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AEROSPACE STANDARD

SAE AS8879 | REV. B

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Superseding AS8879A

Screw Threads - UNJ Profile, Inch

FSC THDS

FOREWORD

This SAE Aerospace Standard (AS) was generated to provide an alternative to the inactive government specification MIL-S-8879 for the UNJ profile, inch screw threads.

The basic design profile of the threads in this document; the diameter-pitch combinations and tolerances are based on the Unified Inch standard. These profiles are not interchangeable with Metric (MJ) or UN profile inch screw threads. However, since the UNJ profile and tolerances set down for aerospace UNJ threads (inch series) in international standard ISO 3161 and ASME B1.15 (Class 3) were based on MIL-S-8879, the resultant thread geometry is interchangeable with the thread form in AS8879.

The dimensional inspection methods for thread characteristics are outlined in ASME B1.3M.

This document specifies three systems for verification of thread characteristics to ensure dimensional conformance. These three methods correlate to the methods or application categories in the MIL-S-8879 and AS8879 specification, as shown in Table 1:

TABLE 1

MIL-S-8879A Amendment #1	MIL-S-8879C	AS8879	AS8879 Rev. B
Method A			ASME B1.3M System 21
Method B	OTHER THREAD	OTHER THREAD	ASME B1.3M System 22
Method C	SAFETY CRITICAL THREAD	SAFETY CRITICAL THREAD	ASME B1.3M System 23

1. SCOPE:

This SAE Aerospace Standard (AS) specifies the characteristics of the UNJ profile inch series of screw threads, to include a mandatory controlled radius of 0.18142P to 0.15011P at the root of the external thread and with a minor diameter of both external and internal threads increased to provide a basic thread height of 0.5625H in order to accommodate the external thread maximum root radius. The following detailed requirements are included:

a. UNJ basic profile and design profiles.
b. Standard series of diameter-pitch combinations for nominal thread diameters from .060 to 6.000 inches.
c. Standard thread classes and form tolerances.
d. Formulae for thread dimensions and tolerances.
e. Method of designating UNJ threads.
f. Acceptance and verification requirements.
g. Tables for selected diameter-pitch combinations for aerospace screws, bolts, nuts, shaft and bearing retaining screw threads, fluid fittings, and other component thread sizes.
h. Tables for UNJ screw threads limiting dimensions and tolerances.
i. Symbols for UNJ thread dimensions and tolerances.

1.1 Purpose:

This document specifies the geometric characteristics of the UNJ series threads and the acceptance requirements. In addition, the purpose of this specification is to:

a. Define the geometric requirements for a selected series of Unified Screw Threads, Classes 3A and 3B, from ASME B1.1, modified to control the root radius and increase the minor diameter.

b. Establish requirements for continuous radius at the root of the external threads.

c. Establish requirements for an increase in the minor diameter of both internal and external threads to accommodate the root radius.

d. Relate acceptance requirements to the intended service application of the threaded product.

e. Provide default verification requirements if not otherwise specified.

f. Require the use of methods of verification in ASME B1.3M.

g. Encourage the use of new or more efficient methods of manufacture, including on-line or statistical process controls.

1.2 Field of Application:

The UNJ screw thread is intended for threaded parts and used in weight sensitive applications requiring high fatigue strength, resistance to vibration, and where parts are physical size, and strength sensitive. It is also intended for applications where the net fit at maximum material condition provided by Class 3 threads is acceptable.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text in this document and the references cited herein, the text in this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 ASME Publications: Available from ASME, 22 Law Drive, Box 2900, Fairfield, NJ 07007-2900.

ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B1.2	Gages and Gaging for Unified Inch Screw Threads
ASME B1.3M	Screw Thread Gaging System for Dimensional Acceptability - Inch and Metric Screw Threads (UN, UNR, UNJ, M, MJ)
ASME B1.7M	Nomenclature, Definitions, and Letter Symbols for Screw Threads
ASME B46.1	Surface Texture (Surface Roughness, Waviness and Lay)

3. REQUIREMENTS:

3.1 Thread Series:

The two series of threads recognized by this specification are the standard UNJ and special UNJ. The use of standard UNJ threads shall be given first consideration in the design of new equipment. Within standard UNJ threads, the use of fine threads shall be given preference to facilitate the maximum usage of a limited number of threads. Terms for characteristics of thread shall be as defined in ASME B1.7M.

3.1.1 Standard UNJ Series: The standard UNJ series of threads consists of three series with graded pitches (coarse, fine, and extra fine) and the three series with constant pitches (8, 12, and 16 threads per inch). Standard UNJ threads shall be selected from those with diameter-pitch combinations listed in Tables 2 through 7.

3.1.2 Special UNJ Series: The special UNJ series of threads consists of all controlled root radius threads with combinations of diameter and pitch that are not included in the standard UNJ series.

3.2 Designations:

The threads described herein shall be designated in the following manner indicating the nominal diameter, number of threads per inch, thread series symbol (that is, thread form, controlled root symbol and thread series), thread class including the external "A" or internal "B" thread symbol. Reference to AS8879 shall be made in either the threads designation, a general note, or in a reference document.

3.2.1 Standard UNJ Thread Designations: Threads selected from the standard UNJ series shall be specified in accordance with Figure 1.

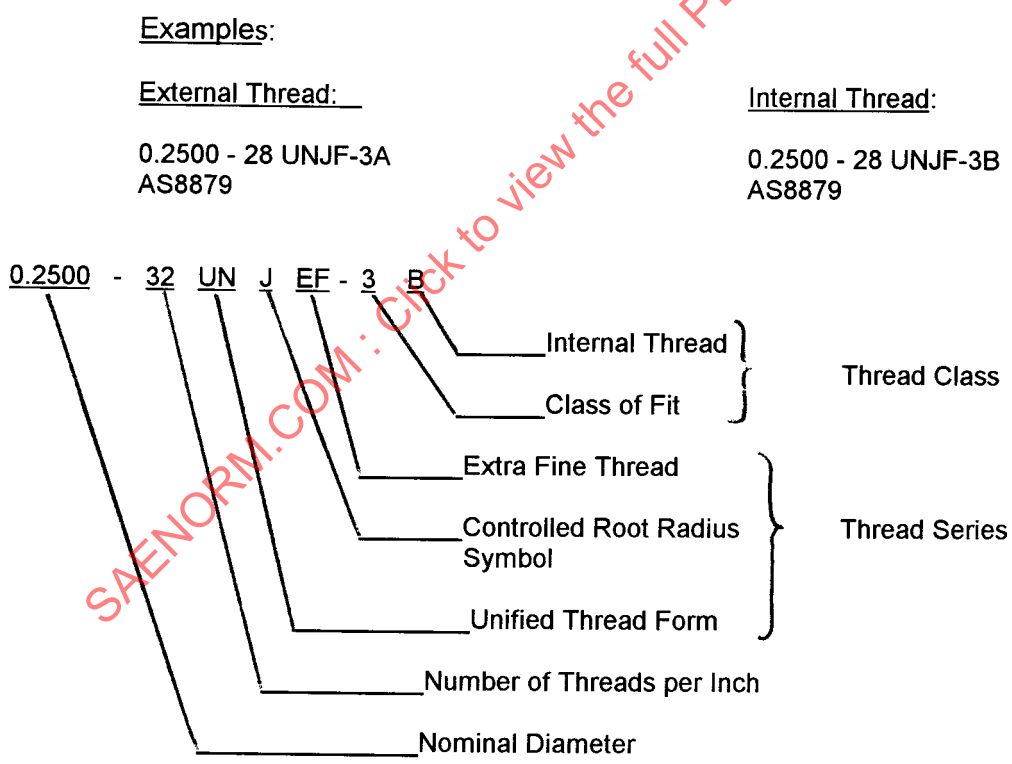

FIGURE 1

3.2.2 Special UNJ Thread Designations: The identifying letter "S" shall be included in the thread series symbol to indicate a special thread. Special diameter-pitch combinations developed in accordance with this specification shall be designated as shown in Figure 2:

Examples

External Thread:

8.750 - 8 UNJS-3A
Major Diameter 8.735 - 8.750
Pitch Diameter 8.6625 - 8.6688
Minor Diameter 8.5918 - 8.6056
Root Radius 0.0188 - 0.0226
AS8879

Internal Thread:

8.750 - 8 UNJS-3B
Major Diameter 8.750 MIN
Pitch Diameter 8.6688 - 8.6769
Minor Diameter 8.6282 - 8.6432
AS8879

FIGURE 2

3.3 Thread Characteristics:

3.3.1 Thread Data:

3.3.1.1 Basic Thread Data: The basic thread data for threads with standard pitches shall be in accordance with Table 8.

3.3.1.2 Standard UNJ Thread Data: Threads, in accordance with this specification, shall be within the limits of size specified in Tables 2 through 7, for the diameter-pitch combinations shown herein. Characteristics shall include pitch diameter size, major diameter size, and minor diameter size.

3.3.1.3 Special UNJ Thread Data: Dimensions for threads of special diameter-pitch combinations shall be computed from the formulas in Table 9.

3.3.2 External threads: External threads shall be of Unified form, in accordance with ASME B1.1 (Class 3A), altered at the root so that the flanks of the adjacent threads are joined by one continuous smoothly blended curve tangent to the flanks at a thread depth of 9H/16, where H is the height of the sharp V thread. The root radius (radius of curvature) tangent to the flanks shall be between 0.18042 pitch and 0.15011 pitch (see Figures 3 and 5).

3.3.3 Internal Threads: The internal threads shall be of the Unified form, in accordance with ASME B1.1 (Class 3B), modified at the minor diameter (truncated to 5H/16) to the values given in Tables 2 through 7 (see Figures 4 and 5).

3.4 Limits of Size:

The specified limits of size are considered exact and are inviolable unless specific exemptions are made. The pitch diameter equivalent of variation in any given element, except pitch diameter shall not exceed 0.4 of the pitch diameter tolerance. Flank angle equivalents are based on a depth "h" which is equal to 3H/4 (see Figure 3). The deviations in lead and flank angle that are equivalent to 0.4 of the pitch diameter tolerance and lead and angle variations equal thereto shall be determined in accordance with Appendix A.

TABLE 2 - Coarse Thread Series

Basic Size Primary 1	Basic Size Secondary 2	Thds Per Inch 3	External thread - UNJC Class 3A								Internal thread - UNJC Class 3B				
			Major Diameter Min 4	Major Diameter Max 5	Pitch Diameter Min 6	Pitch Diameter Max 7	Minor Diameter Min 8	Minor Diameter Max 9	Root Radius Min 10	Root Radius Max 11	Minor Diameter Min 12	Minor Diameter Max 13	Pitch Diameter Min 14	Pitch Diameter Max 15	Major Diameter Min 16
	0.0730	64	0.0692	0.0730	0.0614	0.0629	0.0526	0.0550	0.0023	0.0028	0.0578	0.0619	0.0629	0.0648	0.0730
0.0860		56	0.0819	0.0860	0.0728	0.0744	0.0627	0.0654	0.0027	0.0032	0.0686	0.0732	0.0744	0.0765	0.0860
	0.0990	48	0.0945	0.0990	0.0838	0.0855	0.0720	0.0750	0.0031	0.0038	0.0787	0.0841	0.0855	0.0877	0.0990
0.1120		40	0.1069	0.1120	0.0939	0.0958	0.0798	0.0832	0.0038	0.0045	0.0877	0.0942	0.0958	0.0982	0.1120
0.1250		40	0.1199	0.1250	0.1069	0.1088	0.0928	0.0962	0.0038	0.0045	0.1007	0.1072	0.1088	0.1113	0.1250
0.1380		32	0.1320	0.1380	0.1156	0.1177	0.0979	0.1019	0.0047	0.0056	0.1076	0.1157	0.1177	0.1204	0.1380
0.1640		32	0.1580	0.1640	0.1415	0.1437	0.1238	0.1279	0.0047	0.0056	0.1336	0.1417	0.1437	0.1465	0.1640
0.1900		24	0.1828	0.1900	0.1604	0.1629	0.1368	0.1418	0.0063	0.0075	0.1494	0.1600	0.1629	0.1661	0.1900
	0.2160	24	0.2088	0.2160	0.1863	0.1889	0.1627	0.1678	0.0063	0.0075	0.1754	0.1852	0.1889	0.1922	0.2160
0.2500		20	0.2419	0.2500	0.2147	0.2175	0.1864	0.1922	0.0075	0.0090	0.2013	0.2121	0.2175	0.2211	0.2500
0.3125		18	0.3038	0.3125	0.2734	0.2764	0.2420	0.2483	0.0083	0.0100	0.2584	0.2690	0.2764	0.2803	0.3125
0.3750		16	0.3656	0.3750	0.3311	0.3344	0.2957	0.3028	0.0094	0.0113	0.3141	0.3250	0.3344	0.3387	0.3750
0.4375		14	0.4272	0.4375	0.3876	0.3911	0.3472	0.3550	0.0107	0.0129	0.3680	0.3795	0.3911	0.3957	0.4375
0.5000		13	0.4891	0.5000	0.4463	0.4500	0.4028	0.4111	0.0115	0.0139	0.4251	0.4368	0.4500	0.4548	0.5000
0.5625		12	0.5511	0.5625	0.5045	0.5084	0.4574	0.4663	0.0125	0.0150	0.4814	0.4914	0.5084	0.5135	0.5625
0.6250		11	0.6129	0.6250	0.5619	0.5660	0.5105	0.5201	0.0136	0.0164	0.5365	0.5474	0.5660	0.5714	0.6250
0.7500		10	0.7371	0.7500	0.6806	0.6850	0.6240	0.6345	0.0150	0.0180	0.6526	0.6646	0.6850	0.6907	0.7500
0.8750		9	0.8611	0.8750	0.7981	0.8028	0.7352	0.7467	0.0167	0.0200	0.7668	0.7801	0.8028	0.8089	0.8750
1.0000		8	0.9850	1.0000	0.9137	0.9188	0.8430	0.8556	0.0188	0.0226	0.8783	0.8933	0.9188	0.9254	1.0000
1.1250		7	1.1086	1.1250	1.0268	1.0322	0.9460	0.9600	0.0214	0.0258	0.9859	1.0030	1.0322	1.0393	1.1250
1.2500		7	1.2336	1.2500	1.1517	1.1572	1.0709	1.0850	0.0214	00258	1.1109	1.1280	1.1572	1.1644	1.2500
1.3750		6	1.3568	1.3750	1.2607	1.2667	1.1664	1.1825	0.0250	0.0301	1.2127	1.2327	1.2667	1.2745	1.3750
1.5000		6	1.4818	1.5000	1.3856	1.3917	1.2913	1.3075	0.0250	0.0301	1.3377	1.3577	1.3917	1.3996	1.5000
1.7500		5	1.7295	1.7500	1.6134	1.6201	1.5002	1.5191	0.0300	0.0361	1.5552	1.5792	1.6201	1.6288	1.7500
2.0000		4.5	1.9780	2.0000	1.8486	1.8557	1.7229	1.7434	0.0334	0.0401	1.7835	1.8102	1.8557	1.8650	2.0000
2.2500		4.5	2.2280	2.2500	2.0984	2.1057	1.9727	1.9934	0.0334	0.0401	2.0335	2.0602	2.1057	2.1152	2.2500
2.5000		4	2.4762	2.5000	2.3298	2.3376	2.1884	2.2113	0.0375	0.0451	2.2565	2.2865	2.3376	2.3477	2.5000
2.7500		4	2.7262	2.7500	2.5797	2.5876	2.4382	2.4613	0.0375	0.0451	2.5065	2.5365	2.5876	2.5979	2.7500
3.0000		4	2.9762	3.0000	2.8296	2.8376	2.6882	2.7113	0.0375	0.0451	2.7565	2.7865	2.8376	2.8480	3.0000
3.2500		4	3.2262	3.2500	3.0794	3.0876	2.9380	2.9613	0.0375	0.0451	3.0065	3.0365	3.0876	3.0982	3.2500
3.5000		4	3.4762	3.5000	3.3293	3.3376	3.1878	3.2113	0.0375	0.0451	3.2565	3.2865	3.3376	3.3484	3.5000
3.7500		4	3.7262	3.7500	3.5792	3.5876	3.4378	3.4613	0.0375	0.0451	3.5065	3.5365	3.5876	3.5985	3.7500
4.0000		4	3.9762	4.0000	3.8291	3.8376	3.6876	3.7113	0.0375	0.0451	3.7565	3.7865	3.8376	3.8487	4.0000

TABLE 3 - Fine Thread Series

Basic Size Primary 1	Basic Size Secondary 2	Thds Per Inch 3	External thread - UNJF Class 3A								Internal thread - UNJF Class 3B				
			Major Diameter Min 4	Major Diameter Max 5	Pitch Diameter Min 6	Pitch Diameter Max 7	Minor Diameter Min 8	Minor Diameter Max 9	Root Radius Min 10	Root Radius Max 11	Minor Diameter Min 12	Minor Diameter Max 13	Pitch Diameter Min 14	Pitch Diameter Max 15	Major Diameter Min 16
0.0600		80	0.0568	0.0600	0.0506	0.0519	0.0435	0.0456	0.0019	0.0023	0.0479	0.0511	0.0519	0.0536	0.0600
	0.0730	72	0.0695	0.0730	0.0626	0.0640	0.0547	0.0570	0.0021	0.0025	0.0595	0.0631	0.0640	0.0659	0.0730
0.0860		64	0.0822	0.0860	0.0744	0.0759	0.0656	0.0680	0.0023	0.0028	0.0708	0.0749	0.0759	0.0779	0.0860
	0.0990	56	0.0949	0.0990	0.0858	0.0874	0.0757	0.0784	0.0027	0.0032	0.0816	0.0862	0.0874	0.0895	0.0990
0.1120		48	0.1075	0.1120	0.0967	0.0985	0.0849	0.0880	0.0031	0.0038	0.0917	0.0971	0.0985	0.1008	0.1120
0.1250		44	0.1202	0.1250	0.1083	0.1102	0.0954	0.0987	0.0034	0.0041	0.1029	0.1088	0.1102	0.1126	0.1250
0.1380		40	0.1329	0.1380	0.1198	0.1218	0.1057	0.1092	0.0038	0.0045	0.1137	0.1202	0.1218	0.1243	0.1380
0.1640		36	0.1585	0.1640	0.1439	0.1460	0.1282	0.1320	0.0042	0.0050	0.1370	0.1442	0.1460	0.1487	0.1640
0.1900		32	0.1840	0.1900	0.1674	0.1697	0.1497	0.1539	0.0047	0.0056	0.1596	0.1675	0.1697	0.1726	0.1900
	0.2160	28	0.2095	0.2160	0.1904	0.1928	0.1702	0.1748	0.0054	0.0064	0.1812	0.1896	0.1928	0.1959	0.2160
0.2500		28	0.2435	0.2500	0.2243	0.2268	0.2041	0.2088	0.0054	0.0064	0.2152	0.2229	0.2268	0.2300	0.2500
0.3125		24	0.3053	0.3125	0.2827	0.2854	0.2591	0.2644	0.0063	0.0075	0.2719	0.2799	0.2854	0.2890	0.3125
0.3750		24	0.3678	0.3750	0.3450	0.3479	0.3214	0.3268	0.0063	0.0075	0.3344	0.3417	0.3479	0.3516	0.3750
0.4375		20	0.4294	0.4375	0.4019	0.4050	0.3736	0.3797	0.0075	0.0090	0.3888	0.3970	0.4050	0.4091	0.4375
0.5000		20	0.4919	0.5000	0.4643	0.4675	0.4360	0.4422	0.0075	0.0090	0.4513	0.4591	0.4675	0.4717	0.5000
0.5625		18	0.5538	0.5625	0.5230	0.5264	0.4916	0.4983	0.0083	0.0100	0.5084	0.5166	0.5264	0.5308	0.5625
0.6250		18	0.6163	0.6250	0.5854	0.5889	0.5540	0.5608	0.0083	0.0100	0.5709	0.5788	0.5889	0.5934	0.6250
0.7500		16	0.7406	0.7500	0.7056	0.7094	0.6702	0.6778	0.0094	0.0113	0.6892	0.6977	0.7094	0.7143	0.7500
0.8750		14	0.8647	0.8750	0.8245	0.8286	0.7841	0.7925	0.0107	0.0129	0.8055	0.8152	0.8286	0.8339	0.8750
1.0000		12	0.9886	1.0000	0.9415	0.9459	0.8944	0.9038	0.0125	0.0150	0.9189	0.9289	0.9459	0.9516	1.0000
1.1250		12	1.1136	1.1250	1.0664	1.0709	1.0192	1.0288	0.0125	0.0150	1.0439	1.0539	1.0709	1.0768	1.1250
1.2500		12	1.2386	1.2500	1.1913	1.1959	1.1442	1.1538	0.0125	0.0150	1.1689	1.1789	1.1959	1.2019	1.2500
1.3750		12	1.3636	1.3750	1.3162	1.3209	1.2690	1.2788	0.0125	0.0150	1.2939	1.3039	1.3209	1.3270	1.3750
1.5000		12	1.4886	1.5000	1.4411	1.4459	1.3940	1.4038	0.0125	0.0150	1.4189	1.4289	1.4459	1.4522	1.5000

TABLE 4 - Extra Fine Thread Series

Basic Size Primary 1	Basic Size Secondary 2	Thds Per Inch 3	External thread - UNJEF Class 3A								Internal thread - UNJEF Class 3B				
			Major Diameter Min 4	Major Diameter Max 5	Pitch Diameter Min 6	Pitch Diameter Max 7	Minor Diameter Min 8	Minor Diameter Max 9	Root Radius Min 10	Root Radius Max 11	Minor Diameter Min 12	Minor Diameter Max 13	Pitch Diameter Min 14	Pitch Diameter Max 15	Major Diameter Min 16
	0.216	32	0.2100	0.2160	0.1933	0.1957	0.1756	0.1799	0.0047	0.0056	0.1856	0.1929	0.1957	0.1988	0.2160
0.2500		32	0.2440	0.2500	0.2273	0.2297	0.2096	0.2139	0.0047	0.0056	0.2196	0.2263	0.2297	0.2328	0.2500
0.3125		32	0.3065	0.3125	0.2898	0.2922	0.2721	0.2764	0.0047	0.0056	0.2820	0.2880	0.2922	0.2953	0.3125
0.3750		32	0.3690	0.3750	0.3522	0.3547	0.3345	0.3389	0.0047	0.0056	0.3446	0.3501	0.3547	0.3580	0.3750
0.4375		28	0.4310	0.4375	0.4116	0.4143	0.3914	0.3963	0.0054	0.0064	0.4027	0.4086	0.4143	0.4178	0.4375
0.5000		28	0.4935	0.5000	0.4740	0.4768	0.4538	0.4588	0.0054	0.0064	0.4652	0.4708	0.4768	0.4804	0.5000
0.5625		24	0.5553	0.5625	0.5325	0.5354	0.5089	0.5144	0.0063	0.0075	0.5219	0.5281	0.5354	0.5392	0.5625
0.6250		24	0.6178	0.6250	0.5949	0.5979	0.5713	0.5768	0.0063	0.0075	0.5844	0.5904	0.5979	0.6018	0.6250
	0.6875	24	0.6803	0.6875	0.6574	0.6604	0.6338	0.6394	0.0063	0.0075	0.6469	0.6527	0.6604	0.6643	0.6875
0.7500		20	0.7419	0.7500	0.7142	0.7175	0.6859	0.6922	0.0075	0.0090	0.7013	0.7081	0.7175	0.7218	0.7500
	0.8125	20	0.8044	0.8125	0.7767	0.7800	0.7484	0.7547	0.0075	0.0090	0.7638	0.7706	0.7800	0.7843	0.8125
0.8750		20	0.8669	0.8750	0.8392	0.8425	0.8109	0.8172	0.0075	0.0090	0.8263	0.8331	0.8425	0.8468	0.8750
	0.9375	20	0.9294	0.9375	0.9016	0.9050	0.8738	0.8797	0.0075	0.0090	0.8888	0.8956	0.9050	0.9094	0.9375
1.0000		20	0.9919	1.0000	0.9641	0.9675	0.9358	0.9422	0.0075	0.0090	0.9513	0.9581	0.9675	0.9719	1.0000
	1.0625	18	1.0538	1.0625	1.0228	1.0264	0.9914	0.9983	0.0083	0.0100	1.0084	1.0159	1.0264	1.0310	1.0625
1.1250		18	1.1163	1.1250	1.0853	1.0889	1.0539	1.0608	0.0083	0.0100	1.0709	1.0784	1.0889	1.0935	1.1250
	1.1875	18	1.1788	1.1875	1.1478	1.1514	1.1164	1.1233	0.0083	0.0100	1.1334	1.1409	1.1514	1.1561	1.1875
1.2500		18	1.2413	1.2500	1.2103	1.2139	1.1789	1.1858	0.0083	0.0100	1.1959	1.2034	1.2139	1.2186	1.2500
	1.3125	18	1.3038	1.3125	1.2728	1.2764	1.2414	1.2483	0.0083	0.0100	1.2584	1.2659	1.2764	1.2811	1.3125
1.3750		18	1.3663	1.3750	1.3353	1.3389	1.3039	1.3108	0.0083	0.0100	1.3209	1.3284	1.3389	1.3436	1.3750
	1.4375	18	1.4288	1.4375	1.3977	1.4014	1.3663	1.3733	0.0083	0.0100	1.3834	1.3909	1.4014	1.4062	1.4375
1.5000		18	1.4913	1.5000	1.4602	1.4639	1.4288	1.4358	0.0083	0.0100	1.4459	1.4534	1.4639	1.4687	1.5000
	1.5625	18	1.5538	1.5625	1.5277	1.5264	1.4913	1.4983	0.0083	0.0100	1.5084	1.5159	1.5264	1.5312	1.5625
1.6250		18	1.6163	1.6250	1.5852	1.5889	1.5538	1.5608	0.0083	0.0100	1.5709	1.5784	1.5889	1.5937	1.6250
	1.6875	18	1.6788	1.6875	1.6476	1.6514	1.6162	1.6233	0.0083	0.0100	1.6334	1.6409	1.6514	1.6563	1.6875

TABLE 5 - Eight Thread Series

Basic Size Primary 1	Basic Size Secondary 2	External Thread - 8UNJ Class 3A Root Radius 0.0188 - 0.0226						Internal Thread - 8UNJ Class 3B				
		Major Diameter Min 3	Major Diameter Max 4	Pitch Diameter Min 5	Pitch Diameter Max 6	Minor Diameter Min 7	Minor Diameter Max 8	Minor Diameter Min 9	Minor Diameter Max 10	Pitch Diameter Min 11	Pitch Diameter Max 12	Major Diameter Min 13
	1.0625	1.0475	1.0625	0.9762	0.9813	0.9055	0.9182	0.9408	0.9558	0.9813	0.9880	1.0625
1.1250		1.1100	1.1250	1.0386	1.0438	0.9679	0.9806	1.0033	1.0183	1.0438	1.0505	1.1250
	1.1875	1.1725	1.1875	1.1011	1.1063	1.0304	1.0432	1.0658	1.0808	1.1063	1.1131	1.1875
1.2500		1.2350	1.2500	1.1635	1.1688	1.0928	1.1056	1.1283	1.1433	1.1688	1.1757	1.2500
	1.3125	1.2975	1.3125	1.2260	1.2313	1.1553	1.1682	1.1908	1.2058	1.2313	1.2382	1.3125
1.3750		1.3600	1.3750	1.2884	1.2938	1.2177	1.2306	1.2533	1.2683	1.2938	1.3008	1.3750
	1.4375	1.4225	1.4375	1.3509	1.3563	1.2802	1.2932	1.3158	1.3308	1.3563	1.3634	1.4375
1.5000		1.4850	1.5000	1.4133	1.4188	1.3426	1.3556	1.3783	1.3933	1.4188	1.4259	1.5000
	1.5625	1.5475	1.5625	1.4758	1.4813	1.4051	1.4182	1.4408	1.4558	1.4813	1.4885	1.5625
1.6250		1.6100	1.6250	1.5382	1.5438	1.4675	1.4806	1.5033	1.5183	1.5438	1.5510	1.6250
	1.6875	1.6725	1.6875	1.6007	1.6063	1.5300	1.5432	1.5658	1.5808	1.6063	1.6136	1.6875
1.7500		1.7350	1.7500	1.6631	1.6688	1.5924	1.6056	1.6283	1.6433	1.6688	1.6762	1.7500
	1.8125	1.7975	1.8125	1.7256	1.7313	1.6549	1.6682	1.6908	1.7058	1.7313	1.7387	1.8125
1.8750		1.8600	1.8750	1.7881	1.7938	1.7174	1.7306	1.7533	1.7683	1.7938	1.8013	1.8750
	1.9375	1.9225	1.9375	1.8505	1.8563	1.7798	1.7932	1.8158	1.8308	1.8563	1.8638	1.9375
2.0000		1.9850	2.0000	1.9130	1.9188	1.8423	1.8556	1.8783	1.8933	1.9188	1.9264	2.0000
	2.1250	2.1100	2.1250	2.0379	2.0438	1.9672	1.9806	2.0033	2.0183	2.0438	2.0515	2.1250
2.2500		2.2350	2.2500	2.1628	2.1688	2.0921	2.1056	2.1283	2.1433	2.1688	2.1766	2.2500
	2.3750	2.3600	2.3750	2.2878	2.2938	2.2171	2.2306	2.2533	2.2683	2.2938	2.3017	2.3750
2.5000		2.4850	2.5000	2.4127	2.4188	2.3420	2.3556	2.3783	2.3933	2.4188	2.4268	2.5000
	2.6250	2.6100	2.6250	2.5376	2.5438	2.4669	2.4806	2.5033	2.5183	2.5438	2.5518	2.6250
2.7500		2.7350	2.7500	2.6625	2.6688	2.5918	2.6056	2.6283	2.6433	2.6688	2.6769	2.7500
	2.8750	2.8600	2.8750	2.7875	2.7938	2.7168	2.7306	2.7533	2.7683	2.7938	2.8020	2.8750
3.0000		2.9850	3.0000	2.9124	2.9188	2.8417	2.8556	2.8783	2.8933	2.9188	2.9271	3.0000
	3.1250	3.1100	3.1250	3.0374	3.0438	2.9667	2.9806	3.0033	3.0183	3.0438	3.0522	3.1250
3.2500		3.2350	3.2500	3.1623	3.1688	3.0916	3.1056	3.1283	3.1433	3.1688	3.1773	3.2500
	3.3750	3.3600	3.3750	3.2872	3.2938	3.2165	3.2306	3.2533	3.2683	3.2938	3.3023	3.3750
3.5000		3.4850	3.5000	3.4122	3.4188	3.3415	3.3556	3.3783	3.3933	3.4188	3.4274	3.5000
	3.6250	3.6100	3.6250	3.5371	3.5438	3.4664	3.4806	3.5033	3.5183	3.5438	3.5525	3.6250
3.7500		3.7350	3.7500	3.6621	3.6688	3.5914	3.6056	3.6283	3.6433	3.6688	3.6776	3.7500
	3.8750	3.8600	3.8750	3.7870	3.7938	3.7163	3.7306	3.7533	3.7683	3.7938	3.8026	3.8750
4.0000		3.9850	4.0000	3.9120	3.9188	3.8413	3.8556	3.8783	3.8933	3.9188	3.9277	4.0000

TABLE 6 - Twelve Thread Series

Basic Size Primary 1	Basic Size Secondary 2	External Thread - 12UNJ Class 3A Root Radius 0.0125 - 0.015						Internal Thread - 12UNJ Class 3B				
		Major Diameter Min 3	Major Diameter Max 4	Pitch Diameter Min 5	Pitch Diameter Max 6	Minor Diameter Min 7	Minor Diameter Max 8	Minor Diameter Min 9	Minor Diameter Max 10	Pitch Diameter Min 11	Pitch Diameter Max 12	Major Diameter Min 13
0.6250		0.6136	0.6250	0.5668	0.5709	0.5196	0.5288	0.5439	0.5539	0.5709	0.5762	0.6250
	0.6875	0.6761	0.6875	0.6293	0.6334	0.5822	0.5913	0.6064	0.6164	0.6334	0.6387	0.6875
0.7500		0.7386	0.7500	0.6918	0.6959	0.6446	0.6538	0.6689	0.6789	0.6959	0.7013	0.7500
	0.8125	0.8011	0.8125	0.7543	0.7584	0.7072	0.7163	0.7314	0.7414	0.7584	0.7638	0.8125
0.8750		0.8636	0.8750	0.8168	0.8209	0.7696	0.7788	0.7939	0.8039	0.8209	0.8263	0.8750
	0.9375	0.9261	0.9375	0.8793	0.8834	0.8320	0.8413	0.8564	0.8664	0.8834	0.8889	0.9375
	1.0625	1.0511	1.0625	1.0042	1.0084	0.9570	0.9663	0.9814	0.9914	1.0084	1.0139	1.0625
	1.1875	1.1761	1.1875	1.1291	1.1334	1.0820	1.0913	1.1064	1.1164	1.1334	1.1390	1.1875
	1.3125	1.3011	1.3125	1.2541	1.2584	1.2070	1.2163	1.2314	1.2414	1.2584	1.2640	1.3125
	1.4375	1.4261	1.4375	1.3790	1.3834	1.3318	1.3413	1.3564	1.3664	1.3834	1.3891	1.4375
	1.5625	1.5511	1.5625	1.5040	1.5084	1.4568	1.4663	1.4814	1.4914	1.5084	1.5141	1.5625
1.6250		1.6136	1.6250	1.5665	1.5709	1.5194	1.5288	1.5439	1.5539	1.5709	1.5766	1.6250
	1.6875	1.6761	1.6875	1.6289	1.6334	1.5818	1.5913	1.6064	1.6164	1.6334	1.6392	1.6875
1.7500		1.7386	1.7500	1.6914	1.6959	1.6442	1.6538	1.6689	1.6789	1.6959	1.7017	1.7500
	1.8125	1.8011	1.8125	1.7539	1.7584	1.7068	1.7163	1.7314	1.7414	1.7584	1.7642	1.8125
1.8750		1.8636	1.8750	1.8164	1.8209	1.7692	1.7788	1.7939	1.8039	1.8209	1.8267	1.8750
	1.9375	1.9261	1.9375	1.8789	1.8834	1.8318	1.8413	1.8564	1.8664	1.8834	1.8893	1.9375
2.0000		1.9886	2.0000	1.9414	1.9459	1.8942	1.9038	1.9189	1.9289	1.9459	1.9518	2.0000
	2.1250	2.1136	2.1250	2.0664	2.0709	2.0192	2.0288	2.0439	2.0539	2.0709	2.0768	2.1250
2.2500		2.2386	2.2500	2.1914	2.1959	2.1442	2.1538	2.1689	2.1789	2.1959	2.2018	2.2500
	2.3750	2.3636	2.3750	2.3163	2.3209	2.2692	2.2788	2.2939	2.3039	2.3209	2.3269	2.3750
2.5000		2.4886	2.5000	2.4413	2.4459	2.3942	2.4038	2.4189	2.4289	2.4459	2.4519	2.5000
	2.6250	2.6136	2.6250	2.5663	2.5709	2.5192	2.5288	2.5439	2.5539	2.5709	2.5769	2.6250
2.7500		2.7386	2.7500	2.6913	2.6959	2.6442	2.6538	2.6689	2.6789	2.6959	2.7019	2.7500
	2.8750	2.8636	2.8750	2.8162	2.8209	2.7690	2.7788	2.7939	2.8039	2.8209	2.8271	2.8750
3.0000		2.9886	3.0000	2.9412	2.9459	2.8940	2.9038	2.9189	2.9289	2.9459	2.9521	3.0000
	3.1250	3.1136	3.1250	3.0662	3.0709	3.0190	3.0288	3.0439	3.0539	3.0709	3.0771	3.1250
3.2500		3.2386	3.2500	3.1912	3.1959	3.1440	3.1538	3.1689	3.1789	3.1959	3.2021	3.2500
	3.3750	3.3636	3.3750	3.3161	3.3209	3.2690	3.2788	3.2939	3.3039	3.3209	3.3272	3.3750
3.5000		3.4886	3.5000	3.4411	3.4459	3.3940	3.4038	3.4189	3.4289	3.4459	3.4522	3.5000
	3.6250	3.6136	3.6250	3.5661	3.5709	3.5190	3.5288	3.5439	3.5539	3.5709	3.5772	3.6250
3.7500		3.7386	3.7500	3.6911	3.6959	3.6440	3.6538	3.6689	3.6789	3.6959	3.7022	3.7500
	3.8750	3.8636	3.8750	3.8160	3.8209	3.7688	3.7788	3.7939	3.8039	3.8209	3.8273	3.8750
4.0000		3.9886	40000	3.9410	3.9459	3.8938	3.9038	3.9189	3.9289	3.9259	3.9523	4.0000
	4.1250	4.1136	4.1250	4.0660	4.0709	4.0188	4.0288	4.0439	4.0539	4.0709	4.0773	4.1250
4.2500		4.2386	4.2500	4.1910	4.1959	4.1438	4.1538	4.1689	4.1789	4.1959	4.2023	4.2500
	4.3750	4.3636	4.3750	4.3160	4.3209	4.2688	4.2788	4.2939	4.3039	4.3209	4.3273	4.3750
4.5000		4.4886	4.5000	4.4410	4.4459	4.3938	4.4038	4.4189	4.4289	4.4459	4.4523	4.5000
	4.6250	4.6136	4.6250	4.5659	4.5709	4.5188	4.5288	4.5439	4.5539	4.5709	4.5775	4.6250
4.7500		4.7386	4.7500	4.6909	4.6959	4.6438	4.6538	4.6689	4.6789	4.6959	4.7025	4.7500

TABLE 6 - Twelve Thread Series (Continued)

Basic Size Primary 1	Basic Size Secondary 2	External Thread - 12UNJ Class 3A Root Radius 0.0125 - 0.015						Internal Thread - 12UNJ Class 3B				
		Major Diameter Min 3	Major Diameter Max 4	Pitch Diameter Min 5	Pitch Diameter Max 6	Minor Diameter Min 7	Minor Diameter Max 8	Minor Diameter Min 9	Minor Diameter Max 10	Pitch Diameter Min 11	Pitch Diameter Max 12	Major Diameter Min 13
	4.8750	4.8636	4.8750	4.8159	4.8209	4.7688	4.7788	4.7939	4.8039	4.8209	4.8275	4.8750
5.0000		4.9886	5.0000	4.9409	4.9459	4.8938	4.9038	4.9189	4.9289	4.9459	4.9525	5.0000
	5.1250	5.1136	5.1250	5.0659	5.0709	5.0188	5.0288	5.0439	5.0539	5.0709	5.0775	5.1250
5.2500		5.2386	5.2500	5.1909	5.1959	5.1438	5.1538	5.1689	5.1789	5.1959	5.2025	5.2500
	5.3750	5.3636	5.3750	5.3159	5.3209	5.2688	5.2788	5.2939	5.3039	5.3209	5.3275	5.3750
5.5000		5.4886	5.5000	5.4409	5.4459	5.3938	5.4038	5.4189	5.4289	5.4459	5.4525	5.5000
	5.6250	5.6136	5.6250	5.5657	5.5709	5.5186	5.5288	5.5439	5.5539	5.5709	5.5776	5.6250
5.7500		5.7386	5.7500	5.6907	5.6959	5.6436	5.6538	5.6689	5.6789	5.6959	5.7026	5.7500
	5.8750	5.8636	5.8750	5.8157	5.8209	5.7686	5.7788	5.7939	5.8039	5.8209	5.8276	5.8750
6.0000		5.9886	6.0000	5.9407	5.9459	5.8936	5.9038	5.9189	5.9289	5.9459	5.9526	6.0000

TABLE 7 - Sixteen Thread Series

Basic Size Primary 1	Basic Size Secondary 2	External Thread - 16UNJ Class 3A Root Radius 0.0094 - 0.0113						Internal Thread - 16UNJ Class 3B				
		Major Diameter Min 3	Major Diameter Max 4	Pitch Diameter Min 5	Pitch Diameter Max 6	Minor Diameter Min 7	Minor Diameter Max 8	Minor Diameter Min 9	Minor Diameter Max 10	Pitch Diameter Min 11	Pitch Diameter Max 12	Major Diameter Min 13
0.4375		0.4281	0.4375	0.3935	0.3969	0.3581	0.3653	0.3766	0.3868	0.3969	0.4014	0.4375
0.5000		0.4906	0.5000	0.4559	0.4594	0.4205	0.4278	0.4392	0.4488	0.4594	0.4640	0.5000
0.5625		0.5531	0.5625	0.5184	0.5219	0.4830	0.4903	0.5017	0.5109	0.5219	0.5265	0.5625
0.6250		0.6156	0.6250	0.5808	0.5844	0.5454	0.5528	0.5642	0.5731	0.5844	0.5890	0.6250
	0.6875	0.6781	0.6875	0.6433	0.6469	0.6079	0.6153	0.6267	0.6353	0.6469	0.6515	0.6875
	0.8125	0.8031	0.8125	0.7683	0.7719	0.7329	0.7403	0.7517	0.7602	0.7719	0.7766	0.8125
0.8750		0.8656	0.8750	0.8308	0.8344	0.7954	0.8028	0.8142	0.8227	0.8344	0.8391	0.8750
	0.9375	0.9281	0.9375	0.8932	0.8969	0.8578	0.8653	0.8767	0.8852	0.8969	0.9018	0.9375
1.0000		0.9906	1.0000	0.9557	0.9594	0.9203	0.9278	0.9392	0.9477	0.9594	0.9643	1.0000
	1.0625	1.0531	1.0625	1.0182	1.0219	0.9828	0.9903	1.0017	1.0102	1.0219	1.0268	1.0625
1.1250		1.1156	1.1250	1.0807	1.0844	1.0453	1.0528	1.0642	1.0727	1.0844	1.0893	1.1250
	1.1875	1.1781	1.1875	1.1431	1.1469	1.1077	1.1153	1.1267	1.1352	1.1469	1.1519	1.1875
1.2500		1.2406	1.2500	1.2056	1.2094	1.1702	1.1778	1.1892	1.1977	1.2094	1.2144	1.2500
	1.3125	1.3031	1.3125	1.2681	1.2719	1.2327	1.2403	1.2517	1.2602	1.2719	1.2769	1.3125
1.3750		1.3656	1.3750	1.3306	1.3344	1.2952	1.3028	1.3142	1.3227	1.3344	1.3394	1.3750
	1.4375	1.4281	1.4375	1.3930	1.3969	1.3576	1.3653	1.3767	1.3852	1.3969	1.4020	1.4375
1.5000		1.4906	1.5000	1.4555	1.4594	1.4201	1.4278	1.4392	1.4477	1.4594	1.4645	1.5000
	1.5625	1.5531	1.5625	1.5180	1.5219	1.4826	1.4903	1.5017	1.5102	1.5219	1.5270	1.5625
1.6250		1.6156	1.6250	1.5805	1.5844	1.5451	1.5528	1.5642	1.5727	1.5844	1.5895	1.6250
	1.6875	1.6781	1.6875	1.6429	1.6469	1.6075	1.6153	1.6267	1.6352	1.6469	1.6521	1.6875
1.7500		1.7406	1.7500	1.7054	1.7094	1.6700	1.6778	1.6892	1.6877	1.7094	1.7146	1.7500
	1.8125	1.8031	1.8125	1.7679	1.7719	1.7325	1.7403	1.7517	1.7602	1.7719	1.7771	1.8125
1.8750		1.8656	1.8750	1.8304	1.8344	1.7950	1.8028	1.8142	1.8227	1.8344	1.8396	1.8750
	1.9375	1.9281	1.9875	1.8929	1.8969	1.8575	1.8653	1.8767	1.8852	1.8969	1.9021	1.9375
2.0000		1.9906	2.0000	1.9554	1.9594	1.9200	1.9278	1.9392	1.9477	1.9594	1.9646	2.0000
	2.1250	2.1156	2.1250	1.0804	2.0844	2.0450	2.0528	2.0642	2.0727	2.0844	2.0896	2.1250
2.2500		2.2406	2.2500	2.2054	2.2.094	2.1700	2.1778	2.1892	2.1977	2.2094	2.2146	2.2500
	2.3750	2.3656	2.3750	2.3303	2.3344	2.2949	2.3028	2.3142	2.3227	2.3344	2.3398	2.3750
2.5000		2.4906	2.5000	2.4553	2.4594	2.4199	2.4278	2.4392	2.4477	2.4594	2.4648	2.5000
	2.6250	2.6156	2.6250	2.5803	2.5844	2.5449	2.5528	2.5642	2.5727	2.5844	2.5898	2.6250
2.7500		2.7406	2.7500	2.7053	2.7094	2.6699	2.6778	2.6892	2.6977	2.7094	2.7148	2.7500
	2.8750	2.8656	2.8750	2.8302	2.8344	2.7948	2.8028	2.8142	2.8227	2.8344	2.8399	2.8750
3.0000		2.9906	3.0000	2.9552	2.9594	2.9198	2.9278	2.9392	2.9477	2.9594	2.9649	3.0000
	3.1250	3.1156	3.1250	3.0802	3.0844	3.0448	3.0528	3.0642	3.0727	3.0844	3.0899	3.1250
3.2500		3.2406	3.2500	3.2052	3.2094	3.1698	3.1778	3.1892	3.1977	3.2094	3.2149	3.2500
	3.3750	3.3656	3.3750	3.3301	3.3344	3.2947	3.3028	3.3142	3.3227	3.3344	3.3400	3.3750

TABLE 7 - Sixteen Thread Series (Continued)

Basic Size Primary 1	Basic Size Secondary 2	External Thread - 16UNJ Class 3A Root Radius 0.0094 - 0.0113						Internal Thread - 16UNJ Class 3B				
		Major Diameter Min 3	Major Diameter Max 4	Pitch Diameter Min 5	Pitch Diameter Max 6	Minor Diameter Min 7	Minor Diameter Max 8	Minor Diameter Min 9	Minor Diameter Max 10	Pitch Diameter Min 11	Pitch Diameter Max 12	Major Diameter Min 13
3.5000		3.4906	3.5000	3.4551	3.4594	3.4197	3.4278	3.4392	3.4477	3.4594	3.4650	3.5000
	3.6250	3.6156	3.6250	3.5801	3.5844	3.5447	3.5528	3.5642	3.5727	3.5844	3.5900	3.6250
3.7500		3.7406	3.7500	3.7051	3.7094	3.6697	3.6778	3.6892	3.6977	3.7094	3.7150	3.7500
	3.8750	3.8656	3.8750	3.8300	3.8344	3.7946	3.8028	3.8142	3.8227	3.8344	3.8401	3.8750
4.0000		3.9906	4.0000	3.9550	3.9594	3.9196	3.9278	3.9392	3.9477	3.9594	3.9651	4.0000
	4.1250	4.1156	4.1250	4.0800	4.0844	4.0446	4.0528	4.0642	4.0727	4.0844	4.0901	4.1250
4.2500		4.2406	4.2500	4.2050	4.2094	4.1696	4.1778	4.1892	4.1977	4.2094	4.2151	4.2500
	4.3750	4.3656	4.3750	4.3300	4.3344	4.2946	4.3028	4.3142	4.3227	4.3344	4.3401	4.3750
4.5000		4.4906	4.5000	4.4550	4.4594	4.4196	4.4278	4.4392	4.4477	4.4594	4.4651	4.5000
	4.6250	4.6156	4.6250	4.5799	4.5844	4.5445	4.5528	4.5642	4.5727	4.5844	4.5903	4.6250
4.7500		4.7406	4.7500	4.7049	4.7094	4.6695	4.6778	4.6892	4.6977	4.7094	4.7153	4.7500
	4.8750	4.8656	4.8750	4.8299	4.8344	4.7945	4.8028	4.8142	4.8227	4.8344	4.8403	4.8750
5.0000		4.9906	5.0000	4.9549	4.9594	4.9195	4.9278	4.9392	4.9477	4.9594	4.9653	50000
	5.1250	5.1156	5.1250	5.0799	5.0844	5.0445	5.0528	5.0642	5.0727	5.0844	5.0903	5.1250
5.2500		5.2406	5.2500	5.2049	5.2094	5.1695	5.1778	5.1892	5.1977	5.2094	5.2153	5.2500
	5.3750	5.3656	5.3750	5.3299	5.3344	5.2945	5.3028	5.3142	5.3227	5.3344	5.3403	5.3750
5.5000		5.4906	5.5000	5.4549	5.4594	5.4195	5.4278	5.4392	5.4477	5.4594	5.4653	5.5000
	5.6250	5.6156	5.6250	5.5797	5.5844	5.5443	5.5528	5.5642	5.5727	5.5844	5.5905	5.6250
5.7500		5.7406	5.7500	5.7047	5.7094	5.6693	5.6778	5.6892	5.6977	5.7094	5.7155	5.7500
	5.8750	5.8656	5.8750	5.8297	5.8344	5.7943	5.8028	5.8142	5.8227	5.8344	5.8405	5.8750
6.0000		5.9906	6.0000	5.9547	5.9594	5.9193	5.9278	5.9392	5.9477	5.9594	5.9655	6.0000

TABLE 8 - Basic Thread Data

Threads per Inch	Pitch	Truncation of Internal Thread Crest	Flat at Internal Thread Root and External Thread Crest	Height of Sharp V Thread	Truncation of Internal Thread Root and External Thread Crest	Minimum Root Radius	Height from Sharp "V" to External Thread Root and Max. Root Radius	Half Addendum of External Thread	Flat at Internal Thread Crest
n	p = 1/n	$\frac{5H}{16}$ =	$\frac{P}{8}$ =	H =	$\frac{H}{8}$ =		$\frac{5H}{24}$ =	$\frac{3H}{16}$ =	$\frac{5p}{16}$ =
		0.27063p	0.125p	0.866025p	0.10825p	0.15011p	0.18042p	0.16238p	0.3125p
1	2	3	4	5	6	7	8	9	10
80	0.012500	0.00338	0.00156	0.010825	0.00135	0.0019	0.00226	0.00203	0.00391
72	0.013889	0.00376	0.00174	0.012028	0.00150	0.0021	0.00251	0.00226	0.00434
64	0.015625	0.00423	0.00195	0.013532	0.00169	0.0023	0.00282	0.00254	0.00488
56	0.017857	0.00483	0.00223	0.015465	0.00193	0.0027	0.00322	0.00290	0.00558
48	0.020833	0.00564	0.00260	0.018042	0.00226	0.0031	0.00376	0.00338	0.00651
44	0.022727	0.00615	0.00284	0.019682	0.00246	0.0034	0.00410	0.00369	0.00710
40	0.025000	0.00677	0.00312	0.021651	0.00271	0.0038	0.00451	0.00406	0.00781
36	0.027778	0.00752	0.00347	0.024056	0.00301	0.0042	0.00501	0.00451	0.00868
32	0.031250	0.00846	0.00391	0.027063	0.00338	0.0047	0.00564	0.00507	0.00977
28	0.035714	0.00967	0.00446	0.030929	0.00387	0.0054	0.00644	0.00580	0.01116
24	0.041667	0.01128	0.00521	0.036084	0.00451	0.0063	0.00752	0.00677	0.01302
20	0.050000	0.01353	0.00625	0.043301	0.00541	0.0075	0.00902	0.00812	0.01562
18	0.055556	0.01504	0.00694	0.048113	0.00601	0.0083	0.01002	0.00902	0.01736
16	0.062500	0.01691	0.00781	0.054127	0.00677	0.0094	0.01128	0.01015	0.01953
14	0.071429	0.01933	0.00893	0.061859	0.00773	0.0107	0.01289	0.01160	0.02232
13	0.076923	0.02082	0.00962	0.066617	0.00833	0.0115	0.01388	0.01249	0.02404
12	0.083333	0.02255	0.01042	0.072169	0.00902	0.0125	0.01503	0.01353	0.02604
11	0.090909	0.02460	0.01136	0.078730	0.00984	0.0136	0.01640	0.01476	0.02841
10	0.100000	0.02706	0.01250	0.086603	0.01083	0.0150	0.01804	0.01624	0.03125
9	0.111111	0.03007	0.01389	0.096225	0.01203	0.0167	0.02005	0.01804	0.03472
8	0.125000	0.03383	0.01562	0.108253	0.01353	0.0188	0.02255	0.02030	0.03906
7	0.142857	0.03866	0.01786	0.123718	0.01546	0.0214	0.02577	0.02320	0.04464
6	0.166667	0.04510	0.02083	0.144338	0.01804	0.0250	0.03007	0.02706	0.05208
5	0.200000	0.05413	0.02500	0.173205	0.02165	0.0300	0.03608	0.03248	0.06250
4.5	0.222222	0.06014	0.02778	0.192450	0.02406	0.0334	0.04009	0.03608	0.06944
4	0.250000	0.06766	0.03125	0.216506	0.02706	0.0375	0.04510	0.04059	0.07812

TABLE 8 (Continued)

Addendum of External Thread	Height of Internal Thread and Depth of Thread Engagement	Height of External Thread	Twice the External Thread Addendum	Difference Between Max-Major and Pitch Diameters of Internal Thread	Double Height of Internal Thread	Double Height of External Thread	Difference Between Max. Pitch Dia. and Max. Minor Diameter External Thread	Difference Between Min. Pitch Dia. and Min. Minor Diameter of External Thread	Maj Dia Tolerance
$\frac{3H}{8}=$	$\frac{9H}{16}=$	$\frac{2H}{3}=$	$\frac{3H}{4}=$	$\frac{11H}{12}=$	$\frac{9H}{8}=$	$\frac{4H}{3}=$	$\frac{7H}{12}=$	.6533H =	$.06\sqrt[3]{\rho^2}$
0.32476p	0.48714p	0.57735p	0.649519p	0.79386p	0.97428p	1.1547p	0.50518p	0.56580p	
11	12	13	14	15	16	17	18	19	20
0.00406	0.00609	0.00722	0.008119	0.00992	0.01218	0.01443	0.00631	0.00707	0.0032
0.00451	0.00677	0.00802	0.009021	0.01103	0.01353	0.01604	0.00702	0.00786	0.0035
0.00507	0.00761	0.00902	0.010149	0.01240	0.01522	0.01804	0.00789	0.00884	0.0038
0.00580	0.00870	0.01031	0.011599	0.01418	0.01740	0.02062	0.00902	0.01010	0.0041
0.00677	0.01015	0.01203	0.013532	0.01654	0.02030	0.02406	0.01052	0.01179	0.0045
0.00738	0.01107	0.01312	0.014762	0.01804	0.02214	0.02624	0.01148	0.01286	0.0048
0.00812	0.01218	0.01443	0.016238	0.01985	0.02436	0.02887	0.01263	0.01414	0.0051
0.00902	0.01353	0.01604	0.018042	0.02205	0.02706	0.03208	0.01403	0.01572	0.0055
0.01015	0.01522	0.01804	0.020297	0.02481	0.03045	0.03608	0.01579	0.01768	0.0060
0.01160	0.01740	0.02062	0.023197	0.02835	0.03480	0.04124	0.01804	0.02021	0.0065
0.01353	0.02030	0.02406	0.027063	0.03308	0.04060	0.04811	0.02105	0.02358	0.0072
0.01624	0.02436	0.02887	0.032476	0.03969	0.04871	0.05774	0.02526	0.02829	0.0081
0.01804	0.02706	0.03208	0.036084	0.04410	0.05413	0.06415	0.02807	0.03143	0.0087
0.02030	0.03045	0.03608	0.040595	0.04962	0.06089	0.07217	0.03157	0.03536	0.0094
0.02320	0.03480	0.04124	0.046394	0.05670	0.06959	0.08248	0.03608	0.04041	0.0103
0.02498	0.03747	0.04441	0.049963	0.06107	0.07494	0.08882	0.03886	0.04352	0.0108
0.02706	0.04059	0.04811	0.054127	0.06615	0.08119	0.09622	0.04210	0.04715	0.0114
0.02952	0.04429	0.05249	0.059047	0.07217	0.08857	0.10497	0.04593	0.05144	0.0121
0.03248	0.04871	0.05774	0.064952	0.07939	0.09743	0.11547	0.05052	0.05658	0.0129
0.03608	0.05413	0.06415	0.072169	0.08821	0.10825	0.12830	0.05613	0.06287	0.0139
0.04059	0.06089	0.07217	0.081190	0.09923	0.12178	0.14434	0.06315	0.07072	0.0150
0.04639	0.06959	0.08248	0.092788	0.11341	0.13918	0.16496	0.07217	0.08083	0.0164
0.05413	0.08119	0.09623	0.108253	0.13231	0.16238	0.19245	0.08420	0.09430	0.0182
0.06495	0.09743	0.11547	0.129904	0.15877	0.19486	0.23094	0.10104	0.11316	0.0205
0.07217	0.10825	0.12830	0.144338	0.17641	0.21651	0.25660	0.11226	0.12573	0.0220
0.08119	0.12178	0.14434	0.162380	0.19846	0.24357	0.28868	0.12630	0.14145	0.0238

TABLE 9 - Special Diameter-Pitch Combinations

Dimensions for threads of special diameter-pitch combinations shall be computed by the following formulas:

External Threads:		
Maximum major diameter (d)	=	Basic major diameter
Minimum major diameter (d min)	=	Basic major diameter minus tolerance specified in Table 8, column 20 herein.
Maximum pitch diameter (d_2 max)	=	Basic major diameter minus 0.649519p. See Table 8, column 14 herein.
Minimum pitch diameter (d_2 min)	=	Maximum pitch diameter minus tolerance specified in ASME B1.1, Table 35.
Maximum minor diameter (d_3 max)	=	Maximum pitch diameter minus 0.50518p. See Table 8, column 18 herein.
Minimum minor diameter (d_3 min)	=	Minimum pitch diameter minus 0.56580p. See Table 8, column 19 herein.
Maximum root radius (r max)	=	0.18042p. See Table 8, column 8 herein.
Minimum root radius (r min)	=	0.15011p. See Table 8, column 7 herein.
Internal Threads:		
Minimum major diameter (D)	=	Basic major diameter
Minimum pitch diameter (D_2 min)	=	Basic major diameter minus 0.649519p. See Table 8, column 14 herein.
Maximum pitch diameter (D_2 max)	=	Minimum pitch diameter plus tolerance specified in ASME B1.1, Table 38.
Minimum minor diameter (D_1 min)	=	Basic major diameter minus 0.97428p. See Table 8, column 16 herein. Round up to the next larger fourth place decimal, unless the fifth place is zero.
Maximum minor diameter (D_1 max)	=	Minimum minor diameter plus the internal thread minor diameter tolerances.
Minor diameter tolerance (TD_1)	=	$\left[0.05\sqrt[3]{p^2} + 0.03p/D\right] - 0.002$ except the tolerance shall not be greater than 0.259809p nor less than 0.135315p for threads 13 per inch and finer. For threads 12 per inch and coarser, the tolerance is equal to 0.120p. Where: p = pitch, D = basic major diameter (D_{bsc})

NOTE: Dimensions of special threads shall be rounded off to 4 decimal places after all computations are made.

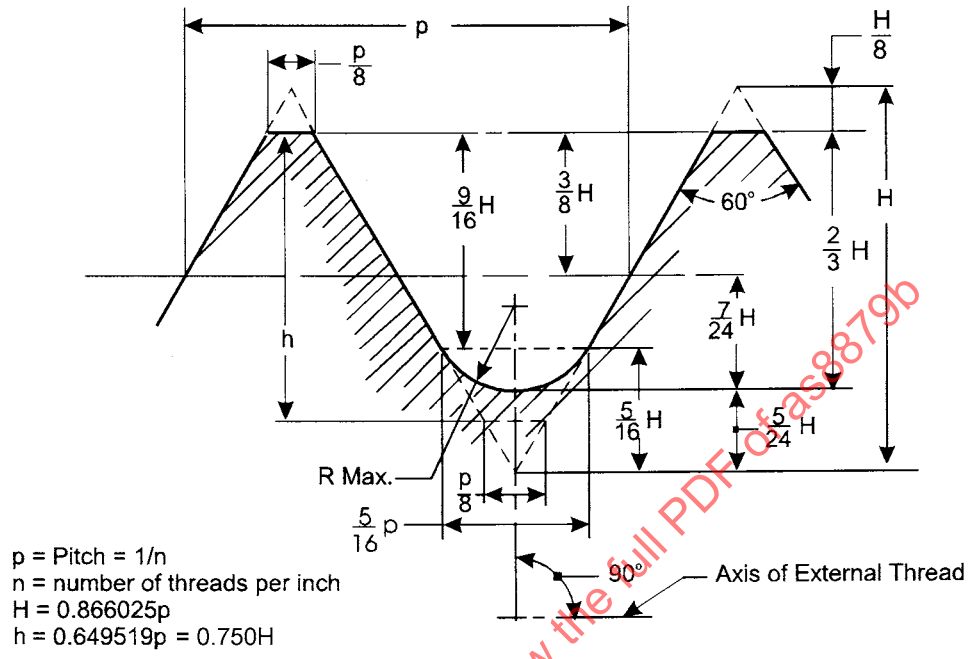

FIGURE 3 - External Thread Maximum Material Condition

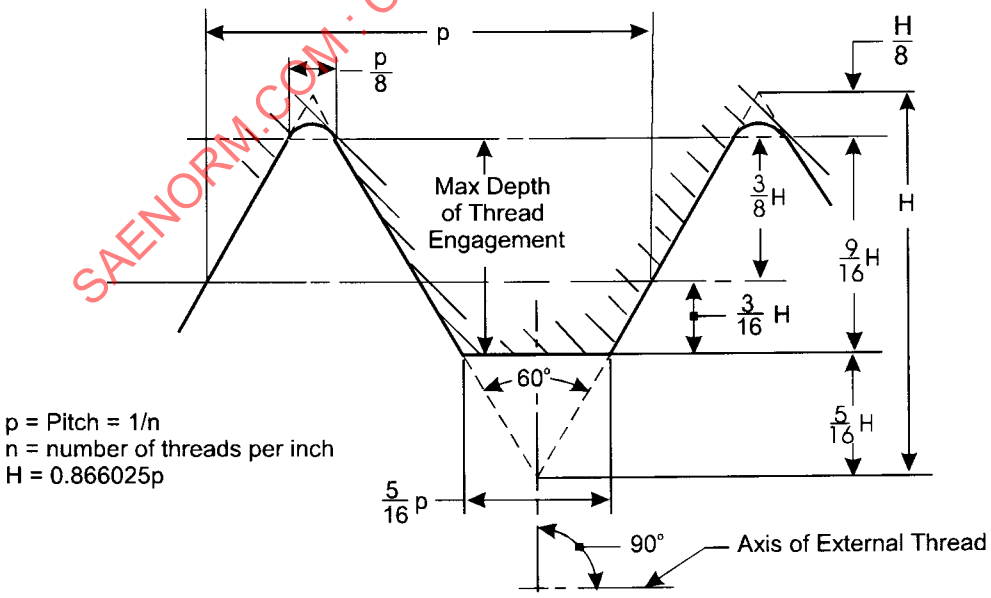

FIGURE 4 - Internal Thread Maximum Material Condition

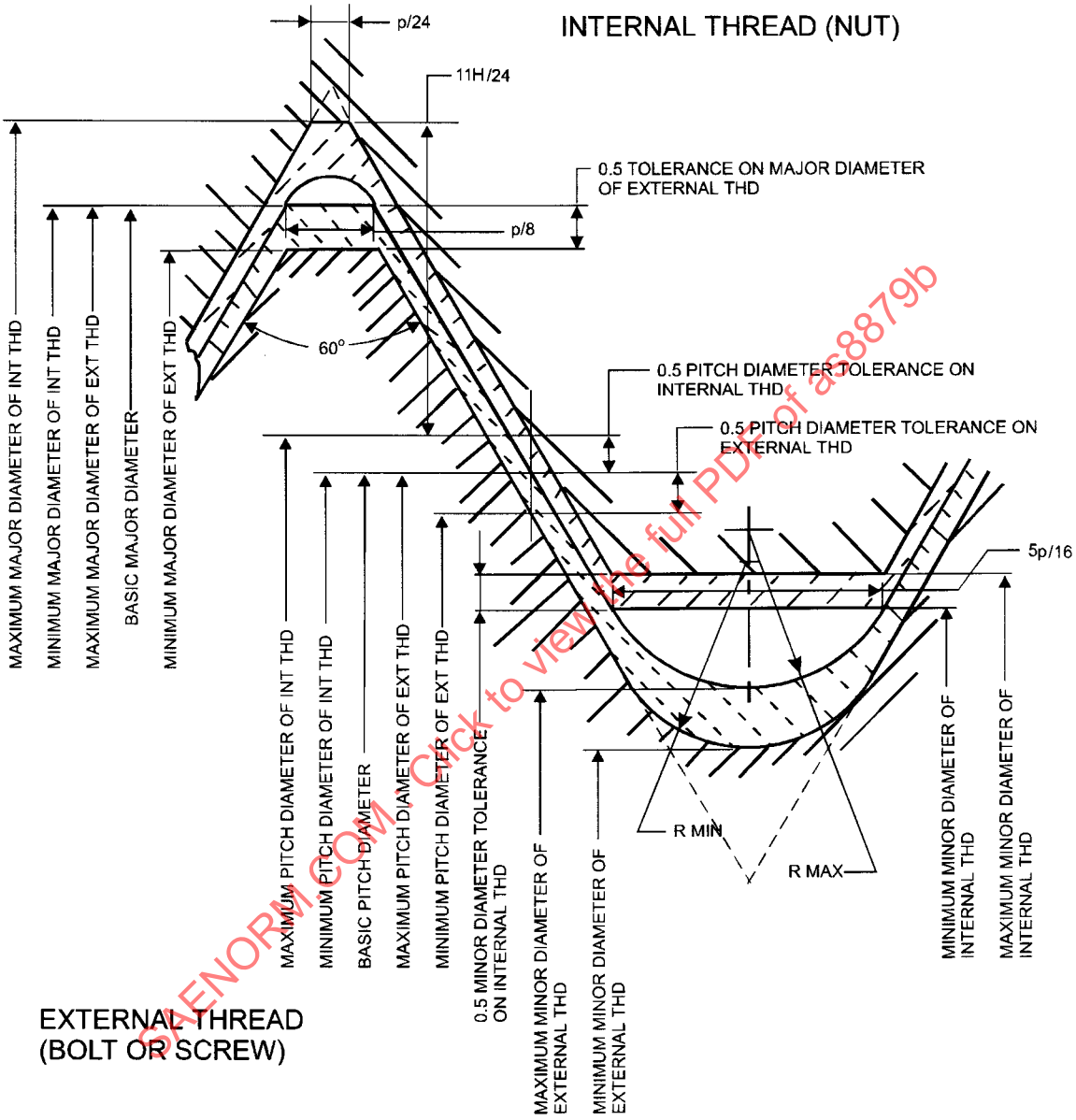

FIGURE 5 - Disposition of Tolerances and Crest Clearances

3.4.1 Length of Engagement and Tolerances: The length of engagement for UNJC, UNJF, and the 8UNJ series threads upon which their specified tolerances are based is equal to the basic major diameter. These tolerances are applicable for the lengths of engagement of these threads of 1.0 to 1.5 times the basic major diameter. The length of engagement for UNJEF, 12UNJ, and 16UNJ series threads upon which their specified tolerances are based is equal to 9 pitches. These tolerances are applicable for lengths of engagement of these threads of 5 to 15 pitches.

3.4.2 Variations: The combined effect of variations in the following characteristics shall not result in exceedance of the pitch diameter tolerance.

3.4.2.1 Pitch Diameter: No portion of the complete thread shall be permitted to project beyond the envelope defined by the maximum-material limits, or beyond that defined by the minimum-material limits, and thus be outside of the tolerance zone specified.

3.4.2.2 Lead and Flank Angle: The lead shall be the number of thread starts divided by the number of threads per inch. The flank angle shall be 30 degrees. The diameter equivalent of variations in the lead (including helix variations), or flank angle, shall not exceed 0.4 of the total pitch diameter tolerance for each element individually, see Appendix A.

3.4.2.3 Circularity (Roundness): The product screw thread pitch diameter shall be circular within a tolerance zone of one-half the pitch diameter tolerance where pitch diameter tolerance is less than 0.004 inch. Where pitch diameter tolerance is 0.004 inch or larger, the tolerance zone is 0.002 inch. When circularity is checked using pitch diameter indicating gage segments or rolls, the circularity tolerance is equal to one-half the difference between maximum and the minimum pitch diameter readings. Threads 1.5000 inches and larger with 16 threads per inch or less may exceed the tolerance by 0.002 inch over a maximum arc of 15 degrees, in the direction of minimum material in this area provided that this overcut does not result in raised material on the thread flanks or roots. The tolerance shall fall within the pitch diameter tolerance except above the 15 degree arc.

3.4.2.4 Taper: Taper of the pitch diameter based on the length of engagement in 3.4.1 shall be within 0.4 of the pitch diameter tolerance.

3.4.2.5 Incomplete Threads: Unless otherwise specified, the runout threads on the external threaded parts shall be no less than one nor more than two pitches in length. The threads shall run out onto the shank eliminating any abrupt change in cross-sectional area. The root of the runout threads shall be radiused. The radius, as it approaches the unthreaded portion of the shank, shall be no less than the radius of the full thread portion.

3.4.2.5.1 Lead Threads: Unless otherwise specified, the entering end of external threads and the entering end of internal threads may be outside the specified limits of size for a length not to exceed two pitches, including chamfer. In no case shall the lead threads exceed the maximum material limit of size specified herein.

3.4.3 Material Limits for Coated/plated Threads: When externally threaded parts are to be coated/plated, the minimum pitch diameter shall not be reduced by more than 0.001 inch on all threads for which the pitch diameter tolerance specified herein does not exceed 0.0035 inch. For threaded parts for which the pitch diameter tolerance specified herein is greater than 0.0035 inch, the minimum pitch diameter may be reduced by an amount equal to 0.3 times the pitch diameter tolerance but not more than 0.0015 inch. All external thread elements shall be within the adjusted tolerance before coating. Internal thread to be coated/plated may be increased by the same amount permitted for external threads. All internal thread elements shall be within the adjusted tolerance before coating. The material limits for coated/plated threads shall be the same material limits as required in this specification for uncoated/unplated threads.

3.4.3.1 Coating Threads With Solid Film Lubricant: Externally threaded parts to be coated with solid film lubricant shall not have the minimum pitch diameter reduced by more than 0.001 inch. Internally threaded parts to be coated with solid film lubricant shall not have the maximum pitch diameter increased by more than 0.001 inch. The variation in pitch diameter to accommodate solid film lubricant is not in addition to that specified in 3.4.3 if another coating is applied before the solid film lubricant. The solid film lubricant may be removed for gaging. Parts which have had the coating removed shall be recoated in accordance with the manufacturer's procedure prior to restocking or usage. When it is not possible to recoat the parts in accordance with the manufacturer's procedure, the parts shall either be returned to the manufacturer or be scrapped to prevent their usage.

3.4.4 Runout: The circular runout of the external thread major diameter cylinder and the internal thread minor diameter cylinder with the pitch diameter cylinder shall not exceed twice the pitch diameter tolerance.

3.5 Surface Roughness:

On certain parts it may be necessary to control the surface roughness of the thread flanks, roots, or crests. This requirement shall be specified, if necessary, on the part drawing or specification. Due consideration shall be given to the practical method of production and the surface roughness commensurate with that method. Unless otherwise specified, the surface roughness of the thread flanks and the roots shall be no greater than 63 µin Ra for external threads and 100 µin Ra for internal threads in accordance with ASME B46.1.

4. ACCEPTANCE:

4.1 Gaging:

Depending on the degree of confidence desired by the part designer, gaging shall be accomplished in accordance with ASME B1.3M System 21, System 22, or System 23, as shown in Table 10. Unless otherwise specified on the drawing or product specification, products having external or internal threads meeting the requirements of this standard shall be verified in accordance with System 22, except internal threads of a nominal size less than 0.190 inches, where System 21 shall be used. When required, a designer may tailor a general gaging system to suit specific needs.

NOTE: There is only one class of UNJ threads, i.e., Class 3. The choice of alternate gaging systems does not infer permission to depart from specified thread dimensions and tolerances.

4.2 Gaging and Gaging Practices:

Gages and gaging practices shall be in accordance with ASME B1.3M as shown in Table 10.

4.2.1 When the pitch diameter size or functional size conformity cannot be accomplished on a completed screw thread product because of a configuration change to the threads (e.g., deformation, slots, self-locking devices), the product screw threads shall be verified at the point of manufacture prior to the configuration change.

4.3 Methods of Gaging:

Each method in Table 10 lists minimum gaging for that system, but new or more effective methods are acceptable so long as they can be demonstrated to show and assure conformance of the threads to the requirements of this document and drawings, product specifications, or specification sheets supporting or derived from this document. Gages shall meet the requirements of ASME B1.2; new or more effective methods are acceptable. Purchaser approved on-line or statistical process controls may be used.

5. QUALITY ASSURANCE PROVISIONS:

5.1 Verification:

Products having threads in accordance with this specification shall be inspected as stated herein and as specified on the detail standard, specification or product drawing.

TABLE 10 - Gaging Methods, Procedures, and Thread Features to be Gaged

Gaging Method	Minimum Inspection
	External Product Thread
System 21 (Interchangeability Control)	Maximum material (Functional diameter) - GO threaded rings, or GO thread snap gages[1] or Indicating gage[1]. Minimum material pitch diameter - NOT-GO threaded ring Snap gage or indicating gage engaging one pitch or less using cone and vee contacts with .09H flats, radius contacts simulate best size wire, or three wire direct measurement. Major diameter - Micrometer or GO and NOT-GO plain ring gage, or plain snap, or indicating gage.
System 22 (Max. and Min. Material Limits Control)	Maximum material (Functional diameter) - GO threaded ring, or GO threaded snap, or Indicating gage[1]. Minimum material pitch diameter - Snap gage or indicating gage engaging one pitch or less using cone and vee contacts with .09H flats, radius contacts simulate best size wire, or three wire direct measurement. Minor diameter - Snap or indicating gage, or optical projection. Root radius - Optical projection. Major diameter - Micrometer, gage, or GO and NOT-GO plain ring gage, or plain snap gage, or indicating gage.
System 23 (Thread element control within maximum and minimum limits)	Maximum material (Functional diameter size)[2] - GO thread ring and indicating gage[1]. Minimum material pitch diameter[2] - Snap gage or indicating gage engaging one pitch or less using cone and vee contacts with .09H flats, radius contacts to simulate best wire, or three wire direct measurement. Minor diameter - Snap or indicating gage having 55° or less included angle, optical projection.

TABLE 10 - Gaging Methods, Procedures, and Thread Features to be Gaged (Continued)

Gaging Method	Minimum Inspection
	Root radius - Optical projection. Major diameter - Micrometer, or GO and NOT-GO plain ring gage, or plain snap gage, or indicating gage. Taper - Use the same indicating gage system as for min. material P.D., see above. Circularity - Use the same indicating gage system as for max. material and min. material P.D., see above. (180° contact for oval out-of-round) (120° contact for odd lobe out-of-round). Flank angle[2] - Differential gaging system or optical projection. Lead (including helix variations)[2] - Differential gaging system, or helical path analyzer. (Lead error equals pitch plus maximum helical path deviation) Runout - Indicating system for pitch cylinder to major diameter cylinder Surface roughness - See 3.5.
	Internal Product Thread
System 21 (Interchangeability Control)	Maximum material (Functional diameter)[4] - GO threaded plugs, or Indicating gage[3]. Minimum material pitch diameter[2] (Functional diameter) - NOT GO threaded plug. Minor diameter - GO and NOT-GO plain plug gages or indicating gage.

TABLE 10 - Gaging Methods, Procedures, and Thread Features to be Gaged (Continued)

Gaging Method	Minimum Inspection
System 22 (Max. and Min. Material Limits Control)	Maximum material (Functional diameter) - GO threaded plug, or Indicating gage[3]. Minimum material pitch diameter[2] - Indicating gage engaging one pitch or less using cone and vee contacts with .09 H flats, radius contacts simulate best size wire. Floating radius contacts should not exceed 3.5 pitches. Minor diameter - GO and NOT-GO plain plug gage or indicating gage.
System 23 (Thread element control within maximum and minimum limits)	Maximum material (Functional diameter size)[2] - GO threaded plug and indicating gage[3]. Minimum material pitch diameter[2] - Indicating gage engaging one pitch or less using cone and vee contacts with .09H flats, radius contacts to simulate best wire. Floating contacts should not exceed 3.5 pitches. Minor diameter - GO and NOT-GO plain plug gages; or indicating gage. Taper - Use the same indicating gage system as for min. material P.D., see above. Circularity - Use the same indicating gage system as for max. material and min. material P.D., see above. (180° contact for oval out-of-round) (120° contact for odd lobe out-of-round). Flank angle[2] - Differential gaging system or optical projection. Lead (including helix variations)[2] - Differential gaging system, or helical path analyzer. (Lead error equals pitch plus maximum helical path deviation)

TABLE 10 - Gaging Methods, Procedures, and Thread Features to be Gaged (Continued)

Gaging Method	Minimum Inspection
	Runout - Indicating system for pitch cylinder to minor diameter cylinder.
	Surface roughness - See 3.5.

[1] Gage flank angle engagement .5625H (9/16H); for definition of "H" see Table 8.

[2] If the differential between "GO" functional size and the pitch diameter size does not exceed 0.4 of the pitch diameter tolerance, inspection of flank angle and lead (including helix variations) is not necessary.

[3] Gage flank angle engagement .625H (5/8H); for definition of "H" see Table 8.

[4] For tapped holes with internal threads of nominal diameter less than 0.190 inches, only the functional diameter limits of size and the minor diameter limits of size measurements are to be performed.

6. INFORMATION FOR GUIDANCE ONLY:

6.1 Clarification:

The following comments are intended to clarify subjects related to this specification and are not to be construed as screw thread requirements, per se.

6.1.1 Use of Unified Thread Tools and Gages: The following UN form tools and gages may be used for UNJ threads covered by this document:

a. Taps and thread gages for Class 3B.

b. Threaded gages for Class 3A, except crest truncation of the maximum material thread gage must be increased to 0.3125p flat.

6.2 Definitions:

For terms, symbols, and data not identified or specified herein, see ASME B1.7M.

6.3 Class 3BG:

Class 3BG threads for high temperature applications shall no longer be used in new designs. This special class provided an allowance of internal threads of 0.003 inch for 32 threads per inch and coarser and 0.001 inch for finer pitch threads.

6.4 Key Words:

Screw threads, controlled radius root, fatigue sensitive applications, strength sensitive applications, physical size and weight sensitive applications, UNJ screw threads, UNJS screw threads.

6.5 The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document.

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