T6510 T6511 | $t \leq 25$ | 415 | - | 370 | - | 7 | 5 |
| | | $25 < t \leq 75$ | 460 | - | 415 | - | 7 | - |
| 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 | $t \le 30$ | 380 | - | 260 | - | 10 | 8 |
| 2024[c] | O[d] | All | - | 245 | - | 125 | - | 12 |
| | T3 | $t \le 5$ | 395 | - | 290 | - | - | 12 |
| | | $5 < t \le 15$ | 395 | - | 290 | - | - | 12 |
| | | $15 < t \le 30$ | 415 | - | 305 | - | 9 | - |
| | T3510 T3511 | $t \le 15$ | 395 | - | 290 | - | 8 | 6 |
| | | $15 < t \le 50$ | 420 | - | 290 | - | 8 | - |
| | T4 | $t \le 6$ | 390 | - | 295 | - | - | 12 |
| | | $6 < t \le 19$ | 410 | - | 305 | - | - | 12 |
| | | $19 < t \le 38$ | 450 | - | 315 | - | - | 10 |
| | | $38 < t, A \le 16\,000$ | 480 | - | 365 | - | - | 10 |
| | | $38 < t, 16\,000 < A \le 20\,000$ | 470 | - | 335 | - | - | 8 |
| | | $38 < t, 20\,000 < A \le 30\,000$ | 460 | - | 315 | - | - | 8 |
| | T42[e] | $t \le 19$ | 390 | - | 265 | - | - | 12 |
| | | $19 < t \le 38$ | 390 | - | 265 | - | - | 10 |
| | | $38 < t, A \le 16\,000$ | 390 | - | 265 | - | - | 10 |
| | | $38 < t, 16\,000 < A \le 20\,000$ | 390 | - | 265 | - | - | 8 |
| | T81 | $t \le 5$ | 440 | - | 385 | - | - | 4 |
| | | $5 < t \le 15$ | 440 | - | 385 | - | - | 4 |
| | | $15 < t \le 30$ | 450 | - | 400 | - | 4 | - |
| | T8 T8510 T8511 | $t \le 50$ | 455 | - | 380 | - | 5 | 4 |
| 2030 | T4 T4510 T4511 | $t \le 30$ | 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 | $t \le 20$ | 100 | 150 | 40 | - | 20 | 18 |
| 5019 | H112 | $t \le 30$ | 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 |

**17**

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

Not for Resale

**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 |

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**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] | $t \le 6$ | 540 | - | 480 | - | 6 | 7 |
| | | $6 < t \le 75$ | 560 | - | 500 | - | - | 7 |
| | | $75 < t \le 110, A \le 13\ 000$ | 560 | - | 490 | - | - | 7 |
| | | $75 < t \le 110, 13\ 000 < A \le 20\ 000$ | 540 | - | 480 | - | - | 6 |
| | | $110 < t \le 130, A \le 20\ 000$ | 540 | - | 470 | - | - | 6 |
| | T6510 | $t \le 25$ | 530 | - | 460 | - | 6 | 4 |
| | T6511 | $25 < t \le 60$ | 540 | - | 470 | - | 6 | - |
| | T73[n] T73510[n] T73511[n] | $t \le 30$ | 470 | - | 400 | - | 7 | - |

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

[b]   Electrical conductivity $\gamma \ge 35,4$ MS/m.

[c]   If a profile cross-section is comprised of 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 may 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 may 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 $\gamma \ge 30$ MS/m.

[i]   Electrical conductivity $\gamma \ge 32$ 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 may 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 may 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 or 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 |
| 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<br><br>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 |

**Table B.1** *(continued)*

| Temper | Description |
|---|---|
| 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<br><br>The products may 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<br><br>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.<br><br>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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Price based on 26 pages