

QQ-A-250/13E
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SUPERSEDING
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FEDERAL SPECIFICATION

ALUMINUM ALLOY ALCLAD 7075, PLATE AND SHEET

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

(This specification forms a part of the latest issue of Federal Specification QQ-A-250.)

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the specific requirements for aluminum alloy alclad 7075 plate and sheet; the general requirements are covered in QQ-A-250. The plate and sheet covered by this specification shall be an integral composite product consisting of a heat-treatable aluminum alloy (7075) core with thin layers of an aluminum alloy (7072) anodic to the core and of approximately equal thickness bonded to both surfaces.

1.2 Classification.

1.2.1 Tempers. The plate and sheet shall be classified as O, T6, T62, T651, or F temper, as specified (see 6.2). The definitions of these tempers shall be as specified in American National Standards Institute ANSI Std. H35.1.

2. APPLICABLE DOCUMENTS

Latest issue of Federal Specification:

QQ-A-250 - Aluminum and Aluminum Alloy Plate and Sheet; General Specification for.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC. 20402.

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Military Specification:

MIL-I-8950 - Inspection, Ultrasonic, Wrought Metals, Process for.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

American National Standards Institute ANSI Standard:

H35.1 - Alloy and Temper Designation Systems for Aluminum.

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

3. REQUIREMENTS

3.1 Chemical composition.

3.1.1 The chemical composition of the core ingots or slabs and of the cladding plates used for the manufacture of the alclad plates and sheets shall conform to the requirements specified in table I for core and cladding, respectively.

TABLE 1. Chemical composition ^{1/}

| Element | Analysis | | | |
|---------------|-------------|---------|------------------|---------|
| | Core (7075) | | (Cladding (7072) | |
| | Minimum | Maximum | Minimum | Maximum |
| | Percent | Percent | Percent | Percent |
| Zinc | 5.1 | 6.1 | 0.8 | 1.3 |
| Magnesium | 2.1 | 2.9 | - | 0.10 |
| Copper | 1.2 | 2.0 | - | .10 |
| Chromium | 0.18 | 0.35 | - | - |
| Manganese | - | 0.30 | - | .10 |
| Iron | - | 0.50 | - | 2/ |
| Silicon | - | 0.40 | - | 2/ |
| Titanium | - | .20 | - | - |
| Others, each | - | .05 | - | .05 |
| Others, total | - | .15 | - | .15 |
| Aluminum | Remainder | | Remainder | |

^{1/} Analyses shall regularly be made only for the elements specifically mentioned in the above table. If, however, the presence of other elements is indicated in the course of routine analysis, further analysis shall be made to determine conformance to the limits specified for other elements.

^{2/} Iron plus silicon 0.7 percent maximum.

3.2 Mechanical properties.

3.2.1 Mechanical properties of material as supplied. The mechanical properties perpendicular to the direction of final rolling, except for material less than 9 inches in width, shall conform to the requirements of table II for the temper specified. For material less than 9 inches in width, the mechanical properties parallel to the direction of final rolling shall conform to the requirements of table II for the temper specified.

TABLE II. Mechanical properties

| Temper | Thickness | Tensile strength, minimum | Yield strength at 0.2 percent offset or at extension indicated | | Elongation in 2 in. or 4 times D $\frac{1}{2}$, $\frac{2}{2}$, minimum |
|----------------------------|--------------------------------|---------------------------|--|----------------------|--|
| | | | Minimum | Extension under load | |
| | Inches | P.s.i. | P.s.i. | Inch/Inch | Percent |
| 0 | 0.008 thru 0.014 | 36,000 $\frac{3}{2}$ | 20,000 $\frac{3}{2}$ | 0.0041 | 9 |
| | .015 thru .062 | 36,000 $\frac{3}{2}$ | 20,000 $\frac{3}{2}$ | .0041 | 10 |
| | .063 thru .187 | 38,000 $\frac{3}{2}$ | 20,000 $\frac{3}{2}$ | .0040 | 10 |
| | $\frac{4}{2}$.188 thru .499 | 39,000 $\frac{3}{2}$ | 21,000 $\frac{3}{2}$ | .0041 | 10 |
| | $\frac{4}{2}$.500 thru 1.000 | 40,000 $\frac{3}{2}$ | - | - | 10 |
| T6 and T62 $\frac{5}{2}$ | 0.008 thru 0.011 | 68,000 | 58,000 | 0.0076 | 5 |
| | .012 thru .039 | 70,000 | 60,000 | .0078 | 7 |
| | .040 thru .062 | 72,000 | 62,000 | .0080 | 8 |
| | .063 thru .187 | 73,000 | 63,000 | .0081 | 8 |
| | .188 thru .249 | 75,000 | 64,000 | .0082 | 8 |
| T651 and T62 $\frac{5}{2}$ | $\frac{4}{2}$ 0.250 thru 0.499 | 75,000 | 65,000 | 0.0083 | 9 |
| | $\frac{4}{2}$.500 thru 1.000 | 78,000 | 68,000 | .0086 | 7 |
| | $\frac{4}{2}$ 1.001 thru 2.000 | 77,000 | 67,000 | .0085 | 6 |
| | $\frac{4}{2}$ 2.001 thru 2.500 | 76,000 | 64,000 | .0082 | 5 |
| | $\frac{4}{2}$ 2.501 thru 3.000 | 72,000 | 61,000 | .0079 | 5 |
| | $\frac{4}{2}$ 3.001 thru 3.500 | 71,000 | 58,000 | .0076 | 5 |
| | $\frac{4}{2}$ 3.501 thru 4.000 | 67,000 | 54,000 | .0072 | 3 |
| F | All | 6/ | 6/ | 6/ | 6/ |

1/ Not required for material 1/2 inch or less in width.

2/ D represents specimen diameter.

3/ Maximum

4/ The properties for these thicknesses are those of the core alloy since the tests are made on a round specimen machined from the plate.

5/ Material in the T62 temper is not available from the materials producers.

6/ No requirements.

3.2.2 Mechanical properties after heat treatment. In addition to conforming to the requirements of 3.2.1, material in the annealed (0) and the as-fabricated (F) tempers shall, after proper solution heat-treatment and aging, also conform to the requirements of table II for the T6 and T62 tempers. Material as received in the T6 and T651 tempers shall, after proper re-solution heat-treatment and aging, be capable of conforming to the requirements specified in table II for the T6 and T62 tempers.

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3.2.3 Bend test. Bend-test specimens taken from material shall be capable of withstanding, without cracking, the bend test specified in QQ-A-250. The values for bend factor N are given in table III.

TABLE III. Bend test factor "N"

| Thickness of material | Temper | |
|-----------------------|--------|------------|
| | 0 | T6 and T62 |
| Inch | | |
| 0.008 thru 0.020 | 1 | 6 |
| .021 thru .032 | 1 | 7 |
| .033 thru .063 | 2 | 7 |
| .064 thru .091 | 3 | 8 |
| .092 thru .125 | 3 | 9 |
| .126 thru .249 | 4 | 10 |
| .250 thru .499 | 6 | 12 |

3.3 Cladding thickness.

3.3.1 Thickness of cladding plates. The aluminum alloy (7072) plates that are bonded to the two sides of the aluminum alloy (7075) ingot or slab to form a composite that is to be rolled to the finished thickness shall each have a thickness as specified in table IV.

TABLE IV. Cladding thickness

| Thickness of finished plate or sheet | Nominal cladding thickness per side; percent of composite thickness | Average thickness per side of cladding on finished plate or sheet; minimum percent of plate or sheet thickness |
|--------------------------------------|---|--|
| Inches | | |
| Under 0.063 | 4 | 3.2 |
| 0.063 thru 0.187 | 2.5 | $\frac{1}{2}$ |
| 0.188 and over | 1.5 | $\frac{1}{1.2}$ |

1/ For plate 0.500 and over, the average cladding thickness per side shall have a maximum value of 3 percent of the plate thickness.

3.3.2 Thickness of cladding. If question arises concerning the thickness of cladding of the finished sheet or plate, samples examined in accordance with QQ-A-250 shall show an average of cladding on each side, not less than that specified in table IV.

3.4 Internal defects. When specified (see 6.2), plate shall be ultrasonically inspected (see QQ-A-250). Acceptance limits shall be as specified in table V.

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TABLE V. Ultrasonic discontinuity acceptance limits ^{1/}

| Thickness | Maximum weight per piece | Discontinuity class ^{2/} |
|------------------|-----------------------------|-----------------------------------|
| Inches | Pounds | |
| 0.500 thru 1.499 | 2,000 | B |
| 1.500 thru 3.000 | 2,000 | A |
| 3.001 thru 4.000 | 2,000 | B |

^{1/} Discontinuities in excess of those listed in table V may be allowed subject to the approval of the procuring activity, if it is established that they will be removed by machining or that they are in non-critical areas.

^{2/} The discontinuity class limits are defined in MIL-I-8950.

3.5 Marking. In addition to the marking required in Fed. Std. No. 184, material in the T6 and T651 tempers shall be identified by a lot number marked in at least one location on each piece.

4. QUALITY ASSURANCE PROVISIONS (See QQ-A-250.)

4.1 Mechanical tests after heat treatment.

4.1.1 Number of tests, after heat treatment. From material in the annealed (O) and as-fabricated (F) tempers, an additional number of specimens equal to that required by QQ-A-250 shall be taken and tested after solution heat treatment and artificial aging to determine compliance with 3.2.2.

5. PREPARATION FOR DELIVERY (See QQ-A-250.)

6. NOTES

6.1 Intended use. Alclad 7075 plates and sheets are used where very high strength with good resistance to corrosion are required. Formability is not as good as for lower strength aluminum alloys, cost is higher, and ductility may be somewhat lower.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Form and temper required (see 1.2.1).
- (c) Dimensions required.

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- (d) Requirements for sizes not specifically covered (See QQ-A-250).
- (e) Whether ultrasonic inspection of plate is required (see 3.4).
- (f) Selection of applicable levels of preservation, packaging, and packing required, if other than level C (see QQ-A-250).

6.3 Temper. Temper T651 is available in plate only.

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Navy - AS

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Army - MR, MI, MU, WC
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