AEROSPACE STANDARD

AS7228™	REV. B

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Superseding AS7228A

Rivets, Steel, Corrosion-Resistant 18Cr - 9Ni Solution Heat Treated, Procurement Specification for

FSC 5320

RATIONALE

In 3.3, change "passivated" to "cleaned." Revise hardness to allow testing per ASTM E92.

1. SCOPE

1.1 Type

This procurement specification covers aircraft quality solid rivets and tubular end rivets made from a corrosion-resistant steel of the type identified under the Unified Numbering System as UNS S30200.

1.2 Application

Primarily for joining corrosion-resistant steel parts requiring corrosion, heat, and oxidation resistance up to approximately 800 °F, but not requiring high shear strength.

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.

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 +1 724-776-4970 (outside USA), www.sae.org.

AMS2248 Chemical Check Analysis Limits, Corrosion- and Heat-Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys

AMS2750 Pyrometry

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AS7228B

AS3228 Rivet - Tubular, Countersunk, AS7228

AS3229 Rivet - Tubular, Universal, AS7228

AS124951 Rivet - 100° Countersunk Head, Corrosion Resistant Steel

AS125401 Rivet - Universal Head, Corrosion Resistant Steel

2.1.2 U.S. Government Publications

Copies of these documents are available online at https://quicksearch.dla.mil.

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

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E92 Vickers Hardness Testing

ASTM E353 Standard Test Methods for Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.1.4 AIA Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NASM1312-6 Fasteners Test Methods, Method 6, Hardness

2.1.5 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

ASME Y14.5M Dimensioning and Tolerancing

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 the vendor's inspection at the same time.

2.3 Unit Symbols

HV10 hardness, Vickers, measured under a 10 kg load

% percent (1% = 1/100)

kg kilogram

°F degree, Fahrenheit

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 E353, by spectrochemical methods, or by other analytical methods acceptable to the purchaser.

Table 1 - Material composition

Element	% by Weight Min	% by Weight Max
Carbon	---	0.12
Manganese	---	2.00
Silicon	---	1.00
Phosphorus	---	0.045
Sulfur	---	0.030
Chromium	17.00	---
Nickel	8.00	---
Molybdenum	---	0.75
Copper	---	0.75
Iron	remainder	

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.1.3 Condition

Solution heat treated, cold drawn wire or bar.

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 AS124951 through AS125100 and AS125401 through AS125550 for solid rivets, and AS3228 and AS3229 for tubular rivets.

3.3 Fabrication

Cold headed, unless the purchaser permits machining. Rivets, after forming, shall be solution heat treated free from continuous carbide network, descaled if necessary, and cleaned; solution heat treatment shall be performed in a furnace atmosphere which will not cause change in composition at the surface. Furnace surveys and calibration of temperature controllers and recorders shall be in accordance with AMS2750.

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 (refer to ASME Y14.5M). 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 Inches	Rivet Head Runout Tolerance FIM, Inches Flush Head	Rivet Head Runout Tolerance FIM, Inches Protruding Head
0.062	0.003	0.010
0.094	0.003	0.010
0.125	0.005	0.010
0.156	0.005	0.015
0.188	0.005	0.015
0.250	0.005	0.020
0.312	0.010	0.020
0.375	0.010	0.020

3.5 Properties

Rivets shall conform to the following requirements:

3.5.1 Hardness

Shall be not higher than 150 HV10, determined in accordance with ASTM E92 or NASM1312-6.

3.5.2 Formability

Solid-shank rivets shall withstand being driven cold to form a crack-free upset head having a diameter of 1.25 to 1.50 times the nominal shank diameter and a height within the range shown in Table 3 and with expansion of the shank to the full diameter of the hole in which it is installed, using a rivet having a grip length of 1.5 times the nominal shank diameter, 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 Inches	Head Height Proportion of Nominal Diameter
0.062 and 0.094	0.5 to 1.0
0.125 and 0.156	0.5 to 0.8
0.188 and 0.250	0.5 to 0.8
0.312 and 0.375	0.5 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 Quality

Rivets, as received by the purchaser, shall be uniform in quality and condition, 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 the vendor's test and shall be responsible for performing all required tests. The 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 the 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 (see 3.1), design, dimensions, and tolerances (see 3.2), runout of head (see 3.4), and hardness (see 3.5.1) 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

Characteristic	Req Para	Sample Size	Test Method
Nondestructive Tests			
Design & Dimensions	3.2	4.5.2	Conventional measuring methods
Runout of Head	3.4	4.5.2	Conventional measuring methods
Quality	3.6	4.5.2	Visual
Destructive Tests			
Material Composition	3.1.1	4.5.1	ASTM E353
Hardness	3.5.1	4.5.3	ASTM E92 or NASM1312-6

4.4.2 Periodic Tests

Tests to determine conformance to requirements for formability (see 3.5.2) or flarability (see 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.