SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS-QQ-A-250/24B

Issued 1998-06
Revised 1998-11
Cancelled 2009-03

Superseded by AMS4315
Superseding AMS-QQ-A-250/24A

Aluminum Alloy, 7075, Plate and Sheet
(Improved Exfoliation Resistant)

(Composition similar to UNS A97075)

RATIONALE

AMS-QQ-A-250/24 has been designated Cancelled and Superseded because equivalent technical requirements are provided by AMS4315.

CANCELLATION NOTICE

This specification has been declared “CANCELLED” by the Aerospace Materials Division, SAE, as of March 2009 and has been superseded by AMS4315. The requirements of the latest issue of AMS4315 shall be fulfilled whenever reference is made to the cancelled AMS-QQ-A-250/24. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by AMS4315.

Cancelled specifications are available from SAE.

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS-QQ-A-250/24A

Issued JUN 1998
Revised NOV 1998

Submitted for recognition as an American National Standard

Aluminum Alloy, 7075, Plate and Sheet (Improved Exfoliation Resistant)

NOTICE

This document has been taken directly from Federal Specification QQ-A-250/24B and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace QQ-A-250/24B. Any part numbers established by the original specification remain unchanged.

The original Federal Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, and (b) the use of the existing government specification or standard format.

Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any material relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this technical report.

The complete requirements for procuring 7075 plate and sheet described herein shall consist of this document and the latest issue of AMS QQ-A-250.

1. SCOPE AND CLASSIFICATION:

1.1 Scope:

This specification covers the specific requirements for aluminum alloy 7075 plate and sheet for applications requiring improved exfoliation resistance.

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1.2 Classification:

Sheet shall be furnished in the T76 temper only and plate shall be supplied in the T7651 temper only, as specified (see 6.2). Definitions of these tempers are specified in AMS QQ-A-250 and as follows:

T76 - Solution heat-treated and artificially aged sufficient to produce improved resistance to exfoliation and stress-corrosion cracking.

T7651 - Solution heat-treated, stress relieved by stretching to produce a permanent set of 2 percent nominal but not less than 1-1/2 nor more than 3 percent, and artificially aged sufficient to produce improved resistance to exfoliation and stress-corrosion cracking. Plate shall receive no further straightening after stretching.

2. APPLICABLE DOCUMENTS:

See AMS QQ-A-250 and the following:

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 1193	Standard Specification for Reagant Water
ASTM G 34	Standard Method of Test for Exfoliation Corrosion Susceptibility in 7XXX Series Copper Containing Aluminum Alloys (EXCO Test).
ASTM G 38	Recommended Practices for Making and Using the O-Ring stress-corrosion Cracking Test Specimens

3. REQUIREMENTS:

3.1 Chemical composition:

The chemical composition of the ingots or slabs used for the manufacturer of the plates and sheets 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	0.35
Manganese	----	0.30
Iron	----	0.50
Silicon	----	0.40
Titanium	----	2/
Zirconium	----	2/
Others, each	----	0.05
Others, total	----	0.15
Aluminum	Remainder	

1/ Analysis shall regularly be made only for the elements specifically mentioned. 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/ Titanium plus zirconium, 0.25 percent maximum.

3.2 Mechanical properties:

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

Form and Temper	Thickness in inches	Tensile strength, p.s.i. minimum	Yield strength at 0.2 percent offset, p.s.i. minimum	Elongation in 2 inches or 4 times D. percent minimum 1/ 2/
T76	0.063 thru 0.249	73,000	62,000	8
T7651	0.250 thru 0.499	72,000	61,000	8
	0.500 thru 1.000	71,000	60,000	6
	1.001 thru 2,000	71,000	60,000	5

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

2/ D represents specimen diameter.

3.3 Internal defects:

When specified (see 6.2), plate shall be ultrasonically inspected (see AMS QQ-A-250). Acceptance limits shall be as specified in table III.

TABLE III. Ultrasonic discontinuity acceptance limits 1/

Thickness in inches	Maximum weight per piece in pounds	Discontinuity class 2/
0.500 thru 1.000	2,000	B

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 discontinuity class limits are defined in MIL-I-8950.

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3.4 Exfoliation and stress-corrosion cracking:

Material in the T76 and the T7651 tempers, when tested in accordance with 4.2.1 and 4.2.2, shall show neither exfoliation corrosion equivalent to or in excess of that depicted in Figure 2 of ASTM G 34 for category B nor stress-corrosion cracking susceptibility beyond the acceptance criteria as detailed in 4.2.2.5.

3.4.1 Lot acceptance control criteria for T76 and T7651 tempers.: Susceptibility to exfoliation and stress-corrosion cracking for each lot of T76 and T7651 temper material shall be determined by the following control criteria (see 4.1.2 and 4.2.2).

a. Determine mechanical properties and electrical conductivity.

b. If the conductivity is 38 percent IACS or higher, and the tensile properties meet the minimum limits specified herein, the material is acceptable.

c. If the conductivity is at least 36 percent IACS but less than 38 percent IACS, the material shall be tested as specified or reprocessed.

d. If the conductivity is below 36 percent IACS, the material is not acceptable and must be reprocessed.

3.5 Marking:

In addition to the marking required in FED-STD-184, plate and sheet shall be identified by a lot number marked in at least one location on each piece.

4. QUALITY ASSURANCE PROVISIONS:

See AMS QQ-A-250 and the following:

4.1 Sampling:

4.1.1 For exfoliation and stress-corrosion cracking tests: Two samples shall be taken for each 4,000 pounds or less of the first three production lots for each size range of sheet and plate listed in table II. Thereafter, surveillance testing shall be performed on at least one sample per month for each size range of sheet and plate produced during that month which had previously been produced with acceptable exfoliation resistance. The surveillance test sample shall be taken from a lot which has met the requirements of 3.4.1(b). Samples as above shall be taken for stress-corrosion cracking test when thickness permits (see 4.2.2).

4.1.2 For mechanical property and conductivity tests: Sampling shall be in accordance with AMS QQ-A-250 for mechanical property tests. Mechanical properties and conductivities shall be determined on the same samples (see 4.2.3). Conductivity shall be determined prior to testing for mechanical property.

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4.2 Tests:

4.2.1 Exfoliation corrosion test: Test shall be performed in accordance with ASTM G 34. Full thickness specimens of sheet and plate large enough to provide visual assessment of attack may be used, however for all materials, 0.100 inch or more in thickness, 10 percent of the thickness shall be removed by machining one surface. The machined surface shall be evaluated.

4.2.2 Stress-corrosion cracking test: Stress-corrosion tests shall be performed on plate 0.75-inch and over in thickness as follows.

4.2.2.1 Specimens: Specimens shall be selected in a manner such as to permit application of the specific tension stress in the short transverse direction. Specimens shall be C-rings as described in FED-STD-151, Method 823, or in ASTM G 38.

4.2.2.2 Exposure period: Exposure shall be for 30 days.

4.2.2.3 Tension stress: The tensile stress applied in the short transverse direction (perpendicular to grain flow) shall be 25,000 psi, and the specimen shall be held at constant strain.

4.2.2.4 Exposure procedure: The stressed specimen shall be exposed to a 3.5 percent salt solution prepared by dissolving reagent grade sodium chloride (NaC1) in distilled or deionized water, conforming to ASTM D 1193, Type II. The pH of the solution shall be 6.4 to 7.2. The solution temperature shall be 75 ± 2°F, air temperature shall be 80 ±2°F, and with a relative humidity of 45 ±6 percent. The alternate immersion cycle shall consist of 10 minutes immersion in solution and 50 minutes in air, with sufficient circulation to dry the specimens slowly before the next immersion.

4.2.2.5 Stress-corrosion test results: After a 30-day exposure the specimen shall exhibit no visual evidence of stress-corrosion cracking. Any highly directional attack which is suspected of concealing a stress-corrosion crack shall be cross sectioned and examined metallographically. An example of stress corrosion cracking is shown on Figure 1. Figure 2 illustrates pitting type attack which does not constitute failure.

4.2.3 Electrical conductivity tests: The conductivity shall be determined by taking three electrical conductivity readings at random on each sample. For thicknesses less than 0.100 inch, the conductivity shall be determined on the surface. For thicknesses of 0.100 inch and over, the conductivity shall be determined on the machined surface after machining one surface of the sample to a depth of approximately 10 percent of the product thickness. The surface machining may be accomplished by chemical milling. The average of the three readings shall be used as the conductivity acceptance criteria of 3.4.1.

4.3 Records:

The producer shall maintain records of the performance of all lots sampled and tested. Upon request of the procuring activity, such records shall be made available. These records shall be maintained for not less than one year after completion of the contract or purchase order.