

NATIONAL AEROSPACE STANDARD

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC., 610 SHOREHAM BUILDING, WASHINGTON 5, D. C.

SPECIFICATION

FASTENERS, PANEL, FAST OPERATING

1. SCOPE AND CLASSIFICATION

- 1.1 Scope - This specification establishes the requirements for panel fasteners.
- 1.2 Classification - Panel Fasteners covered by this specification shall be of the following types, classes, and sizes:
- 1.2.1 Types - Flush Head - Type I
Protruding Head - Type II
Wing Head - Type III
- 1.2.2 Classes - Class A - Floating Receptacle for Dimpled Top Sheet
Class B - Rigid Receptacle
Class C - Floating Receptacle for Flat Top Sheet
- 1.2.3 Sizes - No. 2 - 200-lb Rated Load
No. 7 - 700-lb Rated Load

2. APPLICABLE SPECIFICATIONS, OTHER PUBLICATIONS, AND DRAWINGS

- 2.1 Specifications - The following specifications of the issue in effect on date of invitation for bids shall form a part of this specification to the extent specified herein:

- ① Federal
 QQ-A-355 Aluminum Alloy Plate and Sheet, 2024
 QQ-A-362 Aluminum Alloy Plate and Sheet, Alclad 2024
 FED-STD-151 Metals, Test Method
 QQ-P-416 Plating, Cadmium, Electrodeposited
- ① Air Force-Navy Aeronautical
 MIL-A-8625 Anodic, Coatings, For Aluminum and Aluminum Alloy
 QQ-Z-325 Zinc Coating - Electrodeposited, Requirements For
 MIL-S-18729 Steel, Plate, Sheet, and Strip, Alloy 4130, Aircraft Quality
 MIL-S-18728 Steel, Plate, Sheet, and Strip, Alloy 8630, Aircraft Quality

3. REQUIREMENTS

- 3.1 Material - Material shall be of the best commercial quality suitable for the purpose intended.
- 3.2 Design - The fastener shall be of the stud-grommet-receptacle design such that when the fastener is opened, the stud is retained in the top panel by the grommet and the receptacle is retained by the panel support. The stud shall be removable and replaceable without the use of special tools, and without affecting the re-usability of the stud. The grommet shall be designed to carry the stud load into the top panel and to protect the top panel from contact with the stud.
- 3.2.1 Dimensions - The grommet and stud combination shall fall within the envelope dimensions and fit the hole dimensions shown on Figure 4 for the applicable size and type. The receptacle shall fall within the envelope dimensions and have the rivet hole spacing shown on Figure 4 for the applicable size and class.
- 3.2.2 Installation - The grommet shall be attachable by insertion in the mounting hole and application of a locking means which may be released without damage to the panel or grommet. The receptacle shall be attachable with rivets or projection welding. If weld projections are provided, the spacing of the projections shall be the same as specified for the rivet holes.

- ① INACTIVE FOR DESIGN AFTER DECEMBER 1962.
 SEE MIL-F-5591.

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3. REQUIREMENTS (Cont)

- 3.2.3 Engaging - The stud shall engage the receptacle within 180° of rotation in the clockwise direction, as viewed from the outer sheet. Manual rotational alignment of the stud shall not be required to place the sheet containing the stud assembly in contact with the structure containing the receptacle, when the stud and receptacle are axially aligned but in any relative rotational position.
- 3.2.4 Locking - The stud shall be positively locked within 85 to 135 degrees of clockwise rotation, as viewed from the outside sheet, after the stud has been engaged.
- 3.2.4.1 Stop - A positive stop shall be provided to prevent the stud from being turned past the position of full lock.
- 3.2.5 Unlocking - The stud shall unlock within 85 to 135 degrees of counter-clockwise rotation, as viewed from the outside sheet.
- 3.2.6 Heads -
- 3.2.6.1 Flush Heads - Type I - The flush head shall be so designed that when the fastener is installed and locked in the total sheet thickness for which the stud is intended, the head will be flush with the surface of the outer sheet within $\pm .015$.
- 3.2.6.2 Protruding Heads - Type II - Application of the protruding head studs shall not require dimpling or countersinking of the outer sheet.
- 3.2.6.3 Wing Heads - Type III - Shall be designed for operation without tools. Application shall not require dimpling or countersinking of the outer sheet.
- 3.2.7 Screw Driver Slots - The screw driver slot in the flush and oval head types shall conform to the dimensions on Figure 4. When the fastener is in locked position, the slot shall be in line with the receptacle mounting rivets.
- 3.2.8 Floating Receptacle - The floating receptacles shall provide the minimum lateral movement listed in Table I when installed in accordance with the applicable conditions of Figure 4. Lateral movement is measured in all directions from the center (neutral) position.
- 3.3 Interchangeability - All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance. Changes in manufacturer's part numbers shall be governed by the drawing number requirements of Specification No. MIL-D-5028.
- 3.4 ^① Finish - Aluminum alloy parts shall be covered with an anodic film in accordance with Specification No. MIL-A-8625. Parts of steel or copper alloy shall be cadmium-plated in accordance with Specification No. QQ-P-416 or zinc-plated in accordance with Specification No. QQ-Z-325. ^①
- 3.5 Performance -
- 3.5.1 Initial Tension - The initial tension (bearing pressure) between the sheets shall be not less than the value specified in Table II for the size tested.
- 3.5.2 Sheet Separation - The sheet separation shall not exceed 3/64 inch at their rated tensile load as specified in Table II.
- 3.5.3 Locking and Unlocking Torque -
- 3.5.3.1 Maximum Torque - The maximum torque required to lock and unlock the fastener shall not exceed the maximum locking and unlocking torques specified in Table II when tested on test specimens fabricated to the nominal thickness of sheets as shown in Figures 1-2.
- 3.5.3.2 Minimum Torque - The minimum torque required to lock and unlock the fastener shall not be less than the minimum locking and unlocking torques specified in Table II when tested on test specimens fabricated to the nominal thickness of sheets as shown on Figures 1-2.

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3. REQUIREMENTS (Cont)

- 3.5.3.3 Absolute Maximum Torque - The absolute maximum torque required to lock and unlock the fastener shall not exceed 133 percent of the maximum locking and unlocking torque values specified in Table II when tested with the addition of a 0.010 inch shim between the sheets as shown in Figure 2.
- 3.5.3.4 Absolute Minimum Torque - The absolute minimum torque required to lock and unlock the fastener shall be not less than 87 percent of the minimum locking and unlocking torque values specified in Table II when mounted on sheets having a total thickness of 0.010 inch less than the total nominal thickness shown in Figure 2.
- 3.5.4 Tension - The fastener shall be subjected to rated tensile load specified in Table II. The fastener shall not develop a permanent set in excess of 0.008 of an inch for Size 7 and 0.006 of an inch for Size 2. There shall be no failure at a load less than 150 percent of the rated load.
- 3.5.5 Shear - The fastener shall be subjected to the rated shear loads specified in Table II without signs of permanent deformation. There shall be no failures at less than 150 percent of the rated load.
- 3.5.6 Vibration -
- 3.5.6.1 The fastener shall withstand the vibration requirements as specified in Table II for 25 hours without failure. Amplitude is defined as the extent of vibratory movement as measured between opposite extremes.
- 3.5.6.2 The fastener shall withstand additional vibration at the frequency and amplitude specified in Table II at no load, for 5 hours, without failure.
- 3.5.7 Endurance - The fasteners shall withstand the number of cycles of operation as specified in Table II at 110 cpm without failure.
- 3.5.8 Locking Stop Strength - The fastener mounted as shown in Figure 2 shall support without damage to the stud or receptacle the minimum locking stop strength values specified in Table II.
- 3.5.9 Curved Sheet Installation - When the fasteners are installed on a curved fixture, in accordance with Figure 3, it shall be possible to place the top sheet on the substructure and lock the fasteners in sequence from either end without rotational alignment of the studs prior to the locking operation.
- 3.5.10 Corrosion Resistance - Exposure to salt spray in accordance with Specification No. FED-STD-151^① for 200 hours shall cause no corrosion of the fastener.
- 3.5.11 Hardness - Fastener studs shall be hardened to prevent damage to screw driver slots, etc. Studs shall be either surface hardened to a depth of 0.005 to 0.012 and to a Rockwell hardness of 15-N-80 minimum, or, if fabricated of through hardening steel, shall be heat treated to a Rockwell hardness of C-30 minimum.
- 3.5.12 Failure - Failure as used in paragraphs 3.5.4, 3.5.5, 3.5.6.1 and 3.5.6.2 will be considered as the point at which one or more of the fastener component parts fracture or break, or where distortion, permanent set, or wear will prevent the locking and unlocking of the fastener or will allow the unlocking with the application of less than the absolute minimum torque.
- 3.6 Workmanship - Workmanship shall be in accordance with high-grade aircraft manufacturing practices. Fastener parts shall be free from burrs. Tool marks and other defects not affecting serviceability or performance, as defined by this specification, shall not be cause for rejection.

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THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME PRODUCT, AND SHALL BECOME EFFECTIVE FOR MANUFACTURE NOT LATER THAN 6 MONTHS AFTER THE LATEST DATE OF APPROVAL SHOWN.

IN FORMULATING AND APPROVING NAS STANDARDS, AIA AND ITS COMMITTEES WILL NOT INVESTIGATE PATENTS WHICH MAY APPLY TO THE SUBJECT MATTER. PROSPECTIVE USERS OF THE STANDARD ARE RESPONSIBLE FOR PROTECTING THEMSELVES AGAINST LIABILITY FOR INFRINGEMENT OF PATENTS

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