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AN AMERICAN NATIONAL STANDARD

TRACK BOLTS AND NUTS

ANSI/ASME B18.10 - 1982

[REVISION OF ANSI B18.10-1963 (1975)]

SPONSORED AND PUBLISHED BY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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FOREWORD

Sectional Committee B18 on Dimensional Standardization of Bolts, Nuts, Rivets, Screws, and Similar Fasteners was organized in March 1922, under the procedure of the American Standards Association with the Society of Automotive Engineers and The American Society of Mechanical Engineers as joint sponsors.

Following the organization of the Sectional Committee, subcommittees were appointed to facilitate development of standards for the several types of bolts and nuts within the scope of its activity. Subcommittee No. 4 on Track Bolts and Nuts was organized in March 1923. With the cooperation of the Rail Committee of the American Railway Engineering Association, Engineering Division of the American Railway Association, a study was made first of the various types of track bolts in use in the United States. In March 1924 two series of proposed standard dimensions for track bolt heads were developed conforming to that practice. This activity finally resulted in the approval and issuance of an American Standard known as B18d in November 1930.

Following its reorganization, the Sectional Committee in February 1947 decided that further study should be made of the existing standards. Some types and sizes were no longer required nor specified by users. Furthermore, manufacturers presented data on the multiplicity of designs and dimensional features of nuts and bolts which complicated stock sizes, dies, and tools.

Therefore, a new subcommittee was formed in May 1947. It was agreed that a comprehensive series of tests would be beneficial, particularly in determining dimensional features of track nuts as compared to the strength and design of the track bolt. Plans for the tests were developed in detail and conducted at one of the Republic Steel Corporation's plants in Cleveland, Ohio during 1947 and 1948. These tests were mostly of the static tension type and involved hundreds of specimens and literally thousands of measurements.

Analysis of these tests indicated the desirability of making a series of torque tests which would be more in the nature of actual usage of track bolts and nuts in service.

Testing equipment was assembled and the actual work was conducted at the Roanoke, Va., Shops of the Norfolk & Western Railway during 1949, using special equipment devised for the purpose. The resulting data have served as a guide in arriving at the revised standards presented in the table.

Practical features were also taken into consideration in connection with some of the dimensions, both of track bolts and track bolt nuts, to provide for usage in the field. All of the sizes in use for specific applications have not been included, because it would be impossible to incorporate all special sizes without enlarging the tables to an impractical extent.

The Subcommittee worked closely with committees of the American Railway Engineering Association and the American Iron and Steel Institute having jurisdiction in track bolt and nut standardization and these committees concur in principle with the revision that has been prepared. Their assistance and cooperation in arriving at the revised standards was important and is fully recognized.

The foregoing work resulted in the issuance of a revised standard known as American Standard Track Bolts and Nuts ASA B18.10-1952.

At a meeting on May 23, 1958, the Subcommittee proposed that several revisions of the standards be considered to simplify certain features and bring them up to date. These revisions were given further study in collaboration with the AREA Rail Committee, and at a meeting on May 12, 1960, the Subcommittee recommended certain revisions in provisions for the wrench turn fit, correction of errors in the "H" dimensions for the 5/8 and 1-1/8 in. diameter bolts in Table 1, elimination of the dimensions for the 1-1/4 in. diameter track bolt and nut as this size had not been used, and addition of a drawing to Table 3 to show the 25 deg. chamfer track bolt nut in addition to the 60 deg. chamfer track bolt nut. Later, the minimum dimensions for thickness U of the track bolt nuts in Table 3 were revised to correspond to the ASA B18.2-1960 Standard. A revised draft incorporating the recommended changes received letter ballot approval of the Sectional Committee on August 29, 1962, and on receipt of sponsor approval was submitted to the

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American Standards Association with the recommendation for approval as an American Standard. This approval was granted on May 22, 1963.

In October 1981, the Subcommittee was requested to review the current specification dated 1963, reaffirmed 1975. This review resulted in modification of the section on threads/thread-fit to conform with other standards on track bolts and nuts regarding terminology being used for measuring allowable resistance on free and wrench fit nuts. Other changes include cross-reference to specific ASTM/AREA standards and appropriate ANSI specifications.

This Standard was approved by letter ballot of committee B18 on May 11, 1982. It was subsequently approved by the Sponsor and submitted to the American National Standards Institute for designation as an American National Standard. This designation was granted on November 2, 1982.

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TRACK BOLTS AND NUTS

1 GENERAL

All types of track bolts and nuts used by the various railroads and electric railways in the United States and Canada were studied by the committee, and it is their belief that the recommended dimensions are based on sound engineering design to meet existing conditions, present usage, and where possible, simplification of manufacture. Manufacturers of track bolts and nuts furnished data to the committee on sizes and types purchased over an extended period to determine the most generally used design. A program of static and torsion testing was conducted to establish the best engineering design, taking into account present-day joint bar designs, use of power wrenches, and other factors.

Tolerances for the heads, necks, and bodies of track bolts, and the dimensions of track bolt nuts are made adequate for good manufacturing practice with the thought in mind that manufacturers will use working gages to keep within the limits, and thus ensure that the product will pass the user's inspection.

2 SIZES

In ordering bolts it is essential to specify the nominal diameter over the threaded portion, shown as D in Tables 1 and 2, and not the body diameter. In the upper portion of Tables 1 and 2 the sizes vary by 1/8 in. increments, while the lower section of these tables lists the intermediate 1/16 in. sizes now in limited use, but not recommended for new design.

3 HEADS

The design and dimensions of the heads have been established since 1930. This type of head, commonly referred to as the mushroom head, consists of a cross-section which has the top periphery formed by three radii. Tests have shown this type of head to be stronger than a round or button type of the same outside diameter, since the thickness of the head at the edges is increased.

4 NECKS

Types of track bolts are designated as "oval neck" and "elliptic neck." The oval neck type is in most general use, but some large systems have found advantages in the use of the elliptic neck for their particular conditions, and this type is included to take care of their requirements.

5 BODY DIAMETERS

The body diameter is not specified because of different methods of manufacture. The type of track bolt in general use has the thread rolled to a larger diameter than the body. Bodies of these bolts are approximately 1/16 in. smaller in diameter than the threaded section. When cut threads are specified, the body diameter is approximately equal to the outside diameter of the threaded section.

6 THREADS AND THREAD FIT

Thread form shall be in accordance with American National Standard for Unified Screw Threads, ANSI B1.1. Bolt threads may be formed by cutting or rolling at the option of the manufacturer. Two classes of fit may be specified, (a) free fit, and (b) wrench turn fit.

(a) Free Fit. Threads for free fit shall conform as closely as practicable to the American National Standard limits for unified coarse thread series class 2A for bolts and 2B for nuts. The torque for free fit shall be the maximum experienced during assembly.

(b) Wrench Turn Fit. The nut shall have a free fit for at least two threads in starting on the bolts. When

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engaged for the thickness of the nut plus two threads, the torque shall meet the minimum and maximum specified below. When engaged for the remainder of the thread length, the torque shall not exceed the maximum requirement.

	Torque, lb-ft	
	Min.	Max.
Low-carbon nuts	10	90
Medium-carbon nuts	10	110

7 NUTS

In the upper portion of Table 3 only the 1/8 in. sizes are listed, and the dimensions across the flats are the same as the American National Standard Heavy Square Series. The thickness for the optional low carbon nut is 1/8 in. greater than the American National Standard Heavy Square Nut. A large number of torque tests were made which established the fact that the additional 1/8 in. thickness was required for the optional low carbon steel nuts to break heat-treated carbon steel track bolts. Results of similar torque tests proved that medium carbon nuts of American National Standard Heavy Square dimensions are capable of breaking heat-treated carbon steel track bolts. When medium carbon steel nuts are specified, the American National Standard Heavy Square Nuts ANSI B18.2.2 are recommended. The lower section of Table 3 lists the intermediate 1/16 in. sizes, and also the 1 in. and 1-1/8 in. sizes now in limited use, but not recommended for new design.

8 MATERIAL

Satisfactory materials for track bolts and nuts are covered by current specifications of the American Society for Testing and Materials (A 183) and the American Railway Engineering Association Manual (Design of Track Bolts and Nuts).

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TRACK BOLTS AND NUTS

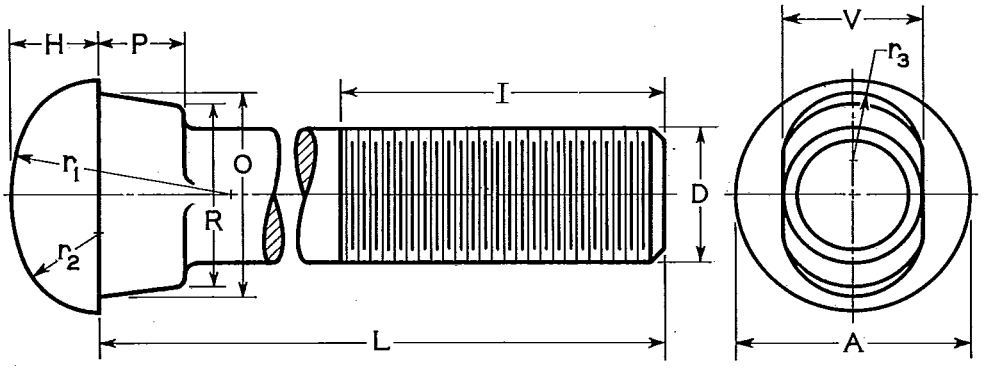


TABLE 1 OVAL NECK TRACK BOLTS

Nominal Diameter Over Thread [Notes (1), (2)]	Head				Neck					Length Under Head	Min. Thread Length	Threads/in.
D	A	H	r_1	r_2	O	R	P	r_3	V	L	I	
1/2	7/8	5/16	11/16	9/32	5/8	19/32	5/16	1/2	Same	Under 7 in.	1-1/8	13
5/8	1-5/64	25/64	59/64	23/64	13/16	25/32	3/8	body	as	by steps	1-1/4	11
3/4	1-9/32	15/32	1-5/32	7/16	1-1/16	1-1/32	7/16	diam.	body	of 1/4 in.	1-3/4	10
7/8	1-31/64	35/64	1-25/64	33/64	1-7/32	1-3/16	1/2	of	diam.	From 7 to	2	9
1	1-11/16	5/8	1-5/8	19/32	1-3/8	1-11/32	9/16	bolt	of	10 in.	2-1/4	8
1-1/8	1-57/64	45/64	1-55/64	43/64	1-17/32	1-1/2	5/8		bolt	by steps	2-1/2	7
										of 1/2 in.		
Additional sizes now in use but not recommended for new design												
13/16	1-9/32	15/32	1-5/32	7/16	1-1/16	1-1/32	7/16	Same	Same	Same	1-7/8	10
15/16	1-31/64	35/64	1-25/64	33/64	1-7/32	1-3/16	1/2	as	as	as	2-1/8	9
1-1/16	1-11/16	5/8	1-5/8	19/32	1-3/8	1-11/32	9/16	above	above	above	2-3/8	8

GENERAL NOTES:
(a) All dimensions are given in inches.
(b) *Tolerances:* Length (L) plus or minus 1/8 in.
Neck (O and R) plus or minus 1/32 in.
Head (A and H) plus or minus 1/16 in.

NOTES:
(1) In ordering bolts, specify the nominal diameter (D) over the threads and not the body diameter.
(2) Standard sizes for industrial use are 1/2, 5/8, 3/4, 7/8, and 1 in. with free fit ANSI heavy square nuts.

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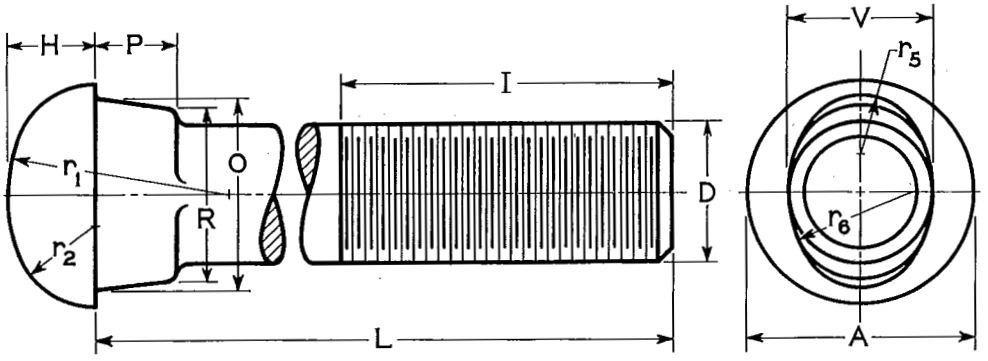


TABLE 2 ELLIPTIC NECK TRACK BOLTS

Nominal Diameter Over Thread [Note (1)]	Head				Neck						Length Under Head	Min. Thread Length	Threads/in.
D	A	H	r_1	r_2	O	R	P	r_5	r_6	V	L	I	
3/4	1-9/32	15/32	1-5/32	7/16	63/64	61/64	7/16	9/32	41/64	Same as body diam. of bolt	Under 7 in. by steps of 1/4 in. From 7 to 10 in. by steps of 1/2 in.	1-3/4	10
7/8	1-31/64	35/64	1-25/64	33/64	1-3/16	1-5/32	1/2	5/16	51/64			2	9
1	1-11/16	5/8	1-5/8	19/32	1-3/8	1-11/32	9/16	3/8	15/16			2-1/4	8
1-1/8	1-57/64	45/64	1-55/64	43/64	1-1/2	1-15/32	5/8	7/16	1			2-1/2	7
Additional sizes now in use but not recommended for new design													
13/16	1-25/64	33/64	1-9/32	31/64	1-1/8	1-3/32	15/32	19/64	25/32	Same as above	Same as above	1-3/4	10
15/16	1-19/32	19/32	1-33/64	9/16	1-7/32	1-3/16	17/32	23/64	25/32			2	9
1-1/16	1-51/64	43/64	1-3/4	41/64	1-7/16	1-13/32	19/32	25/64	31/32			2-1/4	8

GENERAL NOTES:

(a) All dimensions are given in inches.

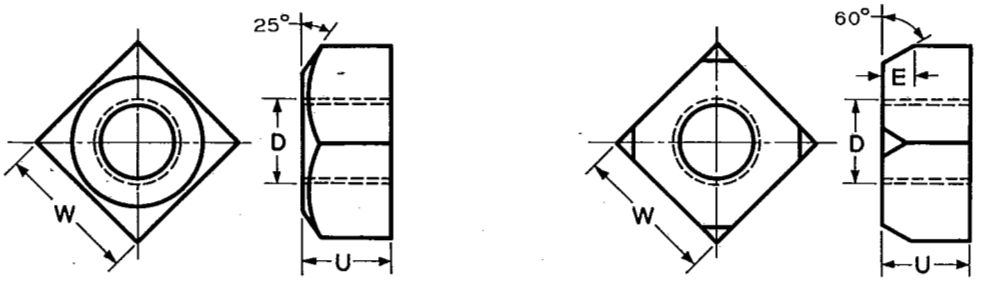
(b) *Tolerances:* Length (L) plus or minus 1/8 in.
Neck (O and R) plus or minus 1/32 in.
Head (A and H) plus or minus 1/16 in.

NOTE:

(1) In ordering bolts, specify the nominal diameter (D) over the threads and not the body diameter.

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STANDARD NUT OPTIONAL NUT

TABLE 3 TRACK BOLT NUTS

Nominal Diameter	Width Across Flats (W)			Thickness (U)						Chamfer (Optional Nut Only) [Note (1)]
				Recommended for Medium Carbon Nuts			Recommended for Low Carbon Nuts			
D	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	E
3/4	1-1/4	1.2500	1.212	3/4	0.774	0.710	7/8	0.901	0.833	1/4
7/8	1-7/16	1.4375	1.394	7/8	0.901	0.833	1	1.028	0.956	1/4
1	1-5/8	1.6250	1.575	1	1.028	0.956	1-1/8	1.155	1.079	3/8
1-1/8	1-13/16	1.8125	1.756	1-1/8	1.155	1.079	1-1/4	1.282	1.187	1/2
Additional sizes now in use but not recommended for new design										
13/16	1-1/4	1.2500	1.212	....	....	....	7/8	0.901	0.833	1/4
15/16	1-1/2	1.5000	1.450	....	....	....	1-1/8	1.155	1.079	3/8
1	1-1/2	1.5000	1.450	....	....	....	1-1/8	1.155	1.079	3/8
1-1/16	1-5/8	1.6250	1.575	....	....	....	1-1/8	1.155	1.079	3/8
1-1/8	1-11/16	1.6875	1.631	....	....	....	1-1/4	1.282	1.187	1/2

GENERAL NOTES:

(a) All dimensions are given in inches.

(b) 60 deg. chamfer is optional when specified. (Dimensions for medium carbon nuts are the same as American National Standard Heavy Square Nut, ANSI B18.2.2 for sizes shown.)

NOTE:

(1) This dimension is not specified in ANSI B18.2.2, which specifies diameter of top circle instead.

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Small Solid Rivets B18.1.1–1972 (R1977)
Large Rivets B18.1.2–1972 (R1977)
Square And Hex Bolts And Screws B18.2.1–1981
Square And Hex Nuts B18.2.2–1972
Metric Hex Cap Screws B18.2.3.1M–1979
Metric Formed Hex Screws B18.2.3.2M–1979
Metric Heavy Hex Screws B18.2.3.3M–1979
Metric Hex Flange Screws B18.2.3.4M–1979
Metric Hex Bolts B18.2.3.5M–1979
Metric Heavy Hex Bolts B18.2.3.6M–1979
Metric Heavy Hex Structural Bolts B18.2.3.7M–1979
Metric Hex Lag Screws B18.2.3.8M–1981
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Metric Hex Flange Nuts B18.2.4.4M–1982
Metric Hex Jam Nuts B18.2.4.5M–1979
Metric Heavy Hex Nuts B18.2.4.6M–1979
Socket Cap, Shoulder And Set Screws-Inch Series B18.3–1982
Socket Head Cap Screws (Metric Series) B18.3.1M–1982
Metric Series Hexagon Keys And Bits B18.3.2M–1979
Hexagon Socket Head Shoulder Screws: Metric Series B18.3.3M–1979
Hexagon Socket Button Head Cap Screws: Metric Series B18.3.4M–1979
Metric Series Hexagon Socket Set Screws B18.3.6M–1979
Round Head Bolts (Inch Series) B18.5–1978
Metric Round Head Short Square Neck Bolts B18.5.2.1M–1981
Metric Round Head Square Neck Bolts B18.5.2.2M–1982
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Slotted Headless Set Screws B18.6.2–1972 (R1977)
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Track Bolts And Nuts B18.10–1982
Miniature Screws B18.11–1961 (R1975)
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Forged Eyebolts B18.15–1969
Mechanical And Performance Requirements For Prevailing-Torque Type
Steel Metric Hex Nuts And Hex Flange Nuts B18.16.1M–1979
Torque-Tension Test Requirements For Prevailing Torque Type
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