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FED. SUPPLY CLASS
5320

1.0 SCOPE

1.1 Purpose. This specification establishes the requirements for pull-type and stump-type, flush and protruding head, swage locking pins and collars of various materials for use as permanent attachment fasteners.

1.2 Classification. The swage locking pins and collars covered by this specification shall be of the types, sizes and materials designated by the part numbers specified on the applicable NAS standards.

2.0 REFERENCED DOCUMENTS

2.1 Applicable Documents. The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein (see 6.5).

2.1.1 Government.

FEDERAL SPECIFICATIONS:

QQ-A-430	Aluminum Alloy Rod and Wire, For Rivets and Cold Heading
QQ-N-281	Nickel-Copper Alloy Bar, Rod, Plate, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections

MILITARY SPECIFICATIONS AND STANDARDS:

MIL-A-8625	Anodic Coatings for Aluminum and Aluminum Alloys
MIL-DTL-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
~~MIL-L-87132~~	~~Lubricant, Cetyl Alcohol, 1-Hexadecanol, Application to Fasteners~~
MIL-STD-129	Standard Practice for Military Marking

2.1.2 Non-Government.

AS5272	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting Procurement Specification
AS87132	Lubricant, Cetyl Alcohol, 1-Hexadecanol, Application to Fasteners
AMS2770	Heat Treatment of Wrought Aluminum Alloy Parts
AMS2759	Heat Treatment of Steel (Parts)
AMS2700	Passivation of Corrosion-Resistant Steel
AMS2416	Plating, Nickel-Cadmium Diffused
AMS5629	Steel, Corrosion Resistant, Bars, Forgings, Rings, and Extrusions
AMS5737	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, and Tubing
AMS6322	Steel Bars, Forgings, and Rings
AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
ASME B46.1	Surface Texture (Surface Roughness, Waviness, and Lay)
ASQ Z1.4	Sampling Procedures and Tables for Inspection By Attributes
ASTM D5486/D5486M	Standard Specification for Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing
ASTM D3951	Standard Practice for Commercial Packaging
(10) ASTM E1417/E1417M	Standard Practice for Liquid Penetrant Examination
ASTM E1444/E1444M	Standard Practice for Magnetic Particle Examination
NAS1080	Collar, Swage Locking for Pull-Type and Stump-Type Lockbolts
(10) NASM1312-8	Fastener Test Methods, Method 8, Tensile Strength
NASM1312-13	Fastener Test Methods, Method 13, Double Shear Test
NAS1495	Recommended Qualification Test Procedure for Compliance with NAS Specifications and Standard Drawings

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REVISION DATE: NOVEMBER 30, 2016
ISSUE DATE: MAY 1960

THIRD ANGLE PROJECTION	CUSTODIAN	REVISION
	NATIONAL AEROSPACE STANDARDS COMMITTEE	10
PROCUREMENT SPECIFICATION	TITLE	CLASSIFICATION SPECIFICATION
NONE	PINS AND COLLARS, SWAGE LOCKING	NAS1413

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NAS9800	Head Protrusion Gaging, 100° Flush Head Fasteners
NAS1414-1422	Pin, Swage Locking, Steel, 100° Shear Head, Stump-Type
NAS1424-1432	Pin, Swage Locking, Steel, Protruding Head, Shear, Stump-Type
NAS1436-1442	Pin, Swage Locking, Steel, Standard and Oversize, 100° Shear Head, Pull-Type
NAS1446-1452	Pin, Swage Locking, Steel, Standard and Oversize, Protruding Head, Shear, Pull-Type
NAS1456-1462	Pin, Swage Locking, Steel, Standard and Oversize, 100° Head (MS24694), Tension, Pull-Type
NAS1465-1472	Pin, Swage Locking, Steel, Standard and Oversize, Protruding Head Tension, Pull-Type
NAS1475-1482	Pin, Swage Locking, Steel, Standard and Oversize, 100° Head (MS20426), Tension, Pull-Type
NAS1486-1492	Pin, Swage Locking, Steel, 100° Head (MS24694), Tension, Stump-Type
NAS1496-1502	Pin, Swage Locking, Steel, Protruding Head, Tension, Stump-Type
NAS1516-1522	Pin, Swage Locking, Aluminum Alloy, 100° Head (MS24694), Tension, Pull-Type
NAS1525-1532	Pin, Swage Locking, Aluminum Alloy, Protruding Head, Tension, Pull-Type
NAS1535-1542	Pin, Swage Locking, Aluminum Alloy, 100° Head (MS20426), Tension, Pull-Type
NAS1546-1552	Pin, Swage Locking, Aluminum Alloy, 100° Head (MS24694), Tension, Stump-Type
NAS1555-1562	Pin, Swage Locking, Aluminum Alloy, Protruding Head Tension, Stump-Type
NAS1563	Gages, Pins and Collar Inspection, Swage Locking
NAS6910	Pin, Swage Locking, PH13-8MO CRES, 100° Crown Head, Tension, Pull-Type
NAS6911	Pin, Swage Locking, PH13-8MO CRES, 100° Head, Shear, Stump-Type
NAS6912	Pin, Swage Locking, PH13-8MO CRES, Protruding Head, Shear, Stump-Type
NAS6913	Pin, Swage Locking, PH13-8MO CRES, 100° Crown Head, Shear, Pull-Type
NAS6914	Pin, Swage Locking, PH13-8MO CRES, Protruding Head, Shear, Pull-Type
NAS6915-6922	Pin, Swage Locking, Aluminum Alloy, 100° Head (MS20426), Tension, Stump-Type
NAS6925-6932	Pin, Swage Locking, Steel, 100° Head (MS20426), Tension, Stump-Type
NAS6935-6942	Pin, Swage Locking, Steel, 100° Crown Head, Tension, Pull-Type
NAS6946-6952	Pin, Swage Locking, A286 CRES, 100° Head (MS24694), Tension, Pull-Type
NAS6955-6962	Pin, Swage Locking, A286 CRES, 100° Head (MS20426), Tension, Pull-Type
NAS6965-6972	Pin, Swage Locking, A286 CRES, Protruding Head, Tension, Pull-Type
NAS6974-6982	Pin, Swage Locking, A286 CRES, 100° Shear Head, Stump-Type
NAS6984-6992	Pin, Swage Locking, A286 CRES, Protruding Head, Shear, Stump-Type
NAS7004-7012	Pin, Swage Locking, A286 CRES, 100° Shear/Tension Head, Pull-Type
NAS7014-7022	Pin, Swage Locking, A286 CRES, Protruding Head, Shear/Tension, Pull-Type
NAS7024-7032	Pin, Swage Locking, 108 KSI Steel, 100° Shear/Tension Head, Pull-Type
NAS7034-7042	Pin, Swage Locking, 108 KSI Steel, Protruding Head, Shear/Tension, Pull-Type

3.0 REQUIREMENTS

3.1 General. Pins supplied to this specification shall comply with the design requirements of their respective NAS drawings and the requirements of this specification and shall have passed all the applicable tests herein.

3.2 Composition. The materials used in the manufacture of the pins shall be as follows:

(a) Aluminum alloy pins, 7075 aluminum alloy per QQ-A-430.

(b) Alloy steel – AISI 4140 (UNS G41400) per AMS6382, 4340 (UNS G43406) per AMS6415 or AMS6484, or 8740 (UNS G87400) per AMS6322, AMS6325 OR AMS6327, 160/180 KSI tensile, 95 KSI minimum shear strength.

(c) Alloy steel – AISI 8740 (UNS G87400) per AMS6322, AMS6325 OR AMS6327, 180/200 KSI tensile, 108 KSI minimum shear strength.

(d) A286 CRES – AISI 660 per chemical requirements of AMS5737, solution treated and aged, minimum shear strength 95 KSI.

(e) PH13-8MO CRES, per chemical requirements of AMS5629, minimum shear strength 125 KSI.

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3.3 Collars. Collars for use with pins shall conform to NAS1080 and as referred to in Table III.

3.4 Design and Construction.

3.4.1 Pull Type. The pull-type design shall be such that bucking on the head end is not required during installation. The fastener assembly shall consist of a pin, inserted from one side of the work with a collar swaged in place on the opposite side. The installation tool shall grip the pin of the collar side, clamp the sheet together with uniformly retained clamping force, swage the collar in place, and break off the pulling end of the stem. The installed assembly shall meet the strength requirements specified herein. Interchangeability of the pulling end detail is required between like products to ensure standardized installation tooling.

3.4.2 Stump Type. The stump type design shall be such that restraint of the head end is required during installation. The fastener assembly shall consist of a pin inserted from one side of the work with a collar swaged in place on the opposite side. The installation shall consist of a device to provide head restraint and to swage or squeeze the collar in place. The installed assembly with uniformly retained clamping force shall meet the strength requirements specified herein.

3.4.3 Dimensions. Dimensions shall be in accordance with applicable NAS standards.

3.4.4 Grip Lengths. Grip lengths of the pins shall be in increments as shown on the applicable NAS standards.

3.4.5 Sealant Escape Groove Option. The installation of pins not having a sealant escape groove with sealant must have the sealant material wiped clean from the locking grooves before the collar is installed to achieve properly engaged collar installations. Pins with a sealant escape groove cut through the pin locking grooves allow the sealant material to escape from the locking grooves as the collar is swaged during installation. Part number codes for sealant escape groove pins are shown on the applicable NAS standards and shall be inspected as specified in 4.3.8.

3.4.6 Heat Treatment.

(a) Aluminum alloy pins and collars, except 2219 aluminum collars, shall be heat treated in equipment meeting the requirements of AMS2770. Collars made from 2219 aluminum alloy shall be heat treated in equipment meeting the requirements of AMS2770, except soak times at the precipitation hardening temperature may be extended to enhance resistance to intergranular corrosion, provided the finished product meets all required properties. Localized intergranular corrosion shall not exceed .012 inches in depth and average depth of intergranular corrosion shall not exceed .008 inches when tested in accordance with 4.3.3.

(b) Alloy steel pins, A286 CRES pins and PH13-8MO CRES pins shall be heat treated in equipment conforming to the requirements of AMS2759. Carbon restoration of alloy steel pins shall be permissible to the extent permitted by hardness limits as specified in 3.4.7.

3.4.7 Hardness.

(a) Alloy steel pins classified as having 95 KSI shear strength shall have a hardness of 77-82 HR15N on the surface and 36-41 HRC in the core when tested in accordance with 4.3.1.

(b) Alloy steel pins classified as having a 108 KSI shear strength shall have a hardness of 78-82 HR15N on the surface and 40-43 HRC in the core when tested in accordance with 4.3.1.

(c) Acceptance of A286 and PHI3-8MO CRES pins shall be based on the results of test for shear and tensile strength.

3.4.8 Lubrication. Lubrication shall be in accordance with applicable NAS standards.

(a) Cetyl Alcohol – Immerse clean components in solution of .60 to 1.50 lbs. of cetyl alcohol per gallon of solvent that will produce a chlorine free alcohol lubrication.

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(b) Dow Corning Molykote R 106, bonded coating dry film or equivalent. This dry film is specified as the A286 and Nickel-Copper collar lubricant and is not compatible with liquid oxygen.

(c) AS5272, Type I – Lubricant, solid film, heat cured, corrosion inhibiting.

(d) ~~MIL-L-87132~~ AS87132 – Lubricant, cetyl alcohol, hexadeconal, application to fasteners.

3.4.9 Finish. Pins and collars shall be finished in accordance with applicable NAS standards.

(a) Cadmium Plating – All alloy steel pins and, when plating is required, A286 CRES pins and all carbon steel collars shall be cadmium plated in accordance with AMS-QQ-P-416, Type II, Class 2. Sustained load testing shall not be applicable to fasteners manufactured in accordance with this document.

(b) Diffused Nickel Cadmium Plating – When required, shall be in accordance with AMS2416. Sustained load testing shall not be applicable to fasteners manufactured in accordance with this document.

(c) PH13-8MO and bare A286 CRES pins shall be passivated in accordance with AMS2700, Method 1, Class 4.

3.4.10 Surface Roughness. Bearing surface of head, head to shank radius, and shank surface shall have: 63 microinches Ra; all other surfaces: 125 microinches Ra per ASME B46.1.

3.4.11 Identification. Pins and collars shall be identified as shown on applicable NAS standards.

3.4.12 Workmanship. Workmanship shall be in accordance with high grade manufacturing practices. Collars, except as noted in NAS1080, must be free from burrs or other defects. Pins shall be free from discontinuities and defects as defined in 3.5.

3.5 Discontinuities. Pins shall be acceptable provided they do not contain discontinuities which equal or exceed the following limitations. Care must be exercised not to confuse cracks with other discontinuities as described below.

3.5.1 Seams, Inclusions, and Tool Marks. Pins may possess these characteristics, except as noted in 3.5.2, which do not exceed the tolerances in Table I. Seams up to the depth indicated which have been rolled beneath the annular rings or grooves shall not be cause for rejection. Surface or sub-surface inclusions as revealed by any of the methods noted herein, and not indicative of unsatisfactory quality, shall be accepted.

3.5.2 Defects on Pin Head. The total defects of seams, inclusions, nicks, gouges, or openings on the pin head shall not be more than three, in the following locations:

(a) On the top of the pin head exceeding the depth limits shown in Table I.

(b) On the periphery of the pin head exceeding the depth limits shown in Table I for protruding and flush head pins.

(c) On the bearing surface of the head exceeding the depth limits shown in Table I. Pins shall not possess mutilation of this surface sufficient to prevent firm seating.

3.5.3 Head Shank Junction. Only longitudinal seams of the depths shown in Table I shall be permitted. Slight tool marks or undercuts not exceeding the limits of Table II will be permitted, provided they fair into the shank with no sharp scratches, gouges or corners.

TABLE I – LIMITS FOR SEAM DEPTHS (inches)

Pin Diameter	Depth in Shank, Top of Head or Bearing Surface of Head	Depth on Periphery of Head
.328 and under	.005	.020
.375 and .391	.006	.024

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