U. S. DEPARTMENT OF COMMERCE
R. P. LAMONT, Secretary
BUREAU OF STANDARDS
GEORGE K. BURGESS, Director

AMERICAN NATIONAL SPECIAL SCREW THREADS

COMMERCIAL STANDARD CS25-30

[Issued September 19, 1930]

Effective Date, July 1, 1930

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1930

NOTE

This commercial standard presents in compact form the tables of dimensions of special screw threads having the American National form of thread (60°) as published in the 1928 Report of the National Screw Thread Commission (Secs. IV and XD), Bureau of Standards Miscellaneous Publication No. 89 [1] and *is identical therewith.* Figure and table numbers are identical with those in the Report of the National Screw Thread Commission for convenience in making references.

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[1] The complete report may be procured from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at 50 cents per copy.

ACCEPTORS

ASSOCIATIONS

American Oil Burner Association (Inc.), New York, N. Y. (in principle).
National Hardware Association of the United States, Philadelphia, Pa.
National Machine Tool Builders' Association, Cincinnati, Ohio.
National Retail Hardware Association, Indianapolis, Ind.
Screw Machine Products Association, eastern division, New Haven, Conn.

FIRMS

Adams Co., The, Dubuque, Iowa.
Allied Products Corporation, Victor-Peninsular division, Detroit, Mich.
Almond Manufacturing Co., T. R., Ashburnham, Mass.
Alvord-Polk Tool Co., Millersburg, Pa.
American Manganese Bronze Co., Philadelphia, Pa.
American Tool & Manufacturing Co., Urbana, Ohio.
Armstrong Manufacturing Co., The, Bridgeport, Conn.
Arrow Head Steel Products Co., Minneapolis, Minn. (in principle).
Autocar Co., Ardmore, Pa.
Babson Dow Manufacturing Co., Roxbury, Mass.
Bard Manufacturing Co., Royersford, Pa.
Barnes Drill Co., Rockford, Ill.
Bell Co. (Inc.), The David, Buffalo, N. Y.
Bethlehem Shipbuilding Corporation (Ltd.), Quincy, Mass.
Biglow & Co. (Inc.), L. C., New York, N. Y.
Brewer Titchener Corporation, Cortland, N. Y.
Brightman Manufacturing Co., The, South Columbus, Ohio.
Brightman Nut & Manufacturing Co., Sandusky, Ohio.
Brill Co., The J. G., Philadelphia, Pa.
Buffalo Bolt Co., North Tonawanda, N. Y.
Chase Cos. (Inc.), Waterbury Manufacturing Co. division, Waterbury, Conn.
Chicago Screw Co., Chicago, Ill.
Clark Bros. Bolt Co., Milldale, Conn.
Clendenin Bros. (Inc.), Baltimore, Md.
Cleveland Twist Drill Co., The, Cleveland, Ohio.
Cleveland Wrought Products Co., The, Cleveland, Ohio.
Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn.
Columbia Nut & Bolt Co., Bridgeport, Conn.
Columbus Bolt Works Co., The, Columbus, Ohio.
Conant & Donelson Co., Conway, Mass.
Corbin Screw Corporation, The, New Britain, Conn.
Cox & Sons Co., The, Bridgeton, N. J. (in principle).
Dallett Co., The, Philadelphia, Pa.
Davenport Machine Tool Co. (Inc.), Rochester, N. Y.
Detroit Screw Works, Detroit, Mich.
Eastwood Wire Corporation, Belleville, N. J.
Economy Engineering Co., The, Willoughby, Ohio.
Electric Boat Co., Groton, Conn.
Erie Forge Co., Erie Pa.
Essley Machinery Co., The E. L., Chicago, Ill.
Eureka Tool Machine Co., Newark, N. J.
Federal Huber Co., Plano, Kendall County, Ill.
Fischer Special Manufacturing Co., The, Cincinnati, Ohio.
Flannery Bolt Co., Bridgeville, Pa.
Fortney Manufacturing Co., Newark, N. J.
Foster Machine Co., Elkhart, Ind.
Fostoria Screw Co., The, Fostoria, Ohio.
Gaskell & Son (Inc.), William, Brooklyn, N. Y.
General Manufacturing Co., The, Waterbury, Conn.
Geometric Tool Co., The, New Haven, Conn.
Gibbs & Cox (Inc.), New York, N. Y.
Gisholt Machine Co., Madison, Wis.
Globe Products Co., The, Cleveland, Ohio.
Grabler Manufacturing Co., The, Cleveland, Ohio.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Gurley, W. & L. E., Troy, N. Y.
Hardinge Bros., Chicago, Ill.
Harper Co., H. M., Chicago, Ill.
Harrington Co., The, Philadelphia, Pa.
Hartford Machine Screw Co., Hartford, Conn.
Haynes Stellite Co., Kokomo, Ind.
Howe Chain Co., Muskegon, Mich.
Independent Contact Manufacturing Co., Union City, N. J.
Indicating Calipers Corporation, New York, N. Y.
Jenckes Knitting Machine Co., Pawtucket, R. I.
John-sons Gage Works, Hartford, Conn.
Johnson Rule Manufacturing Co., E. P., Chicago, Ill.
Kalman Steel Co., Chicago, Ill.
Kramer Co., C. P., Chicago, Ill.
Lamson & Sessions Co., The, Cleveland, Ohio.
Landis Machine Co., Waynesboro, Pa.
Lang Tool Co., The C. W. Dayton, Ohio.
Lanman Co., The E. B., East Chicago, Ind.
Lehmann Machine Co., St. Louis, Mo.
Mac Lean-Fogg Lock Nut Co., Chicago, Ill.
Macy & Co. (Inc.), R. H., New York, N. Y.
Manufacturers' & Inventors' Electric Co., New York, N. Y.
Maryland Bolt & Nut Co., The, Mount Washington, Baltimore, Md.
Meisel Press Manufacturing Co., Boston, Mass.
Mitchell Engineering Co., The, Springfield, Ohio.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Murchey Machine & Tool Co., Detroit, Mich.
Napoleon Products Co., The, Napoleon, Ohio.
Narragansett Machine Co., Pawtucket, R. I.
Nash Motors Co., The, Racine, Wis.

National Lock Co., Rockford, Ill.
National Machine Products Co., Detroit, Mich.
National Marine Lamp Co., The, Forestville, Conn.
Non-Pareil Die Corporation, Camden, N. J.
Northwest Automatic Products Corporation, Minneapolis, Minn.
Packard Motor Car Co., Detroit, Mich.
Penn Screw & Machine Works, Philadelphia, Pa.
Pheoll Manufacturing Co., Chicago, Ill.
Philadelphia Hardware & Malleable Iron Works (Inc.), Philadelphia, Pa.
Pittsburgh Screw & Bolt Corporation, N. S. Pittsburgh, Pa.
Ramsdell Manufacturing Co., The, Cleveland, Ohio.
Reed & Prince Manufacturing Co., Worcester, Mass.
Reed Small Tool Works, Worcester, Mass.
Rhode Island Tool Co., Providence, R. I.
Rickert-Shafer Co., Erie, Pa.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
St. Louis Screw & Bolt Co., St. Louis, Mo.
Scovill Manufacturing Co., Waterbury, Conn.
Screw Machine Specialty Co., Pittsburgh, Pa.
Sessions & Son, J. H., Bristol, Conn.
Seymour Brass Turning Co., Seymour, Conn.
Sherman-Klove Co., Chicago, Ill.
Skelly Bolt Co. (Inc.), Thos. P., Philadelphia, Pa.
Smalley General Co., Bay City, Mich.
Standard Nut & Bolt Co., Valley Falls, R. I.
Standard Screw Co., Chicago, Ill.
Standard Shop Equipment Co., Philadelphia, Pa.
Starrett Co., The L. S. Athol, Mass.
Steele & Johnson Manufacturing Co., Waterbury, Conn.
Steward & Romaine Manufacturing Co., Philadelphia, Pa.
Strong, Carlisle & Hammond Co., The, Cleveland, Ohio.
Superior Machine & Engineering Co., Detroit, Mich.
Taft-Peirce Manufacturing Co., Woonsocket, R. I.
Taylor Instrument Cos., Rochester, N. Y.
Triplex Machine Tool Co., New York, N. Y.
Triplex Screw Co., Cleveland, Ohio.
Union Twist Drill Co., Butterfield division, Derby Line, Vt.
United States Aluminum Co., The, Pittsburgh, Pa.
Upson-Walton Co., The, Cleveland, Ohio.
Van Denburgh, L. W., Newark, N. J.
Van Keuren Co., The, Watertown, Mass.
Ware Bros. (Chicago Roller Skate Co.), Chicago, Ill.
Western Automatic Machine Screw Co., Elyria, Ohio.
Western Screw-Products Co., St. Louis, Mo.
White Motor Co., The, Cleveland, Ohio.
Williams & Co., J. H., Buffalo, N. Y.
Worcester Taper Pin Co., Worcester, Mass.

GOVERNMENT

Navy Department, Washington, D. C.

AMERICAN NATIONAL SPECIAL SCREW THREADS

COMMERCIAL STANDARD CS25-30

At the request of the National Screw Thread Commission, a pamphlet entitled "American National Screw Thread Tables for Shop Use, II, Special Threads," and presenting in compact form the tables of dimensions of special screw threads as published in the 1928 Report of the National Screw Thread Commission, Bureau of Standards Miscellaneous Publication No. 89, was circulated as a recommended commercial standard to producers, distributors, and users for written acceptance. The industry has since accepted and approved for promulgation by the Department of Commerce the basic sizes, limiting dimensions, and tolerances for the American 12-pitch thread series and other screw threads of special diameters, pitches, and lengths of engagement shown herein.

This standard is effective (see p. 22) for new production by acceptors of record July 1, 1930.

Promulgation recommended.

I. J. FAIRCHILD,
Chief, Division of Trade Standards.

Promulgated.

GEORGE K. BURGESS,
Director, Bureau of Standards.

APPROVED.

R. P. LAMONT,
Secretary of Commerce.

COMMERCIAL STANDARD CS25-30

AMERICAN NATIONAL 12-PITCH THREAD SERIES

Where special threads are required, it is sometimes essential to select a certain pitch as standard for a range of sizes. Also, in general practice, where the pitch of a special thread is optional, the uniform use of a selected pitch is advantageous. For such applications the 12 pitch is widely used, particularly for two distinct purposes as given below, but for different reasons.

Sizes of 12-pitch threads from one-half inch to and including 1¾ inches are used in railroad practice, which requires that worn stud holes be retapped with a tap of the next larger size, the increment being one-sixteenth inch throughout most of the range.

The 12-pitch threads are also widely used in machine construction, as for thin nuts on shafts and sleeves. From the standpoints of good design and simplification of practice, it is desirable to maintain shoulder diameters to ⅛-inch steps. The 12 pitch is the coarsest, for a thread of basic depth, which will permit a threaded collar which screws onto a threaded shoulder to slip over a shaft, the difference in diameter between shoulder and shaft being one-eighth inch.

TABLE 87.—*American National 12-pitch thread series*

Identification		Basic diameters			
Sizes	Threads per inch	Major diameter *D*	Pitch diameter *E*	Minor diameter *K*	Metric equivalent of major diameter
		Inches	*Inches*	*Inches*	*mm*
1/2	12	0.5000	0.4459	0.3917	12.700
9/16 [1]	12	.5625	.5084	.4542	14.288
5/8	12	.6250	.5709	.5167	15.875
11/16	12	.6875	.6334	.5792	17.463
3/4	12	.7500	.6959	.6417	19.050
13/16	12	.8125	.7584	.7042	20.638
7/8	12	.8750	.8209	.7667	22.225
15/16	12	.9375	.8834	.8292	23.813
1	12	1.0000	.9459	.8917	25.400
1 1/16	12	1.0625	1.0084	.9542	26.988
1 1/8 [2]	12	1.1250	1.0709	1.0167	28.575
1 3/16	12	1.1875	1.1334	1.0792	30.163
1 1/4 [2]	12	1.2500	1.1959	1.1417	31.750
1 5/16	12	1.3125	1.2584	1.2042	33.338
1 3/8	12	1.3750	1.3209	1.2667	34.925
1 1/2 [2]	12	1.5000	1.4459	1.3917	38.100
1 3/4	12	1.7500	1.6959	1.6417	44.450
2	12	2.0000	1.9459	1.8917	50.800
2 1/4	12	2.2500	2.1959	2.1417	57.150
2 1/2	12	2.5000	2.4459	2.3917	63.500
2 3/4	12	2.7500	2.6959	2.6417	69.850
3	12	3.0000	2.9459	2.8917	76.200

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

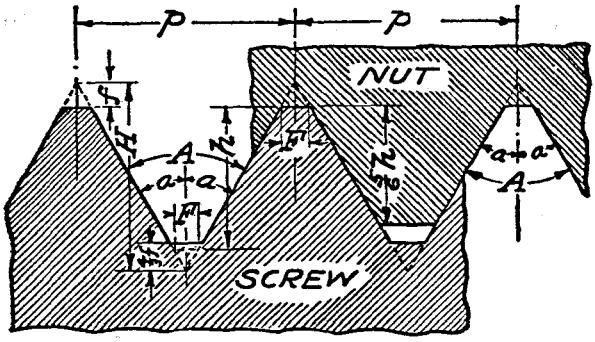

FIG. 3.—*American National form of thread*

NOTE.—No allowance is shown. This condition exists in class 2, free fit, and class 3, medium fit, where both the minimum nut and the maximum screw are basic.

NOTATION

n=number of threads per inch
H=0.866025 p, depth of 60° sharp V thread
h=0.649519 p, depth of American National form of thread
$\frac{5}{6}h$=0.541266 p, maximum depth of engagement

F=0.125000 p, width of flat at crest and root of American National form
f=0.108253 p } depth of truncation
=$\frac{1}{6}H$ }
=$\frac{1}{6}h$ }

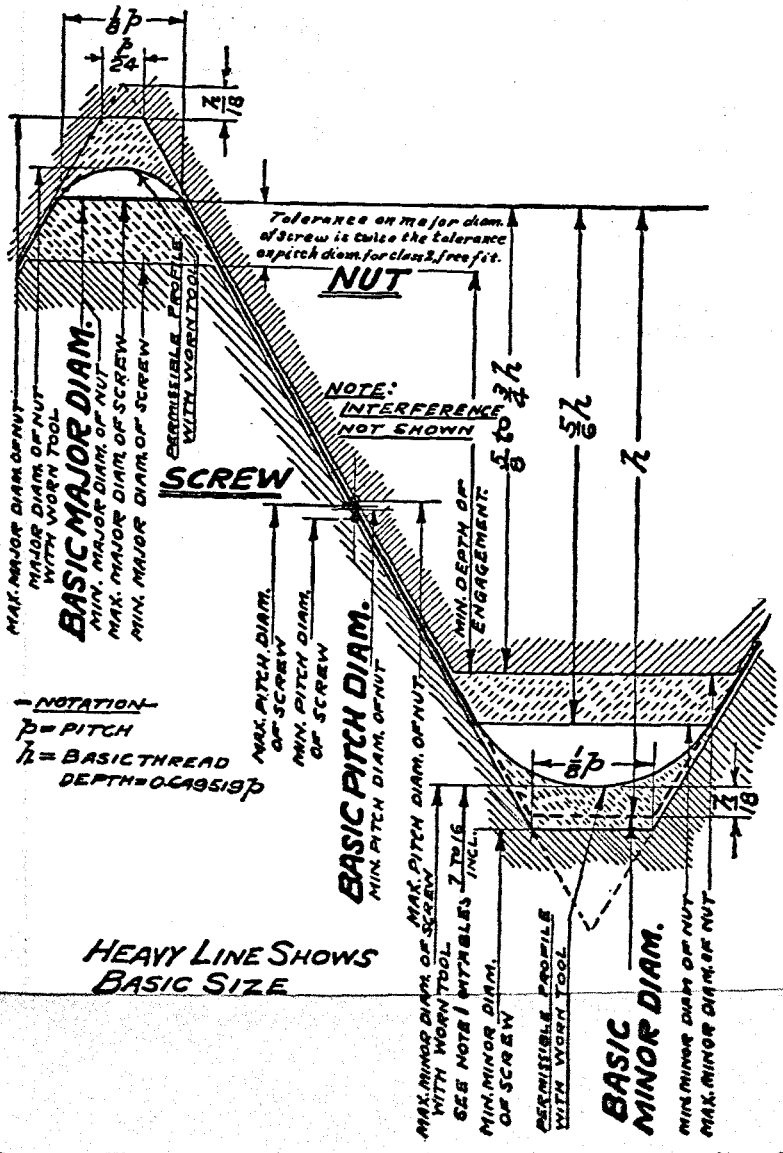

FIG. 10.—*Illustration of tolerances and crest clearances for class 3, medium fit*

TABLE 88.—*Limiting dimensions and tolerances, classes 1, 2, 3, and 4 fits, American National 12-pitch thread series*

Dimensions and tolerances [1]		Size, (inches)							
		½	9/16 [2]	⅝	11/16	¾	13/16	⅞	15/16
BOLTS AND SCREWS		*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
Class 1, major diameter	Max	0.4976	0.5601	0.6226	0.6851	0.7476	0.8101	0.8726	0.9351
	Min	.4818	.5443	.6068	.6693	.7318	.7943	.8568	.9193
	Tol	.0158	.0158	.0158	.0158	.0158	.0158	.0158	.0158
Classes 2, 3, and 4, major diameter	Max	.5000	.5625	.6250	.6875	.7500	.8125	.8750	.9375
	Min	.4888	.5513	.6138	.6763	.7388	.8013	.8638	.9263
	Tol	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112
Class 1, minor diameter	Max.[4]	.3954	.4579	.5204	.5829	.6454	.7079	.7704	.8329
Classes 2, 3, and 4, minor diameter	Max.[4]	.3978	.4603	.5228	.5853	.6478	.7103	.7728	.8353
Class 1, loose fit, pitch, diameter	Max	.4435	.5060	.5685	.6310	.6935	.7560	.8185	.8810
	Min	.4356	.4981	.5606	.6231	.6856	.7481	.8106	.8731
	Tol	.0079	.0079	.0079	.0079	.0079	.0079	.0079	.0079
Class 2, free fit, pitch diameter	Max	.4459	.5084	.5709	.6334	.6959	.7584	.8209	.8834
	Min	.4403	.5028	.5653	.6278	.6903	.7528	.8153	.8778
	Tol	.0056	.0056	.0056	.0056	.0056	.0056	.0056	.0056
Class 3, medium fit, pitch diameter	Max	.4459	.5084	.5709	.6334	.6959	.7584	.8209	.8834
	Min	.4419	.5044	.5669	.6294	.6919	.7544	.8169	.8794
	Tol	.0040	.0040	.0040	.0040	.0040	.0040	.0040	.0040
Class 4, close fit, pitch diameter	Max	.4464	.5089	.5714	.6339	.6964	.7589	.8214	.8839
	Min	.4444	.5069	.5694	.6319	.6944	.7569	.8194	.8819
	Tol	.0020	.0020	.0020	.0020	.0020	.0020	.0020	.0020
NUTS AND TAPPED HOLES									
Classes 1, 2, 3, and 4, major diameter	Min.[5]	.5000	.5625	.6250	.6875	.7500	.8125	.8750	.9375
Classes 1, 2, 3, and 4, minor diameter	Max	.4225	.4850	.5438	.6063	.6688	.7313	.7938	.8563
	Min	.4098	.4723	.5348	.5973	.6598	.7223	.7848	.8473
	Tol	.0127	.0127	.0090	.0090	.0090	.0090	.0090	.0090
Classes 1, 2, 3, and 4, pitch diameter	Min	.4459	.5084	.5709	.6334	.6959	.7584	.8209	.8834
Class 1, pitch diameter	Max	.4538	.5163	.5788	.6413	.7038	.7663	.8288	.8913
	Tol	.0079	.0079	.0079	.0079	.0079	.0079	.0079	.0079
Class 2, pitch diameter	Max	.4515	.5140	.5765	.6390	.7015	.7640	.8265	.8890
	Tol	.0056	.0056	.0056	.0056	.0056	.0056	.0056	.0056
Class 3, pitch diameter	Max	.4499	.5124	.5749	.6374	.6999	.7624	.8249	.8874
	Tol	.0040	.0040	.0040	.0040	.0040	.0040	.0040	.0040
Class 4, pitch diameter	Max	.4479	.5104	.5729	.6354	.6979	.7604	.8229	.8854
	Tol	.0020	.0020	.0020	.0020	.0020	.0020	.0020	.0020

Footnotes at end of table.

TABLE 88.—*Limiting dimensions and tolerances, classes 1, 2, 3, and 4 fits, American National 12-pitch thread series*—Continued

Dimensions and tolerances [1]		Size, (inches)						
		1	1 1/16	1 1/8 [2]	1 3/16	1 1/4 [2]	1 5/16	1 3/8
BOLTS AND SCREWS		*Inch*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
Class 1, major diameter	Max	0.9976	1.0601	1.1226	1.1851	1.2476	1.3101	1.3726
	Min	.9818	1.0443	1.1068	1.1693	1.2318	1.2943	1.3568
	Tol	.0158	.0158	.0158	.0158	.0158	.0158	.0158
Classes 2, 3, and 4, major diameter	Max	1.0000	1.0625	1.1250	1.1875	1.2500	1.3125	1.3750
	Min	.9888	1.0513	1.1138	1.1763	1.2388	1.3013	1.3638
	Tol	.0112	.0112	.0112	.0112	.0112	.0112	.0112
Class 1, minor diameter	Max [4]	.8954	.9579	1.0204	1.0829	1.1454	1.2079	1.2704
Classes 2, 3, and 4, minor diameter	Max [4]	.8978	.9603	1.0228	1.0853	1.1478	1.2103	1.2728
Class 1, loose fit, pitch diameter	Max	.9435	1.0060	1.0685	1.1310	1.1935	1.2560	1.3185
	Min	.9356	.9981	1.0606	1.1231	1.1856	1.2481	1.3106
	Tol	.0079	.0079	.0079	.0079	.0079	.0079	.0079
Class 2, free fit, pitch diameter	Max	.9459	1.0084	1.0709	1.1334	1.1959	1.2584	1.3209
	Min	.9403	1.0028	1.0653	1.1278	1.1903	1.2528	1.3153
	Tol	.0056	.0056	.0056	.0056	.0056	.0056	.0056
Class 3, medium fit, pitch diameter	Max	.9459	1.0084	1.0709	1.1334	1.1959	1.2584	1.3209
	Min	.9419	1.0044	1.0669	1.1294	1.1919	1.2544	1.3169
	Tol	.0040	.0040	.0040	.0040	.0040	.0040	.0040
Class 4, close fit, pitch diameter	Max	.9464	1.0089	1.0714	1.1339	1.1964	1.2589	1.3214
	Min	.9444	1.0069	1.0694	1.1319	1.1944	1.2569	1.3194
	Tol	.0020	.0020	.0020	.0020	.0020	.0020	.0020
NUTS AND TAPPED HOLES								
Classes 1, 2, 3, and 4, major diameter	Min. [5]	1.0000	1.0625	1.1250	1.1875	1.2500	1.3125	1.3750
Classes 1, 2, 3, and 4, minor diameter	Max	.9188	.9813	1.0438	1.1063	1.1688	1.2313	1.2938
	Min	.9098	.9723	1.0348	1.0973	1.1598	1.2223	1.2848
	Tol	.0090	.0090	.0090	.0090	.0090	.0090	.0090
Classes 1, 2, 3, and 4, pitch diameter	Min	.9459	1.0084	1.0709	1.1334	1.1959	1.2584	1.3209
Class 1, pitch diameter	Max	.9538	1.0163	1.0788	1.1413	1.2038	1.2663	1.3288
	Tol	.0079	.0079	.0079	.0079	.0079	.0079	.0079
Class 2, pitch diameter	Max	.9515	1.0140	1.0765	1.1390	1.2015	1.2640	1.3265
	Tol	.0056	.0056	.0056	.0056	.0056	.0056	.0056
Class 3, pitch diameter	Max	.9499	1.0124	1.0749	1.1374	1.1999	1.2624	1.3249
	Tol	.0040	.0040	.0040	.0040	.0040	.0040	.0040
Class 4, pitch diameter	Max	.9479	1.0104	1.0729	1.1354	1.1979	1.2604	1.3229
	Tol	.0020	.0020	.0020	.0020	.0020	.0020	.0020

Footnotes at end of table.

TABLE 88.—*Limiting dimensions and tolerances, classes 1, 2, 3, and 4 fits, American National 12-pitch thread series*—Continued

Dimensions and tolerances [1]		Size, (inches)						
		1½ [2]	1¾	2	2¼	2½	2¾	3
BOLTS AND SCREWS		*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
Class 1, major diameter	Max	1.4976	1.7476	1.9976	2.2476	2.4976	2.7476	2.9976
	Min	1.4818	1.7318	1.9818	2.2318	2.4818	2.7318	2.9818
	Tol	.0158	.0158	.0158	.0158	.0158	.0158	.0158
Classes 2, 3, and 4, major diameter	Max	1.5000	1.7500	2.0000	2.2500	2.5000	2.7500	3.0000
	Min	1.4888	1.7388	1.9888	2.2388	2.4888	2.7388	2.9888
	Tol	.0112	.0112	.0112	.0112	.0112	.0112	.0112
Class 1, minor diameter	Max.[4]	1.3954	1.6454	1.8954	2.1454	2.3954	2.6454	2.8954
Classes 2, 3, and 4, minor diameter	Max.[4]	1.3978	1.6478	1.8978	2.1478	2.3978	2.6478	2.8978
Class 1, loose fit, pitch diameter	Max	1.4435	1.6935	1.9435	2.1935	2.4435	2.6935	2.9435
	Min	1.4356	1.6829	1.9329	2.1823	2.4323	2.6823	2.9323
	Tol	.0079	.0106	.0106	.0112	.0112	.0112	.0112
Class 2, free fit, pitch diameter	Max	1.4459	1.6959	1.9459	2.1959	2.4459	2.6959	2.9459
	Min	1.4403	1.6882	1.9382	2.1876	2.4376	2.6876	2.9376
	Tol	.0056	.0077	.0077	.0083	.0083	.0083	.0083
Class 3, medium fit, pitch diameter	Max	1.4459	1.6959	1.9459	2.1959	2.4459	2.6959	2.9459
	Min	1.4419	1.6896	1.9396	2.1890	2.4390	2.6890	2.9390
	Tol	.0040	.0063	.0063	.0069	.0069	.0069	.0069
Class 4, close fit, pitch diameter	Max	1.4464	1.6964	1.9464	2.1964	2.4464	2.6964	2.9464
	Min	1.4444	1.6933	1.9433	2.1930	2.4430	2.6930	2.9430
	Tol	.0020	.0031	.0031	.0034	.0034	.0034	.0034
NUTS AND TAPPED HOLES								
Classes 1, 2, 3, and 4, major diameter	Min.[5]	1.5000	1.7500	2.0000	2.2500	2.5000	2.7500	3.0000
Classes 1, 2, 3, and 4, minor diameter	Max	1.4188	1.6688	1.9188	2.1688	2.4188	2.6688	2.9188
	Min	1.4098	1.6598	1.9098	2.1598	2.4098	2.6598	2.9098
	Tol	.0090	.0090	.0090	.0090	.0090	.0090	.0090
Classes 1, 2, 3, and 4, pitch diameter	Min	1.4459	1.6959	1.9459	2.1959	2.4459	2.6959	2.9459
Class 1, pitch diameter	Max	1.4538	1.7065	1.9565	2.2071	2.4571	2.7071	2.9571
	Tol	.0079	.0106	.0106	.0112	.0112	.0112	.0112
Class 2, pitch diameter	Max	1.4515	1.7036	1.9536	2.2042	2.4542	2.7042	2.9542
	Tol	.0056	.0077	.0077	.0083	.0083	.0083	.0083
Class 3, pitch diameter	Max	1.4499	1.7022	1.9522	2.2028	2.4528	2.7028	2.9528
	Tol	.0040	.0063	.0063	.0069	.0069	.0069	.0069
Class 4, pitch diameter	Max	1.4479	1.6990	1.9490	2.1993	2.4493	2.6993	2.9493
	Tol	.0020	.0031	.0031	.0034	.0034	.0034	.0034

[1] Tolerances are based on a length of engagement of 1 inch.
[2] Standard size screw and nut of the American National coarse-thread series.
[3] Standard size screw and nut of the American National fine-thread series.
[4] Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. The minimum minor diameter of the screw shall be that corresponding to a flat at the minor diameter of the minimum screw equal to $\frac{1}{8} \times p$, and may be determined by subtracting 0.0541 inch from the minimum pitch diameter of the screw.
[5] Dimensions for the minimum major diameter of the nut correspond to the basic flat, ($\frac{1}{8} \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. The maximum major diameter of the nut shall be that corresponding to a flat at the major diameter of the maximum nut equal to $\frac{1}{24} \times p$, and may be determined by adding 0.0662 inch to the maximum pitch diameter of the nut.

SCREW THREADS OF SPECIAL DIAMETERS, PITCHES, AND LENGTHS OF ENGAGEMENT

For threaded parts such as hub and radiator caps in the automotive industry, threaded collars on machine tools, etc., where the diameters are larger, the pitches finer, and the lengths of engagement shorter than for bolt and nut practice Tables 27, 28, 29, 30, and 31 are arranged herein, and are intended to cover all practical combinations of diameter, pitch, length of engagement, and class of fit. The use of these tables instead of the application of formulas to determine limiting dimensions of a special thread facilitates placing dimensions on drawings. Also, in cases of special threads of the same diameter, pitch, and class of fit, but slightly different lengths of engagement, the threads may be gaged by a single set of gages, as identical pitch diameter tolerances will be applied.

Rules for Use of Tables.—For consistent application of these pitch-diameter tolerance tables to all cases, adherence to the following rules relative to the use of the tables is necessary:

1. All thread dimensions of threads of special diameters, pitches, and lengths of engagement, except pitch diameter tolerances, are derived from Table 27. Pitch diameter tolerances are taken from Tables 28, 29, 30, or 31, depending upon the class of fit required.

Tolerances on pitch diameter corresponding to major diameters between those for which values are given in the tables shall be those of the next larger diameter.

2. Tolerances on pitch diameter for pitches between those for which values are given in the tables shall be those of the next coarser pitch, except that for screws having 80, 72, 44, 13, 11, 9, 7, 5, or 4½ threads per inch, lengths of engagement of one and one-half diameters or less, and diameters less than the standard diameters for the respective pitches as given in Section III[2] for standard sizes and pitches, the tolerances given in Section III shall be used.

3. Tolerances on pitch diameter for pitches coarser than 4 threads per inch shall be the same as those for 4 threads per inch.

4. Tolerances on pitch diameter when the length of engagement is ½, or 1½, inches for 12 threads per inch and finer, or 1, or 3, inches for pitches coarser than 12 threads per inch, shall correspond to the interval of which these are the upper limits.

5. Tolerances on pitch diameter for lengths of engagement greater than those for which values are given shall be the maximum values listed for the pitch concerned.

Example: 3¼ inch, 16-thread, class 1, with allowance on screw, one-half inch length of engagement:

From Table 28:

Pitch diameter tolerance ..... =0.0095

Also from Table 27, for the screw:

Maximum major diameter=3.2500−0.0018=3.2482
Minimum major diameter =3.2482− .0126=3.2356
Maximum minor diameter=3.2500− .0785=3.1715
Maximum pitch diameter =3.2500− .0424=3.2076
Minimum pitch diameter =3.2076− .0095=3.1981

And for the nut:

Minimum major diameter ..... =3.2500
Minimum minor diameter =3.2500− .0677=3.1823
Maximum minor diameter=3.1823+ .0068=3.1891
Minimum pitch diameter =3.2500− .0406=3.2094
Maximum pitch diameter =3.2094+ .0095=3.2189

[2] Of the 1928 report.

TABLE 27.—*Thread dimensions of special screw threads, classes 1, 2, 3, and 4 fits*

Threads per inch	SCREW SIZES To obtain maximum dimensions for major, pitch, and minor diameters, subtract the values in the "maximum" columns from the basic major diameter. Apply tolerances minus. See Tables 28, 29, 30, and 31 for pitch diameter tolerances.									NUT SIZES To obtain minimum dimensions for minor, pitch, and major diameters, subtract the values in the "minimum" columns from the basic major diameter. Apply tolerances plus. See Tables 28, 29, 30, and 31 for pitch diameter tolerances.			
	Major diameter				Pitch diameter, maximum			Minor diameter,[1] maximum		Minor diameter		Pitch diameter, minimum	Major diameter,[2] minimum
	Maximum		Tolerance							Minimum	Tolerance		
	Class 1	Classes 2, 3, 4	Class 1	Classes 2, 3, 4	Class 1	Classes 2, 3	Class 4	Class 1	Classes 2, 3, 4	Classes 1, 2, 3, and 4			
	Inch	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	0.0007	0.0000	0.0052	0.0038	0.0108	0.0101	0.0100	0.0199	0.0192	0.0169	0.0017	0.0101	0.0000
56	.0008	.0000	.0056	.0040	.0124	.0116	.0114	.0227	.0219	.0193	.0019	.0116	.0000
48	.0009	.0000	.0062	.0044	.0144	.0135	.0133	.0265	.0256	.0226	.0023	.0135	.0000
40	.0010	.0000	.0068	.0048	.0172	.0162	.0160	.0317	.0307	.0271	.0027	.0162	.0000
36	.0011	.0000	.0072	.0050	.0191	.0180	.0178	.0352	.0341	.0301	.0030	.0180	.0000
32	.0011	.0000	.0076	.0054	.0214	.0203	.0201	.0394	.0383	.0338	.0034	.0203	.0000
28	.0012	.0000	.0086	.0062	.0244	.0232	.0230	.0450	.0438	.0387	.0039	.0232	.0000
24	.0013	.0000	.0092	.0066	.0284	.0271	.0268	.0524	.0511	.0451	.0045	.0271	.0000
20	.0015	.0000	.0102	.0072	.0340	.0325	.0322	.0628	.0613	.0541	.0054	.0325	.0000
18	.0016	.0000	.0114	.0082	.0377	.0361	.0358	.0698	.0682	.0601	.0060	.0361	.0000
16	.0018	.0000	.0126	.0090	.0424	.0406	.0402	.0785	.0767	.0677	.0068	.0406	.0000
14	.0021	.0000	.0140	.0098	.0485	.0464	.0460	.0897	.0876	.0773	.0077	.0464	.0000
12	.0024	.0000	.0158	.0112	.0565	.0541	.0536	.1046	.1022	.0902	.0090	.0541	.0000
10	.0028	.0000	.0184	.0128	.0678	.0650	.0644	.1255	.1227	.1083	.0109	.0650	.0000
8	.0034	.0000	.0222	.0152	.0846	.0812	.0805	.1568	.1534	.1353	.0135	.0812	.0000
6	.0044	.0000	.0290	.0202	.1127	.1083	.1074	.2089	.2045	.1804	.0180	.1083	.0000
4	.0064	.0000	.0408	.0280	.1688	.1624	.1611	.3131	.3067	.2706	.0270	.1624	.0000

[1] Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. The minimum minor diameter of the screw shall be that corresponding to a flat at the minor diameter of the minimum screw equal to $\frac{1}{8} \times p$, and may be determined by subtracting the basic thread depth, h (or $0.6495p$), from the minimum pitch diameter of the screw.

[2] Dimensions for the minimum major diameter of the nut correspond to the basic flat ($\frac{1}{8} \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. The maximum major diameter of the nut shall be that corresponding to a flat at the major diameter of the maximum nut equal to $\frac{1}{64} \times p$, and may be determined by adding $1\frac{3}{8} \times h$ (or $0.7939p$) to the maximum pitch diameter of the nut.

TABLE 28.—*Pitch diameter tolerances for special screw threads, class 1, loose fit*

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1/16 inch	1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	3/4 inch
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64		1/2	0.0026	0.0026	0.0034	0.0038	0.0042	0.0044	0.0047
56		1/2	.0028	.0028	.0034	.0038	.0044	.0046	.0049
	1/2	1 1/2	.0052	.0054	.0055	.0056	*.0056*	*.0056*	*.0056*
48		1/2	.0031	.0031	.0034	.0038	.0046	.0048	.0051
	1/2	1 1/2	.0054	.0056	.0057	.0057	.0057	.0057	.0057
40		1/2	.0034	[1] .0034	.0034	.0038	.0046	.0051	.0054
	1/2	1 1/2	.0057	.0057	.0057	.0057	.0057	.0057	.0057
36		1/2		.0036	.0036	.0038	.0046	.0051	.0056
	1/2	1 1/2		.0057	.0057	.0057	.0057	.0057	.0057
32		1/2		.0038	.0038	.0038	.0046	.0051	.0057
	1/2	1 1/2		.0057	.0057	.0057	.0057	.0057	.0057
28		1/2			.0043	[2] .0043	.0046	.0051	.0057
	1/2	1 1/2			.0057	.0057	.0057	.0057	.0057
24		1/2			.0046	.0046	[2] .0046	.0051	.0057
	1/2	1 1/2			.0057	.0057	.0057	.0057	.0057
20		1/2			.0051	[1] .0051	.0051	[2] .0051	.0057
	1/2	1 1/2			.0057	.0057	.0057	.0057	.0057
	1 1/2	3			.0098	.0100	.0102	*.0102*	*.0102*
18		1/2				.0057	.0057	.0057	.0057
	1/2	1 1/2				.0057	.0057	.0057	.0057
	1 1/2	3				.0102	.0104	.0106	.0109
16		1/2				.0063	[1] .0063	.0063	.0063
	1/2	1 1/2				.0063	.0063	.0063	[2] .0063
	1 1/2	3				.0105	.0107	.0109	.0112
14		1/2					.0070	.0070	.0070
	1/2	1 1/2					.0070	.0070	.0070
	1 1/2	3					.0111	.0113	.0116
12		1/2					.0075	.0077	.0079
	1/2	1 1/2					.0079	.0079	.0079
	1 1/2	3					.0115	.0117	.0120
10		1						.0087	[1] .0092
	1	3						.0117	.0120
	3	6						.0167	.0171
8		1						.0095	.0098
	1	3						.0125	.0128
	3	6						.0175	.0178
6		1							.0109
	1	3							.0139
	3	6							.0189

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 28.—*Pitch diameter tolerances for special screw threads, class 1, loose fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1 inch	1½ inches	2 inches	3 inches	4 inches	6 inches	8 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	-------	½	0.0050	0.0052	-------	-------	-------	-------	-------
56	-------	½	.0052	.0056	-------	-------	-------	-------	-------
	½	1½	*.0056*	*.0056*	-------	-------	-------	-------	-------
48	-------	½	.0054	.0058	0.0062	-------	-------	-------	-------
	½	1½	.0062	*.0062*	*.0062*	-------	-------	-------	-------
40	-------	½	.0057	.0061	.0065	-------	-------	-------	-------
	½	1½	.0068	*.0068*	*.0068*	-------	-------	-------	-------
36	-------	½	.0058	.0063	.0067	0.0072	-------	-------	-------
	½	1½	.0070	.0072	*.0072*	*.0072*	-------	-------	-------
32	-------	½	.0060	.0065	.0069	.0075	-------	-------	-------
	½	1½	.0070	.0076	*.0076*	*.0076*	-------	-------	-------
28	-------	½	.0063	.0067	.0071	.0077	0.0083	-------	-------
	½	1½	.0070	.0079	.0086	*.0086*	*.0086*	-------	-------
24	-------	½	.0066	.0070	.0074	.0080	.0086	-------	-------
	½	1½	.0070	.0079	.0089	.0092	*.0092*	-------	-------
20	-------	½	.0070	.0074	.0078	.0084	.0090	0.0099	-------
	½	1½	.0070	.0079	.0093	.0099	.0102	*.0102*	-------
	1½	3	*.0102*	*.0102*	*.0102*	*.0102*	*.0102*	*.0102*	-------
18	-------	½	.0070	.0077	.0080	.0087	.0092	.0101	0.0109
	½	1½	.0070	.0079	.0095	.0102	.0107	.0114	*.0114*
	1½	3	.0112	.0114	*.0114*	*.0114*	*.0114*	*.0114*	*.0114*
16	-------	½	.0070	.0079	.0083	.0090	.0095	.0104	.0112
	½	1½	.0070	.0079	.0098	.0105	.0110	.0119	.0126
	1½	3	.0115	.0120	.0123	.0126	*.0126*	*.0126*	*.0126*
14	-------	½	.0070	.0079	.0087	.0093	.0099	.0108	.0115
	½	1½	[2] .0070	.0079	.0102	.0108	.0114	.0123	.0130
	1½	3	.0119	.0123	.0127	.0133	.0139	.0140	*.0140*
12	-------	½	.0079	.0079	.0091	.0097	.0103	.0112	.0119
	½	1½	.0079	[2] .0079	.0106	.0112	.0118	.0127	.0134
	1½	3	.0123	.0127	.0131	.0137	.0143	.0152	.0158
10	-------	1	.0093	.0098	.0102	.0108	.0113	.0122	.0130
	1	3	.0123	.0128	[2] .0132	.0138	.0143	.0152	.0160
	3	6	.0173	.0178	.0181	.0184	*.0184*	*.0184*	*.0184*
8	-------	1	[1] .0111	.0111	.0111	.0115	.0121	.0130	.0137
	1	3	.0131	.0135	.0139	[2] .0145	.0151	.0160	.0167
	3	6	.0181	.0185	.0189	.0195	.0201	.0210	.0217
6	-------	1	.0112	.0116	.0120	.0126	.0132	.0141	.0148
	1	3	.0142	[1] .0145	.0150	.0156	.0162	.0171	.0178
	3	6	.0192	.0196	.0200	.0206	.0212	.0221	.0228
4	-------	1	.0130	.0134	.0138	.0145	.0150	.0159	.0167
	1	3	.0160	.0164	.0168	[1] .0204	.0204	.0204	.0204
	3	6	.0210	.0215	.0218	.0225	.0230	.0239	.0247

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 28.—*Pitch diameter tolerances for special screw threads, class 1, loose fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	10 inches	12 inches	14 inches	16 inches	18 inches	20 inches	24 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
18	------	½	0.0114	------	------	------	------	------	------
	½	1½	*.0114*	------	------	------	------	------	------
	1½	3	*.0114*	------	------	------	------	------	------
16	------	½	.0118	0.0124	------	------	------	------	------
	½	1½	*.0126*	*.0126*	------	------	------	------	------
	1½	3	*.0126*	*.0126*	------	------	------	------	------
14	------	½	.0122	.0128	0.0133	0.0138	------	------	------
	½	1½	.0137	.0140	*.0140*	*.0140*	------	------	------
	1½	3	*.0140*	*.0140*	*.0140*	*.0140*	------	------	------
12	------	½	.0126	.0132	.0138	.0143	0.0148	0.0152	------
	½	1½	.0141	.0147	.0153	.0158	*.0158*	*.0158*	------
	1½	3	*.0158*	*.0158*	*.0158*	*.0158*	*.0158*	*.0158*	------
10	------	1	.0136	.0142	.0148	.0153	.0158	.0163	0.0171
	1	3	.0166	.0172	.0178	.0183	*.0184*	*.0184*	*.0184*
	3	6	*.0184*	*.0184*	*.0184*	*.0184*	*.0184*	*.0184*	*.0184*
8	------	1	.0144	.0150	.0156	.0161	.0166	.0170	.0179
	1	3	.0174	.0180	.0186	.0191	.0196	.0200	.0209
	3	6	.0222	*.0222*	*.0222*	*.0222*	*.0222*	*.0222*	*.0222*
6	------	1	.0155	.0161	.0166	.0172	.0176	.0181	.0190
	1	3	.0185	.0191	.0196	.0202	.0206	.0211	.0220
	3	6	.0235	.0241	.0246	.0252	.0256	.0261	.0270
4	------	1	.0173	.0179	.0185	.0190	.0195	.0199	.0208
	1	3	.0204	.0209	.0215	.0220	.0225	.0229	.0238
	3	6	.0253	.0259	.0265	.0270	.0275	.0279	.0288

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 29.—*Pitch diameter tolerances for special screw threads, class 2, free fit*

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1/16 inch	1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	3/4 inch
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64		1/2	0.0019	0.0019	0.0024	0.0027	0.0030	0.0032	0.0035
56		1/2	.0020	.0020	.0024	.0027	.0031	.0033	.0036
	1/2	1 1/2	.0038	.0040	*.0040*	*.0040*	*.0040*	*.0040*	*.0040*
48		1/2	.0022	.0022	.0024	.0027	.0032	.0034	.0037
	1/2	1 1/2	.0039	.0041	.0041	.0041	.0041	.0041	.0041
40		1/2	.0024	[1] .0024	.0024	.0027	.0033	.0035	.0038
	1/2	1 1/2	.0041	.0041	.0041	.0041	.0041	.0041	.0041
36		1/2		.0025	.0025	.0027	.0033	.0036	.0039
	1/2	1 1/2		.0041	.0041	.0041	.0041	.0041	.0041
32		1/2		.0027	.0027	.0027	.0033	.0036	.0040
	1/2	1 1/2		.0041	.0041	.0041	.0041	.0041	.0041
28		1/2			.0031	[2] .0031	.0033	.0036	.0041
	1/2	1 1/2			.0041	.0041	.0041	.0041	.0041
24		1/2			.0033	.0033	[2] .0033	.0036	.0041
	1/2	1 1/2			.0041	.0041	.0041	.0041	.0041
20		1/2			.0036	[1] .0036	.0036	[2] .0036	.0041
	1/2	1 1/2			.0041	.0041	.0041	.0041	.0041
18		1/2				.0039	.0041	.0041	.0041
	1/2	1 1/2				.0041	.0041	.0041	.0041
	1 1/2	3				.0079	.0081	.0082	*.0082*
16		1/2				.0040	[1] .0045	.0045	.0045
	1/2	1 1/2				.0045	.0045	.0045	[2] .0045
	1 1/2	3				.0080	.0082	.0084	.0087
14		1/2					.0045	.0048	.0049
	1/2	1 1/2					.0049	.0049	.0049
	1 1/2	3					.0084	.0086	.0089
12		1/2					.0046	.0048	.0051
	1/2	1 1/2					.0056	.0056	.0056
	1 1/2	3					.0086	.0088	.0091
10		1						.0056	[1] .0064
	1	3						.0088	.0091
	3	6						*.0128*	*.0128*
8		1						.0060	.0064
	1	3						.0090	.0093
	3	6						.0140	.0143
6		1							.0068
	1	3							.0098
	3	6							.0148

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 28.—*Pitch diameter tolerances for special screw threads, class 1, loose fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	10 inches	12 inches	14 inches	16 inches	18 inches	20 inches	24 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
18	------	½	0.0114	------	------	------	------	------	------
	½	1½	*.0114*	------	------	------	------	------	------
	1½	3	*.0114*	------	------	------	------	------	------
16	------	½	.0118	0.0124	------	------	------	------	------
	½	1½	*.0126*	*.0126*	------	------	------	------	------
	1½	3	*.0126*	*.0126*	------	------	------	------	------
14	------	½	.0122	.0128	0.0133	0.0138	------	------	------
	½	1½	.0137	.0140	*.0140*	*.0140*	------	------	------
	1½	3	*.0140*	*.0140*	*.0140*	*.0140*	------	------	------
12	------	½	.0126	.0132	.0138	.0143	0.0148	0.0152	------
	½	1½	.0141	.0147	.0153	.0158	*.0158*	*.0158*	------
	1½	3	*.0158*	*.0158*	*.0158*	*.0158*	*.0158*	*.0158*	------
10	------	1	.0136	.0142	.0148	.0153	.0158	.0163	0.0171
	1	3	.0166	.0172	.0178	.0183	*.0184*	*.0184*	*.0184*
	3	6	*.0184*	*.0184*	*.0184*	*.0184*	*.0184*	*.0184*	*.0184*
8	------	1	.0144	.0150	.0156	.0161	.0166	.0170	.0179
	1	3	.0174	.0180	.0186	.0191	.0196	.0200	.0209
	3	6	.0222	*.0222*	*.0222*	*.0222*	*.0222*	*.0222*	*.0222*
6	------	1	.0155	.0161	.0166	.0172	.0176	.0181	.0190
	1	3	.0185	.0191	.0196	.0202	.0206	.0211	.0220
	3	6	.0235	.0241	.0246	.0252	.0256	.0261	.0270
4	------	1	.0173	.0179	.0185	.0190	.0195	.0199	.0208
	1	3	.0204	.0209	.0215	.0220	.0225	.0229	.0238
	3	6	.0253	.0259	.0265	.0270	.0275	.0279	.0288

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 29.—*Pitch diameter tolerances for special screw threads, class 2, free fit*

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1/16 inch	1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	3/4 inch
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	------	1/2	0.0019	0.0019	0.0024	0.0027	0.0030	0.0032	0.0035
56	------	1/2	.0020	.0020	.0024	.0027	.0031	.0033	.0036
	1/2	1 1/2	.0038	.0040	*.0040*	*.0040*	*.0040*	*.0040*	*.0040*
48	------	1/2	.0022	.0022	.0024	.0027	.0032	.0034	.0037
	1/2	1 1/2	.0039	.0041	.0041	.0041	.0041	.0041	.0041
40	------	1/2	.0024	[1] .0024	.0024	.0027	.0033	.0035	.0038
	1/2	1 1/2	.0041	.0041	.0041	.0041	.0041	.0041	.0041
36	------	1/2	--------	.0025	.0025	.0027	.0033	.0036	.0039
	1/2	1 1/2	--------	.0041	.0041	.0041	.0041	.0041	.0041
32	------	1/2	--------	.0027	.0027	.0027	.0033	.0036	.0040
	1/2	1 1/2	--------	.0041	.0041	.0041	.0041	.0041	.0041
28	------	1/2	--------	--------	.0031	[2] .0031	.0033	.0036	.0041
	1/2	1 1/2	--------	--------	.0041	.0041	.0041	.0041	.0041
24	------	1/2	--------	--------	.0033	.0033	[2] .0033	.0036	.0041
	1/2	1 1/2	--------	--------	.0041	.0041	.0041	.0041	.0041
20	------	1/2	--------	--------	.0036	[1] .0036	.0036	[2] .0036	.0041
	1/2	1 1/2	--------	--------	.0041	.0041	.0041	.0041	.0041
18	------	1/2	--------	--------	--------	.0039	.0041	.0041	.0041
	1/2	1 1/2	--------	--------	--------	.0041	.0041	.0041	.0041
	1 1/2	3	--------	--------	--------	.0079	.0081	.0082	*.0082*
16	------	1/2	--------	--------	--------	.0040	[1] .0045	.0045	.0045
	1/2	1 1/2	--------	--------	--------	.0045	.0045	.0045	[2] .0045
	1 1/2	3	--------	--------	--------	.0080	.0082	.0084	.0087
14	------	1/2	--------	--------	--------	--------	.0045	.0048	.0049
	1/2	1 1/2	--------	--------	--------	--------	.0049	.0049	.0049
	1 1/2	3	--------	--------	--------	--------	.0084	.0086	.0089
12	------	1/2	--------	--------	--------	--------	.0046	.0048	.0051
	1/2	1 1/2	--------	--------	--------	--------	.0056	.0056	.0056
	1 1/2	3	--------	--------	--------	--------	.0086	.0088	.0091
10	------	1	--------	--------	--------	--------	--------	.0056	[1] .0064
	1	3	--------	--------	--------	--------	--------	.0088	.0091
	3	6	--------	--------	--------	--------	--------	*.0128*	*.0128*
8	------	1	--------	--------	--------	--------	--------	.0060	.0064
	1	3	--------	--------	--------	--------	--------	.0090	.0093
	3	6	--------	--------	--------	--------	--------	.0140	.0143
6	------	1	--------	--------	--------	--------	--------	--------	.0068
	1	3	--------	--------	--------	--------	--------	--------	.0098
	3	6	--------	--------	--------	--------	--------	--------	.0148

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 29.—*Pitch diameter tolerances for speical screw threads, class 2, free fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1 inch	1½ inches	2 inches	3 inches	4 inches	6 inches	8 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	-------	½	0.0038	-------	-------	-------	-------	-------	-------
56	-------	½	.0038	0.0040	-------	-------	-------	-------	-------
	½	1½	*.0040*	*.0040*	-------	-------	-------	-------	-------
48	-------	½	.0039	.0044	-------	-------	-------	-------	-------
	½	1½	.0044	*.0044*	-------	-------	-------	-------	-------
40	-------	½	.0041	.0045	0.0048	-------	-------	-------	-------
	½	1½	.0048	*.0048*	*.0048*	-------	-------	-------	-------
36	-------	½	.0042	.0046	.0050	-------	-------	-------	-------
	½	1½	.0049	.0050	*.0050*	-------	-------	-------	-------
32	-------	½	.0043	.0047	.0051	0.0054	-------	-------	-------
	½	1½	.0049	.0054	*.0054*	*.0054*	-------	-------	-------
28	-------	½	.0044	.0048	.0052	.0058	0.0062	-------	-------
	½	1½	.0049	.0056	.0062	*.0062*	*.0062*	-------	-------
24	-------	½	.0045	.0050	.0054	.0060	.0065	-------	-------
	½	1½	.0049	.0056	.0066	*.0066*	*.0066*	-------	-------
20	-------	½	.0047	.0052	.0056	.0062	.0067	0.0072	-------
	½	1½	.0049	.0056	.0071	.0072	*.0072*	*.0072*	-------
18	-------	½	.0049	.0053	.0057	.0063	.0069	.0078	0.0082
	½	1½	.0049	.0056	.0072	.0078	.0082	*.0082*	*.0082*
	1½	3	*.0082*	*.0082*	*.0082*	*.0082*	*.0082*	*.0082*	*.0082*
16	-------	½	.0049	.0054	.0058	.0065	.0070	.0079	.0087
	½	1½	.0049	.0056	.0073	.0080	.0085	.0090	*.0090*
	1½	3	.0090	*.0090*	*.0090*	*.0090*	*.0090*	*.0090*	*.0090*
14	-------	½	.0049	.0056	.0060	.0066	.0072	.0081	.0088
	½	1½	[2].0049	.0056	.0075	.0081	.0087	.0096	.0098
	1½	3	.0092	.0096	.0098	*.0098*	*.0098*	*.0098*	*.0098*
12	-------	½	.0054	.0056	.0062	.0068	.0074	.0083	.0090
	½	1½	.0056	[2].0056	.0077	.0083	.0089	.0098	.0105
	1½	3	.0094	.0098	.0100	.0108	.0112	*.0112*	*.0112*
10	-------	1	.0064	.0066	.0070	.0076	.0082	.0091	.0098
	1	3	.0094	.0098	[2].0100	.0108	.0112	.0121	.0128
	3	6	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*
8	-------	1	[1].0076	.0076	.0076	.0080	.0085	.0094	.0102
	1	3	.0095	.0100	.0104	[2].0110	.0115	.0124	.0132
	3	6	.0145	.0150	.0152	*.0152*	*.0152*	*.0152*	*.0152*
6	-------	1	.0071	.0075	.0079	.0085	.0091	.0100	.0107
	1	3	.0101	[1].0101	.0109	.0115	.0121	.0130	.0137
	3	6	.0151	.0155	.0159	.0165	.0171	.0180	.0187
4	-------	1	.0080	.0084	.0088	.0095	.0100	.0109	.0117
	1	3	.0110	.0114	.0118	[1].0140	.0140	.0140	.0147
	3	6	.0160	.0164	.0168	.0175	.0180	.0189	.0197

[1] ~~Standard size of the American National coarse-thread series.~~
[2] Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 29.—*Pitch diameter tolerances for special screw threads, class 2, free fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	10 inches	12 inches	14 inches	16 inches	18 inches	20 inches	24 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
16	------	½	0.0090	------	------	------	------	------	------
	½	1½	*.0090*	------	------	------	------	------	------
	1½	3	*.0090*	------	------	------	------	------	------
14	------	½	.0095	0.0098	------	------	------	------	------
	½	1½	*.0098*	*.0098*	------	------	------	------	------
	1½	3	*.0098*	*.0098*	------	------	------	------	------
12	------	½	.0097	.0103	0.0109	0.0112	------	------	------
	½	1½	.0112	*.0112*	*.0112*	*.0112*	------	------	------
	1½	3	*.0112*	*.0112*	*.0112*	*.0112*	------	------	------
10	------	1	.0105	.0111	.0116	.0122	0.0126	0.0128	------
	1	3	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	------
	3	6	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	------
8	------	1	.0109	.0115	.0120	.0125	.0130	.0135	0.0143
	1	3	.0139	.0145	.0150	.0152	*.0152*	*.0152*	*.0152*
	3	6	*.0152*	*.0152*	*.0152*	*.0152*	*.0152*	*.0152*	*.0152*
6	------	1	.0114	.0120	.0126	.0131	.0136	.0140	.0149
	1	3	.0144	.0150	.0156	.0161	.0166	.0170	.0179
	3	6	.0194	.0200	.0202	*.0202*	*.0202*	*.0202*	*.0202*
4	------	1	.0123	.0129	.0135	.0140	.0145	.0149	.0158
	1	3	.0153	.0159	.0165	.0170	.0175	.0179	.0188
	3	6	.0203	.0209	.0215	.0220	.0225	.0229	.0238

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 30.—*Pitch diameter tolerances for special screw threads, class 3, medium fit*

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1/16 inch	1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	3/4 inch
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	------	1/2	0.0014	0.0014	0.0017	0.0019	0.0023	0.0025	0.0028
	1/2	1 1/2	.0030	.0030	.0030	.0030	.0030	.0030	.0030
56	------	1/2	.0015	.0015	.0017	.0019	.0024	.0026	.0029
	1/2	1 1/2	.0030	.0030	.0030	.0030	.0030	.0030	.0030
48	------	1/2	.0016	.0016	.0017	.0019	.0024	.0026	.0029
	1/2	1 1/2	.0030	.0030	.0030	.0030	.0030	.0030	.0030
40	------	1/2	.0017	[1] .0017	.0017	.0019	.0024	.0026	.0030
	1/2	1 1/2	.0030	.0030	.0030	.0030	.0030	.0030	.0030
36	------	1/2	------	.0018	.0018	.0019	.0024	.0026	.0030
	1/2	1 1/2	------	.0030	.0030	.0030	.0030	.0030	.0030
32	------	1/2	------	.0019	.0019	.0019	.0024	.0026	.0030
	1/2	1 1/2	------	.0030	.0030	.0030	.0030	.0030	.0030
28	------	1/2	------	------	.0022	[2] .0022	.0024	.0026	.0030
	1/2	1 1/2	------	------	.0030	.0030	.0030	.0030	.0030
24	------	1/2	------	------	.0024	.0024	[2] .0024	.0026	.0030
	1/2	1 1/2	------	------	.0030	.0030	.0030	.0030	.0030
20	------	1/2	------	------	.0025	[1] .0026	.0026	[2] .0026	.0030
	1/2	1 1/2	------	------	.0030	.0030	.0030	.0030	.0030
	1 1/2	3	------	------	.0065	.0066	.0068	.0070	.0071
18	------	1/2	------	------	------	.0027	.0030	.0030	.0030
	1/2	1 1/2	------	------	------	.0030	.0030	.0030	.0030
	1 1/2	3	------	------	------	.0067	.0069	.0071	.0071
16	------	1/2	------	------	------	.0028	[1] .0032	.0032	.0032
	1/2	1 1/2	------	------	------	.0032	.0032	.0032	[2] .0032
	1 1/2	3	------	------	------	.0068	.0070	.0071	.0071
14	------	1/2	------	------	------	------	.0032	.0036	.0036
	1/2	1 1/2	------	------	------	------	.0036	.0036	.0036
	1 1/2	3	------	------	------	------	.0071	.0071	.0071
12	------	1/2	------	------	------	------	.0032	.0036	.0040
	1/2	1 1/2	------	------	------	------	.0040	.0040	.0040
	1 1/2	3	------	------	------	------	.0071	.0071	.0071
10	------	1	------	------	------	------	------	.0040	[1] .0045
	1	3	------	------	------	------	------	.0071	.0071
	3	6	------	------	------	------	------	.0120	.0123
8	------	1	------	------	------	------	------	.0042	.0045
	1	3	------	------	------	------	------	.0071	.0071
	3	6	------	------	------	------	------	.0122	.0125
6	------	1	------	------	------	------	------	------	.0048
	1	3	------	------	------	------	------	------	.0071
	3	6	------	------	------	------	------	------	.0128

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

TABLE 30.—*Pitch diameter tolerances for special screw threads, class 3, medium fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1 inch	1½ inches	2 inches	3 inches	4 inches	6 inches	8 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	-------	½	0.0031	0.0036	0.0038	--------	--------	--------	--------
	½	1½	.0036	.0038	*.0038*	--------	--------	--------	--------
56	-------	½	.0032	.0036	.0040	--------	--------	--------	--------
	½	1½	.0036	.0040	*.0040*	--------	--------	--------	--------
48	-------	½	.0032	.0037	.0041	0.0044	--------	--------	--------
	½	1½	.0036	.0040	.0044	*.0044*	--------	--------	--------
40	-------	½	.0033	.0037	.0041	.0048	--------	--------	--------
	½	1½	.0036	.0040	.0048	*.0048*	--------	--------	--------
36	-------	½	.0033	.0038	.0042	.0048	0.0050	--------	--------
	½	1½	.0036	.0040	.0050	*.0050*	*.0050*	--------	--------
32	-------	½	.0034	.0038	.0042	.0048	.0054	--------	--------
	½	1½	.0036	.0040	.0054	*.0054*	*.0054*	--------	--------
28	-------	½	.0034	.0039	.0043	.0049	.0054	0.0062	--------
	½	1½	.0036	.0040	.0058	.0062	*.0062*	*.0062*	--------
24	-------	½	.0035	.0040	.0044	.0050	.0055	.0064	--------
	½	1½	.0036	.0040	.0059	.0065	.0066	*.0066*	--------
20	-------	½	.0036	.0040	.0045	.0051	.0056	.0065	0.0072
	½	1½	.0036	.0040	.0060	.0066	.0071	.0072	*.0072*
	1½	3	*.0071*	*.0071*	*.0072*	*.0072*	*.0072*	*.0072*	*.0072*
18	-------	½	.0036	.0040	.0045	.0051	.0057	.0066	.0073
	½	1½	.0036	.0040	.0060	.0066	.0072	.0081	.0082
	1½	3	.0071	.0071	.0082	*.0082*	*.0082*	*.0082*	*.0082*
16	-------	½	.0036	.0040	.0046	.0052	.0058	.0066	.0074
	½	1½	.0036	.0040	.0061	.0067	.0073	.0081	.0089
	1½	3	.0071	.0071	.0084	.0090	*.0090*	*.0090*	*.0090*
14	-------	½	.0036	.0040	.0047	.0053	.0058	.0067	.0075
	½	1½	[2].0036	.0040	.0062	.0068	.0073	.0082	.0090
	1½	3	.0071	.0071	.0084	.0092	.0098	*.0098*	*.0098*
12	-------	½	.0040	.0040	.0048	.0054	.0059	.0068	.0076
	½	1½	.0040	[2].0040	.0063	.0069	.0074	.0083	.0091
	1½	3	.0071	.0071	.0084	.0092	.0099	.0108	.0112
10	-------	1	.0046	.0050	.0054	.0060	.0066	.0075	.0082
	1	3	.0071	.0071	[2].0084	.0092	.0099	.0108	.0112
	3	6	.0126	.0128	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*
8	-------	1	[1].0054	.0054	.0056	.0062	.0068	.0077	.0084
	1	3	.0071	.0071	.0086	[2].0092	.0099	.0108	.0114
	3	6	.0128	.0132	.0136	.0142	.0148	.0152	*.0152*
6	-------	1	.0054	.0055	.0059	.0065	.0070	.0079	.0087
	1	3	.0071	[1].0071	.0089	.0095	.0100	.0109	.0117
	3	6	.0130	.0135	.0139	.0145	.0150	.0159	.0167
4	-------	1	.0055	.0059	.0063	.0070	.0075	.0084	.0092
	1	3	.0085	.0089	.0093	[1].0097	.0105	.0114	.0122
	3	6	.0135	.0139	.0143	.0150	.0155	.0164	.0172

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 30.—*Pitch diameter tolerances for special screw threads, class 3, medium fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	10 inches	12 inches	14 inches	16 inches	18 inches	20 inches	24 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
18	------	½	0.0080	------	------	------	------	------	------
	½	1½	*.0082*	------	------	------	------	------	------
	1½	3	*.0082*	------	------	------	------	------	------
16	------	½	.0081	0.0087	------	------	------	------	------
	½	1½	.0090	*.0090*	------	------	------	------	------
	1½	3	*.0090*	*.0090*	------	------	------	------	------
14	------	½	.0082	.0088	0.0093	0.0098	------	------	------
	½	1½	.0097	.0098	*.0098*	*.0098*	------	------	------
	1½	3	*.0098*	*.0098*	*.0098*	*.0098*	------	------	------
12	------	½	.0083	.0089	.0094	.0099	0.0104	0.0109	------
	½	1½	.0098	.0104	.0109	.0112	*.0112*	*.0112*	------
	1½	3	*.0112*	*.0112*	*.0112*	*.0112*	*.0112*	*.0112*	------
10	------	1	.0089	.0095	.0101	.0106	.0111	.0115	0.0124
	1	3	.0119	.0125	.0128	*.0128*	*.0128*	*.0128*	*.0128*
	3	6	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*	*.0128*
8	------	1	.0091	.0097	.0102	0108	.0113	.0117	.0126
	1	3	.0121	.0127	.0132	.0138	.0143	.0147	.0152
	3	6	*.0152*	*.0152*	*.0152*	*.0152*	*.0152*	*.0152*	*.0152*
6	------	1	.0094	.0100	.0105	.0110	.0115	.0120	.0128
	1	3	.0124	.0130	.0135	.0140	.0145	.0150	.0158
	3	6	.0174	.0180	.0185	.0190	.0195	.0200	.0202
4	------	1	.0098	.0104	.0110	.0115	.0120	.0124	.0133
	1	3	.0128	.0134	.0140	.0145	.0150	.0154	.0163
	3	6	.0178	.0184	.0190	.0195	.0200	.0204	.0213

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 31.—*Pitch diameter tolerances for special screw threads, class 4, close fit*

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1/16 inch	1/8 inch	3/16 inch	1/4 inch	3/8 inch	1/2 inch	3/4 inch
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	------	1/2	0.0007	0.0007	0.0009	0.0010	0.0012	0.0013	0.0014
	1/2	1 1/2	.0015	.0015	.0015	.0015	0.0015	.0015	.0015
	1 1/2	3	.0028	.0029	.0030	.0031	.0032	.0033	.0034
56	------	1/2	.0007	.0007	.0009	.0010	.0012	.0013	.0014
	1/2	1 1/2	.0015	.0015	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	.0028	.0029	.0030	.0031	.0032	.0033	.0034
48	------	1/2	.0008	.0008	.0009	.0010	.0012	.0013	.0015
	1/2	1 1/2	.0015	.0015	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	.0029	.0030	.0030	.0031	.0032	.0033	.0035
40	------	1/2	.0009	[1] .0009	.0009	.0010	.0012	.0013	.0015
	1/2	1 1/2	.0015	.0015	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	.0029	.0030	.0031	.0032	.0033	.0034	.0035
36	------	1/2	------	.0009	.0009	.0010	.0012	.0013	.0015
	1/2	1 1/2	------	.0015	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	------	.0030	.0031	.0032	.0033	.0034	.0035
32	------	1/2	------	.0010	.0010	.0010	.0012	.0013	.0015
	1/2	1 1/2	------	.0015	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	------	.0030	.0031	.0032	.0033	.0034	.0036
28	------	1/2	------	------	.0011	[2] .0011	.0012	.0013	.0015
	1/2	1 1/2	------	------	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	------	------	.0032	.0032	.0033	.0034	.0036
24	------	1/2	------	------	.0012	.0012	[2] .0012	.0013	.0015
	1/2	1 1/2	------	------	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	------	------	.0032	.0033	.0034	.0035	.0036
20	------	1/2	------	------	.0012	[1] .0013	.0013	[2] .0013	.0015
	1/2	1 1/2	------	------	.0015	.0015	.0015	.0015	.0015
	1 1/2	3	------	------	.0032	.0033	.0034	.0035	.0036
18	------	1/2	------	------	------	.0013	.0015	.0015	.0015
	1/2	1 1/2	------	------	------	.0015	.0015	.0015	.0015
	1 1/2	3	------	------	------	.0033	.0034	.0035	.0036
16	------	1/2	------	------	------	.0014	[1] .0016	.0016	.0016
	1/2	1 1/2	------	------	------	.0016	.0016	.0016	[2] .0016
	1 1/2	3	------	------	------	.0034	.0035	.0036	.0036
14	------	1/2	------	------	------	------	.0016	.0018	.0018
	1/2	1 1/2	------	------	------	------	.0018	.0018	.0018
	1 1/2	3	------	------	------	------	.0035	.0036	.0036
12	------	1/2	------	------	------	------	.0016	.0018	.0020
	1/2	1 1/2	------	------	------	------	.0020	.0020	.0020
	1 1/2	3	------	------	------	------	.0036	.0036	.0036
10	------	1	------	------	------	------	------	.0020	[1] .0023
	1	3	------	------	------	------	------	.0036	.0036
	3	6	------	------	------	------	------	.0060	.0062
8	------	1	------	------	------	------	------	.0021	.0023
	1	3	------	------	------	------	------	.0036	.0036
	3	6	------	------	------	------	------	.0061	.0062
6	------	1	------	------	------	------	------	------	.0024
	1	3	------	------	------	------	------	------	.0036
	3	6	------	------	------	------	------	------	.0064

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

TABLE 31.—*Pitch diameter tolerances for special screw threads, class 4, close fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	1 inch	1½ inches	2 inches	3 inches	4 inches	6 inches	8 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	------	½	0.0016	0.0018	0.0020	0.0023	0.0026	0.0030	0.0034
	½	1½	.0018	.0020	.0027	.0030	.0033	.0038	*.0038*
	1½	3	.0036	.0036	*.0038*	*.0038*	*.0038*	*.0038*	*.0038*
56	------	½	.0016	.0018	.0020	.0023	.0026	.0030	.0034
	½	1½	.0018	.0020	.0027	.0031	.0033	.0038	.0040
	1½	3	.0036	.0036	.0040	*.0040*	*.0040*	*.0040*	*.0040*
48	------	½	.0016	.0018	.0020	.0023	.0026	.0031	.0034
	½	1½	.0018	.0020	.0028	.0031	.0034	.0038	.0042
	1½	3	.0036	.0036	.0040	.0043	.0044	*.0044*	*.0044*
40	------	½	.0016	.0018	.0021	.0024	.0027	.0031	.0035
	½	1½	.0018	.0020	.0028	.0031	.0034	.0038	.0042
	1½	3	.0036	.0036	.0041	.0044	.0047	.0048	*.0048*
36	------	½	.0017	.0019	.0021	.0024	.0027	.0031	.0035
	½	1½	.0018	.0020	.0028	.0031	.0034	.0039	.0042
	1½	3	.0036	.0036	.0041	.0044	.0047	.0050	*.0050*
32	------	½	.0017	.0019	.0021	.0024	.0027	.0031	.0035
	½	1½	.0018	.0020	.0029	.0032	.0034	.0039	.0043
	1½	3	.0036	.0036	.0041	.0044	.0047	.0051	.0054
28	------	½	.0017	.0019	.0021	.0024	.0027	.0032	.0036
	½	1½	.0018	.0020	.0029	.0032	.0035	.0039	.0043
	1½	3	.0036	.0036	.0041	.0044	.0047	.0052	.0056
24	------	½	.0018	.0020	.0022	.0025	.0028	.0032	.0036
	½	1½	.0018	.0020	.0029	.0032	.0035	.0040	.0043
	1½	3	.0036	.0036	.0042	.0045	.0048	.0052	.0056
20	------	½	.0018	.0020	.0022	.0025	.0028	.0033	.0036
	½	1½	.0018	.0020	.0030	.0033	.0036	.0040	.0044
	1½	3	.0036	.0036	.0042	.0045	.0048	.0053	.0056
18	------	½	.0018	.0020	.0023	.0026	.0028	.0033	.0037
	½	1½	.0018	.0020	.0030	.0033	.0036	.0040	.0044
	1½	3	.0036	.0036	.0042	.0046	.0048	.0053	.0057
16	------	½	.0018	.0020	.0023	.0026	.0029	.0033	.0037
	½	1½	.0018	.0020	.0030	.0033	.0036	.0041	.0044
	1½	3	.0036	.0036	.0042	.0046	.0049	.0053	.0057
14	------	½	.0018	.0020	.0023	.0026	.0029	.0034	.0038
	½	1½	[2].0018	.0020	.0031	.0034	.0037	.0041	.0045
	1½	3	.0036	.0036	.0042	.0046	.0049	.0054	.0058
12	------	½	.0020	.0020	.0024	.0027	.0030	.0034	.0038
	½	1½	.0020	[2].0020	.0031	.0034	.0037	.0042	.0046
	1½	3	.0036	.0036	.0042	.0046	.0050	.0054	.0058
10	------	1	.0023	.0023	.0027	.0030	.0033	.0037	.0041
	1	3	.0036	.0036	[2].0042	.0046	.0050	.0054	.0058
	3	6	.0063	.0065	.0067	.0070	.0073	.0077	.0081
8	------	1	[1].0027	.0027	.0028	.0031	.0034	.0038	.0042
	1	3	.0036	.0036	.0043	[2].0046	.0050	.0054	.0058
	3	6	.0064	.0066	.0068	.0071	.0074	.0078	.0082
6	------	1	.0027	.0027	.0029	.0032	.0035	.0040	.0043
	1	3	.0036	[1].0036	.0044	.0047	.0050	.0055	.0058
	3	6	.0065	.0067	.0069	.0072	.0075	.0080	.0083
4	------	1	.0028	.0030	.0032	.0035	.0038	.0042	.0046
	1	3	.0043	.0045	.0047	[1].0048	.0053	.0057	.0061
	3	6	.0068	.0070	.0072	.0075	.0078	.0082	.0086

[1] Standard size of the American National coarse-thread series.
[2] Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 31.—*Pitch diameter tolerances for special screw threads, class 4, close fit*—Continued

Threads per inch	Lengths of engagement		Pitch diameter tolerances for diameters up to and including—						
	From—	To and including—	10 inches	12 inches	14 inches	16 inches	18 inches	20 inches	24 inches
	Inches	*Inches*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*
64	-------	½	0.0037	-------	-------	-------	-------	-------	-------
	½	1½	*.0038*	-------	-------	-------	-------	-------	-------
	1½	3	*.0038*	-------	-------	-------	-------	-------	-------
56	-------	½	.0037	0.0040	-------	-------	-------	-------	-------
	½	1½	*.0040*	*.0040*	-------	-------	-------	-------	-------
	1½	3	*.0040*	*.0040*	-------	-------	-------	-------	-------
48	-------	½	.0038	.0041	0.0044	-------	-------	-------	-------
	½	1½	.0044	*.0044*	*.0044*	-------	-------	-------	-------
	1½	3	*.0044*	*.0044*	*.0044*	-------	-------	-------	-------
40	-------	½	.0038	.0041	.0044	0.0046	-------	-------	-------
	½	1½	.0046	.0048	*.0048*	*.0048*	-------	-------	-------
	1½	3	*.0048*	*.0048*	*.0048*	*.0048*	-------	-------	-------
36	-------	½	.0038	.0041	.0044	.0047	0.0049	-------	-------
	½	1½	.0046	.0049	.0050	*.0050*	*.0050*	-------	-------
	1½	3	*.0050*	*.0050*	*.0050*	*.0050*	*.0050*	-------	-------
32	-------	½	.0038	.0041	.0044	.0047	.0049	0.0052	-------
	½	1½	.0046	.0049	.0052	.0054	*.0054*	*.0054*	-------
	1½	3	*.0054*	*.0054*	*.0054*	*.0054*	*.0054*	*.0054*	-------
28	-------	½	.0039	.0042	.0045	.0047	.0050	.0052	0.0056
	½	1½	.0046	.0049	.0052	.0055	.0057	.0059	.0062
	1½	3	.0059	.0062	*.0062*	*.0062*	*.0062*	*.0062*	*.0062*
24	-------	½	.0039	.0042	.0045	.0048	.0050	.0052	.0057
	½	1½	.0047	.0050	.0052	.0055	.0057	.0060	.0064
	1½	3	.0059	.0062	.0065	.0066	*.0066*	*.0066*	*.0066*
20	-------	½	.0040	.0043	.0046	.0048	.0050	.0053	.0057
	½	1½	.0047	.0050	.0053	.0056	.0058	.0060	.0065
	1½	3	.0060	.0063	.0066	.0068	.0070	.0072	.0072
18	-------	½	.0040	.0043	.0046	.0048	.0051	.0053	.0057
	½	1½	.0047	.0050	.0053	.0056	.0058	.0061	.0065
	1½	3	.0060	.0063	.0066	.0068	.0071	.0073	.0077
16	-------	½	.0040	.0043	.0046	.0049	.0051	.0053	.0058
	½	1½	.0048	.0051	.0054	.0056	.0059	.0061	.0065
	1½	3	.0060	.0063	.0066	.0069	.0071	.0073	.0078
14	-------	½	.0041	.0044	.0047	.0049	.0052	.0054	.0058
	½	1½	.0048	.0051	.0054	.0057	.0059	.0061	.0066
	1½	3	.0061	.0064	.0067	.0069	.0072	.0074	.0078
12	-------	½	.0041	.0044	.0047	.0050	.0052	.0054	.0059
	½	1½	.0049	.0052	.0055	.0057	.0060	.0062	.0066
	1½	3	.0061	.0064	.0067	.0070	.0072	.0074	.0079
10	-------	1	.0044	.0048	.0050	.0053	.0055	.0058	.0062
	1	3	.0061	.0064	.0067	.0070	.0072	.0074	.0079
	3	6	.0084	.0088	.0090	.0093	.0095	.0098	.0102
8	-------	1	.0045	.0048	.0051	.0054	.0056	.0059	.0063
	1	3	.0061	.0064	.0067	.0070	.0072	.0074	.0079
	3	6	.0085	.0088	.0091	.0094	.0096	.0099	.0103
6	-------	1	.0047	.0050	.0053	.0055	.0058	.0060	.0064
	1	3	.0062	*.0065*	*.0068*	*.0070*	*.0073*	*.0075*	*.0079*
	3	6	.0087	.0090	.0093	.0095	.0098	.0100	.0104
4	-------	1	.0049	.0052	.0055	.0058	.0060	.0062	.0066
	1	3	.0064	.0067	.0070	.0073	.0075	.0077	.0082
	3	6	.0089	.0092	.0095	.0098	.0100	.0102	.0106

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a shorter length of engagement, coarser pitch, or smaller diameter.

HISTORY OF PROJECT

In the United States, the standardization of screw threads for general fastening purposes has culminated in the general adoption of the American National coarse and fine thread series, as presented in Bureau of Standards Miscellaneous Publication No. 89 and CS24–30. It frequently occurs, however, that good design of mechanical products requires the use of diameters, pitches, or lengths of engagement of threads other than standard, and there developed the necessity for a standard practice as to preferred pitches, standard tolerances, etc., for such special screw threads. In the course of its work the National Screw Thread Commission undertook to develop, and, in its 1924 report outlined such a standard practice, which was extensively revised and republished in the 1928 report of the commission. In addition, the American National 12-pitch thread series, an outgrowth of railroad practice, was included in the 1928 report as a series for special applications.

While the recommendations of the National Screw Thread Commission are mandatory upon the War and Navy Departments and as far as practicable apply also to purchases by all Government departments, it seemed desirable to determine the extent to which these standards were being applied within the industries concerned. Accordingly, on May 8, 1929, the National Screw Thread Commission requested the cooperation of the National Bureau of Standards to determine the extent of adoption and use of the National Screw Thread Commission recommendations in industry.

The hearings of the National Screw Thread Commission having performed all the essential functions of the general conferences normally required as a part of the procedure leading to the establishment of commercial standards, and the recommendations of the National Screw Thread Commission having attained national recognition and a large following, it seemed logical to proceed directly with the circulation of the essential screw thread tables and tolerances to industry for written acceptance. This was done and resulted in the impressive roster of organizations as listed on page III of this pamphlet which have indicated in writing their intention of making the American National Special Screw Threads, as set forth herein, their standard of practice.

STANDING COMMITTEE

The National Screw Thread Commission, being a thoroughly representative body, seemed the logical one to act as the standing committee to consider or propose any changes in the standard in order that it may be kept continually in accord with the desires of the industry and the advance in the art. Comment or suggestions are welcome at all times and should be addressed to H. W. Bearce, secretary, National Screw Thread Commission, Washington, D. C.

EFFECTIVE DATE

A number of producers and users have followed the reports of the National Screw Thread Commission for several years, and for such organizations the effective date will indicate no change in practice. The chief purpose of the effective date is to identify the acceptors of record with the commercial standard. The selection of a date for making it effective was determined after circulation of the industry, when the necessary support was secured. Adequate support having been recorded and announced, the standard was made effective as of July 1, 1930, for new production.

COMMERCIAL STANDARDS SERVICE

Industry has long sensed the need for a wider application and use of specifications developed and approved by nationally recognized organizations. To assist these bodies and the producers and consumers in securing this result and as a natural outgrowth of the movement toward elimination of waste through simplified practice, the Bureau of Standards has set up a procedure under which specifications, properly indorsed, may be printed as official publications of the Department of Commerce and promulgated as "commercial standards." This service parallels that of simplified practice in many respects, and is available only upon request.

Broadly speaking, the aim is to continue the same character of cooperative service in this field that is being rendered in simplification. The division of trade standards is not designed to act as a standardizing body, nor will it engage in the preparation of specifications. Its service is mainly promotional in character, since its chief mission is to get behind a standard or a specification which any branch of industry may want to promulgate on a nation-wide basis; to determine its eligibility for promulgation; to publish and broadcast it in the event the prerequisites of procedure have been met, including a satisfactory majority acceptance; to facilitate the application of the certification plan for the assurance and convenience of the purchaser; to provide means for periodic audits of adherence; and to cooperate with the Bureau of Foreign and Domestic Commerce in determining the desire of industry relative to translation and promulgation of such specifications as a basis for foreign commerce.

In general, it may be said that a simplification covers types, sizes, and varieties of a commodity which are retained by industry on the basis of demand, whereas a commercial standard establishes definite requirements as to grade, quality, or dimensional tolerances in addition to any limitation of variety desired and accepted by the industry.

ORGANIZATION AND DUTIES OF STANDING COMMITTEE

In order to carry on the aims and desires of the industry in the standardization of their product, a standing committee is appointed at the general conference. This committee consists of members from each division of the industry, namely, producers, distributors, and consumers, and thus reflects the well-balanced viewpoint of all concerned. The members of the committee receive all suggestions regarding the commercial standard and consider its revision in the event that such action is desirable and mutually beneficial. If the commercial standard does not warrant revision, it is reaffirmed in its existing form, but if any important changes are found desirable their adoption is recommended by the committee, whereupon the industry is again solicited for written acceptance of the standard in its revised form.

The committee is in effect a centralizing agency for criticisms and comments regarding the commercial standard and is charged with the responsibility of recommending revisions to keep the standard abreast with current industrial practice. The proper functioning of the committee requires that, when necessary, its members be willing to attend meetings held at some central place, although in many cases it will be possible to conduct the work by correspondence.

When any deceptions in reference to the commercial standard are reported to the standing committee, it applies moral suasion or such other corrective measures as seem desirable. The Department of Commerce has no "police power" to compel adherence, therefore it is incumbent upon the standing committee to do all in its power to encourage all divisions of the industry to follow the provisions of the commercial standard and contribute in every way possible to its general adoption and usefulness.

YOUR COOPERATION

As a producer, distributor, or consumer of some of the commodities for which commercial standards have already been established, you are in a position to avail yourself of the benefits arising from the use of quality standards and incidentally to add impetus to this method of eliminating waste. The first step is a declaration in favor of the standard by recording your intention to adhere, as closely as circumstances will allow, to the standards for those products which you may buy or sell. The receipt of your signed acceptance will permit the listing of your company in new editions of the commercial standards that you accept.

You will, of course, want to examine any commercial standards before signing a formal acceptance. The Bureau of Standards will, therefore, furnish a copy of any standard under consideration for acceptance. To facilitate this procedure, a list appears on page 28 that may be checked and mailed to the Division of Trade Standards, Bureau of Standards, Washington, D. C. The publications may also be secured singly or in quantities at a nominal price from the Government Printing Office. Prices will be furnished upon request.

The acceptance of a commercial standard is an entirely voluntary action and applies to the production, sale, and use of stock items. It is not meant to interfere with the manufacture or sale of special sizes and types sometimes required.

Trade associations and individual companies often distribute large numbers of the printed standard for the information and guidance of their members or customers. In such cases it is possible to extend the scope and degree of adherence by urging each recipient to send in an acceptance, bearing in mind that the practical value of any standardization is measured by the observance it receives.

An acceptance form for the commercial standard herein covered is included on page 25.

ACCEPTANCE OF COMMERCIAL STANDARD

Please Sign and Return This Sheet to Division of Trade Standards, Bureau of Standards, Washington, D. C.

Date, _____

DIVISION OF TRADE STANDARDS,
BUREAU OF STANDARDS,
Washington, D. C.

GENTLEMEN: We, the undersigned, do hereby accept the original draft of the Commercial Standard, as our standard practice in the { production [1] / distribution [1] / use [1] } of special screw threads beginning _____, and will use our best effort in
(Date)
securing its general adoption.

To permit intelligent review of the effectiveness of the commercial standard every year by an accredited committee of all interests, working in cooperation with the Department of Commerce, we plan to supply all data, upon request, which may be necessary for the development of constructive revisions. It is understood that any suggested modifications will be submitted as soon as formulated, and shall not be promulgated until accepted in form similar to this recommendation.

Signature _____

(Kindly typewrite or print the following lines)

Title _____

Company _____

Street address _____

City and State _____

We are members of the following associations or other organizations interested in the production, sale, or use of special screw threads:

_____

_____

_____

[1] Please designate which group you represent by drawing lines through the other two. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "In principle" should be added after the signature.

TO THE ACCEPTOR

In signing the acceptance blank, please bear the following points clearly in mind:

1. *Adherence.*—The Department of Commerce has no regulatory powers to enforce adherence to the commercial standards. Instead, this waste-elimination program is based on voluntary cooperation and self-government in industry. To make this specific standardization operate as a satisfactory example of self-government, it is highly desirable that it be kept distinct from any plan or method of governmental regulation or control. It will be successful according to the degree to which manufacturers, distributors, and purchasers adhere to its terms and conditions.

2. *The industry's responsibility.*—The department cooperates only on the request of the industry and assumes no responsibility for industrial acceptance or adherence. This program was developed by the industry on its own initiative. Its success depends wholly on the active cooperation of those concerned.

3. *The acceptor's responsibility.*—You are entering into an entirely voluntary arrangement, whereby the members of the industry—the distributors and consumers of the product, and others concerned—hope to secure the benefits inherent in commercial standardization. Those responsible for this standard realize that instances may occur in which it will be necessary to supply or purchase items not included therein. The purpose is, however, to secure wider support for nationally recognized standards covering grade, quality, and other characteristics of products. *Consumers* can make the program a success if, in their purchasing, they will make a definite and conscientious effort to *specify in terms of this commercial standard.*

4. *The department's responsibility.*—The function performed by the Department of Commerce is fourfold: First, to act as a referee to insure adequate consideration of the needs of all interests; second, to supply such assistance and advice in the development of this program as past experience with similar programs may suggest; third, to solicit and record the extent of adoption and adherence to the standard; and fourth, to add all possible prestige to this standardization movement by publication and promulgation if and when it is adopted and accepted by all elements directly concerned.

(Cut on this line)

REQUEST FOR COMMERCIAL STANDARDS

Date _____

DIVISION OF TRADE STANDARDS,
BUREAU OF STANDARDS,
Washington, D. C.

GENTLEMEN: The undersigned wishes to examine the commercial standards checked on the reverse side of this page, with a view toward accepting them as our standard of practice in the production, distribution, or consumption of the standardized lines.

Signed _____

(Kindly typewrite or print the following lines)

Title _____

Company _____

Street address _____

City and State _____

COMMERCIAL STANDARDS

CS No.	Items
0–30.	The Commercial Standards Service and its value to business.
1–28.	Clinical thermometers.
2–29.	Surgical gauze. (Preparation postponed.)
3–28.	Stoddard solvent.
4–29.	Staple porcelain (all-clay) plumbing fixtures.
5–29.	Steel pipe nipples.
6–29.	Wrought-iron pipe nipples.
7–29.	Standard-weight malleable iron or steel screwed unions.
8–30.	Plain and thread plug and ring gage blanks.
9–29.	Builders' template hardware.
10–29.	Brass pipe nipples.
11–29.	Regain of mercerized cotton yarns.
12–29.	Domestic and industrial fuel oils.
13–30.	Dress patterns.
14.	Boys' blouses, button-on waists, shirts, and junior shirts. (In preparation.)
15–29.	Men's pajamas.
16–29.	Wallpaper.
17–30.	Diamond-core drill fittings.
18–29.	Hickory golf shafts.
19–30.	Foundry patterns of wood.
20–30.	Staple vitreous china plumbing fixtures.
21–30.	Interchangeable ground-glass joints.
22–30.	Builders' hardware (nontemplate). (In preparation.)
23–30.	Feldspar. (In preparation.)
24–30.	Standard screw threads.
25–30.	Special screw threads.

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