ASME B18.2.3.9M-2001

[Revision of ANSI/ASME B18.2.3.9M-1984 (R1995)]

REAFFIRMED 2020

METRIC HEAVY HEX FLANGE SCREWS

AN AMERICAN NATIONAL STANDARD

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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 will issue written replies to inquiries concerning interpretations of technical aspects of this Standard.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

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 2 was subsequently established and charged with the responsibility for technical content of standards covering wrench head bolts and nuts.

At its meeting on December 4, 1974, Committee B18 authorized preparation of a series of standards for metric fasteners. Subcommittee 2 was assigned responsibility for developing standards for metric hex bolts, screws, and nuts.

Following issuance of ANSI B18.2.3.4M-1979, interest developed in the farm equipment, heavy truck, and off-road vehicles industries for a second series of metric hex flange screws having a head widths across flats series equal to those of metric hex cap screws. During the analytical research study to optimize head proportions of hex flange screws (refer to the Foreword of ASME B18.2.3.4M-2000), this larger head series was also investigated, and appropriate values for the various head characteristics were established for screw sizes M10 through M20.

This new design of metric heavy hex flange screws was submitted by the United States of America/Canada to ISO/TC2 at its May 1982 meetings. TC2 accepted the proposal and authorized development of International Organization for Standardization (ISO) standards.

After these ISO decisions, Subcommittee 2 drafted this Standard.

This Standard was approved by letter ballot of the ASME B18 Standards Committee on April 18, 1983, and was subsequently approved by the American Society of Mechanical Engineers and submitted to the American National Standards Institute for designation as an American National Standard. This was granted on March 23, 1984. The Standard was reaffirmed in 1995. This draft revision was prepared based on revisions that were made in the metric hex cap screw standard in December 1998. This Standard was approved by the American National Standards Institute on March 9, 2001. The key revisions include the following:

(a) The heavy hex series is expanded to include sizes M5, M6, and M8 with head dimensions adopted by ISO/DIS 8102.

(b) All head heights *(K)* and wrenching heights *(K_w)* are increased to improve wrenchability.

(c) The position of head-to-shank is changed to maximum material condition (MMC) as described in para. 11 and Tables 2 and 5.

(d) The length tolerances are changed in Table 7 to agree with those of the draft of ASME B18.2.3.4M, Metric Hex Flange Screws.

(e) Straightness is specified at MMC, and a rail gage replaces the sleeve gage as specified in para. 18.

(f) The concavity angle of the conical bearing surface is now 0.75 deg ±0.50 deg to agree with that of ISO and to match B18.2.3.4M. The bearing face runout is to be measured on the actual bearing circle instead of the minimum bearing circle as specified in para. 13.

(g) The transition threads shall have a rounded root contour per para. 20.4. This replaces,

“For screws of Property Class 10.9 and higher strength materials (tensile strength 1040 MPa and higher) the transition threads shall have a rounded root contour no radius of which shall be less than the specified minimum at the root of the full form thread.”

(h) The position of body-to-thread previously required is deleted based on the B18 Subcommittee 2 decision of December 2, 1998.

(i) Appendix A is added to provide a detailed comparison with ISO/DIS 8102, with unpublished changes agreed upon in ISO/TC2/WG2. The current wrenching height formula in ISO 4759-1 would increase the wrenching heights even more. No support exists in North America for increases beyond those included herein.

ASME B18 STANDARDS 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 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

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.

Interpretations. Upon request, the B18 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 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:	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. The inquirer may also include any plans or drawings which are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this 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.

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METRIC HEAVY HEX FLANGE SCREWS

1 SCOPE

(a) This Standard covers the complete dimensional and general data for metric series heavy hex flange screws recognized as American National Standard.

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

2 COMPARISON WITH ISO/DIS 8102

(a) Heavy hex flange screws as presented in this standard are harmonized to the extent possible with the draft international standard ISO/DIS 8102, Hexagon Bolts With Flange—Heavy Series, and with revisions agreed to by ISO/TC2/WG2 in May 1989 in Zurich and later that have not been published in a revised draft. If it were published, the dimensional differences between this Standard and ISO/DIS 8102 would be few, relatively minor, and none would affect functional interchangeability of screws manufactured to the requirements of either.

This Standard specifies some requirements that are not included in ISO/DIS 8102. **Dimensional requirements shown in bold type are in addition to, or differ from, ISO/DIS 8102.** The technical differences between this standard and the ISO documents are described in Appendix A.

(b) Letter symbols designating dimensional characteristics are in accord with ISO 225, Fasteners—Bolts, Screws, Studs and Nuts—Symbols and Designations of Dimensions, and with ISO/DIS 8102, except where capitals have been used instead of lowercase letters used in the ISO standards.

3 REFERENCED STANDARDS

The following is a list of publications referenced in this Standard. Unless otherwise specified, the standard(s) referenced shall be the most recent issue at the time of order placement.

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

ASME B1.13M Metric Screw Threads—M Profile

ASME B18.2.8 Clearance Holes for Inch and Metric Bolts and Screws

ASME B18.12 Glossary of Terms for Mechanical Fasteners

ASME B18.18.1M Inspection and Quality Assurance for General Purpose Fasteners

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

ASME B18.24.1 Part Identifying Number (PIN) Code System Standard for B18 Externally Threaded Fasteners

ASME Y14.5M Dimensioning and Tolerancing

Publisher: American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007

ASTM F 468M Nonferrous Bolts, Hex Cap Screws, and Stands for General Use (Metric)

ASTM F 568M Carbon and Alloy Steel Externally Threaded Metric Fasteners

ASTM F 738M Stainless Steel Metric Bolts, Screws, and Studs

ASTM F 788/F 788M Surface Discontinuities of Bolts, Screws and Studs, Inch and Metric Series

Publisher: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428

ISO 225 Fasteners—Bolts, Screws, Studs and Nuts—Symbols and Designations of Dimensions[1]

ISO 3508 Thread Runouts for Fasteners With Thread in Accordance With ISO 261 and ISO 262[1]

ISO 4759-1 Tolerances for Fasteners—Part 1: Bolts, Screws and Nuts With Thread Diameters 1.6 to 150 mm and Product Grades A, B and C[1]

ISO/DIS 8102 Hexagon Bolts With Flange-Heavy Series[1]

[1] May also be obtained from American National Standards Institute, 11 West 42nd Street, New York, NY 10036.