ASME B18.29.1-2010
[Revision of ASME B18.29.1-1993 (R2007)]

Helical Coil Screw Thread Inserts — Free Running and Screw Locking (Inch Series)

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AN AMERICAN NATIONAL STANDARD

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ASME
SETTING THE STANDARD

Three Park Avenue • New York, NY • 10016 USA

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This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to this edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this document. Periodically, certain actions of the ASME B18 Committee may be published as Cases. Cases and interpretations are published on the ASME Web site under the Committee Pages at http://cstools.asme.org as they are issued.

The American Society of Mechanical Engineers
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FOREWORD

Although this is the first ASME standard covering helical coil screw thread inserts, they have been in use for many years. The helical coil screw thread insert was invented in the 1930s and found initial acceptance in aircraft manufactured and serviced by the Allied Air Forces during World War II.

Since that time, applications for helical coil inserts have come into broad usage in aerospace, automotive, and industrial original equipment design, production salvage (repair), and in-service repair.

Although this usage did include metric spark plug sizes, the regular metric series was developed in Europe in the 1950s, and came into production in the inch-using countries in the 1960s.

Subcommittee 29, Threaded Inserts, met initially in May 1989 after authorization by the ASME B18 Committee to proceed with development of standards covering screw thread inserts.

Following approval by the B18 Committee, the proposal was submitted to the American National Standards Institute for approval. The 1993 edition was approved by ANSI on February 4, 1993.

In 2008, an update of this Standard was initiated by the ASME B18.29 Subcommittee. After needed revisions and additions were clearly identified, ballots were properly undertaken. Ballots resulted in changes related to the ballot comments. In 2009, this Standard was approved by the B18.29 Subcommittee and the B18 Committee.

This revision was approved by the American National Standards Institute (ANSI) on February 25, 2010.

ASME B18 COMMITTEE
Standardization of Bolts, Nuts, Rivets, Screws, Washers, and Similar Fasteners

(The following is the roster of the Committee at the time of approval of this Standard.)

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CORRESPONDENCE WITH THE B18 COMMITTEE

General. ASME standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B18 Standards Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued for the purpose of providing alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee Web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the standard, the paragraph, figure or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the standard to which the proposed Case applies.

Interpretations. Upon request, the B18 Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B18 Standards Committee.

The request for an interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Enter the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B18 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B18 Standards Committee.

HELICAL COIL SCREW THREAD INSERTS—FREE RUNNING AND SCREW LOCKING (INCH SERIES)

1 INTRODUCTORY NOTES

1.1 Scope

1.1.1 This Standard delineates the dimensional data for the inch series helical coil screw thread inserts and the threaded holes into which they are installed. Both free-running and screw-locking types having unified fine and unified coarse thread series from size #1 through 1½ in. are covered. Appendices that describe insert selection, STI (screw thread insert) taps, gages and gaging, insert installation, and removal tooling are also included.

1.1.2 The inclusion of dimensional data in this Standard is not intended to imply that all products described are stock sizes. Consumers should consult with manufacturers concerning availability.

1.2 References

The latest editions of the following documents form a part of this Standard to the extent specified herein.

Army A-A-59158, Tools for Inserting and Extracting Helical Coil Wire Screw Thread Inserts

Publisher: IHS Inc., 15 Inverness Way East, Englewood, CO 80112 (www.ihs.com)

ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form)

ASME B1.2, Gages and Gaging for Unified Inch Screw Threads

ASME B1.3, Screw Thread Gaging Systems for Acceptability — Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ)

ASME B18.18.2, Inspection and Quality Assurance for High-Volume Machine Assembly Fasteners

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

ASME B47.1, Gage Blanks

ASME B94.9, Taps: Ground and Cut Threads

ASME Y14.5M, Dimensioning and Tolerancing

ASME Y14.36, Surface Texture Symbols

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016; Order Department: 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900 (www.asme.org)

ASTM E 290, Standard Test Methods for Bend Testing of Material for Ductility

ASTM B 209-02, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM A 370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428 (www.astm.org)

SAE AMS4120, Aluminum Alloy, Rolled or Cold Finished Bars, Rods, and Wire, 4.4Cu–1.5Mg–0.60Mn (2024), Solution Heat Treated and Naturally Aged (T4), Solution Heat Treated, Cold Worked, and Naturally Aged (T351)

SAE AS5272, Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting Procurement Specification

SAE AS8879, Screw Threads — UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter

SAE J417, Hardness Tests and Hardness Number Conversions.

Publisher: Society of Automotive Engineers (SAE International), 400 Commonwealth Drive, Warrendale, PA 15096-0001 (www.sae.org)

1.3 Description

Helical coil inserts are screw thread bushings coiled from wire of diamond shaped cross-sections. The inserts are screwed into STI tapped holes to form nominal size internal threads. Inserts are installed by torquing through a diametral tang. This tang is notched for removal after installation.

In the free state, the inserts are larger in diameter than the tapped hole into which they are installed. In the assembly operation, the torque applied to the tang reduces the diameter of the leading coil and permits it to enter the tapped thread. The remaining coils are reduced in diameter as they, in turn, are screwed into the tapped hole. When the torque or rotation is stopped, the coils expand with a spring-like action, anchoring the insert in place against the tapped hole.

1.4 Class of Fit

Since helical coil inserts are flexible, the class of fit of the final assembly is a function of the size of the tapped hole. Helical coil STI taps are available for both tolerance Classes 2B and 3B tapped holes. Tolerance Class 2B tapped holes provide maximum production tolerances, but result in lower locking torques when screw locking inserts are used. The higher and more consistent torques given in Table 5 are met by the screw locking inserts when assembled and tested in tolerance Class 3B tapped holes in accordance with section 2.

1.5 Compatibility

Assembled helical coil inserts will mate properly with items having UN external threads in accordance with ASME B1.1. In addition, due to the radius on the crest of the insert at the minor diameter, the assembled insert will mate with UNJ profile external threaded parts with controlled radius root threads per SAE AS8879.

1.6 Types of Inserts

1.6.1 Free-Running. The free-running insert provides a smooth, hard, and free-running thread.

1.6.2 Screw-Locking. The screw-locking insert provides a resilient locking thread produced by a series of chords on one or more of the insert coils.

2 STI TAPPED HOLE

The tapped hole into which the insert is installed shall be in accordance with ASME B1.1, except that diameters are larger to accommodate the wire cross-section of the insert. Dimensions of the STI tapped holes are shown in Table 1 and calculated per Note (3) of Table 1.

2.1 Screw Thread Designation

2.1.1 Designation for Tapped Hole. The drawing note for the STI threaded hole per Table 1 to accept the helical coil insert shall be in accordance with the following example:

EXAMPLE: $\frac{1}{4}$-20 UNC-2B STI thread 0.430 min. depth, per ASME B18.29.1.

2.1.2 Designation for a Helical Coil Insert. Designation of the helical coil insert on parts lists, spares lists, purchase orders, etc., shall be in accordance with the following examples:

EXAMPLES:
(1) ASME B18.29.1, $\frac{1}{4}$-20 UNC 0.375 long helical coil free-running insert.
(2) ASME B18.29.1, #10-32 UNF 0.380 long helical coil screw-locking insert.

2.1.3 Designation for STI Threaded Hole Including Installed Helical Coil Insert. The drawing note for the STI threaded hole per Table 1, having a helical coil insert installed, shall be in accordance with the following example:

EXAMPLES:
(1) $\frac{1}{4}$-20 UNC-2B STI thread 0.430 deep.
(2) ASME B18.29.1, $\frac{1}{4}$-20 UNC 0.375 long helical coil free-running insert.

2.2 Gages and Gaging

Acceptance of the threaded hole is determined by gaging with STI GO, NOT GO (HI), and plain cylindrical gages designed and applied in accordance with System 21 of ASME B1.3 (see Nonmandatory Appendix C).

3 HELICAL COIL INSERT

3.1 Insert Material

Chemical composition of the insert is austenitic corrosion resistant (stainless) steel within the limits of Table 2.

3.2 Properties

3.2.1 Tensile Strength. Wire, before coiling into inserts, shall have tensile strength not lower than 150,000 psi, determined in accordance with ASTM A 370.

3.2.2 Bending. Wire shall withstand, without cracking, bending in accordance with ASTM E 290 at room temperature through an angle of 180 deg around a diameter equal to twice the cross-sectional dimension of the wire in the plane of the bend.

3.2.3 Workmanship. The formed wire shall be of uniform quality and temper; smooth, clean, free from kinks, waviness, splits, cracks, laps, seams, scale, segregation, and other defects that may impair the serviceability of the insert.

3.3 Coatings

3.3.1 Red Dye Identification. Screw-locking inserts are dyed red for identification. The red dye may completely or partially cover the insert. However, it must be sufficient to identify the insert when it is installed in the tapped hole.

3.3.2 Dry Film Lubricant Coating. When specified, dry film lubricant coating can be applied to helical coil inserts. It shall meet the requirements of para. 3.3.2.1 and para. 3.3.2.2. Color of dry film lubricated insert is dark gray to black.

3.3.2.1 Dry Film Material. The lubricant shall meet the requirements of SAE AS5272, Type I.

3.3.2.2 Thickness. The coating shall be uniformly deposited on the insert with minimum thickness being complete coverage. The maximum thickness shall be the avoidance of "bridging" between coils. Slight fill-in