

FED. SUPPLY CLASS

5320

## 1.0 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 in both thick and thin sheets. The bulbed blind head configuration makes these rivets especially suited for thin sheet or double dimple applications.

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

### Class 1: Protruding Head Rivets

- Type A – 2219 Aluminum Alloy Sleeve, Nickel Alloy 600 Spindle
- Type B – 5056 Aluminum Alloy Sleeve, Alloy Steel Spindle
- Type C – Nickel Alloy 600 Sleeve, A286 CRES Spindle (NAS1738)  
A286 CRES Sleeve, A286 CRES Spindle (NAS1768)
- Type D – 2017 Aluminum Alloy Sleeve, 7075 Aluminum Alloy Spindle (NAS1768)
- Type E – 5056 Aluminum Alloy Sleeve, Nickel Alloy 600 Spindle
- Type M – Nickel-Copper Sleeve, Nickel Alloy 600 Spindle (NAS1738)  
Nickel-Copper Sleeve and Nickel-Copper Spindle (NAS1768)

### Class 2: 100° Flush Head Rivets

- Type A – 2219 Aluminum Alloy Sleeve, Nickel Alloy 600 Spindle
- Type B – 5056 Aluminum Alloy Sleeve, Alloy Steel Spindle
- Type C – Nickel Alloy 600 Sleeve, A286 CRES Spindle (NAS1739)  
A286 CRES Sleeve A286 CRES Spindle (NAS1769)
- Type D – 2017 Aluminum Alloy Sleeve, 7075 Aluminum Alloy Spindle (NAS1769)
- Type E – 5056 Aluminum Alloy Sleeve, Nickel Alloy 600 Spindle
- Type M – Nickel-Copper Sleeve, Nickel Alloy 600 Spindle (NAS1739)  
Nickel-Copper Sleeve and Nickel-Copper Spindle (NAS1769)

## 2.0 APPLICABLE DOCUMENTS

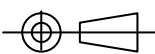
2.1 **Publications.** The following publications of the issue in effect on the date of invitation for bids shall form a part of this specification to the extent specified herein.

### 2.1.1 Federal Specifications

- QQ-A-430 Aluminum Alloy Rod and Wire for Rivets and Cold Heading
- QQ-N-281 Nickel-Copper-Alloy (Nickel-Copper and R-Nickel-Copper) Bars, Plates, Rods, Sheets, Strips, Wire, Forgings and Structural and Special Shaped Sections
- 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>

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|                                                                                                               |                                                                                                   |                                                                     |
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| THIRD ANGLE PROJECTION<br> | CUSTODIAN<br>NATIONAL AEROSPACE STANDARDS COMMITTEE                                               | REVISION<br><b>9</b>                                                |
| PROCUREMENT SPECIFICATION<br><br>NONE                                                                         | TITLE<br><br><b>RIVET, BLIND, SELF-PLUGGING,<br/>MECHANICALLY LOCKED SPINDLE, BULBED</b><br><br>⑨ | CLASSIFICATION SPECIFICATION<br><br><b>NAS1740</b><br>SHEET 1 OF 16 |

## 2.1.2 Industry Specifications

### SAE International

|              |                                                                                   |
|--------------|-----------------------------------------------------------------------------------|
| AMS-QQ-P-416 | Plating, Cadmium (Electrodeposited)                                               |
| AMS2759      | Heat Treatment of Steel Parts, General Requirements                               |
| AMS5665      | (UNS N06600) Alloy Bars, Forgings and Rings, Corrosion and Heat Resistant         |
| AMS5687      | (UNS N06600) Alloy Wire, Corrosion and Heat Resistant                             |
| AMS5732      | (UNS S66286) Steel Bars, Forgings, Tubing and Rings, Corrosion and Heat Resistant |
| AMS5737      | (UNS S66286) Steel Bars, Forgings and Tubing, Corrosion and Heat Resistant        |
| AMS6322      | (UNS G87400) Steel Bars, Forgings and Rings                                       |
| AMS2770      | Heat Treatment of Wrought Aluminum Alloys                                         |
| AMS H 6875   | Heat Treatment for Steel, Process For                                             |

Copies can be obtained from SAE International, 400 Commonwealth Dr., Warrendale, PA 15096-0001. [www.sae.org](http://www.sae.org)

### ASTM International

|            |                                            |
|------------|--------------------------------------------|
| ASTM D3951 | Standard Practice for Commercial Packaging |
|------------|--------------------------------------------|

Copies can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. [www.astm.org](http://www.astm.org)

### 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](http://www.asq.org)

## 2.1.3 Standards

### Military

|             |                                  |
|-------------|----------------------------------|
| MIL-STD-129 | Marking For Shipment and Storage |
|-------------|----------------------------------|

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

### Aerospace Industries Association

|           |                                                                    |
|-----------|--------------------------------------------------------------------|
| NAS1738   | Rivet, Blind Protruding Head, Mechanically Locked Spindle, Bulbed  |
| NAS1739   | Rivet, Blind, 100° Flush Head, Mechanically Locked Spindle, Bulbed |
| NAS1768   | Rivet, Blind Protruding Head, Mechanically Locked Spindle, Bulbed  |
| NAS1769   | Rivet, Blind, 100° Flush Head, Mechanically Locked Spindle, Bulbed |
| 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](http://www.aia-aerospace.org)

## 3.0 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 as specified in the applicable NAS standard.

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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 guns (prime mover) presently available at government facilities and guns (prime mover) also in use by prime airframe manufacturers with the addition of an attachable nose assembly.
- 3.3.2 Installation. The rivet shall be installed by mechanical means. Installation is to be accomplished by action of a spindle being pulled into the rivet shank. The installation tool shall be capable of installing the rivet and mechanically locking the spindle to the rivet sleeve in one operation. The excess portion of the rivet spindle shall be separated during the installation operation.
- 3.3.3 Spindle Retention. When tests are performed as specified by Paragraph 4.4.6, the rivet spindle shall withstand an axial pushout load of the values specified in Table I. The spindle of an uninstalled rivet shall be capable of withstanding an axial pushout load of the values specified in Table I, Column B.

TABLE I – SPINDLE RETENTION LOADS (Paragraph 4.4.6)

| Nominal Rivet Diameter | A<br>Total Pounds Required to Pushout Locked Spindle (min) | B<br>Minimum Pounds Pushout, Uninstalled Rivet |
|------------------------|------------------------------------------------------------|------------------------------------------------|
| 1/8                    | 125 pounds                                                 | 10 pounds                                      |
| 5/32                   | 175 pounds                                                 | 10 pounds                                      |
| 3/16                   | 250 pounds                                                 | 15 pounds                                      |

- 3.3.4 Dimensions. Rivets shall conform dimensionally to the applicable NAS standards.
- 3.3.5 Concentricity of Rivet Heads. The rivet head 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 Installed Flushness. The installed spindle and lock ring shall be flush within the limits shown in Figure 1. A means of visual inspection shall be provided to show that the rivet is properly installed.

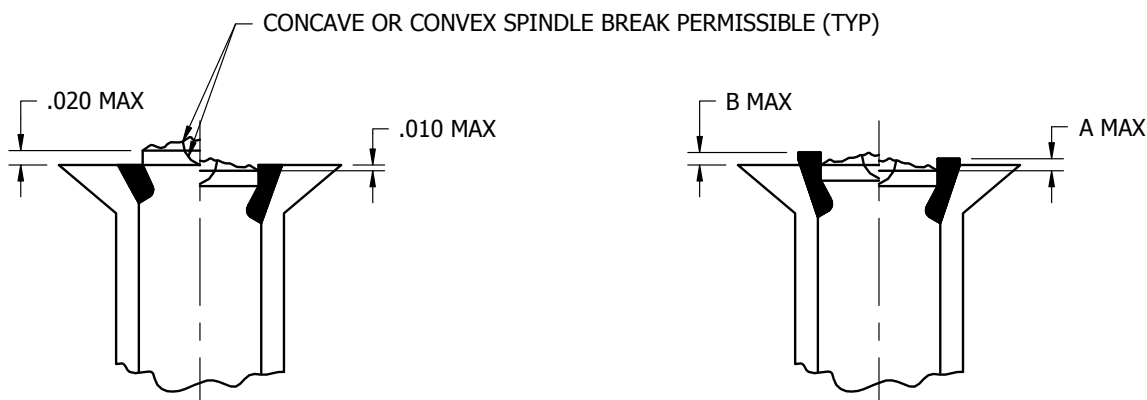
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**SPINDLE LIMITS**

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.

**COLLAR LIMITS**

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.

- (a) 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.

| DIA DASH NO. | A MAX | B MAX |
|--------------|-------|-------|
| 4            | .015  | .010  |
| 5            | .020  | .010  |
| 6            | .025  | .015  |

FIGURE 1 – SPINDLE AND COLLAR FLUSHNESS LIMITS

- 3.3.7 **Finish.** Rivets shall be finished in accordance with applicable NAS standards.
- 3.3.8 **Heat Treatment.** Heat treatment of aluminum alloy shall be per AMS2770 except that the shank end of the sleeve may be annealed by an induction annealing process. Heat treatment of alloy steel shall be per ~~AMS-H-6875~~ AMS2759.
- 3.3.9 **Shear Strength.** The single shear strength of the rivet shall not be less than the value specified in Table II when tested in accordance with Paragraph 4.4.3.
- 3.3.10 **Tensile Strength.** The tensile strength of the driven rivet shall not be less than the values listed in Table III when tested in accordance with Paragraph 4.4.4.
- 3.3.11 **Fatigue Strength.** Rivets shall withstand 8 million fatigue cycles at the loads specified in Table IX when tested in accordance with Paragraph 4.4.9.
- 3.3.12 **Expansion.** The rivet shall be expanded by mechanical means. Expansion is to be accomplished by action of a spindle being pulled into the rivet sleeve. The rivet sleeve shall expand to at least the minimum diameters shown in Table IV to within .016 inches of the rivet head, when installed in accordance with Paragraph 4.4.11.

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TABLE II – SHEAR STRENGTHS

| Nominal Rivet Diameter | Class          | Rivet Grip Dash No. /b/ | Minimum Shear Strengths (LBF) |                |        |        |
|------------------------|----------------|-------------------------|-------------------------------|----------------|--------|--------|
|                        |                |                         | Type A                        | Types B, D & E | Type M | Type C |
| 1/8                    | 1 (Protruding) | 1                       | 487                           | 435            | 525    | 698    |
|                        |                | 2                       | 667                           | 592            | 750    | 921    |
|                        |                | 3                       | 847                           | 619            | 895    | 1,143  |
|                        |                | 4                       | –                             | –              | –      | 1,221  |
|                        | 2 (Flush)      | 2                       | 548                           | 480            | 570    | 816    |
|                        |                | 3                       | 714                           | 619            | 785    | 1,008  |
|                        |                | 4                       | 793                           | –              | 895    | 1,194  |
|                        |                | 5                       | 847                           | –              | –      | 1,221  |
| 5/32                   | 1 (Protruding) | 1                       | 704                           | 610            | 735    | 1,014  |
|                        |                | 2                       | 919                           | 805            | 1,015  | 1,284  |
|                        |                | 3                       | 1,132                         | 935            | 1,290  | 1,547  |
|                        |                | 4                       | 1,280                         | –              | 1,353  | 1,820  |
|                        |                | 5                       | –                             | –              | –      | 1,845  |
|                        | 2 (Flush)      | 3                       | 960                           | 815            | 1,010  | 1,373  |
|                        |                | 4                       | 1,122                         | 935            | 1,270  | 1,607  |
|                        |                | 5                       | 1,220                         | –              | 1,353  | 1,842  |
| 3/16                   | 1 (Protruding) | 6                       | 1,280                         | –              | –      | 1,845  |
|                        |                | 1                       | 899                           | 765            | 935    | 1,305  |
|                        |                | 2                       | 1,156                         | 1,015          | 1,255  | 1,626  |
|                        |                | 3                       | 1,404                         | 1,240          | 1,575  | 1,943  |
|                        |                | 4                       | 1,656                         | 1,260          | 1,823  | 2,251  |
|                        | 2 (Flush)      | 5                       | 1,725                         | –              | –      | 2,488  |
|                        |                | 3                       | 1,164                         | 1,005          | 1,210  | 1,720  |
|                        |                | 4                       | 1,442                         | 1,200          | 1,510  | 1,990  |
|                        |                | 5                       | 1,554                         | 1,260          | 1,823  | 2,260  |
|                        |                | 6                       | 1,669                         | –              | –      | 2,488  |
|                        |                | 7                       | 1,725                         | –              | –      | –      |

/b/ For rivet grips greater than listed, use highest value shown for the diameter, class and type.

TABLE III – TENSILE STRENGTH VALUES (LBF)

| Nominal Rivet Diameter | Type A | Type B, D & E | Type M | Type C |
|------------------------|--------|---------------|--------|--------|
| 1/8                    | 410    | 345           | 490    | 570    |
| 5/32                   | 615    | 530           | 740    | 860    |
| 3/16                   | 830    | 710           | 1,000  | 1,160  |

TABLE IV – RIVET SLEEVE EXPANSION REQUIREMENTS

| Nominal Rivet Diameter | Minimum Sleeve Diameter After Expansion |
|------------------------|-----------------------------------------|
| 1/8                    | .1440                                   |
| 5/32                   | .1770                                   |
| 3/16                   | .2055                                   |