ASME B18.2.2-2022
(Revision of ASME B18.2.2-2015)

Nuts for General Applications: Machine Screw Nuts; and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)

AN AMERICAN NATIONAL STANDARD

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The American Society of Mechanical Engineers
Two 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.

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The American Society of Mechanical Engineers
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FOREWORD

American National Standards Committee B18 for the standardization of bolts, screws, nuts, rivets, and similar fasteners was organized in March 1922 as Sectional Committee B18 under the aegis of the American Engineering Standards Committee (later the American Standards Association, then the United States of America Standards Institute, Inc.) with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors. Subcommittee 2 was subsequently established and charged with the responsibility for technical content of standards covering wrench head bolts and nuts.

Subcommittee 2, after appraisal of the requirements of industry, developed a proposed standard series of bolt head and nut dimensions. This proposal was finally approved and designated a Tentative American Standard in February 1927.

A first revision of the document was designated as an American Standard in March 1933 and was followed by a second revision that was granted approval as an American Standard in January 1941.

Following reorganization of the B18 Committee in 1947, Subcommittee 2 was asked to expand the standard on head proportions into a complete product standard. A proposal covering square and hexagon head bolts and nuts, hexagon head cap screws, and automotive hexagon head bolts was prepared and submitted to the B18 Committee in April 1950. While this draft was under consideration, the B18 Committee received a proposal from the British Standards Institution for unification of dimensions on products incorporating unified screw threads. The Committee welcomed the opportunity of discussing the proposals and an American-British-Canadian Conference was held in New York on June 1 and 2, 1950.

It was agreed in the conference that the essentials of unification could be accomplished by selection of mutually satisfactory across-the-flats dimensions, since this would permit the use of the same wrenches and because other features would rarely affect interchangeability. After due consideration, suitable existing across-the-flats dimensions were selected for the hexagon products affected.

In its meeting of October 13, 1950, Subcommittee 2 agreed to incorporate into the proposed standard the conference recommendations on $\frac{1}{4}$ in. hexagon head bolts, $\frac{5}{8}$ in. hexagon head cap screws and automotive hexagon head bolts, and $\frac{7}{16}$ in. light and regular hexagon and square nuts. At a subsequent meeting of Subcommittee 2, further changes were adopted in order to combine the light and regular series of nuts, and to combine the automotive hexagon head bolt, hexagon head cap screw, and regular hexagon head close tolerance bolt.

In view of the progress made in the United States and the urgency of standardization for mutual defense, the British Standards Institution sponsored a second conference in London in April 1951 to complete the unification of certain hexagon bolts and nuts.

At a meeting on June 8, 1951, Subcommittee 2 reaffirmed its acceptance of the unified dimensions that correspond with those in the March 1951 draft, but attempted to select better nomenclature for the unified products. A final draft incorporating the nomenclature "Finished Hexagon Bolts and Nuts" and containing numerous editorial changes was submitted for letter ballot in September 1951. Following approval by the B18 Committee and the sponsors, the proposal was presented to the American Standards Association for approval and designation as an American Standard. This was granted on March 24, 1952.

It was recognized that the standard was in need of additional refinements; therefore, Subcommittee 2 began work immediately to eliminate these shortcomings. A proposed revision removing inconsistencies with respect to fillets, improving the length tolerances on heavy hexagon bolts, and incorporating numerous other corrections and clarifications of an editorial nature resulted. The most noteworthy editorial change was a decision to combine the coverage for hexagon cap screws and square head set screws from the B18.2 standard with the coverage for slotted head cap screws and slotted headless set screws from the B18.6 standard for publication in a separate document. The requirements for the unified hexagon cap screws and finished hexagon bolts being identical in the overlapping sizes, the data would now be available in two publications. Following approvals by the B18 Committee and sponsor organizations, the proposal was submitted to the American Standards Association and declared an American Standard on February 2, 1955.

A revision of this Standard comprised of numerous editorial corrections and inclusion of an appendix for grade markings was duly approved and designated an American Standard on April 18, 1960.

At a meeting in February 1960, Subcommittee 2 approved a recommendation to reduce the head heights for heavy, heavy semifinished, and heavy finished hexagon bolt, which was subsequently approved by letter ballot of the B18 Committee on August 16, 1960. A proposed standard for heavy hexagon structural bolts submitted and accepted by Subcommittee 2 at its October 17, 1960, meeting was approved by letter ballot of the B18 Committee on May

9, 1961. To meet the urgent needs of the steel construction industry, it was considered necessary to publish the standard for the structural bolts immediately. Consequently, Appendix IV to ASA B18.2-1960 containing coverage for the revised heavy hexagon bolts and the new heavy hexagon structural bolts was released in 1962.

In October 1961, Subcommittee 2 appointed a subgroup to review all product standards for square and hexagon bolts, screws, and nuts, and to recommend simplifications that would be compatible with technical, production, and distribution advances that had occurred over the prior several years. The subgroup presented its recommendations at a meeting of Subcommittee 2 in October 1962. It was agreed that the internally and externally threaded products should be published in separate documents as suggested, and draft proposals for each were completed.

The proposed revision for square and hex nuts incorporated the following subgroup recommendations: discontinuation of regular semifinished nuts; elimination of regular hexagon and heavy hexagon nuts in sizes $\frac{1}{4}$ in. through 1 in.; elimination of finished hexagon nuts in sizes larger than $1\frac{1}{2}$ in.; elimination of the washer face semifinished style on finished series nuts in sizes $\frac{5}{8}$ in. and smaller and heavy series nuts in sizes $\frac{7}{16}$ in. and smaller; removal of machine screw nuts (these nuts are now contained in B18.6.3); and adoption of an abbreviated product nomenclature. Letter ballot of this proposal to the B18 Committee resulted in approval. Following acceptance by the sponsor organizations the revision was submitted to the American Standards Association and designated ASA B18.2.2 on September 8, 1965.

Subcommittee 2 continued to further develop refinements initiated by the simplification subgroup and to study changes suggested by consumer interests. This work culminated in Subcommittee acceptance of a 1970 proposal incorporating, in addition to numerous editorial changes, revisions to the requirements on angularity of bearing face and countersink diameters for the various hex nuts and heavy hex nuts, and inclusion of an appendix covering the gaging of slots in slotted nuts.

The proposed revision, after approval by letter ballot of the B18 Committee in March 1970, was subsequently approved by the sponsors and submitted to the American National Standards Institute (ANSI) for designation as an American National Standard. This was granted on January 18, 1972.

A proposed revision of this Standard agreed upon by Subcommittee 2 incorporated a provision to enable consumers to specify heavy hex nuts and heavy hex jam nuts with close bearing face angularity, when required; clarified intent with regard to width across flats on nuts produced from bar stock; deleted coverage for hex castle nuts from the appendices; and included numerous editorial refinements. This proposal was formally approved by letter ballot of the subcommittee and the B18 Committee. Following its acceptance by the sponsor organizations the revision was referred to ANSI and granted approval as an American National Standard on February 27, 1987.

In March 2009, the B18.2 Subcommittee undertook a revision of this Standard. The format has been updated to meet the requirements of ASME B18.12.1. Regular pattern machine screw nuts have been moved from ASME B18.6.3, and the small pattern machine screw nuts have been added to this Standard. The hex flange nut that was previously referred to as IFI-145 has been added. Coupling nuts have been added. Many of the sizes came from the IFI-128 and others were based on what has been used for many years by industry. This proposal was formally approved by letter ballot of the subcommittee and the B18 Committee. Following its acceptance by the sponsor organizations, the revision was referred to ANSI and granted approval as an American National Standard on August 24, 2010.

In September 2014, the B18.2 Subcommittee agreed to revise this Standard. Updates to the standard included correcting and expanding tabulated dimensions of small pattern hex machine screw nuts, revising washer face diameter tolerancing to be consistent with cap screws, a revised procedure for thread acceptance gaging of jam nuts, and a nonmandatory appendix with a procedure for measuring bearing surface runout. The revision was approved as an American National Standard on August 12, 2015.

In September 2020, the B18.16 Subcommittee agreed to revise this Standard. The only significant update is the inclusion of castle nuts, which had been removed after the 1970 edition but still have commercial usage. Also, the tables have been editorially redesignated based on their parent paragraph. This revision was approved as an American National Standard on January 21, 2022.

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 or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B18 Standards Committee
The American Society of Mechanical Engineers
Two 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 to provide 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 and 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.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the B18 Standards Committee at the above address. 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 in one or two words.
Edition:	Cite 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. Please provide a condensed and precise question, composed in such a way that a “yes” or “no” reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of “Yes” or “No,” with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. 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 the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

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 and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B18 Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at http://go.asme.org/B18committee.

NUTS FOR GENERAL APPLICATIONS: MACHINE SCREW NUTS; AND HEX, SQUARE, HEX FLANGE, AND COUPLING NUTS (INCH SERIES)

1 INTRODUCTION

1.1 Scope

1.1.1 This Standard is intended to cover the complete general and dimensional data for the types of inch series square and hex nuts, including machine screw nuts and coupling nuts (see Tables 1.1.1-1 through 1.1.1-15). Also included are appendices covering gaging of slots in slotted nuts, wrench openings for nuts, formulas on which dimensional data are based, and measurement of bearing surface runout. It should be understood that where questions arise concerning acceptance of product, the dimensions in the tables shall govern over recalculation by formula.

1.1.2 The inclusion of dimensional data in this Standard is not intended to imply that all of the products described herein are stock production sizes. Consumers are requested to consult with manufacturers concerning lists of stock production sizes.

1.2 Comparison to ISO Standards

There are no comparable ISO inch fastener standards.

1.3 Dimensions

Unless otherwise indicated, units of measurement are expressed in inches.

1.4 Options

Where options are allowed, they shall be selected at the manufacturer's discretion unless otherwise specified by the purchaser.

1.5 Terminology References

For definitions of terminology not specifically defined in this Standard, refer to ASME B18.12.

2 REFERENCES

Unless otherwise specified, the standards referenced shall be the latest edition at the time of order placement.

ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B1.3, Screw Thread Gaging Systems for Acceptability: Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ)
ASME B18.12, Glossary of Terms for Mechanical Fasteners
ASME B18.18, Quality Assurance for Fasteners
ASME B18.24, Part Identifying Number (PIN) Code System for B18 Fastener Products
ASME B107 Series, Standards for Hand Tools
Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts
ASTM F467, Standard Specification for Nonferrous Nuts for General Use
ASTM F594, Standard Specification for Stainless Steel Nuts
ASTM F1941/F1941M, Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric