

QQ-A-225/9E
May 10, 1982
SUPERSEDING
QQ-A-225/9D
August 24, 1971

FEDERAL SPECIFICATION SHEET

ALUMINUM ALLOY 7075, BAR, ROD, WIRE AND SPECIAL SHAPES; ROLLED, DRAWN OR COLD FINISHED

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

The complete requirements for procuring aluminum alloy 7075 bar, rod, wire and special shapes described herein shall consist of this document and the latest issue of QQ-A-225/GEN.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the specific requirements for aluminum alloy 7075, bar, rod, wire and special shapes produced by rolling, drawing or cold finishing.

1.2 Classification.

1.2.1 Tempers. The bar, rod, wire and special shapes shall be classified as O, T6, T62, T651, T73 or T7351 tempers, as specified (see 3.2.1 and 6.2).

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-225/GEN - Aluminum and Aluminum Alloy Bar, Rod, Wire or Special Shapes; Rolled, Drawn or Cold Finished; 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 20402.

FSC 9525, 9530,
9540

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(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 Commercial Item Descriptions from established distribution points in their agencies.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bid or solicitation for offers, shall apply.

American Society for Testing and Materials (ASTM) Standards

B117 - Salt Spray (Fog) Testing

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

3. REQUIREMENTS

3.1 Chemical composition. 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 |
| Iron | -- | 0.50 |
| Silicon | -- | 0.40 |
| Manganese | -- | 0.30 |
| Titanium | -- | 0.20 |
| Other elements, each | -- | 0.05 |
| Other elements, 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 in the course of routine analysis, further analysis shall be made to determine conformance to the limits specified for other elements.

3.2 Mechanical properties.

3.2.1 Mechanical properties of material as supplied. The mechanical properties in the direction of working shall conform to the requirements of table II for the temper specified.

TABLE II. Mechanical properties

| Temper | Diameter or thickness, inches | Tensile strength, minimum, ksi | Yield strength at 0.2 percent offset or at extension indicated <u>6/</u> | | Elongation in 2 in. or 4 times diameter <u>6/</u> , minimum, percent |
|----------------------|-------------------------------------|--------------------------------|--|---------------------------------|--|
| | | | Minimum, ksi | Extension under load, inch/inch | |
| 0 | Up to 8.000, inclusive | 40.0 <u>2/</u> | 12.0 | -- | 10 |
| T6 and T62 <u>4/</u> | Up to 4.000, inclusive <u>3/</u> | 77.0 | 66.0 | 0.0084 | 7 |
| T651 <u>1/</u> | 0.500 to 4.000, inclusive <u>3/</u> | 77.0 | 66.0 | 0.0084 | 7 |
| T73 <u>5/</u> | Up to 3.000, inclusive <u>3/</u> | 68.0 | 56.0 | 0.0074 | 10 |
| T7351 <u>1/ 5/</u> | 0.500 to 3.000, inclusive <u>3/</u> | 68.0 | 56.0 | 0.0074 | 10 |

1/ Tempers T651 and T7351 are available only in rod, bar and shapes

2/ Maximum

3/ For rounds (rods), maximum diameter is 3 or 4 inches, whichever is applicable; for square, hexagonal, or octagonal bar, maximum thickness is 3 or 3-1/2 inches, whichever is applicable; for rectangular bar, maximum thickness is 3 inches with corresponding maximum width of 6 inches; for rectangular bar less than 3 inches in thickness, maximum width of 10 inches.

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- 4/ Material in the T62 temper is not available from the materials producers
- 5/ Definition of T73 and T7351 tempers - The T73 temper applies to material which has been solution heat-treated and stabilized to develop the required mechanical properties and resistance to stress-corrosion cracking. The T7351 temper applies to material which has been solution heat-treated, stress-relieved by stretching to produce a permanent set of 1-1/2 percent nominal, but not less than 1 nor more than 3 percent, and stabilized to develop the required mechanical properties and resistance to stress-corrosion cracking
- 6/ See QQ-A-225/GEN for yield strength and elongation requirement exceptions

3.2.2 Mechanical properties after heat treatment. In addition to conforming to the requirements of 3.2.1, the mechanical properties in the direction of working of material ordered in the annealed (O) temper, and without subsequent cold-working or forming operations, and subsequently solution heat-treated and artificially aged shall conform to the requirements specified in table II for the T6, T62 and T73 tempers. Material as received in the T6, T651, T73 and T7351 tempers shall, after proper re-solution heat treatment and aging, be capable of conforming to the requirements specified in table II for the T6, T62 and T73 tempers. Material in the T6, T62 and T651 tempers shall after proper aging be capable of conforming to the requirements specified in table II for the T73 or T7351 tempers, as applicable (see QQ-A-225/GEN for the solution and aging treatments).

3.3 Finish. Unless otherwise specified in the contract or order (see 6.2), rod up to and including 3 inches in diameter, and bar up to and including 2 inches thick (with maximum width for rectangles of 4 inches) shall be processed to size by cold finishing.

3.4 Stress-corrosion cracking (SCC).

3.4.1 Resistance to SCC. Material in the T73 or T7351 tempers shall be capable of exhibiting no evidence of stress-corrosion cracking when subjected to the test specified in 4.2. The supplier shall maintain records of the performance of all lots so tested.

3.4.2 Acceptance criteria. Susceptibility to stress-corrosion cracking for each lot of 7075-T73 and T7351 material shall be established by testing the previously selected tensile test specimens 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 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 to 40 percent IACS, 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 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 reprocessed or a sample of the material may be heat-treated for not less than 30 minutes at $870^{\circ} \pm 10^{\circ} \text{F}$, quenched in cold water. Conductivity shall then be measured within 15 minutes after quenching. If the difference between this measurement and the original measurement on the T73 or T7351 material is 6 percentage points or more, the T73 or T7351 temper material is satisfactory. If the difference is less than 6 percentage points, the T73 or T7351 material must be reprocessed

3.5 Marking. In addition to the marking required in QQ-A-225/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 (see 6.2).

4. QUALITY ASSURANCE PROVISIONS (see QQ-A-225/GEN)

4.1 Number of tests after heat treatment. From material in the annealed (O) temper, an additional number of specimens equal to those required by QQ-A-225/GEN shall be taken and tested after solution heat treatment and artificial aging to determine compliance with 3.2.2.

4.2 Stress-corrosion cracking test. Specimens of 7075-T73 and T7351 alloy shall be selected in a manner that will permit application of the specified tensile stress in the short transverse grain direction. The specimens shall be subjected to the following stress corrosion test:

- (a) Thirty days' exposure
- (b) Stressed in the short transverse direction with respect to grain flow and held at a constant strain. The stress level shall be 75 percent of the specified longitudinal yield strength
- (c) The stressed specimens shall be exposed to a solution of 3.5 percent NaCl conforming to the purity and pH requirements of ASTM B117, at room temperature, by alternate immersion. The exposure cycle shall consist of 10 minutes immersion in the solution and 50 minutes out of the solution

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1/ For material thicknesses less than 0.700 inch, the specimen tested shall be a tension specimen selected so that the applied stress is, if possible, parallel in direction to the smallest dimension of the product which is in excess of 0.700 inch

5. PREPARATION FOR DELIVERY (see QQ-A-225/GEN)

6. NOTES

6.1 Intended use. This alloy is intended for use where high strength and good corrosion resistance are required.

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) Mechanical properties and dimensional tolerance requirements for sizes not specifically covered
- (e) Finish requirements (see 3.3)
- (f) Whether there are special end use requirements
- (g) For military agencies - Selection of applicable levels of preservation, packaging and packing required. Also specify marking requirements (see Section 5, QQ-A-225/GEN)
- (h) For civil agencies - Specify packing level, level A or commercial. Also specify marking requirements (see Section 5, QQ-A-225/GEN)

MILITARY INTEREST:

Custodians

Army - MR
Air Force - 11

Review Activities

Army - AR, CR, EA
Navy - OS
Air Force - 85, 99
DLA - IS

User activities

Army - ME
Navy - EC, MC, SH, YD

CIVIL AGENCY COORDINATING ACTIVITY

GSA - FSS

PREPARING ACTIVITY

Navy - AS

DOD project 9525-0051

(See Instructions - Reverse Side)

| | | | |
|---|--|---|--|
| 1. DOCUMENT NUMBER | | 2. DOCUMENT TITLE | |
| 3a. NAME OF SUBMITTING ORGANIZATION | | 4. TYPE OF ORGANIZATION (Mark one) | |
| b. ADDRESS (Street, City, State, ZIP Code) | | <input type="checkbox"/> VENDOR | |
| | | <input type="checkbox"/> USER | |
| <input type="checkbox"/> MANUFACTURER | | | |
| <input type="checkbox"/> OTHER (Specify): _____ | | | |
| 5. PROBLEM AREAS | | | |
| a. Paragraph Number and Wording: | | | |
| | | | |
| b. Recommended Wording: | | | |
| | | | |
| c. Reason/Rationale for Recommendation: | | | |
| | | | |
| 6. REMARKS | | | |
| | | | |
| 7a. NAME OF SUBMITTER (Last, First, MI) - Optional | | 8. WORK TELEPHONE NUMBER (Include Area Code) - Optional | |
| c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional | | 9. DATE OF SUBMISSION (YYMMDD) | |
| | | | |

TO DETACH THIS LINE, CUT ALONG THIS LINE.)