AEROSPACE STANDARD

AS7229

Issued 1992-10
Reaffirmed 2013-10

Superseding AMS 7229F

Rivets, Steel, Corrosion and Heat Resistant 18Cr - 10.5Ni - 0.70(Cb+Ta) Solution Heat Treated Procurement Specification For

FSC 5320

RATIONALE

AS7229 has been reaffirmed to comply with the SAE five-year review policy.

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 S34700.

1.2 Application:

Primarily for joining corrosion resistant steel parts requiring corrosion, heat, and oxidation resistance up to approximately 1300 °F but not requiring high shear strength.

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 2248 Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys
AMS 2750 Pyrometry

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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http://www.sae.org/technical/standards/AS7229

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-1312	Fasteners, Test Methods
MIL-STD-2073-1	DoD Materiel, Procedures for Development and Application of Packaging Requirements

2.1.2.2 Air Force-Navy Aeronautical Standards:

AN123151 Thru AN123300	Rivet, Solid, Universal Head, AMS 7229
AN123451 Thru AN123600	Rivet, Solid, 100° Flush Head, AMS 7229

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

ASTM A 262	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
ASTM E 353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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
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 E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Material Composition

Element	% By Weight min	% By Weight max
Carbon	---	0.08
Manganese	---	2.00
Silicon	---	1.00
Phosphorus	---	0.040
Sulfur	---	0.030
Chromium	17.00	19.00
Nickel	9.00	12.00
Columbium + Tantalum	10XC	1.10
Molybdenum	---	0.75
Copper	---	0.75
Iron	remainder	

3.1.2 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2248.

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 AN123151 thru AN123300 and AN123451 thru AN123600 for solid rivets.

3.3 Fabrication:

Cold headed, unless purchaser permits forming heads by machining. Rivets, after forming, shall be solution heat treated free from continuous carbide network, descaled if necessary, and passivated; 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 AMS 2750.

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	0.003	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 165 HV10, determined in accordance with MIL-STD-1312-6.

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 inch	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.

3.5.4 Embrittlement: Representative rivets, after sensitizing treatment, shall meet the copper/copper sulfate/sulfuric acid test conducted in accordance with ASTM A 262, practice E.

3.6 Quality:

Rivets as received by 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 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 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 (3.1), design, dimensions, and tolerances (3.2), runout of head (3.4), and hardness (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 E 353
Hardness	3.5.1	4.5.3	MIL-STD-1312-6

4.4.2 Periodic Tests: Tests to determine conformance to requirements for formability (3.5.2) or flarability (3.5.3) as applicable, and embrittlement (3.5.4) 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.