SELECTION GUIDE

YG THREADING TOOLS

HSS-E & HSS YG TAP GENERAL

- For General Purpose Through and Blind Hole Applications

Please visit globalyg1.com/mat for material search

◎ : Excellent ○ : Good

HOLE TYPE	Max. 2.0xD Blind /Through Hole		
TOOL MATERIAL	HSS		
CHAMFER LEAD	9P/5P/2P		
FLUTE TYPE	Straight Flute		
SPIRAL FLUTE ANGLE	-		
SERIES M			
SERIES M/MF			
SERIES UNC			
SERIES UNC/UNF			
SERIES UNC/UNF/UNS	T7316/T7A16/T7B16 (p.B228)	T6316 (p.B235)	T8316 (p.B237)
SERIES UNC/UN8			
SERIES NPT			
SERIES NPTF			
SERIES NPS/NPSF			
SURFACE TREATMENT / COATING	Bright	Steam Oxide	TiN
	Hand Tap		
MODEL			

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment		HB	HRc	T7316/T7A16/T7B16	T6316	T8316
P	1	Non-alloy steel	About 0.15% C	Annealed	125		○ 25-50	○ 25-50	○ 50-80
P	2	Non-alloy steel	About 0.45% C	Annealed	190	13	○ 25-50	○ 25-50	○ 50-80
P	3	Non-alloy steel	About 0.45% C	Quenched & Tempered	250	25	○ 25-50	○ 25-50	○ 50-80
P	4	Non-alloy steel	About 0.75% C	Annealed	270	28			
P	5	Non-alloy steel	About 0.75% C	Quenched & Tempered	300	32			
P	6	Low alloy steel		Annealed	180	10	○ 6-30	○ 6-30	○ 10-35
P	7	Low alloy steel		Quenched & Tempered	275	29			
P	8	Low alloy steel		Quenched & Tempered	300	32			
P	9	Low alloy steel		Quenched & Tempered	350	38			
P	10	High alloyed steel, and tool steel		Annealed	200	15			
P	11	High alloyed steel, and tool steel		Quenched & Tempered	325	35			
M	12	Stainless steel	Ferritic / Martensitic	Annealed	200	15	○ 12-35	○ 12-35	○ 20-50
M	13	Stainless steel	Martensitic	Quenched & Tempered	240	23			
M	14	Stainless steel	Austenitic		180	10			
K	15	Grey cast iron	Pearlitic / ferritic		180	10			
K	16	Grey cast iron	Pearlitic (Martensitic)		260	26			
K	17	Nodular cast iron	Ferritic		160	3	○ 12-45	○ 12-45	○ 25-55
K	18	Nodular cast iron	Pearlitic		250	25	○ 12-45	○ 12-45	○ 25-55
K	19	Malleable cast iron	Ferritic		130				
K	20	Malleable cast iron	Pearlitic		230	21			
N	21	Aluminum-wrought alloy	Not Curable		60		○ 50-65		○ 50-65
N	22	Aluminum-wrought alloy	Curable	Hardened	100		○ 50-65		○ 50-65
N	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75		○ 40-65		○ 45-90
N	24	Aluminum-cast, alloyed	≤ 12% Si, Curable	Hardened	90				
N	25	Aluminum-cast, alloyed	> 12% Si, Not Curable		130				
N	26	Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%		110		○ 50-60	○ 50-60	○ 65-100
N	27	Copper and Copper Alloys (Bronze / Brass)	CuZn, CuSnZn (Brass)		90		○ 30-65	○ 30-65	○ 30-65
N	28	Copper and Copper Alloys (Bronze / Brass)	CuSn, lead-free copper and electrolytic copper		100				
N	29	Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic						
N	30	Non Metallic Materials	Rubber, Wood, etc.						
S	31	Heat Resistant Super Alloys	Fe Based	Annealed	200	15			
S	32	Heat Resistant Super Alloys	Fe Based	Cured	280	30			
S	33	Heat Resistant Super Alloys	Ni or Co Based	Annealed	250	25			
S	34	Heat Resistant Super Alloys	Ni or Co Based	Cured	350	38			
S	35	Heat Resistant Super Alloys	Ni or Co Based	Cast	320	34			
S	36	Titanium Alloys	Pure Titanium		400 Rm				
S	37	Titanium Alloys	Alpha + Beta Alloys	Hardened	1050 Rm				
H	38	Hardened steel		Hardened	550	55			
H	39	Hardened steel		Hardened	630	60			
H	40	Chilled Cast Iron		Cast	400	42			
H	41	Hardened Cast Iron		Hardened	550	55			

HOLE TYPE	Max. 2.0xD Blind /Through Hole										
TOOL MATERIAL	HSS										
CHAMFER LEAD	9P/5P/2P			5P/2P				4P-5P			
FLUTE TYPE	Straight Flute			Straight Flute				Straight Flute			
SPIRAL FLUTE ANGLE	-			-		Left Hand	Left Hand	-			
M											
M/MF	T7315 (p.B239)	T6315 (p.B240)	T8315 (p.B241)		T7B15 (p.B243)		T7A15 (p.B245)				
UNC								T7616 (p.B246)	T6616 (p.B246)	T8616 (p.B246)	
UNC/UNF				T7326 (p.B242)		T7336 (p.B244)					
UNC/UNF/UNS											
UNC/UN8											
NPT											
NPTF											
NPS/NPSF											
SURFACE TREATMENT / COATING	Bright	Steam Oxide	TiN	Bright	Bright	Bright	Bright	Bright	Steam Oxide	TiN	
	Hand Tap							Pulley Tap			
MODEL											

ISO	VDI 3323	T7315	T6315	T8315	T7326	T7B15	T7336	T7A15	T7616	T6616	T8616
P	1	○ 25-50	○ 25-50	○ 50-80	○ 25-50	○ 25-50	○ 25-50	○ 25-50	◎ 25-50	◎ 25-50	◎ 50-80
P	2	○ 25-50	○ 25-50	○ 50-80	○ 25-50	○ 25-50	○ 25-50	○ 25-50	◎ 25-50	◎ 25-50	◎ 50-80
P	3	○ 25-50	○ 25-50	○ 50-80	○ 25-50	○ 25-50	○ 25-50	○ 25-50	◎ 25-50	◎ 25-50	◎ 50-80
P	4										
P	5										
P	6	○ 6-30	○ 6-30	○ 10-35	○ 6-30	○ 6-30	○ 6-30	○ 6-30	◎ 6-30	◎ 6-30	◎ 10-35
P	7										
P	8										
P	9										
P	10										
P	11										
M	12	○ 12-35	○ 12-35	○ 20-50	○ 12-35	○ 12-35	○ 12-35	○ 12-35	○ 12-35	○ 12-35	○ 20-50
M	13										
M	14										
K	15										
K	16										
K	17	○ 12-45	○ 12-45	○ 25-55	○ 12-45	○ 12-45	○ 12-45	○ 12-45	○ 12-45	○ 12-45	○ 25-55
K	18	○ 12-45	○ 12-45	○ 25-55	○ 12-45	○ 12-45	○ 12-45	○ 12-45	○ 12-45	○ 12-45	○ 25-55
K	19										
K	20										
N	21	○ 50-65		○ 50-65	○ 50-65	○ 50-65	○ 50-65	○ 50-65	○ 50-65		○ 50-65
N	22	○ 50-65		○ 50-65	○ 50-65	○ 50-65	○ 50-65	○ 50-65	○ 50-65		○ 50-65
N	23	○ 40-65		○ 45-90	○ 40-65	○ 40-65	○ 40-65	○ 40-65	○ 40-65		○ 45-90
N	24										
N	25										
N	26	○ 50-60	○ 50-60	○ 65-100	○ 50-60	○ 50-60	○ 50-60	○ 50-60	○ 50-60	○ 50-60	○ 65-100
N	27	○ 30-65	○ 30-65	○ 30-65	○ 30-65	○ 30-65	○ 30-65	○ 30-65	○ 30-65	○ 30-65	○ 30-65
N	28										
N	29										
N	30										
S	31										
S	32										
S	33										
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H	40										
H	41										

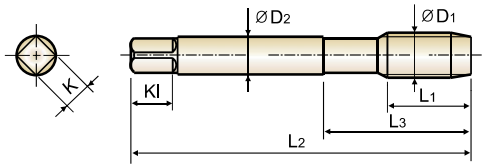
YG TAP GENERAL

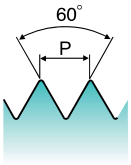
T8316 SERIES

Hand Tap
Taper, Plug & Bottoming Style

ANSI





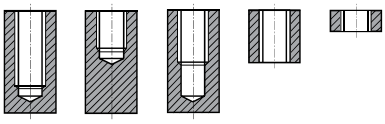


Material groups **GS**

HSS | UNC UNF UNS | USCTI 302 | 9P/5P/2P | TiN

p.B216

Thread Depth / Hole Type 2.0×D



Unit : Inch

Size D1	T.P.I	EDP No. TiN Taper	EDP No. TiN Plug	EDP No. TiN Bottoming	Limit	Overall Length L2	Thread Length L1	Neck Length L3	Shank Diameter D2	Square Size K	Square Length Kl	No. of Flute
#0	80UNF	-	T8316027	T8316028	H1	1.634	.315	.512	.141	.110	.190	2
#1	64UNC	-	T8316047	T8316048	H1	1.693	.374	.571	.141	.110	.190	2
#1	72UNF	-	T8316067	T8316068	H1	1.693	.374	.571	.141	.110	.190	2
#2	56UNC	-	T8316087	T8316088	H2	1.752	.433	.650	.141	.110	.190	3
#4	40UNC	-	T8316167	T8316168	H2	1.874	.563	.799	.141	.110	.190	3
#5	40UNC	-	T8316207	T8316208	H2	1.937	.626	.882	.141	.110	.190	3
#6	32UNC	-	T8316247	T8316248	H3	2.000	.689	.965	.141	.110	.190	3
#6	40UNF	-	T8316267	T8316268	H2	2.000	.689	.965	.141	.110	.190	3
#8	32UNC	-	T8316287	T8316288	H3	2.126	.752	1.047	.168	.131	.250	4
#8	36UNF	-	T8316307	T8316308	H2	2.126	.752	1.047	.168	.131	.250	4
#10	24UNC	-	T8316327	T8316328	H3	2.374	.906	1.220	.194	.152	.250	4
#10	32UNF	-	T8316347	T8316348	H3	2.374	.906	1.220	.194	.152	.250	4
#12	24UNC	-	T8316367	T8316368	H3	2.374	.906	1.220	.220	.165	.280	4
#12	28UNF	-	T8316387	T8316388	H3	2.374	.906	1.220	.220	.165	.280	4
1/4	20UNC	-	T8316407	T8316408	H3	2.500	1.000	1.354	.255	.191	.310	4
1/4	28UNF	-	T8316427	T8316428	H3	2.500	1.000	1.354	.255	.191	.310	4
5/16	18UNC	-	T8316447	T8316448	H3	2.720	1.126	1.500	.318	.238	.380	4
5/16	24UNF	-	T8316467	T8316468	H3	2.720	1.126	1.500	.318	.238	.380	4
3/8	16UNC	-	T8316487	T8316488	H3	2.937	1.252	1.646	.381	.286	.440	4
3/8	24UNF	-	T8316507	T8316508	H3	2.937	1.252	1.646	.381	.286	.440	4
7/16	14UNC	-	T8316527	T8316528	H3	3.157	1.437	-	.323	.242	.410	4
7/16	20UNF	-	T8316547	T8316548	H3	3.157	1.437	-	.323	.242	.410	4
1/2	13UNC	-	T8316567	T8316568	H3	3.374	1.657	-	.367	.275	.440	4
1/2	20UNF	-	T8316587	T8316588	H3	3.374	1.657	-	.367	.275	.440	4
9/16	12UNC	-	T8316607	T8316608	H3	3.594	1.657	-	.429	.322	.500	4
9/16	18UNF	-	T8316627	T8316628	H3	3.594	1.657	-	.429	.322	.500	4

▶ NEXT PAGE

◎ : Excellent ○ : Good

ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	○	○	○			○						○					○	○		

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended	○	○	○			○	○														

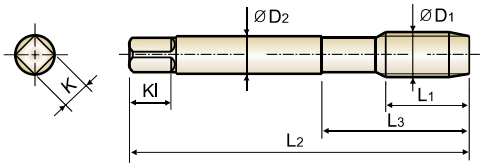
YG TAP GENERAL

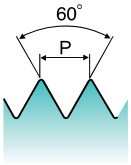
T8316 SERIES

Hand Tap
Taper, Plug & Bottoming Style

ANSI



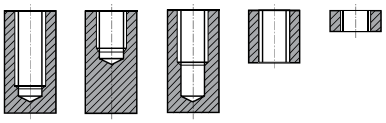




Material groups **GS** | HSS | UNC UNF UNS | USCTI 302 | 9P/5P/2P | TiN

p.B216

Thread Depth / Hole Type 2.0×D



Unit : Inch

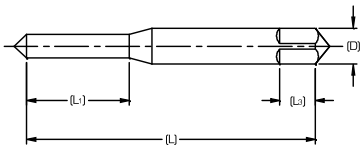
Size D1	T.P.I	EDP No. TiN Taper	EDP No. TiN Plug	EDP No. TiN Bottoming	Limit	Overall Length L2	Thread Length L1	Neck Length L3	Shank Diameter D2	Square Size K	Square Length Kl	No. of Flute
5/8	11UNC	-	T8316647	T8316648	H3	3.811	1.811	-	.480	.360	.560	4
5/8	18UNF	-	T8316667	T8316668	H3	3.811	1.811	-	.480	.360	.560	4
3/4	10UNC	-	T8316707	T8316708	H3	4.252	2.000	-	.590	.442	.690	4
3/4	16UNF	-	T8316727	T8316728	H3	4.252	2.000	-	.590	.442	.690	4
7/8	9UNC	-	T8316747	T8316748	H4	4.689	2.220	-	.697	.523	.750	4
7/8	14UNF	-	T8316767	T8316768	H4	4.689	2.220	-	.697	.523	.750	4
1	8UNC	-	T8316787	T8316788	H4	5.126	2.500	-	.800	.600	.810	4
1	12UNF	-	T8316807	T8316808	H4	5.126	2.500	-	.800	.600	.810	4
1	14UNS	-	T8316817	T8316818	H4	5.126	2.500	-	.800	.600	.810	4
1-1/8	7UNC	-	T8316827	T8316828	H4	5.437	2.563	-	.896	.672	.880	4
1-1/8	12UNF	-	T8316847	T8316848	H4	5.437	2.563	-	.896	.672	.880	4
1-1/4	7UNC	-	T8316867	T8316868	H4	5.752	2.563	-	1.021	.766	1.000	4
1-1/4	12UNF	-	T8316887	T8316888	H4	5.752	2.563	-	1.021	.766	1.000	6
1-3/8	6UNC	-	T8316907	T8316908	H4	6.063	3.000	-	1.108	.831	1.060	4
1-3/8	12UNF	-	T8316927	T8316928	H4	6.063	3.000	-	1.108	.831	1.060	6
1-1/2	6UNC	-	T8316947	T8316948	H4	6.374	3.000	-	1.233	.925	1.130	4
1-1/2	12UNF	-	T8316967	T8316968	H4	6.374	3.000	-	1.233	.925	1.130	6

◎ : Excellent ○ : Good

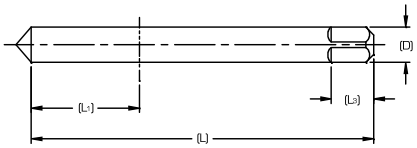
ISO	P											M			K					
Material Description	Non-alloy steel					Low alloy steel				High alloyed steel, and tool steel		Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc		13	25	28	32	10	29	32	38	15	35	15	23	10	10	26	3	25		21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	○	○	○			○						○					○	○		

ISO	N										S							H			
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel		Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended	○	○	○			○	○														

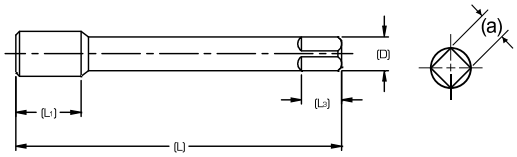
YG-1 USCTI 302 TAP BLANK DIMENSION



Blank Design (1)



Blank Design (2)



Blank Design (3)

Unified Tap Blank

Nominal Size	Overall Length (L)	Thread Length (L_1)	Shank Diameter (D)	Square Length (L_3)	Square Size (a)	Blank Design No.
#0	1.63	.31	.141	.19	.110	1
#1	1.69	.38	.141	.19	.110	1
#2	1.75	.44	.141	.19	.110	1
#3	1.81	.50	.141	.19	.110	1
#4	1.88	.56	.141	.19	.110	1
#5	1.94	.63	.141	.19	.110	1
#6	2.00	.69	.141	.19	.110	1
#8	2.13	.75	.168	.25	.131	1
#10	2.38	.88	.194	.25	.152	1
#12	2.38	.94	.220	.28	.165	1
1/4	2.50	1.00	.255	.31	.191	2
5/16	2.72	1.13	.318	.38	.238	2
3/8	2.94	1.25	.381	.44	.286	2
7/16	3.16	1.44	.323	.41	.242	3
1/2	3.38	1.66	.367	.44	.275	3
9/16	3.59	1.66	.429	.50	.322	3
5/8	3.81	1.81	.480	.56	.360	3
11/16	4.03	1.81	.542	.63	.406	3
3/4	4.25	2.00	.590	.69	.442	3
13/16	4.47	2.00	.652	.69	.489	3
7/8	4.69	2.22	.697	.75	.523	3
15/16	4.91	2.22	.760	.75	.570	3
1	5.13	2.50	.800	.81	.600	3
1-1/8	5.44	2.56	.896	.88	.672	3
1-1/4	5.75	2.56	1.021	1.00	.766	3
1-3/8	6.06	3.00	1.108	1.06	.831	3
1-1/2	6.38	3.00	1.233	1.13	.925	3

Metric Tap Blank

Nominal Size	Overall Length (L)	Thread Length (L_1)	Shank Diameter (D)	Square Length (L_3)	Square Size (a)	Blank Design No.
M1.6	1.63	.310	.141	.19	.110	1
M1.8	1.69	.380	.141	.19	.110	1
M2	1.75	.440	.141	.19	.110	1
M2.5	1.81	.500	.141	.19	.110	1
M3	1.94	.630	.141	.19	.110	1
M3.5	2.00	.690	.141	.19	.110	1
M4	2.13	.750	.168	.25	.131	1
M4.5	2.38	.880	.194	.25	.152	1
M5	2.38	.880	.194	.25	.152	1
M6	2.50	1.00	.255	.31	.191	2
M7	2.72	1.13	.318	.38	.238	2
M8	2.72	1.13	.318	.38	.238	2
M10	2.94	1.25	.381	.44	.286	2
M12	3.38	1.66	.367	.44	.275	3
M14	3.59	1.66	.429	.50	.322	3
M16	3.81	1.81	.480	.56	.360	3
M18	4.03	1.81	.542	.63	.406	3
M20	4.47	2.00	.652	.69	.489	3
M22	4.69	2.22	.697	.75	.523	3
M24	4.91	2.22	.760	.75	.570	3
M30	5.44	2.56	1.021	1.00	.766	3
M33	5.75	2.56	1.108	1.06	.831	3
M36	6.06	3.00	1.233	1.13	.925	3

TECHNICAL DATA

TAP RECOMMENDATIONS FOR CLASSES OF THREAD - INCH

Internal Screw Thread Classes and Tap Recommendations

Size	Threads per Inch		Recommended Tap for Class of Thread				Pitch Diameter Limits for Class of Thread				
			Unified Class of Thread		American National Class of Thread		Min. All Class (Basic)	Unified Class of Thread		American National Class of Thread	
	UNC	UNF	Class 2	Class 3	Class 2B	Class 3B		Max. Class 2	Max. Class 3	Max. Class 2B	Max. Class 3B
#0	–	80	GH1	GH1	GH2	GH1	.0519	.0536	.0532	.0542	.0536
#1	64	–	GH1	GH1	GH2	GH1	.0629	.0648	.0643	.0655	.0648
#1	–	72	GH1	GH1	GH2	GH1	.0640	.0658	.0653	.0665	.0659
#2	56	–	GH1	GH1	GH2	GH1	.0744	.0764	.0759	.0772	.0765
#2	–	64	GH1	GH1	GH2	GH1	.0759	.0778	.0773	.0786	.0779
#3	48	–	GH1	GH1	GH2	GH1	.0855	.0877	.0871	.0885	.0877
#3	–	56	GH1	GH1	GH2	GH1	.0874	.0894	.8890	.0902	.0895
#4	40	–	GH2	GH1	GH2	GH2	.0958	.0982	.0975	.0991	.0982
#4	–	48	GH1	GH1	GH2	GH1	.0985	.1007	.1001	.1016	.1008
#5	40	–	GH2	GH1	GH2	GH2	.1088	.1112	.1105	.1121	.1113
#5	–	44	GH1	GH1	GH2	GH1	.1102	.1125	.1118	.1134	.1126
#6	32	–	GH2	GH1	GH3	GH2	.1177	.1204	.1196	.1214	.1204
#6	–	40	GH2	GH1	GH2	GH2	.1218	.1242	.1235	.1252	.1243
#8	32	–	GH2	GH1	GH3	GH2	.1437	.1464	.1456	.1475	.1465
#8	–	36	GH2	GH1	GH2	GH2	.1460	.1485	.1478	.1496	.1487
#10	24	–	GH3	GH1	GH3	GH3	.1629	.1662	.1653	.1672	.1661
#10	–	32	GH2	GH1	GH3	GH2	.1697	.1724	.1716	.1736	.1726
#12	24	–	GH3	GH1	GH3	GH3	.1889	.1922	.1913	.1933	.1922
#12	–	28	GH3	GH1	GH3	GH3	.1928	.1959	.1950	.1970	.1959
1/4	20	–	GH3	GH2	GH5	GH3	.2175	.2211	.2201	.2223	.2211
1/4	–	28	GH3	GH1	GH4	GH3	.2268	.2299	.2290	.2311	.2300
5/16	18	–	GH3	GH2	GH5	GH3	.2764	.2805	.2794	.2817	.2803
5/16	—	24	GH3	GH1	GH4	GH3	.2854	.2887	.2878	.2902	.2890
3/8	16	–	GH3	GH2	GH5	GH3	.3344	.3389	.3376	.3401	.3387
3/8	–	24	GH3	GH1	GH4	GH3	.3479	.3512	.3503	.3528	.3516
7/16	14	–	GH5	GH3	GH5	GH3	.3911	.3960	.3947	.3972	.3957
7/16	–	20	GH3	GH1	GH5	GH3	.4050	.4086	.4076	.4104	.4091
1/2	13	–	GH5	GH3	GH5	GH3	.4500	.4552	.4537	.4565	.4548
1/2	–	20	GH3	GH1	GH5	GH3	.4675	.4711	.4701	.4731	.4717
9/16	12	–	GH5	GH3	GH5	GH3	.5084	.5140	.5124	.5152	.5135
9/16	–	18	GH3	GH2	GH5	GH3	.5264	.5305	.5294	.5323	.5308
5/8	11	–	GH5	GH3	GH5	GH3	.5660	.5719	.5702	.5732	.5714
5/8	–	18	GH3	GH2	GH5	GH3	.5889	.5930	.5919	.5949	.5934
3/4	10	–	GH5	GH3	GH5	GH3	.6850	.6914	.6895	.6927	.6907
3/4	–	16	GH3	GH2	GH5	GH3	.7094	.7139	.7126	.7159	.7143
7/8	9	–	GH6	GH4	GH6	GH4	.8028	.8098	.8077	.8110	.8089
7/8	–	14	GH4	GH2	GH6	GH4	.8286	.8335	.8322	.8356	.8339
1	8	–	GH6	GH4	GH6	GH4	.9188	.9264	.9242	.9276	.9254
1	–	12	GH4	GH2	GH6	GH4	.9459	.9515	.9499	.9535	.9516

The above recommended taps normally produce the Class of Thread indicated in average materials when used with reasonable care. However, if the tap specified does not give a satisfactory gage fit in the work, a choice of some other limit tap will be necessary.

TAP DRILL SIZES - UNIFIED THREAD

Size	Threads Per Inch				Minor Diameter			Tap Drill Diameter (Cutting Tap)				
	UNC	UNF	UNEF	UN	Min. 2B&3B	Max. 2B	Max. 3B	80% Thread	75% Thread	70% Thread	65% Thread	60% Thread
#0	-	80	-	-	.0465	.0514	.0514	.0470	.0478	.0486	.0494	.0503
#1	64	-	-	-	.0561	.0623	.0623	.0568	.0578	.0588	.0598	.0608
	-	72	-	-	.0580	.0635	.0635	.0586	.0595	.0604	.0613	.0622
#2	56	-	-	-	.0667	.0737	.0737	.0674	.0686	.0698	.0709	.0721
	-	64	-	-	.0691	.0753	.0753	.0698	.0708	.0718	.0728	.0738
#3	48	-	-	-	.0764	.0845	.0845	.0774	.0787	.0801	.0814	.0828
	-	56	-	-	.0797	.0865	.0865	.0804	.0816	.0828	.0839	.0851
#4	40	-	-	-	.0849	.0939	.0939	.0860	.0876	.0893	.0909	.0925
	-	48	-	-	.0894	.0968	.0968	.0904	.0917	.0931	.0944	.0958
#5	40	-	-	-	.0979	.1062	.1062	.0990	.1006	.1023	.1039	.1055
	-	44	-	-	.1004	.1079	.1079	.1014	.1029	.1043	.1058	.1073
#6	32	-	-	-	.1040	.1140	.1140	.1055	.1076	.1096	.1116	.1136
	-	40	-	-	.1110	.1190	.1186	.1120	.1136	.1153	.1169	.1185
#8	32	-	-	-	.1300	.1390	.1389	.1315	.1336	.1356	.1376	.1396
	-	36	-	-	.1340	.1420	.1416	.1351	.1369	.1387	.1405	.1424
#10	24	-	-	-	.1450	.1560	.1555	.1467	.1494	.1521	.1548	.1575
	-	32	-	-	.1560	.1640	.1641	.1575	.1596	.1616	.1636	.1656
#12	24	-	-	-	.1710	.1810	.1807	.1727	.1754	.1781	.1808	.1835
	-	28	-	-	.1770	.1860	.1857	.1789	.1812	.1835	.1858	.1882
	-	-	32	-	.1820	.1900	.1895	.1835	.1856	.1876	.1896	.1916
1/4	20	-	-	-	.1960	.2070	.2067	.1980	.2013	.2045	.2078	.2110
	-	28	-	-	.2110	.2200	.2190	.2129	.2152	.2175	.2198	.2222
	-	-	32	-	.2160	.2240	.2229	.2175	.2196	.2216	.2236	.2256
5/16	18	-	-	-	.2520	.2650	.2630	.2548	.2584	.2620	.2656	.2692
	-	-	-	20	.2580	.2700	.2680	.2605	.2638	.2670	.2703	.2735
	-	24	-	-	.2670	.2770	.2754	.2692	.2719	.2746	.2773	.2800
	-	-	-	28	.2740	.2820	.2807	.2754	.2777	.2800	.2823	.2847
	-	-	32	-	.2790	.2860	.2847	.2800	.2821	.2841	.2861	.2881
3/8	16	-	-	-	.3070	.3210	.3182	.3101	.3141	.3182	.3222	.3263
	-	-	-	20	.3210	.3320	.3297	.3230	.3263	.3295	.3328	.3360
	-	24	-	-	.3300	.3400	.3372	.3317	.3344	.3371	.3398	.3425
	-	-	-	28	.3360	.3450	.3426	.3379	.3402	.3425	.3448	.3472
	-	-	32	-	.3410	.3490	.3469	.3425	.3446	.3466	.3486	.3506
7/16	14	-	-	-	.3600	.3760	.3717	.3633	.3679	.3726	.3772	.3818
	-	-	-	16	.3700	.3840	.3800	.3726	.3766	.3807	.3847	.3888
	-	20	-	-	.3830	.3950	.3916	.3855	.3888	.3920	.3953	.3985
	-	-	28	-	.3990	.4070	.4051	.4004	.4027	.4050	.4073	.4097
	-	-	-	32	.4040	.4110	.4094	.4050	.4071	.4091	.4111	.4131
1/2	13	-	-	-	.4170	.4340	.4284	.4201	.4251	.4301	.4351	.4400
	-	-	-	16	.4320	.4460	.4419	.4351	.4391	.4432	.4472	.4513
	-	20	-	-	.4460	.4570	.4537	.4480	.4513	.4545	.4578	.4610
	-	-	28	-	.4610	.4700	.4676	.4629	.4652	.4675	.4698	.4722
	-	-	-	32	.4660	.4740	.4719	.4675	.4696	.4716	.4736	.4756
9/16	12	-	-	-	.4720	.4900	.4843	.4759	.4813	.4867	.4921	.4976
	-	-	-	16	.4950	.5090	.5040	.4976	.5016	.5057	.5097	.5138
	-	18	-	-	.5020	.5150	.5106	.5048	.5084	.5120	.5156	.5192
	-	-	-	20	.5080	.5200	.5162	.5105	.5138	.5170	.5203	.5235
	-	-	24	-	.5170	.5270	.5244	.5192	.5219	.5246	.5273	.5300
	-	-	-	28	.5240	.5320	.5301	.5254	.5277	.5300	.5323	.5347
	-	-	-	32	.5290	.5360	.5344	.5300	.5321	.5341	.5361	.5381
5/8	11	-	-	-	.5270	.5460	.5391	.5305	.5364	.5423	.5482	.5541

TECHNICAL DATA

Size	Threads Per Inch				Minor Diameter			Tap Drill Diameter (Cutting Tap)				
	UNC	UNF	UNEF	UN	Min. 2B&3B	Max. 2B	Max. 3B	80% Thread	75% Thread	70% Thread	65% Thread	60% Thread
5/8	-	-	-	12	.5350	.5530	.5463	.5384	.5438	.5492	.5546	.5601
	-	-	-	16	.5570	.5710	.5662	.5601	.5641	.5682	.5722	.5763
	-	18	-	-	.5650	.5780	.5730	.5673	.5709	.5745	.5781	.5817
	-	-	-	20	.5710	.5820	.5787	.5730	.5763	.5795	.5828	.5860
	-	-	24	-	.5800	.5900	.5869	.5817	.5844	.5871	.5898	.5925
	-	-	-	28	.5860	.5950	.5926	.5879	.5902	.5925	.5948	.5972
	-	-	-	32	.5910	.5980	.5969	.5925	.5946	.5966	.5986	.6006
11/16	-	-	-	12	.5970	.6150	.6085	.6009	.6063	.6117	.6171	.6226
	-	-	-	16	.6200	.6340	.6284	.6226	.6266	.6307	.6347	.6388
	-	-	-	20	.6330	.6450	.6412	.6355	.6388	.6420	.6453	.6485
	-	-	24	-	.6420	.6520	.6494	.6442	.6469	.6496	.6523	.6550
	-	-	-	28	.6490	.6570	.6551	.6504	.6527	.6550	.6573	.6597
	-	-	-	32	.6540	.6610	.6594	.6550	.6571	.6591	.6611	.6631
3/4	10	-	-	-	.6420	.6630	.6545	.6461	.6526	.6591	.6656	.6721
	-	-	-	12	.6600	.6780	.6707	.6634	.6688	.6742	.6796	.6851
	-	16	-	-	.6820	.6960	.6908	.6851	.6891	.6932	.6972	.7013
	-	-	20	-	.6960	.7070	.7037	.6980	.7013	.7045	.7078	.7110
	-	-	-	28	.7110	.7200	.7176	.7129	.7152	.7175	.7198	.7222
	-	-	-	32	.7160	.7240	.7219	.7175	.7196	.7216	.7236	.7256
13/16	-	-	-	12	.7220	.7400	.7329	.7259	.7313	.7367	.7421	.7476
	-	-	-	16	.7450	.7590	.7533	.7476	.7516	.7557	.7597	.7638
	-	-	20	-	.7580	.7700	.7662	.7605	.7638	.7670	.7703	.7735
	-	-	-	28	.7740	.7820	.7801	.7754	.7777	.7800	.7823	.7847
	-	-	-	32	.7790	.7860	.7844	.7800	.7821	.7841	.7861	.7881
7/8	9	-	-	-	.7550	.7780	.7681	.7595	.7668	.7740	.7812	.7884
	-	-	-	12	.7850	.8030	.7948	.7884	.7938	.7992	.8046	.8101
	-	14	-	-	.7980	.8140	.8068	.8008	.8054	.8101	.8147	.8193
	-	-	-	16	.8070	.8210	.8158	.8101	.8141	.8182	.8222	.8263
	-	-	20	-	.8210	.8320	.8287	.8230	.8263	.8295	.8328	.8360
	-	-	-	28	.8360	.8450	.8426	.8379	.8402	.8425	.8448	.8472
	-	-	-	32	.8410	.8490	.8469	.8425	.8446	.8466	.8486	.8506
15/16	-	-	-	12	.8470	.8650	.8575	.8509	.8563	.8617	.8671	.8726
	-	-	-	16	.8700	.8840	.8783	.8726	.8766	.8807	.8847	.8888
	-	-	20	-	.8830	.8950	.8912	.8855	.8888	.8920	.8953	.8985
	-	-	-	28	.8990	.9070	.9051	.9004	.9027	.9050	.9073	.9097
	-	-	-	32	.9040	.9110	.9094	.9050	.9071	.9091	.9111	.9131
1	8	-	-	-	.8650	.8900	.8797	.8701	.8782	.8863	.8945	.9026
	-	12	-	-	.9100	.9280	.9198	.9134	.9188	.9242	.9296	.9351
	-	-	-	16	.9320	.9460	.9408	.9351	.9391	.9432	.9472	.9513
	-	-	20	-	.9460	.9570	.9537	.9480	.9513	.9545	.9578	.9610
	-	-	-	28	.9610	.9700	.9676	.9629	.9652	.9675	.9698	.9722
	-	-	-	32	.9660	.9740	.9719	.9675	.9696	.9716	.9736	.9756
1-1/16	-	-	-	8	.9270	.9520	.9422	.9326	.9407	.9488	.9570	.9651
	-	-	-	12	.9720	.9900	.9823	.9759	.9813	.9867	.9921	.9976
	-	-	-	16	.9950	1.0090	1.0033	.9976	1.0016	1.0057	1.0097	1.0138
	-	-	18	-	1.0020	1.0150	1.0105	1.0048	1.0084	1.0120	1.0156	1.0192
	-	-	-	20	1.0080	1.0200	1.0162	1.0105	1.0138	1.0170	1.0203	1.0235
	-	-	-	28	1.0240	1.0320	1.0301	1.0254	1.0277	1.0300	1.0323	1.0347
1-1/8	7	-	-	-	.9700	.9980	.9875	.9765	.9858	.9951	1.0044	1.0137
	-	-	-	8	.9900	1.0150	1.0047	.9951	1.0032	1.0113	1.0195	1.0276
	-	12	-	-	1.0350	1.0530	1.0448	1.0384	1.0438	1.0492	1.0546	1.0601
	-	-	-	16	1.0570	1.0710	1.0658	1.0601	1.0641	1.0682	1.0722	1.0763
	-	-	18	-	1.0650	1.0780	1.0730	1.0673	1.0709	1.0745	1.0781	1.0817
	-	-	-	20	1.0710	1.0820	1.0787	1.0730	1.0763	1.0795	1.0828	1.0860

TECHNICAL DATA

Size	Threads Per Inch				Minor Diameter			Tap Drill Diameter (Cutting Tap)				
	UNC	UNF	UNEF	UN	Min. 2B&3B	Max. 2B	Max. 3B	80% Thread	75% Thread	70% Thread	65% Thread	60% Thread
1-1/8	-	-	-	28	1.0860	1.0950	1.0926	1.0879	1.0902	1.0925	1.0948	1.0972
1-3/16	-	-	-	8	1.0520	1.0770	1.0672	1.0576	1.0657	1.0738	1.0820	1.0901
	-	-	-	12	1.0970	1.1150	1.1073	1.1009	1.1063	1.1117	1.1171	1.1226
	-	-	-	16	1.1200	1.1340	1.1283	1.1226	1.1266	1.1307	1.1347	1.1388
	-	-	18	-	1.1270	1.1400	1.1355	1.1298	1.1334	1.1370	1.1406	1.1442
	-	-	-	20	1.1330	1.1450	1.1412	1.1355	1.1388	1.1420	1.1453	1.1485
	-	-	-	28	1.1490	1.1570	1.1551	1.1504	1.1527	1.1550	1.1573	1.1597
1-1/4	7	-	-	-	1.0950	1.1230	1.1125	1.1015	1.1108	1.1201	1.1294	1.1387
	-	-	-	8	1.1150	1.1400	1.1297	1.1201	1.1282	1.1363	1.1445	1.1526
	-	12	-	-	1.1600	1.1780	1.1698	1.1634	1.1688	1.1742	1.1796	1.1851
	-	-	-	16	1.1820	1.1960	1.1908	1.1851	1.1891	1.1932	1.1972	1.2013
	-	-	18	-	1.1900	1.2030	1.1980	1.1923	1.1959	1.1995	1.2031	1.2067
	-	-	-	20	1.1960	1.2070	1.2037	1.1980	1.2013	1.2045	1.2078	1.2110
	-	-	-	28	1.2110	1.2200	1.2176	1.2129	1.2152	1.2175	1.2198	1.2222
1-5/16	-	-	-	8	1.1770	1.2020	1.2176	1.1826	1.1907	1.1988	1.2070	1.2151
	-	-	-	12	1.2220	1.2400	1.2323	1.2259	1.2313	1.2367	1.2421	1.2476
	-	-	-	16	1.2450	1.2590	1.2533	1.2476	1.2516	1.2557	1.2597	1.2638
	-	-	18	-	1.2520	1.2650	1.2605	1.2548	1.2584	1.2620	1.2656	1.2692
	-	-	-	20	1.2580	1.2700	1.2662	1.2605	1.2638	1.2670	1.2703	1.2735
	-	-	-	28	1.2740	1.2820	1.2801	1.2754	1.2777	1.2800	1.2823	1.2847
1-3/8	6	-	-	-	1.1950	1.2250	1.2146	1.2018	1.2126	1.2235	1.2343	1.2451
	-	-	-	8	1.2400	1.2650	1.2547	1.2451	1.2532	1.2613	1.2695	1.2776
	-	12	-	-	1.2850	1.3030	1.2948	1.2884	1.2938	1.2992	1.3046	1.3101
	-	-	-	16	1.3070	1.3210	1.3158	1.3101	1.3141	1.3182	1.3222	1.3263
	-	-	18	-	1.3150	1.3280	1.3230	1.3173	1.3209	1.3245	1.3281	1.3317
	-	-	-	20	1.3210	1.3320	1.3287	1.3230	1.3263	1.3295	1.3328	1.3360
	-	-	-	28	1.3360	1.3450	1.3426	1.3379	1.3402	1.3425	1.3448	1.3472
1-7/16	-	-	-	6	1.2570	1.2880	1.2770	1.2643	1.2751	1.2860	1.2968	1.3076
	-	-	-	8	1.3020	1.3270	1.3172	1.3076	1.3157	1.3238	1.3320	1.3401
	-	-	-	12	1.3470	1.3650	1.3573	1.3509	1.3563	1.3617	1.3671	1.3726
	-	-	-	16	1.3700	1.3840	1.3783	1.3726	1.3766	1.3807	1.3847	1.3888
	-	-	18	-	1.3770	1.3900	1.3855	1.3798	1.3834	1.3870	1.3906	1.3942
	-	-	-	20	1.3830	1.3950	1.3912	1.3855	1.3888	1.3920	1.3953	1.3985
	-	-	-	28	1.3990	1.4070	1.4051	1.4004	1.4027	1.4050	1.4073	1.4097
1-1/2	6	-	-	-	1.3200	1.3500	1.3396	1.3268	1.3376	1.3485	1.3593	1.3701
	-	-	-	8	1.3650	1.3900	1.3797	1.3701	1.3782	1.3863	1.3945	1.4026
	-	12	-	-	1.4100	1.4280	1.4198	1.4134	1.4188	1.4242	1.4296	1.4351
	-	-	-	16	1.4320	1.4460	1.4408	1.4351	1.4391	1.4432	1.4472	1.4513
	-	-	18	-	1.4400	1.4520	1.4480	1.4423	1.4459	1.4495	1.4531	1.4567
	-	-	-	20	1.4460	1.4570	1.4537	1.4480	1.4513	1.4545	1.4578	1.4610
	-	-	-	28	1.4610	1.4700	1.4676	1.4629	1.4652	1.4675	1.4698	1.4722
1-9/16	-	-	-	6	1.3820	1.4130	1.4021	1.3893	1.4001	1.4110	1.4218	1.4326
	-	-	-	8	1.4270	1.4520	1.4422	1.4326	1.4407	1.4488	1.4570	1.4651
	-	-	-	12	1.4720	1.4900	1.4823	1.4759	1.4813	1.4867	1.4921	1.4976
	-	-	-	16	1.4950	1.5090	1.5033	1.4976	1.5016	1.5057	1.5097	1.5138
	-	-	18	-	1.5020	1.5150	1.5105	1.5048	1.5084	1.5120	1.5156	1.5192
	-	-	-	20	1.5080	1.5200	1.5162	1.5105	1.5138	1.5170	1.5203	1.5235
1-5/8	-	-	-	6	1.4450	1.4750	1.4646	1.4518	1.4626	1.4735	1.4843	1.4951
	-	-	-	8	1.4900	1.5150	1.5047	1.4951	1.5032	1.5113	1.5195	1.5276
	-	-	-	12	1.5350	1.5530	1.5448	1.5384	1.5438	1.5492	1.5546	1.5601
	-	-	-	16	1.5570	1.5710	1.5658	1.5601	1.5641	1.5682	1.5722	1.5763
	-	-	18	-	1.5650	1.5780	1.5730	1.5673	1.5709	1.5745	1.5781	1.5817
	-	-	-	20	1.5710	1.5820	1.5787	1.5730	1.5763	1.5795	1.5828	1.5860
1-11/16	-	-	-	6	1.5070	1.5380	1.5271	1.5143	1.5251	1.5360	1.5468	1.5576

TECHNICAL DATA

Size	Threads Per Inch				Minor Diameter			Tap Drill Diameter (Cutting Tap)				
	UNC	UNF	UNEF	UN	Min. 2B&3B	Max. 2B	Max. 3B	80% Thread	75% Thread	70% Thread	65% Thread	60% Thread
1-11/16	-	-	-	8	1.5520	1.5770	1.5672	1.5576	1.5657	1.5738	1.5820	1.5901
	-	-	-	12	1.5970	1.6150	1.6073	1.6009	1.6063	1.6117	1.6171	1.6226
	-	-	-	16	1.6200	1.6340	1.6283	1.6226	1.6266	1.6307	1.6347	1.6388
	-	-	18	-	1.6270	1.6400	1.6355	1.6298	1.6334	1.6370	1.6406	1.6442
	-	-	-	20	1.6330	1.6450	1.6412	1.6355	1.6388	1.6420	1.6453	1.6485
1-3/4	5	-	-	-	1.5340	1.5680	1.5575	1.5422	1.5552	1.5681	1.5811	1.5941
	-	-	-	6	1.5700	1.6000	1.5896	1.5768	1.5876	1.5985	1.6093	1.6201
	-	-	-	8	1.6150	1.6400	1.6297	1.6201	1.6282	1.6363	1.6445	1.6526
	-	-	-	12	1.6600	1.6780	1.6698	1.6634	1.6688	1.6742	1.6796	1.6851
	-	-	-	16	1.6820	1.6960	1.6908	1.6851	1.6891	1.6932	1.6972	1.7013
	-	-	-	20	1.6960	1.7070	1.7037	1.6980	1.7013	1.7045	1.7078	1.7110
1-13/16	-	-	-	6	1.6320	1.6630	1.6521	1.6393	1.6501	1.6610	1.6718	1.6826
	-	-	-	8	1.6770	1.7020	1.6922	1.6826	1.6907	1.6988	1.7070	1.7151
	-	-	-	12	1.7220	1.7400	1.7323	1.7259	1.7313	1.7367	1.7421	1.7476
	-	-	-	16	1.7450	1.7590	1.7533	1.7476	1.7516	1.7557	1.7597	1.7638
	-	-	-	20	1.7580	1.7700	1.7662	1.7605	1.7638	1.7670	1.7703	1.7735
1-7/8	-	-	-	6	1.6950	1.7250	1.7146	1.7018	1.7126	1.7235	1.7343	1.7451
	-	-	-	8	1.7400	1.7650	1.7547	1.7451	1.7532	1.7613	1.7695	1.7776
	-	-	-	12	1.7850	1.8030	1.7948	1.7884	1.7938	1.7992	1.8046	1.8101
	-	-	-	16	1.8070	1.8210	1.8158	1.8101	1.8141	1.8182	1.8222	1.8263
	-	-	-	20	1.8210	1.8320	1.8287	1.8230	1.8263	1.8295	1.8328	1.8360
1-15/16	-	-	-	6	1.7570	1.7880	1.7771	1.7643	1.7751	1.7860	1.7968	1.8076
	-	-	-	8	1.8020	1.8270	1.8172	1.8076	1.8157	1.8238	1.8320	1.8401
	-	-	-	12	1.8470	1.8650	1.8573	1.8509	1.8563	1.8617	1.8671	1.8726
	-	-	-	16	1.8700	1.8840	1.8783	1.8726	1.8766	1.8807	1.8847	1.8888
	-	-	-	20	1.8830	1.8950	1.8912	1.8855	1.8888	1.8920	1.8953	1.8985
2	4 1/2	-	-	-	1.7590	1.7950	1.7861	1.7691	1.7835	1.7979	1.8124	1.8268
	-	-	-	6	1.8200	1.8500	1.8396	1.8268	1.8376	1.8485	1.8593	1.8701
	-	-	-	8	1.8650	1.8900	1.8797	1.8701	1.8782	1.8863	1.8945	1.9026
	-	-	-	12	1.9100	1.9280	1.9198	1.9134	1.9188	1.9242	1.9296	1.9351
	-	-	-	16	1.9320	1.9460	1.9408	1.9351	1.9391	1.9432	1.9472	1.9513
	-	-	-	20	1.9460	1.9570	1.9537	1.9480	1.9513	1.9545	1.9578	1.9610
2-1/8	-	-	-	6	1.9450	1.9750	1.9646	1.9518	1.9626	1.9735	1.9843	1.9951
	-	-	-	8	1.9900	2.0150	2.0047	1.9951	2.0032	2.0113	2.0195	2.0276
	-	-	-	12	2.0350	2.0530	2.0448	2.0384	2.0438	2.0492	2.0546	2.0601
	-	-	-	16	2.0570	2.0710	2.0658	2.0601	2.0641	2.0682	2.0722	2.0763
	-	-	-	20	2.0710	2.0820	2.0787	2.0730	2.0763	2.0795	2.0828	2.0860
2-1/4	4 1/2	-	-	-	2.0090	2.0450	2.0361	2.0191	2.0335	2.0479	2.0624	2.0768
	-	-	-	6	2.0700	2.1000	2.0896	2.0768	2.0876	2.0985	2.1093	2.1201
	-	-	-	8	2.1150	2.1400	2.1297	2.1201	2.1282	2.1363	2.1445	2.1526
	-	-	-	12	2.1600	2.1780	2.1698	2.1634	2.1688	2.1742	2.1796	2.1851
	-	-	-	16	2.1820	2.1960	2.1908	2.1851	2.1891	2.1932	2.1972	2.2013
	-	-	-	20	2.1960	2.2070	2.2037	2.1980	2.2013	2.2045	2.2078	2.2110
2-3/8	-	-	-	6	2.1950	2.2260	2.2146	2.2018	2.2126	2.2235	2.2343	2.2451
	-	-	-	8	2.2400	2.2650	2.2547	2.2451	2.2532	2.2613	2.2695	2.2776
	-	-	-	12	2.2850	2.3030	2.2948	2.2884	2.2938	2.2992	2.3046	2.3101
	-	-	-	16	2.3070	2.3210	2.3158	2.3101	2.3141	2.3182	2.3222	2.3263
	-	-	-	20	2.3210	2.3320	2.3287	2.3230	2.3263	2.3295	2.3328	2.3360
2-1/2	4	-	-	-	2.2290	2.2670	2.2594	2.2402	2.2564	2.2727	2.2889	2.3052
	-	-	-	6	2.3200	2.3500	2.3396	2.3268	2.3376	2.3485	2.3593	2.3701
	-	-	-	8	2.3650	2.3900	2.3797	2.3701	2.3782	2.3863	2.3945	2.4026
	-	-	-	12	2.4100	2.4280	2.4198	2.4134	2.4188	2.4242	2.4296	2.4351
	-	-	-	16	2.4320	2.4460	2.4408	2.4351	2.4391	2.4432	2.4472	2.4513
	-	-	-	20	2.4460	2.4570	2.4537	2.4480	2.4513	2.4545	2.4578	2.4610