AEROSPACE STANDARD

AS7232™ REV. B

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Superseding AS7232A

Rivets, Solid and Tubular, Nickel Alloy Corrosion and Heat Resistant 74Ni - 15.5Cr - 8.0Fe Procurement Specification for SC 5320

RATIONALE

Section 3.5.1 was altered to show change of hardness check from ASTM E92 to NASM1312 method 6.

1. SCOPE

1.1 Type

This procurement specification covers aircraft quality solid rivets and tubular end rivets made from a corrosion and heat resistant nickel base alloy of the type identified under the Unified Numbering System as UNS N06600.

1.2 Application

Primarily for fastener applications requiring corrosion resistance and heat and oxidation resistance up to 2000 °F, but with reduced strength at the elevated temperatures. Rivets shall not be hand peened during driving.

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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https://www.sae.org/standards/content/AS7232B/

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2269 Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys

AMS2750 Pyrometry

AS3230 Rivet - Tubular, Countersunk, Corrosion and Heat Resistant Nickel Alloy (UNS N06600)

AS3231 Rivet - Tubular, Universal

2.1.2 U.S. Government Publications

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

2.1.2.1 Military Standard

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

2.1.2.2 Air Force-Navy Aeronautical Standards

AS123301 thru AS123450 Rivet, Solid, Universal Head, AMS7232

AS123601 thru AS123750 Rivet, Solid, 100° Flush Head, AMS7232

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-862-9585, www.astm.org.

ASTM E354 Chemical Analysis of High-Temperature, Electrical, Magnetic and Other Similar Iron, Nickel, and Cobalt Alloys

2.1.4 AIA/NAS 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 Fastener Test Methods, Method 6, Hardness

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

°F degree, Fahrenheit

% percent (1% = 1/100)

HV hardness, Vickers

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 E354 or by spectrochemical or other analytical methods acceptable to purchaser.

Table 1 - Material composition

Element	% of Weight Min	% of Weight Max
Carbon	--	0.06
Manganese	--	1.00
Silicon	--	0.50
Sulfur	--	0.015
Chromium	14.00	17.00
Nickel + Cobalt	72.00	--
Iron	6.00	10.00
Cobalt /1/	--	1.00
Columbium + Tantalum /1/	--	1.00
Titanium /1/	--	0.50
Aluminum /1/	--	0.35
Copper	--	0.50

/1/ Determination not required for routine acceptance.

3.1.1.1 Check Analysis

Composition variation shall meet the requirements of AMS2269.

3.1.2 Condition

Wire cold drawn from hot finished wire or rod which has been previously ground or has had surface preparation (other than by pickling) for removal of seams and other injurious surface imperfections.

3.2 Design and Dimensions

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 drawing as in 2.1.1.2.

3.3 Fabrication

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

3.3.1 Annealing

Rivets shall be annealed by heating to 1950 °F ± 25 °F, holding at heat for 5 to 20 minutes, and cooling as required. Furnaces may be any type ensuring uniform temperature throughout the parts being heated and shall be equipped with, and operated by, automatic temperature controllers and data recorders conforming to AMS2750. The furnace atmosphere shall be such that it will not cause surface hardening.

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

Hardness shall not be higher than 151 HV10 determined in accordance with NASM1312 method 6.

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	0.5 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 as in 2.1.1.2 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 purchaser, shall be uniform in quality and condition, sound, smooth, and free from foreign materials and from imperfections detrimental to usage of the rivets.

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.

4.3.1 Tests for all technical requirements are acceptance tests and shall be performed on each production inspection lot. A summary of acceptance tests is specified in Table 4.

4.4 Acceptance Tests Sampling

4.4.1 Material Composition

One sample from each heat of alloy.

4.4.2 Nondestructive Tests - Visual and Dimensional

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

4.4.3 Hardness

A random sample consisting of five rivets shall be selected from each production inspection lot.

4.4.4 Formability or Flarability Tests

As agreed upon by purchaser and vendor.

4.4.5 Acceptance Quality

Of random samples tested, acceptance quality shall be based on zero defectives.

4.5 Reports

The vendor of parts shall furnish with each shipment a report stating that the parts conform to the condition, chemical composition, and other technical requirements of this specification. This report shall include the purchase order number, lot number, AS7232B, contractor or other direct supplier of material, part number, nominal size, and quantity.

Table 4 - Summary of acceptance tests

Table 4A - Nondestructive tests

Characteristic	Req Para	Sample Size	Test Method
Packaging and Identification	5.1	None	Visual examination
Dimensions	3.2	Table 5	Conventional measuring methods
Runout of Head	3.4	Table 5	Conventional measuring methods
Quality	3.7	Table 5	Visual examination

Table 4B - Destructive tests

Characteristic	Req Para	Sample Size	Test Method
Material	3.1	4.4.1	Per ASTM E354
Hardness	3.5.1	4.4.3	Per NASM1312-6
Formability	3.5.2	4.4.4	Conventional driving tool
Flarability	3.5.3	4.4.4	Conventional flaring tool

Table 5 - Sampling data

Nondestructive tests
visual and dimensional

Production Inspection Lot	Sample Size
2 to 5	2
16 to 50	3
51 to 150	5
151 to 500	8
501 to 3200	13
3201 to 35000	20
35001 to 500000	32
500001 and over	50

4.6 Rejected Lots

If a production inspection lot is rejected, the vendor of parts may perform corrective action to screen out or rework the defective parts and resubmit for acceptance tests inspection as in Table 4. Resubmitted lots shall be clearly identified as re-inspected lots.