

**ASME B1.7-2006**  
(Revision of ANSI/ASME B1.7M-1984)

# **Screw Threads: Nomenclature, Definitions, and Letter Symbols**

**AN AMERICAN NATIONAL STANDARD**



The American Society of  
Mechanical Engineers

**ASME B1.7-2006**  
(Revision of ANSI/ASME B1.7M-1984)

# **Screw Threads: Nomenclature, Definitions, and Letter Symbols**

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

Three Park Avenue • New York, NY 10016

Date of Issuance: November 17, 2006

This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda or written interpretations of the requirements of this Standard issued to this edition.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under the procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment, which provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not “approve”, “rate,” or “endorse” any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assumes any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form,  
in an electronic retrieval system or otherwise,  
without the prior written permission of the publisher.

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

Copyright © 2006 by  
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
All rights reserved  
Printed in U.S.A.

# CONTENTS

Foreword . . . . .	v
Committee Roster . . . . .	vi
<b>1 General</b> . . . . .	<b>1</b>
<b>2 Definition of Terms</b> . . . . .	<b>1</b>
<b>Figures</b>	
1 Allowance . . . . .	2
2 Axis of Thread . . . . .	2
3 Best Wire Size . . . . .	2
4 Blunt Start Thread . . . . .	3
5 Bottom of Chamfer . . . . .	4
6 Clearance Flank . . . . .	4
7 Countersink . . . . .	4
8 Crest . . . . .	4
9 Root and Crest Truncation . . . . .	5
10 Fundamental Deviation . . . . .	6
11 Metric Tolerance System for Screw Threads . . . . .	7
12 Element . . . . .	7
13 Flank . . . . .	7
14 Flank Angle . . . . .	7
15 Flat Form . . . . .	7
16 Following Flank . . . . .	8
17 Gauge Plane . . . . .	8
18 Height of Fundamental Triangle . . . . .	8
19 Height of Thread . . . . .	9
20 Height of Thread Engagement . . . . .	9
21 Helix . . . . .	9
22 Helix Variation (Drunken Thread) . . . . .	9
23 Incomplete Thread . . . . .	10
24 Interference Fit . . . . .	11
25 Internal Thread . . . . .	11
26 Lead . . . . .	11
27 Leading Flank . . . . .	11
28 Gaging Length . . . . .	11
29 Length of Assembly . . . . .	11
30 Length of Thread Engagement . . . . .	12
31 Load Flank . . . . .	12
32 Major Clearance . . . . .	12
33 Major Diameter, External Thread . . . . .	12
34 Major Diameter, Internal Thread . . . . .	12
35 Major Diameter, Internal Thread (Rounded Form) . . . . .	12
36 Major Diameter, Taper Thread . . . . .	12
37 Minor Clearance . . . . .	13
38 Minor Diameter, External Thread (Flat Form) . . . . .	14
39 Minor Diameter, External Thread (Rounded Form) . . . . .	14
40 Minor Diameter, Internal Thread . . . . .	14
41 Minor Diameter, Taper Thread . . . . .	14
42 Multiple Start Thread . . . . .	14

43	Pitch	14
44	Pitch Cone	14
45	Pitch Cylinder	14
46	Pitch Diameter, External Thread	15
47	Pitch Diameter, Internal Thread	15
48	Plane of Vanish Point	15
49	Profile, Basic Thread	16
50	Root Radius	16
51	Screw Thread	16
52	Sharp Crest and Root	16
53	Shear Area	17
54	Straight Thread	18
55	Thread Angle	23
56	Thread Ridge Thickness	23
57	Truncation	23
58	Vanish Cone	24

**Tables**

1	General Symbols	19
2	ISO General Symbols	20
3	Thread Series Designations	21
4	ISO Thread Series Designations	22

**Nonmandatory Appendices**

A	Superseded Thread Series Designations	25
B	ISO Symbols for Screw Threads	26
C	Greek Alphabet	27

# FOREWORD

The first revision of ASA B1.7-1949, the first American Standard on Nomenclature, Definitions, and Letter Symbols for Screw Threads, was approved in January 1965. These earlier definitions and symbols were subsequently published as appendix material in ASA B1.1, B2.1, and B2.2. As such they underwent some revision over the years. A draft based on such revisions, dated July 1961, was prepared by Subcommittee 8 and widely circulated by the sponsors for comment. Extensive comments were received from members of Sectional Committee B1, B2, B4, and others, which were reviewed and acted upon at a meeting of Subcommittee 8, held November 28, 1961.

A second revised draft, dated July 1962, was prepared and submitted to the American-British-Canadian Conference on Engineering Standards, held in Harriman, New York on September 22-26, 1962. Suggested revisions agreed upon by the conference were embodied in the draft, which was then submitted to letter ballot by Sectional Committees B1 and B2 on July 9, 1963.

Further refinements were made in the proposal because of comments received from the sectional committee ballots, and a new draft was issued in May 1964. The draft was submitted to the American Standards Association for approval and designation as an American Standard. This was granted on January 19, 1965, and reaffirmed in 1972 by the American National Standards Institute as American National Standard ANSI B1.7.

Following the 1972 reaffirmation, comments from members of the American National Standards Committee B1, and others, indicated that a complete revision be undertaken. A new draft was prepared and submitted in March 1975 to Subcommittee 7 for review and approval. After numerous comments and subsequent changes, the proposed standard was submitted to and approved by American National Standards Committee B1. The document was then transmitted to the Secretariat and ANSI in October 1976. It was approved as an American National Standard, ANSI B1.7-1977, on September 16, 1977.

Within the period from 1977 to 1984 there was considerable B1 standards activity in the development of metric screw thread standards for U.S. usage. ISO standards were blended with ANSI standards, requiring many revisions in ANSI symbology and definitions of terms. ISO symbols were adopted, except those where a change from American practice would confuse the general understanding of the elements symbolized. Also, many ISO definitions were incorporated into American definitions in order to facilitate the correct interpretation of both ISO and ANSI terminology. These revisions were approved and designated as American National Standard ANSI/ASME B1.7M-1984, on November 2, 1984.

Screw thread standards are constantly being revised as required by the ASME B1 Committee. Additionally, the title of this document was changed to "Screw Threads: Nomenclature, Definitions, and Letter Symbols." This revision was approved and designated by the American National Standards Institute on September 11, 2006.

# ASME B1 COMMITTEE

## Screw Threads

(The following is the roster of the Committee at the time of approval of this Standard.)

### STANDARDS COMMITTEE OFFICERS

**A. L. Barrows**, *Chair*  
**D. S. George**, *Vice Chair*  
**A. L. Guzman**, *Secretary*

### STANDARDS COMMITTEE PERSONNEL

<b>A. L. Barrows</b> , Kennametal, Inc.	<b>B. Larzelere</b> , <i>Corresponding Member</i> , Deltronic Corp.
<b>F. G. Calderone</b> , <i>Corresponding Member</i> , Quality Systems Implementers	<b>L. L. Lord</b> , <i>Corresponding Member</i> , Consultant
<b>L. N. Dixon, Jr.</b> , General Electric	<b>M. H. McWilliams</b> , PMC Lonestar
<b>R. Dodge</b> , Pennoyer-Dodge Co.	<b>D. R. Maisch</b> , <i>Alternate</i> , PMC Lonestar
<b>D. Everett</b> , National Institute of Standards and Technology	<b>D. Miskinis</b> , Kennametal, Inc.
<b>G. A. Flannery</b> , <i>Corresponding Member</i> , Mercury Gage Co.	<b>W. R. Newman</b> , <i>Corresponding Member</i> , Consultant
<b>H. N. Frost</b> , Defense Supply Center	<b>D. R. Oas</b> , Seaway Bolt & Specials Corp.
<b>J. O. Gehret III</b> , Vermont Thread Gage, LLC	<b>M. W. Rose</b> , Glastonbury Southern Gage
<b>D. S. George</b> , Ford Motor Co.	<b>W. A. Watts</b> , <i>Alternate</i> , Glastonbury Southern Gage
<b>J. R. Gervasi</b> , Kerr Lakeside, Inc.	<b>E. Schwartz</b> , Consultant
<b>J. Greenslade</b> , Greenslade & Co.	<b>R. H. Searr</b> , <i>Member Emeritus</i> , Mak Tool & Gage
<b>L. C. Borowski</b> , <i>Alternate</i> , Greenslade & Co.	<b>B. F. Sheffler</b> , Dresser-Rand Co.
<b>A. L. Guzman</b> , The American Society of Mechanical Engineers	<b>A. D. Shepherd, Jr.</b> , Emuge Corp.
<b>R. J. Hukari</b> , SPS Technologies	<b>D. Skierski</b> , Sterling Gage & Calibration, LLC
<b>L. C. Johnson</b> , The Johnson Gage Co.	<b>R. D. Strong</b> , General Motors Vehicle Engineering Center
<b>D. D. Katz</b> , Precision Fittings	<b>A. F. Thibodeau</b> , <i>Member Emeritus</i> , Swanson Tool Manufacturing, Inc.
<b>R. P. Knittel</b> , Leitech-US Ltd.	<b>R. E. Vincent, Jr.</b> , General Plug Manufacturing Co.
<b>P. A. Larouche</b> , Swanson Tool Manufacturing	<b>C. J. Wilson</b> , Industrial Fasteners Institute

### SUBCOMMITTEE 7 – NOMENCLATURE, DEFINITIONS, AND LETTER SYMBOLS FOR SCREW THREADS

<b>B. F. Sheffler</b> , <i>Chair</i> , Dresser-Rand Co.	<b>D. D. Katz</b> , Precision Fittings
<b>A. L. Barrows</b> , Kennametal, Inc.	<b>R. P. Knittel</b> , Leitech-US Ltd.
<b>F. G. Calderone</b> , <i>Corresponding Member</i> , Quality Systems Implementers	<b>B. Larzelere</b> , <i>Corresponding Member</i> , Deltronic Corp.
<b>L. N. Dixon, Jr.</b> , General Electric	<b>W. R. Newman</b> , <i>Corresponding Member</i> , Consultant
<b>R. Dodge</b> , Pennoyer-Dodge Co.	<b>M. W. Rose</b> , Glastonbury Southern Gage
<b>D. S. George</b> , Ford Motor Co.	<b>E. Schwartz</b> , Consultant
<b>J. Jennings</b> , <i>Corresponding Member</i> , Naval Surface Warfare Center	<b>R. H. Searr</b> , <i>Member Emeritus</i> , Mak Tool & Gage
<b>L. C. Johnson</b> , The Johnson Gage Co.	<b>A. D. Shepherd, Jr.</b> , Emuge Corp.
	<b>R. E. Spencer</b> , Faber Enterprises, Inc.
	<b>C. J. Wilson</b> , Industrial Fasteners Institute

# SCREW THREADS: NOMENCLATURE, DEFINITIONS, AND LETTER SYMBOLS

## 1 GENERAL

### 1.1 Scope

The purpose of this Standard is to establish a uniform practice for standard screw threads with regard to the following:

- (a) screw thread nomenclature
- (b) letter symbols for the designating features of a screw thread for use on drawings, in tables that set forth dimensional standards, in other records, and for expressing mathematical relationship

This Standard consists of: a glossary of terms, illustrations, an illustrated table showing the application of symbols, and a table of thread series designations. Many of the terms and symbols specified in this Standard vary considerably from those prior to the 1984 issue, because ISO terms and symbols have been adopted where the intended definition is the same.

### 1.2 References

The following is a list of publications referenced in this Standard.

- ANSI/CGA V-1, National Gas Screw Threads<sup>1</sup>  
 Publisher: Canadian Gas Association (CGA), 350 Sparks Street, Ottawa, Ontario K1R 7S8, Canada
- ASME B1.20.7, Hose Coupling Screw Threads  
 ASME Y14.5M, Dimensioning and Tolerancing  
 Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2300, Fairfield, NJ 07007-2300
- ISO 7-1, Pipe Threads Where Pressure Tight Joints are Made on Threads—Part 1: Designation, Dimensions, and Tolerances
- ISO 228-1, Pipe Threads Where Pressure Tight Joints are Not Made on the Threads—Part 1: Designation, Dimensions, and Tolerances
- ISO 1502, ISO General Purpose Metric Screw Thread-Gauging
- ISO 2901, ISO Metric Trapezoidal Screw Threads
- ISO 2902, ISO Metric Trapezoidal Screw Threads
- ISO 2903, ISO Metric Trapezoidal Screw Threads
- ISO 2904, ISO Metric Trapezoidal Screw Threads
- ISO/R1501, ISO Miniature Screw Threads

<sup>1</sup> May also be obtained from American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036.

Publisher: International Organization for Standardization (ISO), 1 rue de Varembe, Case Postal 56, CH-1211, Genève 20, Switzerland/Suisse

### 1.3 Federal Government Use

When this Standard is approved by the Department of Defense and Federal agencies, and is incorporated into FED-STD-H28/1, *Screw Thread Standards for Federal Services, Section 1*, the use of this Standard by the Federal Government is subject to all requirements and limitations of FED-STD-H28/1.

## 2 DEFINITION OF TERMS

The definitions presented herein are listed alphabetically and apply generally to all forms of screw threads, thread gages, and thread measurements. They relate to the following:

- (a) types of screw threads
- (b) size and fit of threaded parts in general
- (c) geometric elements, attributes, and dimensions of screw threads

ISO nomenclature is used where the exact meaning is coincident with the U.S. practice.

*actual fit*: the measured difference, subject to measurement uncertainty, before assembly, between the sizes of two mating parts that are to be assembled.

*actual size*: the measured size of a characteristic or element subject to measurement uncertainty.

*addendum*: the addendum of an external thread is the radial distance between the major and pitch cylinders or cones, respectively. The addendum of an internal thread is the radial distance between the minor and pitch cylinders or cones, respectively. This term applies to those threads having a recognized pitch cylinder or pitch cone.

*allowance*: a prescribed difference between the maximum material limits of mating parts. It is the minimum clearance (positive allowance) or maximum interference (negative allowance) between such parts. It is numerically equal to the absolute value of ISO term fundamental deviation (see Fig. 1).

*attribute*: nondimensional thread element(s) and characteristic(s), taken singly or in a group. Inspection/evaluation by limit gages is an attribute inspection.

*axis of thread*: the axis of the thread pitch cylinder or cone (see Fig. 2).