AN AMERICAN NATIONAL STANDARD

T-Slots, Their Bolts, Nuts, and Tongues

ANSI/ASME B5.1M - 1985

(REVISION OF ANSI B5.1-1975)

REAFFIRMED 1998

FOR CURRENT COMMITTEE PERSONNEL
PLEASE SEE ASME MANUAL AS-11

REAFFIRMED 2004

FOR CURRENT COMMITTEE PERSONNEL
PLEASE E-MAIL CS@asme.org

SPONSORED AND PUBLISHED BY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

Date of Issuance: September 15, 1986

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.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Consensus 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 assume 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 issued in accordance with governing ASME procedures and policies which preclude the issuance of interpretations by individual volunteers.

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.

Copyright © 1986 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All Rights Reserved
Printed in U.S.A.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

FOREWORD

(This Foreword is not part of ANSI/ASME B5.1M-1985.)

Work on the standardization of T-slots started in 1924 and a tentative standard was published in 1927. The first official American Standard for T-slots came in 1941. This was last revised in 1949.

The 1975 revision continued the basic sizes originally established. However, all dimensions except the nominal T-bolt size were converted to decimal inches in recognition of the increasing preference of industry for decimals.

Much material that was originally included to cover the transitional period has been deleted. A lettering system for the figures has been adopted that should facilitate cross reference between tables. In this system, comparable dimensions bear the same letter with a subscript indicating table number. Thus, A_1 is width of T-slot throat, A_2 is diameter of T-bolt to fit that throat, and A_3 is width of T-nut tongue to fit that throat.

Metric T-slots, as they have been standardized by ISO/TC39, Machine Tools, have been placed side by side with the inch-sized T-slots. Interchangeability is possible between corresponding sizes of the two measuring systems with the exception of the locating tongue and T-slot throat dimensions, and the difference in the fastening threads on T-bolts. The listing of T-slots and T-bolts in ISO 299-1973, although essentially identical to sizes listed in this Standard, are rejected because they are shown with fractional dimensions. The spacing of T-slots in machine tool components as given in ISO 299-1973 is likewise rejected following consensus of U.S. builders and users of machine tools. This Standard accepts the tolerance codes of ISO 286 for metric sizes of T-slots only.

Information relative to cutters for T-slots has been deleted to avoid duplication and possible conflict with information contained in ANSI/ASME B94.19, Milling Cutters and End Mills.

Following approval by the Standards Committee, the 1975 revision was presented to the sponsor organizations and to ANSI for approval and designation as an American National Standard. This was granted on August 8, 1975.

The 1985 revision was approved as an American National Standard on December 12, 1985.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

ASME STANDARDS COMMITTEE B5
Machine Tools, Components, Elements, Performance, and Equipment

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

OFFICERS

R. T. Woythal, *Vice Chairman, Group A*
W. S. Roorda, *Vice Chairman, Group B*
H. Cooper, *Vice Chairman, Group C*
W. R. Daisak, *Secretary*

COMMITTEE PERSONNEL

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
F. S. Blackall, The Taft-Pierce Manufacturing Co., Woonsocket, Rhode Island

DEFENSE INDUSTRIAL PLANT EQUIPMENT CENTER
J. W. Lynch, Defense Logistics Agency, Memphis, Tennessee
D. Williams, *Alternate,* Defense Logistics Agency, Memphis, Tennessee

NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
V. R. Walser, Giddings & Lewis Machine Tool Co., Fond du Lac, Wisconsin
A. M. Bratkovich, *Alternate,* National Machine Tool Builders Association, McLean, Virginia

SOCIETY OF AUTOMOTIVE ENGINEERS
R. W. Kynast, The Cross Co., Fraser, Michigan

U.S. DEPARTMENT OF THE ARMY
D. L. York, U.S. Army Armament Material Readiness Command, Rock Island, Illinois

INDIVIDUAL MEMBERS
P. Ackerman, AMF, Inc. Westerville, Ohio
H. Cooper, Consultant, Troy, Michigan
W. S. Roorda, Alcona Associates Inc., Harrisville, Michigan
J. J. Smetana, General Electric Co., Schenectady, New York
R. T. Woythal, Kearney & Trecker Corp., Milwaukee, Wisconsin

SUBCOMMITTEE B5.1 — COMPONENTS

R. R. Carrol, Lucas Machine Division, Litton Industrial Products, Cleveland, Ohio
G. J. Czarnecki, DeLaval Turbine Canada Ltd., Ontario, Canada
R. T. Woythal, Kearney & Trecker Corp., Milwaukee, Wisconsin

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

CONTENTS

Foreword iii
Standards Committee Roster v

1 Scope 1
2 Definitions 1
3 References 1
4 Dimensions 1

Tables

1 T-Slots 2
2 Dimensions of T-Bolts 4
3 Dimensions of T-Nuts 6
4 Dimensions of Tongue Seats, Inserted Tongues, and Solid Tongues 7

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

AN AMERICAN NATIONAL STANDARD

T-SLOTS, THEIR BOLTS, NUTS, AND TONGUES

1 SCOPE

This Standard applies to T-slots as used on machine tools for the mounting of fixtures, attachments, and accessories; and to the bolts, nuts, and tongues used in such slots.

2 DEFINITIONS

T-slot — a slot with a narrow throat near the surface and a wider space (called headspace) further from the surface so that clamping can be effected aganst the shoulder at the inside end of the throat

T-bolt — a bolt with a square head that fits in the headspace of a T-slot with a shank which protrudes through the throat and to which the fixture is attached

T-nut — a square nut which fits the headspace of a T-slot and has a tongue fitting in the throat. A T-nut is tapped to take a stud of smaller diameter than the throat of the slot.

solid tongue — a projection on a fixture or attachment designed to locate in the throat of a T-slot

inserted tongue — a tongue which is inserted in a seat in the base of a fixture and projects to locate the fixture in the throat of a T-slot

3 REFERENCES

The latest editions of the following American National Standards apply:

ANSI/ASME B1.1, Unified Inch Screw Threads

ANSI/ASME B1.16M, Gages and Gaging for Metric M Screw Threads

ANSI/ASME B18.3, Socket Cap, Shoulder, and Set Screws

ANSI/ASME B94.19, Milling Cutters and End Mills

Publisher: ASME
United Engineering Center
345 East 47th Street
New York, NY 10017

Orders: ASME Order Department
22 Law Drive
Box 2300
Fairfield, NJ 07007-2300

ISO 263-1973, ISO Inch Screw Threads

ISO 286-1962, System of Limits and Fits, Part I

ISO 965-1973, General Purpose Metric Screw Threads

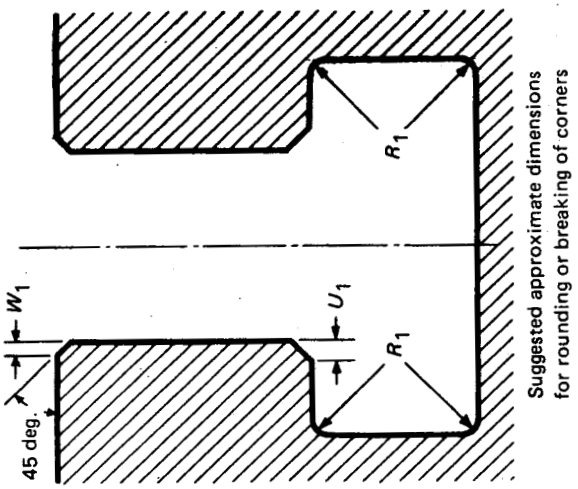
Publisher: International Organization
for Standardization
Geneva, Switzerland

Orders: American National Standards
Institute, Inc.
1430 Broadway
New York, NY 10018

4 DIMENSIONS

Suggested dimensions for T-slots, T-bolts, T-nuts, tongue seats, inserted tongues, and solid tongues are given in Tables 1 through 4.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale



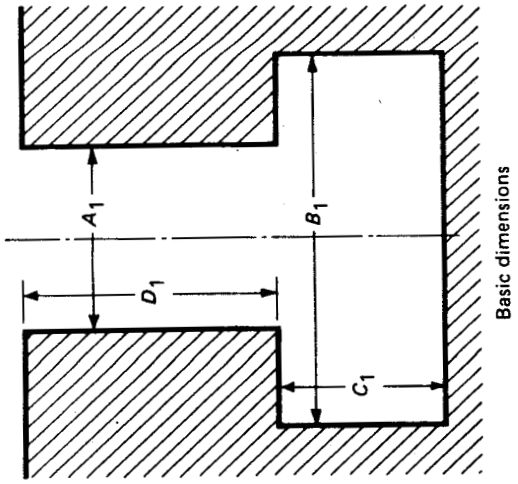


TABLE 1

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

TABLE 1 T-SLOTS

Nominal T-Bolt Size [Note (1)]		Width of Throat A_1 [Note (2)]		Headspace Dimensions								Depth of Throat D_1				Rounding or Breaking of Corners [Note (3)]					
				Width B_1				Depth C_1								in.			mm		
				in.		mm		in.		mm		in.		mm							
in.	mm	in.	mm	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	R_1 max.	W_1 max.	U_1 max.	R_1 max.	W_1 max.	U_1 max.
...	4	....	5	...	...	10	11	...	...	3	3.5	...	...	4.5	7	...	...	...	0.5	0.8	0.8
...	5	...	6	...	...	11	12.5	...	...	5	6	...	...	5	8	...	...	...	0.5	0.8	0.8
0.250	6	0.282	8	0.500	0.562	14.5	16	0.203	0.234	7	8	0.125	0.375	7	11	0.02	0.02	0.03	0.5	0.8	0.8
0.312	8	0.344	10	0.594	0.656	16	18	0.234	0.266	7	8	0.156	0.438	9	14	0.02	0.03	0.03	0.5	0.8	0.8
0.375	10	0.438	12	0.719	0.781	19	21	0.297	0.328	8	9	0.219	0.562	11	17	0.02	0.03	0.03	0.5	0.8	0.8
0.500	12	0.562	14	0.906	0.969	23	25	0.359	0.391	9	11	0.312	0.688	12	19	0.02	0.03	0.03	0.5	0.8	0.8
0.625	16	0.688	18	1.188	1.250	30	32	0.453	0.484	12	14	0.438	0.875	16	24	0.03	0.03	0.05	0.8	0.8	1.3
0.750	20	0.812	22	1.375	1.469	37	40	0.594	0.625	16	18	0.562	1.062	20	29	0.03	0.03	0.05	0.8	0.8	1.3
1.000	24	1.062	28	1.750	1.844	46	50	0.781	0.828	20	22	0.750	1.250	26	36	0.03	0.06	0.05	0.8	1.5	1.3
1.250	30	1.312	36	2.125	2.219	56	60	1.031	1.094	25	28	1.000	1.562	33	46	0.03	0.06	0.05	0.8	1.5	1.3
1.500	36	1.562	42	2.562	2.656	68	72	1.281	1.344	32	35	1.250	1.938	39	53	0.03	0.06	0.05	0.8	1.5	1.3
...	42	...	48	...	...	80	85	...	...	36	40	...	...	44	59	...	...	...	1.5	2.5	2
...	48	...	54	...	...	90	95	...	...	40	44	...	...	50	66	...	...	...	1.5	2.5	2

NOTES:

(1) Width of tongue (tenon) to be used with the above T-slots will be found in Table 4.

(2) Throat dimensions are basic. When slots are intended to be used for holding only, tolerances can be 0.0 + 0.010 in. or H12 Metric (ISO/R286); when intended for location, tolerance can be 0.0 + 0.001 in. or H8 Metric (ISO/R286).

(3) Corners of T-slots may be square, or may be rounded or broken to the indicated maximum dimensions at the manufacturer's option.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

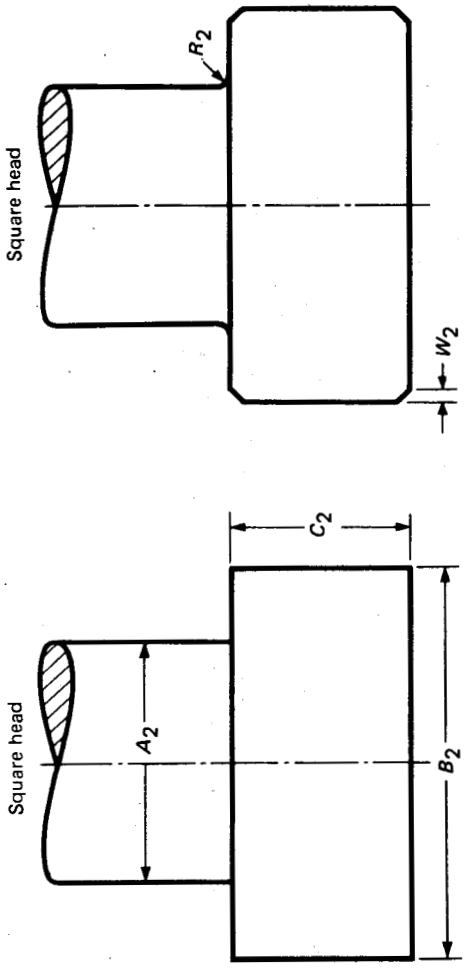


TABLE 2

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

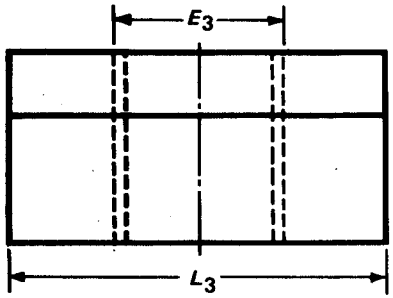
Not for Resale

TABLE 2 DIMENSIONS OF T-BOLTS

Nominal T-Bolt Size and Thread A_2 [Notes (1), (3)]		Bolt Head Dimensions										Rounding of Corners [Note (2)]			
		Width Across Flats B_2				Width Across Corners		Height C_2				R_2		W_2	
		in.		mm		in.	mm	in.		mm		in.	mm	in.	mm
Customary UNC-2A	Metric ISO [Note (4)]	max.	min.	max.	min.	max.	max.	max.	min.	max.	min.	max.	max.	max.	max.
...	M4	...	...	9	8.5	...	12.7	...	...	2.5	2.1	...	0.3	...	0.5
...	M5	...	...	10	9.5	...	14.1	...	...	4	3.6	...	0.3	...	0.5
0.250–20	M6	0.469	0.438	13	12	0.663	18.4	0.156	0.141	6	5.6	0.02	0.5	0.03	0.8
0.312–18	M8	0.562	0.531	15	14	0.796	21.2	0.188	0.172	6	5.6	0.02	0.5	0.03	0.8
0.375–16	M10	0.688	0.656	18	17	0.972	25.5	0.250	0.234	7	6.6	0.02	0.5	0.03	0.8
0.500–13	M12	0.875	0.844	22	21	1.238	31.1	0.312	0.297	8	7.6	0.02	0.5	0.06	1.5
0.625–11	M16	1.125	1.094	28	27	1.591	39.6	0.406	0.391	10	9.6	0.03	0.8	0.06	1.5
0.750–10	M20	1.312	1.281	34	33	1.856	48.1	0.531	0.500	14	13.2	0.03	0.8	0.06	1.5
1.000– 8	M24	1.688	1.656	43	42	2.387	60.8	0.688	0.656	18	17.2	0.03	0.8	0.06	1.5
1.250– 7	M30	2.062	2.031	53	52	2.917	75	0.938	0.906	23	22.2	0.03	0.8	0.06	1.5
1.500– 6	M36	2.500	2.469	64	63	3.536	90.5	1.188	1.156	28	27.2	0.03	0.8	0.06	1.5
...	M42	...	...	75	74	...	106.1	...	...	32	30.5	...	1	...	2
...	M48	...	...	85	84	...	120.2	...	...	36	34.5	...	1	...	2

NOTES:
(1) Tolerances for diameters of bolts or studs and for threads are in accordance with ANSI/ASME B1.1 and ISO 263–1973 for inch threads, and with ANSI/ASME B1.16M and ISO 965–1973 for metric threads.
(2) Corners of T-bolts may be square, or may be rounded or broken to the indicated maximum dimensions at the manufacturer's option.
(3) T-slots to be used with these bolts will be found in Table 1.
(4) Metric thread grade and tolerance position is 5g 6g.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale



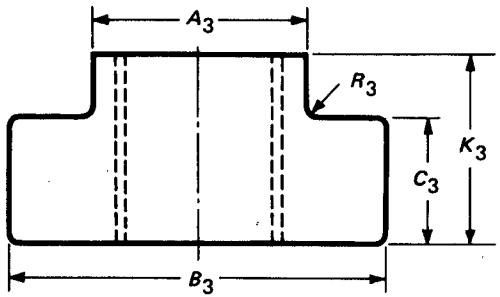


TABLE 3 DIMENSIONS OF T-NUTS

Nominal T-Bolt Size [Note (1)]		Width of Tongue A_3				Tap for Stud E_3 [Note (2)]		Width of Nut B_3				Height of Nut C_3				Total Thickness, Including Tongue K_3 [Note (3)]		Length of Nut L_3 [Note (3)]		Rounding of Corners			
		in.		mm				in.		mm		in.		mm						R_3		W_3	
in.	mm	max.	min.	max.	min.	UNC-3B	ISO	max.	min.	max.	min.	max.	min.	max.	min.	in.	mm	in.	mm	in. max.	mm max.	in. max.	mm max.
...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
0.250	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
0.312	8	0.330	0.320	8.7	8.5	0.250–20	M6	0.562	0.531	15	14	0.188	0.172	6	5.6	0.281	9	0.562	18	0.02	0.5	0.03	0.8
0.375	10	0.418	0.408	11	10.75	0.312–18	M8	0.688	0.656	18	17	0.250	0.234	7	6.6	0.375	10.5	0.688	20	0.02	0.5	0.03	0.8
0.500	12	0.543	0.533	13.5	13.25	0.375–16	M10	0.875	0.844	22	21	0.312	0.297	8	7.6	0.531	12	0.875	23	0.02	0.5	0.06	1.5
0.625	16	0.668	0.658	17.25	17	0.500–13	M12	1.125	1.094	28	27	0.406	0.391	10	9.6	0.625	15	1.125	27	0.03	0.8	0.06	1.5
0.750	20	0.783	0.773	20.5	20.25	0.625–11	M16	1.312	1.281	34	33	0.531	0.500	14	13.2	0.781	21	1.312	35	0.03	0.8	0.06	1.5
1.000	24	1.033	1.018	26.5	26	0.750–10	M20	1.688	1.656	43	42	0.688	0.656	18	17.2	1.000	27	1.688	46	0.03	0.8	0.06	1.5
1.250	30	1.273	1.258	33	32.5	1.000– 8	M24	2.062	2.031	53	52	0.938	0.906	23	22.2	1.312	34	2.062	53	0.03	0.8	0.06	1.5
1.500	36	1.523	1.508	39.25	38.75	1.250– 7	M30	2.500	2.469	64	63	1.188	1.156	28	27.2	1.625	42	2.500	65	0.03	0.8	0.06	1.5
...	42	...	...	46.75	46.25	...	M36	...	...	75	74	...	...	32	30.5	...	48	...	75	...	1	...	2
...	48	...	...	52.5	51.75	...	M42	...	...	85	84	...	...	36	34.5	...	54	...	85	...	1	...	2

NOTES:
(1) T-slot dimensions to fit the above nuts will be found in Table 1.
(2) Tolerances for threads are in accordance with ANSI/ASME B1.1 and ISO 263–1973 for inch threads, and ANSI/ASME B1.16M and ISO 965–1973 for metric threads.
(3) There are no tolerances given for "total thickness" or "nut length" as they need not be held to close limits.
(4) Metric tapped thread grade and tolerance position is 5H.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

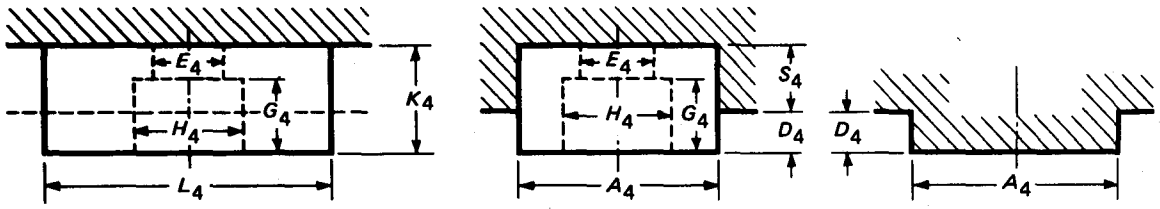


TABLE 4 DIMENSIONS OF TONGUE SEATS, INSERTED TONGUES, AND SOLID TONGUES

Nominal T-Bolt Size A_2		Tongue Dimensions: Width A_4 [Note (1)]		Length L_4 [Note (2)]		Projection D_4 [Note (3)]		Thickness K_4		Depth of Seat S_4 [Note (3)]		Socket Head Cap Screw: Diameter of Screw and Thread E_4		Diameter of Head H_4		Thickness of Head G_4	
												Customary UNC-3A/3B	Metric ISO [Note (4)]				
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm			in.	mm	in.	mm
···	4	···	5	···	7	···	2	···	4.5	···	2.5	···	M2	···	3.8	···	2
···	5	···	6	···	8	···	2	···	5	···	3	···	M2.5	···	4.5	···	2.5
0.250	6	0.282	8	0.38	10	0.094	2.5	0.219	6	0.125	3.5	No. 5-40	M3	0.205	5.5	0.125	3
0.312	8	0.344	10	0.47	12	0.125	3	0.281	7	0.156	4	No. 8-32	M4	0.270	7	0.164	4
0.375	10	0.438	12	0.56	15	0.125	3	0.312	8	0.187	5	No. 10-24	M5	0.312	8.5	0.190	5
0.500	12	0.562	14	0.75	19	0.125	3	0.344	9	0.219	6	0.250-20	M6	0.375	10	0.250	6
0.625	16	0.688	18	0.94	24	0.125	3	0.375	10	0.250	7	0.250-20	M6	0.375	10	0.250	6
0.750	20	0.812	22	1.12	30	0.156	4	0.438	12	0.281	8	0.312-18	M8	0.469	13	0.312	8
1.000	24	1.062	28	1.50	37	0.219	5	0.562	14	0.343	9	0.375-16	M10	0.562	16	0.375	10
1.250	30	1.312	36	1.88	46	0.250	6	0.625	16	0.375	10	0.375-16	M10	0.562	16	0.375	10
1.500	36	1.562	42	2.25	57	0.312	8	0.750	19	0.438	11	0.500-13	M12	0.750	18	0.500	12
···	42	···	48	···	64	···	10	···	22	···	12	···	M14	···	21	···	14
···	48	···	54	···	72	···	12	···	25	···	13	···	M16	···	24	···	16

NOTES:
(1) A tolerance of 0–0.001 in. or H8 metric (ISO/R 286) is allowed on "width of tongue" A_4.
(2) The length of tongue can be varied to suit requirements.
(3) The "tongue projection" D_4 and "depth of seat" S_4 are vital only when reversible tongues are expected to be used. In some cases, a greater projection D_4 or a shallower seat S_4 may be desirable. Such changes can be made without interferring with interchangeability.
(4) Metric thread fit is 5H/4g 6g.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale



Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale