QQ-A-250/12F
November 15, 1982
SUPERSEDING
QQ-A-250/12E
January 8, 1971

# FEDERAL SPECIFICATION SHEET

## ALUMINUM ALLOY 7075, PLATE AND SHEET

This specification is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of Federal Agencies.

The complete requirements for procuring the aluminum alloy 7075 plate and sheet described herein shall consist of this document and the latest issue of QQ-A-250/GEN (see 2.1).

## 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the specific requirements for aluminum-alloy 7075 plate and sheet.

1.2 Classification.

1.2.1 Tempers. The plate and sheet shall be classified as O, T6, T62, T73, T651, T7351, or F temper, as specified (see 6.2 and 6.3). The definitions of these tempers shall be as specified in QQ-A-250/GEN.

## 2. APPLICABLE DOCUMENTS

2.1 Government publications. The issues of the following documents, in effect on date of invitation for bids or solicitation for offers, form a part of this specification to the extent specified herein.

Federal Specifications

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

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20370.

(Single copies of this specification, and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commerical Item Descriptions from established distribution points in their agencies.)

3. REQUIREMENTS

3.1 Chemical composition.

3.1.1 The chemical composition shall conform to the requirements specified in table I.

TABLE I. Chemical composition 1/

| Element | Percent | |
|---|---|---|
| | Minimum | Maximum |
| Zinc | 5.1 | 6.1 |
| Magnesium | 2.1 | 2.9 |
| Copper | 1.2 | 2.0 |
| Chromium | 0.18 | 0.28 |
| Manganese | -- | 0.30 |
| Iron | -- | 0.50 |
| Silicon | -- | 0.40 |
| Titanium | -- | 0.20 |
| Other, each | -- | 0.05 |
| Others, total | -- | 0.15 |
| Aluminum | Remainder | |

1/ Analysis shall regularly be made only for the elements specifically mentioned in table I. If, however, the presence of other elements is indicated or suspected in amounts greater than the specified limits, further analysis shall be made to determine that these elements are not present in excess of specified limits

3.2 Mechanical properties.

3.2.1 Mechanical properties of material as supplied. The mechanical properties perpendicular to the direction of the 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, inches | Tensile strength, minimum, ksi, (UOS) 1/ | Yield strength at 0.2 percent offset or at extension shown | | Elongation in 2 inches or 4 times D 2/, 3/, minimum, percent |
|---|---|---|---|---|---|
| | | | Minimum, ksi (UOS) 1/ | Extension under load, inch/inch | |
| O | 0.015 - 0.499 | 40.0 4/ | 21.0 4/ | 0.0040 4/ | 10 |
| | 0.500 - 2.000 | 40.0 4/ | -- | -- | 10 |
| T6 and T62 5/ | 0.008 - 0.011 | 74.0 | 63.0 | 0.0083 | 5 |
| | 0.012 - 0.039 | 76.0 | 67.0 | 0.0085 | 7 |
| | 0.040 - 0.125 | 78.0 | 68.0 | 0.0086 | 8 |
| | 0.126 - 0.249 | 78.0 | 69.0 | 0.0087 | 8 |
| T651 and T62 5/, 7/ | 0.250 - 0.499 | 78.0 | 67.0 | 0.0085 | 9 |
| | 0.500 - 1.000 | 78.0 | 68.0 | 0.0086 | 7 |
| | 1.001 - 2.000 | 77.0 | 67.0 | 0.0085 | 6 |
| | 2.001 - 2.500 | 76.0 | 64.0 | 0.0082 | 5 |
| | 2.501 - 3.000 | 72.0 | 61.0 | 0.0079 | 5 |
| | 3.001 - 3.500 | 71.0 | 58.0 | 0.0076 | 5 |
| | 3.501 - 4.000 | 67.0 | 54.0 | 0.0072 | 3 |
| T73 | 0.040 - 0.249 | 67.0 | 56.0 | 0.0074 | 8 |
| T7351 | 0.250 - 1.000 | 69.0 | 57.0 | 0.0075 | 7 |
| | 1.001 - 2.000 | 69.0 | 57.0 | 0.0075 | 6 |
| | 2.001 - 2.500 | 66.0 | 52.0 | 0.0070 | 6 |
| | 2.501 - 3.000 | 64.0 | 49.0 | 0.0067 | 6 |
| | 3.001 - 3.500 | 63.0 | 49.0 | 0.0067 | 6 |
| | 3.501 - 4.000 | 61.0 | 48.0 | 0.0066 | 6 |
| F | All | 6/ | 6/ | 6/ | 6/ |

Table II. Mechanical properties - Continued

1/ Properties are minimum, unless otherwise specified, abbreviated: UOS
2/ Not required for material 1/2 inch or less in width
3/ D represents specimen diameter
4/ Maximum
5/ Material in the T62 temper is not available from the materials producers
6/ No requirements
7/ The properties specified for the T651 temper are those formerly specified for the T6 temper

3.2.2 Mechanical properties after heat treatment. In addition to conforming to the requirements of 3.2.1, material in the tempers identified in the following paragraphs shall, after having been processed to tempers also identified therein, have properties conforming to those specified in table II, as applicable.

3.2.2.1 Material in the annealed (O) and as-fabricated (F) tempers. Material in the O and F tempers, without the subsequent imposition of cold work or forming operations, shall, after proper solution and artificial aging treatments, develop the properties specified for the T6 and T62 tempers. Material in the O and F tempers, without the subsequent imposition of cold work or forming operations, shall be heat treatable to the properties specified for the T73 temper. Such capability shall be demonstrated when specified (see 6.2 and 6.4).

3.2.2.2 Material in the T6, T73 and T7351 tempers. Material in the T6, T73 and T7351 tempers, without the subsequent imposition of cold work or forming operations, shall be heat treatable to the properties specified for the T6 and T62 tempers. Such capability shall be demonstrated when specified (see 6.2 and 6.4).

3.2.2.3 Material in the T6 and T651 tempers. Material in the T6 and T651 tempers shall be heat treatable to the properties specified for the T73 and T7351 tempers, as applicable. Such capability shall be demonstrated when specified (see 6.2).

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/GEN. The values for bend factor "N" are given in table III.

TABLE III. Bend test factor "N"

| Thickness, inch | Tempers | |
|---|---|---|
| | 0 | T6 and T62 |
| 0.008 - 0.020 | 1 | 7 |
| 0.021 - 0.062 | 2 | 8 |
| 0.063 - 0.091 | 3 | 9 |
| 0.092 - 0.125 | 4 | 10 |
| 0.126 - 0.249 | 5 | 11 |
| 0.250 - 0.499 | 6 | 14 |

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

TABLE IV. Ultrasonic discontinuity acceptance limits 1/

| Thickness, inches | Maximum weight per piece, pounds | Discontinuity class 2/ |
|---|---|---|
| 0.500 - 1.499 | 2,000 | B |
| 1.500 - 3.000 | 2,000 | A |
| 3.001 - 4.000 | 2,000 | B |

1/ Discontinuities in excess of those listed in table IV 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 QQ-A-250/GEN

3.4 Resistance to stress-corrosion cracking. Material 0.750 inch and thicker in the T73 and T7351 tempers shall exhibit no evidence of stress-corrosion cracking when subjected to the test specified in 4.2.

3.4.1 Acceptance criteria for stress-corrosion cracking. Resistance to stress-corrosion cracking for each lot of 7075-T73 and T7351 material shall be established by testing the previously selected tension test sample to the following criteria:

(a) Determine electrical conductivity and tensile properties
(b) If the conductivity is below 38.0 percent International Annealed Copper Standard (IACS), the material is considered unsatisfactory and must be reprocessed, regardless of property level

(c) If the conductivity is 40.0 percent IACS or higher and tensile properties meet the minimum values specified herein, the material is considered to be satisfactory

(d) If conductivity is 38.0 to 39.9 percent IACS inclusive, if tensile properties meet the minimum limits specified herein, and if the yield strength does not exceed the specified minimum by more than 11.9 thousand pounds per square inch (ksi), the material is considered to be satisfactory

(e) If conductivity is below 40.0 percent IACS and the yield strength exceeds the specified minimum value by 12.0 ksi or more, the material is considered suspect

(f) When material is considered suspect, it may be given additional second step aging or be reprocessed

3.5 Marking. In addition to the marking required in QQ-A-250/GEN, material in the T6, T651, T73 and T7351 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/GEN)

4.1 Sampling. Sampling for conformance to the requirements of Section 3 shall be as specified in QQ-A-250/GEN.

4.1.1 Sampling for heat treatability. From material in each temper of those specified for heat treatability demonstrations in 3.2.2 and 6.2, an additional number of specimens equal to that required by QQ-A-250/GEN shall be taken and tested after heat treatment to each temper specified, as applicable, to determine conformance to 3.2.2.

4.1.2 Sampling for electrical conductivity tests. Samples for these tests shall be those used for tension tests.

4.2 Procedure for stress-corrosion cracking test. Specimens shall be stressed in tension in the short transverse direction with respect to grain flow and held at constant strain. The stress level shall be 75 percent of the minimum specified long transverse yield strength. The specimens shall be subjected to the stress-corrosion test specified in QQ-A-250/GEN. It shall be the responsibility of the contractor that test results be recorded, identified as to lot, and preserved.

5. PREPARATION FOR DELIVERY (see QQ-A-250/GEN)

6. NOTES

6.1 Intended use. Alloy 7075 plate and sheet are intended for use in applications requiring a high strength heat treatable aluminum alloy.

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, quantity and temper required (see 1.2.1)
(c) Dimensions required
(d) Requirements for sizes not specifically covered (see QQ-A-250/GEN)
(e) Whether ultrasonic inspection of plate is required (see 3.3)
(f) Selection of applicable levels of preservation, packaging and packing required, if other than level C (see QQ-A-250/GEN)
(g) Whether demonstration of capability to develop properties in tempers other than those supplied is required (see 3.2.2)
(h) Special end use requirements
(i) Duration of maintenance of stress-corrosion test records

6.3 Temper. T651 and T7351 tempers are available in plate only.

6.4 Mechanical properties after heat treatment. Mechanical properties of producer-supplied material are certified for the temper of material supplied. The producer's "capability" demonstration is not evidence that user-treated material conforms to property requirements of a given temper. Frequently, user-heat-treated material may develop a lower level of properties, especially if any cold, warm or hot work is introduced, prior to heat treatment. The user should be held responsible for demonstrating that his processing is acceptable.

MILITARY INTERESTS:

Custodians

Army - MR
Navy - AS
Air Force - 20

Review Activities

Army - AR, MI,
DLA - IS

User Activities

Army - ER, ME
Navy - MC, OS

CIVIL AGENCY COORDINATING ACTIVITIES:

NASA - JFK, MSF
GSA - FSS

PREPARING ACTIVITY:

Navy - AS

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