

QQ-A-200/11E
 3 November 1983
 SUPERSEDING
 QQ-A-200/110
 April 13, 1971

FEDERAL SPECIFICATION SHEET

ALUMINUM ALLOY 7075, BAR, ROD, SHAPES, TUBE AND WIRE, EXTRUDED

This specification was approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

The complete requirements for procuring the aluminum alloy 7075 bar, rod, shapes, tube and wire, extruded described herein shall consist of this document and the latest issue of QQ-A-200/GEN (see 2.1).

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the specific requirements for aluminum alloy 7075 bar, rod, shapes, tube and wire produced by extrusion.

1.2 Classification.

1.2.1 Tempers. The bar, rod, shapes, tube and wire shall be of the following tempers, as specified (see 6.2): 0, T6, T62, T6510, T6511, T73, T73510 or T73511. The definition of these tempers shall be as specified in QQ-A-200/GEN.

1.2.2 Tubing. Tubing shall be additionally classified as follows:

<u>Type</u>	<u>Description</u>
I	- Tubing extruded from hollow billets using die and mandrel (see QQ-A-200/GEN)
II	- Tubing extruded from solid billets using a porthole or spider die or similar tooling (see QQ-A-200/GEN) <u>1/</u>

1/ Type II tubing is not commonly available from the producers

2. APPLICABLE DOCUMENTS

FSC 9530, 4710,
 9525, 9540

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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-200/GEN - Aluminum Alloy, Bar, Rod, Shapes, Structural Shapes, Tube and Wire, Extruded; 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.

(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 points in their agencies.)

Military Standards

MIL-STD-2154 - 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.)

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 <u>2/</u>	--	0.15
Aluminum	Remainder	

1/ Analysis shall routinely 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

2/ The sum of those "Others" metallic elements 0.010 percent or more each, expressed to the second decimal before determining the sum

3.2 Mechanical properties.

3.2.1 Mechanical properties of material as supplied. Mechanical properties of as-supplied material shall, in the longitudinal (extrusion) direction, conform to the property requirements specified in table II, except as exempted in QQ-A-200/GEN.

3.2.2 Mechanical properties after heat treatment. In addition to conforming to the requirements of 3.2.1, materials identified in the following paragraphs shall, after having been heat-treated to other tempers also identified therein, have properties in the longitudinal (extrusion) direction conforming to those specified in table II, as applicable.

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TABLE II. Mechanical properties

Temper	Thickness, (bar and shapes); diameter, (rod and wire); wall thickness, (tube), inches	Area, square inches	Tensile strength, Minimum, ksi	Yield strength at 0.2 percent offset or at extension indicated		Elongation in 2 inches or 4 times D ₁ /, percent
				Minimum, ksi	Extension under load, inch per inch	
0	All	All	2/	2/	--	10
T6, T623/ T6510 and T65114/	Up to 0.249, incl.	All	78.0	70.0	0.0088	7
	0.250 to 0.499, incl.	All	81.0	73.0	.0090	7
	0.500 to 2.999, incl.	All	81.0	72.0	.0090	7
	3.000 to 4.499, incl.	Up thru 20 Over 20	81.0	71.0	.0088	7
T73, T73510 T735114/	3.000 to 4.499, incl.	Up thru 32	78.0	70.0	.0088	6
	4.500 to 5.000, incl.	Up thru 32	78.0	68.0	.0086	6
T73, T73510 T735114/	0.062 to 0.249, incl.	Up thru 20	68.0	58.0	.0076	7
	0.250 to 1.499, incl.	Up thru 25	70.0	61.0	.0079	8
	1.500 to 2.999, incl.	Up thru 25	69.0	59.0	.0077	8
	3.000 to 4.499, incl.	Up thru 20	68.0	57.0	.0075	7
T73, T73510 T735114/	3.000 to 4.499, incl.	Over 20 thru 32	65.0	55.0	.0073	7

1/ D represents specimen diameter

2/ No minimum required. Maximum tensile and yield strengths shall be 40.0 ksi and 24.0 ksi, respectively

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

4/ For stress-relieved tempers, the characteristics and properties, other than those specified, may differ somewhat from the corresponding characteristics and properties of the material in the basic temper

3.2.2.1 Material in the O temper. Material in the O temper, without the subsequent imposition of cold work or forming operations, shall, after proper solution heat treatment and artificial aging, develop the properties specified in table II for the T62 temper. Material in the O temper, without the subsequent imposition of cold work or forming operations, shall be capable of being solution heat-treated and overaged (stabilized) to the properties specified for the T73 temper. Such capability shall be demonstrated when specified (see 6.2).

3.2.2.2 Material in the T6, T6510, T6511, T73, T73510 and T73511 tempers. Material in the T6, T6510, T6511, T73, T73510 and T73511 tempers, without the subsequent imposition of cold work or forming operations, shall be capable of being solution heat-treated and artificially aged or overaged, as applicable, to the properties specified for the T62 and T73 tempers. Such capability shall be demonstrated when specified (see 6.2).

3.3 Internal defects. When specified (see 6.2), bar, rod, tube and shapes shall be ultrasonically inspected (see QQ-A-200/GEN). Acceptance limits shall be as specified in table III. The technique for inspection of tube shall be as agreed upon by the procuring activity and the contractor (see 6.2).

TABLE III. Ultrasonic discontinuity acceptance limits 1/

Thickness, (bar and shapes); diameter (rod); wall thickness, (tube); inches <u>2/</u>	Maximum weight per piece, pounds	Maximum width to thickness ratio <u>3/</u>	Discontinuity class <u>4/</u>
0.500 to 1.499	600	10 to 1	B
1.500 and over	600	10 to 1	A

1/ Discontinuities in excess of those listed in table III 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 noncritical areas

2/ The thickness of any element of a shape shall be deemed to be the smallest dimension of that element, and the discontinuity class applicable to that particular thickness shall apply to that element of the shape

3/ Not applicable to rod and tube

4/ The discontinuity class limits are defined in MIL-STD-2154

3.4 Resistance to stress-corrosion cracking. Material supplied in the T73, T73510 and T73511 tempers shall exhibit no evidence of stress-corrosion cracking when subjected to the test specified in 4.2. Sampling frequency shall be in accordance with QQ-A-200/GEN.

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3.4.1 Lot acceptance criteria for stress-corrosion cracking. Resistance to stress-corrosion cracking for each lot of 7075-T73, T73510 and T73511 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 40.0 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 through 39.9 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 ksi, the material is considered to be satisfactory
- (e) If conductivity is 38.0 through 39.9 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 either be given additional second step aging or be reprocessed

3.5 Marking. In addition to the marking required by QQ-A-200/GEN, material in the T6, T6510, T6511, T73, T73510 and T73511 tempers shall be identified by a lot number marked in at least one location on each piece.

4. QUALITY ASSURANCE PROVISIONS (see QQ-A-200/GEN)

4.1 Mechanical tests after heat treatment.

4.1.1 Material in the 0 temper. From material in the 0 temper, an additional number of specimens, equal to that required by QQ-A-200/GEN, shall be taken and tested after solution heat treatment and artificial aging to determine compliance with 3.2.2.1 relative to the T62 temper. When specified (see 6.2), from material in the 0 temper, a number of specimens, equal to that required by QQ-A-200/GEN, shall be taken and tested after solution heat treatment and over-aging to determine compliance with 3.2.2.1 relative to the T73 temper.

4.1.2 Material in tempers other than 0. When specified (see 6.2), from material in a temper other than the 0 temper, an additional number of specimens, equal to that required by QQ-A-200/GEN, shall be taken and tested after the appropriate solution heat treatment and aging treatment to determine compliance with 3.2.2.2.

4.2 Stress-corrosion cracking test. Specimens shall be selected from 7075-T73, -T73510, and -T73511 material, 0.750 inch and greater in thickness, in a manner which will permit application of the specified tensile stress in the short transverse direction with respect to grain flow. Specimens shall be stressed in tension in the short transverse direction and held at constant strain. The stress level shall be 75 percent of the specified longitudinal yield strength. The specimens shall be subjected to the stress-corrosion test specified in QQ-A-200/GEN, the exposure duration to be 20 days. It is the responsibility of the contractor that test results be recorded, identified as to lot, and maintained.

4.3 Electrical conductivity testing. Conductivity measurements shall be made prior to tensile testing on samples selected from the extruded 7075-T73, -T73510, and -T73511 material, to determine compliance with 3.4.1. For all material in the thickness range of 0.500 through 1.500 inches, conductivity measurements shall be made at the approximate center of the section thickness on a plane parallel to the longitudinal centerline of the extrusion. For material over 1.500 inches in thickness, the conductivity shall be measured on the test coupon surface which is closest to the center of the extrusion thickness and on a plane parallel to the extrusion surface. For extruded sections of non-constant cross-sectional dimensions, conductivity measurements shall be made at the center of the section possessing the greatest cross-sectional thickness. For material 0.101 through 0.499 inch in thickness, the conductivity shall be determined on the subsurface after removal of approximately 10 percent of the thickness from one surface. For material up through 0.100 inch in thickness, the conductivity shall be measured on the surface of the tensile test specimen. For curved surfaces, the conductivity shall be measured on machined flat spot; however, for small sizes of tubes, a cut-out portion may be flattened and the conductivity determined on the surface.

5. PREPARATION OF DELIVERY (see QQ-A-200/GEN)

6. NOTES

6.1 Intended use. This alloy is intended for use where high strength is required, and where good resistance to general corrosion is not important. The T6510 and T73510 tempers are intended primarily to provide extruded material with low residual stresses and consequent minimum distortion during machining. The T6511 and T73511 tempers are straightened T6510 and T73510 material respectively and may have unknown residual stresses and may or may not distort during machining. The T73, T73510 and T73511 tempers provide resistance to stress corrosion.

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-200/GEN)
- (e) Special end use requirements

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- (f) Which, if any, demonstrations of heat treatability are to be performed where such demonstrations are optional (see 3.2.2.1 and 3.2.2.2)
- (g) Whether ultrasonic inspection of material is required (see 3.3). Method of inspection of tubing, where applicable. Requirements for sizes, maximum weights and discontinuity classes not covered in table III
- (h) Selection of applicable levels of preservation and packing (see QQ-A-200/GEN)

6.3 Properties after heat treatment. Mechanical properties and corrosion properties, where applicable, 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 solution heat treatment. The user should be held responsible for demonstrating that his processing will yield properties meeting requirements.

6.4 International standardization agreements. Certain provisions of this specification are the subject of international standardization agreement ABC-NAVY-STD-44. When amendment, revision or cancellation of this specification is proposed which affects or violates the international agreement concerned, the preparing activity will inform GSA so that appropriate reconciliation action may be taken through international standardization channels.

MILITARY INTEREST:

Custodians

Army-MR
Navy-AS
Air Force-20

Review Activities

Army-AR, EA, MI
DLA-IS

User Activities

Army-CR
Navy-MC, SH

CIVIL AGENCY COORDINATING ACTIVITIES:

NASA-JFK, MSF
GSA-FSS
DOE-BPA

PREPARING ACTIVITY:

NAVY-AS

DOD Project 9530-0205

Orders for this publication are to be placed with the General Services Administration, acting as an agent for the Superintendent of Documents. See Section 2 of this specification to obtain extra copies and other documents referenced herein.

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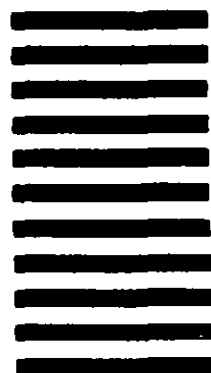


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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

QQ-A-200/11E

2. DOCUMENT TITLE

Aluminum Alloy 7075, Bar, Rod, Shapes, Tube and Wire, Extruded

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

 VENDOR USER MANUFACTURER OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)

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

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)