

**ASME B18.16.6-2017**  
(Revision of ASME B18.16.6-2014)

# Prevailing Torque Locknuts (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**

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: June 19, 2017

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# FOREWORD

ASME B18.16.6-2008 was balloted and approved by the B18 Standards Committee and B18 Subcommittee 16 on April 29, 2008. The proposal was submitted to the American National Standards Institute and designated as an American National Standard on August 25, 2008.

At the B18 meeting in the fall of 2011, Subcommittee 16 decided to expand this Standard to include all styles of locking nuts. B18.16.6 now contained dimensional and performance requirements for nonmetallic insert and all-metal locking nuts in a variety of grades. This Standard was intended to replace IFI-100/107, which the Industrial Fasteners Institute agreed to withdraw after the publication of this Standard. ASME B18.16.6-2014 was balloted and approved by the B18 Standards Committee and B18 Subcommittee 16 on March 12, 2014.

At the B18 meeting in the spring of 2015, Subcommittee 16 decided to revise this Standard based on several technical and editorial updates. Updates to this Standard include lowering the proof and clamp load values of thin nuts from 60% to 45% of regular hex nuts; harmonizing proof loads with SAE J995 2012, resulting in lower proof loads for fine and 8-UN series nuts; correcting hex height values on style NTM locknuts; clarifying corner fill requirements; increasing the proof load requirement for style NU locknuts; and correcting various table references.

This revision was approved as an American National Standard on June 1, 2017.

Suggestions for improvement of this Standard are welcome. They should be sent to Secretary, B18 Committee, The American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.



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

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

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

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

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

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

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

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

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the B18 Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

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

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

**Attending Committee Meetings.** The B18 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B18 Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at [go.asme.org/B18committee](http://go.asme.org/B18committee).



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# PREVAILING TORQUE LOCKNUTS (INCH SERIES)

## 1 INTRODUCTION

### 1.1 Scope

This Standard covers the complete general, dimensional, mechanical, and performance requirements (proof load, prevailing torque, and torque-tension) for carbon steel, inch series nylon insert locknuts of grades N2, N5, and N8 in styles NE ( $\frac{1}{4}$  in. to  $1\frac{1}{2}$  in.), NTE ( $\frac{1}{4}$  in. to  $1\frac{1}{2}$  in.), NU ( $\frac{1}{4}$  in. to 3 in.), NTU ( $\frac{1}{4}$  in. to 3 in.), NM (#2 to #12), NTM (#2 to #12), and hex flange ( $\frac{1}{4}$  in. to  $\frac{3}{4}$  in.). This Standard also includes all-metal hex (#4 to  $1\frac{1}{2}$  in.) and hex flange ( $\frac{1}{4}$  in. to  $\frac{3}{4}$  in.) locking nuts of grades A, B, C, F, and G. These nut designs are designated as American National Standards.

### 1.2 Comparison to ISO Standards

There is no ISO inch standard for these products.

## 2 REFERENCE STANDARDS

The following is a list of publications referenced in this Standard. Unless otherwise specified, the reference standard(s) shall be the most recent issue 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 B1.15, Unified Inch Screw Threads (UNJ Thread Form)

ASME B18.2.1, Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)

ASME B18.12, Glossary of Terms for Mechanical Fasteners

ASME B18.18, Quality Assurance for Fasteners

ASME B18.21.1, Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 ([www.asme.org](http://www.asme.org))

ASTM F436, Standard Specification for Hardened Steel Washers

ASTM F606/F606M, Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets

ASTM F788, Standard Specification for Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series

ASTM F812, Standard Specification for Surface Discontinuities of Nuts, Inch and Metric Series

ASTM F1137, Standard Specification for Phosphate/Oil Corrosion Protective Coatings for Fasteners

ASTM F1470, Standard Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

ASTM F1941/F1941M, Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 ([www.astm.org](http://www.astm.org))

IFI-101, Torque-Tension Requirements for Prevailing-Torque Type Steel Hex and Hex Flange Nuts

Publisher: Industrial Fasteners Institute (IFI), 6363 Oak Tree Boulevard, Independence, OH 44131 ([www.indfast.org](http://www.indfast.org))

SAE J409, Product Analysis — Permissible Variations from Specified Chemical Analysis of a Heat or Cast of Steel

Publisher: SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001 ([www.sae.org](http://www.sae.org))

## 3 TERMINOLOGY

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

## 4 DIMENSIONS

Unless otherwise specified, all dimensions in this Standard are inches and shall be as specified in the tables and sections 6 through 9. All dimensions apply before coating.

## 5 NUT DESIGNS AND PROPERTY GRADES

### 5.1 Nylon Insert Locknuts

Nylon insert locknuts are two-piece construction hex nuts and hex flange nuts that derive their prevailing torque characteristics from a full ring of nylon material, located and retained in the nut under its top surface. These are designated in Table 1 as property grades N2, N5, and N8 with hardness requirements in Table 2. The configuration styles are NE (Table 3), NTE (Table 4), NU (Table 5), NTU (Table 6), NM (Table 7), NTM (Table 8), and hex flange (Table 9).

### 5.2 All-Metal Locknuts

All-metal locknuts are one-piece construction hex and hex flange nuts that derive their prevailing torque performance from controlled distortion of the nut threads and/or body. Hex locknuts are designated as grades A, B, and C. The dimensions are located in Table 10. Hex flange locknuts are designated as grades F and G. The dimensions are in Table 11. Table 1 identifies the material requirements for the various grades, and Table 2 identifies sizes and hardness requirements for the various grades.

## 6 CORNER FILL

A rounding or lack of fill at the location where the hex corners intersect with the chamfer shall be permissible, provided the width across corners is within specified limits in the area extending from a distance equal to 17.5% of the basic thread diameter from the chamfered bearing face to 85% of the specified minimum hex height.

## 7 CHAMFERS AND BEARING CIRCLES

### 7.1 Chamfer Length on Bearing Side of Nuts

The length of chamfer at hex corners shall be from 5% to 15% of the nominal thread diameter. The surface of the chamfer may be convex or rounded.

### 7.2 Bearing Surface Diameter

The diameter of bearing circle on 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.

## 8 COUNTERSINKS

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

**Table 1 Chemical Composition Requirements**

Nut Grade	C, Max.	Mn, Min.	P, Max.	S, Max.
N2, A	0.47	...	0.12 [Note (1)]	0.15 [Note (2)]
N5, B, F	0.55	0.30	0.05 [Notes (3), (4)]	0.15 [Notes (2), (4)]
N8, C, G	0.55	0.30	0.04	0.05 [Note (5)]

GENERAL NOTE: All values are for ladle analysis (percent by weight) and are subject to standard variations for check analysis as given in SAE J409.

NOTES:

- (1) Resulfurized and rephosphorized material is not subject to rejection based on check analysis for sulfur.
- (2) If agreed between purchaser and producer, sulfur content may be 0.23 max.
- (3) Phosphorus content may be 0.13 max. for acid bessemer steel only.
- (4) If agreed between purchaser and producer, sulfur content may be 0.35 max. and phosphorus content may be 0.12 max., provided that manganese content is 0.70 min.
- (5) If agreed between purchaser and producer, sulfur content may be 0.33 max., provided that manganese content is 1.35 min.

**Table 2 Hardness Requirements**

Nut Grade [Note (1)]	Locknut Size [Note (2)]	Rockwell Hardness
N2, N5, A, B, and F	$\frac{1}{4}$ – $1\frac{1}{2}$	C28, max.
N8, C, and G	$\frac{1}{4}$ – $\frac{5}{8}$	C24–C32
	$\frac{3}{4}$ –1	C26–C34
	$1\frac{1}{8}$ – $1\frac{1}{2}$	C26–C36

NOTES:

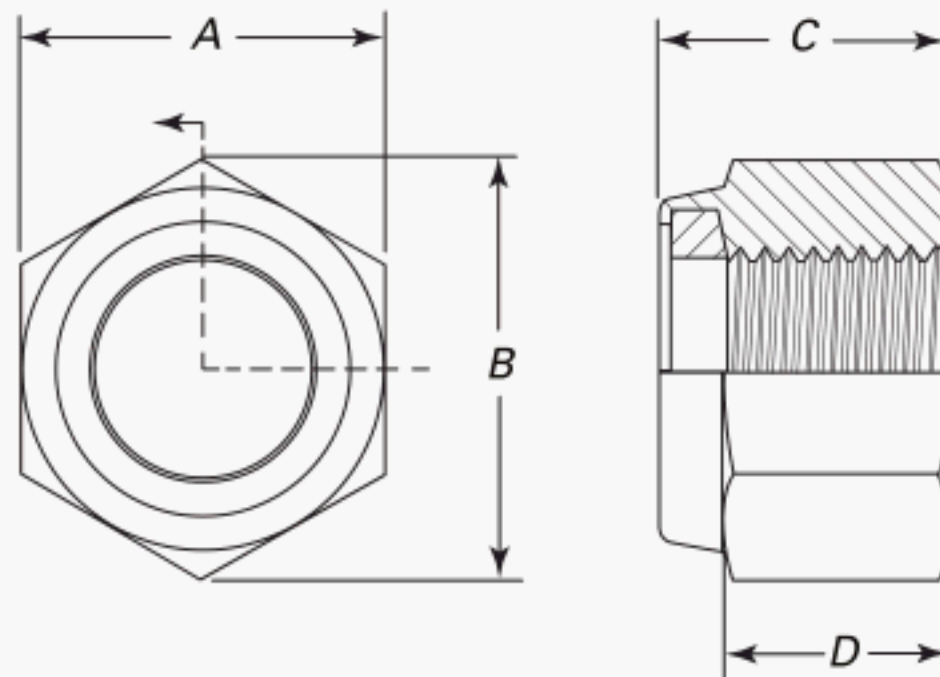
- (1) For grade N2 sizes over  $1\frac{1}{2}$ , the minimum hardness shall be HRB 68.
- (2) For values on sizes not listed in Table 2, agreement shall be reached between purchaser and supplier.

## 9 THREADS

Threads shall be unified thread form coarse, fine, or 8 thread series (UNC, UNF, or 8-UN) Class 2B in accordance with ASME B1.1 or UNJ thread form (UNJC, UNJF, or UNJ8 series) either Class 2B or 3B in accordance with ASME B1.15 provided all performance requirements of the final parts are in compliance.

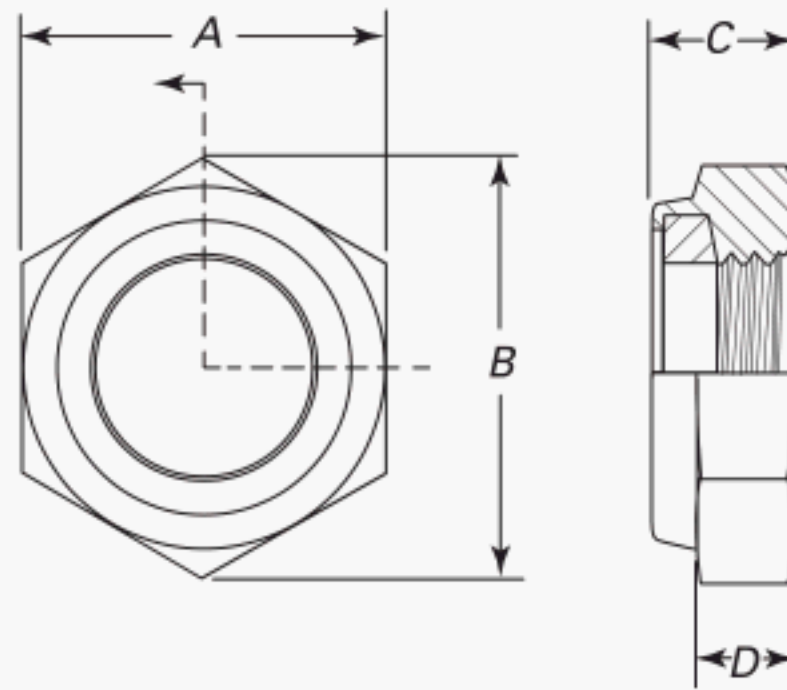
Inspection shall be in accordance with System 21 of ASME B1.3. Inspection shall be conducted prior to nut deformation or nylon ring captivation.

After deformation or nylon captivation, the GO threaded plug gage must enter  $\frac{3}{8}$  in. and smaller nuts at least one-half turn, and for  $\frac{7}{16}$ -in. nuts and above one full turn from the bearing surface side of the nut.

**Table 3 Style NE Nylon Insert Locknut Dimensions**

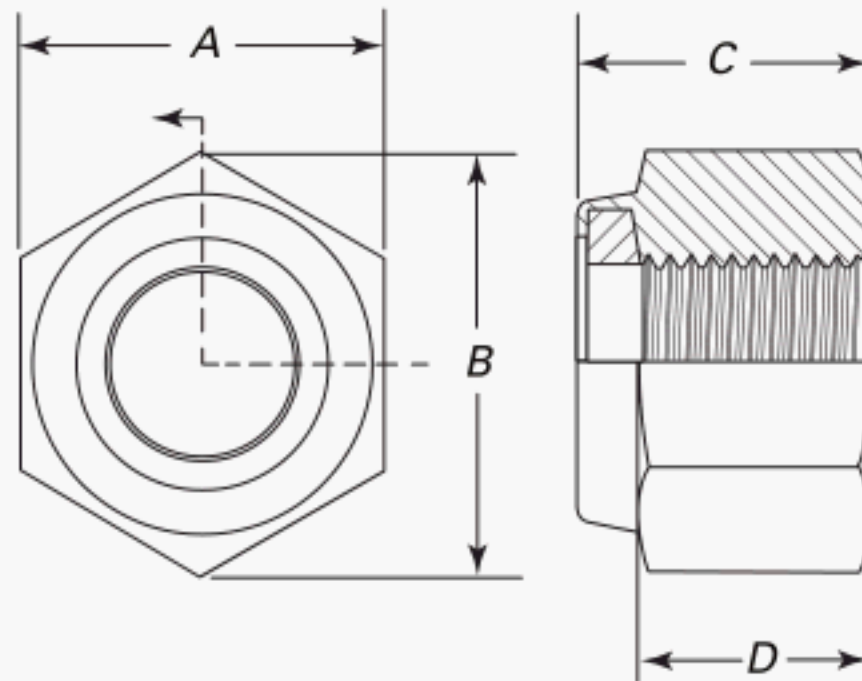
Designation		Width Across Flats, <i>A</i>		Minimum Width Across Corners, <i>B</i>	Thickness, <i>C</i>		Minimum Hex Height, <i>D</i>	Maximum Runout of Bearing Surface With Thread P.D. FIM
Size	Nominal Diameter	Max.	Min.		Max.	Min.		
$\frac{1}{4}$	0.2500	0.439	0.430	0.482	0.328	0.298	0.225	0.010
$\frac{5}{16}$	0.3125	0.502	0.489	0.552	0.359	0.329	0.250	0.011
$\frac{3}{8}$	0.3750	0.564	0.551	0.622	0.468	0.438	0.335	0.012
$\frac{7}{16}$	0.4375	0.627	0.616	0.698	0.468	0.438	0.324	0.013
$\frac{1}{2}$	0.5000	0.752	0.736	0.837	0.609	0.579	0.464	0.014
$\frac{9}{16}$	0.5625	0.877	0.861	0.978	0.656	0.626	0.469	0.015
$\frac{5}{8}$	0.6250	0.940	0.922	1.051	0.765	0.735	0.593	0.016
$\frac{3}{4}$	0.7500	1.064	1.052	1.191	0.890	0.860	0.742	0.018
$\frac{7}{8}$	0.8750	1.252	1.239	1.403	0.999	0.969	0.790	0.020
1	1.0000	1.440	1.427	1.615	1.078	1.016	0.825	0.022
$1\frac{1}{8}$	1.1250	1.627	1.614	1.826	1.203	1.141	0.930	0.025
$1\frac{1}{4}$	1.2500	1.815	1.801	2.038	1.422	1.360	1.125	0.028
$1\frac{3}{8}$	1.3750	2.008	1.973	2.232	1.609	1.547	1.282	0.031
$1\frac{1}{2}$	1.5000	2.197	2.159	2.444	1.640	1.578	1.313	0.034



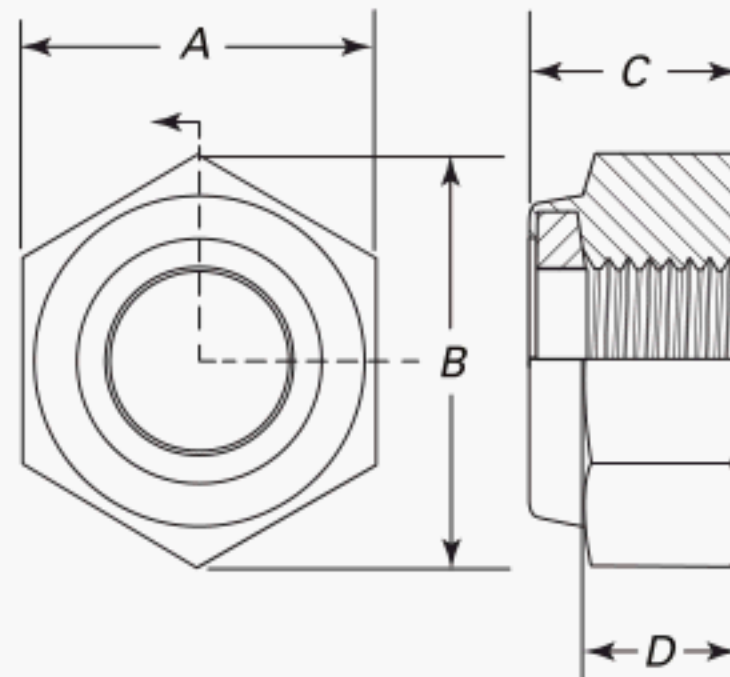
**Table 4 Style NTE Nylon Insert Locknut Dimensions**

Designation		Width Across Flats, <i>A</i>		Minimum Width Across Corners, <i>B</i>	Thickness, <i>C</i>		Minimum Hex Height, <i>D</i>	Maximum Runout of Bearing Surface With Thread P.D. FIM
Size	Nominal Diameter	Max.	Min.		Max.	Min.		
$\frac{1}{4}$	0.2500	0.439	0.430	0.482	0.218	0.188	0.125	0.010
$\frac{5}{16}$	0.3125	0.502	0.492	0.552	0.265	0.235	0.158	0.011
$\frac{3}{8}$	0.3750	0.564	0.553	0.622	0.281	0.251	0.150	0.012
$\frac{7}{16}$	0.4375	0.627	0.615	0.694	0.328	0.298	0.225	0.013
$\frac{1}{2}$	0.5000	0.752	0.741	0.837	0.328	0.298	0.190	0.014
$\frac{9}{16}$	0.5625	0.877	0.865	0.978	0.374	0.344	0.225	0.015
$\frac{5}{8}$	0.6250	0.940	0.928	1.051	0.406	0.376	0.265	0.016
$\frac{3}{4}$	0.7500	1.064	1.052	1.191	0.421	0.391	0.288	0.018
$\frac{7}{8}$	0.8750	1.252	1.239	1.403	0.484	0.454	0.340	0.020
1	1.0000	1.440	1.427	1.615	0.578	0.516	0.405	0.022
$1\frac{1}{8}$	1.1250	1.627	1.614	1.826	0.672	0.610	0.500	0.025
$1\frac{1}{4}$	1.2500	1.815	1.801	2.038	0.765	0.703	0.523	0.028
$1\frac{3}{8}$	1.3750	2.008	1.973	2.249	0.821	0.759	0.493	0.031
$1\frac{1}{2}$	1.5000	2.197	2.159	2.416	0.828	0.766	0.565	0.034

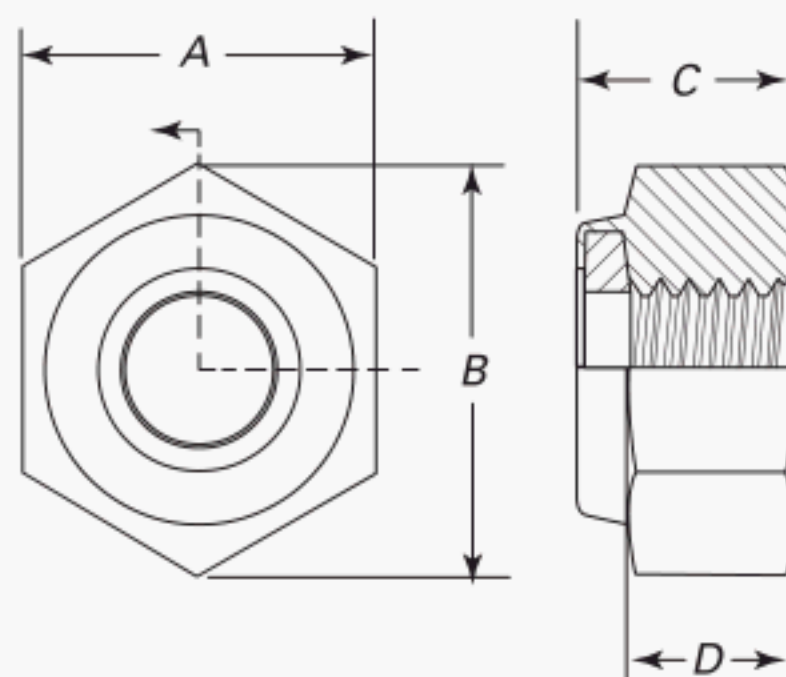


**Table 5 Style NU Nylon Insert Locknut Dimensions**

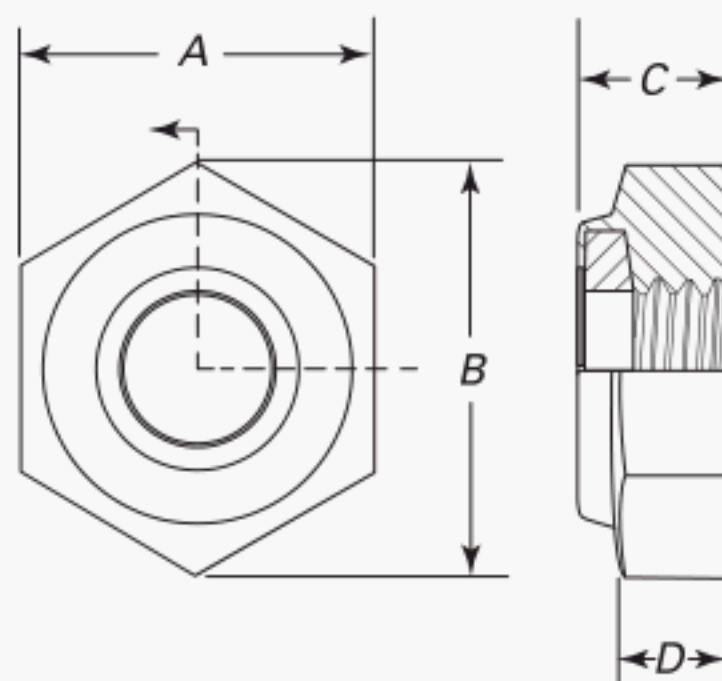
Designation		Width Across Flats, <i>A</i>		Minimum Width Across Corners, <i>B</i>	Thickness, <i>C</i>		Minimum Hex Height, <i>D</i>	Maximum Runout of Bearing Surface With Thread P.D. FIM
Size	Nominal Diameter	Max.	Min.		Max.	Min.		
$\frac{1}{4}$	0.2500	0.506	0.489	0.556	0.390	0.360	0.290	0.010
$\frac{5}{16}$	0.3125	0.566	0.551	0.624	0.453	0.423	0.335	0.011
$\frac{3}{8}$	0.3750	0.691	0.675	0.763	0.562	0.532	0.392	0.012
$\frac{7}{16}$	0.4375	0.754	0.736	0.829	0.609	0.579	0.464	0.013
$\frac{1}{2}$	0.5000	0.879	0.861	0.969	0.718	0.688	0.544	0.014
$\frac{9}{16}$	0.5625	0.942	0.922	1.037	0.812	0.782	0.655	0.015
$\frac{5}{8}$	0.6250	1.067	1.045	1.175	0.874	0.844	0.677	0.016
$\frac{3}{4}$	0.7500	1.255	1.231	1.382	1.015	0.985	0.790	0.018
$\frac{7}{8}$	0.8750	1.444	1.417	1.589	1.140	1.110	0.883	0.020
1	1.0000	1.632	1.602	1.796	1.312	1.250	1.000	0.022
$1\frac{1}{8}$	1.1250	1.820	1.788	2.002	1.469	1.407	1.096	0.025
$1\frac{1}{4}$	1.2500	2.008	1.973	2.209	1.672	1.610	1.250	0.028
$1\frac{3}{8}$	1.3750	2.197	2.159	2.416	1.828	1.766	1.376	0.031
$1\frac{1}{2}$	1.5000	2.384	2.344	2.622	1.953	1.891	1.413	0.034
$1\frac{5}{8}$	1.6250	2.572	2.530	2.886	2.172	2.110	1.637	0.038
$1\frac{3}{4}$	1.7500	2.762	2.715	3.035	2.376	2.250	1.830	0.041
$1\frac{7}{8}$	1.8750	2.950	2.901	3.242	2.422	2.296	1.875	0.044
2	2.0000	3.137	3.086	3.449	2.469	2.343	1.750	0.047
$2\frac{1}{4}$	2.2500	3.514	3.457	3.862	2.876	2.750	2.063	0.052
$2\frac{1}{2}$	2.5000	4.015	3.875	4.618	3.204	3.078	2.475	0.058
$2\frac{3}{4}$	2.7500	4.015	3.875	4.618	3.204	3.078	2.350	0.064
3	3.0000	4.640	4.500	5.102	3.704	3.578	2.750	0.070

**Table 6 Style NTU Nylon Insert Locknut Dimensions**

Designation		Width Across Flats, <i>A</i>		Minimum Width Across Corners, <i>B</i>	Thickness, <i>C</i>		Minimum Hex Height, <i>D</i>	Maximum Runout of Bearing Surface With Thread P.D. FIM
Size	Nominal Diameter	Max.	Min.		Max.	Min.		
$\frac{1}{4}$	0.2500	0.502	0.492	0.552	0.296	0.266	0.194	0.010
$\frac{5}{16}$	0.3125	0.564	0.553	0.622	0.328	0.298	0.212	0.011
$\frac{3}{8}$	0.3750	0.690	0.679	0.766	0.421	0.391	0.251	0.012
$\frac{7}{16}$	0.4375	0.752	0.741	0.837	0.453	0.423	0.316	0.013
$\frac{1}{2}$	0.5000	0.877	0.865	0.978	0.546	0.516	0.360	0.014
$\frac{9}{16}$	0.5625	0.940	0.928	1.051	0.578	0.548	0.421	0.015
$\frac{5}{8}$	0.6250	1.064	1.052	1.191	0.624	0.594	0.428	0.016
$\frac{3}{4}$	0.7500	1.252	1.239	1.403	0.718	0.688	0.488	0.018
$\frac{7}{8}$	0.8750	1.440	1.427	1.615	0.796	0.766	0.535	0.020
1	1.0000	1.627	1.614	1.826	0.922	0.860	0.600	0.022
$1\frac{1}{8}$	1.1250	1.814	1.801	2.038	1.000	0.938	0.627	0.025
$1\frac{1}{4}$	1.2500	2.008	1.973	2.232	1.140	1.078	0.720	0.028
$1\frac{3}{8}$	1.3750	2.197	2.159	2.444	1.219	1.157	0.767	0.031
$1\frac{1}{2}$	1.5000	2.384	2.344	2.622	1.344	1.282	0.810	0.034
$1\frac{3}{4}$	1.7500	2.762	2.715	3.075	1.532	1.406	0.986	0.041
2	2.0000	3.137	3.086	3.497	1.735	1.609	1.016	0.047
$2\frac{1}{4}$	2.2500	3.514	3.457	3.918	2.001	1.875	1.179	0.052
$2\frac{1}{2}$	2.5000	4.015	3.875	4.393	2.250	2.124	1.523	0.058
$2\frac{3}{4}$	2.7500	4.015	3.875	4.393	2.250	2.124	1.523	0.064
3	3.0000	4.640	4.500	5.102	2.788	2.662	2.075	0.070

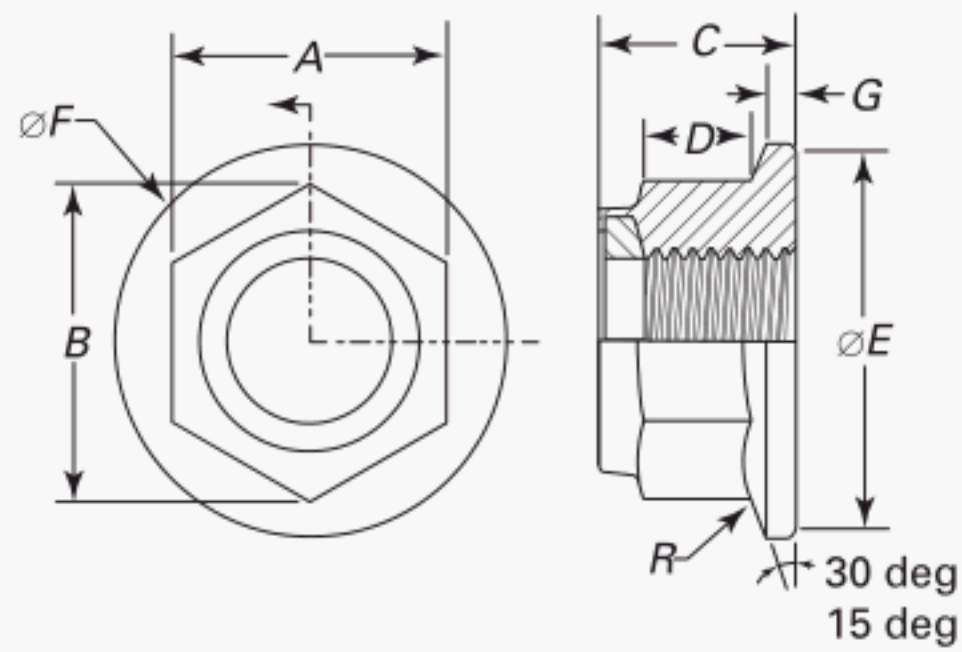
**Table 7 Style NM Nylon Insert Locknut Dimensions**

Designation		Width Across Flats, $A$		Minimum Width Across Corners, $B$	Thickness, $C$		Minimum Hex Height, $D$	Maximum Runout of Bearing Surface With Thread P.D. FIM
Size	Nominal Diameter	Max.	Min.		Max.	Min.		
#2	0.0860	0.251	0.243	0.268	0.153	0.133	0.081	0.004
#4	0.1120	0.251	0.243	0.268	0.153	0.133	0.081	0.004
#6	0.1380	0.313	0.305	0.339	0.188	0.168	0.103	0.004
#8	0.1640	0.345	0.336	0.374	0.239	0.219	0.140	0.004
#10	0.1900	0.376	0.367	0.410	0.249	0.229	0.140	0.004
#12	0.2160	0.439	0.430	0.482	0.328	0.298	0.225	0.005

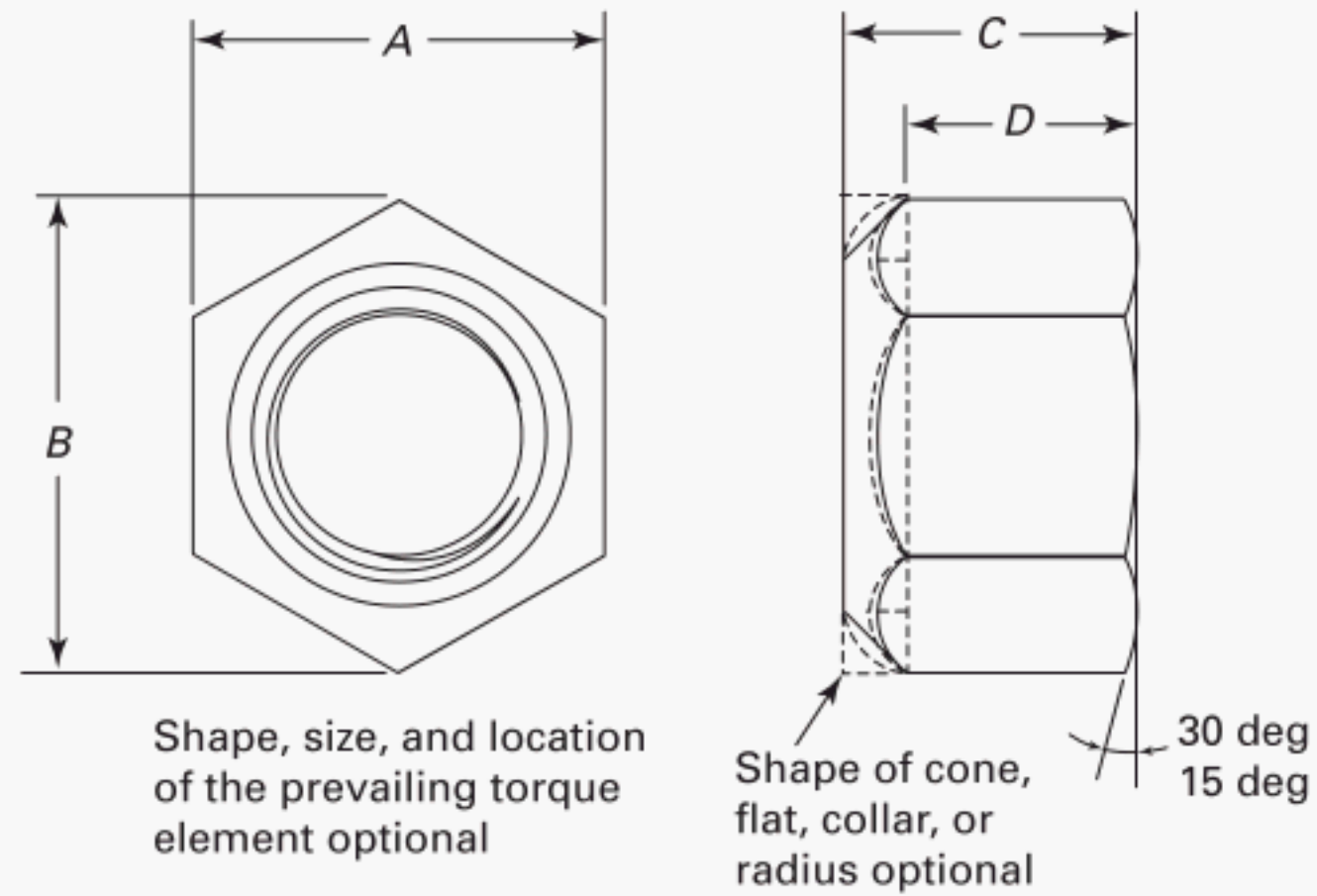
**Table 8 Style NTM Nylon Insert Locknut Dimensions**

Designation		Width Across Flats, $A$		Minimum Width Across Corners, $B$	Thickness, $C$		Minimum Hex Height, $D$	Maximum Runout of Bearing Surface With Thread P.D. FIM
Size	Nominal Diameter	Max.	Min.		Max.	Min.		
#2	0.0860	0.251	0.243	0.268	0.124	0.094	0.075	0.004
#3	0.0990	0.251	0.243	0.268	0.124	0.094	0.075	0.004
#4	0.1120	0.251	0.243	0.268	0.124	0.094	0.075	0.004
#5	0.1250	0.251	0.243	0.268	0.124	0.094	0.075	0.004
#6	0.1380	0.313	0.305	0.339	0.140	0.110	0.090	0.004
#8	0.1640	0.345	0.336	0.374	0.187	0.157	0.110	0.004
#10	0.1900	0.376	0.367	0.410	0.187	0.157	0.110	0.004
#12	0.2160	0.439	0.430	0.482	0.218	0.188	0.125	0.005



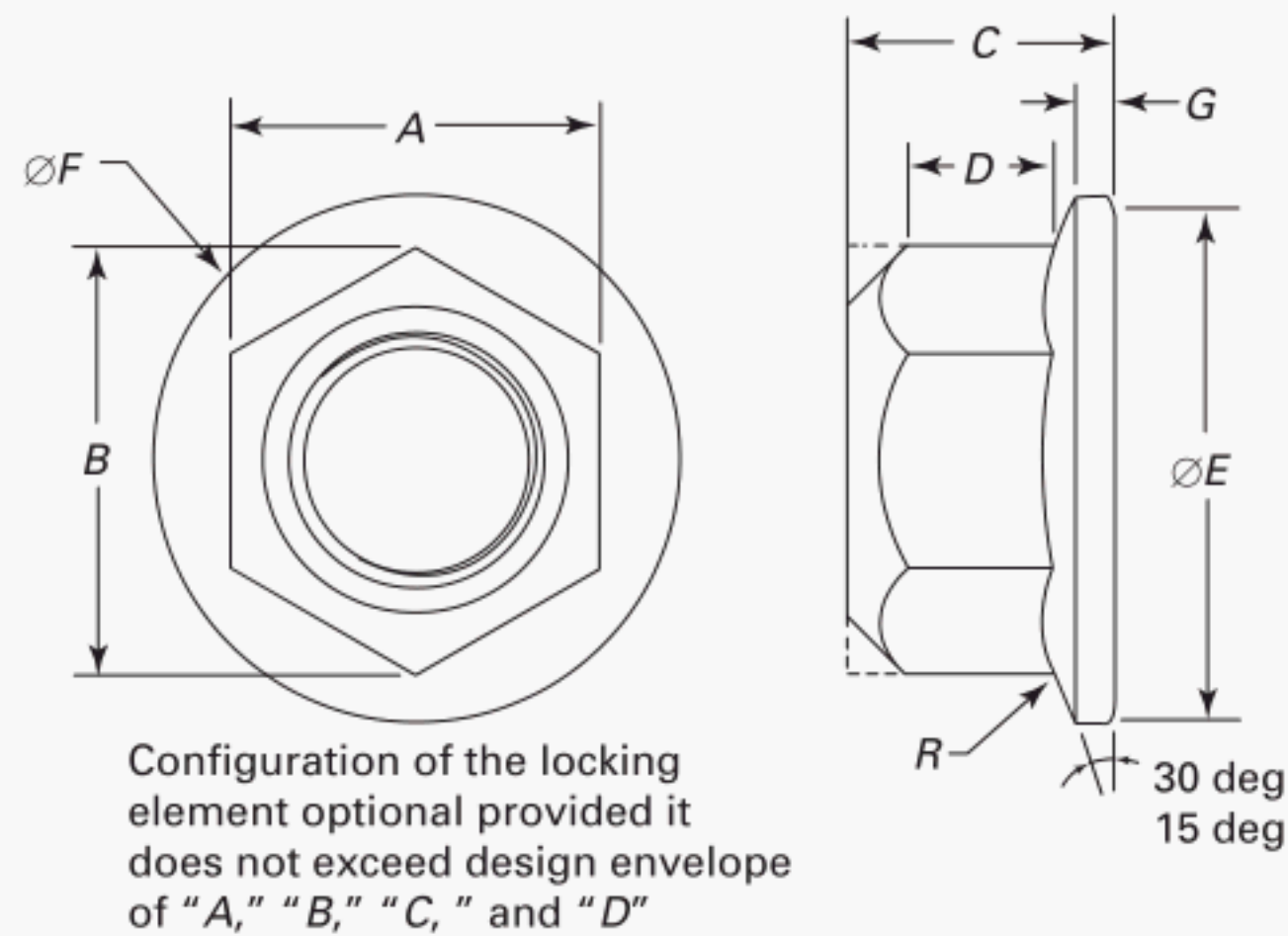
**Table 9 Dimensions of Nylon Insert Hex Flange Nuts**

Size	Nominal Diameter	Width Across Flats, $A$		Width Across Corners, $B$		Maximum Thickness, $C$	Min. Hex Height, $D$	Minimum Diameter of Bearing Surface, $E$	Minimum Flange Thickness, $G$	Max. Flange Top Radius, $R$	Maximum Flange Diameter, $F$	Maximum Runout of Bearing Surface With Thread P.D. FIM
		Max.	Min.	Max.	Min.							
$\frac{1}{4}$	0.2500	0.4385	0.4280	0.505	0.488	0.300	0.140	0.484	0.040	0.010	0.560	0.011
$\frac{5}{16}$	0.3125	0.5020	0.4890	0.577	0.557	0.365	0.170	0.602	0.050	0.010	0.680	0.013
$\frac{3}{8}$	0.3750	0.5645	0.5510	0.650	0.628	0.425	0.200	0.730	0.060	0.020	0.810	0.015
$\frac{7}{16}$	0.4375	0.6895	0.6750	0.794	0.768	0.495	0.230	0.846	0.070	0.020	0.930	0.016
$\frac{1}{2}$	0.5000	0.7520	0.7360	0.866	0.840	0.555	0.260	0.982	0.080	0.020	1.070	0.018
$\frac{9}{16}$	0.5625	0.8770	0.8610	1.010	0.982	0.625	0.290	1.101	0.090	0.030	1.190	0.019
$\frac{5}{8}$	0.6250	0.9395	0.9220	1.083	1.051	0.690	0.320	1.230	0.100	0.030	1.330	0.021
$\frac{3}{4}$	0.7500	1.1270	1.0880	1.299	1.240	0.825	0.380	1.472	0.110	0.030	1.585	0.023

**Table 10 Dimensions of Prevailing Torque All-Metal Type Hex Nuts**

Designation		Width Across Flats, <i>A</i>		Width Across Corners, <i>B</i>		Thickness, <i>C</i>		Minimum Hex Height, <i>D</i>	Maximum Runout of Bearing Surface With Thread P.D. FIM
Size	Nominal Diameter	Max.	Min.	Max.	Min.	Max.	Min.		
#4	0.1120	0.251	0.241	0.289	0.275	0.163	0.087	0.066	0.008
#6	0.1380	0.313	0.302	0.361	0.344	0.171	0.102	0.075	0.008
#8	0.1640	0.345	0.332	0.397	0.378	0.191	0.117	0.083	0.009
#10	0.1900	0.376	0.362	0.433	0.413	0.241	0.117	0.083	0.009
#12	0.2160	0.438	0.423	0.505	0.482	0.241	0.148	0.103	0.010
1/4	0.2500	0.4385	0.428	0.505	0.488	0.288	0.212	0.145	0.010
5/16	0.3125	0.5020	0.489	0.577	0.557	0.336	0.258	0.166	0.011
3/8	0.3750	0.5645	0.551	0.650	0.628	0.415	0.320	0.198	0.012
7/16	0.4375	0.6895	0.675	0.794	0.768	0.463	0.365	0.223	0.013
1/2	0.5000	0.7520	0.736	0.866	0.840	0.573	0.427	0.262	0.014
9/16	0.5625	0.8770	0.861	1.010	0.982	0.621	0.473	0.286	0.015
5/8	0.6250	0.9395	0.922	1.083	1.051	0.731	0.535	0.329	0.016
3/4	0.7500	1.1270	1.088	1.299	1.240	0.827	0.617	0.382	0.018
7/8	0.8750	1.3145	1.269	1.516	1.447	0.922	0.724	0.450	0.020
1	1.0000	1.5020	1.450	1.732	1.653	1.018	0.831	0.513	0.022
1 1/8	1.1250	1.6895	1.631	1.949	1.859	1.176	0.939	0.576	0.025
1 1/4	1.2500	1.8770	1.812	2.165	2.066	1.272	1.030	0.628	0.028
1 3/8	1.3750	2.0645	1.994	2.382	2.273	1.399	1.138	0.681	0.031
1 1/2	1.5000	2.2520	2.175	2.598	2.480	1.526	1.245	0.757	0.034



**Table 11 Dimensions of Prevailing Torque All-Metal Type Hex Flange Nuts**

Size	Nominal Diameter	Width Across Flats, <i>A</i>		Width Across Corners, <i>B</i>		Maximum Thickness, <i>C</i>	Min. Hex Height, <i>D</i>	Minimum Diameter of Bearing Surface, <i>E</i>	Minimum Flange Thickness, <i>G</i>	Max. Flange Top Radius, <i>R</i>	Maximum Flange Diameter, <i>F</i>	Maximum Runout of Bearing Surface With Thread P.D. FIM
		Max.	Min.	Max.	Min.							
$\frac{1}{4}$	0.2500	0.4385	0.4280	0.505	0.488	0.300	0.140	0.484	0.040	0.010	0.560	0.011
$\frac{5}{16}$	0.3125	0.5020	0.4890	0.577	0.557	0.365	0.170	0.602	0.050	0.010	0.680	0.013
$\frac{3}{8}$	0.3750	0.5645	0.5510	0.650	0.628	0.425	0.200	0.730	0.060	0.020	0.810	0.015
$\frac{7}{16}$	0.4375	0.6895	0.6750	0.794	0.768	0.495	0.230	0.846	0.070	0.020	0.930	0.016
$\frac{1}{2}$	0.5000	0.7520	0.7360	0.866	0.840	0.555	0.260	0.982	0.080	0.020	1.070	0.018
$\frac{9}{16}$	0.5625	0.8770	0.8610	1.010	0.982	0.625	0.290	1.101	0.090	0.030	1.190	0.019
$\frac{5}{8}$	0.6250	0.9395	0.9220	1.083	1.051	0.690	0.320	1.230	0.100	0.030	1.330	0.021
$\frac{3}{4}$	0.7500	1.1270	1.0880	1.299	1.240	0.825	0.380	1.472	0.110	0.030	1.585	0.023

## 10 MATERIAL, MECHANICAL, AND PERFORMANCE PROPERTIES

### 10.1 Material and Processes

**10.1.1 Material.** Locknuts shall be made of carbon steel and shall conform to the requirements of Table 1.

Alternate material may be used with prior agreement between the purchaser and supplier on material selection, all performance characteristics, and nut markings.

**10.1.1.1 Nylon Rings.** The nylon insert material shall be manufactured of nylon sufficient to meet the prevailing torque requirements of Tables 12, 13, and 14 when tested as specified in para. 10.3.1. Nylon rings are only functional up to 250°F.

**10.1.2 Heat Treatment.** Nut grades N2 and A shall not be heat treated. Other locknut grades may be through-hardened at the discretion of the manufacturer (see Table 2) to meet the mechanical and performance requirements of this Standard. Case hardening is not allowed on locknuts.

**10.1.3 Finish.** Nuts may be furnished plain (bare metal) or with a protective coating as specified by the purchaser. When selecting protective coatings, consideration should be given to the curing temperatures of the finishes on nylon insert locknuts.

**10.1.4 Locknut Lubrication.** All nuts may be provided with an additional supplementary lubricant that shall be clean and dry to the touch as defined in ASTM F1137.

### 10.2 Mechanical Requirements

**10.2.1 Proof Load.** Locknuts shall withstand the proof load specified for the applicable grade and thread series in Tables 12, 13, and 14 when tested as specified in para. 11.1.

**10.2.2 Hardness.** Nuts shall have a hardness conforming to the limits specified for the applicable grade in Table 2 when tested as specified in para. 11.2.

### 10.3 Performance Requirements for Steel Locknuts

All performance requirements in Tables 12, 13, and 14 apply to all steel locknuts as they are supplied to the end user regardless of finish.

**10.3.1 Prevailing Torque.** The prevailing torque developed by nuts during their first installation, or any subsequent installation or removal, shall not exceed the maximum first installation torque specified for the applicable grade in Tables 12, 13, and 14 when tested as specified in para. 11.3. In addition, minimum prevailing torque generated by nuts during their first and third removals shall not be less than the respective removal torque values specified for the applicable grade in Tables 12, 13, and 14.

## 11 TEST METHODS

### 11.1 Proof Load Test

The test sample nut shall be assembled on a test bolt (see para. 11.5.4) or on a hardened mandrel (see para. 11.5.5) with a minimum of three threads projecting through the nut. The proof load test may be performed prior to the prevailing torque feature being added to the nut. For referee test purposes, the hardened mandrel shall be used and the prevailing torque feature present. The maximum prevailing torque occurring during the assembly of the nut on the test bolt or mandrel shall be recorded.

The specified proof load in Tables 12, 13, and 14 shall be applied in tension or compression through the test bolt or mandrel against the nut bearing surface in an axial direction and held for 10 sec. For referee purposes, the load shall be applied in tension. The nut shall resist this load without thread stripping or rupture. The prevailing torque necessary to remove the nut from the test bolt or mandrel shall not exceed the maximum torque occurring during assembly.

### 11.2 Rockwell Hardness Test

Rockwell hardness tests shall be conducted in accordance with the procedures in ASTM F606/F606M.

### 11.3 Prevailing Torque Test

The prevailing torque test shall be conducted at room temperature using a load-measuring device (see para. 11.5.2). A test bolt (see para. 11.5.4) and/or hardened mandrel (see para. 11.5.6) shall be inserted in the load-measuring device and hardened washer (see para. 11.5.3) placed on the bolt or mandrel and the sample nut then assembled on the bolt or mandrel. The nut shall be advanced until a minimum of three and a maximum of five full bolt or mandrel threads protrude through the top of the nut. At that time, the maximum torque shall be recorded. This torque shall not exceed the first installed prevailing torque value as specified for the applicable grade and thread series in Tables 12, 13, and 14. The torque-measuring device shall be in accordance with para. 11.5.1.

Tightening shall be continued until the nut is seated against the hardened washer. The length of the test bolt or mandrel should be such that seating of the nut shall occur at or before a length equivalent to a maximum of nine thread pitches of the test bolt or mandrel protruding through the top of the nut, as measured from the end of the bolt or mandrel. The nut shall then be tightened until a tensile load equal to the clamp load, as specified for the applicable grade and thread series in Tables 12, 13, and 14, is developed in the bolt or mandrel. The hardened washer shall be prevented from turning during nut tightening. The nut shall then be backed off by the application of reverse torque until the tensile load in the bolt or mandrel has been reduced to zero. The

**Table 12 Proof Loads, Clamp Loads, and Prevailing Torques for Coarse Thread Locknuts  
(Regardless of Finish)**

Nut Size and Threads Per Inch	Grade N2 and A Nuts		Grade N5, B, and F Nuts		Grade N8, C, and G Nuts		Prevailing Torque		
	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Max. First Install, in.-lb	Min. First Removal, in.-lb	Min. Third Removal, in.-lb
No. 4–40	540	250	720	380	910	550	4.0	1.0	0.2
No. 6–32	820	370	1,100	580	1,350	810	8.0	1.5	0.5
No. 8–32	1,250	580	1,700	900	2,100	1,250	12.0	2.0	0.5
No. 10–24	1,550	720	2,100	1,100	2,600	1,550	17	2.5	1.0
No. 12–24	2,200	1,000	2,900	1,550	3,650	2,200	27	3.5	1.0
$\frac{1}{4}$ –20	2,900	1,300	3,800	2,000	4,750	2,850	40	5.0	1.5
$\frac{5}{16}$ –18	4,700	2,150	6,300	3,350	7,850	4,700	80	8.0	2.5
$\frac{3}{8}$ –16	7,000	3,200	9,300	4,950	11,600	6,950	110	12.0	4.0
$\frac{7}{16}$ –14	9,550	4,400	12,800	6,800	15,900	9,600	135	17.0	5.0
$\frac{1}{2}$ –13	12,800	5,850	17,000	9,050	21,300	12,800	204	22.0	7.5
$\frac{9}{16}$ –12	16,400	7,550	21,800	11,600	27,300	16,400	300	30.0	10.0
$\frac{5}{8}$ –11	20,300	9,300	27,200	14,500	33,900	20,300	420	39.0	12.5
$\frac{3}{4}$ –10	30,000	13,800	40,100	21,300	50,100	30,100	540	58.0	20.0
$\frac{7}{8}$ –9	41,600	12,400	55,400	29,500	69,300	41,600	840	88.0	30.0
1–8	54,500	15,000	72,700	38,700	90,900	54,600	1,080	120.0	40.0
$1\frac{1}{8}$ –7	68,700	18,900	80,100	42,100	115,000	69,000	1,200	150.0	50.0
$1\frac{1}{4}$ –7	87,200	24,000	101,700	53,500	145,000	87,000	1,320	188.0	60.0
$1\frac{3}{8}$ –6	104,000	28,700	121,300	63,800	173,000	104,000	1,620	220.0	70.0
$1\frac{1}{2}$ –6	126,000	34,800	147,500	77,600	211,000	127,000	1,800	260.0	90.0

GENERAL NOTE: For styles NTE, NTU, and NTM, the proof load and clamp load values shall be 45% of those shown in this Table.

NOTES:

- (1) For values on sizes not listed in Table 12, agreement shall be reached between purchaser and supplier.
- (2) For style NU, the proof load values shall be 110% of those shown in this Table.
- (3) The supplier shall report the torque range to achieve the clamp load values in this Table.



**Table 13 Proof Loads, Clamp Loads, and Prevailing Torques for Fine Thread Locknuts (Regardless of Finish)**

Nut Size and Threads Per Inch	Grade N2 and A Nuts		Grade N5, B, and F Nuts		Grade N8, C, and G Nuts		Prevailing Torque		
	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Proof Load, lb [Note (1)]	Clamp Load, lb [Notes (1), (3)]	Max. First Install, in.-lb	Min. First Removal, in.-lb	Min. Third Removal, in.-lb
No. 4–48	530	270	720	420	990	600	4.0	1.0	0.2
No. 6–40	800	420	1,100	640	1,500	900	8.0	1.5	0.5
No. 8–36	1,200	610	1,600	930	2,200	1,300	12.0	2.0	0.5
No. 10–32	1,600	840	2,200	1,300	3,000	1,800	17	2.5	1.0
No. 12–28	2,100	1,050	2,800	1,650	3,900	2,350	27	3.5	1.0
$\frac{1}{4}$ –28	2,900	1,500	4,000	2,300	5,450	3,250	40	5.0	1.5
$\frac{5}{16}$ –24	4,650	2,400	6,350	3,700	8,700	5,200	80	8.0	2.5
$\frac{3}{8}$ –24	7,000	3,600	9,550	5,600	13,200	7,900	110	12.0	4.0
$\frac{7}{16}$ –20	9,500	4,900	13,000	7,550	17,800	10,700	135	17.0	5.0
$\frac{1}{2}$ –20	12,800	6,550	17,400	10,200	24,000	14,400	204	22	7.5
$\frac{9}{16}$ –18	16,200	8,350	22,100	13,000	30,400	18,300	300	30	10.0
$\frac{5}{8}$ –18	20,500	10,500	27,900	16,300	38,400	23,000	420	39	12.5
$\frac{3}{4}$ –16	29,800	15,400	40,700	23,800	56,000	33,600	540	58	20
$\frac{7}{8}$ –14	40,800	12,600	55,500	32,400	76,400	45,800	840	88	30
1–14	54,400	16,800	74,100	43,300	101,900	61,100	1,080	120	40
1–12	53,000	16,400	72,300	42,300	99,500	59,700	1,080	120	40
$1\frac{1}{8}$ –12	68,500	21,200	80,400	47,500	128,000	76,800	1,200	150	50
$1\frac{1}{4}$ –12	85,800	26,600	100,900	59,700	161,000	96,600	1,320	188	60
$1\frac{3}{8}$ –12	105,200	32,500	123,600	72,900	197,000	118,000	1,620	220	70
$1\frac{1}{2}$ –12	126,500	39,100	148,600	87,700	237,000	142,000	1,800	260	90

GENERAL NOTE: For styles NTE, NTU, and NTM, the proof load and clamp load values shall be 45% of those shown in this Table.

NOTES:

- (1) For values on sizes not listed in Table 13, agreement shall be reached between purchaser and supplier.
- (2) For style NU, the proof load values shall be 110% of the values shown in this Table, excluding grades N8, C, and G.
- (3) The supplier shall report the torque range to achieve the clamp load values in this Table.

**Table 14 Proof Loads, Clamp Loads, and Prevailing Torques for 8-UN Series Thread Locknuts (Regardless of Finish)**

Nut Size and Threads Per Inch	Grade N2 and A Nuts		Grade N5, B, and F Nuts		Grade N8, C, and G Nuts		Prevailing Torque		
	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Proof Load, lb [Notes (1), (2)]	Clamp Load, lb [Notes (1), (3)]	Max. First Install, in.-lb	Min. First Removal, in.-lb	Min. Third Removal, in.-lb
$1\frac{1}{8}$ –8	71,150	19,600	83,000	44,200	118,600	71,200	1,200	150	50
$1\frac{1}{4}$ –8	90,000	24,800	105,000	55,900	150,000	90,000	1,320	188	60
$1\frac{3}{8}$ –8	111,000	30,600	129,500	68,900	185,000	111,100	1,620	220	70
$1\frac{1}{2}$ –8	134,250	37,000	156,600	83,400	223,750	134,300	1,800	260	90

GENERAL NOTE: For styles NTE, NTU, and NTM, the proof load and clamp load values shall be 45% of those shown in this Table.

NOTES:

- (1) For values on sizes not listed in Table 14, agreement shall be reached between purchaser and supplier.
- (2) For style NU, the proof load values shall be 110% of those shown in this Table.
- (3) The supplier shall report the torque range to achieve the clamp load values in this Table.

lowest numerical torque occurring while the nut is being backed off throughout the next 360 deg of rotation shall be recorded as the minimum first removal torque. This minimum torque shall not be less than the first removal prevailing torque value as specified in Tables 12, 13, and 14. The nut shall then be backed off until the prevailing torque element is disengaged from the bolt or mandrel thread. The nut shall be reassembled and removed two more times. On each reassembly, the nut shall be assembled to the initial first removal position, but no clamp load shall be induced in the bolt or mandrel. The test washer shall not be removed during these additional cycles.

At no time during the two additional installations and removals should the prevailing torque exceed the maximum, first install prevailing torque value as specified for the applicable grade and thread series in Tables 12, 13, and 14. During the third removal, the minimum torque occurring while the nut is being backed off throughout the first 360 deg of rotation shall be recorded. The minimum torque shall not be less than the third removal value as specified in Tables 12, 13, and 14. Sufficient time shall elapse between installation and removal cycles to prevent overheating of the test assembly.

The speed of installation and removal of the nut shall not exceed 30 rpm and shall be continuous and uniform.

#### 11.4 Optional Torque-Tension Test

When torque-tension data are desired by the purchaser, refer to IFI-101.

#### 11.5 Test Devices, Washers, Bolts, and Mandrels

**11.5.1 Torque-Measuring Device.** The torque-measuring device, handheld or automatic, shall be capable of measuring the torque while the test locknut is rotating on a test bolt. The measuring devices and/or system shall be accurate within  $\pm 2\%$  of the device scale from 20% through 100% of the full scale. Devices should not be used in the lower 20% of their full-scale capability.

**11.5.2 Load-Measuring Device.** The load-measuring device used in the prevailing torque test shall be capable of measuring the actual tension induced in the test bolt as the nut is tightened. The measuring devices and/or system shall be accurate within  $\pm 5\%$  of the device scale from 20% through 100% of the full scale. The bolt clearance hole in the backing plate behind the washer shall have the same diameter and tolerance as the test washer.

**11.5.3 Test Washer.** Washers or multiple-hole test strips shall be plain finished and hardened to HRC 38 minimum. The washer's outside diameter or strip width shall be larger than the maximum across corners or flange diameter, whichever is greater, of the locknuts being tested. The inside diameter of the through hole shall conform to the inside hole diameters specified in

either ASME B18.21.1, Type A, or ASTM F436 for sizes through 1 in. in diameter. Washers for sizes over 1 in. shall have an inside diameter of 108% of the nominal bolt or mandrel diameter with a +0.032 tolerance.

Washers and strips shall not be used for more than one test per hole on each side.

**11.5.4 Test Bolt.** The test bolt may be used for proof load and prevailing torque testing for all sizes.

The bolt shall have threads conforming to Class 2A tolerances as specified in ASME B1.1. Threads on all bolts 1 in. in diameter and smaller shall be produced by thread rolling. Bolt length shall be such that a minimum length equivalent to six thread pitches, as measured from the end of the bolt, will protrude through the nut when the nut is seated against the test washer. Thread length shall be such that a minimum of two full threads are within the grip after the nut is seated. The bolt shall be pointed in accordance with the dimensional requirements for hex cap screws as given in ASME B18.2.1. The thread surface shall be free of burrs or other contamination that might affect an accurate determination of the prevailing torque developed by the nut.

The test bolt shall have a minimum specified tensile strength not less than the specified proof load of the nut to be tested. The test bolts shall have a zinc phosphate and oil finish according to grade D of ASTM F1137.

The bolts shall conform to the surface discontinuity requirements of ASTM F788. When test bolts less than  $\frac{3}{4}$  in. in diameter are used, a new bolt shall be used for testing each nut. Bolts  $\frac{3}{4}$  in. and larger in diameter may be reused if upon nonmagnified (except for personal corrective lenses) visual inspection, the thread does not show thread flank deformation or grooving.

**11.5.5 Proof Load Testing Mandrel.** Proof load testing mandrels may be used for proof load testing all nut sizes.

The threaded mandrel used for proof load testing of nuts shall have threads conforming to Class 3A tolerances as specified in ASME B1.1, except that the major diameter shall be the minimum major diameter with a plus tolerance of 0.002 in. The mandrel shall be quenched and tempered to a hardness range of HRC 45–HRC 50.

Test mandrels may be reused if upon nonmagnified (except for personal corrective lenses) visual inspection the thread flanks are not visibly deformed or grooved.

**11.5.6 Prevailing Torque Testing Mandrel.** Prevailing torque testing mandrels may be used for all nut sizes.

The threaded mandrel used for prevailing torque testing of nuts shall have threads conforming to Class 2A tolerances for both the pitch diameter and major diameter as specified in ASME B1.1. The mandrel shall be quenched and tempered to a hardness range of HRC 45–HRC 50.

Test mandrels may be reused if upon nonmagnified (except for personal corrective lenses) visual inspection the thread flanks are not visibly deformed or grooved.



NOTE: Threaded mandrels with a pitch diameter size between the low limit of Class 3A and the high limit of Class 2A, and a major diameter size within the limits of low limit 3A with a tolerance of minus zero plus 0.002 in., can be used for testing both proof load and prevailing torque.

## 12 GRADES AND MANUFACTURING MARKING

### 12.1 Grade and Source Markings

Markings may be on the top or the wrench flats of locknuts or on the top of flanges for flange nuts. Markings on the top of locknuts or on flanges may be raised or depressed at the option of the manufacturer. Markings on the wrench flats and bearing surfaces of locknuts shall be depressed. Locknuts must conform to all locknut dimensions when measurements are made over the marks. For nuts larger than 1½ in., the nature and location of markings shall be based on an agreement between the purchaser and supplier.

### 12.2 Grade Marking Requirements and Options

Nut grades N5, B, and F locknuts shall be marked with three equally spaced (120 deg) identical symbols on the top side of the nut.

Nut grades N8, C, and G locknuts shall be marked with six equally spaced (60 deg) identical symbols on the top side of the nut.

Alternatively, grades F and G may be marked on the tops of the flange.

Alternatively, when grades N5, N8, B, and C locknuts are machined from bar stock, grades N5 and B locknuts may be identified with one set of circumferential notches cut into the corners of the nut and grades N8 and C locknuts with two sets of circumferential notches cut into the corners of the nut.

### 12.3 Source Marking and Options

All grade N5, N8, B, F, C, and G locknuts shall be uniquely marked or color coded to identify the manufacturer. Such markings may be separate from the grade markings or may be incorporated into one or more of the three or six grade marking symbols.

Insert color may be used as a manufacturer's identification on nylon insert locknuts provided the color is registered to the manufacturer on the U.S. Department of Commerce list of registered FQA Insignias, <http://www.uspto.gov/trademarks/law/fastener/fqa.jsp>.

## 13 QUALITY ASSURANCE

### 13.1 Dimensional Inspection Sampling

Sampling and procedures for dimensional inspections shall be in accordance with ASME B18.18.

### 13.2 Performance and Mechanical Testing Sampling

Sampling for performance and mechanical requirements shall be done in accordance with ASTM F1470.

### 13.3 Modification After Delivery

The supplier shall not be responsible for nonconformances resulting from any modification of the parts after delivery to the purchaser.

## 14 WORKMANSHIP

Nuts shall be free of surface irregularities (e.g., burrs, seams, laps, loose scale) that might affect their serviceability. When control of surface irregularities is important for the intended application, ASTM F812 shall be specified by the purchaser.

## 15 DESIGNATION

### 15.1 Nylon Insert Nuts

Nylon insert locknuts shall be designated by the following data preferably in the sequence as follows:

- (a) product name
- (b) designation of standard (i.e., ASME B18.16.6)
- (c) nominal diameter and threads per inch
- (d) style of locknut (NM, NU, etc.)
- (e) steel property grade or material identification
- (f) protective coating, if required
- (g) torque-tension data per IFI-101, if required

EXAMPLE: Nylon insert locknut, ASME B18.16.6, ½–13, NE, grade N8, zinc plated per ASTM F1941/F1941M, Fe/Zn 5C.

### 15.2 All-Metal Locknuts

All-metal locknuts shall be designated by the following data preferably in the sequence as follows:

- (a) product name and type
- (b) designation of standard (i.e., ASME B18.16.6)
- (c) nominal diameter and threads per inch
- (d) steel grade or material identification
- (e) protective coating, if required
- (f) torque-tension data per IFI-101, if required

EXAMPLE: All-metal hex flange locknut, ASME B18.16.6, ⅝–11, grade F, zinc plated per ASTM F1941/F1941M, Fe/Zn 5C.

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Small Solid Rivets .....	B18.1.1-1972 (R2016)
Large Rivets .....	B18.1.2-1972 (R2016)
Metric Small Solid Rivets .....	B18.1.3M-1983 (R2016)
Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series) .....	B18.2.1-2012
Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series) .....	B18.2.2-2015
Metric Heavy Hex Screws .....	B18.2.3.3M-2007 (R2014)
Metric Hex Bolts .....	B18.2.3.5M-1979 (R2016)
Metric Heavy Hex Flange Screws .....	B18.2.3.9M-2001 (R2014)
Metric Slotted Hex Nuts .....	B18.2.4.3M-1979 (R2017)
Metric 12-Point Flange Head Screws .....	B18.2.5M-2013
Metric Fasteners for Use in Structural Applications .....	B18.2.6M-2012
Clearance Holes for Bolt, Screws, and Studs .....	B18.2.8-1999 (R2017)
Straightness Gage and Gaging for Bolts and Screws .....	B18.2.9-2010 (R2017)
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Round Head Bolts (Inch Series) .....	B18.5-2012
Wood Screws (Inch Series) .....	B18.6.1-1981 (R2016)
Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws (Inch Series) .....	B18.6.2-1998 (R2010)
Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series) .....	B18.6.3-2013
Thumb Screws and Wing Screws (Inch Series) .....	B18.6.8-2010 (R2017)
Wing Nuts (Inch Series) .....	B18.6.9-2010 (R2017)
General Purpose Semi-Tubular Rivets, Full Tubular Rivets, Split Rivets and Rivet Caps .....	B18.7-2007 (R2017)
Metric General Purpose Semi-Tubular Rivets .....	B18.7.1M-2007 (R2017)
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# ASME B18.16.6-2017

ISBN 978-0-7918-7066-2



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