AMERICAN NATIONAL STANDARD

Metric Hex Bolts

ANSI B18.2.3.5M - 1979

Government Key Words:
Bolt, Hex—Metric

REAFFIRMED 2016

SECRETARIAT

SOCIETY OF AUTOMOTIVE ENGINEERS
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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United Engineering Center 345 East 47th Street New York, N. Y. 10017

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This non-Government document was adopted on 26 April 1979 and is approved for use by the DoD and Federal Agencies. Metric hex bolts shall conform to this document and Appendix III, which establishes standard items for Government application. Appendix III, Table 4 shall be used for item selection in accordance with the part numbering system and size information contained therein. The indicated industry group has furnished the clearances required by existing regulations. Copies of the document are stocked by DoD Single Stock Point, Naval Publications and Forms Center, Philadelphia, PA, 19120, for issue to DoD activities and Federal Agencies only. Contractors and industry groups must obtain copies directly from:

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FSC 5306

Date of Issuance: August 31, 1979

ERRATA

to

ANSI B18.2.3.5M-1979
METRIC HEX BOLTS

Page 3, Note 18, *change* B1.13 *to read* B1.13M

Page 5, in the standard shall be replaced with the second page of this errata

Page 10, MATERIAL AND FINISH CODE, *change to read:*

A – Steel w/Cadmium Plating per QQ-P-416, Type II, Class 3 (5.1μm Plating Thickness), Property Class 10.9.

B – Steel w/Zinc Plating per QQ-Z-325, Type II, Class 3 (5.1μm Plating Thickness), Property Class 10.9.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
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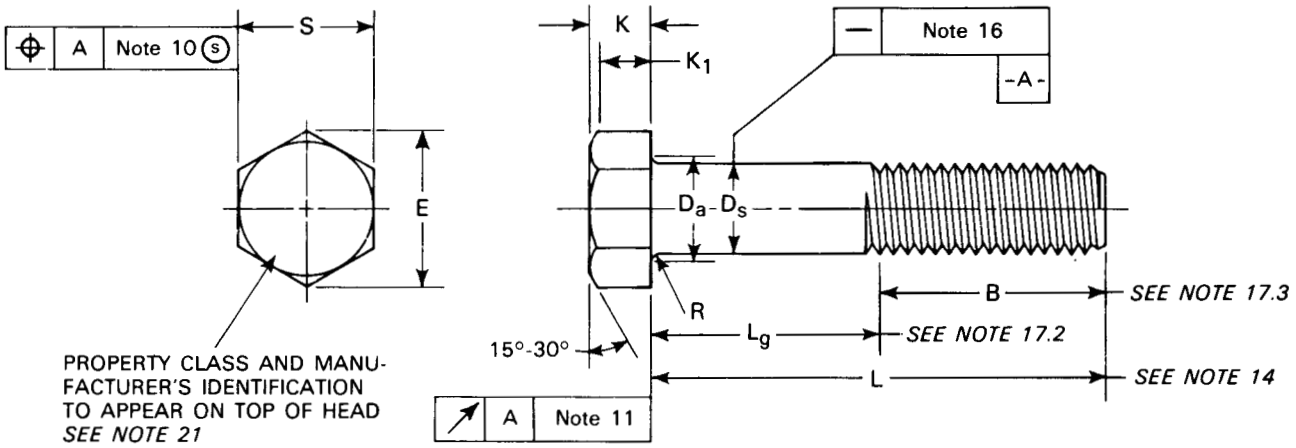

Table 1 Dimensions of Hex Bolts

D	Ds		S		E		K		K_1	Da	R	B (Ref)		
												Thread Length (Basic)		
Nominal Bolt Dia and Thread Pitch	Body Diameter		Width Across Flats		Width Across Corners		Head Height		Wrenching Height	Fillet Transition Dia	Radius of Fillet	Bolt Lengths ≤ 125	Bolt Lengths > 125 and ≤ 200	Bolt Lengths > 200
	Max	Min	Max	Min	Max	Min	Max	Min	Min	Max	Min			
M5 x 0.8	5.48	4.52	8.00	7.64	9.24	8.63	3.88	3.35	2.4	5.7	0.2	16	22	35
M6 x 1	6.19	5.52	10.00	9.64	11.55	10.89	4.38	3.85	2.8	6.8	0.3	18	24	37
M8 x 1.25	8.58	7.42	13.00	12.57	15.01	14.20	5.68	5.10	3.7	9.2	0.4	22	28	41
M10 x 1.5	10.58	9.42	16.00	15.57	18.48	17.59	6.85	6.17	4.5	11.2	0.4	26	32	45
M12 x 1.75	12.70	11.30	18.00	17.57	20.78	19.85	7.95	7.24	5.2	13.7	0.6	30	36	49
M14 x 2	14.70	13.30	21.00	20.16	24.25	22.78	9.25	8.51	6.2	15.7	0.6	34	40	53
M16 x 2	16.70	15.30	24.00	23.16	27.71	26.17	10.75	9.68	7.0	17.7	0.6	38	44	57
M20 x 2.5	20.84	19.16	30.00	29.16	34.64	32.95	13.40	12.12	8.8	22.4	0.8	46	52	65
M24 x 3	24.84	23.16	36.00	35.00	41.57	39.55	15.90	14.56	10.5	26.4	0.8	54	60	73
M30 x 3.5	30.84	29.16	46.00	45.00	53.12	50.55	19.75	17.92	13.1	33.4	1.0	66	72	85
M36 x 4	37.00	35.00	55.00	53.80	63.51	60.79	23.55	21.62	15.8	39.4	1.0	78	84	97
M42 x 4.5	43.00	41.00	65.00	62.90	75.06	71.71	27.05	25.03	18.2	45.4	1.2	90	96	109
M48 x 5	49.00	47.00	75.00	72.60	86.60	82.76	31.07	28.93	21.0	52.0	1.5	102	108	121
M56 x 5.5	57.20	54.80	85.00	82.20	98.15	93.71	36.20	33.80	24.5	62.0	2.0	–	124	137
M64 x 6	65.52	62.80	95.00	91.80	109.70	104.65	41.32	38.68	28.0	70.0	2.0	–	140	153
M72 x 6	73.84	70.80	105.00	101.40	121.24	115.60	46.45	43.55	31.5	78.0	2.0	–	156	169
M80 x 6	82.16	78.80	115.00	111.00	132.79	126.54	51.58	48.42	35.0	86.0	2.0	–	172	185
M90 x 6	92.48	88.60	130.00	125.50	150.11	143.07	57.74	54.26	39.2	96.0	2.0	–	192	205
M100 x 6	102.80	98.60	145.00	140.00	167.43	159.60	63.90	60.10	43.4	107.0	2.5	–	212	225
See Notes	12				6.9		7		8	13		17.3		
M10 x 1.5	10.58	9.42	15.00	14.57	17.32	16.46	6.85	6.17	4.5	11.2	0.4	26	32	45

*See Note 2.2 of General Data.

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 American Standards Institute and, as of October 6, 1969, the American National Standards Institute, Inc.), with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors. Subcommittee 2 was subsequently established and charged with the responsibility for technical content of standards covering wrench head bolts and nuts.

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

At a meeting on September 22, 1976, Subcommittee 2 organized the contents of a standard covering eight different hex head screw and bolt products. Actual drafting was postponed until ISO/TC2 could reach final decisions relating to basic dimensions and characteristics of hex bolts, screws and nuts. At ISO/TC2 meetings held in April 1977, final actions were taken. Committee B18 affirmed the TC2 decisions at a meeting on June 29, 1977 and drafting of this standard was started.

In February 1978, Committee B18 established a cooperative program with the Department of Defense to draft American National Standards for metric fasteners in such a way that they could be used directly by the Government for procurement purposes. The Department of Defense requested that each of the eight products be covered in separate standards, and Subcommittee 2 accepted this approach at its meeting on June 27, 1978.

This standard was approved by letter ballot of Committee B18 on September 15, 1978, and was subsequently approved by the secretariat and submitted to the American National Standards Institute for designation as an American National Standard. This was granted on April 26, 1979.

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CONTENTS

AMERICAN NATIONAL STANDARD

METRIC HEX BOLTS

GENERAL DATA

1. Scope

1.1 This standard covers the complete general and dimensional data for metric hex bolts recognized as "American National Standard."

1.2 The inclusion of dimensional data in this standard is not intended to imply that all of the sizes in conjunction with the various options described herein are stock production items. Consumers are requested to consult with manufacturers concerning lists of stock production hex bolts.

1.3 Hex bolts purchased for Government use shall conform to this standard, and additionally to the requirements of Appendix III.

2. Comparison With ISO Standards

2.1 Hex bolts as presented in this standard have been coordinated, to the extent possible, with ISO 4016. The dimensional differences between this ANSI standard and ISO 4016 are few, relatively minor, and none will affect the functional interchangeability of bolts manufactured to the requirements of either.

The following functional characteristics of hex bolts in sizes M5 thru M36 are in agreement between this ANSI standard and ISO 4016:

Diameters and thread pitches (see 26)
Body diameters
Widths across flats (see 2.2)
Head heights
Thread lengths
Thread dimensions
Nominal lengths

2.2 At its meeting in Varna, May 1977, ISO/TC2 studied several technical reports analyzing design considerations influencing determination of the best series of width across flats for hexagon bolts, screws and nuts. A primary technical objective was to achieve a logical ratio between under head (nut) bearing surface area (which determines the magnitude of the compressive stress on the bolted members) and the tensile stress area of the screw thread (which governs the clamping force that can be developed by tightening the fastener.) Table 1 lists the sizes selected by ISO/TC2 to be ISO standard.

M10 bolts with 15 mm width across flats are currently being produced and used in U.S.A. and many other countries of the world. This size, however, is not an ISO standard. Unless M10 bolts with 15 mm width across flats are specifically ordered, M10 bolts with 16 mm width across flats shall be furnished.

2.3 Letter symbols designating dimensional characteristics are used in accord with those used in ISO standards, except capitals have been used for data processing convenience instead of lower case letters used in ISO standards.

3. Dimensions

3.1 All dimensions in this standard are in millimeters, unless stated otherwise.

3.2 Symbols specifying geometric characteristics are in accord with American National Standard, Dimensioning and Tolerancing, ANSI Y14.5-1973.

4. Availability. Hex bolts in sizes M5 thru M24 are standard only in lengths longer than 150 mm or 10D, whichever is shorter. When shorter lengths of these sizes are ordered, hex cap screws, in conformance with ANSI B18.2.3.1M, are normally supplied. Hex bolts in sizes M30 and larger are standard in all lengths, however, at manufacturer's option, hex cap screws may be substituted for any diameter-length combination.