

ASME B1.3M

ADOPTION NOTICE

ASME B1.3M, "Screw Thread Gaging Systems for Dimensional Acceptability - Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ) was adopted on 10 March 1994 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Defense Industrial Supply Center, ATTN: DISC-EPT, 700 Robbins Avenue, Philadelphia, PA 19111-5096. DoD activities may obtain copies of this standard from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. The private sector and other Government agencies may purchase copies from The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017-2392 or The American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002.

NOTE: Use of this standard is subject to all requirements and limitations of FED-STD-H28/20, Screw-Thread Standards for Federal Services, Section 20, Inspection Methods for Acceptability of UN, UNR, UNJ, M, and MJ Screw-Threads.

Custodians:

Army - AR  
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# Errata

## to

# ASME B1.3M-1992

The Errata corrections listed below apply to ASME B1.3M-1992, Screw Thread Gaging Systems for Dimensional Acceptability. This Errata is being issued in the form of replacement pages. Corrections are incorporated directly into the affected pages. Replace or insert the pages listed. It is also advisable that this cover page be retained for reference. The pages show the corrections given below. The pages not listed are the reverse sides of the listed pages and contain no changes.

Page	Location	Change
5	Table 1	<i>In Column <math>J_1</math>, for 4.3.2, delete bullet</i>
6	Table 1	(1) <i>In column <math>D_2</math>, for 4.9, delete bullet</i> (2) <i>In column <math>D_4</math>, for 4.9, add bullet</i>
8, 9	Table 2	(1) <i>In column <math>B_1</math>, for 1.1, delete bullet</i> (2) <i>Entries for 3.2 through 3.5 deleted</i> (3) <i>Column <math>M</math> heading should read Diam. Runout Minor to Pitch</i>
11	Table 2	(1) <i>Column <math>M</math> heading should read Diam. Runout Minor to Pitch</i> (2) <i>In column <math>M</math>, for 9, add bullet</i>
12	Table 3	(1) <i>For System 21:</i> (a) <i>column <math>J_1</math>, add 9</i> (b) <i>column <math>J_2</math>, add 9</i> (2) <i>For System 21A, column <math>L</math>, change 9.10 to read 9, 10</i> (3) <i>For System 22:</i> (a) <i>column <math>C_1</math>, add 9</i> (b) <i>column <math>C_2</math>, add 9</i> (c) <i>column <math>J_1</math>, add 9</i> (d) <i>column <math>J_2</math>, add 9</i> (4) <i>For System 23:</i> (a) <i>column <math>C_1</math>, add 9</i> (b) <i>column <math>C_2</math>, add 9</i> (c) <i>column <math>J_1</math>, add 9</i> (d) <i>column <math>J_2</math>, add 9</i> (e) <i>column <math>E_1-l</math>, change 4, 10 to read 4.10</i>

<b>Page</b>	<b>Location</b>	<b>Change</b>
13	Table 4	<p>(1) <i>For System 21, column <math>K_2</math>, add 9</i></p> <p>(2) <i>For System 22:</i></p> <ul style="list-style-type: none"><li>(a) <i>column <math>A_1</math>, delete 2.1</i></li><li>(b) <i>column <math>C_1</math>, add 9</i></li><li>(c) <i>column <math>C_2</math>, add 9</i></li><li>(d) <i>column <math>K_2</math>, add 9</i></li></ul> <p>(3) <i>For System 23:</i></p> <ul style="list-style-type: none"><li>(a) <i>column <math>C_1</math>, add 9</i></li><li>(b) <i>column <math>C_2</math>, add 9</i></li><li>(c) <i>column <math>K_2</math>, add 9</i></li><li>(d) <i>column <math>E_{1-1}</math>, change 4, 10 to read 4.10</i></li><li>(e) <i>In second column, next to last entry should read Runout minor diameter to pitch diameter</i></li></ul>

**TABLE 1 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR EXTERNAL PRODUCT THREAD CHARACTERISTICS**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation	Flank Angle Variation	Major Diameter		Minor Diameter		Root Rad.	Diam. Runout Major to Pitch	Surface Texture
	Oval 180 deg.		Multilobe 120 deg.												
	Limit	Size	Limit	Size	Limit	Size			Limit	Size	Limit	Size			
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>			H	I	J <sub>1</sub>	J <sub>2</sub>			
1.1 >											[Note (1)]				
1.2 >															
2.1 >	•										[Note (1)]				
2.2 >	•				•										
2.3 >	•										[Note (1)]				
2.4 >	•				•										
2.5 >	•				•										
2.6 >	•				•										
2.7 >															
3.1(a) >									•						
3.1(b) >									•						
3.2 >									•						
3.3 >											•				
3.4 >									•						
3.5 >											•				
4.1.1 >			•	•							[Note (1)]				
4.1.2 >	•	•									[Note (1)]				
4.3.1 >			•	•							[Note (1)]				
4.3.2 >	•	•									[Note (1)]				
4.5.1 >			•	•	•	•									
4.5.2 >	•	•			•	•									

**NOTE:**

(1) Maximum minor diameter limit is acceptable when product passes GO gage on UN, UNR, UNJ, M, and MJ threads.

**TABLE 1 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
EXTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

Thread Gages and Measuring Equipment	Maximum Material		NOT GO Functional Diameter		Minimum Material					
	GO				Pitch Diam.		Thd. Groove Diam.		Boundary Thread Flank	
	Func. Limit	Func. Size	Func. Limit	Func. Size	Limit	Size	Limit	Size	Limit	Size
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
4.6.1 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 120 deg. contact							•	•		
4.6.2 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 180 deg. contact							•	•		
4.7 Major diameter and pitch diameter runout gage										
4.8 Differential segments or rolls (GO profile for one pitch in length) used in combination with GO/minimum material indicating gages to yield a diameter equivalent for variations in lead (including uniformity of helix) and flank angle										
4.9 Minimum material — B and C NOT GO rolls or segments									•	•
4.10 Cumulative form gaging — maximum-material and minimum-material dimensions collectively establish cumulative form within limits defined by the applicable thread documents										
5 Indicating Plain Diameter Gages										
5.1 Major diameter type										
5.2 Minor diameter type										
6 Pitch Micrometer With Standard Contacts (Approximately NOT GO Profile) Cone and Vee			•	•						
7 Pitch Micrometer With Modified Contacts (Approximately Pitch Diameter Contact) Cone and Vee					•	•				
8 Thread Measuring Wires With Suitable Measuring Means							•	•		
9 Optical Comparator and Toolmaker's Microscope With Suitable Fixturing					•	•				
10 Profile Tracting Equipment With Suitable Fixturing										
11 Lead Measuring Machine With Suitable Fixturing										
12 Helical Path Attachment Used With GO Type Indicating Gage										
13 Helical Path Analyzer										
14 Plain Micrometer and Calipers — Modified as Required										
15 Surface Measuring Equipment or Texture Comparison Specimen										
16 Roundness Equipment										
17 Linear Measuring Machine With Required Accessories						•				
18 Coordinate Measuring Machine With Required Accessories						•		•		

GENERAL NOTE:  
The notation NOT GO is used to indicate LO, M<sub>N</sub>/M<sub>T</sub>, and NOT GO gages as described by the respective gage standard.

**TABLE 1 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
EXTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation	Flank Angle Variation	Major Diameter		Minor Diameter		Root Rad.	Diam. Runout Major to Pitch	Surface Texture		
	Oval 180 deg.		Multilobe 120 deg.		Limit	Size			Limit	Size	Limit	Size				Limit	Size
	Limit	Size	Limit	Size													
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>			H	I	J <sub>1</sub>	J <sub>2</sub>				K <sub>1</sub>	K <sub>2</sub>
4.6.1>			.	.	.	.											
4.6.2>	.	.			.	.											
4.7>														.			
4.8>	.	.	.	.	.	.	.	.									
4.9>																	
4.10>	Cumulative Form																
5.1>									.	.							
5.2>											.	.					
6>	.	.			.	.											
7>	.	.			.	.											
8>	.	.			.	.											
9>	.	.	.	.			.	.	.	.	.	.	.	.			
10>								.					.				
11>							.										
12>							.										
13>							.										
14>									.	.							
15>															.		
16>	.	.	.	.													
17>		.				.	.		.		.	.					
18>		.	.	.	.	.	.	.	.	.	.	.	.	.	.		

NOTE:

(1) Maximum minor diameter limit is acceptable when product passes GO gage on UN, UNR, UNJ, M, and MJ threads.

**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS**

Thread Gages and Measuring Equipment	Maximum Material		NOT GO Functional Diameter		Minimum Material					
	GO				Pitch Diam.		Thd. Groove Diam.		Boundary Thread Flank	
	Func. Limit	Func. Size	Func. Limit	Func. Size	Limit	Size	Limit	Size	Limit	Size
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
1 Threaded Plug Gage (ANSI B47.1)										
1.1 GO	•									
1.2 NOT GO			•							
1.3 Full form gage GO plug (MJ only)	•									
1.4 B and C NOT GO									•	
3 Plain Diameter Gages										
3.1(a) Minimum (GO) plain cylindrical plug for minor diameter										
(b) Maximum (NOT GO) plain cylindrical plug for minor diameter										
4 Indicating Thread Gages Having either two contacts @ 180 deg. or three contacts @ 120 deg.										
4.1.1 GO segments @ 120 deg. contact	•	•	•	•						
4.1.2 GO segments @ 180 deg. contact	•	•	•	•						
4.3.1 GO rolls @ 120 deg. contact	•	•	•	•						
4.3.2 GO rolls @ 180 deg. contact	•	•	•	•						
4.5.1 Minimum material — pitch diameter type — cone and vee @ 120 deg. contact					•	•				
4.5.2 Minimum material — pitch diameter type — cone and vee @ 180 deg. contact					•	•				
4.6.1 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 120 deg. contact							•	•		
4.6.2 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 180 deg. contact							•	•		
4.7 Minor diameter and pitch diameter runout gage										
4.8 Differential segments or rolls (GO profile for one pitch in length) used in combination with GO/minimum material indicating gages to yield a diameter equivalent for variations in lead (including uniformity of helix) and flank angle										
4.9 Minimum material — B and C NOT GO rolls or segments									•	•

GENERAL NOTE:  
The notation NOT GO is used to indicate LO, M<sub>N</sub>/M<sub>T</sub>, and NOT GO gages as described by the respective gage Standard.

**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation	Flank Angle Variation	Major Diameter		Minor Diameter		Root Rad.	Diam. Runout Minor to Pitch	Surface Texture
	Oval 180 deg.		Multilobe 120 deg.						Limit	Size	Limit	Size			
	Limit	Size	Limit	Size	Limit	Size	H	I	J <sub>1</sub>	J <sub>2</sub>	K <sub>1</sub>	K <sub>2</sub>	L	M	N
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>									
1.1 >									[Note (1)]						
1.2 >															
1.3 >									[Note (1)]		•				
1.4 >															
3.1(a) >											•				
3.1(b) >											•				
3.2 >									•						
3.3 >											•				
3.4 >									•						
3.5 >											•				
4.1.1 >															
			•	•					[Note (1)]						
4.1.2 >	•	•							[Note (1)]						
4.3.1 >			•	•					[Note (1)]						
4.3.2 >	•	•							[Note (1)]						
4.5.1 >			•	•	•	•									
4.5.2 >	•	•			•	•									
4.6.1 >			•	•	•	•									
4.6.2 >	•	•			•	•									
4.7 >														•	
4.8 >	•	•	•	•	•	•	•	•							
4.9 >															

NOTE:  
(1) Minimum major diameter limit is acceptable when product passes GO gage.



**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

Thread Gages and Measuring Equipment	Maximum Material		NOT GO Functional Diameter		Minimum Material					
	GO				Pitch Diam.		Thd. Groove Diam.		Boundary Thread Flank	
	Func. Limit	Func. Size	Func. Limit	Func. Size	Limit	Size	Limit	Size	Limit	Size
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
4.10 Cumulative form gaging — maximum-material and minimum-material dimensions collectively establish cumulative form within limits defined by the applicable thread documents										
5 Indicating Plain Diameter Gages										
5.1 Major diameter type										
5.2 Minor diameter type										
6 Pitch Micrometer With Standard Contacts (Approximately NOT GO Profile) Cone and Vee			•	•						
7 Pitch Micrometer With Modified Contacts (Approximately Pitch Diameter Contact) Cone and Vee					•	•				
8 Thread Measuring Balls With Suitable Measuring Means							•	•		
9 Optical Comparator and Toolmaker's Microscope With Suitable Fixturing and Cast Replica					•	•				
10 Profile Tracing Equipment With Suitable Fixturing										
14 Surface Measuring Equipment or Texture Comparison Specimen										
15 Roundness Equipment										
16 Linear Measuring Machine With Required Accessories						•		•		
17 Coordinate Measuring Machine With Required Accessories						•		•		

**GENERAL NOTE:**

The notation NOT GO is used to indicate HJ, M<sub>N</sub>/M<sub>T</sub>, and NOT GO gages as described by the respective gage Standard.

**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation	Flank Angle Variation	Major Diameter		Minor Diameter		Root Rad.	Diam. Runout Minor to Pitch	Surface Texture
	Oval 180 deg.		Multilobe 120 deg.						Limit	Size	Limit	Size			
	Limit	Size	Limit	Size	Limit	Size	Variation	Variation	Limit	Size	Limit	Size	L	M	N
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>	H	I	J <sub>1</sub>	J <sub>2</sub>	K <sub>1</sub>	K <sub>2</sub>			
4.10 >	Cumulative Form														
5.1 >									.	.					
5.2 >											.	.			
6 >	.	.			.	.									
7 >	.	.			.	.									
8 >	.	.			.	.									
9 >							.	.	.	.		.	.	.	
10 >								.					.		
14 >															.
15 >	.	.	.	.											
16 >		.				.				.		.			
17 >		.		.		.	.	.		.		.	.	.	

**TABLE 3 GAGING SYSTEMS FOR EXTERNAL THREADS**

System	Dimensions Inspected	Applicable Thread Gages and Measuring Equipment				
	(For dimension/gage combinations to be used, refer to Table 1.)	Attributes/Fixed Limit Control	Col.	Variables/Indicating Control	Col.	
21	GO maximum material	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>	
	NOT GO functional diameter	1.2, 2.2, 2.4, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>	
	Major diameter	3.1(a), 3.1(b), 3.2, 3.4, 5.1, 9, 14	J <sub>1</sub>	5.1, 9, 14, 17, 18	J <sub>2</sub>	
21A (For M Threads per ANSI B1.18M)	GO maximum-material boundary	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>	
	Minimum-material boundary B and C NOT GO	2.7, 4.9	D <sub>3</sub>	4.9	D <sub>4</sub>	
	Root profile	...		9, 10, 18	L	
	Major diameter	3.1(a), 3.1(b), 3.2, 3.4, 5.1, 14	J <sub>1</sub>	5.1, 14, 17, 18	J <sub>2</sub>	
22	GO maximum material	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>	
	Minimum material					
	Pitch diameter	2.5, 4.5, 7, 9	C <sub>1</sub>	4.5, 7, 9, 17, 18	C <sub>2</sub>	
	or					
	Thread groove diameter	2.6, 4.6, 8	D <sub>1</sub>	4.6, 8, 18	D <sub>2</sub>	
	or <sup>1</sup> {	NOT GO functional diameter combined with control of:	1.2, 2.2, 2.4, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>
		Lead (including helix)	...		4.8, 9, 11, 12, 13, 17, 18	H
		and Flank angle (over the length of full thread)	...		4.8, 9, 10, 18	I
Major diameter	3.1(a), 3.2, 3.4, 5.1, 9, 14	J <sub>1</sub>	5.1, 9, 14, 17, 18	J <sub>2</sub>		
Minor diameter (rounded root)	3.3, 3.5, 5.2, 9	K <sub>1</sub>	5.2, 9, 17, 18	K <sub>2</sub>		
Root profile	...		9, 10, 18	L		
23	GO maximum material	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>	
	Minimum material					
	Pitch diameter	2.5, 4.5, 7, 9	C <sub>1</sub>	4.5, 7, 9, 17, 18	C <sub>2</sub>	
	or					
	Thread groove diameter	2.6, 4.6, 8	D <sub>1</sub>	4.6, 8, 18	D <sub>2</sub>	
	Major diameter	3.1(a), 3.2, 3.4, 5.1, 9, 14	J <sub>1</sub>	5.1, 9, 14, 17, 18	J <sub>2</sub>	
	Minor diameter	3.3, 3.5, 5.2, 9	K <sub>1</sub>	5.2, 9, 17, 18	K <sub>2</sub>	
	Root profile	...		9, 10, 18	L	
	Roundness of pitch cylinder:					
	Oval 180 deg.	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 9, 16	E <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 9, 16, 17, 18	E <sub>2</sub>	
	Multilobe 120 deg.	4.1, 4.3, 4.5, 4.6, 4.8, 9, 16	F <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 9, 16, 18	F <sub>2</sub>	
	Taper of pitch cylinder	2.2, 2.4, 2.5, 2.6, 4.5, 4.6, 4.8, 6, 7, 8	G <sub>1</sub>	4.5, 4.6, 4.8, 6, 7, 8, 17, 18	G <sub>2</sub>	
	Cumulative form variation	...		4.10	E <sub>1</sub> -I	
	Lead including helix variation	...		4.8, 9, 11, 12, 13, 17, 18	H	
	Flank angle variation	...		4.8, 9, 10, 18	I	
Runout major diameter to pitch diameter	...		4.7, 9, 18	M		
Surface texture	...		15	N		

NOTE:

(1) Only by agreement between purchaser and supplier on limits and/or methods.

**TABLE 4 GAGING SYSTEMS FOR INTERNAL THREADS**

System	Dimensions Inspected	Applicable Thread Gages and Measuring Equipment			
	(For dimension/gage combinations to be used, refer to Table 2.)	Attributes/Fixed Limit Control	Col.	Variables/Indicating Control	Col.
21	GO maximum material	1.1, 1.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	NOT GO functional diameter	1.2, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>
	Minor diameter	1.3, 3.1(a), 3.1(b), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 9, 16, 17	K <sub>2</sub>
21A (For M Threads per ANSI B1.18M)	GO maximum-material boundary	1.1, 1.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum-material boundary B and C NOT GO	1.4, 4.9	D <sub>3</sub>	4.9	D <sub>4</sub>
	Minor diameter	1.3, 3.1(a), 3.1(b), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 16, 17	K <sub>2</sub>
22	GO maximum material	1.1, 1.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum material Pitch diameter	4.5, 7, 9	C <sub>1</sub>	4.5, 7, 9, 16, 17	C <sub>2</sub>
	or Thread groove diameter	4.6, 8	D <sub>1</sub>	4.6, 8, 16, 17	D <sub>2</sub>
	or <sup>1</sup> { NOT GO functional diameter combined with control of: Lead (including helix) and Flank angle (over the length of full thread)	1.2, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>
		...		4.8, 9, 17	H
				4.8, 9, 10, 17	I
Minor diameter	1.3, 3.1(a), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 9, 16, 17	K <sub>2</sub>	
23	GO maximum material	1.1, 1.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum material Pitch diameter	4.5, 7, 9	C <sub>1</sub>	4.5, 7, 9, 16, 17	C <sub>2</sub>
	or Thread groove diameter	4.6, 8	D <sub>1</sub>	4.6, 8, 16, 17	D <sub>2</sub>
	Minor diameter	1.3, 3.1(a), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 9, 16, 17	K <sub>2</sub>
	Roundness of pitch cylinder: Oval 180 deg.	4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 15	E <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 15, 16, 17	E <sub>2</sub>
	Multilobe 120 deg.	4.1, 4.3, 4.5, 4.6, 4.8, 15	F <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 15, 17	F <sub>2</sub>
	Taper of pitch cylinder	4.5, 4.6, 4.8, 6, 7, 8	G <sub>1</sub>	4.5, 4.6, 4.8, 6, 7, 8, 16, 17	G <sub>2</sub>
	Cumulative form variation			4.10	E <sub>1</sub> -I
	Lead including helix variation	...		4.8, 9, 17	H
	Flank angle variation	...		4.8, 9, 10, 17	I
	Runout minor diameter to pitch diameter	...		4.7, 9, 17	M
	Surface texture	...		14	N

**NOTE:**

(1) Only by agreement on limits and/or methods between purchaser and supplier.

**ASME B1.3M-1992**  
(REVISION OF ANSI/ASME B1.3M-1986)

**Screw Thread Gaging  
Systems for Dimensional  
Acceptability – Inch and  
Metric Screw Threads**  
(UN, UNR, UNJ, M, and MJ)

**AN AMERICAN NATIONAL STANDARD**



The American Society of  
Mechanical Engineers

AN AMERICAN NATIONAL STANDARD

# **Screw Thread Gaging Systems for Dimensional Acceptability – Inch and Metric Screw Threads**

(UN, UNR, UNJ, M, and MJ)

**ASME B1.3M-1992**

(REVISION OF ANSI/ASME B1.3M-1986)



The American Society of  
Mechanical Engineers

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

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## FOREWORD

(This Foreword is not part of ASME B1.3M-1992.)

The 1986 edition of this Standard was a combination of ANSI B1.3-1979 and ANSI B1.3M-1981. These earlier versions of this Standard were based upon the following instructions as defined by the B1 Committee at its meeting on October 7, 1976, which charged the B1.3 Subcommittee with the responsibility of preparing these documents.

The Subcommittee was to prepare a catalog of gages and gaging systems so that each gage or gaging system would be defined only in terms of the dimension(s) controlled and so that any material of an editorial nature that could be construed as giving preference to one gage or gaging system over another would be eliminated, as outlined in the following three statements:

- (a) All references to referee gaging methods are to be eliminated from all B1 documents.
- (b) A catalog of gaging systems is to be prepared by the B1.3 Subcommittee so that any description of the gage relates only to the specific dimension(s) it controls. All material of an editorial nature that could be construed as giving preference will be eliminated.
- (c) The level of dimensional acceptability shall be determined by the threaded product application and specified by American National Standards or other product standards, or by procurement drawings or documents.

Subsequently, the Subcommittee decided to combine these previous standards into one document and designate it ANSI/ASME B1.3M-1985, Screw Thread Gaging Systems for Dimensional Acceptability — Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ).

This revision includes the following specific changes:

- elimination of internal snap gages
- addition of best wire size radius contacts to minimum material thread groove measurement gaging
- clarification of out-of-round indicating gaging in Tables 1 and 2
- addition of a reference to ANSI/ASME B46.1, *Surface Texture*, to provide roughness average guidelines to be used for the evaluation of the surface texture of threaded products
- addition of linear and coordinate measuring machines to the equipment included for thread evaluation
- clarification that all System 23 checks are not all mandatory
- clarification relating to the measurement of changes in diameter size because of out-of-roundness conditions

Suggestions for improvement of this Standard will be welcome. They should be sent to Secretary, ASME B1 Main Committee, 345 East 47th Street, New York, NY 10017. This revision was approved as an American National Standard on October 12, 1992.



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## SCREW THREAD GAGING SYSTEMS FOR DIMENSIONAL ACCEPTABILITY — INCH AND METRIC SCREW THREADS (UN, UNR, UNJ, M, AND MJ)

### 1 GENERAL

(a) This Standard presents screw thread gaging systems suitable for determining the acceptability of UN, UNR, UNJ, M, and MJ screw threads on externally and internally threaded products. It establishes the criteria for screw thread acceptance when a gaging system is used.

(b) A screw thread gaging system comprises a list of screw thread characteristics that must be inspected to establish the dimensional acceptability of the screw threads on a threaded product and the gage(s) which shall be used when inspecting those characteristics.

(c) *Federal Government Use.* When this Standard is approved by the Department of Defense and federal agencies and is incorporated into FED-STD-H28/20, Screw Thread Standards for Federal Services, Section 20, the use of this Standard by the federal government is subject to all the requirements and limitations of FED-STD-H28/20.

### 2 REFERENCE DOCUMENTS

The latest issues of the following documents form a part of this Standard to the extent specified herein.

#### *American National Standards*

ANSI B1.1

Unified Inch Screw Threads (UN and UNR Thread Form)

ANSI/ASME B1.2

Gages and Gaging for Unified Inch Screw Threads

ANSI B1.7M

Nomenclature, Definitions, and Letter Symbols for Screw Threads

ANSI/ASME B1.13M

Metric Screw Threads — M Profile

ASME B1.15 (under preparation)

Unified Inch Screw Thread (UNJ Thread Form)

ANSI/ASME B1.16M

Gages and Gaging for Metric M Screw Threads

ANSI B1.18 M

Metric Screw Threads for Commercial Mechanical Fasteners — Boundary Profile Defined

ANSI/ASME B1.19M

Gages for Metric Screw Threads for Commercial Mechanical Fasteners — Boundary Profile Defined

ANSI B1.21M

Metric Screw Threads — MJ Profile

ANSI/ASME B1.22M

Gages and Gaging for Metric MJ Screw Threads

ANSI/ASME B46.1

Surface Texture

### 3 SCREW THREAD GAGES AND MEASURING EQUIPMENT

(a) Tables 1 and 2 for external and internal screw threads, respectively, are listings of screw thread gages, gaging elements, and measuring equipment.

NOTE: Throughout the remainder of this Standard, the term *gage* includes any gages, gaging elements, and measuring equipment listed in Tables 1 and 2.

For each gage, these tables specify the thread characteristic(s) for which that gage has the capability of determining dimensional conformance.

(b) The tables are arranged to establish product screw thread dimensional acceptance criteria based on recognized gaging concepts used to assess dimensional conformance.

(1) *Attributes/fixed limit control* is a qualitative assessment of a characteristic(s) using gages which determine only if the characteristic(s) is in conformance.

(2) *Variables/indicating control* is a quantitative and qualitative assessment on a characteristic(s) which is then compared with limiting values in order to determine if the characteristic(s) is in conformance.

## 4 GAGING SYSTEMS

(a) Tables 3 and 4 present screw thread gaging systems for inspection of screw threads for externally threaded and internally threaded products, respectively.

(b) The difference between gaging systems is the level of inspection deemed necessary to satisfy that dimensional conformance has been achieved. The following gaging systems describe four accountable levels of dimensional inspection.

(1) *System 21*. Provides for interchangeable assembly with functional size control at the maximum material limits within the length of standard gaging elements, and also control of the characteristics identified as NOT GO functional diameters.

(2) *System 21A (for Metric Threads in Accordance With ANSI B1.18M)*. Provides for interchangeable assembly with functional size control at the maximum-material limits within the length of standard gaging elements. For external threads, control of the minimum-material boundary is provided at two thread flank locations over the length of the full thread. For internal threads, control of the minimum-material boundary is provided at two thread flank locations. Other thread characteristics such as lead, flank angle, taper, and roundness variations are confined within these limits with no specific control of their magnitudes. System 21A is not applicable to thread sizes smaller than M5.

(3) *System 22*. Provides for interchangeable assembly with functional size control at the maximum-material limits within the length of standard gaging elements, and also control of the minimum-material size limits over the length of the full thread. The cumulative form variation of thread characteristics such as lead, flank angle, taper, and roundness is confined within the maximum- and minimum-material limits.

(4) *System 23*. Provides for interchangeable assembly with functional size control at the maximum-material limits within the length of standard gaging elements, and also control of the minimum-material size limits over the length of the full thread. The magnitude of other thread characteristics such as lead, flank angle, taper, and roundness are further controlled within the maximum- and minimum-material limits. Only thread characteristics in System 23 for which requirements or limitations are specified must be evaluated for System 23 compliance. For example, if the product thread has no surface texture requirement nor major to pitch runout limitation, then Sys-

tem 23 does not require that these two characteristics be checked.

(c) For special applications, the screw thread on a threaded product may require inspection not consistent with any of the standard gaging systems. In such cases, one of the standard gaging systems should be selected and modified by specifying, in accordance with para. 7(b), the addition or the reduction of thread characteristic(s) and gage(s) as selected from Table 1 or 2, as applicable.

(d) Diameter sizes are affected by roundness variations, which may be even-lobed (180 deg. contact) or odd-lobed (120 deg. contact). Consequently, product thread acceptance or rejection can be influenced by thread gages and measuring equipment having the ability to detect one, but not the other, because of gage construction and design. Tables 1 and 2 provide a selection of gages which in combination may be needed to assure that diameter size variations caused by out-of-roundness are contained within product tolerance limits.

## 5 GAGING REQUIREMENTS

(a) Screw threads of threaded products are defined by the applicable thread document. Appropriate ANSI Standards are included in Section 2.

(b) The gaging system used to inspect the screw thread of a threaded product shall be as specified in the product standard, procurement drawing, or purchase inquiry and order.

(c) Each of the thread characteristics specified in the gaging system shall be inspected using the gage (or one of the gages) specified for that characteristic. Gages shall be in conformance with the applicable gaging documents. Use appropriate standards listed in Section 2 unless otherwise specified.

(d) The use of any gage or measuring device is not precluded if the results given by such gage or measuring device correlate with a gage or measuring device listed in this Standard.

## 6 ACCEPTABILITY

(a) The screw thread of a threaded product shall be acceptable when each of the thread characteristics specified in the designated gaging system is found acceptable.

(b) Within each gaging system, a choice of gages is specified for each characteristic. Acceptance by any

SCREW THREAD GAGING SYSTEMS FOR  
DIMENSIONAL ACCEPTABILITY

ASME B1.3M-1992

one gage specified for a characteristic shall be the criterion for acceptance of that characteristic.

(c) All threaded products are subject to visual inspection for gross defects. This visual inspection shall be made without magnification and is intended to detect such gross defects as missing or incomplete threads, defective thread profile, torn or ruptured surfaces and cracks, etc. Surface texture of threaded products, when required, will be evaluated by visual or tactile comparison with texture specimens or surface measurement equipment. ANSI/ASME B46.1, Fig. B1 provides roughness average ( $R_a$ ) guidelines for various thread manufacturing processes.

(d) *Relationship of Gaging Systems to Product Screw Thread Acceptability*

(1) Product screw threads acceptable to System 23 are acceptable where Systems 22 and 21 are specified. The reverse is not necessarily true.

(2) Product screw threads acceptable to System 22 are acceptable where System 21 is specified. The reverse is not necessarily true.

**7 DESIGNATION**

(a) Thread acceptability requirements as described in this Standard must be specified in addition to thread size designation and thread class specified in accordance with the applicable screw thread document.

(1) Thread acceptability requirements may be specified by a general note on the drawing or procurement document stating a particular system and referencing ASME B1.3M.

**EXAMPLES:**

Note 1. Acceptability of screw threads shown on this drawing shall be determined based on System 21, ASME B1.3M.

or

Note 1. Acceptability of screw threads shown on this drawing shall be determined based on System 22, ASME B1.3M.

or

Note 1. Acceptability of screw threads shown on this drawing shall be determined based on System 23, ASME B1.3M.

(2) Thread acceptability requirements may be

specified by showing a system number in parentheses following the thread tolerance class designation.

**EXAMPLES:**

1/4-20UNC-2A(21) or M6x1-6g(21A)

or

.250-28UNJF-3A(22) or M6x1-6g(23)

(b) In cases where gaging systems not tabulated in Table 3 or 4 are required, they shall be specified by designating the nearest tabulated gaging system number followed by an "S." The modifications to the designated tabulated gaging system should immediately follow.

**EXAMPLES:**

Note 1. Acceptability of screw threads shown on this drawing shall be determined based on System 21S, ASME B1.3M, with the addition of control of the thread root radius.

or

M6x1-6g(21S)  
Root Radius Control  
Required

or

Note 1. Acceptability of screw threads shown on this drawing shall be determined based on System 22S, ASME B1.3M, with the addition of control of the thread root radius.

or

1/4-20UNRC-2A(22S)  
Root Radius Control  
Required

or

1/4-20UNC-2A(22S)  
Size Measurement Values  
Required

or

M6x1-6g(23S)  
Functional Limit per Gage  
1.1 Solid Ring Required

or

M6x1-6g(23S)  
Surface Texture Control  
Not Required

**TABLE 1 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
EXTERNAL PRODUCT THREAD CHARACTERISTICS**

Thread Gages and Measuring Equipment	Maximum Material		NOT GO Functional Diameter		Minimum Material					
	GO				Pitch Diam.		Thd. Groove Diam.		Boundary Thread Flank	
	Func. Limit	Func. Size	Func. Limit	Func. Size	Limit	Size	Limit	Size	Limit	Size
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
1 Threaded Ring Gages, Split or Solid (ANSI B47.1)										
1.1 GO	•									
1.2 NOT GO			•							
2 Thread Snap Gages										
2.1 GO segments	•									
2.2 NOT GO segments			•							
2.3 GO rolls	•									
2.4 NOT GO rolls			•							
2.5 Minimum material — pitch diameter type — cone and vee					•					
2.6 Minimum material — thread groove diameter type — cone only							•			
2.7 Minimum material — B and C NOT GO rolls or segments									•	
3 Plain Diameter Gages										
3.1(a) Maximum (GO) plain cylindrical ring for major diameter										
(b) Minimum (NOT GO) plain cylindrical ring for major diameter										
3.2 Major diameter snap type										
3.3 Minor diameter snap type										
3.4 Maximum and minimum major diameter snap type										
3.5 Maximum and minimum minor diameter snap type										
4 Indicating Thread Gages Having either two contacts at 180 deg. or three contacts at 120 deg.										
4.1.1 GO segments @ 120 deg. contact	•	•	•	•						
4.1.2 GO segments @ 180 deg. contact	•	•	•	•						
4.3.1 GO rolls @ 120 deg. contact	•	•	•	•						
4.3.2 GO rolls @ 180 deg. contact	•	•	•	•						
4.5.1 Minimum material — pitch diameter type — cone and vee @ 120 deg. contact					•	•				
4.5.2 Minimum material — pitch diameter type — cone and vee @ 180 deg. contact					•	•				

**GENERAL NOTE:**

The notation NOT GO is used to indicate LO, M<sub>N</sub>/M<sub>T</sub>, and NOT GO gages as described by the respective gage standard.

**TABLE 1 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
EXTERNAL PRODUCT THREAD CHARACTERISTICS**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation	Flank Angle Variation	Major Diameter		Minor Diameter		Root Rad.	Diam. Runout Major to Pitch	Surface Texture
	Oval 180 deg.		Multilobe 120 deg.												
	Limit	Size	Limit	Size	Limit	Size			Limit	Size	Limit	Size			
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>	H	I	J <sub>1</sub>	J <sub>2</sub>	K <sub>1</sub>	K <sub>2</sub>	L	M	N
1.1 >											[Note (1)]				
1.2 >															
2.1 >	.										[Note (1)]				
2.2 >	.				.										
2.3 >	.										[Note (1)]				
2.4 >	.				.										
2.5 >	.				.										
2.6 >	.				.										
2.7 >															
3.1(a) >									.						
3.1(b) >									.						
3.2 >									.						
3.3 >											.				
3.4 >									.						
3.5 >											.				
4.1.1 >			.	.							[Note (1)]				
4.1.2 >	.	.									[Note (1)]				
4.3.1 >			.	.							[Note (1)]				
4.3.2 >	.	.							.		[Note (1)]				
4.5.1 >			.	.	.	.									
4.5.2 >	.	.			.	.									

**NOTE:**

(1) Maximum minor diameter limit is acceptable when product passes GO gage on UN, UNR, UNJ, M, and MJ threads.

**TABLE 1 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
EXTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

Thread Gages and Measuring Equipment	Maximum Material		NOT GO Functional Diameter		Minimum Material					
	GO				Pitch Diam.		Thd. Groove Diam.		Boundary Thread Flank	
	Func. Limit	Func. Size	Func. Limit	Func. Size	Limit	Size	Limit	Size	Limit	Size
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
4.6.1 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 120 deg. contact							•	•		
4.6.2 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 180 deg. contact							•	•		
4.7 Major diameter and pitch diameter runout gage										
4.8 Differential segments or rolls (GO profile for one pitch in length) used in combination with GO/minimum material indicating gages to yield a diameter equivalent for variations in lead (including uniformity of helix) and flank angle										
4.9 Minimum material — B and C NOT GO rolls or segments								•	•	
4.10 Cumulative form gaging — maximum-material and minimum-material dimensions collectively establish cumulative form within limits defined by the applicable thread documents										
5 Indicating Plain Diameter Gages										
5.1 Major diameter type										
5.2 Minor diameter type										
6 Pitch Micrometer With Standard Contacts (Approximately NOT GO Profile) Cone and Vee			•	•						
7 Pitch Micrometer With Modified Contacts (Approximately Pitch Diameter Contact) Cone and Vee					•	•				
8 Thread Measuring Wires With Suitable Measuring Means							•	•		
9 Optical Comparator and Toolmaker's Microscope With Suitable Fixturing					•	•				
10 Profile Tracting Equipment With Suitable Fixturing										
11 Lead Measuring Machine With Suitable Fixturing										
12 Helical Path Attachment Used With GO Type Indicating Gage										
13 Helical Path Analyzer										
14 Plain Micrometer and Calipers — Modified as Required										
15 Surface Measuring Equipment or Texture Comparison Specimen										
16 Roundness Equipment										
17 Linear Measuring Machine With Required Accessories						•				
18 Coordinate Measuring Machine With Required Accessories						•		•		

**GENERAL NOTE:**

The notation NOT GO is used to indicate LO, M<sub>N</sub>/M<sub>T</sub>, and NOT GO gages as described by the respective gage standard.



**TABLE 1 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
EXTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation	Flank Angle Variation	Major Diameter		Minor Diameter		Root Rad.	Diam. Runout Major to Pitch	Surface Texture					
	Oval 180 deg.		Multilobe 120 deg.						Limit	Size	Limit	Size				Limit	Size	Limit	Size	
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>			H	I	J <sub>1</sub>	J <sub>2</sub>				K <sub>1</sub>	K <sub>2</sub>	L	M	N
4.6.1 >			•	•	•	•														
4.6.2 >	•	•			•	•														
4.7 >														•						
4.8 >	•	•	•	•	•	•	•	•												
4.9 >																				
4.10 >	Cumulative Form																			
5.1 >									•	•										
5.2 >											•	•								
6 >	•	•			•	•														
7 >	•	•			•	•														
8 >	•	•			•	•														
9 >	•	•	•	•			•	•	•	•	•	•	•	•						
10 >								•					•							
11 >							•													
12 >							•													
13 >							•													
14 >									•	•										
15 >															•					
16 >	•	•	•	•																
17 >		•				•	•			•		•								
18 >		•		•		•	•	•		•		•	•	•						

**NOTE:**

(1) Maximum minor diameter limit is acceptable when product passes GO gage on UN, UNR, UNJ, M, and MJ threads.

**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS**

Thread Gages and Measuring Equipment	Maximum Material		NOT GO Functional Diameter		Minimum Material						
	GO				Pitch Diam.		Thd. Groove Diam.		Boundary Thread Flank		
	Func. Limit	Func. Size	Func. Limit	Func. Size	Limit	Size	Limit	Size	Limit	Size	
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
1 Threaded Plug Gage (ANSI B47.1)											
1.1 GO	•		•								
1.2 NOT GO			•								
1.3 Full form gage GO plug (MJ only)	•										
1.4 B and C NOT GO									•		
3 Plain Diameter Gages											
3.1(a) Minimum (GO) plain cylindrical plug for minor diameter											
(b) Maximum (NOT GO) plain cylindrical plug for minor diameter											
3.2 Major diameter snap type											
3.3 Minor diameter snap type											
3.4 Maximum and minimum major diameter snap type											
3.5 Maximum and minimum minor diameter snap type											
4 Indicating Thread Gages											
Having either two contacts @ 180 deg. or three contacts @ 120 deg.											
4.1.1 GO segments @ 120 deg. contact	•	•	•	•							
4.1.2 GO segments @ 180 deg. contact	•	•	•	•							
4.3.1 GO rolls @ 120 deg. contact	•	•	•	•							
4.3.2 GO rolls @ 180 deg. contact	•	•	•	•							
4.5.1 Minimum material — pitch diameter type — cone and vee @ 120 deg. contact					•	•					
4.5.2 Minimum material — pitch diameter type — cone and vee @ 180 deg. contact					•	•					
4.6.1 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 120 deg. contact							•	•			
4.6.2 Minimum material — thread groove diameter type — cone or best wire size radius profile @ 180 deg. contact							•	•			
4.7 Minor diameter and pitch diameter runout gage											
4.8 Differential segments or rolls (GO profile for one pitch in length) used in combination with GO/minimum material indicating gages to yield a diameter equivalent for variations in lead (including uniformity of helix) and flank angle											
4.9 Minimum material — B and C NOT GO rolls or segments									•	•	

**GENERAL NOTE:**

The notation NOT GO is used to indicate LO, M<sub>N</sub>/M<sub>T</sub>, and NOT GO gages as described by the respective gage Standard.

**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation H	Flank Angle Variation I	Major Diameter		Minor Diameter		Root Rad. L	Diam. Runout Major to Pitch M	Surface Texture N		
	Oval 180 deg.		Multilobe 120 deg.		Limit	Size			Limit	Size	Limit	Size				Limit	Size
	Limit	Size	Limit	Size													
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>			J <sub>1</sub>	J <sub>2</sub>	K <sub>1</sub>	K <sub>2</sub>				L	M
1.1 >									[Note (1)]								
1.2 >																	
1.3 >									[Note (1)]		•						
1.4 >																	
3.1(a) >											•						
3.1(b) >											•						
3.2 >									•								
3.3 >											•						
3.4 >									•								
3.5 >											•						
4.1.1 >																	
			•	•					[Note (1)]								
4.1.2 >	•	•							[Note (1)]								
4.3.1 >			•	•					[Note (1)]								
4.3.2 >	•	•							[Note (1)]								
4.5.1 >			•	•	•	•											
4.5.2 >	•	•			•	•											
4.6.1 >			•	•	•	•											
4.6.2 >	•	•			•	•											
4.7 >														•			
4.8 >	•	•	•	•	•	•	•	•									
4.9 >																	

NOTE:  
(1) Minimum major diameter limit is acceptable when product passes GO gage.

**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

Thread Gages and Measuring Equipment	Maximum Material		NOT GO Functional Diameter		Minimum Material					
	GO				Pitch Diam.		Thd. Groove Diam.		Boundary Thread Flank	
	Func. Limit	Func. Size	Func. Limit	Func. Size	Limit	Size	Limit	Size	Limit	Size
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
4.10 Cumulative form gaging — maximum-material and minimum-material dimensions collectively establish cumulative form within limits defined by the applicable thread documents										
5 Indicating Plain Diameter Gages										
5.1 Major diameter type										
5.2 Minor diameter type										
6 Pitch Micrometer With Standard Contacts (Approximately NOT GO Profile) Cone and Vee			•	•						
7 Pitch Micrometer With Modified Contacts (Approximately Pitch Diameter Contact) Cone and Vee					•	•				
8 Thread Measuring Balls With Suitable Measuring Means							•	•		
9 Optical Comparator and Toolmaker's Microscope With Suitable Fixturing and Cast Replica					•	•				
10 Profile Tracing Equipment With Suitable Fixturing										
14 Surface Measuring Equipment or Texture Comparison Specimen										
15 Roundness Equipment										
16 Linear Measuring Machine With Required Accessories						•		•		
17 Coordinate Measuring Machine With Required Accessories						•		•		

**GENERAL NOTE:**

The notation NOT GO is used to indicate HJ, M<sub>N</sub>/M<sub>T</sub>, and NOT GO gages as described by the respective gage Standard.

**TABLE 2 SCREW THREAD GAGES AND MEASURING EQUIPMENT FOR  
INTERNAL PRODUCT THREAD CHARACTERISTICS (CONT'D)**

	Roundness of Pitch Cylinder				Taper of Pitch Cylinder		Lead Incl. Helix Variation	Flank Angle Variation	Major Diameter		Minor Diameter		Root Rad.	Diam. Runout Major to Pitch	Surface Texture
	Oval 180 deg.		Multilobe 120 deg.						Limit	Size	Limit	Size			
	Limit	Size	Limit	Size	Limit	Size	Variation	Variation	Limit	Size	Limit	Size	L	M	N
	E <sub>1</sub>	E <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	G <sub>1</sub>	G <sub>2</sub>	H	I	J <sub>1</sub>	J <sub>2</sub>	K <sub>1</sub>	K <sub>2</sub>			
4.10 >	Cumulative Form														
5.1 >									•	•					
5.2 >											•	•			
6 >	•	•			•	•									
7 >	•	•			•	•									
8 >	•	•			•	•									
9 >							•	•	•	•		•	•		
10 >								•					•		
14 >															•
15 >	•	•	•	•											
16 >		•				•				•		•			
17 >		•		•		•	•	•		•		•	•	•	

**TABLE 3 GAGING SYSTEMS FOR EXTERNAL THREADS**

System	Dimensions Inspected	Applicable Thread Gages and Measuring Equipment			
	(For dimension/gage combinations to be used, refer to Table 1.)	Attributes/Fixed Limit Control	Col.	Variables/Indicating Control	Col.
21	GO maximum material	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	NOT GO functional diameter	1.2, 2.2, 2.4, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>
	Major diameter	3.1(a), 3.1(b), 3.2, 3.4, 5.1, 14	J <sub>1</sub>	5.1, 14, 17, 18	J <sub>2</sub>
21A (For M Threads per ANSI B1.18M)	GO maximum-material boundary	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum-material boundary B and C NOT GO	2.7, 4.9	D <sub>3</sub>	4.9	D <sub>4</sub>
	Root profile	...		9.10, 18	L
	Major diameter	3.1(a), 3.1(b), 3.2, 3.4, 5.1, 14	J <sub>1</sub>	5.1, 14, 17, 18	J <sub>2</sub>
22	GO maximum material	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum material				
	Pitch diameter	2.5, 4.5, 7	C <sub>1</sub>	4.5, 7, 17, 18	C <sub>2</sub>
	or				
	Thread groove diameter	2.6, 4.6, 8	D <sub>1</sub>	4.6, 8, 18	D <sub>2</sub>
	or <sup>1</sup> { NOT GO functional diameter combined with control of:	1.2, 2.2, 2.4, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>
	Lead (including helix)	...		4.8, 9, 11, 12, 13, 17, 18	H
	and	...		4.8, 9, 10, 18	I
	Flank angle (over the length of full thread)	...			
Major diameter	3.1(a), 3.2, 3.4, 5.1, 14	J <sub>1</sub>	5.1, 14, 17, 18	J <sub>2</sub>	
Minor diameter (rounded root)	3.3, 3.5, 5.2, 9	K <sub>1</sub>	5.2, 9, 17, 18	K <sub>2</sub>	
Root profile	...		9, 10, 18	L	
23	GO maximum material	1.1, 2.1, 2.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum material				
	Pitch diameter	2.5, 4.5, 7	C <sub>1</sub>	4.5, 7, 17, 18	C <sub>2</sub>
	or				
	Thread groove diameter	2.6, 4.6, 8	D <sub>1</sub>	4.6, 8, 18	D <sub>2</sub>
	Major diameter	3.1(a), 3.2, 3.4, 5.1, 14	J <sub>1</sub>	5.1, 14, 17, 18	J <sub>2</sub>
	Minor diameter	3.3, 3.5, 5.2, 9	K <sub>1</sub>	5.2, 9, 17, 18	K <sub>2</sub>
	Root profile	...		9, 10, 18	L
	Roundness of pitch cylinder:				
	Oval 180 deg.	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 9, 16	E <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 9, 16, 17, 18	E <sub>2</sub>
	Multilobe 120 deg.	4.1, 4.3, 4.5, 4.6, 4.8, 9, 16	F <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 9, 16, 18	F <sub>2</sub>
	Taper of pitch cylinder	2.2, 2.4, 2.5, 2.6, 4.5, 4.6, 4.8, 6, 7, 8	G <sub>1</sub>	4.5, 4.6, 4.8, 6, 7, 8, 17, 18	G <sub>2</sub>
	Cumulative form variation	...		4, 10	E <sub>1</sub> -I
	Lead including helix variation	...		4.8, 9, 11, 12, 13, 17, 18	H
	Flank angle variation	...		4.8, 9, 10, 18	I
Runout major diameter to pitch diameter	...		4.7, 9, 18	M	
Surface texture	...		15	N	

**NOTE:**

(1) Only by agreement between purchaser and supplier on limits and/or methods.

**TABLE 4 GAGING SYSTEMS FOR INTERNAL THREADS**

System	Dimensions Inspected	Applicable Thread Gages and Measuring Equipment			
	(For dimension/gage combinations to be used, refer to Table 2.)	Attributes/Fixed Limit Control	Col.	Variables/Indicating Control	Col.
21	GO maximum material	1.1, 1.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	NOT GO functional diameter	1.2, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>
	Minor diameter	1.3, 3.1(a), 3.1(b), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 16, 17	K <sub>2</sub>
21A (For M Threads per ANSI B1.18M)	GO maximum-material boundary	1.1, 1.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum-material boundary B and C NOT GO	1.4, 4.9	D <sub>3</sub>	4.9	D <sub>4</sub>
	Minor diameter	1.3, 3.1(a), 3.1(b), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 16, 17	K <sub>2</sub>
22	GO maximum material	1.1, 1.3, 2.1, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum material Pitch diameter	4.5, 7	C <sub>1</sub>	4.5, 7, 16, 17	C <sub>2</sub>
	or Thread groove diameter	4.6, 8	D <sub>1</sub>	4.6, 8, 16, 17	D <sub>2</sub>
	or <sup>1</sup> { NOT GO functional diameter combined with control of: Lead (including helix) and Flank angle (over the length of full thread)	1.2, 4.1, 4.3, 6	B <sub>1</sub>	4.1, 4.3, 6	B <sub>2</sub>
		...		4.8, 9, 17	H
		...		4.8, 9, 10, 17	I
	Minor diameter	1.3, 3.1(a), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 16, 17	K <sub>2</sub>
23	GO maximum material	1.1, 1.3, 4.1, 4.3	A <sub>1</sub>	4.1, 4.3	A <sub>2</sub>
	Minimum material Pitch diameter	4.5, 7	C <sub>1</sub>	4.5, 7, 16, 17	C <sub>2</sub>
	or Thread groove diameter	4.6, 8	D <sub>1</sub>	4.6, 8, 16, 17	D <sub>2</sub>
	Minor diameter	1.3, 3.1(a), 3.3, 3.5, 5.2	K <sub>1</sub>	5.2, 16, 17	K <sub>2</sub>
	Roundness of pitch cylinder: Oval 180 deg.	4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 15	E <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 6, 7, 8, 15, 16, 17	E <sub>2</sub>
	Multilobe 120 deg.	4.1, 4.3, 4.5, 4.6, 4.8, 15	F <sub>1</sub>	4.1, 4.3, 4.5, 4.6, 4.8, 15, 17	F <sub>2</sub>
	Taper of pitch cylinder	4.5, 4.6, 4.8, 6, 7, 8	G <sub>1</sub>	4.5, 4.6, 4.8, 6, 7, 8, 16, 17	G <sub>2</sub>
	Cumulative form variation	...		4, 10	E <sub>1</sub> -I
	Lead including helix variation	...		4.8, 9, 17	H
	Flank angle variation	...		4.8, 9, 10, 17	I
	Runout major diameter to pitch diameter	...		4.7, 9, 17	M
	Surface texture	...		14	N

NOTE:  
(1) Only by agreement on limits and/or methods between purchaser and supplier.

## AMERICAN NATIONAL STANDARDS FOR SCREW THREADS

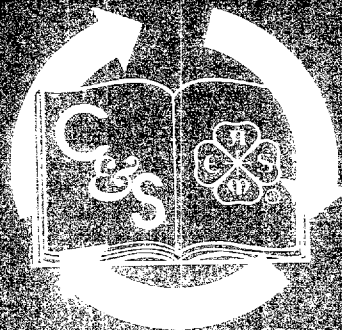
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