



Designation: ~~B209M-07~~ Designation: B209M – 10

Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)¹

This standard is issued under the fixed designation B209M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This specification covers aluminum and aluminum alloy flat sheet, coiled sheet, and plate in the alloys (Note 1) and tempers shown in Tables 2 and 3, and in the following finishes:

1.1.1 Plate in all alloys and sheet in heat-treatable alloys: mill finish.

1.1.2 Sheet in nonheat-treatable alloys: mill finish, one-side bright mill finish, standard one-side bright finish, and standard two-sides bright finish.

1.2 Alloy and temper designations are in accordance with ANSI H35.1/H35.1(M). The equivalent Unified Numbering System (UNS) alloy designations are those of Table 1 preceded by A9, for example, A91100 for aluminum 1100 in accordance with Practice E527.

NOTE 1—Throughout this specification, use of the term *alloy* in the general sense includes aluminum as well as aluminum alloy.

NOTE 2—See Specification B632/B632M for Tread Plate.

NOTE 3—See Specification B928/B928M for 5xxx-H116 and 5xxx-H321 aluminum alloys containing 3 % or more nominal magnesium and intended for marine service and similar environments. Other alloy-temper products listed in Specification B209, which do not require the additional corrosion testing/capability called out in Specification B928/B928M, may be suitable for marine and similar environment applications.

~~1.3 This specification is the metric counterpart of Specification~~

1.3 This specification is the SI companion to Specification B209.

1.4 For acceptance criteria for inclusion of new aluminum and aluminum alloys in this specification, see Annex A2.

2. Referenced Documents

2.1 The following documents form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards*:²

B209 [Specification for Aluminum and Aluminum-Alloy Sheet and Plate](#)

B548 [Test Method for Ultrasonic Inspection of Aluminum-Alloy Plate for Pressure Vessels](#)

B557M [Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products \(Metric\)-10](#)

B594 [Practice for Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications](#)

B632/B632M [Specification for Aluminum-Alloy Rolled Tread Plate](#)

B660 [Practices for Packaging/Packing of Aluminum and Magnesium Products](#)

B666/B666M [Practice for Identification Marking of Aluminum and Magnesium Products](#)

B881 [Terminology Relating to Aluminum- and Magnesium-Alloy Products](#)

B918 [Practice for Heat Treatment of Wrought Aluminum Alloys](#)

B928/B928M [Specification for High Magnesium Aluminum-Alloy Sheet and Plate for Marine Service and Similar Environments](#)

B947 [Practice for Hot Rolling Mill Solution Heat Treatment for Aluminum Alloy Plate](#)

E29 [Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

E34 [Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys](#) ~~E55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition~~

E290 [Test Methods for Bend Testing of Material for Ductility](#)

¹ This specification is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard.

TABLE 1 Chemical Composition Limits^{A,B,C}

NOTE—In case there is a discrepancy in the values listed in Table 1 with those listed in the “International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys” (known as the “Teal Sheets”), the composition limits registered with the Aluminum Association and published in the “Teal Sheets” should be considered the controlling composition. The “Teal Sheets” are available at <http://www.aluminum.org/tealsheets>.

| Alloy | Silicon | Iron | Copper | Manga- nese | Magne- sium | Chro- mium | Zinc | Tita- nium | Other Elements ^D | | Alumi- num |
|-------------------|---------------------------|------|-----------|-------------------|----------------|-------------------|----------|---------------|-----------------------------|--------------------|------------------------|
| | | | | | | | | | Each | Total ^E | |
| 1060 | 0.25 | 0.35 | 0.05 | 0.03 | 0.03 | ... | 0.05 | 0.03 | 0.03 ^F | ... | 99.60 min ^G |
| 1100 | 0.95 Si + Fe | | 0.05–0.20 | 0.05 | ... | ... | 0.10 | ... | 0.05 | 0.15 | 99.00 min ^G |
| 1230 ^H | 0.70 Si + Fe | | 0.10 | 0.05 | 0.05 | ... | 0.10 | 0.03 | 0.03 ^F | ... | 99.30 min ^G |
| 2014 | 0.50–1.2 | 0.7 | 3.9–5.0 | 0.40–1.2 | 0.20–0.8 | 0.10 | 0.25 | 0.15 | 0.05 | 0.15 | remainder |
| Alclad 2014 | 2014 clad with 6003 alloy | | | | | | | | | | |
| 2024 | 0.50 | 0.50 | 3.8–4.9 | 0.30–0.9 | 1.2–1.8 | 0.10 | 0.25 | 0.15 | 0.05 | 0.15 | remainder |
| Alclad 2024 | 2024 clad with 1230 alloy | | | | | | | | | | |
| 2124 | 0.20 | 0.30 | 3.8–4.9 | 0.30–0.9 | 1.2–1.8 | 0.10 | 0.25 | 0.15 | 0.05 | 0.15 | remainder |
| 2219 | 0.20 | 0.30 | 5.8–6.8 | 0.20–0.40 | 0.02 | ... | 0.10 | 0.02–0.10 | 0.05 ^I | 0.15 ^I | remainder |
| Alclad 2219 | 2219 clad with 7072 alloy | | | | | | | | | | |
| 3003 | 0.6 | 0.7 | 0.05–0.20 | 1.0–1.5 | ... | ... | 0.10 | ... | 0.05 | 0.15 | remainder |
| Alclad 3003 | 3003 clad with 7072 alloy | | | | | | | | | | |
| 3004 | 0.30 | 0.7 | 0.25 | 1.0–1.5 | 0.8–1.3 | ... | 0.25 | ... | 0.05 | 0.15 | remainder |
| Alclad 3004 | 3004 clad with 7072 alloy | | | | | | | | | | |
| 3005 | 0.6 | 0.7 | 0.30 | 1.0–1.5 | 0.20–0.6 | 0.10 | 0.25 | 0.10 | 0.05 | 0.15 | remainder |
| 3105 | 0.6 | 0.7 | 0.30 | 0.30–0.8 | 0.20–0.8 | 0.20 | 0.40 | 0.10 | 0.05 | 0.15 | remainder |
| 5005 | 0.30 | 0.7 | 0.20 | 0.20 | 0.50–1.1 | 0.10 | 0.25 | ... | 0.05 | 0.15 | remainder |
| 5010 | 0.40 | 0.7 | 0.25 | 0.10–0.30 | 0.20–0.6 | 0.15 | 0.30 | 0.10 | 0.05 | 0.15 | remainder |
| 5050 | 0.40 | 0.7 | 0.20 | 0.10 | 1.1–1.8 | 0.10 | 0.25 | ... | 0.05 | 0.15 | remainder |
| 5052 | 0.25 | 0.40 | 0.10 | 0.10 | 2.2–2.8 | 0.15–0.35 | 0.10 | ... | 0.05 | 0.15 | remainder |
| 5059 | 0.45 | 0.50 | 0.25 | 0.6–1.2 | 5.0–6.0 | 0.25 | 0.40–0.9 | 0.20 | 0.05 ^J | 0.15 | remainder |
| 5083 | 0.40 | 0.40 | 0.10 | 0.40–1.0 | 4.0–4.9 | 0.05–0.25 | 0.25 | 0.15 | 0.05 | 0.15 | remainder |
| 5086 | 0.40 | 0.50 | 0.10 | 0.20–0.7 | 3.5–4.5 | 0.05–0.25 | 0.25 | 0.15 | 0.05 | 0.15 | remainder |
| 5154 | 0.25 | 0.40 | 0.10 | 0.10 | 3.1–3.9 | 0.15–0.35 | 0.20 | 0.20 | 0.05 | 0.15 | remainder |
| 5252 | 0.08 | 0.10 | 0.10 | 0.10 | 2.2–2.8 | ... | 0.05 | ... | 0.03 ^F | 0.10 ^F | remainder |
| 5254 | 0.45 Si + Fe | | 0.05 | 0.01 | 3.1–3.9 | 0.15–0.35 | 0.20 | 0.05 | 0.05 | 0.15 | remainder |
| 5454 | 0.25 | 0.40 | 0.10 | 0.50–1.0 | 2.4–3.0 | 0.05–0.20 | 0.25 | 0.20 | 0.05 | 0.15 | remainder |
| 5456 | 0.25 | 0.40 | 0.10 | 0.50–1.0 | 4.7–5.5 | 0.05–0.20 | 0.25 | 0.20 | 0.05 | 0.15 | remainder |
| 5457 | 0.08 | 0.10 | 0.20 | 0.15–0.45 | 0.8–1.2 | ... | 0.05 | ... | 0.03 ^F | 0.10 ^F | remainder |
| 5652 | —0.40 Si + Fe | | 0.04 | 0.04 | 2.2–2.8 | 0.15–0.35 | 0.10 | ... | 0.05 | 0.15 | remainder |
| 5657 | 0.08 | 0.10 | 0.10 | 0.03 | 0.6–1.0 | ... | 0.05 | ... | 0.02 ^K | 0.05 ^K | remainder |
| 5754 | 0.40 | 0.40 | 0.10 | 0.50 ^L | 2.6–3.6 | 0.30 ^L | 0.20 | 0.15 | 0.05 | 0.15 | remainder |
| 6003 ^H | 0.35–1.0 | 0.6 | 0.10 | 0.8 | 0.8–1.5 | 0.35 | 0.20 | 0.10 | 0.05 | 0.15 | remainder |
| 6013 | 0.6–1.0 | 0.50 | 0.6–1.1 | 0.20–0.8 | 0.8–1.2 | 0.10 | 0.25 | 0.10 | 0.05 | 0.15 | remainder |
| 6061 | 0.40–0.8 | 0.7 | 0.15–0.40 | 0.15 | 0.8–1.2 | 0.04–0.35 | 0.25 | 0.15 | 0.05 | 0.15 | remainder |
| Alclad 6061 | 6061 clad with 7072 alloy | | | | | | | | | | |
| 7009 ^H | 0.10 | 0.10 | 0.05 | 0.05 | 0.7–1.4 | 0.12–0.25 | 4.5–5.5 | 0.05 | 0.05 | 0.10 | remainder |
| 7072 ^H | 0.7 Si + Fe | | 0.10 | 0.10 | 0.10 | ... | 0.8–1.3 | ... | 0.05 | 0.15 | remainder |
| 7075 | 0.40 | 0.50 | 1.2–2.0 | 0.30 | 2.1–2.9 | 0.18–0.28 | 5.1–6.1 | 0.20 | 0.05 | 0.15 | remainder |
| Alclad 7075 | 7075 clad with 7072 alloy | | | | | | | | | | |
| 7009 Alclad 7075 | 7075 clad with 7009 alloy | | | | | | | | | | |
| 7178 | 0.40 | 0.50 | 1.6–2.4 | 0.30 | 2.4–3.1 | 0.18–0.28 | 6.3–7.3 | 0.20 | 0.05 | 0.15 | remainder |
| Alclad 7178 | 7178 clad with 7072 alloy | | | | | | | | | | |

^A Limits are in mass percent maximum unless shown as a range or stated otherwise.

^B Analysis shall be made for the elements for which limits are shown in this table.

^C For purposes of determining conformance to these limits, an observed value or a calculated value attained from analysis shall be rounded to the nearest unit in the last righthand place of figures used in expressing the specified limit, in accordance with the Rounding Method of Practice E29.

^D Others includes listed elements for which no specific limit is shown as well as unlisted metallic elements. The producer may analyze samples for trace elements not specified in the specification. However, such analysis is not required and may not cover all metallic Others elements. Should any analysis by the producer or the purchaser establish that an Others element exceeds the limit of Each or that the aggregate of several Others elements exceeds the limit of Total, the material shall be considered non-conforming. The Total for Other Elements does not include elements shown in the footnotes with specific composition limits.

^E Other Elements—Total shall be the sum of unspecified metallic elements 0.010 % or more, rounded to the second decimal before determining the sum.

^F Vanadium 0.05 max. The total for other elements does not include vanadium.

^G The aluminum content shall be calculated by subtracting from 100.00 % the sum of all metallic elements present in amounts of 0.010 % or more each, rounded to the second decimal before determining the sum.

^H Composition of cladding alloy as applied during the course of manufacture. Samples from finished sheet or plate shall not be required to conform to these limits.

^I Vanadium, 0.05–0.15, zirconium, 0.10–0.25. The total for other elements does not include vanadium and zirconium.

^J 0.05–0.25 Zr.

^K Gallium 0.03 max, vanadium 0.05 max. The total for other elements does not include vanadium and gallium.

^L 0.10–0.6 Mn + Cr.

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere

E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis

TABLE 2 Mechanical Property Limits for Nonheat-Treatable Alloys^{A,B}

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------|--------------------------------------|-------------------------|---------|-----------------------|-----|------------------------------------|-----|---------------------------------|----------------|--------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 1060 | O | 0.15 | 0.32 | 55 | 95 | 15 | ... | 15 | ... | ... |
| 1060 | O | 0.32 | 0.63 | 55 | 95 | 15 | ... | 18 | ... | ... |
| 1060 | O | 0.63 | 1.20 | 55 | 95 | 15 | ... | 23 | ... | ... |
| 1060 | O | 1.20 | 6.30 | 55 | 95 | 15 | ... | 25 | ... | ... |
| 1060 | O | 6.30 | 80.00 | 55 | 95 | 15 | ... | 25 | 22 | ... |
| 1060 | H12 ^D or H22 ^D | 0.40 | 0.63 | 75 | 110 | 60 | ... | 6 | ... | ... |
| 1060 | H12 ^D or H22 ^D | 0.63 | 1.20 | 75 | 110 | 60 | ... | 7 | ... | ... |
| 1060 | H12 ^D or H22 ^D | 1.20 | 6.30 | 75 | 110 | 60 | ... | 12 | ... | ... |
| 1060 | H12 ^D or H22 ^D | 6.30 | 50.00 | 75 | 110 | 60 | ... | 12 | 10 | ... |
| 1060 | H14 ^D or H24 ^D | 0.20 | 0.32 | 85 | 120 | 70 | ... | 1 | ... | ... |
| 1060 | H14 ^D or H24 ^D | 0.32 | 0.63 | 85 | 120 | 70 | ... | 2 | ... | ... |
| 1060 | H14 ^D or H24 ^D | 0.63 | 1.20 | 85 | 120 | 70 | ... | 6 | ... | ... |
| 1060 | H14 ^D or H24 ^D | 1.20 | 6.30 | 85 | 120 | 70 | ... | 10 | ... | ... |
| 1060 | H14 ^D or H24 ^D | 6.30 | 25.00 | 85 | 120 | 70 | ... | 10 | 9 | ... |
| 1060 | H16 ^D or H26 ^D | 0.15 | 0.32 | 95 | 130 | 75 | ... | 1 | ... | ... |
| 1060 | H16 ^D or H26 ^D | 0.32 | 0.63 | 95 | 130 | 75 | ... | 2 | ... | ... |
| 1060 | H16 ^D or H26 ^D | 0.63 | 1.20 | 95 | 130 | 75 | ... | 4 | ... | ... |
| 1060 | H16 ^D or H26 ^D | 1.20 | 4.00 | 95 | 130 | 75 | ... | 5 | ... | ... |
| 1060 | H18 ^D or H28 ^D | 0.15 | 0.32 | 110 | ... | 85 | ... | 1 | ... | ... |
| 1060 | H18 ^D or H28 ^D | 0.32 | 0.63 | 110 | ... | 85 | ... | 2 | ... | ... |
| 1060 | H18 ^D or H28 ^D | 0.63 | 1.20 | 110 | ... | 85 | ... | 3 | ... | ... |
| 1060 | H18 ^D or H28 ^D | 1.20 | 3.20 | 110 | ... | 85 | ... | 4 | ... | ... |
| 1060 | H112 | 6.30 | 12.50 | 75 | ... | ... | ... | 10 | ... | ... |
| 1060 | H112 | 12.50 | 40.00 | 70 | ... | ... | ... | ... | 18 | ... |
| 1060 | H112 | 40.00 | 80.00 | 60 | ... | ... | ... | ... | 22 | ... |
| 1060 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 1100 | O | 0.15 | 0.32 | 75 | 105 | 25 | ... | 15 | ... | 0 |
| 1100 | O | 0.32 | 0.63 | 75 | 105 | 25 | ... | 17 | ... | 0 |
| 1100 | O | 0.63 | 1.20 | 75 | 105 | 25 | ... | 22 | ... | 0 |
| 1100 | O | 1.20 | 6.30 | 75 | 105 | 25 | ... | 30 | ... | 0 |
| 1100 | O | 6.30 | 80.00 | 75 | 105 | 25 | ... | 28 | 25 | 0 |
| 1100 | H12 ^D or H22 ^D | 0.40 | 0.63 | 95 | 130 | 75 | ... | 3 | ... | 0 |
| 1100 | H12 ^D or H22 ^D | 0.63 | 1.20 | 95 | 130 | 75 | ... | 5 | ... | 0 |
| 1100 | H12 ^D or H22 ^D | 1.20 | 6.30 | 95 | 130 | 75 | ... | 8 | ... | 0 |
| 1100 | H12 ^D or H22 ^D | 6.30 | 12.50 | 95 | 130 | 75 | ... | 10 | 9 | 0 |
| 1100 | H12 ^D or H22 ^D | 12.50 | 50.00 | 95 | 130 | 75 | ... | 10 | 9 | ... |
| 1100 | H14 ^D or H24 ^D | 0.20 | 0.32 | 110 | 145 | 95 | ... | 1 | ... | 0 |
| 1100 | H14 ^D or H24 ^D | 0.32 | 0.63 | 110 | 145 | 95 | ... | 2 | ... | 0 |
| 1100 | H14 ^D or H24 ^D | 0.63 | 1.20 | 110 | 145 | 95 | ... | 3 | ... | 0 |
| 1100 | H14 ^D or H24 ^D | 1.20 | 6.30 | 110 | 145 | 95 | ... | 5 | ... | 0 |
| 1100 | H14 ^D or H24 ^D | 6.30 | 25.00 | 110 | 145 | 95 | ... | 7 | 6 | 0 |
| 1100 | H16 ^D or H26 ^D | 0.15 | 0.32 | 130 | 165 | 115 | ... | 1 | ... | 4 |
| 1100 | H16 ^D or H26 ^D | 0.32 | 0.63 | 130 | 165 | 115 | ... | 2 | ... | 4 |
| 1100 | H16 ^D or H26 ^D | 0.63 | 1.20 | 130 | 165 | 115 | ... | 3 | ... | 4 |
| 1100 | H16 ^D or H26 ^D | 1.20 | 4.00 | 130 | 165 | 115 | ... | 4 | ... | 4 |
| 1100 | H18 ^D or H28 ^D | 0.15 | 0.32 | 150 | ... | ... | ... | 1 | ... | ... |
| 1100 | H18 ^D or H28 ^D | 0.32 | 0.63 | 150 | ... | ... | ... | 1 | ... | ... |
| 1100 | H18 ^D or H28 ^D | 0.63 | 1.20 | 150 | ... | ... | ... | 2 | ... | ... |
| 1100 | H18 ^D or H28 ^D | 1.20 | 3.20 | 150 | ... | ... | ... | 4 | ... | ... |
| 1100 | H112 | 6.30 | 12.50 | 90 | ... | 50 | ... | 9 | ... | ... |
| 1100 | H112 | 12.50 | 40.00 | 85 | ... | 40 | ... | ... | 12 | ... |
| 1100 | H112 | 40.00 | 80.00 | 80 | ... | 30 | ... | ... | 18 | ... |
| 1100 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 3003 | O | 0.15 | 0.20 | 95 | 130 | 35 | ... | 14 | ... | 0 |
| 3003 | O | 0.20 | 0.32 | 95 | 130 | 35 | ... | 18 | ... | 0 |
| 3003 | O | 0.32 | 0.63 | 95 | 130 | 35 | ... | 20 | ... | 0 |
| 3003 | O | 0.63 | 1.20 | 95 | 130 | 35 | ... | 23 | ... | 0 |
| 3003 | O | 1.20 | 6.30 | 95 | 130 | 35 | ... | 25 | ... | 0 |
| 3003 | O | 6.30 | 80.00 | 95 | 130 | 35 | ... | 23 | 21 | ... |
| 3003 | H12 ^D or H22 ^D | 0.40 | 0.63 | 120 | 160 | 85 | ... | 3 | ... | 0 |
| 3003 | H12 ^D or H22 ^D | 0.63 | 1.20 | 120 | 160 | 85 | ... | 4 | ... | 0 |
| 3003 | H12 ^D or H22 ^D | 1.20 | 6.30 | 120 | 160 | 85 | ... | 6 | ... | 0 |
| 3003 | H12 ^D or H22 ^D | 6.30 | 50.00 | 120 | 160 | 85 | ... | 9 | 8 | ... |
| 3003 | H14 ^D or H24 ^D | 0.20 | 0.32 | 140 | 180 | 115 | ... | 1 | ... | 0 |
| 3003 | H14 ^D or H24 ^D | 0.32 | 0.63 | 140 | 180 | 115 | ... | 2 | ... | 0 |
| 3003 | H14 ^D or H24 ^D | 0.63 | 1.20 | 140 | 180 | 115 | ... | 3 | ... | 0 |

TABLE 2 Continued

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------------|--------------------------------------|----------------------------|---------|--------------------------|------------------|---------------------------------------|-----|------------------------------------|-------------------|--------------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 3003 | H14 ^D or H24 ^D | 1.20 | 3.20 | 140 | 180 | 115 | ... | 5 | ... | 0 |
| 3003 | H14 ^D or H24 ^D | 3.20 | 6.30 | 140 | 180 | 115 | ... | 5 | ... | 2 |
| 3003 | H14 ^D or H24 ^D | 6.30 | 25.00 | 140 | 180 | 115 | ... | 8 | 7 | ... |
| 3003 | H16 ^D or H26 ^D | 0.15 | 0.32 | 165 | 205 | 145 | ... | 1 | ... | 4 |
| 3003 | H16 ^D or H26 ^D | 0.32 | 0.63 | 165 | 205 | 145 | ... | 2 | ... | 4 |
| 3003 | H16 ^D or H26 ^D | 0.63 | 1.20 | 165 | 205 | 145 | ... | 3 | ... | 4 |
| 3003 | H16 ^D or H26 ^D | 1.20 | 4.00 | 165 | 205 | 145 | ... | 4 | ... | 6 |
| 3003 | H18 ^D or H28 ^D | 0.15 | 0.32 | 185 | ... | 165 | ... | 1 | ... | ... |
| 3003 | H18 ^D or H28 ^D | 0.32 | 0.63 | 185 | ... | 165 | ... | 1 | ... | ... |
| 3003 | H18 ^D or H28 ^D | 0.63 | 1.20 | 185 | ... | 165 | ... | 2 | ... | ... |
| 3003 | H18 ^D or H28 ^D | 1.20 | 3.20 | 185 | ... | 165 | ... | 4 | ... | ... |
| 3003 | H112 | 6.30 | 12.50 | 115 | ... | 70 | ... | 8 | ... | ... |
| 3003 | H112 | 12.50 | 40.00 | 105 | ... | 40 | ... | ... | 10 | ... |
| 3003 | H112 | 40.00 | 80.00 | 100 | ... | 40 | ... | ... | 16 | ... |
| 3003 | F ^F | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| Alclad 3003 | O | 0.15 | 0.32 | 90 | 125 | 30 | ... | 14 | ... | ... |
| Alclad 3003 | O | 0.32 | 0.63 | 90 | 125 | 30 | ... | 20 | ... | ... |
| Alclad 3003 | O | 0.63 | 1.20 | 90 | 125 | 30 | ... | 22 | ... | ... |
| Alclad 3003 | O | 1.20 | 6.30 | 90 | 125 | 30 | ... | 25 | ... | ... |
| Alclad 3003 | O | 6.30 | 12.50 | 90 | 125 | 30 | ... | 23 | ... | ... |
| Alclad 3003 | O | 12.50 | 80.00 | 95 ^F | 130 ^F | 35 ^F | ... | ... | 21 | ... |
| Alclad 3003 | H12 ^D or H22 ^D | 0.40 | 0.63 | 115 | 155 | 80 | ... | 4 | ... | ... |
| Alclad 3003 | H12 ^D or H22 ^D | 0.63 | 1.20 | 115 | 155 | 80 | ... | 5 | ... | ... |
| Alclad 3003 | H12 ^D or H22 ^D | 1.20 | 6.30 | 115 | 155 | 80 | ... | 6 | ... | ... |
| Alclad 3003 | H12 ^D or H22 ^D | 6.30 | 12.50 | 115 | 155 | 80 | ... | 9 | ... | ... |
| Alclad 3003 | H12 ^D or H22 ^D | 12.50 | 50.00 | 120 ^F | 160 ^F | 85 ^F | ... | ... | 8 | ... |
| Alclad 3003 | H14 ^D or H24 ^D | 0.20 | 0.32 | 135 | 175 | 110 | ... | 1 | ... | ... |
| Alclad 3003 | H14 ^D or H24 ^D | 0.32 | 0.63 | 135 | 175 | 110 | ... | 2 | ... | ... |
| Alclad 3003 | H14 ^D or H24 ^D | 0.63 | 1.20 | 135 | 175 | 110 | ... | 3 | ... | ... |
| Alclad 3003 | H14 ^D or H24 ^D | 1.20 | 6.30 | 135 | 175 | 110 | ... | 5 | ... | ... |
| Alclad 3003 | H14 ^D or H24 ^D | 6.30 | 12.50 | 135 | 175 | 110 | ... | 8 | ... | ... |
| Alclad 3003 | H14 ^D or H24 ^D | 12.50 | 25.00 | 140 ^F | 180 ^F | 115 ^F | ... | ... | 7 | ... |
| Alclad 3003 | H16 ^D or H26 ^D | 0.15 | 0.32 | 160 | 200 | 140 | ... | 1 | ... | ... |
| Alclad 3003 | H16 ^D or H26 ^D | 0.32 | 0.63 | 160 | 200 | 140 | ... | 2 | ... | ... |
| Alclad 3003 | H16 ^D or H26 ^D | 0.63 | 1.20 | 160 | 200 | 140 | ... | 3 | ... | ... |
| Alclad 3003 | H16 ^D or H26 ^D | 1.20 | 4.00 | 160 | 200 | 140 | ... | 4 | ... | ... |
| Alclad 3003 | H18 | 0.15 | 0.32 | 180 | ... | ... | ... | 1 | ... | ... |
| Alclad 3003 | H18 | 0.32 | 0.63 | 180 | ... | ... | ... | 1 | ... | ... |
| Alclad 3003 | H18 | 0.63 | 1.20 | 180 | ... | ... | ... | 2 | ... | ... |
| Alclad 3003 | H18 | 1.20 | 3.20 | 180 | ... | ... | ... | 4 | ... | ... |
| Alclad 3003 | H112 | 6.30 | 12.50 | 110 | ... | 65 | ... | 8 | ... | ... |
| Alclad 3003 | H112 | 12.50 | 40.00 | 105 ^F | ... | 40 ^F | ... | ... | 10 | ... |
| Alclad 3003 | H112 | 40.00 | 80.00 | 100 ^F | ... | 40 ^F | ... | ... | 16 | ... |
| Alclad 3003 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 3004 | O | 0.15 | 0.32 | 150 | 200 | 60 | ... | 9 | ... | 0 |
| 3004 | O | 0.32 | 0.63 | 150 | 200 | 60 | ... | 12 | ... | 0 |
| 3004 | O | 0.63 | 1.20 | 150 | 200 | 60 | ... | 15 | ... | 0 |
| 3004 | O | 1.20 | 6.30 | 150 | 200 | 60 | ... | 18 | ... | 0 |
| 3004 | O | 6.30 | 80.00 | 150 | 200 | 60 | ... | 16 | 14 | ... |
| 3004 | H32 ^D or H22 ^D | 0.40 | 0.63 | 190 | 240 | 145 | ... | 1 | ... | 0 |
| 3004 | H32 ^D or H22 ^D | 0.63 | 1.20 | 190 | 240 | 145 | ... | 3 | ... | 1 |
| 3004 | H32 ^D or H22 ^D | 1.20 | 3.20 | 190 | 240 | 145 | ... | 5 | ... | 2 |
| 3004 | H32 ^D or H22 ^D | 3.20 | 6.30 | 190 | 240 | 145 | ... | 5 | ... | ... |
| 3004 | H32 ^D or H22 ^D | 6.30 | 50.00 | 190 | 240 | 145 | ... | 6 | 5 | ... |
| 3004 | H34 ^D or H24 ^D | 0.20 | 0.32 | 220 | 265 | 170 | ... | 1 | ... | 2 |
| 3004 | H34 ^D or H24 ^D | 0.32 | 0.63 | 220 | 265 | 170 | ... | 2 | ... | 2 |
| 3004 | H34 ^D or H24 ^D | 0.63 | 1.20 | 220 | 265 | 170 | ... | 3 | ... | 3 |
| 3004 | H34 ^D or H24 ^D | 1.20 | 3.20 | 220 | 265 | 170 | ... | 4 | ... | 4 |
| 3004 | H34 ^D or H24 ^D | 3.20 | 6.30 | 220 | 265 | 170 | ... | 4 | ... | ... |
| 3004 | H34 ^D or H24 ^D | 6.30 | 25.00 | 220 | 265 | 170 | ... | 5 | 4 | ... |
| 3004 | H36 ^D or H26 ^D | 0.15 | 0.32 | 240 | 285 | 190 | ... | 1 | ... | 6 |
| 3004 | H36 ^D or H26 ^D | 0.32 | 0.63 | 240 | 285 | 190 | ... | 2 | ... | 6 |
| 3004 | H36 ^D or H26 ^D | 0.63 | 1.20 | 240 | 285 | 190 | ... | 3 | ... | 6 |
| 3004 | H36 ^D or H26 ^D | 1.20 | 4.00 | 240 | 285 | 190 | ... | 4 | ... | 8 |
| 3004 | H38 ^D or H28 ^D | 0.15 | 0.32 | 260 | ... | 215 | ... | ... | ... | ... |
| 3004 | H38 ^D or H28 ^D | 0.32 | 0.63 | 260 | ... | 215 | ... | 1 | ... | ... |
| 3004 | H38 ^D or H28 ^D | 0.63 | 1.20 | 260 | ... | 215 | ... | 2 | ... | ... |

TABLE 2 Continued

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2% offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------------|--------------------------------------|-------------------------|---------|-----------------------|------------------|-----------------------------------|-----|---------------------------------|----------------|--------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 3004 | H38 ^D or H28 ^D | 1.20 | 3.20 | 260 | ... | 215 | ... | 4 | ... | ... |
| 3004 | H112 | 6.30 | 12.50 | 160 | ... | 60 | ... | 7 | ... | ... |
| 3004 | H112 | 12.50 | 40.00 | 160 | ... | 60 | ... | ... | 6 | ... |
| 3004 | H112 | 40.00 | 80.00 | 160 | ... | 60 | ... | ... | 6 | ... |
| 3004 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| Alclad 3004 | O | 0.15 | 0.32 | 145 | 195 | 55 | ... | 9 | ... | ... |
| Alclad 3004 | O | 0.32 | 0.63 | 145 | 195 | 55 | ... | 12 | ... | ... |
| Alclad 3004 | O | 0.63 | 1.20 | 145 | 195 | 55 | ... | 15 | ... | ... |
| Alclad 3004 | O | 1.20 | 6.30 | 145 | 195 | 55 | ... | 18 | ... | ... |
| Alclad 3004 | O | 6.30 | 12.50 | 145 | 195 | 55 | ... | 16 | ... | ... |
| Alclad 3004 | O | 12.50 | 80.00 | 150 ^F | 200 ^F | 60 ^F | ... | ... | 14 | ... |
| Alclad 3004 | H32 ^D or H22 ^D | 0.40 | 0.63 | 185 | 235 | 140 | ... | 1 | ... | ... |
| Alclad 3004 | H32 ^D or H22 ^D | 0.63 | 1.20 | 185 | 235 | 140 | ... | 3 | ... | ... |
| Alclad 3004 | H32 ^D or H22 ^D | 1.20 | 6.30 | 185 | 235 | 140 | ... | 5 | ... | ... |
| Alclad 3004 | H32 ^D or H22 ^D | 6.30 | 12.50 | 185 | 235 | 140 | ... | 6 | ... | ... |
| Alclad 3004 | H32 ^D or H22 ^D | 12.50 | 50.00 | 190 ^F | 240 ^F | 145 ^F | ... | ... | 5 | ... |
| Alclad 3004 | H34 ^D or H24 ^D | 0.20 | 0.32 | 215 | 260 | 165 | ... | 1 | ... | ... |
| Alclad 3004 | H34 ^D or H24 ^D | 0.32 | 0.63 | 215 | 260 | 165 | ... | 2 | ... | ... |
| Alclad 3004 | H34 ^D or H24 ^D | 0.63 | 1.20 | 215 | 260 | 165 | ... | 3 | ... | ... |
| Alclad 3004 | H34 ^D or H24 ^D | 1.20 | 6.30 | 215 | 260 | 165 | ... | 4 | ... | ... |
| Alclad 3004 | H34 ^D or H24 ^D | 6.30 | 12.50 | 215 | 260 | 165 | ... | 5 | ... | ... |
| Alclad 3004 | H34 ^D or H24 ^D | 12.50 | 25.00 | 220 ^F | 265 ^F | 170 ^F | ... | ... | 4 | ... |
| Alclad 3004 | H36 ^D or H26 ^D | 0.15 | 0.32 | 235 | 280 | 185 | ... | 1 | ... | ... |
| Alclad 3004 | H36 ^D or H26 ^D | 0.32 | 0.63 | 235 | 280 | 185 | ... | 2 | ... | ... |
| Alclad 3004 | H36 ^D or H26 ^D | 0.63 | 1.20 | 235 | 280 | 185 | ... | 3 | ... | ... |
| Alclad 3004 | H36 ^D or H26 ^D | 1.20 | 4.00 | 235 | 280 | 185 | ... | 4 | ... | ... |
| Alclad 3004 | H38 | 0.15 | 0.32 | 255 | ... | ... | ... | ... | ... | ... |
| Alclad 3004 | H38 | 0.32 | 0.63 | 255 | ... | ... | ... | 1 | ... | ... |
| Alclad 3004 | H38 | 0.63 | 1.20 | 255 | ... | ... | ... | 2 | ... | ... |
| Alclad 3004 | H38 | 1.20 | 3.20 | 255 | ... | ... | ... | 4 | ... | ... |
| Alclad 3004 | H112 | 6.30 | 12.50 | 155 | ... | 55 | ... | 7 | ... | ... |
| Alclad 3004 | H112 | 12.50 | 40.00 | 160 ^F | ... | 60 ^F | ... | ... | 6 | ... |
| Alclad 3004 | H112 | 40.00 | 80.00 | 160 ^F | ... | 60 ^F | ... | ... | 6 | ... |
| Alclad 3004 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 3005 | O | 0.15 | 0.32 | 115 | 165 | 45 | ... | 10 | ... | ... |
| 3005 | O | 0.32 | 0.63 | 115 | 165 | 45 | ... | 14 | ... | ... |
| 3005 | O | 0.63 | 1.20 | 115 | 165 | 45 | ... | 17 | ... | ... |
| 3005 | O | 1.20 | 6.30 | 115 | 165 | 45 | ... | 20 | ... | ... |
| 3005 | H12 | 0.40 | 0.63 | 140 | 190 | 115 | ... | 1 | ... | ... |
| 3005 | H12 | 0.63 | 1.20 | 140 | 190 | 115 | ... | 2 | ... | ... |
| 3005 | H12 | 1.20 | 6.30 | 140 | 190 | 115 | ... | 3 | ... | ... |
| 3005 | H14 | 0.20 | 0.32 | 165 | 215 | 145 | ... | 1 | ... | ... |
| 3005 | H14 | 0.32 | 0.63 | 165 | 215 | 145 | ... | 1 | ... | ... |
| 3005 | H14 | 0.63 | 1.20 | 165 | 215 | 145 | ... | 2 | ... | ... |
| 3005 | H14 | 1.20 | 6.30 | 165 | 215 | 145 | ... | 3 | ... | ... |
| 3005 | H16 | 0.15 | 0.32 | 190 | 240 | 170 | ... | 1 | ... | ... |
| 3005 | H16 | 0.32 | 0.63 | 190 | 240 | 170 | ... | 1 | ... | ... |
| 3005 | H16 | 0.63 | 1.20 | 190 | 240 | 170 | ... | 2 | ... | ... |
| 3005 | H16 | 1.20 | 4.00 | 190 | 240 | 170 | ... | 2 | ... | ... |
| 3005 | H18 | 0.15 | 0.32 | 220 | ... | 200 | ... | 1 | ... | ... |
| 3005 | H18 | 0.32 | 0.63 | 220 | ... | 200 | ... | 1 | ... | ... |
| 3005 | H18 | 0.63 | 1.20 | 220 | ... | 200 | ... | 2 | ... | ... |
| 3005 | H18 | 1.20 | 3.20 | 220 | ... | 200 | ... | 2 | ... | ... |
| 3005 | H19 | 0.15 | 0.32 | 235 | ... | ... | ... | ... | ... | ... |
| 3005 | H19 | 0.32 | 0.63 | 235 | ... | ... | ... | 1 | ... | ... |
| 3005 | H19 | 0.63 | 1.20 | 235 | ... | ... | ... | 1 | ... | ... |
| 3005 | H19 | 1.20 | 1.60 | 235 | ... | ... | ... | 1 | ... | ... |
| 3005 | H25 | 0.15 | 0.32 | 180 | 235 | 150 | ... | 1 | ... | ... |
| 3005 | H25 | 0.32 | 0.63 | 180 | 235 | 150 | ... | 2 | ... | ... |
| 3005 | H25 | 0.63 | 1.20 | 180 | 235 | 150 | ... | 3 | ... | ... |
| 3005 | H25 | 1.20 | 2.00 | 180 | 235 | 150 | ... | 4 | ... | ... |
| 3005 | H27 | 0.15 | 0.32 | 205 | 260 | 175 | ... | 1 | ... | ... |
| 3005 | H27 | 0.32 | 0.63 | 205 | 260 | 175 | ... | 2 | ... | ... |
| 3005 | H27 | 0.63 | 1.20 | 205 | 260 | 175 | ... | 3 | ... | ... |
| 3005 | H27 | 1.20 | 2.00 | 205 | 260 | 175 | ... | 4 | ... | ... |
| 3005 | H28 | 0.15 | 0.32 | 215 | ... | 185 | ... | 1 | ... | ... |
| 3005 | H28 | 0.32 | 0.63 | 215 | ... | 185 | ... | 2 | ... | ... |

TABLE 2 *Continued*

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------|--------------------------------------|----------------------------|---------|--------------------------|-----|---------------------------------------|------|------------------------------------|-------------------|--------------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 3005 | H28 | 0.63 | 1.20 | 215 | ... | 185 | ... | 3 | ... | ... |
| 3005 | H28 | 1.20 | 2.00 | 215 | ... | 185 | ... | 4 | ... | ... |
| 3105 | O | 0.32 | 0.63 | 95 | 145 | 35 | | 16 | ... | ... |
| 3105 | O | 0.63 | 1.20 | 95 | 145 | 35 | ... | 19 | ... | ... |
| 3105 | O | 1.20 | 2.00 | 95 | 145 | 35 | ... | 20 | ... | ... |
| 3105 | H12 | 0.40 | 0.63 | 130 | 180 | 105 | ... | 1 | ... | ... |
| 3105 | H12 | 0.63 | 1.20 | 130 | 180 | 105 | ... | 2 | ... | ... |
| 3105 | H12 | 1.20 | 2.00 | 130 | 180 | 105 | ... | 3 | ... | ... |
| 3105 | H14 | 0.32 | 0.63 | 150 | 200 | 125 | ... | 1 | ... | ... |
| 3105 | H14 | 0.63 | 1.20 | 150 | 200 | 125 | ... | 2 | ... | ... |
| 3105 | H14 | 1.20 | 2.00 | 150 | 200 | 125 | ... | 2 | ... | ... |
| 3105 | H16 | 0.32 | 0.63 | 170 | 220 | 145 | ... | 1 | ... | ... |
| 3105 | H16 | 0.63 | 1.20 | 170 | 220 | 145 | ... | 1 | ... | ... |
| 3105 | H16 | 1.20 | 2.00 | 170 | 220 | 145 | ... | 2 | ... | ... |
| 3105 | H18 | 0.32 | 0.63 | 190 | ... | 165 | ... | 1 | ... | ... |
| 3105 | H18 | 0.63 | 1.20 | 190 | ... | 165 | ... | 1 | ... | ... |
| 3105 | H18 | 1.20 | 2.00 | 190 | ... | 165 | ... | 2 | ... | ... |
| 3105 | H22 | 0.32 | 0.50 | 130 | ... | 105 | ... | 3 | ... | ... |
| 3105 | H22 | 0.50 | 0.80 | 130 | ... | 105 | ... | 4 | ... | ... |
| 3105 | H22 | 0.80 | 1.20 | 130 | ... | 105 | ... | 5 | ... | ... |
| 3105 | H22 | 1.20 | 2.00 | 130 | ... | 105 | ... | 6 | ... | ... |
| 3105 | H24 | 0.32 | 0.50 | 150 | ... | 125 | ... | 2 | ... | ... |
| 3105 | H24 | 0.50 | 0.80 | 150 | ... | 125 | ... | 3 | ... | ... |
| 3105 | H24 | 0.80 | 1.20 | 150 | ... | 125 | ... | 4 | ... | ... |
| 3105 | H24 | 1.20 | 2.00 | 150 | ... | 125 | ... | 6 | ... | ... |
| 3105 | H25 | 0.32 | 0.63 | 160 | ... | 130 | ... | 2 | ... | ... |
| 3105 | H25 | 0.63 | 1.20 | 160 | ... | 130 | ... | 4 | ... | ... |
| 3105 | H25 | 1.20 | 2.00 | 160 | ... | 130 | ... | 6 | ... | ... |
| 3105 | H26 | 0.32 | 0.80 | 170 | ... | 145 | ... | 3 | ... | ... |
| 3105 | H26 | 0.80 | 1.20 | 170 | ... | 145 | ... | 4 | ... | ... |
| 3105 | H26 | 1.20 | 2.00 | 170 | ... | 145 | ... | 5 | ... | ... |
| 3105 | H28 | 0.32 | 0.80 | 190 | ... | 165 | ... | 2 | ... | ... |
| 3105 | H28 | 0.80 | 1.20 | 190 | ... | 165 | ... | 3 | ... | ... |
| 3105 | H28 | 1.20 | 2.00 | 190 | ... | 165 | ... | 4 | ... | ... |
| 5005 | O | 0.15 | 0.32 | 105 | 145 | 35 | ... | 12 | ... | ... |
| 5005 | O | 0.32 | 0.63 | 105 | 145 | 35 | ... | 16 | ... | ... |
| 5005 | O | 0.63 | 1.20 | 105 | 145 | 35 | ... | 19 | ... | ... |
| 5005 | O | 1.20 | 6.30 | 105 | 145 | 35 | ... | 21 | ... | ... |
| 5005 | O | 6.30 | 80.00 | 105 | 145 | 35 | ... | 22 | 20 | ... |
| 5005 | H12 | 0.40 | 0.63 | 125 | 165 | 95 | ... | 2 | ... | ... |
| 5005 | H12 | 0.63 | 1.20 | 125 | 165 | 95 | ... | 4 | ... | ... |
| 5005 | H12 | 1.20 | 6.30 | 125 | 165 | 95 | ... | 6 | ... | ... |
| 5005 | H12 | 6.30 | 50.00 | 125 | 165 | 95 | ... | 9 | 8 | ... |
| 5005 | H14 | 0.20 | 0.32 | 145 | 185 | 115 | ... | 1 | ... | ... |
| 5005 | H14 | 0.32 | 0.63 | 145 | 185 | 115 | ... | 1 | ... | ... |
| 5005 | H14 | 0.63 | 1.20 | 145 | 185 | 115 | ... | 2 | ... | ... |
| 5005 | H14 | 1.20 | 6.30 | 145 | 185 | 115 | ... | 3 | ... | ... |
| 5005 | H14 | 6.30 | 25.00 | 145 | 185 | 115 | ... | 8 | 7 | ... |
| 5005 | H16 | 0.15 | 0.32 | 165 | 205 | 135 | ... | 1 | ... | ... |
| 5005 | H16 | 0.32 | 0.63 | 165 | 205 | 135 | ... | 1 | ... | ... |
| 5005 | H16 | 0.63 | 1.20 | 165 | 205 | 135 | ... | 2 | ... | ... |
| 5005 | H16 | 1.20 | 4.00 | 165 | 205 | 135 | ... | 3 | ... | ... |
| 5005 | H18 | 0.15 | 0.32 | 185 | ... | ... | ... | 1 | ... | ... |
| 5005 | H18 | 0.32 | 0.63 | 185 | ... | ... | ... | 1 | ... | ... |
| 5005 | H18 | 0.63 | 1.20 | 185 | ... | ... | ... | 2 | ... | ... |
| 5005 | H18 | 1.20 | 3.20 | 185 | ... | ... | ... | 3 | ... | ... |
| 5005 | H32 ^D or H22 ^D | 0.40 | 0.63 | 120 | 160 | 85 | ... | 3 | ... | ... |
| 5005 | H32 ^D or H22 ^D | 0.63 | 1.20 | 120 | 160 | 85 | ... | 4 | ... | ... |
| 5005 | H32 ^D or H22 ^D | 1.20 | 6.30 | 120 | 160 | 85 | ... | 7 | ... | ... |
| 5005 | H32 ^D or H22 ^D | 6.30 | 50.00 | 120 | 160 | 85 | ... | 10 | 9 | ... |
| 5005 | H34 ^D or H24 ^D | 0.20 | 0.32 | 140 | 180 | 105 | ... | 2 | ... | ... |
| 5005 | H34 ^D or H24 ^D | 0.32 | 0.63 | 140 | 180 | 105 | ... | 3 | ... | ... |
| 5005 | H34 ^D or H24 ^D | 0.63 | 1.20 | 140 | 180 | 105 | ... | 4 | ... | ... |
| 5005 | H34 ^D or H24 ^D | 1.20 | 6.30 | 140 | 180 | 105 | ... | 5 | ... | ... |
| 5005 | H34 ^D or H24 ^D | 6.30 | 25.00 | 140 | 180 | 105 | ... | 8 | 7 | ... |
| 5005 | H36 ^D or H26 ^D | 0.15 | 0.32 | 160 | 200 | 125 | ... | 1 | ... | ... |
| 5005 | H36 ^D or H26 ^D | 0.32 | 0.63 | 160 | 200 | 125 | ... | 2 | ... | ... |

TABLE 2 *Continued*

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------|--------------------------------------|----------------------------|---------|--------------------------|-----|---------------------------------------|-----|------------------------------------|-------------------|--------------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 5005 | H36 ^D or H26 ^D | 0.63 | 1.20 | 160 | 200 | 125 | ... | 3 | ... | ... |
| 5005 | H36 ^D or H26 ^D | 1.20 | 4.00 | 160 | 200 | 125 | ... | 4 | ... | ... |
| 5005 | H38 | 0.15 | 0.32 | 180 | ... | ... | ... | 1 | ... | ... |
| 5005 | H38 | 0.32 | 0.63 | 180 | ... | ... | ... | 2 | ... | ... |
| 5005 | H38 | 0.63 | 1.20 | 180 | ... | ... | ... | 3 | ... | ... |
| 5005 | H38 | 1.20 | 3.20 | 180 | ... | ... | ... | 4 | ... | ... |
| 5005 | H112 | 6.30 | 12.50 | 115 | ... | ... | ... | 8 | ... | ... |
| 5005 | H112 | 12.50 | 40.00 | 105 | ... | ... | ... | ... | 10 | ... |
| 5005 | H112 | 40.00 | 80.00 | 100 | ... | ... | ... | ... | 16 | ... |
| 5005 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 5010 | O | 0.25 | 1.80 | 105 | 145 | 35 | ... | 3 | ... | ... |
| 5010 | H22 | 0.25 | 1.80 | 115 | 160 | 95 | ... | 2 | ... | ... |
| 5010 | H24 | 0.25 | 1.80 | 140 | 180 | 115 | ... | 1 | ... | ... |
| 5010 | H26 | 0.25 | 1.80 | 160 | 200 | 145 | ... | 1 | ... | ... |
| 5010 | H28 | 0.25 | 1.80 | 180 | ... | ... | ... | ... | ... | ... |
| 5050 | O | 0.15 | 0.32 | 125 | 165 | 40 | ... | 15 | ... | 0 |
| 5050 | O | 0.32 | 0.63 | 125 | 165 | 40 | ... | 17 | ... | 0 |
| 5050 | O | 0.63 | 1.20 | 125 | 165 | 40 | ... | 19 | ... | 0 |
| 5050 | O | 1.20 | 6.30 | 125 | 165 | 40 | ... | 20 | ... | 0 |
| 5050 | O | 6.30 | 80.00 | 125 | 165 | 40 | ... | 20 | 18 | 2 |
| 5050 | H32 ^D or H22 ^D | 0.40 | 0.63 | 150 | 195 | 110 | ... | 4 | ... | 1 |
| 5050 | H32 ^D or H22 ^D | 0.63 | 1.20 | 150 | 195 | 110 | ... | 5 | ... | 1 |
| 5050 | H32 ^D or H22 ^D | 1.20 | 6.30 | 150 | 195 | 110 | ... | 6 | ... | 2 |
| 5050 | H34 ^D or H24 ^D | 0.20 | 0.32 | 170 | 215 | 140 | ... | 3 | ... | 1 |
| 5050 | H34 ^D or H24 ^D | 0.32 | 0.63 | 170 | 215 | 140 | ... | 3 | ... | 1 |
| 5050 | H34 ^D or H24 ^D | 0.63 | 1.20 | 170 | 215 | 140 | ... | 4 | ... | 1 |
| 5050 | H34 ^D or H24 ^D | 1.20 | 6.30 | 170 | 215 | 140 | ... | 5 | ... | 3 |
| 5050 | H36 ^D or H26 ^D | 0.15 | 0.32 | 185 | 230 | 150 | ... | 2 | ... | 3 |
| 5050 | H36 ^D or H26 ^D | 0.32 | 0.63 | 185 | 230 | 150 | ... | 2 | ... | 3 |
| 5050 | H36 ^D or H26 ^D | 0.63 | 1.20 | 185 | 230 | 150 | ... | 3 | ... | 3 |
| 5050 | H36 ^D or H26 ^D | 1.20 | 4.00 | 185 | 230 | 150 | ... | 4 | ... | 4 |
| 5050 | H38 | 0.15 | 0.32 | 200 | ... | ... | ... | 1 | ... | ... |
| 5050 | H38 | 0.32 | 0.63 | 200 | ... | ... | ... | 2 | ... | ... |
| 5050 | H38 | 0.63 | 1.20 | 200 | ... | ... | ... | 3 | ... | ... |
| 5050 | H38 | 1.20 | 3.20 | 200 | ... | ... | ... | 4 | ... | ... |
| 5050 | H112 | 6.30 | 12.50 | 140 | ... | 55 | ... | 12 | ... | ... |
| 5050 | H112 | 12.50 | 40.00 | 140 | ... | 55 | ... | ... | 10 | ... |
| 5050 | H112 | 40.00 | 80.00 | 140 | ... | 55 | ... | ... | 10 | ... |
| 5050 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 5052 | O | 0.15 | 0.32 | 170 | 215 | 65 | ... | 13 | ... | 0 |
| 5052 | O | 0.32 | 0.63 | 170 | 215 | 65 | ... | 15 | ... | 0 |
| 5052 | O | 0.63 | 1.20 | 170 | 215 | 65 | ... | 17 | ... | 0 |
| 5052 | O | 1.20 | 6.30 | 170 | 215 | 65 | ... | 19 | ... | 0 |
| 5052 | O | 6.30 | 80.00 | 170 | 215 | 65 | ... | 18 | 16 | ... |
| 5052 | H141 | 2.00 | 5.00 | 245 | ... | 165 | ... | 6 | ... | ... |
| 5052 | H141 | 5.00 | 8.00 | 235 | ... | 165 | ... | 8 | ... | ... |
| 5052 | H32 ^D or H22 ^D | 0.40 | 0.63 | 215 | 265 | 160 | ... | 4 | ... | 0 |
| 5052 | H32 ^D or H22 ^D | 0.63 | 1.20 | 215 | 265 | 160 | ... | 5 | ... | 1 |
| 5052 | H32 ^D or H22 ^D | 1.20 | 3.20 | 215 | 265 | 160 | ... | 7 | ... | 2 |
| 5052 | H32 ^D or H22 ^D | 3.20 | 6.30 | 215 | 265 | 160 | ... | 7 | ... | 2 |
| 5052 | H32 ^D or H22 ^D | 6.30 | 50.00 | 215 | 265 | 160 | ... | 11 | 10 | 3 |
| 5052 | H34 ^D or H24 ^D | 0.20 | 0.32 | 235 | 285 | 180 | ... | 3 | ... | 1 |
| 5052 | H34 ^D or H24 ^D | 0.32 | 0.63 | 235 | 285 | 180 | ... | 3 | ... | 1 |
| 5052 | H34 ^D or H24 ^D | 0.63 | 1.20 | 235 | 285 | 180 | ... | 4 | ... | 2 |
| 5052 | H34 ^D or H24 ^D | 1.20 | 3.20 | 235 | 285 | 180 | ... | 6 | ... | 3 |
| 5052 | H34 ^D or H24 ^D | 3.20 | 6.30 | 235 | 285 | 180 | ... | 6 | ... | 4 |
| 5052 | H34 ^D or H24 ^D | 6.30 | 25.00 | 235 | 285 | 180 | ... | 10 | 9 | ... |
| 5052 | H36 ^D or H26 ^D | 0.15 | 0.32 | 255 | 305 | 200 | ... | 2 | ... | 4 |
| 5052 | H36 ^D or H26 ^D | 0.32 | 0.63 | 255 | 305 | 200 | ... | 3 | ... | 4 |
| 5052 | H36 ^D or H26 ^D | 0.63 | 1.20 | 255 | 305 | 200 | ... | 4 | ... | 5 |
| 5052 | H36 ^D or H26 ^D | 1.20 | 4.00 | 255 | 305 | 200 | ... | 4 | ... | 5 |
| 5052 | H38 ^D or H28 ^D | 0.15 | 0.32 | 270 | ... | 220 | ... | 2 | ... | ... |
| 5052 | H38 ^D or H28 ^D | 0.32 | 0.63 | 270 | ... | 220 | ... | 3 | ... | ... |
| 5052 | H38 ^D or H28 ^D | 0.63 | 1.20 | 270 | ... | 220 | ... | 4 | ... | ... |
| 5052 | H38 ^D or H28 ^D | 1.20 | 3.20 | 270 | ... | 220 | ... | 4 | ... | ... |

TABLE 2 *Continued*

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------|--------------------------------------|----------------------------|---------|--------------------------|-----|---------------------------------------|-----|------------------------------------|-------------------|--------------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 5052 | H112 | 6.30 | 12.50 | 190 | ... | 110 | ... | 7 | ... | ... |
| 5052 | H112 | 12.50 | 40.00 | 170 | ... | 65 | ... | ... | 10 | ... |
| 5052 | H112 | 40.00 | 80.00 | 170 | ... | 65 | ... | ... | 14 | ... |
| 5052 | H322 | 0.50 | 1.20 | 215 | 240 | 145 | ... | 5 | ... | ... |
| 5052 | H322 | 1.20 | 2.90 | 215 | 240 | 145 | ... | 7 | ... | ... |
| 5052 | H322 | 2.90 | 3.20 | 215 | 240 | 145 | ... | 9 | ... | ... |
| 5052 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 5059 | O | 1.99 | 6.30 | 330 | ... | 160 | ... | 24 | ... | ... |
| 5059 | O | 6.30 | 12.50 | 330 | ... | 160 | ... | 24 | ... | ... |
| 5059 | O | 12.50 | 20.00 | 330 | ... | 160 | ... | ... | 24 | ... |
| 5059 | O | 20.00 | 40.00 | 330 | ... | 160 | ... | ... | 20 | ... |
| 5059 | O | 40.00 | 180.00 | 300 | ... | 145 | ... | ... | 17 | ... |
| 5059 | H111 | 1.99 | 6.30 | 330 | ... | 160 | ... | 24 | ... | ... |
| 5059 | H111 | 6.30 | 12.50 | 330 | ... | 160 | ... | 24 | ... | ... |
| 5059 | H111 | 12.50 | 20.00 | 330 | ... | 160 | ... | ... | 24 | ... |
| 5059 | H111 | 20.00 | 40.00 | 330 | ... | 160 | ... | ... | 20 | ... |
| 5059 | H111 | 40.00 | 180.00 | 300 | ... | 145 | ... | ... | 17 | ... |
| 5059 | F ^E | 6.30 | 200.00 | ... | ... | ... | ... | ... | ... | ... |
| 5083 | O | 1.25 | 6.30 | 275 | 350 | 125 | 200 | 16 | ... | ... |
| 5083 | O | 6.30 | 80.00 | 270 | 345 | 115 | 200 | 16 | 14 | ... |
| 5083 | O | 80.00 | 120.00 | 260 | ... | 110 | ... | ... | 12 | ... |
| 5083 | O | 120.00 | 160.00 | 255 | ... | 105 | ... | ... | 12 | ... |
| 5083 | O | 160.00 | 200.00 | 250 | ... | 100 | ... | ... | 10 | ... |
| 5083 | H112 | 6.30 | 12.50 | 275 | ... | 125 | ... | 12 | ... | ... |
| 5083 | H112 | 12.50 | 40.00 | 275 | ... | 125 | ... | ... | 10 | ... |
| 5083 | H112 | 40.00 | 80.00 | 270 | ... | 115 | ... | ... | 10 | ... |
| 5083 | H32 | 3.20 | 5.00 | 305 | 385 | 215 | ... | 10 | ... | ... |
| 5083 | H32 | 5.00 | 12.50 | 305 | 385 | 215 | ... | 12 | ... | ... |
| 5083 | H32 | 12.50 | 40.00 | 305 | 385 | 215 | ... | ... | 10 | ... |
| 5083 | H32 | 40.00 | 80.00 | 285 | 385 | 200 | ... | ... | 10 | ... |
| 5083 | F ^E | 6.30 | 200.00 | ... | ... | ... | ... | ... | ... | ... |
| 5086 | O | 0.50 | 0.63 | 240 | 305 | 95 | ... | 15 | ... | ... |
| 5086 | O | 0.63 | 1.20 | 240 | 305 | 95 | ... | 16 | ... | ... |
| 5086 | O | 1.20 | 6.30 | 240 | 305 | 95 | ... | 18 | ... | ... |
| 5086 | O | 6.30 | 50.00 | 240 | 305 | 95 | ... | 16 | 14 | ... |
| 5086 | H32 ^D or H22 ^D | 0.50 | 0.63 | 275 | 325 | 195 | ... | 6 | ... | ... |
| 5086 | H32 ^D or H22 ^D | 0.63 | 1.20 | 275 | 325 | 195 | ... | 6 | ... | ... |
| 5086 | H32 ^D or H22 ^D | 1.20 | 6.30 | 275 | 325 | 195 | ... | 8 | ... | ... |
| 5086 | H32 ^D or H22 ^D | 6.30 | 50.00 | 275 | 325 | 195 | ... | 12 | 10 | ... |
| 5086 | H34 ^D or H24 ^D | 0.20 | 0.32 | 300 | 350 | 235 | ... | 4 | ... | ... |
| 5086 | H34 ^D or H24 ^D | 0.32 | 0.63 | 300 | 350 | 235 | ... | 4 | ... | ... |
| 5086 | H34 ^D or H24 ^D | 0.63 | 1.20 | 300 | 350 | 235 | ... | 5 | ... | ... |
| 5086 | H34 ^D or H24 ^D | 1.20 | 6.30 | 300 | 350 | 235 | ... | 6 | ... | ... |
| 5086 | H34 ^D or H24 ^D | 6.30 | 25.00 | 300 | 350 | 235 | ... | 10 | 9 | ... |
| 5086 | H36 ^D or H26 ^D | 0.15 | 0.32 | 325 | 375 | 260 | ... | 3 | ... | ... |
| 5086 | H36 ^D or H26 ^D | 0.32 | 0.63 | 325 | 375 | 260 | ... | 3 | ... | ... |
| 5086 | H36 ^D or H26 ^D | 0.63 | 1.20 | 325 | 375 | 260 | ... | 4 | ... | ... |
| 5086 | H36 ^D or H26 ^D | 1.20 | 4.00 | 325 | 375 | 260 | ... | 6 | ... | ... |
| 5086 | H38 ^D or H28 ^D | 0.15 | 0.63 | 345 | ... | 285 | ... | 3 | ... | ... |
| 5086 | H112 | 4.00 | 12.50 | 250 | ... | 125 | ... | 8 | ... | ... |
| 5086 | H112 | 12.50 | 40.00 | 240 | ... | 105 | ... | ... | 9 | ... |
| 5086 | H112 | 40.00 | 80.00 | 235 | ... | 95 | ... | ... | 12 | ... |
| 5086 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 5154 | O | 0.50 | 0.63 | 205 | 285 | 75 | ... | 12 | ... | ... |
| 5154 | O | 0.63 | 1.20 | 205 | 285 | 75 | ... | 13 | ... | ... |
| 5154 | O | 1.20 | 6.30 | 205 | 285 | 75 | ... | 16 | ... | ... |
| 5154 | O | 6.30 | 80.00 | 205 | 285 | 75 | ... | 18 | 16 | ... |
| 5154 | H32 ^D or H22 ^D | 0.50 | 0.63 | 250 | 300 | 180 | ... | 5 | ... | ... |
| 5154 | H32 ^D or H22 ^D | 0.63 | 1.20 | 250 | 300 | 180 | ... | 6 | ... | ... |
| 5154 | H32 ^D or H22 ^D | 1.20 | 6.30 | 250 | 300 | 180 | ... | 8 | ... | ... |
| 5154 | H32 ^D or H22 ^D | 6.30 | 50.00 | 250 | 300 | 180 | ... | 12 | 10 | ... |
| 5154 | H34 ^D or H24 ^D | 0.20 | 0.32 | 270 | 320 | 200 | ... | 4 | ... | ... |
| 5154 | H34 ^D or H24 ^D | 0.32 | 0.63 | 270 | 320 | 200 | ... | 4 | ... | ... |

TABLE 2 Continued

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------|--------------------------------------|----------------------------|---------|--------------------------|-----|---------------------------------------|-----|------------------------------------|-------------------|--------------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 5154 | H34 ^D or H24 ^D | 0.63 | 1.20 | 270 | 320 | 200 | ... | 5 | ... | ... |
| 5154 | H34 ^D or H24 ^D | 1.20 | 6.30 | 270 | 320 | 200 | ... | 6 | ... | ... |
| 5154 | H34 ^D or H24 ^D | 6.30 | 25.00 | 270 | 320 | 200 | ... | 10 | 9 | ... |
| 5154 | H36 ^D or H26 ^D | 0.15 | 0.32 | 290 | 340 | 220 | ... | 3 | ... | ... |
| 5154 | H36 ^D or H26 ^D | 0.32 | 0.63 | 290 | 340 | 220 | ... | 3 | ... | ... |
| 5154 | H36 ^D or H26 ^D | 0.63 | 1.20 | 290 | 340 | 220 | ... | 4 | ... | ... |
| 5154 | H36 ^D or H26 ^D | 1.20 | 4.00 | 290 | 340 | 220 | ... | 4 | ... | ... |
| 5154 | H38 ^D or H28 ^D | 0.15 | 0.32 | 310 | ... | 240 | ... | 3 | ... | ... |
| 5154 | H38 ^D or H28 ^D | 0.32 | 0.63 | 310 | ... | 240 | ... | 3 | ... | ... |
| 5154 | H38 ^D or H28 ^D | 0.63 | 1.20 | 310 | ... | 240 | ... | 3 | ... | ... |
| 5154 | H38 ^D or H28 ^D | 1.20 | 3.20 | 310 | ... | 240 | ... | 4 | ... | ... |
| 5154 | H112 | 6.30 | 12.50 | 220 | ... | 125 | ... | 8 | ... | ... |
| 5154 | H112 | 12.50 | 40.00 | 210 | ... | 90 | ... | ... | 9 | ... |
| 5154 | H112 | 40.00 | 80.00 | 205 | ... | 75 | ... | ... | 13 | ... |
| 5154 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 5252 | H24 | 0.63 | 2.50 | 205 | 260 | ... | ... | 10 | ... | ... |
| 5252 | H25 | 0.63 | 2.50 | 215 | 270 | ... | ... | 9 | ... | ... |
| 5252 | H28 | 0.63 | 2.50 | 260 | ... | ... | ... | 3 | ... | ... |
| 5254 | O | 0.50 | 0.63 | 205 | 285 | 75 | ... | 12 | ... | ... |
| 5254 | O | 0.63 | 1.20 | 205 | 285 | 75 | ... | 13 | ... | ... |
| 5254 | O | 1.20 | 6.30 | 205 | 285 | 75 | ... | 16 | ... | ... |
| 5254 | O | 6.30 | 80.00 | 205 | 285 | 75 | ... | 18 | 16 | ... |
| 5254 | H32 ^D or H22 ^D | 0.50 | 0.63 | 250 | 300 | 180 | ... | 5 | ... | ... |
| 5254 | H32 ^D or H22 ^D | 0.63 | 1.20 | 250 | 300 | 180 | ... | 6 | ... | ... |
| 5254 | H32 ^D or H22 ^D | 1.20 | 6.30 | 250 | 300 | 180 | ... | 8 | ... | ... |
| 5254 | H32 ^D or H22 ^D | 6.30 | 50.00 | 250 | 300 | 180 | ... | 12 | 10 | ... |
| 5254 | H34 ^D or H24 ^D | 0.20 | 0.32 | 270 | 320 | 200 | ... | 4 | ... | ... |
| 5254 | H34 ^D or H24 ^D | 0.32 | 0.63 | 270 | 320 | 200 | ... | 4 | ... | ... |
| 5254 | H34 ^D or H24 ^D | 0.63 | 1.20 | 270 | 320 | 200 | ... | 5 | ... | ... |
| 5254 | H34 ^D or H24 ^D | 1.20 | 6.30 | 270 | 320 | 200 | ... | 6 | ... | ... |
| 5254 | H34 ^D or H24 ^D | 6.30 | 25.00 | 270 | 320 | 200 | ... | 10 | 9 | ... |
| 5254 | H36 ^D or H26 ^D | 0.15 | 0.32 | 290 | 340 | 220 | ... | 3 | ... | ... |
| 5254 | H36 ^D or H26 ^D | 0.32 | 0.63 | 290 | 340 | 220 | ... | 3 | ... | ... |
| 5254 | H36 ^D or H26 ^D | 0.63 | 1.20 | 290 | 340 | 220 | ... | 4 | ... | ... |
| 5254 | H36 ^D or H26 ^D | 1.20 | 4.00 | 290 | 340 | 220 | ... | 4 | ... | ... |
| 5254 | H38 ^D or H28 ^D | 0.15 | 0.32 | 310 | ... | 240 | ... | 3 | ... | ... |
| 5254 | H38 ^D or H28 ^D | 0.32 | 0.63 | 310 | ... | 240 | ... | 3 | ... | ... |
| 5254 | H38 ^D or H28 ^D | 0.63 | 1.20 | 310 | ... | 240 | ... | 3 | ... | ... |
| 5254 | H38 ^D or H28 ^D | 1.20 | 3.20 | 310 | ... | 240 | ... | 4 | ... | ... |
| 5254 | H112 | 6.30 | 12.50 | 220 | ... | 125 | ... | 8 | ... | ... |
| 5254 | H112 | 12.50 | 40.00 | 210 | ... | 90 | ... | ... | 9 | ... |
| 5254 | H112 | 40.00 | 80.00 | 205 | ... | 75 | ... | ... | 13 | ... |
| 5254 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 5454 | O | 0.50 | 0.63 | 215 | 285 | 85 | ... | 12 | ... | ... |
| 5454 | O | 0.63 | 1.20 | 215 | 285 | 85 | ... | 13 | ... | ... |
| 5454 | O | 1.20 | 6.30 | 215 | 285 | 85 | ... | 16 | ... | ... |
| 5454 | O | 6.30 | 80.00 | 215 | 285 | 85 | ... | 18 | 16 | ... |
| 5454 | H32 ^D or H22 ^D | 0.50 | 0.63 | 250 | 305 | 180 | ... | 5 | ... | ... |
| 5454 | H32 ^D or H22 ^D | 0.63 | 1.20 | 250 | 305 | 180 | ... | 6 | ... | ... |
| 5454 | H32 ^D or H22 ^D | 1.20 | 6.30 | 250 | 305 | 180 | ... | 8 | ... | ... |
| 5454 | H32 ^D or H22 ^D | 6.30 | 50.00 | 250 | 305 | 180 | ... | 12 | 10 | ... |
| 5454 | H34 ^D or H24 ^D | 0.50 | 0.63 | 270 | 325 | 200 | ... | 4 | ... | ... |
| 5454 | H34 ^D or H24 ^D | 0.63 | 1.20 | 270 | 325 | 200 | ... | 5 | ... | ... |
| 5454 | H34 ^D or H24 ^D | 1.20 | 6.30 | 270 | 325 | 200 | ... | 6 | ... | ... |
| 5454 | H34 ^D or H24 ^D | 6.30 | 25.00 | 270 | 325 | 200 | ... | 10 | 9 | ... |
| 5454 | H112 | 6.30 | 12.50 | 220 | ... | 125 | ... | 8 | ... | ... |
| 5454 | H112 | 12.50 | 40.00 | 215 | ... | 85 | ... | ... | 9 | ... |
| 5454 | H112 | 40.00 | 80.00 | 215 | ... | 85 | ... | ... | 13 | ... |
| 5454 | F ^E | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... | ... |
| 5754 | O | 0.75 | 1.40 | 200 | 270 | 80 | ... | 17 | ... | ... |
| 5754 | O | 1.40 | 2.20 | 200 | 270 | 80 | ... | 18 | ... | ... |
| 5754 | O | 2.20 | 3.50 | 200 | 270 | 80 | ... | 19 | ... | ... |

TABLE 2 *Continued*

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, min, % ^C | | Bend Diameter Factor, <i>N</i> |
|-------|-------------------|----------------------------|---------|--------------------------|-----|---------------------------------------|-----|------------------------------------|-------------------|--------------------------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter | |
| 5456 | O | 1.20 | 6.30 | 290 | 365 | 130 | 205 | 16 | ... | ... |
| 5456 | O | 6.30 | 80.00 | 285 | 360 | 125 | 205 | 16 | 14 | ... |
| 5456 | O | 80.00 | 120.00 | 275 | ... | 120 | ... | ... | 12 | ... |
| 5456 | O | 120.00 | 160.00 | 270 | ... | 115 | ... | ... | 12 | ... |
| 5456 | O | 160.00 | 200.00 | 265 | ... | 105 | ... | ... | 10 | ... |
| 5456 | H112 | 6.30 | 12.50 | 290 | ... | 130 | ... | 12 | ... | ... |
| 5456 | H112 | 12.50 | 40.00 | 290 | ... | 130 | ... | ... | 10 | ... |
| 5456 | H112 | 40.00 | 80.00 | 285 | ... | 125 | ... | ... | 10 | ... |
| 5456 | H32 | 4.00 | 12.50 | 315 | 405 | 230 | ... | 12 | ... | ... |
| 5456 | H32 | 12.50 | 40.00 | 305 | 385 | 215 | ... | ... | 10 | ... |
| 5456 | H32 | 40.00 | 80.00 | 285 | 370 | 200 | ... | ... | 10 | ... |
| 5456 | F ^E | 6.30 | 200.00 | ... | ... | ... | ... | ... | ... | ... |
| 5457 | O | 0.63 | 2.50 | 110 | 150 | ... | ... | 20 | ... | ... |
| 5657 | H241 ^G | 0.63 | 2.50 | 125 | 180 | ... | ... | 13 | ... | ... |
| 5657 | H25 | 0.63 | 2.50 | 140 | 195 | ... | ... | 8 | ... | ... |
| 5657 | H26 | 0.63 | 2.50 | 150 | 205 | ... | ... | 7 | ... | ... |
| 5657 | H28 | 0.63 | 2.50 | 170 | ... | ... | ... | 5 | ... | ... |

^A To determine conformance to this specification, each value for tensile strength and for yield strength shall be rounded to the nearest 1 MPa and each value for elongation to the nearest 0.5 %, both in accordance with the Rounding Method of Practice E29.

^B The basis for establishment of mechanical property limits is shown in Annex A1.

^C Elongations in 50 mm apply for thicknesses up through 12.50 mm and in 5× diameter for thicknesses over 12.50 mm.

^D Materials in either of these tempers, (H32 or H22), (H34 or H24), (H36 or H26), (H38 or H28), (H12 or H22), (H14 or H24), (H16 or H26), (H18 or H28), may be supplied at the option of the supplier, unless one is specifically excluded by the contract or purchase order. When ordered as H2X tempers, the maximum tensile strength and minimum yield strength do not apply. When H2X tempers are supplied instead of ordered H1X or H3X tempers, the supplied H2X temper material shall meet the respective H1X or H3X temper tensile property limits.

^E Tests of F temper plate for tensile properties are not required.

^F The tension test specimen from plate over 12.50 mm in thickness is machined from the core and does not include the cladding alloy.

^G This material is subject to some recrystallization and an attendant loss of brightness.

E1004 Test Method for Determining Electrical Conductivity Using the Electromagnetic (Eddy-Current) Method

E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry

G34 Test Method for Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)

G47 Test Method for Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products

2.3 ISO Standards:³

ISO209-1 Wrought Aluminum and Aluminum Alloys-Chemical Composition and Forms of Product

ISO2107 Aluminum, ISO2107 Aluminum, Magnesium and their Alloys-Temper Designation

ISO6361-2 Wrought Aluminum and Aluminum Alloys, Sheets, Strips, and Plates

2.4 ANSI Standards:⁴

H35.1/H35.1(M) Alloy and Temper Designation Systems for Aluminum

H35.2M Dimensional Tolerances for Aluminum Mill Products

2.5 AMS Specification:⁵

AMS 2772 Heat Treatment of Aluminum Alloy Raw Materials

2.6 Other Standards:⁶

CEN EN 14242 Aluminum and aluminum alloys. Chemical analysis. Inductively coupled plasma optical emission spectral analysis

3. Terminology

3.1 Definitions:

3.2 Refer to Terminology B881 for definitions of product terms used in this specification.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available in the Related Materials section (gray pages) of the *Annual Book of ASTM Standards*, Vol 02.02.

⁴ Available from Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, <http://www.aluminum.org>.

⁵ Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

⁶ For informational purposes, refer to "Statistical Aspects of Mechanical Property Assurance" in the Related Material section of the *Annual Book of ASTM Standards*, Vol 02.02.

⁶ Available from European Committee for Standardization (CEN), 36 rue de Stassart, B-1050, Brussels, Belgium, <http://www.cen.eu/esearch>.

TABLE 3 Tensile Property Limits for Heat-Treatable Alloys^{A,B}

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, ^C min, % | |
|-------------|--------------------------------------|----------------------------|---------|--------------------------|------------------|---------------------------------------|-----|------------------------------------|-------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter |
| 2014 | O | 0.50 | 12.50 | ... | 220 | ... | 110 | 16 | ... |
| 2014 | O | 12.50 | 25.00 | ... | 220 | ... | ... | ... | 9 |
| 2014 | T3 | 0.50 | 1.00 | 405 | ... | 240 | ... | 14 | ... |
| 2014 | T3 | 1.00 | 6.30 | 405 | ... | 250 | ... | 14 | ... |
| 2014 | T4 ^D | 0.50 | 6.30 | 405 | ... | 240 | ... | 14 | ... |
| 2014 | T451 ^E | 6.30 | 12.50 | 400 | ... | 250 | ... | 14 | ... |
| 2014 | T451 ^E | 12.50 | 25.00 | 400 | ... | 250 | ... | ... | 12 |
| 2014 | T451 ^E | 25.00 | 50.00 | 400 | ... | 250 | ... | ... | 10 |
| 2014 | T451 ^E | 50.00 | 80.00 | 395 | ... | 250 | ... | ... | 7 |
| 2014 | T42 ^F | 0.50 | 12.50 | 400 | ... | 235 | ... | 14 | ... |
| 2014 | T42 ^F | 12.50 | 25.00 | 400 | ... | 235 | ... | ... | 12 |
| 2014 | T6, T62 ^F | 0.50 | 1.00 | 440 | ... | 395 | ... | 6 | ... |
| 2014 | T6, T62 ^F | 1.00 | 6.30 | 455 | ... | 400 | ... | 7 | ... |
| 2014 | T6 ^F , T651 ^E | 6.30 | 12.50 | 460 | ... | 405 | ... | 7 | ... |
| 2014 | T6 ^F , T651 ^E | 12.50 | 25.00 | 460 | ... | 405 | ... | ... | 5 |
| 2014 | T6 ^F , T651 ^E | 25.00 | 50.00 | 460 | ... | 405 | ... | ... | 3 |
| 2014 | T6 ^F , T651 ^E | 50.00 | 60.00 | 450 | ... | 400 | ... | ... | 1 |
| 2014 | T6 ^F , T651 ^E | 60.00 | 80.00 | 435 | ... | 395 | ... | ... | 1 |
| 2014 | T6 ^F , T651 ^E | 80.00 | 100.00 | 405 | ... | 380 | ... | ... | ... |
| 2014 | F ^G | 6.30 | 25.00 | ... | ... | ... | ... | ... | ... |
| Alclad 2014 | O | 0.50 | 0.63 | ... | 205 | ... | 95 | 16 | ... |
| Alclad 2014 | O | 0.63 | 1.00 | ... | 205 | ... | 95 | 16 | ... |
| Alclad 2014 | O | 1.00 | 2.50 | ... | 205 | ... | 95 | 16 | ... |
| Alclad 2014 | O | 2.50 | 12.50 | ... | 205 | ... | 95 | 16 | ... |
| Alclad 2014 | O | 12.50 | 25.00 | ... | 220 ^H | ... | ... | ... | 9 |
| Alclad 2014 | T3 | 0.50 | 0.63 | 370 | ... | 230 | ... | 14 | ... |
| Alclad 2014 | T3 | 0.63 | 1.00 | 380 | ... | 235 | ... | 14 | ... |
| Alclad 2014 | T3 | 1.00 | 2.50 | 395 | ... | 240 | ... | 15 | ... |
| Alclad 2014 | T3 | 2.50 | 6.30 | 395 | ... | 240 | ... | 15 | ... |
| Alclad 2014 | T4 ^E | 0.50 | 0.63 | 370 | ... | 215 | ... | 14 | ... |
| Alclad 2014 | T4 ^E | 0.63 | 1.00 | 380 | ... | 220 | ... | 14 | ... |
| Alclad 2014 | T4 ^E | 1.00 | 2.50 | 395 | ... | 235 | ... | 15 | ... |
| Alclad 2014 | T4 ^E | 2.50 | 6.30 | 395 | ... | 235 | ... | 15 | ... |
| Alclad 2014 | T451 ^E | 6.30 | 12.50 | 395 | ... | 250 | ... | 15 | ... |
| Alclad 2014 | T451 ^E | 12.50 | 25.00 | 400 ^H | ... | 250 ^H | ... | ... | 12 |
| Alclad 2014 | T451 ^E | 25.00 | 50.00 | 400 ^H | ... | 250 ^H | ... | ... | 10 |
| Alclad 2014 | T451 ^E | 50.00 | 80.00 | 395 ^H | ... | 250 ^H | ... | ... | 7 |
| Alclad 2014 | T42 ^F | 0.50 | 0.63 | 370 | ... | 215 | ... | 14 | ... |
| Alclad 2014 | T42 ^F | 0.63 | 1.00 | 380 | ... | 220 | ... | 14 | ... |
| Alclad 2014 | T42 ^F | 1.00 | 2.50 | 395 | ... | 235 | ... | 15 | ... |
| Alclad 2014 | T42 ^F | 2.50 | 12.50 | 395 | ... | 235 | ... | 15 | ... |
| Alclad 2014 | T42 ^F | 12.50 | 25.00 | 400 ^H | ... | 235 ^H | ... | ... | 12 |
| Alclad 2014 | T6, T62 ^F | 0.50 | 0.63 | 425 | ... | 370 | ... | 7 | ... |
| Alclad 2014 | T6, T62 ^F | 0.63 | 1.00 | 435 | ... | 380 | ... | 7 | ... |
| Alclad 2014 | T6, T62 ^F | 1.00 | 2.50 | 440 | ... | 395 | ... | 8 | ... |
| Alclad 2014 | T6, T62 ^F | 2.50 | 6.30 | 440 | ... | 395 | ... | 8 | ... |
| Alclad 2014 | T62 ^F , T651 ^E | 6.30 | 12.50 | 440 | ... | 395 | ... | 8 | ... |
| Alclad 2014 | T62 ^F , T651 ^E | 12.50 | 25.00 | 460 ^H | ... | 405 ^H | ... | ... | 5 |
| Alclad 2014 | T62 ^F , T651 ^E | 25.00 | 50.00 | 460 ^H | ... | 405 ^H | ... | ... | 3 |
| Alclad 2014 | T62 ^F , T651 ^E | 50.00 | 60.00 | 450 ^H | ... | 400 ^H | ... | ... | 1 |
| Alclad 2014 | T62 ^F , T651 ^E | 60.00 | 80.00 | 435 ^H | ... | 395 ^H | ... | ... | 1 |
| Alclad 2014 | T62 ^F , T651 ^E | 80.00 | 100.00 | 405 ^H | ... | 380 ^H | ... | ... | ... |
| Alclad 2014 | F ^G | 6.30 | 25.00 | ... | ... | ... | ... | ... | ... |
| 2024 | O | 0.24 | 12.50 | ... | 220 | ... | 95 | 12 | ... |
| 2024 | O | 12.50 | 45.00 | ... | 220 | ... | ... | ... | 10 |
| 2024 | T3 | 0.19 | 0.25 | 435 | ... | 290 | ... | 10 | ... |
| 2024 | T3 | 0.25 | 0.50 | 435 | ... | 290 | ... | 12 | ... |
| 2024 | T3 | 0.50 | 3.20 | 435 | ... | 290 | ... | 15 | ... |
| 2024 | T3 | 3.20 | 6.30 | 435 | ... | 290 | ... | 15 | ... |
| 2024 | T351 ^E | 6.30 | 12.50 | 440 | ... | 290 | ... | 12 | ... |
| 2024 | T351 ^E | 12.50 | 25.00 | 435 | ... | 290 | ... | ... | 7 |
| 2024 | T351 ^E | 25.00 | 40.00 | 425 | ... | 290 | ... | ... | 6 |
| 2024 | T351 ^E | 40.00 | 50.00 | 425 | ... | 290 | ... | ... | 5 |
| 2024 | T351 ^E | 50.00 | 80.00 | 415 | ... | 290 | ... | ... | 3 |
| 2024 | T351 ^E | 80.00 | 100.00 | 395 | ... | 285 | ... | ... | 3 |
| 2024 | T361 | 0.50 | 1.60 | 460 | ... | 345 | ... | 8 | ... |

TABLE 3 Continued

| Alloy | Temper | Specified Thickness, mm | | Tensile Strength, MPa | | Yield Strength (0.2 % offset), MPa | | Elongation, ^C min, % | |
|-------------|--------------------|----------------------------|---------|--------------------------|------------------|---------------------------------------|-----|------------------------------------|-------------------|
| | | over | through | min | max | min | max | in 50 mm | in 5× Diameter |
| | | | | | | | | | |
| 2024 | T361 | 1.60 | 6.30 | 470 | ... | 350 | ... | 9 | ... |
| 2024 | T361 | 6.30 | 12.50 | 455 | ... | 340 | ... | 9 | ... |
| 2024 | T361 | 12.50 | 12.70 | 455 | ... | 340 | ... | ... | 9 |
| 2024 | T4 ^D | 0.24 | 0.50 | 425 | ... | 275 | ... | 12 | ... |
| 2024 | T4 ^D | 0.50 | 6.30 | 425 | ... | 275 | ... | 15 | ... |
| 2024 | T42 ^F | 0.24 | 0.50 | 425 | ... | 260 | ... | 12 | ... |
| 2024 | T42 ^F | 0.50 | 6.30 | 425 | ... | 260 | ... | 15 | ... |
| 2024 | T42 ^F | 6.30 | 12.50 | 425 | ... | 260 | ... | 12 | ... |
| 2024 | T42 ^F | 12.50 | 25.00 | 420 | ... | 260 | ... | ... | 7 |
| 2024 | T42 ^F | 25.00 | 40.00 | 415 | ... | 260 | ... | ... | 6 |
| 2024 | T42 ^F | 40.00 | 50.00 | 415 | ... | 260 | ... | ... | 5 |
| 2024 | T42 ^F | 50.00 | 80.00 | 400 | ... | 260 | ... | ... | 3 |
| 2024 | T62 ^F | 0.24 | 12.50 | 440 | ... | 345 | ... | 5 | ... |
| 2024 | T62 ^F | 12.50 | 80.00 | 435 | ... | 345 | ... | ... | 4 |
| 2024 | T72 ^{F,I} | 0.24 | 6.30 | 415 | ... | 315 | ... | 5 | ... |
| 2024 | T81 | 0.24 | 6.30 | 460 | ... | 400 | ... | 5 | ... |
| 2024 | T851 ^E | 6.30 | 12.50 | 460 | ... | 400 | ... | 5 | ... |
| 2024 | T851 ^E | 12.50 | 25.00 | 455 | ... | 400 | ... | ... | 4 |
| 2024 | T851 ^E | 25.00 | 40.00 | 455 | ... | 395 | ... | ... | 4 |
| 2024 | T861 | 0.50 | 1.60 | 480 | ... | 425 | ... | 3 | ... |
| 2024 | T861 | 1.60 | 6.30 | 490 | ... | 455 | ... | 4 | ... |
| 2024 | T861 | 6.30 | 12.50 | 480 | ... | 440 | ... | 4 | ... |
| 2024 | T861 | 12.50 | 12.70 | 480 | ... | 440 | ... | ... | 3 |
| 2024 | F ^G | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... |
| Alclad 2024 | O | 0.19 | 0.25 | ... | 205 | ... | 95 | 10 | ... |
| Alclad 2024 | O | 0.25 | 1.60 | ... | 205 | ... | 95 | 12 | ... |
| Alclad 2024 | O | 1.60 | 12.50 | ... | 220 | ... | 95 | 12 | ... |
| Alclad 2024 | O | 12.50 | 45.00 | ... | 220 ^H | ... | ... | ... | 10 |
| Alclad 2024 | T3 | 0.19 | 0.25 | 400 | ... | 270 | ... | 10 | ... |
| Alclad 2024 | T3 | 0.25 | 0.50 | 405 | ... | 270 | ... | 12 | ... |
| Alclad 2024 | T3 | 0.50 | 1.60 | 405 | ... | 270 | ... | 15 | ... |
| Alclad 2024 | T3 | 1.60 | 3.20 | 420 | ... | 275 | ... | 15 | ... |
| Alclad 2024 | T3 | 3.20 | 6.30 | 420 | ... | 275 | ... | 15 | ... |
| Alclad 2024 | T351 ^E | 6.30 | 12.50 | 425 | ... | 275 | ... | 12 | ... |
| Alclad 2024 | T351 ^E | 12.50 | 25.00 | 435 ^H | ... | 290 ^H | ... | ... | 7 |
| Alclad 2024 | T351 ^E | 25.00 | 40.00 | 425 ^H | ... | 290 ^H | ... | ... | 6 |
| Alclad 2024 | T351 ^E | 40.00 | 50.00 | 425 ^H | ... | 290 ^H | ... | ... | 5 |
| Alclad 2024 | T351 ^E | 50.00 | 80.00 | 415 ^H | ... | 290 ^H | ... | ... | 3 |
| Alclad 2024 | T351 ^E | 80.00 | 100.00 | 395 ^H | ... | 285 ^H | ... | ... | 3 |
| Alclad 2024 | T361 | 0.50 | 1.60 | 420 | ... | 325 | ... | 8 | ... |
| Alclad 2024 | T361 | 1.60 | 6.30 | 440 | ... | 330 | ... | 9 | ... |
| Alclad 2024 | T361 | 6.30 | 12.50 | 440 | ... | 330 | ... | 9 | ... |
| Alclad 2024 | T361 | 12.50 | 12.70 | 455 ^H | ... | 340 ^H | ... | ... | 9 |
| Alclad 2024 | T4 ^D | 0.24 | 0.50 | 400 | ... | 245 | ... | 12 | ... |
| Alclad 2024 | T4 ^D | 0.50 | 1.60 | 400 | ... | 245 | ... | 15 | ... |
| Alclad 2024 | T4 ^D | 1.60 | 3.20 | 420 | ... | 260 | ... | 15 | ... |
| Alclad 2024 | T42 ^F | 0.19 | 0.25 | 380 | ... | 235 | ... | 10 | ... |
| Alclad 2024 | T42 ^F | 0.25 | 0.50 | 395 | ... | 235 | ... | 12 | ... |
| Alclad 2024 | T42 ^F | 0.50 | 1.60 | 395 | ... | 235 | ... | 15 | ... |
| Alclad 2024 | T42 ^F | 1.60 | 6.30 | 415 | ... | 250 | ... | 15 | ... |
| Alclad 2024 | T42 ^F | 6.30 | 12.50 | 415 | ... | 250 | ... | 12 | ... |
| Alclad 2024 | T42 ^F | 12.50 | 25.00 | 420 ^H | ... | 260 ^H | ... | ... | 7 |
| Alclad 2024 | T42 ^F | 25.00 | 40.00 | 415 ^H | ... | 260 ^H | ... | ... | 6 |
| Alclad 2024 | T42 ^F | 40.00 | 50.00 | 415 ^H | ... | 260 ^H | ... | ... | 5 |
| Alclad 2024 | T42 ^F | 50.00 | 80.00 | 400 ^H | ... | 260 ^H | ... | ... | 3 |
| Alclad 2024 | T62 ^F | 0.24 | 1.60 | 415 | ... | 325 | ... | 5 | ... |
| Alclad 2024 | T62 ^F | 1.60 | 12.50 | 425 | ... | 335 | ... | 5 | ... |
| Alclad 2024 | T72 ^{F,I} | 0.24 | 1.60 | 385 | ... | 295 | ... | 5 | ... |
| Alclad 2024 | T72 ^{F,I} | 1.60 | 6.30 | 400 | ... | 310 | ... | 5 | ... |
| Alclad 2024 | T81 | 0.24 | 1.60 | 425 | ... | 370 | ... | 5 | ... |
| Alclad 2024 | T81 | 1.60 | 6.30 | 445 | ... | 385 | ... | 5 | ... |
| Alclad 2024 | T851 ^E | 6.30 | 12.50 | 445 | ... | 385 | ... | 5 | ... |
| Alclad 2024 | T851 ^E | 12.50 | 25.00 | 455 ^H | ... | 400 ^H | ... | ... | 4 |
| Alclad 2024 | T861 | 0.50 | 1.60 | 440 | ... | 400 | ... | 3 | ... |
| Alclad 2024 | T861 | 1.60 | 6.30 | 475 | ... | 440 | ... | 4 | ... |
| Alclad 2024 | T861 | 6.30 | 12.50 | 470 | ... | 425 | ... | 4 | ... |
| Alclad 2024 | T861 | 12.50 | 12.70 | 480 ^H | ... | 440 ^H | ... | ... | 3 |
| Alclad 2024 | F ^G | 6.30 | 80.00 | ... | ... | ... | ... | ... | ... |