ASME B18.6.3-2024

(Revision of ASME B18.6.3-2013)

# Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)

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AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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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 and, as of October 6, 1969, the American National Standards Institute, Inc.), with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors. Subcommittee 3* was subsequently established and charged with the responsibility for technical content of standards covering slotted and recessed head screws.

An American Standard setting forth slotted head proportions was approved and published in April 1930. Over the years following the issuance of this document, the need for standards more comprehensive than head configurations became apparent. At a meeting held on April 14, 1942, Subcommittee 3* was reorganized and enlarged, and the following operating scope was established:

The scope of Subcommittee 3* shall consist of the development and promulgation of American Standards embracing screw products variously known as machine screws, wood screws, tapping screws, slotted head cap screws, slotted headless set screws, and machine screw nuts. The standards shall comprise complete product standards covering all dimensions and tolerances required for the specification and production of the products. Details shall include boundary dimensions, such as nut width and thickness; screw head dimensions; slot and recess dimensions; body dimensions; thread classification or thread detail, as required; thread length; point design; chamfers; underhead fillets; and supporting general specifications covering the quality, finish, and the allowable tolerances and limits as well as any information that may be necessary to ensure satisfactory application of the products.

Several meetings of the Subcommittee over the ensuing 3 years resulted in the development and acceptance of a proposed revision containing complete product standards covering the slotted and recessed head machine, tapping and wood screws; slotted and hexagon head cap screws; and slotted headless set screws. Following approval by the B18 Committee and sponsor organizations, this proposal was forwarded to the American Standards Association and declared an American Standard, ASA B18.6, on April 12, 1947.

Recognizing the need for further refinements, Subcommittee 3* at a meeting held on February 1, 1951, established three standing working subgroups: one to develop details pertinent to tapping screw threads; a second to review, revise, and develop head dimensions and tolerances; and a third to correlate and edit the technical information emanating from the other two groups. Also at this meeting, numerous suggested changes were reviewed and assigned to the respective subgroups for further development. Additional meetings of the Subcommittee were held on October 9, 1952; October 29, 1953; and April 1 and 2, 1954. Between each of these meetings the subgroups held numerous working sessions and carried on technical development in cooperation with the technical committees of the U.S. Machine Screw and Tapping Screw Service Bureaus.

At the April 1954 meeting, Subcommittee 3,* contemplating a partial revision of the ASA B18.6 document, recommended the publication of standards for wood screws, cap and set screws, machine screws, and tapping and drive screws in four separate documents, each of which would consist of a complete product specification. This approach was confirmed by the B18 Committee with the further stipulation that the coverage for hexagon head cap screws, square head set screws, and machine screw nuts from the ASA B18.2 standard be transferred to the documents covering cap and set screws and machine screws, respectively. It was understood that jurisdiction over the square head set screws and hexagon head cap screws would remain with Subcommittee 2 and that Subcommittee 3* would retain responsibility for machine screw nuts. Following this confirmation and additional direction, the preparation of proposals for the new documents was undertaken.

The proposed standard covering slotted and recessed head machine screws and machine screw nuts was approved by Subcommittee 3* at a meeting held on December 6, 1955. After being circulated to industry for comment, it was revised and subsequently approved by letter ballot of the B18 Committee in March of 1958. The proposal was, however, redrafted to incorporate additional revisions and refinements adopted by Subcommittee 3* at meetings held on October 30, 1958 and September 17, 1959. The revised proposal was recirculated to the B18 Committee and was approved by the sponsor organizations and the American Standards Association and formally designated an American Standard, ASA B18.6.3, on February 12, 1962.

*As of April 1, 1966, Subcommittee 3 was redesignated Subcommittee 6.



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Following issuance of the 1962 document, Subcommittee 3* and the working subgroups continued to develop revisions and refinements reflecting changes in industry practices and technical improvements. Work over the intervening years culminated in the Subcommittee 6 acceptance of a draft dated November 1969, incorporating revisions in the following areas: inclusion of Type IA cross recess data; addition of the No. 0000, No. 000, and No. 00 sizes to most slotted head styles; extensions of size coverage for 100-deg flat countersunk heads and binding heads in smaller sizes, and for pan heads in larger sizes; redimensioning of flat and oval countersunk heads; revision of thread lengths; inclusion of appendices for wobble gaging of recessed heads and wrench sizes for square and hex products; and a complete revamping of the format.

This revision was approved as an American National Standard on May 22, 2003.

In late 2008 the ASME B18.6 Subcommittee undertook a revision of B18.6.3. The first major decision was to combine B18.6.3 and B18.6.4 into one standard for all types of screws, machine and tapping. This was decided since over 50% of both standards were identical, and they both contained essentially the same head and recess data.

The Type VI recess design, having six internal lobes, was introduced into this Standard because of its wide use. The Type II recess was removed from the Standard because there is no documented use of this design today. A grade of hardened steel machine screw was added to the standard along with references to stainless steel and nonferrous materials. The thread Type TRS, for thread rolling screws, was added in the tapping screw section. The Type A thread type was moved back into the body of the standard from the Appendix because it is still in high use in several industries. The Type ABR thread, a Type AB with a radius point, was also introduced. Machine screw nuts were moved to ASME B18.2.2. ASME B18.6.3-2010 was approved as an American National Standard on September 8, 2010.

The 2010 revision was extensive, and users reported numerous minor errors. ASME B18.6.3-2013 corrected the reported errors and updated the quality requirements to reflect the publication of ASME B18.18. ASME B18.6.3-2013 was approved as an American National Standard on February 5, 2013.

Since publication of ASME B18.6.3-2013, users have requested guidance or clarification on a number of issues. In 2016, a joint task group was formed with the SAE Fastener Committee to review these items. The primary items addressed were updating guidance on hydrogen embrittlement testing, lowering core hardness and updating case hardening practices to conform to current industry best practices, revising the tapping screw thread length to accommodate more definitive and practical identification of thread termination, and updating items missed in the 2013 revision.

ASME B18.6.3-2024 was approved by the American National Standards Institute as an American National Standard on January 22, 2024.

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# 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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**Revisions and Errata.** The committee processes revisions to this Standard on a periodic basis 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 in the next edition of the Standard.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata.

This Standard is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

**Cases**

*(a)* The most common applications for cases are

*(1)* to permit early implementation of a revision based on an urgent need

*(2)* to provide alternative requirements

*(3)* to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Standard

*(4)* to permit the use of a new material or process

*(b)* Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Standard.

*(c)* A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

*(1)* a statement of need and background information

*(2)* the urgency of the case (e.g., the case concerns a project that is underway or imminent)

*(3)* the Standard and the paragraph, figure, or table number

*(4)* the editions of the Standard to which the proposed case applies

*(d)* A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

**Interpretations.** Upon request, the committee will issue an interpretation of any requirement of this Standard. An interpretation can be issued only in response to a request submitted through the online Inquiry Submittal Form at https://go.asme.org/InterpretationRequest. Upon submitting the form, the inquirer will receive an automatic e-mail confirming receipt.

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# ASME B18.6.3-2024
# SUMMARY OF CHANGES

Following approval by the ASME B18 Standards Committee and ASME, and after public review, ASME B18.6.3-2024 was approved by the American National Standards Institute on January 22, 2024.

In ASME B18.6.3-2024, figures and tables have been redesignated. ASME B18.6.3-2024 includes the following additional changes identified by a margin note, **(24)**.

| *Page* | *Location* | *Change* |
|---|---|---|
| 1 | 1.7 | Updated |
| 2 | 2.1.1 | Revised |
| 3 | 2.1.5 | Subparagraphs (a) through (c) revised |
| 4 | 3.2 | Revised |
| 5 | 3.8.3 | Revised in its entirety, and para. 3.8.4 deleted |
| 5 | 3.9 | Second sentence revised |
| 5 | 3.11 | (1) Subparagraph (a)(7) revised |
| | | (2) Example (2) deleted, and subsequent Examples redesignated |
| 6 | 4.1.1.4 | Revised |
| 6 | 4.1.2.1 | Penultimate sentence revised |
| 7 | 4.1.3 | Revised |
| 7 | 4.2 | Second sentence revised |
| 7 | 4.3 | (1) Revised in its entirety |
| | | (2) Former Figure 3 deleted |
| 8 | 4.8.1.1 | Second sentence deleted |
| 8 | 4.8.1.2 | Revised |
| 9 | 4.8.1.3 | Reference to SAE J423 revised to SAE J42 and in-text table revised |
| 9 | 4.9 | Reference to ASTM F1941 revised to ASTM F1941/F1941M |
| 9 | 4.11.1 | Revised |
| 10 | 4.11.5 | (1) First sentence added |
| | | (2) Second paragraph revised in its entirety |
| 11 | 5.6 | First sentence revised |
| 11 | 5.7 | Reference to ASTM F1941 revised to ASTM F1941/F1941M |
| 81 | Figure 4.3.1-1 | Former Figure 1 revised |
| 82 | Figure 4.3.2-1 | Former Figure 2 revised |
| 15 | Table 2.2.1-2 | Note (6) added |
| 23 | Table 2.2.2-2 | Note (6) added |
| 27 | Table 2.2.3-2 | Values in “Type III, Driver Size” column revised |
| 43 | Table 2.2.5-3 | Note (6) added |
| 48 | Table 2.2.6-2 | Note (6) added |
| 53 | Table 2.2.7-2 | Note (6) added |
| 61 | Table 2.2.9-2 | Note (4) added |

| *Page* | *Location* | *Change* |
|---|---|---|
| 65 | Table 2.2.10-2 | Note (6) added |
| 73 | Table 2.2.12-2 | Note (3) added |
| 74 | Table 4.1.1.1-1 | Former General Note (d) redesignated as Note (1)(c) |
| 75 | Table 4.1.1.2-1 | Former General Note (c) added to Note (1) |
| 76 | Table 4.1.1.4-1 | (1) Nominal Sizes 2, 4, 6, 8, 10, and 12 made bold and Note (1) revised<br>(2) Former General Note (d) added to Note (1) |
| 96 | Figure IV-1 | Revised |
| 102 | Table VII-2-1 | (1) For drive and gage size number 7, minimum diameter $M$ and maximum diameter $P_1$ revised<br>(2) For drive and gage size numbers 9 and 50, maximum diameter $C$ revised |
| 121 | Table D-1 | “In Asbestos Compositions” section deleted |
| 123 | Table D-2 | “In Asbestos Compositions” section deleted |
| 132 | Table D-5 | “In Asbestos Compositions” section deleted |

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# MACHINE SCREWS, TAPPING SCREWS, AND METALLIC DRIVE SCREWS (INCH SERIES)

## 1 INTRODUCTORY NOTES

### 1.1 Scope

This Standard is intended to cover the complete general and dimensional data for the various types of slotted and recessed head machine screws, tapping screws, and metallic drive screws recognized as American National Standard. Also included are appendices that provide specifications and instructions for the protrusion gaging of flat countersunk head screws; across-corners gaging of hex head screws; penetration gaging and wobble gaging of recessed head screws; approximate hole size for tapping screws; wrench openings for hex and square products; thread dimensions for the No. 0000, No. 000, and No. 00 sizes; means for determining effective grip lengths on screws; documentation for screw types and head types relegated to not-recommended or limited-usage status; and formulas on which dimensional data are based. It shall be understood, however, that where questions arise concerning acceptance of product, the dimensions in the tables shall govern over recalculation by formula.

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

### 1.2 Dimensions

All dimensions in this Standard are given in inches, unless stated otherwise.

### 1.3 Options

Options, where specified, shall be at the discretion of the manufacturer unless otherwise agreed upon by the manufacturer and the purchaser.

### 1.4 Responsibility for Modification

The manufacturer shall not be held responsible for malfunctions of product determined to be due to plating or other modifications when such plating or modification is not accomplished under the manufacturer's control or direction.

### 1.5 Terminology

For definitions of terms relating to fasteners or features thereof used in this Standard, see ASME B18.12.

### 1.6 Comparison With ISO

This Standard has no ISO counterpart.

### 1.7 Referenced Standards (24)

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

ASME B1.1. Unified Inch Screw Threads (UN and UNR Thread Form). The American Society of Mechanical Engineers.
ASME B1.3. Screw Thread Gaging Systems for Acceptability: Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ). The American Society of Mechanical Engineers.
ASME B18.2.9. Straightness Gage and Gaging for Bolts and Screws. The American Society of Mechanical Engineers.
ASME B18.12. Glossary of Terms for Mechanical Fasteners. The American Society of Mechanical Engineers.
ASME B18.18. Quality Assurance for Fasteners. The American Society of Mechanical Engineers.