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FSC 5320

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AEROSPACE STANDARD

SAE AS7222

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Superseding AMS 7222C

ALUMINUM RIVETS, UNS A92117
2.5Cu - 0.3Mg (2117-T4)

FSC 5320

1. SCOPE:

1.1 Type:

This procurement specification covers rivets fabricated from an aluminum alloy designated as 2117-T4, solution treated.

1.2 Application:

Primarily for joining aluminum parts where a medium shear strength is adequate.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other documents shall be the issue in effect on the date of the purchase order.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1.1 Aerospace Material Specifications:

AMS 2355	Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings
AMS 2470	Anodic Treatment, Aluminum Alloys, Chromic Acid Process
AMS 2770	Heat Treatment of Aluminum Alloy Parts

2.1.1.2 Aerospace Standards:

AS125251 thru AS125400	Rivet - 100° Countersunk Head, Aluminum Alloy
AS125701 thru AS125850	Rivet - Universal Head, Aluminum Alloy

2.1.2 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.1.2.1 Military Standards:

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-1312	Fasteners, Test Methods
MIL-STD-2073-1	DOD Materiel, Procedures for Development and Application of Packaging Requirements

2.1.3 ASTM Publication: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 565	Shear Testing of Aluminum and Aluminum-Alloy Rivets and Cold-Heading Wire and Rods

2.1.4 ANSI Publication: Available from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

ANSI Y14.5M	Dimensioning and Tolerancing

2.2 Definitions:

PRODUCTION INSPECTION LOT: A production inspection lot shall be all finished parts of the same part number, made from a single heat of alloy, heat treated at the same time to the same specified condition, produced as one continuous run, and submitted for vendor's inspection at the same time.

3. TECHNICAL REQUIREMENTS:

3.1 Material:

The rivets shall be made from material conforming to the following:

3.1.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355 (see Table 1).

3.1.2 Heading Stock: Shall be wire or rod, in the half-hard temper.

3.2 Design:

Rivet design shall be for standard 100° countersunk head in accordance with AS125251 thru AS125400, and for standard universal head in accordance with AS125701 thru AS125850 standard part drawings.

TABLE 1 - Composition, Percentages by Weight

Copper	2.2 - 3.0
Magnesium	0.20 - 0.50
Iron	0.7 max
Silicon	0.8 max
Zinc	0.25 max
Manganese	0.20 max
Chromium	0.10 max
Other Impurities, each	0.05 max
Other Impurities, total	0.15 max
Aluminum	remainder

3.3 Condition:

3.3.1 Heat Treatment: Following cold heading, rivets shall be solution heat treated in accordance with AMS 2770, unless otherwise specified on the part drawing.

3.3.2 Coating: Following solution heat treatment as in 3.3.1, rivets shall be anodized in accordance with AMS 2470.

3.4 Properties:

Rivets shall conform to the following requirements:

3.4.1 Shear Strength: The undriven strength of rivets greater than 0.094 inch in nominal diameter shall be not less than 26 000 psi in single shear or not less than 52 000 psi in double shear at room temperature when tested as specified in 4.5.2.1, unless shear strength is otherwise specified on the part drawing.

3.4.1.1 For rivets 0.094 inch in nominal diameter or smaller, or for nonstandard diameters for which a shear test fixture is not available, tensile test shall be made as specified in 4.5.2.2. The wire or rod samples shall be taken from the same material lot that the rivets are made. Room temperature tensile strength shall be not less than 38 000 psi, for T4 temper, unless otherwise specified on the part drawing.

3.5 Circular Runout of Head:

The circular runout (see ANSI Y14.5M) of rivet head relative to the shank, from a maximum shank length equal to two nominal shank diameters from the head, shall not vary by an amount which will produce a full indicator movement (FIM) greater than the value specified in Table 2 for the corresponding rivet diameter, unless otherwise specified on the part drawing. The indicator reading shall be taken with the indicator stylus touching the periphery of the head as the rivet is rotated with the shank as an axis.

TABLE 2 - Rivet Head Circular Runout Tolerance

Nominal Diameter of Rivet Shank inch	Rivet Head Circular Runout Tolerance, FIM Flush Head inch	Rivet Head Circular Runout Tolerance, FIM Protruding Head inch
0.062	0.010	0.010
0.094	0.010	0.010
0.125	0.010	0.010
0.156	0.010	0.015
0.188	0.010	0.015
0.250	0.010	0.020
0.312	0.015	0.020
0.375	0.015	0.020

3.6 Identification:

Rivets conforming to this specification shall be identified by a dimple 0.030 in diameter maximum and depressed 0.020 in maximum located in the center of the top surface of the head, for material identification.

3.7 Quality:

Rivets shall be uniform in quality and condition, free from seams, fins, clinch or die marks, cracks, cold shuts, coarse grain, and other injurious defects. Rivets shall drive satisfactorily with full heads and, after driving, shall show no cracks when visually inspected.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of parts shall supply all samples and shall be responsible for performing all required tests. Purchaser reserves the right to perform such confirmatory testing as deemed necessary to ensure that the parts conform to the requirements of this specification.

4.2 Classification of Tests:

Tests to determine conformance to all technical requirements are classified as acceptance tests and shall be performed on each production inspection lot.

4.3 Acceptance Test Sampling:

4.3.1 Sampling for Material Acceptance: Sampling, inspection, and testing of the wire or rod from which the rivets are manufactured shall be in accordance with AMS 2355.

4.3.2 Sampling for Finished Product Acceptance:

4.3.2.1 Sampling for Visual and Dimensional Examination: A random sample shall be selected from each production inspection lot in accordance with MIL-STD-105, Inspection Level II, acceptance quality level (AQL) 4% defective. All dimensional characteristics are considered defective when out of tolerance.

4.3.2.2 Sampling for Tests: Lot size shall be defined in terms of pounds, and sampling size shall be defined in terms of number of rivets. For production inspection lots of 1300 lb and less, a random sample shall be selected in accordance with MIL-STD-105, Inspection Level S-2, acceptance quality level (AQL) of 4% defective. For production inspection lots over 1300 lb, 10 rivets shall be selected from each production inspection lot. The AQL shall be 2.5% defective.

4.4 Preparation of Specimens:

4.4.1 Shear Strength Specimens: Rivet samples with a shank length 2.5 times the nominal shank diameter and greater shall be double or single shear tested as specified in 4.5.2.1. Rivet samples with a shank length less than 2.5 times the nominal shank diameter shall be single shear tested.

4.4.2 Heat Treatment of Tension Test Specimens: Tension test specimens shall be not less than 18 in long, or three specimens each 6 in long. The specimen shall be taken from the wire or rod used to make the rivets and heat treated with the lot of rivets it represents.

4.4.3 Test After Heat Treatment: Specimens shall be tested within 4 days after completion of heat treatment. If, however, the specimens fail to conform to this specification, the test results may be discarded and the remaining untested specimens tested after the expiration of 4 days.

4.5 Inspection Methods:

4.5.1 Examinations:

4.5.1.1 Visual Inspection: The rivets shall be visually inspected to determine conformance to 3.7.

4.5.1.2 Dimensional Inspection: Conformance to the dimensions on the part drawing and the requirements of 3.5, when applicable, shall be performed with conventional measuring methods.