

FED.SUPPLY CLASS

5320

1. SCOPE

1.1 Scope. This specification establishes the requirements for procurement of self-plugging blind rivets, with a mechanically locked spindle, which can be installed in assemblies or construction where access to only one side is available. These rivets are intended for use in aircraft structural or similar applications.

1.2 Classes and types. Rivets shall be furnished in the following classes and types:

Class 1 – Protruding Head Rivets (NAS1398)

Type B – Aluminum Alloy (5056), UNS A95056

Type D – Aluminum Alloy (2017), UNS A92017

Type M – Nickel-Copper, UNS N04400

Type C – Corrosion and Heat Resistant Steel (A286), UNS S66286

Class 2 – 100° Flush Head Rivets (NAS1399)

Type B – Aluminum Alloy (5056), UNS A95056

Type D – Aluminum Alloy (2017), UNS A92017

Type M – Nickel-Copper, UNS N04400

Type C – Corrosion and Heat Resistant Steel (A286), UNS S66286

2. APPLICABLE DOCUMENTS

2.1 Publications. The following publications of the issue in effect on date of invitation for bids shall form a part of this specification to the extent specified herein.

2.1.1 Federal specifications

QQ-A-430 Aluminum Alloy Rod and Wire; for Rivets and Cold Heading

QQ-N-281 Nickel-Copper Alloy Bars, Plates, Rods, Sheets, Strips, Wire, Forgings and Structural and Special Shaped Sections

Copies can be obtained from the Department of Defense Single Stock Point (DODSSP). <http://dodssp.daps.dla.mil>

2.1.2 Military specifications

MIL-DTL-5541 Chemical Films for Aluminum and Aluminum Alloys

MIL-A-8625 Anodic Coatings, for Aluminum and Aluminum Alloys

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

Copies can be obtained from the Department of Defense Single Stock Point (DODSSP). <http://dodssp.daps.dla.mil>

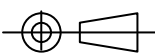
2.1.3 Military standards

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-889 Dissimilar Metals

Copies can be obtained from the Department of Defense Single Stock Point (DODSSP). <http://dodssp.daps.dla.mil>

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THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 7
PROCUREMENT SPECIFICATION NONE	TITLE RIVET, BLIND, SELF-PLUGGING, MECHANICALLY LOCKED SPINDLE ⑦	CLASSIFICATION SPECIFICATION NAS1400 SHEET 1 OF 16

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.
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FORM 09-01

REVISION DATE: SEPTEMBER 28, 2012

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2.1.4 Industry specifications and standards

American Society for Quality

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

Copies can be obtained from the American Society for Quality, 600 North Plankinton Ave., Milwaukee, WI 53203.

www.asq.org

ASTM International

ASTM D3951 Standard Practice for Commercial Packaging

ASTM B700 Standard Specification for Electrodeposited Coatings of Silver for Engineering Use

Copies can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. www.astm.org

Aerospace Industries Association

NAS1398 Rivet, Blind, Protruding Head, Locked Spindle

NAS1399 Rivet, Blind, 100° Flush Head, Locked Spindle

NASM33522 Rivets for Blind Attachment, Limitations for Design and Usage

NASM1312 Fastener Test Methods

Copies can be obtained from the Aerospace Industries Association, 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209. www.aia-aerospace.org

SAE International

AMS-QQ-P-416 Plating, Cadmium (Electrodeposited)

AMS5731 Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings

AMS5732 Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings

AMS5737 Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, and Tubing

AMS2770 Heat Treatment of Wrought Aluminum Alloys

AMS2759 Heat Treatment for Steel, Process for

Copies can be obtained from SAE International, 400 Commonwealth Dr., Warrendale, PA 15096-0001. www.sae.org

3. REQUIREMENTS

3.1 Qualification. The rivets furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein. The rivet manufacturer shall be responsible for conducting the tests of this specification. Results of these tests shall be submitted upon application for qualification.

3.2 Materials. The materials used in the manufacture of the rivets for blind attachment shall be classified as follows:

(A) Types B and D Rivets – Sleeve and spindle shall be aluminum alloy per QQ-A-430.

(B) Type M Rivets – Sleeve to be nickel-copper alloy per QQ-N-281. Spindle to be nickel-copper alloy per QQ-N-281 or CRES per AMS5731 or AMS5732 (A286).

(C) Type C Rivets – Sleeve to be A286 CRES per AMS5731, AMS5732, or AMS5737. Spindle to be A286 CRES per AMS5731.

3.2.1 The material used for the rivet spindle, lock ring, and other parts of the rivet shall be specified in qualification report.

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3.3 Design and construction

3.3.1 Construction. The rivet may be of multiple-piece construction, but must be an integral assembly and shall include a means, other than friction, of mechanically locking the spindle to the rivet body. The rivet assembly shall consist principally of a rivet body and spindle with additional parts, if necessary, for locking the spindle to the body. The rivets produced to this specification must be capable of being installed by tools (guns and pulling heads) presently available at government facilities or in use by airframe manufacturers. If different tools are required to drive rivets of a specific design, they shall be suitably identified or coded with the same symbol and code as the rivet they are capable of installing.

3.3.2 Expansion. The rivet shall be installed by mechanical means. Expansion is to be accomplished by action of a spindle being pulled into and expanding the rivet shank. Amount of shank expansion shall be not less than that shown in Table I when rivet is expanded in air. A means of mechanically locking the spindle to the rivet shank shall be accomplished during the driving operation.

TABLE I – RIVET SHANK EXPANSION REQUIREMENTS (Ref. Paragraph 3.3.2)

NOMINAL SIZE	SHANK DIAMETER AFTER BEING EXPANDED IN AIR (MIN)
.094	.103
.125	.135
.155	.168
.190	.201
.250	.267

3.3.3 Spindle retention. When tests are performed as specified in Paragraph 4.4.8, the rivet spindle shall withstand an axial pushout load of the values specified in Table II. The spindle of an uninstalled rivet (rivet in the as-received condition) shall be capable of withstanding an axial pushout load of the values specified in Table II, Column B.

TABLE II – SPINDLE RETENTION LOADS (MIN) (Ref. Paragraph 4.4.8)

NOMINAL SIZE	A TOTAL POUNDS FORCE REQUIRED TO PUSHOUT LOCKED SPINDLE (MIN) LBF	B MINIMUM POUNDS FORCE PUSHOUT, UNINSTALLED RIVET	
		PARTIALLY SERRATED SPINDLE	FULLY SERRATED SPINDLE
.094	80	10	10
.125	125	25	15
.156	175	45	15
.190	250	45	20
.250	400	45	20

3.3.4 Dimensions. Rivets shall conform dimensionally to the applicable NAS standards.

3.3.5 Roundness and concentricity of heads. Rivet heads shall be round within the limits specified in NAS1398 and NAS1399. They shall be concentric with the shank within the limits specified in Table VII when tested as specified in Paragraph 4.4.2.

3.3.6 Spindle removal and flushness. One tool shall be able to drive and lock the rivet satisfactorily with one contact with the rivet. The excess protrusion of the rivet spindle shall be removed during the driving operation and shall be flush within the limits of Figure 1. A means of visual inspection shall be provided to show that the rivet is properly driven.

3.3.7 Finish. Rivets shall be finished in accordance with applicable NAS standards.

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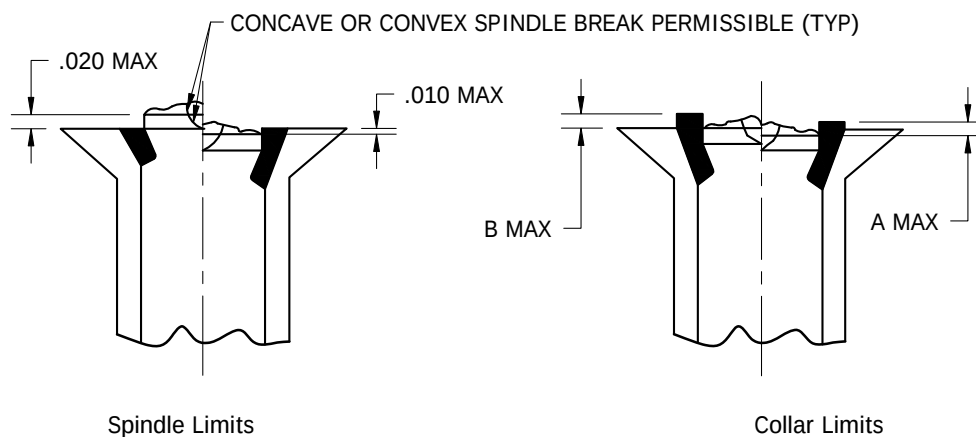
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- 3.3.8 Heat treatment. Heat treatment of all aluminum alloys used in the fabrication of blind rivets shall be in accordance with AMS2770. Heat treatment of all steels used shall be in accordance with AMS2759.



Spindle shall never be more than .020 above top of rivet head or more than .010 below top of rivet head. This applies to both flush and protruding head rivets.

Note: All spindle dimensions refer to the intersection of the rolled break notch and the spindle locking land. No reference is made to the uneven break surface.

Locking collar shall never be more than "B" max above top of rivet head when spindle is above rivet head. If spindle is flush or below flush with rivet head, locking collar should never be more than "A" above spindle. This applies to both flush and protruding head rivets.

	-3 DIA	-4 DIA	-5 DIA	-6 DIA	-8 DIA
A MAX	.015	.015	.020	.025	.030
B MAX	.010	.010	.010	.015	.020

FIGURE 1 – SPINDLE AND COLLAR FLUSHNESS LIMITS

- 3.3.9 Shear strength. The single shear strength of the blind rivet shall be not less than the value specified in Table III when tested in accordance with Paragraph 4.4.4.
- 3.3.10 Tensile strength. The tensile strength of the driven rivet shall be not less than the values listed in Table IV when tested in accordance with Paragraph 4.4.5.
- 3.3.11 Fatigue strength. Rivets shall withstand 8 million stress cycles at the loads specified in Table IX when tested as specified in Paragraph 4.4.11.
- 3.3.12 Sheet take up. Rivets shall meet the requirements of Table VIII when tested in accordance with Paragraph 4.4.9.
- 3.3.13 Lubrication. Lubrication as necessary to assure proper function of the blind rivet is permissible. The lubricant used shall pass the lubricant coating corrosion test or Paragraph 4.4.6 and shall not be changed without re-qualification of the rivet. Cadmium or zinc shall not be used for a lubricant unless specified as a finish.
- 3.3.14 Workmanship. Rivets shall be of uniform quality in accordance with high grade aircraft manufacturing practice. The rivet head shall not possess more than three discontinuities comprised of seams, inclusions, nicks or gouges having a depth exceeding the limits specified in Table V when measured normal to the surface. Discontinuities on the bearing surface that would prevent firm seating are not acceptable.

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TABLE III – SHEAR STRENGTH

NOMINAL SIZE	HEAD CONFIGURATION	TOTAL GRIP (INCH) /a/	MINIMUM SHEAR STRENGTH (LBF)			
			TYPE B 5056	TYPE D 2017	TYPE M NICKEL-COPPER	TYPE C A286
.094	PROTRUDING	.062	–	–	–	407
		.125	–	–	–	543
	FLUSH	.125	–	–	–	453
		.187	–	–	–	543
.125	PROTRUDING	.062	238	302	435	590
		.125	388	494	710	970
	FLUSH	.125	245	312	450	610
		.187	355	450	640	870
		.250	388	494	710	970
		.312	596	755	1,090	1,490
.156	PROTRUDING	.062	325	410	595	810
		.125	510	645	930	1,270
	FLUSH	.187	596	755	1,090	1,490
		.250	550	710	1,000	1,350
		.312	596	755	1,090	1,490
		.375	862	1,090	1,590	2,150
.190	PROTRUDING	.125	640	810	1,180	1,600
		.187	862	1,090	1,590	2,150
	FLUSH	.250	560	710	1,030	1,400
		.312	730	930	1,310	1,800
		.375	820	1,020	1,490	2,000
		.437	862	1,090	1,590	2,150
.250	PROTRUDING	.125	930	1,180	1,700	2,330
		.187	1,240	1,580	2,280	3,120
		.250	1,550	1,970	2,840	3,890
	FLUSH	.250	980	1,250	1,800	2,450
		.312	1,280	1,610	2,300	3,200
		.375	1,400	1,780	2,550	3,450
		.437	1,520	1,920	2,800	3,700
		.500	1,550	1,970	2,840	3,890

/a/ For rivet grips greater than those listed, use highest values shown for the diameter, class and type.

TABLE IV – TENSILE STRENGTH VALUES

NOMINAL SIZE	TYPE B & D LBF	TYPE M LBF	TYPE C LBF
.094	–	–	300
.125	230	340	640
.156	375	550	1,000
.190	540	780	1,500
.250	1,000	1,450	2,700

TABLE V – DISCONTINUITY LIMITS

NOMINAL RIVET DIA (INCH) 1/4 AND UNDER	
LOCATION	MAX DEPTH OF DISCONTINUITY
TOP OF HEAD	.010
PERIPHERY OF HEAD /b/	.020
OTHER SURFACES	.005

/b/ Periphery is defined as the portion of the head outside the shank diameter.