



**ASME B18.2.2-2010**

**[Revision of ASME/ANSI B18.2.2-1987 (R2005)]**

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

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Three Park Avenue • New York, NY • 10016 USA

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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 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 the American National Standards Institute 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 the American National Standards Institute and granted approval as an American National Standard on August 24, 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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**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.

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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: 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 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 that are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B18 Standards Committee.

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# Nuts for General Applications: Machine Screw Nuts, 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 various types of inch series square and hex nuts, including machine screw nuts and coupling nuts, recognized as American National Standard. Also included are appendices covering gaging of slots in slotted nuts, wrench openings for nuts, and formulas on which dimensional data are based. It should be understood, however, 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 B18.18.2, Inspection and Quality Assurance for High-Volume Machine Assembly 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) Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900 ([www.asme.org](http://www.asme.org))

ASTM A 563, Standard Specification for Carbon and Alloy Steel Nuts

ASTM F 467, Standard Specification for Nonferrous Nuts for General Use

ASTM F 594, Standard Specification for Stainless Steel Nuts

ASTM F 812/F 812M, Standard Specification for Surface Discontinuities of Nuts, Inch and Metric Series

ASTM F 1941, Specification for Electrodeposited Coatings on Threaded Fasteners [Unified Inch Screw Threads (UN/UNR)]

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, West Conshohocken, PA 19428 ([www.astm.org](http://www.astm.org))

SAE J995, Mechanical and Material Requirements for Steel Nuts

Publisher: SAE International, 400 Commonwealth Drive, Warrendale, PA 15096 ([www.sae.org](http://www.sae.org))

## 3 GENERAL DATA

### 3.1 Width Across Flats

The width across flats of nut shall be the distance measured, perpendicular to the axis of nut, overall between two opposite sides of the nut in accordance with the notes on respective dimensional tables.

Maximum width across flats shall not be exceeded, except as stated below. No transverse section through the nut between 25% and 75% of the actual nut thickness as measured from the bearing surface shall be less than the minimum width across flats.

NOTE: Nonferrous milled-from-bar hex nuts: The minimum across flats dimensions of nonferrous milled-from-bar hex nuts shall not be less than the values tabulated in Tables 1-1 through

13. The maximum across flats size may be greater than the tabulated values in Tables 1-1 through 13, but shall not be equal to or greater than the minimum wrench opening shown in Table B-1, Nonmandatory Appendix B.

### 3.2 Corner Fill

A rounding or lack of fill at junction of hex corners with chamfer shall be permissible, provided the width across corners is within specified limits at and beyond a distance equal to 17.5% of the basic thread diameter from the chamfered face.

### 3.3 Tops of Nuts and Chamfers

Tops of nuts shall be flat and chamfered. Unless otherwise specified by the purchaser or in this Standard, nuts in sizes  $\frac{5}{8}$  in. nominal size and smaller shall be double-chamfered. Larger size nuts shall be double-chamfered or have washer-faced bearing surface and chamfered top.

**3.3.1 Single-Chamfered Nuts.** Diameter of the chamfer circle shall be equal to the maximum width across flats within a tolerance of  $-15\%$ . The length of chamfer at hex corners shall be from  $5\%$  to  $15\%$  of the basic thread diameter. The surface of the chamfer may be slightly convex or rounded.

**3.3.2 Double-Chamfered Nuts and Washer-Faced Nuts.** The diameter of chamfer circle on double-chamfered nuts and washer-faced nuts shall be within the limits of the maximum width across flats and  $95\%$  of the minimum width-across-flats.

### 3.4 Countersink

Unless otherwise specified in this Standard, tapped holes shall be countersunk on the bearing faces. The maximum countersink diameter shall be the thread basic (nominal) major diameter plus  $0.030$  in. for  $\frac{3}{8}$  in. nominal size nuts and smaller, and  $1.08$  times the basic major diameter for nuts larger than  $\frac{3}{8}$  in. No part of the threaded portion shall project beyond the bearing surface.

### 3.5 Nut Thickness

The nut thickness shall be the overall distance, measured parallel to the axis of nut, from the top of the nut to the bearing surface and shall include the thickness of the washer face where provided.

### 3.6 Washer Face Diameter

Unless otherwise specified, the diameter of washer face shall be within the limits of the maximum width across flats and  $95\%$  of the minimum width across flats.

### 3.7 Slots

When specified in the respective dimensional table, slots shall be normal to nut flats. Contour of bottom of

slots shall be at manufacturer's option. Requirements for gaging slots are specified in Mandatory Appendix I.

### 3.8 True Position of Tapped Hole

**3.8.1 Hex Nuts.** The axis of tapped hole in hex nuts shall be located at true position with respect to the axis of nut body within a tolerance zone having a diameter equivalent to  $4\%$  of the maximum width across flats for  $1\frac{1}{2}$  in. nominal size nuts or smaller and  $6\%$  of the maximum width across flats for nuts larger than  $1\frac{1}{2}$  in., regardless of feature size.

**3.8.2 Square Nuts.** The axis of tapped hole in square nuts shall be located at true position with respect to the axis of nut body within a tolerance zone having a diameter equivalent to  $10\%$  of the maximum width across flats, regardless of feature size.

### 3.9 Bearing Surface Perpendicularity

Bearing surface shall be flat and perpendicular to the axis of the threaded hole within the specified full indicator measurement (FIM) limit indicated in the tables.

### 3.10 Threads

**3.10.1 Thread Class.** Threads shall be Unified Standard, Class 2B, of the series specified in the notes on respective dimensional tables, in accordance with ASME B1.1. Class 3B may be specified by the purchaser if designated at the time of inquiry and order.

**3.10.2 Thread Gaging.** Unless otherwise specified by the purchaser, gaging for screw thread dimensional acceptability shall be in accordance with Gaging System 21 as specified in ASME B1.3, Screw Thread Gaging Systems for Dimensional Acceptability.

### 3.11 Material

Unless otherwise specified by the purchaser or elsewhere in this Standard, chemical and mechanical properties of steel nuts shall conform to Grade A of ASTM A 563, Carbon and Alloy Steel Nuts or Grade 2 (square nuts only) of SAE J995. Nuts of other materials such as corrosion resistant (stainless) steel, brass, bronze, and aluminum alloys shall have properties as agreed upon between the manufacturer and purchaser. Refer to ASTM F 594 for information on corrosion resistant alloy steel requirements and ASTM F 467 for information on nonferrous materials.

### 3.12 Finish

Unless otherwise specified, nuts shall be supplied with a natural (as-processed) finish, unplated or uncoated. If electroplated finishes are required, reference ASTM F 1941. Other finishes may be specified as indicated in the applicable mechanical and performance standards.

### 3.13 Designation

**3.13.1** Nuts shall be designated by the following data in the sequence shown: product name; dimensional standard, nominal size (fraction or decimal); threads per inch; mechanical and performance standard, and grade protective finish (including specification and thickness), if required.

EXAMPLES:

- (1) Square Nut, ASME B18.2.2,  $\frac{1}{2}$ -13, ASTM A 563 Grade A, Zinc Plated per ASTM F 1941 Fe/Zn 3A
- (2) Hex Nut, ASME B18.2.2,  $\frac{3}{4}$ -16, SAE J995 Grade 5, Steel
- (3) Hex Thick Slotted Nut, ASME B18.2.2, 1.000-8, ASTM F 594 (Alloy Group 1) Corrosion Resistant Steel

**3.13.2** For part identification numbers (PIN), refer to ASME B18.24. For machine screw nut PINS, use the

AEN24 and AEN25 family types under ASME B18.6.3 until ASME B18.24 is revised to list the types covered in this Standard.

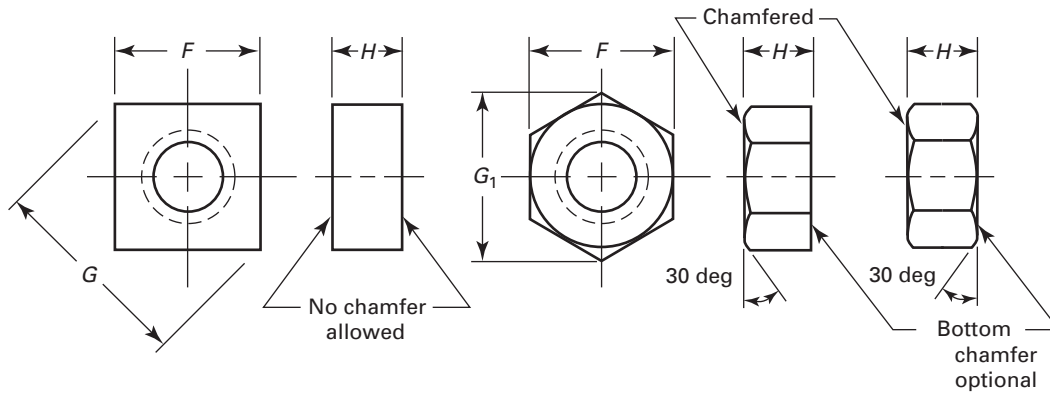
### 3.14 Grade and Manufacturer's Identification Marking

Grade and manufacturer's markings shall be applied as required by the applicable mechanical and performance standard except that markings are not required for the machine screw nuts per Tables 1-1 and 1-2.

### 3.15 Inspection and Quality Assurance

Unless otherwise specified, product quality shall be determined according to ASME B18.18.2.

**Table 1-1 Dimensions of Square and Hex Machine Screw Nuts**



**Machine Screw Nuts [Note (1)]**

Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i>			Width Across Corners				Thickness		Bearing Surface Runout to Thread Axis, FIM
		Basic	Min.	Max.	Square, <i>G</i>		Hex, <i>G</i> <sub>1</sub>		Min.	Max.	
					Min.	Max.	Min.	Max.			
0	0.060	<sup>5</sup> / <sub>32</sub>	0.150	0.156	0.206	0.221	0.171	0.180	0.043	0.050	0.005
1	0.073	<sup>5</sup> / <sub>32</sub>	0.150	0.156	0.206	0.221	0.171	0.180	0.043	0.050	0.005
2	0.086	<sup>3</sup> / <sub>16</sub>	0.180	0.188	0.247	0.265	0.205	0.217	0.057	0.066	0.006
3	0.099	<sup>3</sup> / <sub>16</sub>	0.180	0.188	0.247	0.265	0.205	0.217	0.057	0.066	0.006
4	0.112	<sup>1</sup> / <sub>4</sub>	0.241	0.250	0.331	0.354	0.275	0.289	0.087	0.098	0.009
5	0.125	<sup>5</sup> / <sub>16</sub>	0.302	0.312	0.415	0.442	0.344	0.361	0.102	0.114	0.011
6	0.138	<sup>5</sup> / <sub>16</sub>	0.302	0.312	0.415	0.442	0.344	0.361	0.102	0.114	0.011
8	0.164	<sup>11</sup> / <sub>32</sub>	0.332	0.344	0.456	0.486	0.378	0.397	0.117	0.130	0.012
10	0.190	<sup>3</sup> / <sub>8</sub>	0.362	0.375	0.497	0.53	0.413	0.433	0.117	0.130	0.013
12	0.216	<sup>7</sup> / <sub>16</sub>	0.423	0.438	0.581	0.619	0.482	0.505	0.148	0.161	0.015
<sup>1</sup> / <sub>4</sub>	0.250	<sup>7</sup> / <sub>16</sub>	0.423	0.438	0.581	0.619	0.482	0.505	0.178	0.193	0.015
<sup>5</sup> / <sub>16</sub>	0.312	<sup>9</sup> / <sub>16</sub>	0.545	0.562	0.748	0.795	0.621	0.65	0.208	0.225	0.020
<sup>3</sup> / <sub>8</sub>	0.375	<sup>5</sup> / <sub>8</sub>	0.607	0.625	0.833	0.884	0.692	0.722	0.239	0.257	0.021

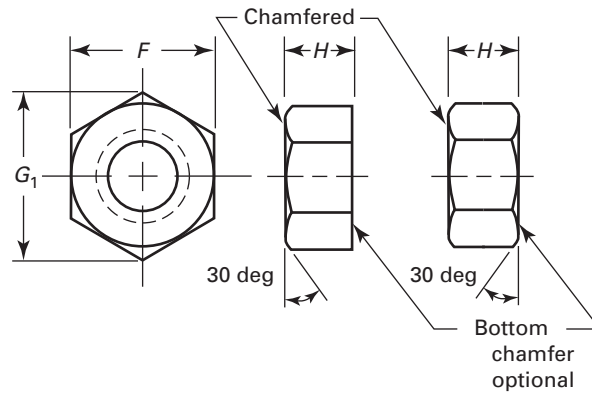
**GENERAL NOTES:**

- (a) For additional requirements refer to section 3, General Data.
- (b) *Material.* Unless otherwise specified, machine screw nuts shall be made of carbon steel.
- (c) *Mechanical Property Requirements.* Unless the purchaser specifies otherwise in the inquiry and purchase documents, machine screw nuts have no mechanical requirements.

**NOTE:**

- (1) As shown in the figure, no countersink is required.

**Table 1-2 Dimensions of Small Pattern Hex Machine Screw Nuts**



**Note (1)**

Nominal Size	Basic Major Diameter of Thread	Width Across Flats, $F$			Width Across Corners		Thickness		Bearing Surface Runout to Thread Axis, FIM
		Basic	Min.	Max.	Hex, $G_1$		Min.	Max.	
					Min.	Max.			
0	0.060	$\frac{1}{8}$	0.121	0.125	0.134	0.140	0.043	0.050	0.005
1	0.073	$\frac{1}{8}$	0.121	0.125	0.134	0.140	0.043	0.050	0.005
2	0.086	$\frac{5}{32}$	0.150	0.156	0.171	0.180	0.057	0.066	0.006
3	0.099	$\frac{5}{32}$	0.150	0.156	0.171	0.180	0.057	0.066	0.006
4	0.112	$\frac{3}{16}$	0.180	0.188	0.205	0.217	0.087	0.098	0.009
5	0.125	$\frac{1}{4}$	0.241	0.25	0.275	0.289	0.102	0.114	0.011
6	0.138	$\frac{5}{16}$	0.302	0.312	0.344	0.361	0.102	0.114	0.011
8	0.164	$\frac{11}{32}$	0.332	0.344	0.378	0.397	0.117	0.13	0.012
10	0.19	$\frac{3}{8}$	0.362	0.375	0.413	0.433	0.117	0.13	0.013

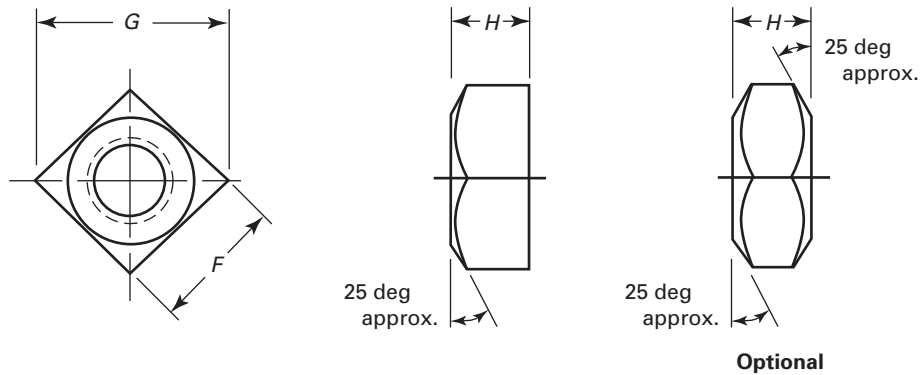
**GENERAL NOTES:**

- (a) For additional requirements refer to section 3, General Data.
- (b) *Material.* Unless otherwise specified, machine screw nuts shall be made of carbon steel.
- (c) *Mechanical Property Requirements.* Unless the purchaser specifies otherwise in the inquiry and purchase documents, machine screw nuts have no mechanical requirements.

**NOTE:**

- (1) As shown in the figure, no countersink is required.

**Table 2 Dimensions of Square Nuts**



**Note (1)**

Nominal Size	Basic Major Diameter of Thread	Width Across Flats, $F$ [Note (2)]			Width Across Corners, $G$		Thickness			Bearing Surface Runout to Thread Axis, FIM
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	
$\frac{1}{4}$	0.2500	$\frac{7}{16}$	0.425	0.438	0.554	0.619	$\frac{7}{32}$	0.203	0.235	0.011
$\frac{5}{16}$	0.3125	$\frac{9}{16}$	0.547	0.562	0.721	0.795	$\frac{17}{64}$	0.249	0.283	0.015
$\frac{3}{8}$	0.3750	$\frac{5}{8}$	0.606	0.625	0.802	0.884	$\frac{21}{64}$	0.310	0.346	0.016
$\frac{7}{16}$	0.4375	$\frac{3}{4}$	0.728	0.750	0.970	1.061	$\frac{3}{8}$	0.356	0.394	0.019
$\frac{1}{2}$	0.5000	$\frac{13}{16}$	0.788	0.812	1.052	1.149	$\frac{7}{16}$	0.418	0.458	0.022
$\frac{5}{8}$	0.6250	1	0.969	1.000	1.300	1.414	$\frac{35}{64}$	0.525	0.569	0.026
$\frac{3}{4}$	0.7500	$1\frac{1}{8}$	1.088	1.125	1.464	1.591	$\frac{21}{32}$	0.632	0.680	0.029
$\frac{7}{8}$	0.8750	$1\frac{5}{16}$	1.269	1.312	1.712	1.856	$\frac{49}{64}$	0.740	0.792	0.034
1	1.0000	$1\frac{1}{2}$	1.450	1.500	1.961	2.121	$\frac{7}{8}$	0.847	0.903	0.039
$1\frac{1}{8}$	1.1250	$1\frac{11}{16}$	1.631	1.688	2.209	2.386	1	0.970	1.030	0.029
$1\frac{1}{4}$	1.2500	$1\frac{7}{8}$	1.812	1.875	2.458	2.652	$1\frac{3}{32}$	1.062	1.126	0.032
$1\frac{3}{8}$	1.3750	$2\frac{1}{16}$	1.994	2.062	2.708	2.917	$1\frac{13}{64}$	1.169	1.237	0.035
$1\frac{1}{2}$	1.5000	$2\frac{1}{4}$	2.175	2.250	2.956	3.182	$1\frac{5}{16}$	1.276	1.348	0.039

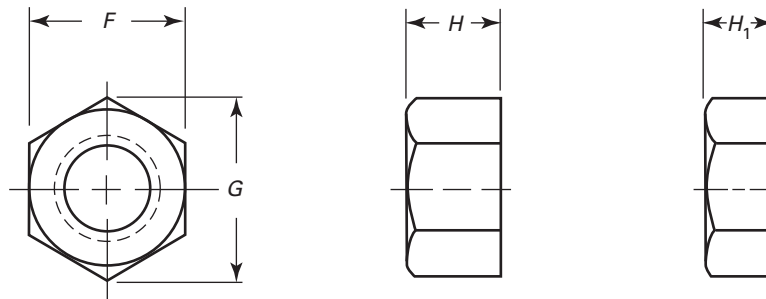
GENERAL NOTE: For additional requirements, refer to section 3, General Data.

NOTES:

- (1) See para. 3.1.
- (2) As shown in the figure, no countersink is required.



**Table 3 Dimensions of Hex Flat Nuts and Hex Flat Jam Nuts**



**Note (1)**

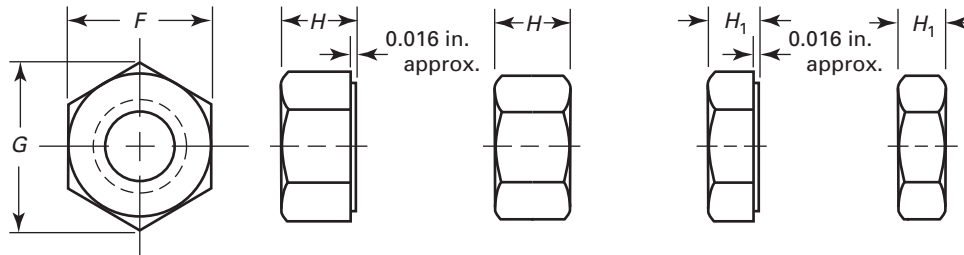
Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i> [Note (2)]			Width Across Corners, <i>G</i> [Note (3)]		Thickness Hex Flat Nuts, <i>H</i>			Thickness Hex Flat Jam Nuts, <i>H</i> <sub>1</sub>			Bearing Surface Runout to Thread Axis, FIM
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Basic	Min.	Max.	
1 <sup>1</sup> / <sub>8</sub>	1.1250	1 <sup>11</sup> / <sub>16</sub>	1.631	1.688	1.859	1.949	1	0.970	1.030	5 <sup>5</sup> / <sub>8</sub>	0.595	0.655	0.029
1 <sup>1</sup> / <sub>4</sub>	1.2500	1 <sup>7</sup> / <sub>8</sub>	1.812	1.875	2.066	2.165	1 <sup>3</sup> / <sub>32</sub>	1.062	1.126	3 <sup>3</sup> / <sub>4</sub>	0.718	0.782	0.032
1 <sup>3</sup> / <sub>8</sub>	1.3750	2 <sup>1</sup> / <sub>16</sub>	1.994	2.062	2.273	2.382	1 <sup>13</sup> / <sub>64</sub>	1.169	1.237	1 <sup>13</sup> / <sub>16</sub>	0.778	0.846	0.035
1 <sup>1</sup> / <sub>2</sub>	1.5000	2 <sup>1</sup> / <sub>4</sub>	2.175	2.250	2.480	2.598	1 <sup>5</sup> / <sub>16</sub>	1.276	1.348	7 <sup>7</sup> / <sub>8</sub>	0.839	0.911	0.039

GENERAL NOTE: For additional requirements, refer to section 3, General Data.

NOTES:

- (1) As shown in the figure, no countersink is required.
- (2) See para. 3.1.
- (3) See para. 3.2.

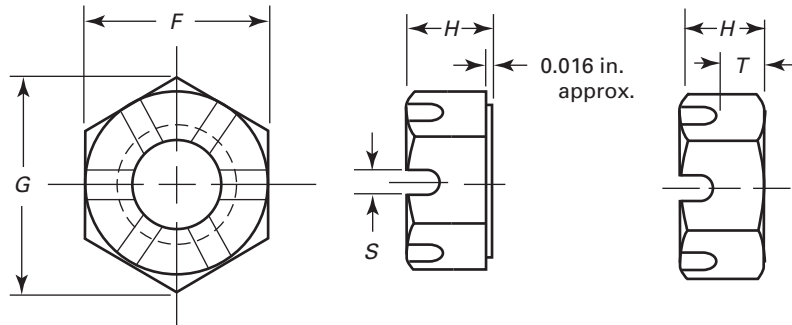
**Table 4 Dimensions of Hex Nuts and Hex Jam Nuts**



Nominal Size	Basic Major Diameter of Thread	Width Across Flats, F		Width Across Corners, G		Thickness Hex Nuts, H		Thickness Jam Nuts, H <sub>1</sub>		Maximum Runout of Bearing Surface to Thread Axis, FIM		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Hex Nuts		Hex Jam Nuts
										Specified Proof Load		
										Up to 150,000 psi	150,000 psi and Greater	
1/4	0.2500	0.428	0.438	0.488	0.505	0.212	0.226	0.150	0.163	0.015	0.010	0.015
5/16	0.3125	0.489	0.500	0.557	0.577	0.258	0.273	0.180	0.195	0.016	0.011	0.016
3/8	0.3750	0.551	0.563	0.628	0.650	0.320	0.337	0.210	0.227	0.017	0.012	0.017
7/16	0.4375	0.675	0.688	0.768	0.794	0.365	0.385	0.240	0.260	0.018	0.013	0.018
1/2	0.5000	0.736	0.750	0.840	0.866	0.427	0.448	0.302	0.323	0.019	0.014	0.019
9/16	0.5625	0.861	0.875	0.982	1.010	0.473	0.496	0.301	0.324	0.020	0.015	0.020
5/8	0.6250	0.922	0.938	1.051	1.083	0.535	0.559	0.363	0.387	0.021	0.016	0.021
3/4	0.7500	1.088	1.125	1.240	1.299	0.617	0.665	0.398	0.446	0.023	0.018	0.023
7/8	0.8750	1.269	1.312	1.447	1.516	0.724	0.776	0.458	0.510	0.025	0.020	0.025
1	1.0000	1.450	1.500	1.653	1.732	0.831	0.887	0.519	0.575	0.027	0.022	0.027
1 1/8	1.1250	1.631	1.688	1.859	1.949	0.939	0.999	0.579	0.639	0.030	0.025	0.030
1 1/4	1.2500	1.812	1.875	2.066	2.165	1.030	1.094	0.687	0.751	0.033	0.028	0.033
1 3/8	1.3750	1.994	2.062	2.273	2.382	1.138	1.206	0.747	0.815	0.036	0.031	0.036
1 1/2	1.5000	2.175	2.250	2.480	2.598	1.245	1.317	0.808	0.880	0.039	0.034	0.039
1 5/8	1.6250	2.35	2.43	2.679	2.805	1.364	1.416	0.868	0.944	0.044	0.038	0.044
1 3/4	1.7500	2.538	2.625	2.893	3.031	1.460	1.540	0.929	1.009	0.048	0.041	0.048
1 7/8	1.8750	2.722	2.813	3.103	3.247	1.567	1.651	0.989	1.073	0.051	0.044	0.051
2	2.0000	2.900	3.000	3.306	3.464	1.675	1.763	1.050	1.138	0.055	0.047	0.055
2 1/4	2.2500	3.263	3.375	3.719	3.897	1.890	1.986	1.155	1.267	0.061	0.052	0.061
2 1/2	2.5000	3.625	3.750	4.133	4.330	2.105	2.209	1.401	1.427	0.068	0.058	0.068
2 3/4	2.7500	3.988	4.125	4.546	4.763	2.319	2.431	1.522	1.556	0.074	0.064	0.074
3	3.0000	4.350	4.500	4.959	5.196	2.534	2.654	1.643	1.685	0.081	0.070	0.081
3 1/4	3.2500	4.713	4.875	5.373	5.629	2.749	2.877	1.748	1.814	0.087	0.075	0.087
3 1/2	3.5000	5.075	5.250	5.786	6.062	2.964	3.100	1.870	1.943	0.094	0.081	0.094
3 3/4	3.7500	5.438	5.625	6.199	6.495	3.178	3.322	1.990	2.072	0.100	0.087	0.100
4	4.0000	5.800	6.000	6.612	6.928	3.393	3.545	2.112	2.201	0.107	0.093	0.107

GENERAL NOTE: For additional requirements, refer to section 3, General Data.

**Table 5 Dimensions of Hex Slotted Nuts**



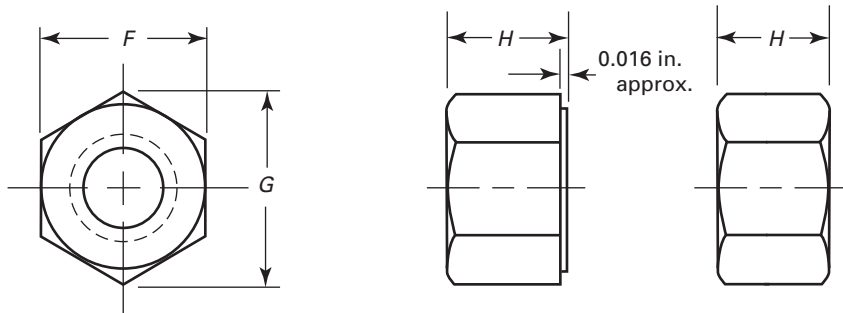
Nominal Size	Basic Major Diameter of Thread	Width Across Flats, $F$ [Note (1)]			Width Across Corners, $G$ [Note (2)]		Thickness, $H$			Unslotted Thickness, $T$ [Note (3)]		Width of Slot, $S$ [Note (3)]		Maximum Runout of Bearing Surface to Thread Axis, FIM [Note (4)]
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Min.	Max.	Min.	Max.	
$\frac{1}{4}$	0.2500	$\frac{7}{16}$	0.428	0.438	0.488	0.505	$\frac{7}{32}$	0.212	0.226	0.12	0.14	0.07	0.10	0.015
$\frac{5}{16}$	0.3125	$\frac{1}{2}$	0.489	0.500	0.557	0.577	$\frac{17}{64}$	0.258	0.273	0.16	0.18	0.09	0.12	0.016
$\frac{3}{8}$	0.3750	$\frac{9}{16}$	0.551	0.562	0.628	0.650	$\frac{21}{64}$	0.320	0.337	0.19	0.21	0.12	0.15	0.018
$\frac{7}{16}$	0.4375	$\frac{11}{16}$	0.675	0.688	0.768	0.794	$\frac{3}{8}$	0.365	0.385	0.21	0.23	0.12	0.15	0.018
$\frac{1}{2}$	0.5000	$\frac{3}{4}$	0.736	0.750	0.840	0.866	$\frac{7}{16}$	0.427	0.448	0.27	0.29	0.15	0.18	0.019
$\frac{9}{16}$	0.5625	$\frac{7}{8}$	0.861	0.875	0.982	1.010	$\frac{31}{64}$	0.473	0.496	0.29	0.31	0.15	0.18	0.020
$\frac{5}{8}$	0.6250	$\frac{15}{16}$	0.922	0.938	1.051	1.083	$\frac{35}{64}$	0.535	0.559	0.32	0.34	0.18	0.24	0.021
$\frac{3}{4}$	0.7500	$1\frac{1}{8}$	1.088	1.125	1.240	1.299	$\frac{41}{64}$	0.617	0.665	0.38	0.40	0.18	0.24	0.023
$\frac{7}{8}$	0.8750	$1\frac{5}{16}$	1.269	1.312	1.447	1.516	$\frac{3}{4}$	0.724	0.776	0.49	0.52	0.18	0.24	0.025
1	1.0000	$1\frac{1}{2}$	1.450	1.500	1.653	1.732	$\frac{55}{64}$	0.831	0.887	0.56	0.59	0.24	0.30	0.027
$1\frac{1}{8}$	1.1250	$1\frac{11}{16}$	1.631	1.688	1.859	1.949	$\frac{31}{32}$	0.939	0.999	0.61	0.64	0.24	0.33	0.030
$1\frac{1}{4}$	1.2500	$1\frac{7}{8}$	1.812	1.875	2.066	2.165	$1\frac{1}{16}$	1.030	1.094	0.67	0.70	0.31	0.40	0.033
$1\frac{3}{8}$	1.3750	$2\frac{1}{16}$	1.994	2.062	2.273	2.382	$1\frac{11}{64}$	1.138	1.206	0.78	0.82	0.31	0.40	0.036
$1\frac{1}{2}$	1.5000	$2\frac{1}{4}$	2.175	2.250	2.480	2.598	$1\frac{9}{32}$	1.245	1.317	0.82	0.86	0.37	0.46	0.039

GENERAL NOTE: For additional requirements, refer to section 3, General Data.

NOTES:

- (1) See para. 3.1.
- (2) See para. 3.2.
- (3) See para. 3.7.
- (4) See paras. 3.3 and 3.9.

**Table 6 Dimensions of Hex Thick Nuts**



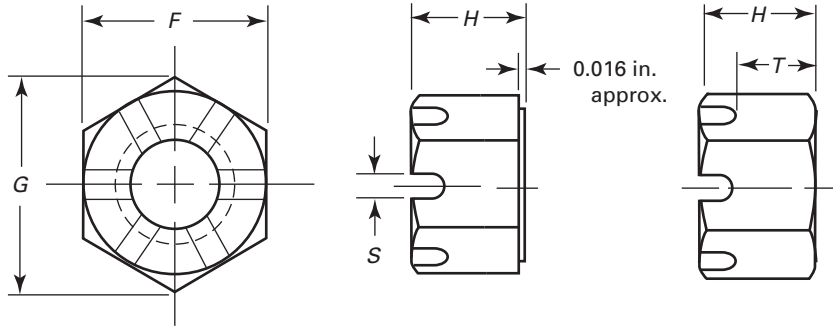
Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i> [Note (1)]			Width Across Corners, <i>G</i> [Note (2)]		Thickness, <i>H</i>			Maximum Runout of Bearing Surface to Thread Axis, <i>FIM</i> [Note (3)]	
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Specified Proof Load	
										Up to 150,000 psi	150,000 psi and Greater
1/4	0.2500	7/16	0.428	0.438	0.488	0.505	9/32	0.274	0.288	0.015	0.010
5/16	0.3125	1/2	0.489	0.500	0.557	0.577	21/64	0.320	0.336	0.016	0.011
3/8	0.3750	9/16	0.551	0.562	0.628	0.650	13/32	0.398	0.415	0.017	0.012
7/16	0.4375	11/16	0.675	0.688	0.768	0.794	29/64	0.444	0.463	0.018	0.013
1/2	0.5000	3/4	0.736	0.750	0.840	0.866	9/16	0.552	0.573	0.019	0.014
9/16	0.5625	7/8	0.861	0.875	0.892	1.010	39/64	0.598	0.621	0.020	0.015
5/8	0.6250	15/16	0.922	0.938	1.051	1.083	23/32	0.706	0.731	0.021	0.016
3/4	0.7500	1 1/8	1.088	1.125	1.240	1.299	13/16	0.798	0.827	0.023	0.018
7/8	0.8750	1 5/16	1.269	1.312	1.447	1.516	29/32	0.890	0.922	0.025	0.020
1	1.0000	1 1/2	1.450	1.500	1.653	1.732	1	0.982	1.018	0.027	0.022
1 1/8	1.1250	1 11/16	1.631	1.688	1.859	1.949	1 5/32	1.136	1.176	0.030	0.025
1 1/4	1.2500	1 7/8	1.812	1.875	2.066	2.165	1 1/4	1.228	1.272	0.033	0.028
1 3/8	1.3750	2 1/16	1.994	2.062	2.273	2.382	1 3/8	1.351	1.399	0.036	0.031
1 1/2	1.5000	2 1/4	2.175	2.250	2.480	2.598	1 1/2	1.474	1.526	0.039	0.034

GENERAL NOTE: For additional requirements, refer to section 3, General Data.

NOTES:

- (1) See para. 3.1.
- (2) See para. 3.2.
- (3) See paras. 3.3 and 3.9.

**Table 7 Dimensions of Hex Thick Slotted Nuts**



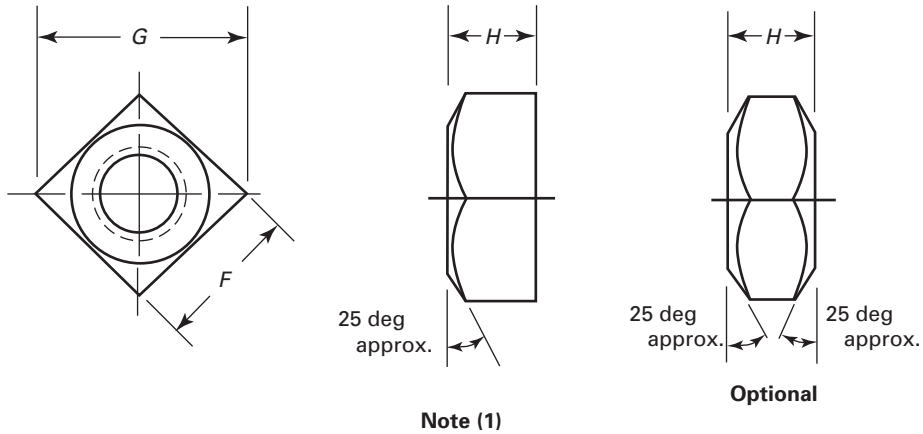
Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i> [Note (1)]			Width Across Corners, <i>G</i> [Note (2)]		Thickness, <i>H</i>			Unslotted Thickness, <i>T</i> [Note (3)]		Width of Slot, <i>S</i> [Note (3)]		Maximum Runout of Bearing Surface to Thread Axis, FIM [Note (4)]
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Min.	Max.	Min.	Max.	
1/4	0.2500	7/16	0.428	0.438	0.488	0.505	9/32	0.274	0.288	0.18	0.20	0.07	0.10	0.015
5/16	0.3125	1/2	0.489	0.500	0.557	0.577	21/64	0.320	0.336	0.22	0.24	0.09	0.12	0.016
3/8	0.3750	9/16	0.551	0.562	0.628	0.650	13/32	0.398	0.415	0.27	0.29	0.12	0.15	0.017
7/16	0.4375	11/16	0.675	0.688	0.768	0.794	29/64	0.444	0.463	0.29	0.31	0.12	0.15	0.018
1/2	0.5000	3/4	0.736	0.750	0.840	0.866	9/16	0.552	0.573	0.40	0.42	0.15	0.18	0.019
9/16	0.5625	7/8	0.861	0.875	0.982	1.010	39/64	0.598	0.621	0.41	0.43	0.15	0.18	0.020
5/8	0.6250	15/16	0.922	0.938	1.051	1.083	23/32	0.706	0.731	0.49	0.51	0.18	0.24	0.021
3/4	0.7500	1 1/8	1.088	1.125	1.240	1.299	13/16	0.798	0.827	0.55	0.57	0.18	0.24	0.023
7/8	0.8750	1 5/16	1.269	1.312	1.447	1.516	29/32	0.890	0.922	0.64	0.67	0.18	0.24	0.025
1	1.0000	1 1/2	1.450	1.500	1.653	1.732	1	0.982	1.018	0.70	0.73	0.24	0.30	0.027
1 1/8	1.1250	1 11/16	1.631	1.688	1.859	1.949	1 5/32	1.136	1.176	0.80	0.83	0.24	0.33	0.030
1 1/4	1.2500	1 7/8	1.812	1.875	2.066	2.165	1 1/4	1.228	1.272	0.86	0.89	0.31	0.40	0.033
1 3/8	1.3750	2 1/16	1.994	2.062	2.273	2.382	1 3/8	1.351	1.399	0.98	1.02	0.31	0.40	0.036
1 1/2	1.5000	2 1/4	2.175	2.250	2.480	2.598	1 1/2	1.474	1.526	1.04	1.08	0.37	0.46	0.039

GENERAL NOTE: For additional requirements, refer to section 3, General Data.

NOTES:

- (1) See para. 3.1.
- (2) See para. 3.2.
- (3) See para. 3.7.
- (4) See paras. 3.3 and 3.9.

**Table 8 Dimensions of Heavy Square Nuts**



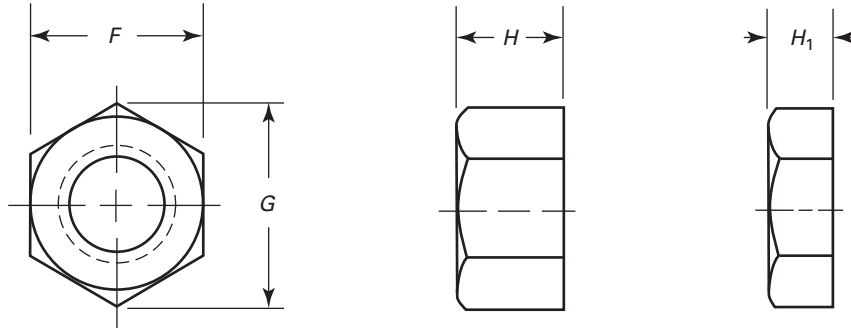
Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i> [Note (2)]			Width Across Corners, <i>G</i>		Thickness, <i>H</i>			Bearing Surface Runout to Thread Axis, FIM
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	
1/4	0.2500	1/2	0.488	0.500	0.640	0.707	1/4	0.218	0.266	0.026
5/16	0.3125	9/16	0.546	0.562	0.720	0.795	5/16	0.280	0.330	0.030
3/8	0.3750	11/16	0.669	0.688	0.889	0.973	3/8	0.341	0.393	0.036
7/16	0.4375	3/4	0.728	0.750	0.970	1.060	7/16	0.403	0.456	0.039
1/2	0.5000	7/8	0.850	0.875	1.137	1.237	1/2	0.464	0.520	0.046
5/8	0.6250	1 1/16	1.031	1.062	1.386	1.503	5/8	0.587	0.647	0.056
3/4	0.7500	1 1/4	1.212	1.250	1.635	1.768	3/4	0.710	0.774	0.065
7/8	0.8750	1 7/16	1.394	1.438	1.884	2.033	7/8	0.833	0.901	0.075
1	1.0000	1 5/8	1.575	1.625	2.132	2.298	1	0.956	1.028	0.082
1 1/8	1.1250	1 13/16	1.756	1.812	2.381	2.563	1 1/8	1.079	1.155	0.063
1 1/4	1.2500	2	1.938	2.000	2.631	2.828	1 1/4	1.187	1.282	0.070
1 3/8	1.3750	2 3/16	2.119	2.188	2.879	3.094	1 3/8	1.310	1.409	0.076
1 1/2	1.5000	2 3/8	2.300	2.375	3.128	3.359	1 1/2	1.433	1.536	0.082

GENERAL NOTE: For additional requirements, refer to section 3, General Data.

NOTES:

- (1) As shown in the figure, no countersink is required.
- (2) See para. 3.1.

**Table 9 Dimensions of Heavy Hex Flat Nuts and Heavy Hex Flat Jam Nuts**



Note (1)

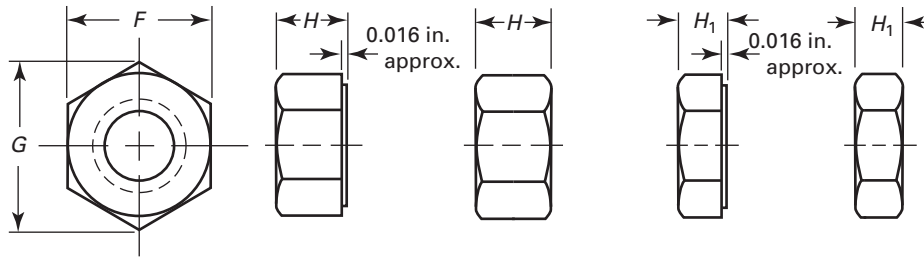
Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i> [Note (2)]			Width Across Corners, <i>G</i> [Note (3)]		Thickness Heavy Hex Flat Nuts, <i>H</i>			Thickness Heavy Hex Flat Jam Nuts, <i>H</i> <sub>1</sub>			Bearing Surface Runout to Thread Axis, FIM
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Basic	Min.	Max.	
1 <sup>1</sup> / <sub>8</sub>	1.1250	1 <sup>13</sup> / <sub>16</sub>	1.756	1.812	2.002	2.093	1 <sup>1</sup> / <sub>8</sub>	1.079	1.155	5 <sup>5</sup> / <sub>8</sub>	0.579	0.655	0.032
1 <sup>1</sup> / <sub>4</sub>	1.2500	2	1.938	2.000	2.209	2.309	1 <sup>1</sup> / <sub>4</sub>	1.187	1.282	3 <sup>3</sup> / <sub>4</sub>	0.687	0.782	0.034
1 <sup>3</sup> / <sub>8</sub>	1.3750	2 <sup>3</sup> / <sub>16</sub>	2.119	2.188	2.416	2.526	1 <sup>3</sup> / <sub>8</sub>	1.310	1.409	1 <sup>13</sup> / <sub>16</sub>	0.747	0.846	0.038
1 <sup>1</sup> / <sub>2</sub>	1.5000	2 <sup>7</sup> / <sub>8</sub>	2.300	2.375	2.622	2.742	1 <sup>1</sup> / <sub>2</sub>	1.433	1.536	7 <sup>7</sup> / <sub>8</sub>	0.808	0.911	0.041
1 <sup>3</sup> / <sub>4</sub>	1.7500	2 <sup>3</sup> / <sub>4</sub>	2.662	2.750	3.035	3.175	1 <sup>3</sup> / <sub>4</sub>	1.679	1.790	1	0.929	1.040	0.048
2	2.0000	3 <sup>1</sup> / <sub>8</sub>	3.025	3.125	3.449	3.608	2	1.925	2.044	1 <sup>1</sup> / <sub>8</sub>	1.050	1.169	0.054
2 <sup>1</sup> / <sub>4</sub>	2.2500	3 <sup>1</sup> / <sub>2</sub>	3.388	3.500	3.862	4.041	2 <sup>1</sup> / <sub>4</sub>	2.155	2.298	1 <sup>1</sup> / <sub>4</sub>	1.155	1.298	0.061
2 <sup>1</sup> / <sub>2</sub>	2.5000	3 <sup>7</sup> / <sub>8</sub>	3.750	3.875	4.275	4.474	2 <sup>1</sup> / <sub>2</sub>	2.401	2.552	1 <sup>1</sup> / <sub>2</sub>	1.401	1.552	0.067
2 <sup>3</sup> / <sub>4</sub>	2.7500	4 <sup>1</sup> / <sub>4</sub>	4.112	4.250	4.688	4.907	2 <sup>3</sup> / <sub>4</sub>	2.647	2.806	1 <sup>5</sup> / <sub>8</sub>	1.522	1.681	0.074
3	3.0000	4 <sup>5</sup> / <sub>8</sub>	4.475	4.625	5.102	5.340	3	2.893	3.060	1 <sup>3</sup> / <sub>4</sub>	1.643	1.810	0.080
3 <sup>1</sup> / <sub>4</sub>	3.2500	5	4.838	5.000	5.515	5.774	3 <sup>1</sup> / <sub>4</sub>	3.124	3.314	1 <sup>7</sup> / <sub>8</sub>	1.748	1.939	0.087
3 <sup>1</sup> / <sub>2</sub>	3.5000	5 <sup>3</sup> / <sub>8</sub>	5.200	5.375	5.928	6.207	3 <sup>1</sup> / <sub>2</sub>	3.370	3.568	2	1.870	2.068	0.093
3 <sup>3</sup> / <sub>4</sub>	3.7500	5 <sup>7</sup> / <sub>8</sub>	5.562	5.750	6.341	6.640	3 <sup>3</sup> / <sub>4</sub>	3.616	3.822	2 <sup>1</sup> / <sub>8</sub>	1.990	2.197	0.100
4	4.0000	6 <sup>1</sup> / <sub>8</sub>	5.925	6.125	6.755	7.073	4	3.862	4.076	2 <sup>1</sup> / <sub>4</sub>	2.112	2.326	1.06

GENERAL NOTE: For additional requirements, refer to section 3, General Data.

NOTES:

- (1) As shown in the figure, no countersink is required.
- (2) See para. 3.1.
- (3) See para. 3.2.

**Table 10 Dimensions of Heavy Hex Nuts and Heavy Hex Jam Nuts**



Nominal Size	Basic Major Diameter of Thread	Width Across Flats, F [Note (1)]					Width Across Corners, G [Note (2)]		Thickness Heavy Hex Nuts, H			Thickness Heavy Hex Jam Nuts, H <sub>1</sub>			Maximum Runout of Bearing Surface to Thread Axis, FIM [Note (3)]		
		Basic		Min.		Max.	Min.	Max.	Basic	Min.	Max.	Basic	Min.	Max.	Up to 150,000 psi	150,000 psi and Greater	All Strength Levels
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Basic	Min.	Max.	psi	psi	Strength Levels		
1/4	0.2500	1/2	0.488	0.500	0.556	0.577	15/64	0.218	0.250	11/64	0.156	0.188	0.017	0.011	0.017		
5/16	0.3125	9/16	0.546	0.562	0.622	0.650	19/64	0.280	0.314	13/64	0.186	0.220	0.020	0.012	0.020		
3/8	0.3750	11/16	0.669	0.688	0.763	0.794	23/64	0.341	0.377	15/64	0.216	0.252	0.021	0.014	0.021		
7/16	0.4375	3/4	0.728	0.750	0.830	0.866	27/64	0.403	0.441	17/64	0.247	0.285	0.022	0.015	0.022		
1/2	0.5000	7/8	0.850	0.875	0.969	1.010	31/64	0.464	0.504	19/64	0.277	0.317	0.023	0.016	0.023		
9/16	0.5625	15/16	0.909	0.938	1.037	1.083	35/64	0.526	0.568	21/64	0.307	0.349	0.024	0.017	0.024		
5/8	0.6250	1 1/16	1.031	1.062	1.175	1.227	39/64	0.587	0.631	23/64	0.337	0.381	0.025	0.018	0.025		
3/4	0.7500	1 1/4	1.212	1.250	1.382	1.443	47/64	0.710	0.758	27/64	0.398	0.446	0.027	0.020	0.027		
7/8	0.8750	1 7/16	1.394	1.438	1.589	1.660	55/64	0.833	0.885	31/64	0.458	0.510	0.029	0.022	0.029		
1	1.0000	1 1/2	1.575	1.625	1.796	1.876	63/64	0.956	1.012	35/64	0.519	0.575	0.031	0.024	0.031		
1 1/8	1.1250	1 13/16	1.756	1.812	2.002	2.093	1 7/64	1.079	1.139	39/64	0.579	0.639	0.033	0.027	0.033		
1 1/4	1.2500	2	1.938	2.000	2.209	2.309	1 7/32	1.187	1.251	23/32	0.687	0.751	0.035	0.030	0.035		
1 3/8	1.3750	2 3/16	2.119	2.188	2.416	2.526	1 11/32	1.310	1.378	25/32	0.747	0.815	0.038	0.033	0.038		
1 1/2	1.5000	2 7/8	2.300	2.375	2.622	2.742	1 15/32	1.433	1.505	27/32	0.808	0.880	0.041	0.036	0.041		
1 5/8	1.6250	2 9/16	2.481	2.562	2.828	2.959	1 19/32	1.556	1.632	29/32	0.868	0.944	0.044	0.038	0.044		
1 3/4	1.7500	2 3/4	2.662	2.750	3.035	3.175	1 23/32	1.679	1.759	31/32	0.929	1.009	0.048	0.041	0.048		
1 7/8	1.8750	2 15/16	2.844	2.938	3.242	3.392	1 27/32	1.802	1.886	1 1/32	0.989	1.073	0.051	0.044	0.051		
2	2.0000	3 1/8	3.025	3.125	3.449	3.608	1 31/32	1.925	2.013	1 3/32	1.050	1.138	0.055	0.047	0.055		
2 1/4	2.2500	3 1/2	3.388	3.500	3.862	4.041	2 13/64	2.155	2.251	1 13/64	1.155	1.251	0.061	0.052	0.061		
2 1/2	2.5000	3 7/8	3.750	3.875	4.275	4.474	2 29/64	2.401	2.505	1 29/64	1.401	1.505	0.068	0.058	0.068		
2 3/4	2.7500	4 1/4	4.112	4.250	4.688	4.907	2 45/64	2.647	2.759	1 37/64	1.522	1.634	0.074	0.064	0.074		
3	3.0000	4 7/8	4.475	4.625	5.102	5.340	2 61/64	2.893	3.013	1 45/64	1.643	1.763	0.081	0.070	0.081		
3 1/4	3.2500	5	4.838	5.000	5.515	5.774	3 3/16	3.124	3.252	1 13/16	1.748	1.876	0.087	0.075	0.087		
3 1/2	3.5000	5 3/8	5.200	5.375	5.928	6.207	3 7/16	3.370	3.506	1 15/16	1.870	2.006	0.094	0.081	0.094		
3 3/4	3.7500	5 3/4	5.562	5.750	6.341	6.640	3 11/16	3.616	3.760	2 1/16	1.990	2.134	0.100	0.087	0.100		
4	4.0000	6 1/8	5.925	6.125	6.755	7.073	3 15/16	3.862	4.014	2 3/16	2.112	2.264	0.107	0.093	0.107		

**GENERAL NOTES:**

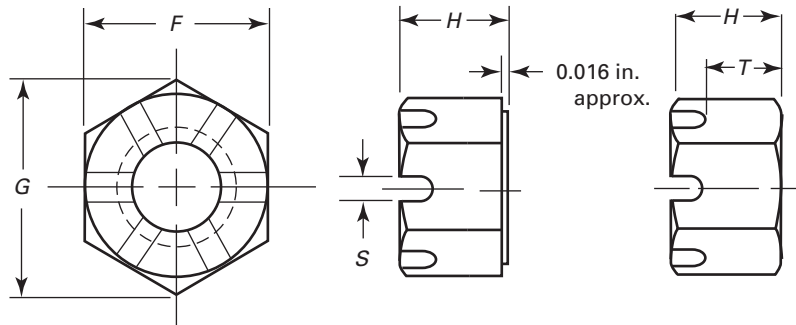
- (a) For additional requirements refer to section 3, General Data.
- (b) *Chamfers and Washer Faces.* Nuts in sizes 7/16 in. nominal size and smaller shall be double-chamfered. Larger size nuts shall be double-chamfered or have washer-faced bearing surface and chamfered top.
- (c) *Optional Bearing Surface Runout.* Where purchaser specifies close runout of bearing face style heavy hex or heavy hex jam nuts in nominal sizes 2 in. to 4 in., nuts shall be so processed as to have a maximum bearing face runout of 0.010 in. FIM.

**NOTES:**

- (1) See para. 3.1.
- (2) See para. 3.2.
- (3) See paras. 3.3 and 3.9.



**Table 11 Dimensions of Heavy Hex Slotted Nuts**



Nominal Size	Basic Major Diameter of Thread	Width Across Flats, F [Note (1)]			Width Across Corners, G [Note (2)]		Thickness, H			Unslotted Thickness, T [Note (3)]		Width of Slot, S [Note (3)]		Maximum Runout of Bearing Surface to Thread Axis, FIM [Note (4)]
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.	Min.	Max.	Min.	Max.	
1/4	0.2500	1/2	0.488	0.500	0.556	0.577	15/64	0.218	0.250	0.13	0.15	0.07	0.10	0.017
5/16	0.3125	9/16	0.546	0.562	0.622	0.650	19/64	0.280	0.314	0.19	0.21	0.09	0.12	0.020
3/8	0.3750	11/16	0.669	0.688	0.763	0.794	23/64	0.341	0.377	0.22	0.24	0.12	0.15	0.021
7/16	0.4375	3/4	0.728	0.750	0.830	0.866	27/64	0.403	0.441	0.26	0.28	0.12	0.15	0.022
1/2	0.5000	7/8	0.850	0.875	0.969	1.010	31/64	0.464	0.504	0.32	0.34	0.15	0.18	0.023
9/16	0.5625	15/16	0.909	0.938	1.037	1.083	35/64	0.526	0.568	0.35	0.37	0.15	0.18	0.024
5/8	0.6250	1 1/16	1.031	1.062	1.175	1.227	39/64	0.587	0.631	0.38	0.40	0.18	0.24	0.025
3/4	0.7500	1 1/4	1.212	1.250	1.382	1.443	47/64	0.710	0.758	0.47	0.49	0.18	0.24	0.027
7/8	0.8750	1 7/16	1.394	1.438	1.589	1.660	55/64	0.833	0.885	0.59	0.62	0.18	0.24	0.029
1	1.0000	1 3/8	1.575	1.625	1.796	1.876	63/64	0.956	1.012	0.69	0.72	0.24	0.30	0.031
1 1/8	1.1250	1 13/16	1.756	1.812	2.002	2.093	1 7/64	1.079	1.139	0.75	0.78	0.24	0.33	0.033
1 1/4	1.2500	2	1.938	2.000	2.209	2.309	1 7/32	1.187	1.251	0.83	0.86	0.31	0.40	0.035
1 3/8	1.3750	2 3/16	2.119	2.188	2.416	2.526	1 11/32	1.310	1.378	0.95	0.99	0.31	0.40	0.038
1 1/2	1.5000	2 3/8	2.300	2.375	2.622	2.742	1 15/32	1.433	1.505	1.01	1.05	0.37	0.46	0.041
1 3/4	1.7500	2 3/4	2.662	2.750	3.035	3.175	1 23/32	1.679	1.759	1.20	1.24	0.43	0.52	0.048
2	2.0000	3 1/8	3.025	3.125	3.449	3.608	1 31/32	1.925	2.013	1.38	1.43	0.43	0.52	0.055
2 1/4	2.2500	3 1/2	3.388	3.500	3.862	4.041	2 13/64	2.155	2.251	1.62	1.67	0.43	0.52	0.061
2 1/2	2.5000	3 7/8	3.750	3.875	4.275	4.474	2 29/64	2.401	2.505	1.74	1.79	0.55	0.64	0.068
2 3/4	2.7500	4 1/4	4.112	4.250	4.688	4.907	2 45/64	2.647	2.759	1.99	2.05	0.55	0.64	0.074
3	3.0000	4 7/8	4.475	4.625	5.102	5.340	2 61/64	2.893	3.013	2.17	2.23	0.62	0.71	0.081
3 1/4	3.2500	5	4.838	5.000	5.515	5.774	3 3/16	3.124	3.252	2.41	2.47	0.62	0.71	0.087
3 1/2	3.5000	5 3/8	5.200	5.375	5.928	6.207	3 7/16	3.370	3.506	2.65	2.72	0.62	0.71	0.094
3 3/4	3.7500	5 3/4	5.562	5.750	6.341	6.640	3 11/16	3.616	3.760	2.90	2.97	0.62	0.71	0.100
4	4.0000	6 1/8	5.925	6.125	6.755	7.073	3 15/16	3.862	4.014	3.15	3.22	0.62	0.71	0.107

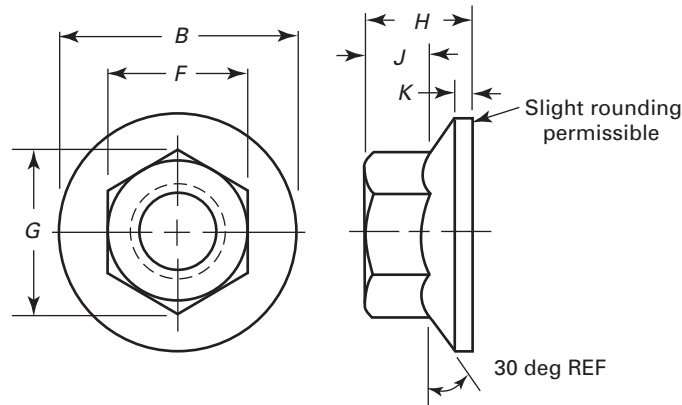
**GENERAL NOTES:**

- (a) For additional requirements, refer to section 3, General Data.
- (b) *Chamfers and Washer Faces.* Nuts in sizes 7/16 in. nominal size and smaller shall be double-chamfered. Larger size nuts shall be double-chamfered or have washer-faced bearing surface and chamfered top.

**NOTES:**

- (1) See para. 3.1.
- (2) See para. 3.2.
- (3) See para. 3.7.
- (4) See paras. 3.3 and 3.9.

**Table 12 Dimensions of Hex Flange Nuts and Large Hex Flange Nuts**

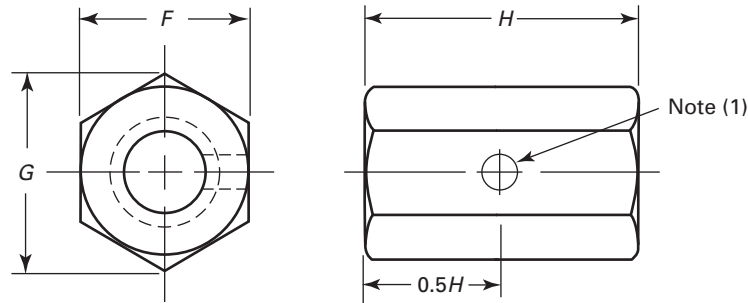


Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i>		Width Across Corners, <i>G</i>		Diameter Flange, <i>B</i>		Nut Thickness, <i>H</i>		Minimum Wrenching Length, <i>J</i>	Minimum Flange Thickness, <i>K</i>	Maximum Runout of Bearing Surface to Thread Axis, FIM
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.			
<b>Hex Flange Nuts</b>												
No. 6	0.1380	0.302	0.312	0.342	0.361	0.406	0.422	0.156	0.171	0.10	0.02	0.014
8	0.1640	0.334	0.344	0.381	0.397	0.452	0.469	0.187	0.203	0.13	0.02	0.016
10	0.1900	0.365	0.375	0.416	0.433	0.480	0.500	0.203	0.219	0.13	0.03	0.017
12	0.2160	0.428	0.438	0.488	0.505	0.574	0.594	0.222	0.236	0.14	0.04	0.020
1/4	0.2500	0.428	0.438	0.488	0.505	0.574	0.594	0.222	0.236	0.14	0.04	0.020
5/16	0.3125	0.489	0.500	0.557	0.577	0.660	0.680	0.268	0.283	0.17	0.04	0.023
3/8	0.3750	0.551	0.562	0.628	0.650	0.728	0.750	0.330	0.347	0.23	0.04	0.025
7/16	0.4375	0.675	0.688	0.768	0.794	0.910	0.937	0.375	0.395	0.26	0.04	0.032
1/2	0.5000	0.736	0.750	0.840	0.866	1.000	1.031	0.437	0.458	0.31	0.05	0.035
9/16	0.5625	0.861	0.875	0.982	1.010	1.155	1.188	0.483	0.506	0.35	0.05	0.040
5/8	0.6250	0.922	0.938	1.051	1.083	1.248	1.281	0.545	0.569	0.40	0.05	0.044
3/4	0.7500	1.088	1.125	1.240	1.299	1.460	1.500	0.627	0.675	0.46	0.06	0.051
<b>Large Hex Flange Nuts</b>												
1/4	0.2500	0.428	0.438	0.488	0.505	0.700	0.728	0.281	0.312	0.15	0.04	0.024
5/16	0.3125	0.489	0.500	0.557	0.577	0.790	0.820	0.343	0.375	0.20	0.04	0.028
3/8	0.3750	0.551	0.562	0.628	0.650	0.885	0.915	0.390	0.406	0.24	0.04	0.031
7/16	0.4375	0.675	0.688	0.768	0.794	1.100	1.131	0.437	0.468	0.26	0.04	0.038
1/2	0.5000	0.736	0.750	0.840	0.866	1.175	1.205	0.485	0.515	0.29	0.06	0.041
9/16	0.5625	0.861	0.875	0.982	1.010	1.260	1.300	0.546	0.578	0.37	0.06	0.044
5/8	0.6250	0.922	0.938	1.051	1.083	1.280	1.360	0.600	0.640	0.42	0.06	0.045

**GENERAL NOTES:**

- (a) For additional requirements refer to section 3, General Data.
- (b) *Concentricity of Tapped Hole.* Axis of tapped hole shall be concentric with axis of nut body within a tolerance equal to 3% (6% FIM) of the maximum width across flats.

**Table 13 Dimensions of Hex Coupling Nuts**



Nominal Size	Basic Major Diameter of Thread	Width Across Flats, <i>F</i>			Width Across Corners, <i>G</i>		Length, <i>H</i>		
		Basic	Min.	Max.	Min.	Max.	Basic	Min.	Max.
#6	0.138	5/16	0.302	0.312	0.344	0.361	1/2	0.470	0.510
#8	0.164	5/16	0.302	0.312	0.344	0.361	5/8	0.595	0.645
#10	0.190	5/16	0.302	0.312	0.344	0.361	3/4	0.711	0.760
1/4	0.250	7/16	0.428	0.438	0.488	0.505	1 1/4	1.690	1.760
5/16	0.312	1/2	0.489	0.500	0.557	0.577	1 3/4	1.690	1.760
3/8	0.375	9/16	0.551	0.562	0.628	0.650	1 3/4	1.690	1.760
7/16	0.437	5/8	0.607	0.625	0.692	0.722	1 3/4	1.690	1.760
1/2	0.500	11/16	0.663	0.688	0.756	0.794	1 3/4	1.690	1.760
9/16	0.562	13/16	0.782	0.813	0.891	0.939	2 1/8	2.067	2.135
5/8	0.625	13/16	0.782	0.813	0.891	0.939	2 1/8	2.067	2.135
3/4	0.750	1	0.963	1.000	1.097	1.155	2 1/4	2.190	2.260
7/8	0.875	1 1/4	1.212	1.250	1.382	1.443	2 1/2	2.440	2.510
1	1.000	1 3/8	1.325	1.375	1.511	1.588	2 3/4	2.690	2.760
1 1/8	1.125	1 1/2	1.450	1.500	1.653	1.732	3	2.940	3.010
1 1/4	1.250	1 5/8	1.575	1.625	1.825	1.876	3	2.940	3.010
1 1/2	1.500	2	1.950	2.000	2.275	2.309	3 1/2	3.440	3.510
1 5/8	1.625	2 9/16	2.481	2.562	2.828	2.959	4 7/8	4.830	4.910
1 3/4	1.750	2 3/4	2.662	2.750	3.035	3.175	5 1/4	5.210	5.290
1 7/8	1.875	2 13/16	2.844	2.938	3.242	3.392	5 5/8	5.580	5.670
2	2.000	3 1/8	3.025	3.125	3.448	3.608	6	5.950	6.040
2 1/4	2.250	3 1/2	3.388	3.500	3.862	4.041	6 3/4	6.700	6.800
2 1/2	2.500	3 7/8	3.750	3.875	4.275	4.474	7 1/2	7.440	7.550
2 3/4	2.750	4 1/4	4.112	4.250	4.688	4.907	8 1/4	8.190	8.310
3	3.000	4 5/8	4.475	4.625	5.101	5.340	9	8.940	9.060
3 1/4	3.250	5	4.838	5.000	5.515	5.773	9 3/4	9.680	9.810
3 1/2	3.500	5 3/8	5.200	5.375	5.928	6.206	10 1/2	10.430	10.570
3 3/4	3.750	5 3/4	5.562	5.750	6.340	6.639	11 1/4	11.170	11.320
4	4.000	6 1/8	5.925	6.125	6.754	7.072	12	11.920	12.080
4 1/4	4.250	6 1/2	6.288	6.500	7.168	7.506	12 3/4	12.670	12.830
4 1/2	4.500	6 7/8	6.650	6.875	7.581	7.939	13 1/2	13.420	13.580
4 3/4	4.750	7 1/4	7.012	7.250	7.994	8.372	14 1/4	14.160	14.340
5	5.000	7 5/8	7.375	7.625	8.408	8.805	15	14.910	15.090
5 1/4	5.250	8	7.738	8.000	8.821	9.238	15 3/4	15.650	15.850
5 1/2	5.500	8 3/8	8.100	8.375	9.234	9.671	16 1/2	16.400	16.600
5 3/4	5.750	8 3/4	8.462	8.750	9.647	10.104	17 1/4	17.150	17.350
6	6.000	9 1/8	8.825	9.125	10.060	10.537	18	17.890	18.110

**Table 13 Dimensions of Hex Coupling Nuts (Cont'd)**

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## GENERAL NOTES:

- (a) For additional requirements, refer to section 3, General Data.
- (b) *Concentricity of Tapped Hole*. Axis of tapped hole shall be concentric with axis of nut body within a tolerance equal to 3% (6% FIM) of the maximum width across flats.
- (c) *Countersink*. Tapped hole may be countersunk on both faces.
- (d) When specified by the purchaser, different thread sizes or series shall be tapped into the nut from opposite ends with each thread extending to approximately  $0.5H$ . All other nut dimensions shall comply with Table 13 unless otherwise agreed to by the supplier and purchaser.
- (e) The dimensions in Table 13 are considered standard, but purchasers may specify across flats sizes and/or lengths that differ from this table.
- (f) Hex coupling nuts must conform to the proof load requirements of ASTM A 563, Grade A for heavy hex nuts.

## NOTE:

- (1) Nuts shall be furnished without a hole, unless specially ordered by the purchaser. In some applications it may be desirable to assure that the threaded parts joined by a coupling nut are each engaged to approximately one-half nut thickness. As a visual inspection aid, a hole drilled through one side of the nut is recommended. The hole should be located at mid-nut thickness, and have a diameter of 0.2 to 0.4 times nominal nut size for sizes  $2\frac{1}{2}$  in. and smaller, and 1 in. for sizes  $2\frac{3}{4}$  in. and larger.

## MANDATORY APPENDIX I

### SLOT GAGES AND GAGING FOR SLOTTED NUTS

The gages specified in Table I-1 shall be used to determine the acceptability of the alignment and bottom contours of the slots in slotted nuts in accordance with the following procedure.

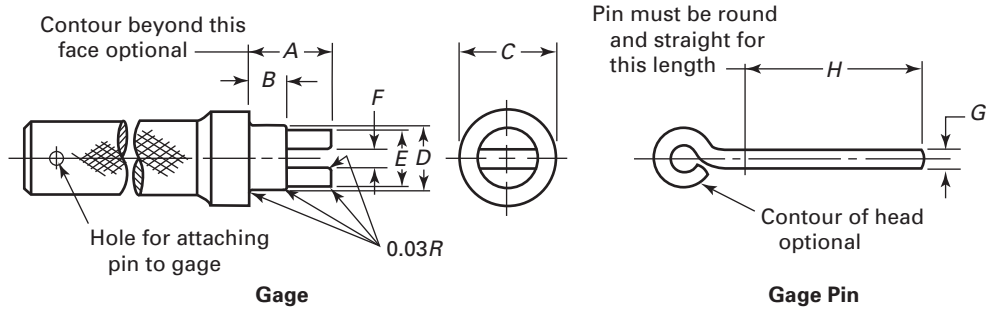
The gaging for slot alignment provides for equal variations in the location of the cotter pinhole in the bolt and the location of the slots in the nut.

To inspect the nut, the slotted end of the gage shall be inserted through the threaded hole from the bearing surface of the nut. The gage pin shall then be inserted into both the gage slot and the nut slots through three

adjacent faces of the nut, consecutively. Slot alignment shall be considered satisfactory if the gage pin fits into the slots without interference at all three gaging positions. The bottom contour shall be acceptable if the gage pin contacts the bottom surfaces of opposite slots during the alignment gaging at all three positions.

Some deviations from the specified gage plug diameters,  $D$ , may be necessary to compensate for variations in the nut thread minor diameter due to differences in manufacturing practices. To ensure adequate service life, gages and gage pins shall be suitably hardened.

**Table I-1 Dimensions of Slot Gages and Gage Pins**



Nominal Size	Basic Major Diameter of Thread	Minimum Gage Pilot Length, A	Maximum Gage Plug Length, B	Minimum Gage Face Diameter, C	Gage Plug Diameter, D [Note (1)]		Gage Pilot Diameter, E ±0.005	Gage Slot Width, F +0.002 -0.000	Gage Pin Diameter, G +0.000 -0.002	Minimum Gage Pin Length, H
					Coarse Thread	Fine Thread				
					+0.000 -0.001	+0.000 -0.001				
1/4	0.2500	0.288	0.110	0.375	0.196	0.211	0.181	0.065	0.065	1.00
5/16	0.3125	0.316	0.150	0.406	0.252	0.267	0.237	0.085	0.085	1.06
3/8	0.3750	0.415	0.180	0.500	0.307	0.330	0.292	0.115	0.115	1.19
7/16	0.4375	0.463	0.200	0.562	0.360	0.383	0.345	0.115	0.115	1.25
1/2	0.5000	0.573	0.260	0.625	0.417	0.446	0.402	0.145	0.145	1.38
9/16	0.5625	0.621	0.280	0.703	0.472	0.502	0.457	0.145	0.145	1.44
5/8	0.6250	0.731	0.310	0.781	0.527	0.565	0.512	0.175	0.175	1.56
3/4	0.7500	0.827	0.370	0.938	0.642	0.682	0.627	0.175	0.175	1.75
7/8	0.8750	0.922	0.480	1.109	0.755	0.798	0.740	0.175	0.175	1.94
1	1.0000	1.018	0.550	1.250	0.865	0.910	0.850	0.235	0.235	2.12
1 1/8	1.1250	1.176	0.600	1.406	0.970	1.035	0.955	0.235	0.235	2.31
1 1/4	1.2500	1.272	0.660	1.562	1.095	1.160	1.080	0.305	0.305	2.50
1 3/8	1.3750	1.399	0.770	1.718	1.195	1.285	1.180	0.305	0.305	2.69
1 1/2	1.5000	1.526	0.810	1.875	1.320	1.410	1.305	0.365	0.365	2.88
1 3/4	1.7500	1.759	1.190	2.188	1.534	...	1.519	0.425	0.425	3.25
2	2.0000	2.013	1.370	2.500	1.759	...	1.744	0.425	0.425	3.62
2 1/4	2.2500	2.251	1.610	2.818	2.009	...	1.994	0.425	0.425	4.00
2 1/2	2.5000	2.505	1.730	3.125	2.229	...	2.214	0.545	0.545	4.38
2 3/4	2.7500	2.759	1.980	3.438	2.479	...	2.464	0.545	0.545	4.75
3	3.0000	3.013	2.160	3.750	2.729	...	2.714	0.615	0.615	5.12
3 1/4	3.2500	3.252	2.400	4.062	2.979	...	2.964	0.615	0.615	5.50
3 1/2	3.5000	3.506	2.640	4.375	3.229	...	3.214	0.615	0.615	5.88
3 3/4	3.7500	3.760	2.890	4.688	3.479	...	3.464	0.615	0.615	6.25
4	4.0000	4.014	3.140	5.000	3.729	...	3.714	0.615	0.615	6.62

**NOTE:**

- (1) Diameters tabulated are equivalent to the minimum minor diameters of Class 2B threads. If the nuts are not threaded with unified coarse (UNC) or fine (UNF) threads, the diameter of gage shall be the same as the diameter of the GO thread plug gage for the bore.

## **NONMANDATORY APPENDIX A FORMULAS FOR NUT DIMENSIONS**

Table A-1 specifies formulas for various nut dimensions.

Table A-1 Formulas for Nut Dimensions

Nut Type	Nut Size	Width Across Flats		Nut Thickness		Width Across Corners	
		Basic [Note (1)]	Tolerance (Minus)	Basic [Note (2)]	Tolerance (Plus or Minus)	Limits, <i>G</i>	
						Min.	Max.
Square	$\frac{1}{4}$ to $\frac{5}{8}$	$F = 1.500D + 0.062$	$0.050D$	$H = 0.875D$	$0.016D + 0.012$	$1.373 \times (\text{Min. } F) - 0.030$	$1.4142 \times (\text{Max. } F)$
	$\frac{3}{4}$ to $1\frac{1}{2}$	$F = 1.500D$	$0.050D$	$H = 0.875D$	$0.016D + 0.012$	$1.373 \times (\text{Min. } F) - 0.030$	$1.4142 \times (\text{Max. } F)$
Hex Flat	$1\frac{1}{8}$ to $1\frac{1}{2}$	$F = 1.500D$	$0.050D$	$H = 0.875D$	$0.016D + 0.012$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
Hex Flat Jam	$1\frac{1}{8}$	$F = 1.500D$	$0.050D$	$H = 0.500D + 0.062$	$0.016D + 0.012$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$1\frac{1}{4}$ to $1\frac{1}{2}$	$F = 1.500D$	$0.050D$	$H = 0.500D + 0.125$	$0.016D + 0.012$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
Hex and Hex Slotted	$\frac{1}{4}$	$F = 1.500D + 0.062$	$0.015D + 0.006$	$H = 0.875D$	$0.015D + 0.003$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$\frac{5}{16}$ to $\frac{5}{8}$	$F = 1.500D$	$0.015D + 0.006$	$H = 0.875D$	$0.015D + 0.003$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$\frac{3}{4}$ to $1\frac{1}{8}$	$F = 1.500D$	$0.050D$	$H = 0.875D - 0.016$	$0.016D + 0.012$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$1\frac{1}{4}$ to $1\frac{1}{2}$	$F = 1.500D$	$0.050D$	$H = 0.875D - 0.031$	$0.016D + 0.012$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
Hex Jam	$\frac{1}{4}$	$F = 1.500D + 0.062$	$0.015D + 0.006$	$H = \text{See Table}$	$0.015D + 0.003$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$\frac{5}{16}$ to $\frac{5}{8}$	$F = 1.500D$	$0.015D + 0.006$	$H = \text{See Table}$	$0.015D + 0.003$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$\frac{3}{4}$ to $1\frac{1}{8}$	$F = 1.500D$	$0.050D$	$H = 0.500D + 0.047$	$0.016D + 0.012$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$1\frac{1}{4}$ to $1\frac{1}{2}$	$F = 1.500D$	$0.050D$	$H = 0.500D + 0.094$	$0.016D + 0.012$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
Hex Thick, and Hex Thick Slotted	$\frac{1}{4}$	$F = 1.500D + 0.062$	$0.015D + 0.006$	$H = \text{See Table}$	$0.015D + 0.003$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$\frac{5}{16}$ to $\frac{5}{8}$	$F = 1.500D$	$0.015D + 0.006$	$H = \text{See Table}$	$0.015D + 0.003$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$\frac{3}{4}$ to $1\frac{1}{2}$	$F = 1.500D$	$0.050D$	$H = \text{See Table}$	$0.015D + 0.003$	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
Heavy Square	$\frac{1}{4}$ to $1\frac{1}{2}$	$F = 1.500D + 0.125$	$0.050D$	$H = 1.000D$	$0.016D + 0.012$ [Note (3)]	$1.373 \times (\text{Min. } F) - 0.030$	$1.4142 \times (\text{Max. } F)$
Heavy Hex Flat	$1\frac{1}{8}$ to 4	$F = 1.500D + 0.125$	$0.050D$	$H = 1.000D$	$0.016D + 0.012$ [Note (3)]	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
Heavy Hex Flat Jam	$\frac{1}{4}$ to $1\frac{1}{8}$	$F = 1.500D + 0.125$	$0.050D$	$H = 0.500D + 0.062$	$0.016D + 0.012$ [Note (4)]	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$1\frac{1}{4}$ to $2\frac{1}{4}$	$F = 1.500D + 0.125$	$0.050D$	$H = 0.500D + 0.125$	$0.016D + 0.012$ [Note (4)]	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$2\frac{1}{2}$ to 4	$F = 1.500D + 0.125$	$0.050D$	$H = 0.500D + 0.250$	$0.016D + 0.012$ [Note (4)]	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$



**Table A-1 Formulas for Nut Dimensions (Cont'd)**

Nut Type	Nut Size	Width Across Flats		Nut Thickness		Width Across Corners	
		Basic [Note (1)]	Tolerance (Minus)	Basic [Note (2)]	Tolerance (Plus or Minus)	Limits, <i>G</i>	
						Min.	Max.
Heavy Hex and Heavy Hex Slotted	$\frac{1}{4}$ to $1\frac{1}{8}$	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 1.000D$ - 0.016	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$1\frac{1}{4}$ to 2	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 1.000D$ - 0.031	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$2\frac{1}{4}$ to 3	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 1.000D$ - 0.047	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$3\frac{1}{4}$ to 4	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 1.000D$ - 0.062	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
Heavy Hex Jam	$\frac{1}{4}$ to $1\frac{1}{8}$	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 0.500D$ + 0.047	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$1\frac{1}{4}$ to 2	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 0.500D$ + 0.094	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$2\frac{1}{4}$	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 0.500D$ + 0.078	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$2\frac{1}{2}$ to 3	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 0.500D$ + 0.203	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$
	$3\frac{1}{4}$ to 4	$F = 1.500D$ + 0.125	0.050 <i>D</i>	$H = 0.500D$ + 0.188	$0.016D +$ 0.012	$1.14 \times (\text{Min. } F)$	$1.1547 \times (\text{Max. } F)$

## NOTES:

- (1) Adjusted to sixteenths.
  - (2)  $\frac{1}{4}$  in. to 1 in. sizes adjusted to sixty-fourths.  $1\frac{1}{8}$  in. to  $2\frac{1}{2}$  in. sizes adjusted upward to thirty-seconds.  $2\frac{3}{4}$  in. to 4 in. sizes adjusted upward to sixteenths.
  - (3) Plus tolerance only. Minus tolerance adjusted so that minimum thickness is equal to minimum thickness of heavy hex nut.
  - (4) Plus tolerance only. Minus tolerance adjusted so that minimum thickness is equal to minimum thickness of heavy hex jam nut.
- where
- D* = nominal nut size or basic diameter of the thread  
*F* = width across flats  
*G* = width across corners

## **NONMANDATORY APPENDIX B WRENCH OPENINGS FOR SQUARE AND HEX NUTS**

Table B-1 specifies wrench openings for square and hex nuts.

**Table B-1 Wrench Openings for Square and Hex Nuts**

Basic Size of Wrench, <i>W</i>	Maximum Nut Across Flats [Note (1)]	Allowance Between Nut Flats and Wrench Jaws [Note (2)]	Wrench Openings			Nominal Nut Sizes			
			Min.	Tolerance [Note (2)]		Machine Screw Nuts	Square Nuts	Hex Flat, Hex Flat Jam, Hex, Hex Jam, Hex Slotted, Hex Thick, Hex Thick Slotted, Heavy Hex Slotted	Heavy Square, Heavy Hex Flat, Heavy Hex Flat Jam, Heavy Hex, Heavy Hex Jam
				[Note (2)]	Max.				
5/32	0.156	0.002	0.158	0.005	0.163	#0, #1	...	...	...
3/16	0.188	0.002	0.190	0.005	0.195	#2, #3	...	...	...
1/4	0.250	0.002	0.252	0.005	0.257	#4	...	...	...
5/16	0.312	0.003	0.315	0.006	0.321	#5, #6	...	...	...
11/32	0.344	0.003	0.347	0.006	0.353	#8	...	...	...
3/8	0.375	0.003	0.378	0.006	0.384	#10	...	...	...
7/16	0.438	0.003	0.440	0.006	0.446	#12, 1/4	1/4	1/4	...
1/2	0.500	0.004	0.504	0.006	0.510	...	...	5/16	1/4
9/16	0.562	0.004	0.566	0.007	0.573	5/16	5/16	3/8	5/16
5/8	0.625	0.004	0.629	0.007	0.636	3/8	3/8	...	...
11/16	0.688	0.004	0.692	0.007	0.699	...	...	7/16	3/8
3/4	0.750	0.005	0.755	0.008	0.763	...	7/16	1/2	7/16
13/16	0.813	0.005	0.818	0.008	0.826	...	1/2	...	...
7/8	0.875	0.005	0.880	0.008	0.888	...	...	9/16	1/2
15/16	0.938	0.006	0.944	0.009	0.953	...	...	5/8	9/16
1	1.000	0.006	1.006	0.009	1.015	...	5/8	...	...
1 1/16	1.063	0.006	1.068	0.009	1.077	...	...	...	5/8
1 1/8	1.125	0.007	1.132	0.010	1.142	...	3/4	3/4	...
1 1/4	1.250	0.007	1.257	0.010	1.267	...	...	...	3/4
1 5/16	1.313	0.008	1.320	0.011	1.331	...	7/8	7/8	...
1 7/16	1.438	0.008	1.446	0.011	1.457	...	...	...	7/8
1 1/2	1.500	0.008	1.508	0.012	1.520	...	1	1	...
1 5/8	1.625	0.009	1.634	0.012	1.646	...	...	...	1
1 11/16	1.688	0.009	1.696	0.012	1.708	...	1 1/8	1 1/8	...
1 13/16	1.813	0.010	1.822	0.013	1.835	...	...	...	1 1/8
1 7/8	1.875	0.010	1.885	0.013	1.898	...	1 1/4	1 1/4	...
2	2.000	0.011	2.011	0.014	2.025	...	...	...	1 1/4
2 1/16	2.063	0.011	2.074	0.014	2.088	...	1 3/8	1 3/8	...
2 3/16	2.188	0.012	2.200	0.015	2.215	...	...	...	1 3/8
2 1/4	2.250	0.012	2.262	0.015	2.277	...	1 1/2	1 1/2	...
2 3/8	2.375	0.013	2.388	0.016	2.404	...	...	...	1 1/2
2 9/16	2.563	0.014	2.576	0.017	2.593	...	...	...	1 5/8
2 3/4	2.750	0.014	2.766	0.017	2.783	...	...	...	1 3/4
2 15/16	2.938	0.016	2.954	0.019	2.973	...	...	...	1 7/8
3 1/8	3.125	0.017	3.142	0.020	3.162	...	...	...	2
3 1/2	3.500	0.019	3.518	0.022	3.540	...	...	...	2 1/4
3 7/8	3.875	0.020	3.895	0.023	3.918	...	...	...	2 1/2
4 1/4	4.250	0.022	4.272	0.025	4.297	...	...	...	2 3/4
4 5/8	4.625	0.024	4.649	0.027	4.676	...	...	...	3
5	5.000	0.026	5.026	0.029	5.055	...	...	...	3 1/4
5 3/8	5.375	0.028	5.403	0.031	5.434	...	...	...	3 1/2
5 3/4	5.750	0.030	5.780	0.033	5.813	...	...	...	3 3/4
6 1/8	6.125	0.032	6.157	0.035	6.192	...	...	...	4

**NOTES:**

- (1) Wrenches are normally marked with "Basic Wrench Size," which corresponds to the basic (maximum, in most cases) width across flats dimension of the respective nut. For specific requirements applicable to wrenches, refer to the appropriate ASME B107 standard, which covers the particular wrench type.
- (2) Allowance (minimum clearance) between maximum width across flats of the nut and jaws of wrench equals  $(0.005W + 0.001)$ . Tolerance on wrench opening equals plus  $(0.005W + 0.004)$  from minimum, where  $W$  = nominal size of wrench.

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# B18 AMERICAN NATIONAL STANDARDS FOR BOLTS, NUTS, RIVETS, SCREWS, WASHERS, AND SIMILAR FASTENERS

Small Solid Rivets .....	B18.1.1-1972 (R2006)
Large Rivets .....	B18.1.2-1972 (R2006)
Metric Small Solid Rivets .....	B18.1.3M-1983 (R2006)
Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series) .....	B18.2.1-2010
Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series) .....	B18.2.2-2010
Metric Hex Cap Screws .....	B18.2.3.1M-1999 (R2005)
Metric Formed Hex Screws .....	B18.2.3.2M-2005
Metric Heavy Hex Screws .....	B18.2.3.3M-1979 (R2001)
Metric Hex Flange Screws .....	B18.2.3.4M-2001 (R2006)
Metric Hex Bolts .....	B18.2.3.5M-1979 (R2006)
Metric Heavy Hex Bolts .....	B18.2.3.6M-1979 (R2006)
Metric Heavy Hex Structural Bolts .....	B18.2.3.7M-1979 (R2006)
Metric Heavy Hex Flange Screws .....	B18.2.3.9M-2001 (R2006)
Metric Hex Nuts, Style 1 .....	B18.2.4.1M-2002 (R2007)
Metric Hex Nuts, Style 2 .....	B18.2.4.2M-2005
Metric Slotted Hex Nuts .....	B18.2.4.3M-1979 (R2006)
Metric Hex Flange Nuts .....	B18.2.4.4M-1982 (R2005)
Metric Hex Jam Nuts .....	B18.2.4.5M-2008
Metric Heavy Hex Nuts .....	B18.2.4.6M-2010
Metric Flanged 12-Point Head Screws .....	B18.2.5M-2009
Fasteners for Use in Structural Applications .....	B18.2.6-2010
Metric 12-Spline Flange Screws .....	B18.2.7.1M-2002 (R2007)
Clearance Holes for Bolt, Screws, and Studs .....	B18.2.8-1999 (R2010)
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Socket Cap, Shoulder, and Set Screws, Hex and Spline Keys (Inch Series) .....	B18.3-2003 (R2008)
Socket Head Cap Screws (Metric Series) .....	B18.3.1M-1986 (R2008)
Metric Series Hexagon Keys and Bits .....	B18.3.2M-1979 (R2008)
Hexagon Socket Head Shoulder Screws (Metric Series) .....	B18.3.3M-1986 (R2008)
Hexagon Socket Button Head Cap Screws (Metric Series) .....	B18.3.4M-1986 (R2008)
Hexagon Socket Flat Countersunk Head Cap Screws (Metric Series) .....	B18.3.5M-1986 (R2008)
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