



AEROSPACE STANDARD

AS5887™

Issued	2014-02
Reaffirmed	2026-01

Insert, Screw Thread, Self-Locking, UNS S66286,
Locked In, Key Locked
Procurement Specification For

FSC 5340

RATIONALE

To produce procurement specification for key locked inserts.

AS5887 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

1.1 Type

This procurement specification covers inserts made from A286 alloy (UNS S66286) which have self-locking internal threads and integrated locking keys to positively secure the insert against rotation when properly installed in threaded holes.

1.2 Application

Inserts covered by this specification are intended as general purpose fasteners.

1.3 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2411	Plating, Silver for High Temperature Applications
AMS2700	Passivation of Corrosion Resistant Steels
AMS2759/3	Heat Treatment Precipitation-Hardening Corrosion-Resistant and Maraging Steel Parts
AMS5731	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, Tubing, and Rings 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V Consumable Electrode Melted, 1800 °F (982 °C) Solution Heat Treated
AMS5732	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, Tubing, and Rings 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V Consumable Electrode Melted 1800 °F (982 °C) Solution and Precipitation Heat Treated
AMS5734	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, and Tubing 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V Consumable Electrode Melted, 1650 °F (899 °C) Solution Heat Treated
AMS5737	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, and Tubing 15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V Consumable Electrode Melted 1650 °F (899 °C) Solution and Precipitation Heat Treated
AMS-QQ-A-225/6	Aluminum Alloy, 2024, Bar, Rod, and Wire; Rolled, Drawn, or Cold Finished
AMS-QQ-A-225/8	Aluminum Alloy 6061, Bar, Rod, Wire, and Special Shapes; Rolled, Drawn, or Cold Finished
AMS-QQ-A-250/4	Aluminum Alloy 2024, Plate and Sheet
AMS-QQ-A-250/11	Aluminum Alloy 6061, Plate and Sheet
AS1310	Faster Torque for Threaded Applications, Definitions Of
AS3651	Insert, Screw Thread, Short, Self-Locking, Key Locked, Heavy Duty, Oversize Self-Broaching Keys, UNS S66286
AS3652	Insert, Screw Thread, Short, Self-Locking, Key Locked, Standard Duty, Oversize Self-Broaching Keys, UNS S66286
AS3653	Insert, Screw Thread, Short, Self-Locking, Key Locked, Heavy Duty, Oversize Self-Broaching Keys, UNS S66286
AS3654	Insert, Screw Thread, Self-Locking, Key Locked, Heavy Duty, Oversize Self-Broaching Keys, UNS S66286
AS4724	Studs and Inserts, Locked In, Self-Broaching Keys - Hole Dimensions and Installation Requirements
AS8879	Screw Threads - UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter
AS9133	Qualification Procedure for Aerospace Standard Parts

2.1.2 U.S. Government Publications

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6396, <http://quicksearch.dla.mil/>.

FED-STD-H28/20 Screw-Thread Standards for Federal Services, Section 20, Inspection Methods for Acceptability of UN, UNR, UNJ, M and MJ Screw-Threads

MIL-HDBK-57 Listing of Fastener Manufacturers' Identification Symbols

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A342 Test Methods for Permeability of Feebly Magnetic Materials

ASTM D3951 Commercial Packaging

ASTM E1417 Liquid Penetrant Examination

2.1.4 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ASME B46.1 Surface Texture (Surface Roughness, Waviness and Lay)

2.1.5 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NASM 1312-6 Fastener Test Methods, Method 6, Hardness

NASM 1312-13 Fastener Test Methods, Method 13, Double Shear

2.1.6 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD2001 Qualified Product Management Council Procedures for Qualified Products Group

2.2 Definitions

Refer to AS1310 for definitions related to fastener torque.

DEFECTIVE: A unit of product which contains one or more defects.

INSPECTION LOT: Shall consist of inserts from a single production lot of the same part number.

PRODUCTION LOT: Shall consist of finished inserts fabricated by the same process from a single heat of alloy, heat treated at the same time to the same condition, produced as one continuous run and submitted for vendor's inspection at the same time.

2.3 Unit Symbols

% - percent (1% = 1/100)

lbf - pound-force (in tables)

lbf-in - pound-force per inch (in tables)

ksi - kips (1000 pounds) per square inch

HRC - hardness, Rockwell C scale

3. TECHNICAL REQUIREMENTS

3.1 The inserts supplied in accordance with this document shall be products which are approved and listed on the applicable Qualified Parts List (QPL). No change in product design, raw material, basic methods of manufacturing or plant site shall be made without notification and prior approval from the Performance Review institute (PRI). Requalification or testing may be required. Parts covered by this document are listed in Tables 3 and 4.

3.1.1 Manufacturer Qualification

A manufacturer producing a product in conformance to this procurement specification shall be in accordance with AS9133 and shall be listed as an approved manufacturer in the applicable PRI qualified parts list.

3.1.2 Product Qualification

All products shall conform to the requirements of this specification and shall be approved in accordance with the requirements of PD2001, for listing in PRI Qualified Products Lists (QPL) PRI-QPL-AS3651, PRI-QPL-AS3652, PRI-QPL-AS3653, or PRI-QPL-AS3654.

3.2 Material

Shall be a corrosion and heat resistant steel, AMS5731, AMS5732, AMS5734, or AMS5737 as specified on the part drawing.

3.3 Design

Finished (completely manufactured) parts shall conform to the following requirements:

3.3.1 Dimensions

The dimensions of the finished parts, after all processing including surface treatment, shall conform to the part drawing. Dimensions shall apply after silver plating.

3.3.2 Surface Texture

Surface texture of finished parts shall conform to the requirements as specified on the part drawing, determined in accordance with ASME B46.1.

3.3.3 Threads

3.3.3.1 Internal Threads

Screw thread UNJF profile and dimensions shall be in accordance with AS8879, unless otherwise specified on the part drawing.

3.3.3.2 External Threads

Screw thread UNJ profile and dimensions shall be in accordance with AS8879, unless otherwise specified on the part drawing. Minor diameters shall be as specified on the part drawing. Assembled inserts (after key installation) shall be checked in a tapped hole prepared in accordance with AS4724.

3.3.3.3 Lead Threads

External lead threads shall not exceed two pitches, including chamfer.

3.3.3.4 Thread Forming

Threads may be produced either by machining, grinding, or fully formed by a single rolling process.

3.3.3.5 Self-Locking Feature

Threads in the area of the self-locking feature may be displaced or deformed radially in a manner that is in conformance with the part drawing. A bolt or screw must enter a minimum of 3/4 of a turn before engagement of the locking feature. The insert shall provide locking torque within the limits of Table 1.

3.4 Heat Treatment

Shall conform to the technical requirements and other provisions specified in AMS2759/3 for A286, 1650 °F solution treatment and 1325 °F aging treatment.

3.4.1 Solution Heat Treatment

Inserts, unless machined from solution heat treated stock or AMS5737 steel, shall be solution heat treated as in 3.4.

3.4.2 Aging Treatment

Solution heat treated inserts shall be heat treated by aging as in 3.4.

3.5 Surface Treatment

3.5.1 Inserts, less the keys, shall be passivated in accordance with AMS2700 method 1 or 2. The key wire material shall be passivated in accordance with AMS2700, method 1 or 2 prior to assembly in the insert.

3.5.2 Following passivation the inserts shall be silver plated, on internal threads only, in accordance with AMS2411. The locking keys shall not be plated.

3.6 Runout

The internal thread pitch diameter shall have a circular runout with the external pitch diameter within 0.006 inch Full Indicator Movement [FIM].

3.7 Source Identification Mark

The insert shall be marked on the key tang or insert body. The source identification insignia for a manufacturer shall be in accordance with MIL-HDBK-57. The source identification mark shall be legible and permanent.

3.8 Magnetic Permeability

Inserts shall have a magnetic permeability of 2.0 maximum (Air = 1.0) for a field of $H = 200$ oersteds, when tested in conformance with ASTM A342.

3.9 Mechanical Properties

3.9.1 Tensile Strength

Parts shall withstand a load not lower than that specified in Table 2 with or without the locking keys installed. Inserts shall be installed in test blocks (Figure 2) specified in 4.5.1, and tested with test bolts as specified in 4.5.3.1. The test bolt shall be assembled into the insert and shall be of sufficient length to extend through the insert a minimum of two (2) pitches. The test shall be conducted in fixtures shown in Figure 1. The minimum load as specified in Table 2, as applicable, shall then be applied to the assembly without failure occurring. In the event of bolt failure below the applicable proof load, the test shall be repeated until the applicable rating of the insert is exceeded. The rate of loading shall not exceed 100 ksi per minute based on the shank area of the bolt.

3.9.2 Resistance to Pull-out (Qualification only)

Tables 3A, 3B, 4A, and 4B contain tabulated minimum shear engagement areas and the associated minimum pullout loads as a function of internal thread size for each of the AS3651, AS3652, AS3653, and AS3654 inserts when installed in materials possessing a shear strength of 27 ksi and 68 ksi. The data contained in these tables is provided as initial qualification information. To determine the pull-out strength of the inserts in materials other than that noted, use Equations 4 and 5 per notes below Table 4B.

3.9.3 Rotational Resistance (Qualification only)

Parts shall withstand a torque load not lower than that specified in Table 5. Inserts shall be installed in test blocks (Figure 2) as specified in 4.5.1, and tested with test bolts as specified in 4.5.3.1. The test shall be conducted as specified in Figure 3. The rotational force is to be applied with a torque wrench and the torque listed in Table 5, as applicable, shall be reached with no axial load exerted on the test block. Failure of the insert to remain in the test block shall be cause for rejection.

3.9.4 Self-Locking Torque Test (15 Cycles, Loaded) as received

- Insert shall be installed into test blocks (Figure 2) specified in 4.5.1, and tested with test bolts as specified in 4.5.3.2.
- The bolt shall be of sufficient length to extend beyond the locking feature a minimum of 2 pitches.
- The self-locking torque shall be measured and recorded and shall not be less than the values specified in Table 6, column 1 (cycles 1 to 15) or greater than the values specified in Table 6, column 2 (cycles 2 to 15).
- The breakaway torque shall be measured and recorded for each cycle on removal of the bolt and shall not be less than the values specified in Table 6, column 1.

3.9.5 Self-Locking Torque (25 Cycles, Loaded, 1025 °F) (Qualification only)

- Insert shall be installed into test blocks (Figure 2) specified in 4.5.1, and tested with test bolts as specified in 4.5.3.2.
- The self-locking torque shall be measured and recorded and shall not be less than values specified in Table 6, column 1 nor exceed values in column 3.
- Bolt shall be seated on spacer located on top of the test block and tightened to the seating torque specified in Table 6, column 4.
- Heat the assembly in furnace at $1025\text{ °F} \pm 10\text{ °F}$, and hold at this temperature for $6\text{ hours} \pm 15\text{ minutes}$.
- Remove the assembly from furnace and cool to ambient temperature.

- f. Release load by unscrewing 1/2 turn of bolt.
- g. Then continue to unscrew to measure and record the breakaway torque, which shall not be less than value specified in Table 6, column 1.
- h. Remove the bolt from the insert.

The procedure above shall be repeated until 25 cycles have been completed.

3.9.6 Hardness

Shall be uniform and within the range of 31 to 36 HRC but parts shall not be rejected on the basis of hardness as determined by NASM 1312-6 if the strength requirements of this specification are met.

3.10 Quality

Parts shall be uniform in quality and condition, clean, sound, smooth, and free from burrs, foreign materials, and imperfections detrimental to the usage of the parts.

3.10.1 Fluorescent Penetrant Inspection

Inserts shall be subject to fluorescent penetrant inspection in accordance with ASTM E1417, Type I, Sensitivity Level 2. The inspection shall be performed subsequent to any processing operation which could adversely affect the outcome of the inspection process. Penetrant inspection indications alone shall not be cause for rejection. If indications are considered cause for rejection, representative samples shall be taken from those inserts showing indications and these samples shall be further examined as specified in 3.10.2.

3.10.1.1 Discontinuities

Examination of longitudinal or transverse sections of the insert shall reveal no discontinuities such as cracks, laps, seams, or inclusions except laps in threads as permitted in 3.11.3 and 3.11.4.

3.10.2 Microscopic Examination

Specimens cut from parts shall be polished, etched with a suitable etchant and examined at a magnification not lower than 100X to determine conformance to the following requirements.

3.10.2.1 Microstructure

Insert shall have microstructure of completely recrystallized material prior to thread deformation.

3.10.2.2 Grain Size

Grain size shall be 5 or finer as determined by comparison of the specimen with the chart in ASTM E112. Isolated grains not exceeding a mean diameter of 0.009 are acceptable.

3.11 Threads

- 3.11.1 Root defects such as laps, seams, notches, slivers, folds, and roughness are not permissible (see Figure 4).
- 3.11.2 Multiple laps on the flanks of threads are not permissible regardless of location. Single laps on the flanks of threads that extend towards the root are not permissible (see Figures 5 and 6).
- 3.11.3 There shall be no laps along the flank of the thread below the pitch diameter (see Figure 7). A single lap is permissible along the flank of the thread above the pitch diameter on either the pressure or non-pressure flank (one lap at any cross-section through the thread) provided that it extends toward the crest and generally parallel to the flank (see Figure 7).