SAE INTERNATIONAL

AEROSPACE STANDARD

AS7225 | REV. A

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Superseding AS7225

Rivets, Carbon Steel
Procurement Specification for

FSC 5320

RATIONALE

AS7225A has been reaffirmed to comply with the SAE five-year review policy.

WARNING

This document includes cadmium as a plating material. The use of cadmium has been restricted and/or banned for use in many countries due to environmental and health concerns. The user should consult with local officials on applicable health and environmental regulations regarding its use.

1. SCOPE

1.1 Type

This procurement specification covers aircraft-quality solid rivets and tubular end rivets made from a carbon steel of the type identified under the Unified Numbering System as UNS G10100.

1.2 Application

Primarily for joining steel parts where a low shear strength is adequate and destruction of the fastener for repair or replacement is permissible.

1.3 Dimensions and Tolerances

Unless otherwise specified herein, dimensions and tolerances are in inches.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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http://www.sae.org/technical/standards/AS7225A

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

2.1.1.1 Aerospace Material Specifications

AMS2259 Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels

AMS2400 Plating, Cadmium

2.1.1.2 Aerospace Standards

AS125101 Rivet - 100° Countersunk Head, Mild Steel

AS125551 thru AS125700 Rivet - Universal Head, Mild Steel

2.1.2 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, http://assist.daps.dla.mil/quicksearch/.

2.1.2.1 Military Specification

MIL-STD-2073-1 Military Packaging, Standard Practice for

2.1.2.2 Air Force-Navy Aeronautical Standard

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM E 350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

2.2 Definitions

DEFECTIVE: A unit of product which contains one or more defects.

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.

2.3 Unit Symbols

° - degree, angular

HRB - hardness, Rockwell B scale

% - percent (1% = 1/100)

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 percentages by weight specified in Table 1, determined by wet chemical methods in accordance with ASTM E 350 or by spectrochemical or other analytical methods acceptable to purchaser.

TABLE 1 - MATERIAL COMPOSITION

Element	% by Weight min	% by Weight max
Carbon	0.05	0.15
Manganese	0.20	0.50
Phosphorus	--	0.040
Sulfur	--	0.050

3.1.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2259.

3.1.2 Condition

Cold drawn wire or bar and annealed.

3.2 Design

Unless otherwise specified on the part drawing, rivets furnished to this specification shall conform to the design, dimensions, and other requirements specified on the applicable AS standard drawing as in 2.1.1.2 or the applicable AN standard drawing as in 2.1.2.2.

3.3 Fabrication

Cold headed, unless purchaser permits machining, annealed, and descaled if necessary.

3.4 Runout of Head

The circular runout of rivet head relative to its shank shall be within the full indicator movement (FIM) specified in Table 2, unless otherwise specified on the part drawing. The measurement shall be taken with the indicator stylus touching the periphery of the protruding head, or the conical surface near the top of the flush head, as the rivet is rotated with its shank as an axis.

TABLE 2 - CIRCULAR RUNOUT TOLERANCE

Rivet Shank Nominal Diameter inch	Rivet Head Runout Tolerance FIM, inch Flush Head	Rivet Head Runout Tolerance FIM, inch Protruding Head
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

3.5 Properties

Rivets shall conform to the following requirements:

3.5.1 Hardness

Shall be not higher than 60 HRB, determined in accordance with ASTM E 18 on a flat, smooth, filed or ground surface near the mid-length of the shank.

3.5.2 Formability

Solid-shank rivets shall withstand being driven cold to form a crack-free upset head. The cold driven, upset head shall have a diameter of 1.25 to 1.66 times the nominal shank diameter and a height within the range shown in Table 3. Using a rivet having a grip length of 1.5 times the nominal shank diameter, the cold driven rivet shall have an expansion of the shank to the full diameter of the hole in which it is installed, provided that the hole diameter is not more than 0.006 inch greater than the nominal shank diameter.

TABLE 3 - RIVET DRIVEN HEAD HEIGHT

Rivet Shank Nominal Diameter inch	Head Height Proportion of Nominal Diameter
0.062 and 0.094	0.33 to 1.0
0.125 and 0.156	0.33 to 0.8
0.188 and 0.250	0.33 to 0.8
0.312 and 0.375	0.33 to 0.7

3.5.3 Flarability

Hollow-end rivets shall withstand being flared to a diameter of 1.5 times the nominal shank diameter without bending the shank and without cracking in the flared end.

3.6 Plating

Where AS7225 is specified, any protective treatment shall be as specified on the part drawing. Where AS7225-1 is specified, parts shall be cadmium plated in accordance with AMS2400.

3.7 Quality

Rivets as received by purchaser, shall be sound, smooth, and free from foreign materials and from imperfections detrimental to usage of the parts.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

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

4.2 Responsibility for Compliance

The manufacturer's system for parts production shall be based on preventing product defects, rather than detecting the defects at final inspection and then requiring corrective action to be invoked. An effective manufacturing in-process control system shall be established, subject to the approval of the purchaser, and used during production of parts.

4.3 Production Acceptance Tests

The purpose of production acceptance tests is to check, as simply as possible, using a method which is inexpensive and representative of the part usage, with the uncertainty inherent in random sampling, that the parts comprising a production inspection lot satisfy the requirements of this specification.

4.4 Classification of Tests

4.4.1 Acceptance Tests

Tests to determine conformance to requirements for material (3.1), design, dimensions and tolerances (3.2), runout of head (3.4), hardness (3.5.1), and plating (3.6) are classified as acceptance tests and shall be performed on each production inspection lot. A summary of acceptance tests is specified in Table 4.

TABLE 4 - SUMMARY OF ACCEPTANCE TESTS

TABLE 4A - NONDESTRUCTIVE TESTS

Characteristic	Req. Para.	Sample Size	Test Method
Design & Dimensions	3.2	Table 5	Conventional measuring methods
Runout of Head	3.4	Table 5	Conventional measuring methods
Quality	3.7	Table 5	Visual

TABLE 4B - DESTRUCTIVE TESTS

Characteristic	Req. Para.	Sample Size	Test Method
Material Composition	3.1.1	4.5.1	ASTM E 350
Hardness	3.5.1	4.5.3	ASTM E 18
Plating	3.6	4.5.4	Per AMS 2400 or microscopic measurement of sectioned specimens

4.4.2 Periodic Tests

Tests to determine conformance to requirements for formability (3.5.2) and flarability (3.5.3) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by the purchaser.

4.5 Acceptance Tests Sampling

4.5.1 Material

One sample from bars or wire from each heat of alloy.

4.5.2 Nondestructive Tests - Visual and Dimensional

A random sample shall be selected from each production inspection lot in accordance with Table 5.