

FED. SUPPLY CLASS

5325

1. SCOPE

1.1 Scope. This specification covers the general requirements for a high-strength, quick-operating, rotary fastener.

1.2 Classification. Fasteners furnished under this specification shall be of the following types, as specified (see 6.2):

Type I – Flush head
Type II – Protruding head

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on the date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

~~QQ-A-287 Aluminum Alloy Plate and Sheet, Alclad 7075~~
~~QQ-A-362 Aluminum Alloy Plate and Sheet, Alclad 2024~~

Military

~~MIL-S-5000 Steel, Chrome-Nickel-Molybdenum (4340 or E-4340) Bars and Reforging Stock~~
~~MIL-DTL-5541 Chemical Films for Aluminum and Aluminum Alloys~~
~~MIL-S-6050 Steel, Chrome-Nickel-Molybdenum (8630) Bars, Rods, and Reforging Stock (for Aircraft Applications)~~
~~MIL-A-8625 Anodic Coatings, for Aluminum and Aluminum Alloys~~
~~MIL-S-18728 Steel Plate, Sheet, and Strip, Alloy, 8630, Aircraft Quality~~
~~MIL-S-18729 Steel Plate, Sheet, and Strip, Alloy, 4130, Aircraft Quality~~
~~MIL-STD-2073/1 Standard Practice for Military Packaging~~

STANDARDS

Military

~~MIL-STD-129 Marking for Shipment and Storage~~
~~MIL-STD-130 Identification Marking of US Military Property~~

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for approval shall apply.

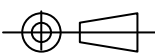
ASTM International

~~ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus~~
~~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

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THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-F-22978, REVISION A, AMENDMENT 1.

THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 1
PROCUREMENT SPECIFICATION NONE	TITLE FASTENER, ROTARY, QUICK-OPERATING, HIGH-STRENGTH	CLASSIFICATION SPECIFICATION NAS22978 SHEET 1 OF 11

Aerospace Industries Association

NASM9006 Recesses Cross, Low Torque Drive, Dimensions and Gage Dimensions For
NASM17731 Fastener, rotary, quick-operating, flush head, floating type, 2210 lbs min tensile strength
NASM17732 Fastener, Rotary, Quick-Operating, Protruding Head, Floating Type, 2210 Lbs. Min Tensile Strength

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

SAE International

AIR4127 Steel: Chemical Composition and Hardenability
AMS6415 Steel, Bars, Forgings, and Tubing .80Cr - 1.8Ni - .25Mo (.38 - .43C) (SAE 4340) - UNS G43406
AMS6484 Steel, Bars, Forgings, and Tubing .80Cr - 1.8Ni - .25Mo (.38 - .43C) (SAE 4340) Normalized and Tempered
AMS2759 Heat Treatment of Steels, (Aircraft Practice) Process for
AMS6345 Steel, Sheet, Strip, and Plate .95Cr - .20Mo (.28 - .33C) (SAE 4130) Normalized or Otherwise Heat Treated - UNS G41300
AMS6350 Steel Sheet, Strip, and Plate .95Cr - .20Mo (.28 - .33C) (SAE 4130) - UNS G41300
AMS6351 Steel Sheet, Strip, and Plate .95Cr - .20Mo (.28 - .33C) (SAE 4130) Spheroidized - UNS G41300
AMS-QQ-P-416 Plating, Cadmium (Electrodeposited)
AMS-QQ-A-250/13 Aluminum Alloy Alclad 7075, Plate and Sheet
AMS-QQ-A-250/5 Aluminum Alloy Alclad 2024, Plate and Sheet - UNS A82024

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

3. REQUIREMENTS

- 3.1 Qualification. The manufacturer shall be responsible for conducting qualification tests and furnishing part drawings, certified qualification test reports (if required by the purchaser) and test samples. The fasteners furnished under this specification shall be produced using the same manufacturing methods as used to produce fasteners that have passed qualification tests. The purchaser may apply any or all tests specified herein to any product represented as meeting this specification, at any time, to verify conformance.
- 3.2 Materials. Materials shall be carbon or alloy steel selected from one of the following tables titled: "Standard Nonresulphurized Carbon Steels: Compositions and Forms Available", "Standard (SAE) Nonresulphurized Carbon Steels for Plates, Sheet, Strip, Structural Shapes, and Welded Tubing", or "Standard and Tentative Standard Alloy Steels" per AIR4127. The material shall be sound, of uniform quality and condition, free from pipes, and shall not contain decarburization, carburization, lap, cracks, twists, seams, or other defects detrimental to the fabrication or performance of parts.
- 3.2.1 Heat treatment. Heat treatment of steel shall be in accordance with AMS2759.
- 3.3 Design and construction. The fastener shall be of the stud receptacle design and shall be so constructed that neither the stud assembly nor the receptacle assembly can be inadvertently disassembled during normal operation. The design shall be such that the stud and receptacle can be removed and replaced in service with any other acceptable fastener of the same type without deviation from the dimensions noted herein and without the use of special tools. The fastener shall provide for retention of the stud in the outer sheet when unfastened.
- 3.3.1 Curved sheet installation. The fastener shall be adaptable to a rigid, curved sheet installation wherein the radius of curvature is not greater than 12 inches and the included angle between extreme fasteners is 90° when tested in accordance with 4.6.11. The fastener shall also be adaptable when the sheet has a radius of curvature not greater than 24 inches, is hinged at one side, and the included angle between the hinge and any fastener is 45°.

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- 3.3.2 Dimensions. The stud assembly and receptacle assembly shall fall within the envelope dimensions and shall conform to the detail dimensions shown on NASM17731 and NASM17732 for the applicable type.
- 3.3.3 Stud assembly. The stud assembly configuration may employ a shear bushing, retainer ring, and other components.
- 3.3.3.1 Recess. The recess in the head of the stud shall be of the cross-recess type in accordance with the dimensions shown on NASM9006.
- 3.3.3.2 Head flushness. In designs utilizing a shear bushing-type component, the stud shall be flush with the top of the shear bushing within $\pm .005$ inches.
- 3.3.4 Receptacle assembly. The receptacle assembly shall be of a floating type and have a minimum float of .020 in any direction from the centered position.
- 3.3.5 Locking and unlocking. When the stud assembly is mated with its receptacle assembly, the installed fastener shall be capable of being fully locked (see 6.4.2) within two complete rotations in the clockwise direction as viewed from the outer sheet. After rotation in the counterclockwise direction to the point of disengagement, and when the inner and outer sheets are then separated by an amount equal to the applicable minimum sheet pull-up value, the fastener shall be capable of relocking without additional counterclockwise rotation. The fastener shall be considered to be fully locked when tightened to a torque conforming to the sheet separation requirement specified in 3.5.5 but which does not exceed the applicable maximum locking torque value listed in Table I. The fully locked fastener shall unlock to the point of complete disengagement within two complete rotations in the counterclockwise direction as viewed from the outer sheet.
- 3.4 Finish. Parts of carbon or alloy steel shall be cadmium plated in accordance with AMS-QQ-P-416, Type II, Class 3.

TABLE I – ROOM TEMPERATURE MECHANICAL PROPERTIES

Requirement	Torque value
Locking torque	30 in-lbf max
Unlocking torque	35 in-lbf max
Torque out	75 in-lbf min
Ultimate shear load	4,650 lbf min
Rated shear load	3,580 lbf min
Ultimate tensile load	2,210 lbf min
Rated tensile load	1,700 lbf min
Sheet separation (test condition)	Not to exceed .015 inches at rated tensile load
Sheet pull-up	1/16 inch min
Stud push-out	150 lbf min
Receptacle push-out	125 lbf min

- 3.5 Performance
- 3.5.1 Locking and unlocking torque. The maximum locking torque value specified in Table I shall not be exceeded while operating the fastener through the entire range of sheet pull-up from initial engagement to the full locked condition when tested in accordance with 4.6.2. The unlocking torque value specified shall not be exceeded while rotating the fastener from the fully locked condition to the point to the point of complete disengagement.
- 3.5.2 Torque-out. When the installed fastener is subjected to the torque-out values specified in Table I in accordance with 4.6.3, there shall be no failure (see 6.4) or permanent deformation to any of the fastener components.
- 3.5.3 Shear. The fastener shall not develop permanent deformation when subjected to the rated shear load and shall withstand the ultimate shear load specified in Table I without failure when tested in accordance with 4.6.9.

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- 3.5.4 Tension. The fasteners shall not develop permanent deformation when subjected to the rated tensile load and shall withstand the ultimate tensile load specified in Table I without failure when tested in accordance with 4.6.5.
- 3.5.5 Sheet separation. The sheet separation determined in accordance with 4.6.6 shall not exceed the value specified in Table I when the installed fastener assembly in the fully locked condition is subjected to the rated tensile load specified in Table I.
- 3.5.6 Sheet pull-up. The installed fastener shall be capable of initial engagement when a sheet separation condition exists at the fastener of not less than the values specified for "Sheet pull-up" in Table I. The fastener shall then be capable of drawing the sheets together at the fastener to the fully locked condition when tested in accordance with 4.6.2.
- 3.5.7 Stud push-out. The stud assembly of the installed fastener shall withstand the push-out values specified in Table I without permanent deformation to any components or separation from the sheet when tested in accordance with 4.6.12.
- 3.5.8 Receptacle push-out. The push-out test load shall be applied axially to the receptacle body through a stud of the type fastener being tested and sufficiently long to transmit the entire test load to the receptacle components. The receptacle assembly shall be mounted in the same fixture as used for the tension test specified in 4.6.13.
- 3.5.9 Vibration. The fastener assembly shall be capable of withstanding the vibration test specified in 4.6.8 without fastener failure and with no more than a 10-percent reduction in the torque required to lock the fastener assembly.
- 3.5.10 Shear fatigue. There shall be no single fastener failure of the fastener assemblies when fatigue tested in accordance with 4.6.7.
- 3.5.11 Corrosion resistance. The fastener assembly shall be capable of withstanding the salt spray test specified in 4.6.10 without becoming inoperable within the locking and unlocking torque specified in 3.3.5.
- 3.5.12 Elevated temperature. The installed fastener assembly shall withstand a temperature limit of 450 °F, when tested in accordance with 4.5.1 and shall be capable of passing the performance tests specified in 4.3.3.
- 3.5.13 Endurance. The fastener shall withstand 1,500 cycles of locking and unlocking without failure when tested in accordance with 4.6.4.
- 3.6 Marking. Marking shall be in accordance with MIL-STD-130 and the applicable NASM standard.
- 3.7 Workmanship. Workmanship shall be in accordance with high-grade manufacturing practice. Fastener parts shall be free from burrs, tool marks, cracks, and other defects which may affect the serviceability or performance of the fastener as defined herein.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any other commercial laboratory acceptable to the procuring activity. The procuring activity reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of tests. Inspection and testing of fasteners shall be classified as follows:

- | | | |
|-----|---------------------------|-------|
| (a) | Qualification tests | (4.3) |
| (b) | Quality conformance tests | (4.4) |

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