

**YU-SY20 AMERICA**

**BEST VALUE IN THE WORLD OF CUTTING TOOLS**



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**YG**  
**Synchro TAP**

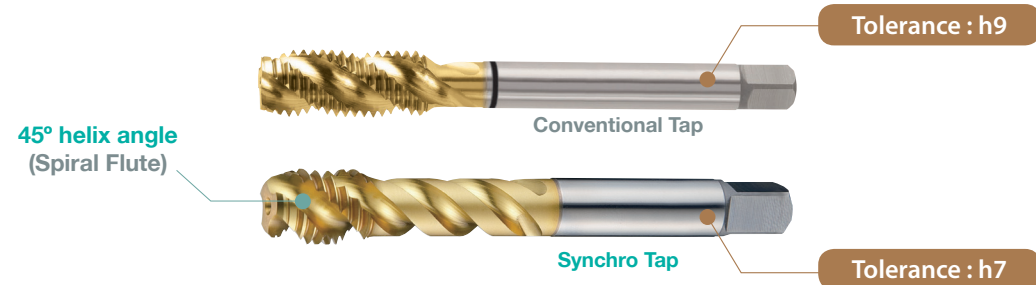
**TiN/TiCN-COATED**

**HSS-PM (Powder Metallurgy) TAPS**

High Speed Tapping with Rigid CNC Machines

## FEATURES OF GEOMETRY

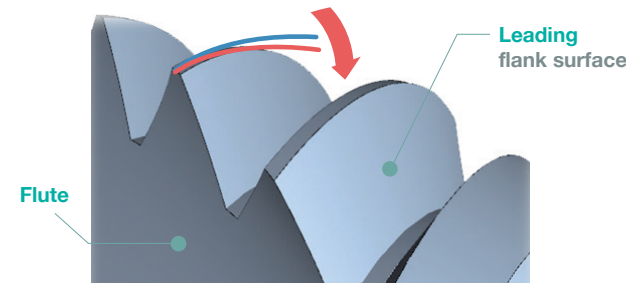
- ▶ **Shorter thread length** to reduce chip problems when tapping at higher spindle speeds



- ▶ **Tightened Shank Tolerance 'h7'** for precision clamping and rigid tapping

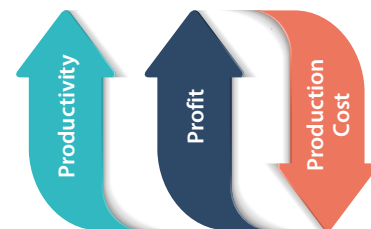
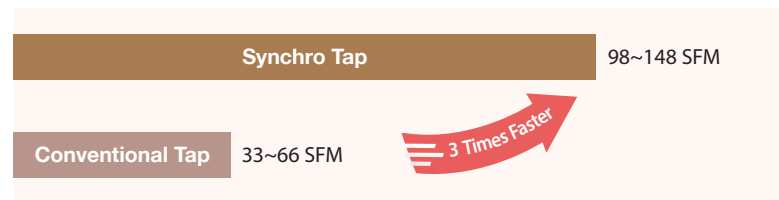
- ▶ **More thread relief** for high speed tapping

- ▶ **HSS-PM (Powder Metallurgy)** for improved wear resistance and longer tool life

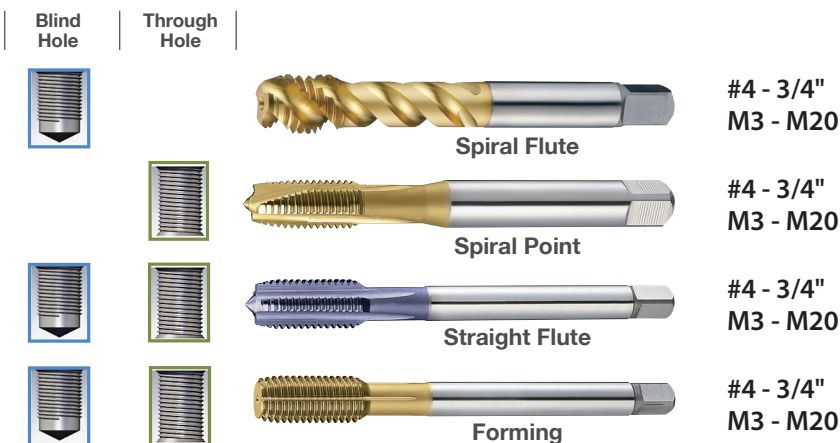


## ADVANTAGES

- ▶ **PRODUCTIVITY**  
Up to 3 times Faster compared to conventional taps



- ▶ **4 kinds of taps are available**



## SYNCHRO TAPPING CHUCK (ER TYPE)

See Page No. 20

- ▶ When using Synchro taps, YG-1 strongly recommends SYNCHRO Tapping Chuck for the best thread quality and superior tool life



### CAT(ASME B5.50)

- ▶ Feature :
  - To compensate for synchronization errors to extend tap life and to improve thread quality
  - To compensate for pitch tolerances of taps
  - For machine with synchronized spindle
- ▶ BT(JIS B6339/MAS-403), HSK(DIN 69893/ISO 12164-1) and K-STRAIGHT taper products are available

## GUIDE LINE TO ICONS

### Work Piece Material

**GS**  
Steels with good machinability  
Rm < 850N/mm<sup>2</sup>

**GG**  
Grey Cast Iron

**GV**  
Any material with at least 8~10% elongation

### Standard of Tools

**ANSI** **CAT**

### Pitch Limit

**H** **D**

### Chamfer Lead

**2P~3P** **4P~5P**

### Helix Angle

**R45°**

### Thread Angle

**60°**

### Taper Accuracy

**AT3**

### Tool Raw Material

**HSS PM**

### Surface Treatment

**TICN**  
Titanium Carbon Nitride Coating

**TiN**  
Titanium Nitride Coating

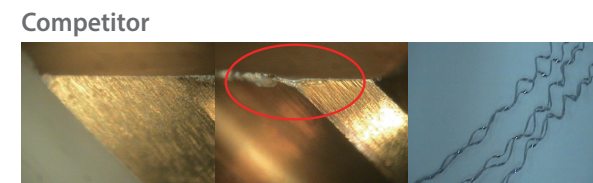
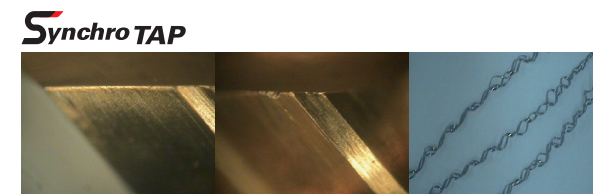
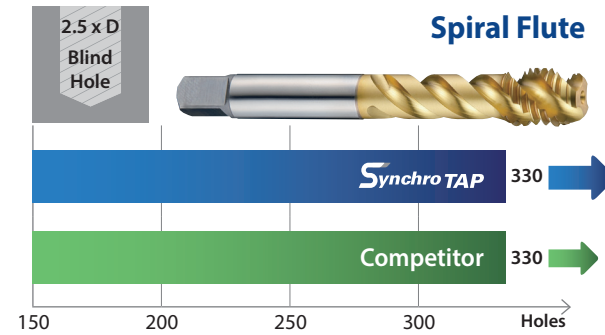
### Coolant System

**AD/B**

## CASE STUDY

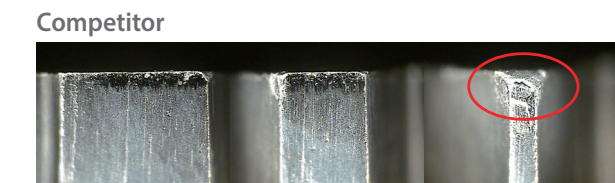
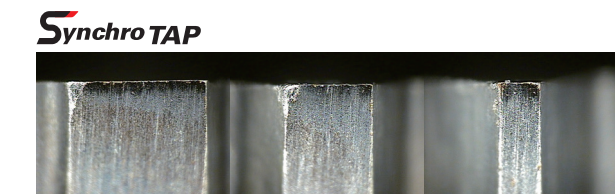
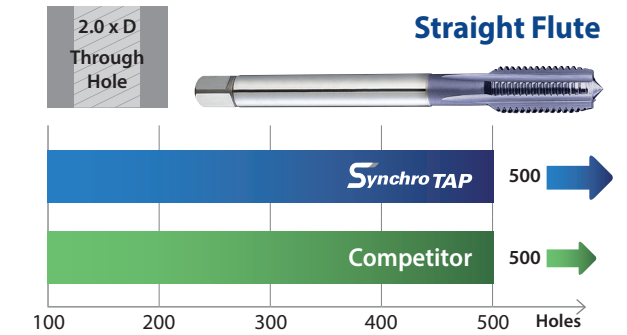
### ► SPIRAL FLUTE TAP M10 x 1.5

Tool	Synchro TAP Spiral Flute Tap	Competitor
Size	M10 x 1.5	
Work Material	C45 / 1045 / S45C Hardness : HRc20	
Cutting Speed	98.4 ft/min.	
RPM	955 rev./min.	
Tapping Depth	.9843" (2.5xD / Blind Hole)	
Tapping Holes	330	
Cooling Method	External Cooling Water Soluble (9% Emulsion)	
Machine	Machining Center	



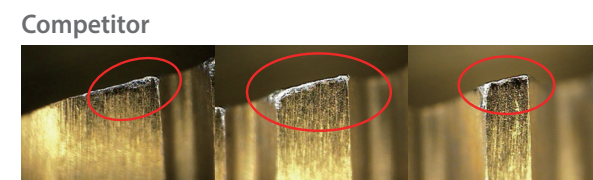
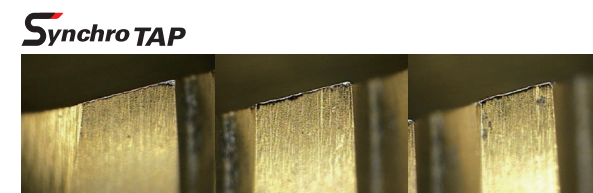
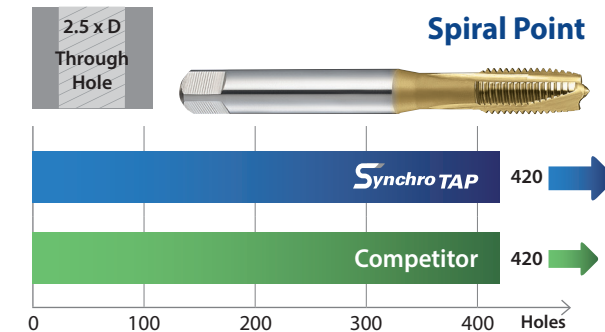
### ► STRAIGHT FLUTE TAP M10 x 1.5

Tool	Synchro TAP Straight Flute Tap	Competitor
Size	M10 x 1.5	
Work Material	4140 / 42CrMo4 / SCM440 Hardness : HRc20	
Cutting Speed	82.0 ft/min.	
RPM	1326 rev./min.	
Tapping Depth	.7874" (2.0xD / Through Hole)	
Tapping Holes	500	
Cooling Method	External Cooling Water Soluble (9% Emulsion)	
Machine	Machining Center	



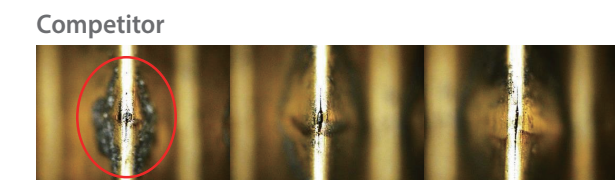
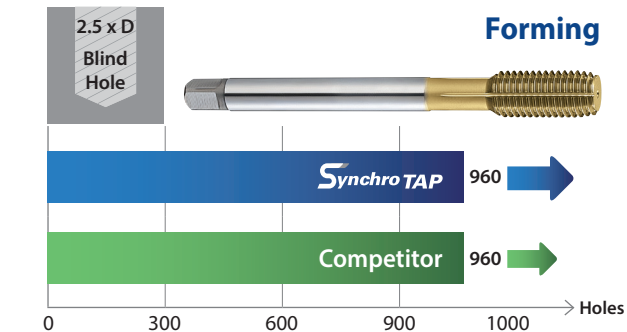
### ► SPIRAL POINT TAP M6 x 1.0

Tool	Synchro TAP Spiral Point Tap	Competitor
Size	M6 x 1.0	
Work Material	4140 / 42CrMo4 / SCM440 Hardness : HRc20	
Cutting Speed	98.4 ft/min.	
RPM	1592 rev./min.	
Tapping Depth	.5906" (2.5xD / Through Hole)	
Tapping Holes	420	
Cooling Method	External Cooling Water Soluble (9% Emulsion)	
Machine	Machining Center	



### ► SPIRAL POINT TAP M6 x 1.0

Tool	Synchro TAP Forming Tap	Competitor
Size	M6 x 1.0	
Work Material	1045 / C45 / S45C Hardness : HRc20	
Cutting Speed	114.8 ft/min.	
RPM	1857 rev./min.	
Tapping Depth	.5906" (2.5xD / Blind Hole)	
Tapping Holes	960	
Cooling Method	External Cooling Water Soluble (9% Emulsion)	
Machine	Machining Center	



# SELECTION GUIDE

## HSS-PM SYNCHRO TAPS

High Speed Tapping with Rigid CNC Machines



Please visit [globalyg1.com/mat](http://globalyg1.com/mat) for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : P.21

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

HOLE TYPE	Max. 2.5xD Blind Hole	
TOOL MATERIAL	HSS-PM	
CHAMFER LEAD ACC. TO DIN2197	2p-3p	
FLUTE TYPE	Spiral Flute	Spiral Flute
SPIRAL FLUTE ANGLE	R45	R45
SERIES	M	
	M/MF	TTS61 (P.10)
	UNC	
	UNC/UNF	TTS65 (P.8)
	UNC/UNF/UNS	
	UNC/UN8	
	NPT	
	NPTF	
NPS/NPSF		
SURFACE TREATMENT / COATING	TiN	TiN
MODEL		

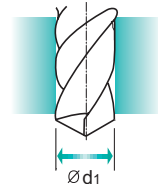
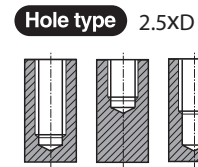
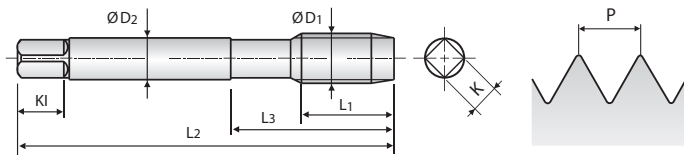
Max. 3.0xD Through Hole		Max. 2.0xD Blind / Through Hole		Max. 3.0xD Blind / Through Hole		SYNCHRO TAPPING CHUCK (ER TYPE)
4p-5p		2p-3p		2p-3p		
Spiral Point	Spiral Point	Straight Flute	Straight Flute	Forming	Forming	CAT (P.20)
-	-	-	-	-	-	
	TTS62 (P.13)		TKS63 (P.16)		TTS64 (P.19)	
TTS66 (P.11)		TKS67 (P.14)		TTS68 (P.17)		
TiN	TiN	TiCN	TiCN	TiN	TiN	

# UNC/UNF TiN-COATED HSS-PM SYNCHRO TAPS SPIRAL FLUTE for High Speed Tapping

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- ▶ Precision Threads
- ▶ Unsurpassed chip handling



Refer to P.24-37 for tap drill sizes

Material groups: **GS** (HSS PM), **UNC UNF**, **H** (60°), **R45°** (2P~3P), **TiN**

Unit : inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
#4 - 40 UNC	40	TTS65162	H2	.250	1.88	.563	.141	.110	.190	3
#4 - 48 UNF	48	TTS65181	H1	.209	1.88	.563	.141	.110	.190	3
#4 - 48 UNF	48	TTS65182	H2	.209	1.88	.563	.141	.110	.190	3
#5 - 40 UNC	40	TTS65202	H2	.250	1.94	.626	.141	.110	.190	3
#5 - 44 UNF	44	TTS65221	H1	.227	1.94	.626	.141	.110	.190	3
#5 - 44 UNF	44	TTS65222	H2	.227	1.94	.626	.141	.110	.190	3
#6 - 32 UNC	32	TTS65242	H2	.313	2.00	.689	.141	.110	.190	3
#6 - 32 UNC	32	TTS65243	H3	.313	2.00	.689	.141	.110	.190	3
#6 - 40 UNF	40	TTS65262	H2	.250	2.00	.689	.141	.110	.190	3
#8 - 32 UNC	32	TTS65282	H2	.313	2.13	.752	.168	.131	.250	3
#8 - 32 UNC	32	TTS65283	H3	.313	2.13	.752	.168	.131	.250	3
#8 - 36 UNF	36	TTS65302	H2	.278	2.13	.752	.168	.131	.250	3
#10 - 24 UNC	24	TTS65323	H3	.417	2.38	.906	.194	.152	.250	3
#10 - 32 UNF	32	TTS65342	H2	.313	2.38	.906	.194	.152	.250	3
#10 - 32 UNF	32	TTS65343	H3	.313	2.38	.906	.194	.152	.250	3
#12 - 24 UNC	24	TTS65363	H3	.417	2.38	.906	.220	.165	.280	3
#12 - 28 UNF	28	TTS65383	H3	.357	2.38	.906	.220	.165	.280	3
1/4 - 20 UNC	20	TTS65403	H3	.500	2.50	1.000	.255	.191	.310	3
1/4 - 20 UNC	20	TTS65405	H5	.500	2.50	1.000	.255	.191	.310	3
1/4 - 28 UNF	28	TTS65423	H3	.357	2.50	1.000	.255	.191	.310	3
1/4 - 28 UNF	28	TTS65424	H4	.357	2.50	1.000	.255	.191	.310	3
5/16 - 18 UNC	18	TTS65443	H3	.556	2.72	1.126	.318	.238	.380	3
5/16 - 18 UNC	18	TTS65445	H5	.556	2.72	1.126	.318	.238	.380	3
5/16 - 24 UNF	24	TTS65463	H3	.417	2.72	1.126	.318	.238	.380	3

▶ 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	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	

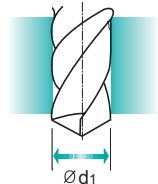
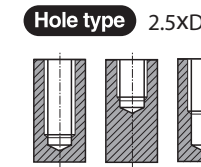
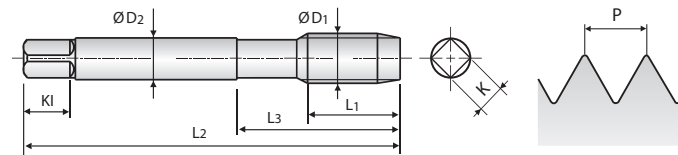
ISO	N						S					H									
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed		Copper and Copper Alloys (Bronze / Brass)		Non Metallic Materials				Heat Resistant Super Alloys		Titanium Alloys	Hardened steel	Chilled Cast Iron	Hardened Cast Iron					
VDI 3323	21	22	23	24	25	26	27	28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

# UNC/UNF TiN-COATED HSS-PM SYNCHRO TAPS SPIRAL FLUTE for High Speed Tapping

## TTS65 SERIES



- ▶ 2-3 times faster when tapping the GS material group
- ▶ Precision Threads
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Refer to P.24-37 for tap drill sizes

Material groups: **GS** (HSS PM), **UNC UNF**, **H** (60°), **R45°** (2P~3P), **TiN**

Unit : inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
5/16 - 24 UNF	24	TTS65464	H4	.417	2.72	1.126	.318	.238	.380	3
3/8 - 16 UNC	16	TTS65483	H3	.625	2.94	1.252	.381	.286	.440	3
3/8 - 16 UNC	16	TTS65485	H5	.625	2.94	1.252	.381	.286	.440	3
3/8 - 24 UNF	24	TTS65503	H3	.417	2.94	1.252	.381	.286	.440	3
3/8 - 24 UNF	24	TTS65504	H4	.417	2.94	1.252	.381	.286	.440	3
7/16 - 14 UNC	14	TTS65523	H3	.714	3.16	1.850	.323	.242	.410	3
7/16 - 14 UNC	14	TTS65525	H5	.714	3.16	1.850	.323	.242	.410	3
7/16 - 20 UNF	20	TTS65543	H3	.500	3.16	1.850	.323	.242	.410	3
7/16 - 20 UNF	20	TTS65545	H5	.500	3.16	1.850	.323	.242	.410	3
1/2 - 13 UNC	13	TTS65563	H3	.769	3.38	2.067	.367	.275	.440	3
1/2 - 13 UNC	13	TTS65565	H5	.769	3.38	2.067	.367	.275	.440	3
1/2 - 20 UNF	20	TTS65583	H3	.500	3.38	2.067	.367	.275	.440	3
1/2 - 20 UNF	20	TTS65585	H5	.500	3.38	2.067	.367	.275	.440	3
9/16 - 12 UNC	12	TTS65603	H3	.833	3.59	2.067	.429	.322	.500	3
9/16 - 12 UNC	12	TTS65605	H5	.833	3.59	2.067	.429	.322	.500	3
9/16 - 18 UNF	18	TTS65623	H3	.556	3.59	2.067	.429	.322	.500	3
9/16 - 18 UNF	18	TTS65625	H5	.556	3.59	2.067	.429	.322	.500	3
5/8 - 11 UNC	11	TTS65643	H3	.909	3.81	2.205	.480	.360	.560	3
5/8 - 11 UNC	11	TTS65645	H5	.909	3.81	2.205	.480	.360	.560	3
5/8 - 18 UNF	18	TTS65663	H3	.556	3.81	2.205	.480	.360	.560	3
5/8 - 18 UNF	18	TTS65665	H5	.556	3.81	2.205	.480	.360	.560	3
3/4 - 10 UNC	10	TTS65705	H5	1.000	4.25	2.480	.590	.442	.690	4
3/4 - 16 UNF	16	TTS65723	H3	.625	4.25	2.480	.590	.442	.690	4
3/4 - 16 UNF	16	TTS65725	H5	.625	4.25	2.480	.590	.442	.690	4

◎ : 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	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	

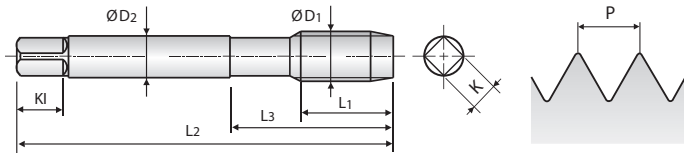
ISO	N						S					H									
Material Description	Aluminum-wrought alloy		Aluminum-cast, alloyed		Copper and Copper Alloys (Bronze / Brass)		Non Metallic Materials				Heat Resistant Super Alloys		Titanium Alloys	Hardened steel	Chilled Cast Iron	Hardened Cast Iron					
VDI 3323	21	22	23	24	25	26	27	28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

# M/MF TiN-COATED HSS-PM SYNCHRO TAPS SPIRAL FLUTE for High Speed Tapping

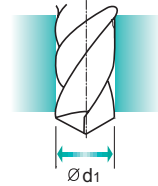
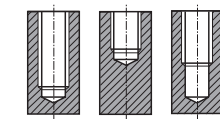
**TTS61 SERIES**



- ▶ 2-3 times faster when tapping the GS material group
- ▶ Precision Threads
- ▶ Unsurpassed chip handling



Hole type 2.5XD



Refer to P.24-37 for tap drill sizes

Material groups: **GS** (HSS PM, M MF, D, 60°, R45°, 2P~3P, TiN)

Unit : inch

Size	Pitch	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	K1	Z
M3	x 0.5	<b>TTS61203</b>	D3	.197	1.94	.646	.141	.110	.190	3
M4	x 0.7	<b>TTS61244</b>	D4	.276	2.13	.768	.168	.131	.250	3
M5	x 0.8	<b>TTS61284</b>	D4	.315	2.38	.933	.194	.152	.250	3
M6	x 1.0	<b>TTS61315</b>	D5	.394	2.50	1.000	.255	.191	.310	3
M8	x 1.25	<b>TTS61365</b>	D5	.512	2.72	1.126	.318	.238	.380	3
M8	x 1.0	<b>TTS61375</b>	D5	.394	2.72	1.126	.318	.238	.380	3
M10	x 1.5	<b>TTS61426</b>	D6	.591	2.94	1.252	.381	.286	.440	3
M10	x 1.25	<b>TTS61435</b>	D5	.512	2.94	1.252	.381	.286	.440	3
M12	x 1.75	<b>TTS61506</b>	D6	.709	3.38	2.067	.367	.275	.440	3
M12	x 1.25	<b>TTS61525</b>	D5	.512	3.38	2.067	.367	.275	.440	3
M14	x 2.0	<b>TTS61547</b>	D7	.787	3.59	2.067	.429	.322	.500	3
M14	x 1.5	<b>TTS61556</b>	D6	.591	3.59	2.067	.429	.322	.500	3
M16	x 2.0	<b>TTS61607</b>	D7	.787	3.81	2.205	.480	.360	.560	3
M16	x 1.5	<b>TTS61616</b>	D6	.591	3.81	2.205	.480	.360	.560	3
M18	x 2.5	<b>TTS61657</b>	D7	.984	4.03	2.205	.542	.406	.630	4
M18	x 1.5	<b>TTS61676</b>	D6	.591	4.03	2.205	.542	.406	.630	4
M20	x 2.5	<b>TTS61707</b>	D7	.984	4.47	2.480	.652	.489	.690	4
M20	x 1.5	<b>TTS61726</b>	D6	.591	4.47	2.480	.652	.489	.690	4

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	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	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	

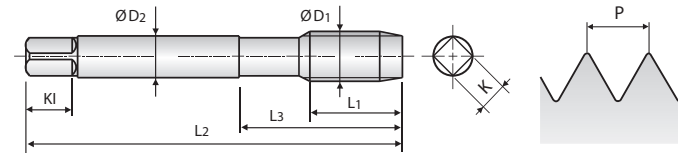
ISO Material Description	N										S						H				
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron		
VDI 3323	21	22	23	24	25	26	27	28	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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

# UNC/UNF TiN-COATED HSS-PM SYNCHRO TAPS SPIRAL POINT for High Speed Tapping

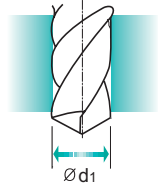
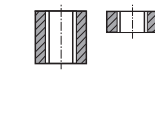
**TTS66 SERIES**



- ▶ 2-3 times faster when tapping the GS material group
- ▶ Precision Threads
- ▶ Unsurpassed chip handling



Hole type 3.0XD



Refer to P.24-37 for tap drill sizes

Material groups: **GS** (HSS PM, UNC UNF, H, 60°, 4P~5P, TiN)

Unit : inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	K1	Z
#4 - 40 UNC		<b>TTS66162</b>	H2	.250	1.88	.563	.141	.110	.190	3
#4 - 48 UNF		<b>TTS66181</b>	H1	.209	1.88	.563	.141	.110	.190	3
#4 - 48 UNF		<b>TTS66182</b>	H2	.209	1.88	.563	.141	.110	.190	3
#5 - 40 UNC		<b>TTS66202</b>	H2	.250	1.94	.626	.141	.110	.190	3
#5 - 44 UNF		<b>TTS66221</b>	H1	.227	1.94	.626	.141	.110	.190	3
#5 - 44 UNF		<b>TTS66222</b>	H2	.227	1.94	.626	.141	.110	.190	3
#6 - 32 UNC		<b>TTS66242</b>	H2	.313	2.00	.689	.141	.110	.190	3
#6 - 32 UNC		<b>TTS66243</b>	H3	.313	2.00	.689	.141	.110	.190	3
#6 - 40 UNF		<b>TTS66262</b>	H2	.250	2.00	.689	.141	.110	.190	3
#8 - 32 UNC		<b>TTS66282</b>	H2	.313	2.13	.752	.168	.131	.250	3
#8 - 32 UNC		<b>TTS66283</b>	H3	.313	2.13	.752	.168	.131	.250	3
#8 - 36 UNF		<b>TTS66302</b>	H2	.278	2.13	.752	.168	.131	.250	3
#10 - 24 UNC		<b>TTS66323</b>	H3	.417	2.38	.906	.194	.152	.250	3
#10 - 32 UNF		<b>TTS66342</b>	H2	.313	2.38	.906	.194	.152	.250	3
#10 - 32 UNF		<b>TTS66343</b>	H3	.313	2.38	.906	.194	.152	.250	3
#12 - 24 UNC		<b>TTS66363</b>	H3	.417	2.38	.906	.220	.165	.280	3
#12 - 28 UNF		<b>TTS66383</b>	H3	.357	2.38	.906	.220	.165	.280	3
1/4 - 20 UNC		<b>TTS66403</b>	H3	.500	2.50	1.000	.255	.191	.310	3
1/4 - 20 UNC		<b>TTS66405</b>	H5	.500	2.50	1.000	.255	.191	.310	3
1/4 - 28 UNF		<b>TTS66423</b>	H3	.357	2.50	1.000	.255	.191	.310	3
1/4 - 28 UNF		<b>TTS66424</b>	H4	.357	2.50	1.000	.255	.191	.310	3
5/16 - 18 UNC		<b>TTS66443</b>	H3	.556	2.72	1.126	.318	.238	.380	3
5/16 - 18 UNC		<b>TTS66445</b>	H5	.556	2.72	1.126	.318	.238	.380	3
5/16 - 24 UNF		<b>TTS66463</b>	H3	.417	2.72	1.126	.318	.238	.380	3

▶ NEXT PAGE

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	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	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	

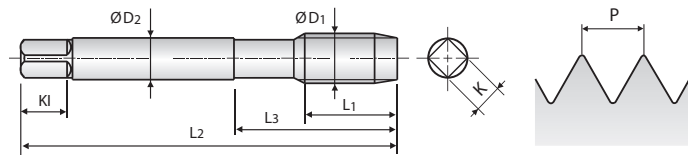
ISO Material Description	N										S						H				
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron		
VDI 3323	21	22	23	24	25	26	27	28	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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

# UNC/UNF TiN-COATED HSS-PM SYNCHRO TAPS SPIRAL POINT for High Speed Tapping

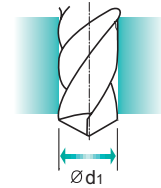
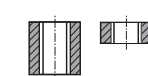
**TTS66 SERIES**



- ▶ 2-3 times faster when tapping the GS material group
- ▶ Precision Threads
- ▶ Unsurpassed chip handling



**Hole type** 3.0XD



Refer to P.24-37 for tap drill sizes

Material groups: **GS** **HSS PM** **UNC UNF** **H** **60°** **4P~5P** **TiN**

Unit : inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	K1	Z
5/16 - 24	UNF	<b>TTS66464</b>	H4	.417	2.72	1.126	.318	.238	.380	3
3/8 - 16	UNC	<b>TTS66483</b>	H3	.625	2.94	1.252	.381	.286	.440	3
3/8 - 16	UNC	<b>TTS66485</b>	H5	.625	2.94	1.252	.381	.286	.440	3
3/8 - 24	UNF	<b>TTS66503</b>	H3	.417	2.94	1.252	.381	.286	.440	3
3/8 - 24	UNF	<b>TTS66504</b>	H4	.417	2.94	1.252	.381	.286	.440	3
7/16 - 14	UNC	<b>TTS66523</b>	H3	.714	3.16	1.850	.323	.242	.410	4
7/16 - 14	UNC	<b>TTS66525</b>	H5	.714	3.16	1.850	.323	.242	.410	4
7/16 - 20	UNF	<b>TTS66543</b>	H3	.500	3.16	1.850	.323	.242	.410	4
7/16 - 20	UNF	<b>TTS66545</b>	H5	.500	3.16	1.850	.323	.242	.410	4
1/2 - 13	UNC	<b>TTS66563</b>	H3	.769	3.38	2.067	.367	.275	.440	4
1/2 - 13	UNC	<b>TTS66565</b>	H5	.769	3.38	2.067	.367	.275	.440	4
1/2 - 20	UNF	<b>TTS66583</b>	H3	.500	3.38	2.067	.367	.275	.440	4
1/2 - 20	UNF	<b>TTS66585</b>	H5	.500	3.38	2.067	.367	.275	.440	4
9/16 - 12	UNC	<b>TTS66603</b>	H3	.833	3.59	2.067	.429	.322	.500	4
9/16 - 12	UNC	<b>TTS66605</b>	H5	.833	3.59	2.067	.429	.322	.500	4
9/16 - 18	UNF	<b>TTS66623</b>	H3	.556	3.59	2.067	.429	.322	.500	4
9/16 - 18	UNF	<b>TTS66625</b>	H5	.556	3.59	2.067	.429	.322	.500	4
5/8 - 11	UNC	<b>TTS66643</b>	H3	.909	3.81	2.205	.480	.360	.560	4
5/8 - 11	UNC	<b>TTS66645</b>	H5	.909	3.81	2.205	.480	.360	.560	4
5/8 - 18	UNF	<b>TTS66663</b>	H3	.556	3.81	2.205	.480	.360	.560	4
5/8 - 18	UNF	<b>TTS66665</b>	H5	.556	3.81	2.205	.480	.360	.560	4
3/4 - 10	UNC	<b>TTS66703</b>	H3	1.000	4.25	2.480	.590	.442	.690	4
3/4 - 10	UNC	<b>TTS66705</b>	H5	1.000	4.25	2.480	.590	.442	.690	4
3/4 - 16	UNF	<b>TTS66723</b>	H3	.625	4.25	2.480	.590	.442	.690	4
3/4 - 16	UNF	<b>TTS66725</b>	H5	.625	4.25	2.480	.590	.442	.690	4

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	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	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	

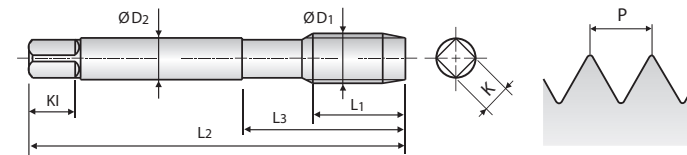
ISO Material Description	N										S						H				
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron		
VDI 3323	21	22	23	24	25	26	27	28	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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

# M/MF TiN-COATED HSS-PM SYNCHRO TAPS SPIRAL POINT for High Speed Tapping

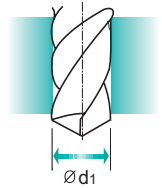
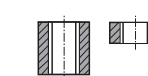
**TTS62 SERIES**



- ▶ 2-3 times faster when tapping the GS material group
- ▶ Precision Threads
- ▶ Unsurpassed chip handling



**Hole type** 3.0XD



Refer to P.24-37 for tap drill sizes

Material groups: **GS** **HSS PM** **M MF** **D** **60°** **4P~5P** **TiN**

Unit : inch

Size	Pitch	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	K1	Z
M3	x 0.5	<b>TTS62203</b>	D3	.197	1.94	.646	.141	.110	.190	3
M4	x 0.7	<b>TTS62244</b>	D4	.276	2.13	.768	.168	.131	.250	3
M5	x 0.8	<b>TTS62284</b>	D4	.315	2.38	.933	.194	.152	.250	3
M6	x 1.0	<b>TTS62315</b>	D5	.394	2.50	1.000	.255	.191	.310	3
M8	x 1.25	<b>TTS62365</b>	D5	.512	2.72	1.126	.318	.238	.380	3
M8	x 1.0	<b>TTS62375</b>	D5	.394	2.72	1.126	.318	.238	.380	3
M10	x 1.5	<b>TTS62426</b>	D6	.591	2.94	1.252	.381	.286	.440	3
M10	x 1.25	<b>TTS62435</b>	D5	.512	2.94	1.252	.381	.286	.440	3
M12	x 1.75	<b>TTS62506</b>	D6	.709	3.38	2.067	.367	.275	.440	4
M12	x 1.25	<b>TTS62525</b>	D5	.512	3.38	2.067	.367	.275	.440	4
M14	x 2.0	<b>TTS62547</b>	D7	.787	3.59	2.067	.429	.322	.500	4
M14	x 1.5	<b>TTS62556</b>	D6	.591	3.59	2.067	.429	.322	.500	4
M16	x 2.0	<b>TTS62607</b>	D7	.787	3.81	2.205	.480	.360	.560	4
M16	x 1.5	<b>TTS21616</b>	D6	.591	3.81	2.205	.480	.360	.560	4
M18	x 2.5	<b>TTS62657</b>	D7	.984	4.03	2.205	.542	.406	.630	4
M18	x 1.5	<b>TTS62676</b>	D6	.591	4.03	2.205	.542	.406	.630	4
M20	x 2.5	<b>TTS62707</b>	D7	.984	4.47	2.480	.652	.489	.690	4
M20	x 1.5	<b>TTS62726</b>	D6	.591	4.47	2.480	.652	.489	.690	4

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	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	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	

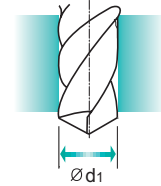
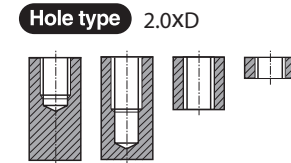
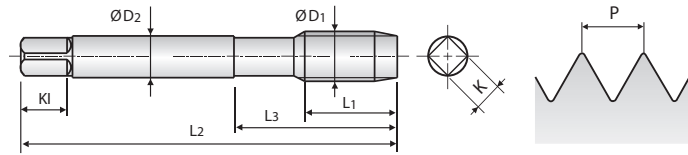
ISO Material Description	N										S						H				
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron		
VDI 3323	21	22	23	24	25	26	27	28	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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

# UNC/UNF TiCN-COATED HSS-PM SYNCHRO TAPS STRAIGHT FLUTE for High Speed Tapping

## TKS67 SERIES



- ▶ 2-3 times faster when tapping the GG material group
- ▶ Precision Threads
- ▶ Unsurpassed chip handling



Refer to P.24-37 for tap drill sizes

Material groups: **GG**, **HSS PM**, **UNC UNF**, **H**, **60°**, **2P~3P**, **TiCN**

Unit: inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
#4 - 40 UNC		TKS67162	H2	.250	1.88	.563	.141	.110	.190	3
#4 - 48 UNF		TKS67181	H1	.209	1.88	.563	.141	.110	.190	3
#4 - 48 UNF		TKS67182	H2	.209	1.88	.563	.141	.110	.190	3
#5 - 40 UNC		TKS67202	H2	.250	1.94	.626	.141	.110	.190	3
#5 - 44 UNF		TKS67221	H1	.227	1.94	.626	.141	.110	.190	3
#5 - 44 UNF		TKS67222	H2	.227	1.94	.626	.141	.110	.190	3
#6 - 32 UNC		TKS67242	H2	.313	2.00	.689	.141	.110	.190	3
#6 - 32 UNC		TKS67243	H3	.313	2.00	.689	.141	.110	.190	3
#6 - 40 UNF		TKS67262	H2	.250	2.00	.689	.141	.110	.190	3
#8 - 32 UNC		TKS67282	H2	.313	2.13	.752	.168	.131	.250	3
#8 - 32 UNC		TKS67283	H3	.313	2.13	.752	.168	.131	.250	3
#8 - 36 UNF		TKS67302	H2	.278	2.13	.752	.168	.131	.250	3
#10 - 24 UNC		TKS67323	H3	.417	2.38	.906	.194	.152	.250	3
#10 - 32 UNF		TKS67342	H2	.313	2.38	.906	.194	.152	.250	3
#10 - 32 UNF		TKS67343	H3	.313	2.38	.906	.194	.152	.250	3
#12 - 24 UNC		TKS67363	H3	.417	2.38	.906	.220	.165	.280	3
#12 - 28 UNF		TKS67383	H3	.357	2.38	.906	.220	.165	.280	3
1/4 - 20 UNC		TKS67403	H3	.500	2.50	1.000	.255	.191	.310	3
1/4 - 20 UNC		TKS67405	H5	.500	2.50	1.000	.255	.191	.310	3
1/4 - 28 UNF		TKS67423	H3	.357	2.50	1.000	.255	.191	.310	3
1/4 - 28 UNF		TKS67424	H4	.357	2.50	1.000	.255	.191	.310	3
5/16 - 18 UNC		TKS67443	H3	.556	2.72	1.126	.318	.238	.380	3
5/16 - 18 UNC		TKS67445	H5	.556	2.72	1.126	.318	.238	.380	3
5/16 - 24 UNF		TKS67463	H3	.417	2.72	1.126	.318	.238	.380	3

▶ NEXT PAGE

◎: Excellent ○: Good

ISO Material Description	P											M				K							
	Non-alloy steel					Low alloy steel						High alloyed steel, and tool steel				Stainless steel				Grey cast iron		Nodular 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					
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230			
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

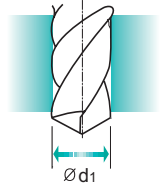
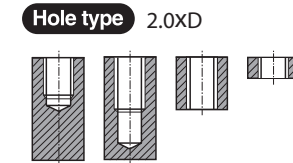
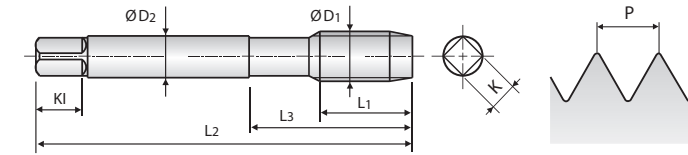
ISO Material Description	N						S										H						
	Aluminum-wrought alloy		Aluminum-cast, alloyed		Copper and Copper Alloys (Bronze / Brass)		Non Metallic Materials				Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron			
VDI 3323	21	22	23	24	25	26	27	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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

# UNC/UNF TiCN-COATED HSS-PM SYNCHRO TAPS STRAIGHT FLUTE for High Speed Tapping

## TKS67 SERIES



- ▶ 2-3 times faster when tapping the GG material group
- ▶ Precision Threads
- ▶ Unsurpassed chip handling



Refer to P.24-37 for tap drill sizes

Material groups: **GG**, **HSS PM**, **UNC UNF**, **H**, **60°**, **2P~3P**, **TiCN**

Unit: inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
5/16 - 24 UNF		TKS67464	H4	.417	2.72	1.126	.318	.238	.380	3
3/8 - 16 UNC		TKS67483	H3	.625	2.94	1.252	.381	.286	.440	4
3/8 - 16 UNC		TKS67485	H5	.625	2.94	1.252	.381	.286	.440	4
3/8 - 24 UNF		TKS67503	H3	.417	2.94	1.252	.381	.286	.440	4
3/8 - 24 UNF		TKS67504	H4	.417	2.94	1.252	.381	.286	.440	4
7/16 - 14 UNC		TKS67523	H3	.714	3.16	1.850	.323	.242	.410	4
7/16 - 14 UNC		TKS67525	H5	.714	3.16	1.850	.323	.242	.410	4
7/16 - 20 UNF		TKS67543	H3	.500	3.16	1.850	.323	.242	.410	4
7/16 - 20 UNF		TKS67545	H5	.500	3.16	1.850	.323	.242	.410	4
1/2 - 13 UNC		TKS67563	H3	.769	3.38	2.067	.367	.275	.440	4
1/2 - 13 UNC		TKS67565	H5	.769	3.38	2.067	.367	.275	.440	4
1/2 - 20 UNF		TKS67583	H3	.500	3.38	2.067	.367	.275	.440	4
1/2 - 20 UNF		TKS67585	H5	.500	3.38	2.067	.367	.275	.440	4
9/16 - 12 UNC		TKS67603	H3	.833	3.59	2.067	.429	.322	.500	4
9/16 - 12 UNC		TKS67605	H5	.833	3.59	2.067	.429	.322	.500	4
9/16 - 18 UNF		TKS67623	H3	.556	3.59	2.067	.429	.322	.500	4
9/16 - 18 UNF		TKS67625	H5	.556	3.59	2.067	.429	.322	.500	4
5/8 - 11 UNC		TKS67643	H3	.909	3.81	2.205	.480	.360	.560	4
5/8 - 11 UNC		TKS67645	H5	.909	3.81	2.205	.480	.360	.560	4
5/8 - 18 UNF		TKS67663	H3	.556	3.81	2.205	.480	.360	.560	4
5/8 - 18 UNF		TKS67665	H5	.556	3.81	2.205	.480	.360	.560	4
3/4 - 10 UNC		TKS67703	H3	1.000	4.25	2.480	.590	.442	.690	4
3/4 - 10 UNC		TKS67705	H5	1.000	4.25	2.480	.590	.442	.690	4
3/4 - 16 UNF		TKS67723	H3	.625	4.25	2.480	.590	.442	.690	4
3/4 - 16 UNF		TKS67725	H5	.625	4.25	2.480	.590	.442	.690	4

◎: Excellent ○: Good

ISO Material Description	P											M				K							
	Non-alloy steel					Low alloy steel						High alloyed steel, and tool steel				Stainless steel				Grey cast iron		Nodular 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					
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230			
Recommended	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

ISO Material Description	N						S										H						
	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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

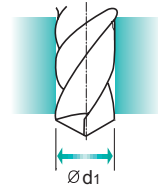
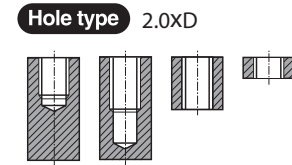
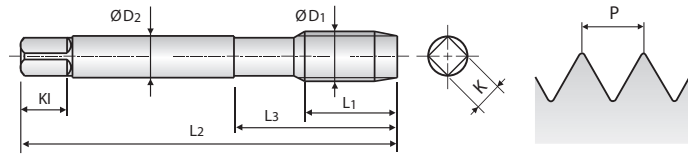


# M/MF TiCN-COATED HSS-PM SYNCHRO TAPS STRAIGHT FLUTE for High Speed Tapping

**TKS63 SERIES**



- ▶ 2-3 times faster when tapping the GG material group
- ▶ Precision Threads
- ▶ Unsurpassed chip handling



Refer to P.24-37 for tap drill sizes

Material groups: **GG** **HSS PM** **M MF** **D** **60°** **2P~3P** **TiCN**

Unit : inch

Size	Pitch	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
M3	x 0.5	<b>TKS63203</b>	D3	.197	1.94	.646	.141	.110	.190	3
M4	x 0.7	<b>TKS63244</b>	D4	.276	2.13	.768	.168	.131	.250	3
M5	x 0.8	<b>TKS63284</b>	D4	.315	2.38	.933	.194	.152	.250	3
M6	x 1.0	<b>TKS63315</b>	D5	.394	2.50	1.000	.255	.191	.310	3
M8	x 1.25	<b>TKS63365</b>	D5	.512	2.72	1.126	.318	.238	.380	3
M8	x 1.0	<b>TKS63375</b>	D5	.394	2.72	1.126	.318	.238	.380	3
M10	x 1.5	<b>TKS63426</b>	D6	.591	2.94	1.252	.381	.286	.440	4
M10	x 1.25	<b>TKS63435</b>	D5	.512	2.94	1.252	.381	.286	.440	4
M12	x 1.75	<b>TKS63506</b>	D6	.709	3.38	2.067	.367	.275	.440	4
M12	x 1.25	<b>TKS63525</b>	D5	.512	3.38	2.067	.367	.275	.440	4
M14	x 2.0	<b>TKS63547</b>	D7	.787	3.59	2.067	.429	.322	.500	4
M14	x 1.5	<b>TKS63556</b>	D6	.591	3.59	2.067	.429	.322	.500	4
M16	x 2.0	<b>TKS63607</b>	D7	.787	3.81	2.205	.480	.360	.560	4
M16	x 1.5	<b>TKS63616</b>	D6	.591	3.81	2.205	.480	.360	.560	4
M18	x 2.5	<b>TKS63657</b>	D7	.984	4.03	2.205	.542	.406	.630	4
M18	x 1.5	<b>TKS63676</b>	D6	.591	4.03	2.205	.542	.406	.630	4
M20	x 2.5	<b>TKS63707</b>	D7	.984	4.47	2.480	.652	.489	.690	4
M20	x 1.5	<b>TKS63726</b>	D6	.591	4.47	2.480	.652	.489	.690	4

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	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	30	10	29	32	38	15	35	15	23	10	10	26	3	25			
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	○	○	○	○	○	○	○	○	○	○	○	◎	◎	◎	◎	◎	◎	◎	○	○	

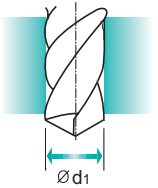
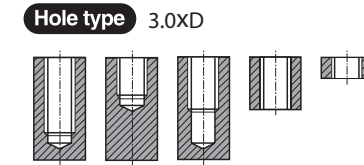
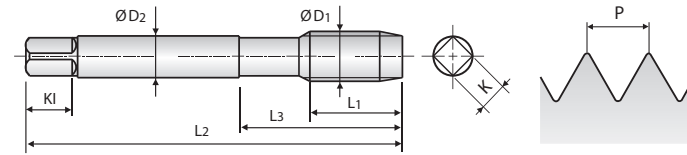
ISO Material Description	N						S						H								
	Aluminum-wrought alloy		Aluminum-cast, alloyed		Copper and Copper Alloys (Bronze / Brass)		Non Metallic Materials		Heat Resistant Super Alloys			Titanium Alloys			Hardened steel	Chilled Cast Iron	Hardened Cast Iron				
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc	21	22	23	24	25	26	27	28	29	30	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	○	○	○	○	○	○	○	○	○	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

# UNC/UNF TiN-COATED HSS-PM SYNCHRO TAPS FORMING for High Speed Tapping

**TTS68 SERIES**



- ▶ 2-3 times faster when machining the GV material group
- ▶ Precision Threads



Refer to P.24-37 for tap drill sizes

Material groups: **GV** **HSS PM** **UNC UNF** **H** **60°** **2P~3P** **TiN**

Unit : inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
#4 - 40 UNC		<b>TTS68163</b>	H3	.250	1.88	.563	.141	.110	.190	4
#4 - 40 UNC		<b>TTS68165</b>	H5	.250	1.88	.563	.141	.110	.190	4
#4 - 48 UNF		<b>TTS68183</b>	H3	.209	1.88	.563	.141	.110	.190	4
#4 - 48 UNF		<b>TTS68185</b>	H5	.209	1.88	.563	.141	.110	.190	4
#5 - 40 UNC		<b>TTS68203</b>	H3	.250	1.94	.626	.141	.110	.190	5
#5 - 40 UNC		<b>TTS68205</b>	H5	.250	1.94	.626	.141	.110	.190	5
#5 - 44 UNF		<b>TTS68223</b>	H3	.227	1.94	.626	.141	.110	.190	5
#5 - 44 UNF		<b>TTS68225</b>	H5	.227	1.94	.626	.141	.110	.190	5
#6 - 32 UNC		<b>TTS68243</b>	H3	.313	2.00	.689	.141	.110	.190	5
#6 - 32 UNC		<b>TTS68245</b>	H5	.313	2.00	.689	.141	.110	.190	5
#6 - 40 UNF		<b>TTS68263</b>	H3	.250	2.00	.689	.141	.110	.190	5
#6 - 40 UNF		<b>TTS68265</b>	H5	.250	2.00	.689	.141	.110	.190	5
#8 - 32 UNC		<b>TTS68283</b>	H3	.313	2.13	.752	.168	.131	.250	5
#8 - 32 UNC		<b>TTS68285</b>	H5	.313	2.13	.752	.168	.131	.250	5
#8 - 36 UNF		<b>TTS68303</b>	H3	.278	2.13	.752	.168	.131	.250	5
#8 - 36 UNF		<b>TTS68305</b>	H5	.278	2.13	.752	.168	.131	.250	5
#10 - 24 UNC		<b>TTS68324</b>	H4	.417	2.38	.906	.194	.152	.250	5
#10 - 24 UNC		<b>TTS68326</b>	H6	.417	2.38	.906	.194	.152	.250	5
#10 - 32 UNF		<b>TTS68344</b>	H4	.313	2.38	.906	.194	.152	.250	5
#10 - 32 UNF		<b>TTS68346</b>	H6	.313	2.38	.906	.194	.152	.250	5
#12 - 24 UNC		<b>TTS68364</b>	H4	.417	2.38	.906	.220	.165	.280	5
#12 - 24 UNC		<b>TTS68366</b>	H6	.417	2.38	.906	.220	.165	.280	5
1/4 - 20 UNC		<b>TTS68404</b>	H4	.500	2.50	1.000	.255	.191	.310	5
1/4 - 20 UNC		<b>TTS68406</b>	H6	.500	2.50	1.000	.255	.191	.310	5
1/4 - 28 UNF		<b>TTS68424</b>	H4	.357	2.50	1.000	.255	.191	.310	5
1/4 - 28 UNF		<b>TTS68426</b>	H6	.357	2.50	1.000	.255	.191	.310	5

▶ NEXT PAGE

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	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	30	10	29	32	38	15	35	15	23	10	10	26	3	25			
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N						S						H								
	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	21	22	23	24	25	26	27	28	29	30	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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

# UNC/UNF TiN-COATED HSS-PM SYNCHRO TAPS FORMING for High Speed Tapping

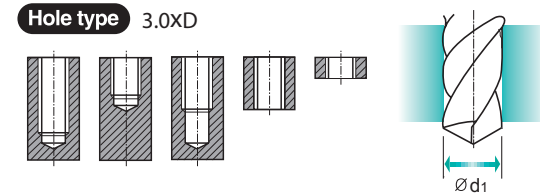
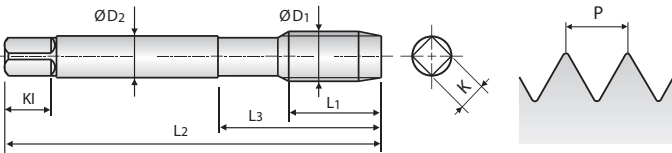
**TTS68 SERIES**

# M/MF TiN-COATED HSS-PM SYNCHRO TAPS FORMING for High Speed Tapping

**TTS64 SERIES**



- ▶ 2-3 times faster when machining the GV material group
- ▶ Precision Threads



Refer to P.24-37 for tap drill sizes

Material groups: **GV** **HSS PM** **UNC UNF** **H** **60°** **2P~3P** **TiN**

Unit : inch

Size	TPI	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Flute
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
5/16 - 18 UNC		<b>TTS68445</b>	H5	.556	2.72	1.126	.318	.238	.380	5
5/16 - 18 UNC		<b>TTS68447</b>	H7	.556	2.72	1.126	.318	.238	.380	5
5/16 - 24 UNF		<b>TTS68465</b>	H5	.417	2.72	1.126	.318	.238	.380	5
5/16 - 24 UNF		<b>TTS68467</b>	H7	.417	2.72	1.126	.318	.238	.380	5
3/8 - 16 UNC		<b>TTS68485</b>	H5	.625	2.94	1.252	.381	.286	.440	6
3/8 - 16 UNC		<b>TTS68487</b>	H7	.625	2.94	1.252	.381	.286	.440	6
3/8 - 24 UNF		<b>TTS68505</b>	H5	.417	2.94	1.252	.381	.286	.440	6
3/8 - 24 UNF		<b>TTS68507</b>	H7	.417	2.94	1.252	.381	.286	.440	6
7/16 - 14 UNC		<b>TTS68525</b>	H5	.714	3.16	1.850	.323	.242	.410	6
7/16 - 14 UNC		<b>TTS68528</b>	H8	.714	3.16	1.850	.323	.242	.410	6
7/16 - 20 UNF		<b>TTS68545</b>	H5	.500	3.16	1.850	.323	.242	.410	6
7/16 - 20 UNF		<b>TTS68548</b>	H8	.500	3.16	1.850	.323	.242	.410	6
1/2 - 13 UNC		<b>TTS68566</b>	H6	.769	3.38	2.067	.367	.275	.440	6
1/2 - 13 UNC		<b>TTS68568</b>	H8	.769	3.38	2.067	.367	.275	.440	6
1/2 - 20 UNF		<b>TTS68585</b>	H5	.500	3.38	2.067	.367	.275	.440	6
1/2 - 20 UNF		<b>TTS68588</b>	H8	.500	3.38	2.067	.367	.275	.440	6
9/16 - 12 UNC		<b>TTS68607</b>	H7	.833	3.59	2.067	.429	.322	.500	8
9/16 - 12 UNC		<b>TTS68600</b>	H10	.833	3.59	2.067	.429	.322	.500	8
9/16 - 18 UNF		<b>TTS68627</b>	H7	.556	3.59	2.067	.429	.322	.500	8
9/16 - 18 UNF		<b>TTS68620</b>	H10	.556	3.59	2.067	.429	.322	.500	8
5/8 - 11 UNC		<b>TTS68647</b>	H7	.909	3.81	2.205	.480	.360	.560	8
5/8 - 11 UNC		<b>TTS68640</b>	H10	.909	3.81	2.205	.480	.360	.560	8
5/8 - 18 UNF		<b>TTS68667</b>	H7	.556	3.81	2.205	.480	.360	.560	8
5/8 - 18 UNF		<b>TTS68660</b>	H10	.556	3.81	2.205	.480	.360	.560	8
3/4 - 10 UNC		<b>TTS68707</b>	H7	1.000	4.25	2.480	.590	.442	.690	8
3/4 - 10 UNC		<b>TTS68700</b>	H10	1.000	4.25	2.480	.590	.442	.690	8
3/4 - 16 UNF		<b>TTS68727</b>	H7	.625	4.25	2.480	.590	.442	.690	8
3/4 - 16 UNF		<b>TTS68720</b>	H10	.625	4.25	2.480	.590	.442	.690	8

◎ : Excellent ○ : Good

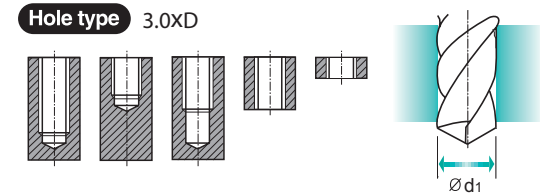
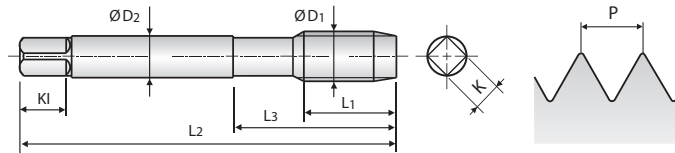
ISO Material Description	P										M			K							
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel			Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
HRc		13	25	28	32	10	29	32	38	15	35	15	23	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 Material Description	N				S					H											
	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	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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



- ▶ 2-3 times faster when machining the GV material group
- ▶ Precision Threads



Refer to P.24-37 for tap drill sizes

Material groups: **GV** **HSS PM** **M MF** **D** **60°** **2P~3P** **TiN**

Unit : inch

Size	Pitch	EDP No.	Limit	Thread Length	Overall Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Lobe
ØD1	P	TiN		L1	L2	L3	ØD2	K	KI	Z
M3	x 0.5	<b>TTS64205</b>	D5	.197	1.94	.646	.141	.110	.190	5
M4	x 0.7	<b>TTS64246</b>	D6	.276	2.13	.768	.168	.131	.250	5
M5	x 0.8	<b>TTS64287</b>	D7	.315	2.38	.933	.194	.152	.250	5
M6	x 1.0	<b>TTS64318</b>	D8	.394	2.50	1.000	.255	.191	.310	5
M8	x 1.25	<b>TTS64369</b>	D9	.512	2.72	1.126	.318	.238	.380	5
M10	x 1.5	<b>TTS64420</b>	D10	.591	2.94	1.252	.381	.286	.440	6
M12	x 1.75	<b>TTS6450A</b>	D11	.709	3.38	2.067	.367	.275	.440	6
M14	x 2.0	<b>TTS6454B</b>	D12	.787	3.59	2.067	.429	.322	.500	8
M16	x 2.0	<b>TTS6460B</b>	D12	.787	3.81	2.205	.480	.360	.560	8
M18	x 2.5	<b>TTS6465B</b>	D12	.984	4.03	2.205	.542	.406	.630	8
M20	x 2.5	<b>TTS6470B</b>	D12	.984	4.47	2.480	.652	.489	.690	8

◎ : Excellent ○ : Good

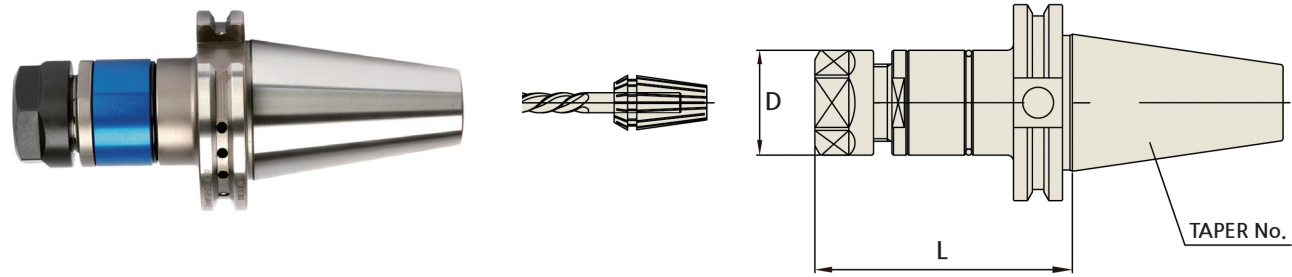
ISO Material Description	P										M			K							
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel			Stainless steel			Grey cast iron		Nodular cast iron		Malleable cast iron
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
HRc		13	25	28	32	10	29	32	38	15	35	15	23	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 Material Description	N				S					H											
	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	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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

# SYNCHRO TAPPING CHUCK (ER TYPE)

CAT SERIES



Unit : mm

EDP No.	TAPER No.	MODEL No.	Tap Size	Clamping Range	Nut	D	L
JK060SYT	40	CAT40AD/B-SYTER12-79	M3~M12	3.5~10	ER16	28	79
JK062SYT		CAT40AD/B-SYTER16-85	M3~M16	3.5~10	ER20	35	85
JK064SYT		CAT40AD/B-SYTER20-90	M3~M20	3.5~16	ER25	42	90
JK066SYT		CAT40AD/B-SYTER27-100	M4~M27	3.5~16	ER32	50	100
JK068SYT		CAT40AD/B-SYTER33-105	M4~M33	7~16	ER40	63	105
JL060SYT	50	CAT50AD/B-SYTER12-79	M3~M12	3.5~10	ER16	28	79
JL062SYT		CAT50AD/B-SYTER16-85	M3~M16	3.5~10	ER20	35	85
JL064SYT		CAT50AD/B-SYTER20-90	M3~M20	3.5~16	ER25	42	90
JL066SYT		CAT50AD/B-SYTER27-100	M4~M27	3.5~16	ER32	50	100
JL068SYT		CAT50AD/B-SYTER33-105	M4~M33	7~16	ER40	63	105

- Feature :
- To compensate for synchronization errors to extend tap life and to improve thread quality
  - To compensate for pitch tolerances of taps
  - For machine with synchronized spindle

► BT(JIS B6339/MAS-403), HSK(DIN 69893/ISO 12164-1) AND K-STRAIGHT TAPER PRODUCTS ARE AVAILABLE

# RECOMMENDED CUTTING CONDITIONS

ISO	VDI 3323	Material Description	HB	HRc	UNC/UNF	TTS65	TTS66	TKS67	TTS68
					M/MF	TTS61	TTS62	TKS63	TTS64
					Speed(SFM)				
P	1	Non-alloy steel	125			79-148	79-148	79-148	115-184
	2		190	13	79-148	79-148	79-148	115-184	
	3		250	25	79-148	79-148	79-148	115-184	
	4		270	28	66-128	66-128	66-128	98-164	
	5		300	32					
	6	Low alloy steel	180	10	66-128	66-128	66-128	98-164	
	7		275	29	66-128	66-128	66-128	98-164	
	8		300	32					
	9		350	38					
	10	High alloyed steel, and tool steel	200	15					
	11		325	35					
M	12	Stainless steel	200	15		39-98	39-98		49-108
	13		240	23	39-98	39-98		49-108	
	14		180	10	39-60	39-60		49-75	
K	15	Grey cast iron	180	10	98-148	98-148		98-148	
	16		260	26			98-148		
	17	Nodular cast iron	160	3	82-148	82-148		82-148	
	18		250	25			82-148		
	19		130				82-148		
20	Malleable cast iron	230	21				82-148		
N	21	Aluminum-wrought alloy	60						131-184
	22		100					131-184	
	23	Aluminum-cast, alloyed	75		148-197	148-197	148-197	184-230	
	24		90	148-197	148-197	148-197	184-230		
	25		130	82-118	82-118	82-118	115-148		
	26		110	98-148	98-148				
	27	Copper and Copper Alloys (Bronze / Brass)	90						
	28		100	82-118	82-118		115-148		
	29	Non Metallic Materials							
	30								
S	31	Heat Resistant Super Alloys	200	15					
	32		280	30					
	33		250	25					
	34		350	38					
	35		320	34					
	36	Titanium Alloys	400 Rm						
	37		1050 Rm						
H	38	Hardened steel	550	55					
	39		630	60					
	40	Chilled Cast Iron	400	42					
	41	Hardened Cast Iron	550	55					

TROUBLE SHOOTING GUIDE

Specific Problem	Cause	Solution
<b>Dimensional Accuracy</b>		
<b>Oversize Pitch Diameter</b>	Incorrect Tap	<ol style="list-style-type: none"> <li>1. Use proper limits of taps</li> <li>2. Use longer chamfered taps</li> </ol>
	Chip Packing	<ol style="list-style-type: none"> <li>1. Use spiral point or spiral fluted taps</li> <li>2. Reduce number of flutes to provide extra chip room</li> <li>3. Use larger hole size</li> <li>4. If tapping a hole, allow deeper hole where applicable or shorten the thread length of the parts</li> <li>5. Use proper lubricant</li> </ol>
	Galling	<ol style="list-style-type: none"> <li>1. Apply coated tap: HardSlick or Chrome</li> <li>2. Use proper coolant/concentration</li> <li>3. Reduce tapping speed</li> <li>4. Use proper cutting angle in accordance with material being tapped</li> <li>5. Use large hole size</li> </ol>
	Operating Conditions	<ol style="list-style-type: none"> <li>1. Check tapping speed</li> <li>2. Be sure of correct to tool alignment</li> <li>3. Free cutting either tap or workpiece</li> <li>4. Use proper tapping speed to avoid torn or rough threads</li> <li>5. Use lead screw tapper</li> <li>6. Use proper tapping machine with suitable power</li> <li>7. Avoid misalignment of the tap and drill hole from loose spindle or worn holder</li> </ol>
	Tool Condition	<ol style="list-style-type: none"> <li>1. Obtain proper indexing angle for the flutes at the cutting edge</li> <li>2. Grind proper cutting angle and chamfer angle</li> <li>3. Avoid too narrow a land width</li> <li>4. Remove burrs from regrinding</li> </ol>
<b>Oversize Internal Diameter</b>	Hole Size	<ol style="list-style-type: none"> <li>1. Use minimum hole size</li> <li>2. Avoid tapered hole</li> <li>3. Use proper chamfered taps</li> </ol>
	Galling	1. Galling solutions 1 through 4 above can be applied to this specific problem
<b>Undersize Pitch Diameter</b>	Incorrect Tap	<ol style="list-style-type: none"> <li>1. Use oversize taps</li> <li>2. Apply proper chamfer angle</li> <li>3. Increase cutting angle</li> </ol>
	Damaged Thread	1. Use proper reversing speed to avoid damaging tapped thread on the way out of the hole
	Left-over Chips	<ol style="list-style-type: none"> <li>1. Increase cutting performance to avoid any left over chips in the hole</li> <li>2. Remove left over chips from the hole for gage checking</li> </ol>
<b>Undersize Internal Diameter</b>	Hole Size	1. Use maximum drill size
<b>Breakage</b>	Incorrect Tap Selection	<ol style="list-style-type: none"> <li>1. Avoid chip packing in the flutes or on the bottom of the hole</li> <li>2. Use spiral pointed or spiral fluted taps or fluteless taps</li> <li>3. Apply correct surface treatment such as Hardslick or bright</li> </ol>
	Excessive Tapping Torque	<ol style="list-style-type: none"> <li>1. Use larger drill size</li> <li>2. Try to shorten thread length</li> <li>3. Increase cutting angle</li> <li>4. Apply a tap with more thread relief and reduced land width</li> <li>5. Apply correct surface treatment such as Hardslick</li> </ol>

TROUBLE SHOOTING GUIDE

Specific Problem	Cause	Solution
<b>Dimensional Accuracy</b>		
<b>Breakage</b>	Operating Conditions	<ol style="list-style-type: none"> <li>1. Reduce tapping speed</li> <li>2. Avoid misalignment between tap and the hole and tapered hole</li> <li>3. Use floating type of tapping holder</li> <li>4. Use tapping holder with torque adjustment</li> <li>5. Avoid hitting bottom of the hole with tap</li> </ol>
	Tool Condition	<ol style="list-style-type: none"> <li>1. Do not grind the bottom of the flute</li> <li>2. Avoid too narrow a land width</li> <li>3. Remove all worn sections when regrinding the flutes</li> <li>4. Regrind tool more frequently</li> </ol>
<b>Chipping</b>	Incorrect Tap Selection	<ol style="list-style-type: none"> <li>1. Reduce cutting angle</li> <li>2. Use a different kind of high-speed steel tap</li> <li>3. Reduce hardness of the tap</li> <li>4. Increase chamfer length</li> <li>5. Avoid chip packing in the flutes or in the bottom of the hole by using spiral fluted or spiral pointed taps</li> </ol>
	Operating Conditions	<ol style="list-style-type: none"> <li>1. Reduce tapping speed</li> <li>2. Avoid misalignment between tap and hole</li> <li>3. Avoid sudden return of reverse in blind hole tapping</li> <li>4. Avoid galling</li> <li>5. Use larger hole size</li> </ol>
<b>Wear</b>	Incorrect Tap Selection	<ol style="list-style-type: none"> <li>1. Apply specially designed tap for tapping heat treated material</li> <li>2. Change to a type of high-speed steel tap that contains vanadium</li> <li>3. Apply special surface treatment such as TiCN, TiAlN or Hardslick</li> <li>4. Increase chamfer length</li> </ol>
	Operating Conditions	<ol style="list-style-type: none"> <li>1. Reduce tapping speed</li> <li>2. Apply proper cutting lubricants</li> <li>3. Avoid work hardened hole</li> <li>4. Use larger hole size</li> </ol>
	Tool Condition	<ol style="list-style-type: none"> <li>1. Grind proper cutting angle</li> <li>2. Avoid hardness reduction from grinding process</li> </ol>
<b>Torn or Rough Thread</b>	Chamfer Too Short	1. Increase chamfer length
	Wrong Cutting Angle	1. Apply proper cutting angle
	Galling	<ol style="list-style-type: none"> <li>1. Use thread relieved taps</li> <li>2. Reduce land width</li> <li>3. Apply surface treatment such as Hardslick or chrome</li> <li>4. Use proper cutting lubricant</li> <li>5. Reduce tapping speed</li> <li>6. Use larger hole size</li> <li>7. Obtain proper alignment between tap and work</li> </ol>
	Chip Packing	<ol style="list-style-type: none"> <li>1. Use spiral pointed or spiral fluted taps</li> <li>2. Use larger drill size</li> </ol>
<b>Chattering on Tapped Thread</b>	Tool Free Cutting	<ol style="list-style-type: none"> <li>1. Reduce cutting angle</li> <li>2. Reduce amount of thread relief</li> </ol>
	Tool Condition	<ol style="list-style-type: none"> <li>1. Avoid too narrow land width</li> <li>2. Do not grind the bottom of the flute</li> </ol>



### UNC/UNF RECOMMENDED TAP DRILL SIZE - 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

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### UNC/UNF RECOMMENDED TAP DRILL SIZE - 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
	-	-	-	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
	-	-	-	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

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TECHNICAL DATA

**UNC/UNF** RECOMMENDED TAP DRILL SIZE  
- 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
	-	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
<b>1*1/16</b>	-	-	-	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
<b>1*1/8</b>	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
	-	-	-	28	1.0860	1.0950	1.0926	1.0879	1.0902	1.0925	1.0948	1.0972
<b>1*3/16</b>	-	-	-	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
<b>1*1/4</b>	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
<b>1*5/16</b>	-	-	-	8	1.1770	1.2020	1.1922	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
<b>1*3/8</b>	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	-	-	1.2580	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

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TECHNICAL DATA



**UNC/UNF** RECOMMENDED TAP DRILL SIZE  
- 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
<b>1*7/16</b>	-	-	-	6	1.2570	1.2880	1.2771	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
<b>1*1/2</b>	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
<b>1*9/16</b>	-	-	-	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
<b>1*5/8</b>	-	-	-	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
<b>1*11/16</b>	-	-	-	6	1.5070	1.5380	1.5271	1.5143	1.5251	1.5360	1.5468	1.5576
	-	-	-	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
<b>1*3/4</b>	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
<b>1*13/16</b>	-	-	-	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
<b>1*7/8</b>	-	-	-	6	1.6950	1.7250	1.7146	1.7018	1.7126	1.7235	1.7343	1.7451

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**UNC/UNF** RECOMMENDED TAP DRILL SIZE  
- 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
-	-	-	-	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



**M/MF** RECOMMENDED TAP DRILL SIZE  
- METRIC THREAD

Size	Pitch		Minor Diameter		Tap Drill Diameter (Cutting Tap)									
	M	MF	Min. 6H	Max. 6H	80% Thread		75% Thread		70% Thread		65% Thread		60% Thread	
			mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
M1	0.25	-	0.729	0.798	0.74	.0291	0.76	.0298	0.77	.0304	0.79	.0311	0.81	.0317
-	-	0.2	0.783	0.841	0.79	.0312	0.81	.0317	0.82	.0322	0.83	.0327	0.84	.0332
M1.1	0.25	-	0.829	0.898	0.84	.0331	0.86	.0337	0.87	.0344	0.89	.0350	0.91	.0356
-	-	0.2	0.883	0.941	0.89	.0351	0.91	.0356	0.92	.0361	0.93	.0367	0.94	.0372
M1.2	0.25	-	0.929	0.998	0.94	.0370	0.96	.0377	0.97	.0383	0.99	.0389	1.01	.0396
-	-	0.2	0.983	1.041	0.99	.0391	1.01	.0396	1.02	.0401	1.03	.0406	1.04	.0411
M1.4	0.3	-	1.075	1.159	1.09	.0428	1.11	.0436	1.13	.0444	1.15	.0451	1.17	.0459
-	-	0.2	1.183	1.241	1.19	.0469	1.21	.0474	1.22	.0480	1.23	.0485	1.24	.0490
M1.6	0.35	-	1.221	1.321	1.24	.0487	1.26	.0496	1.28	.0505	1.30	.0514	1.33	.0523
-	-	0.2	1.383	1.441	1.39	.0548	1.41	.0553	1.42	.0558	1.43	.0563	1.44	.0569
M1.7	0.35	-	1.321	1.421	1.34	.0526	1.36	.0535	1.38	.0544	1.40	.0553	1.43	.0562
-	-	0.3	1.375	1.459	1.39	.0547	1.41	.0554	1.43	.0562	1.45	.0570	1.47	.0577
-	-	0.25	1.429	1.498	1.44	.0567	1.46	.0573	1.47	.0580	1.49	.0586	1.51	.0593
-	-	0.2	1.483	1.541	1.49	.0587	1.51	.0593	1.52	.0598	1.53	.0603	1.54	.0608
M1.8	0.35	-	1.421	1.521	1.44	.0565	1.46	.0574	1.48	.0583	1.50	.0592	1.53	.0601
-	-	0.2	1.583	1.641	1.59	.0627	1.61	.0632	1.62	.0637	1.63	.0642	1.64	.0647
M2	0.4	-	1.567	1.679	1.58	.0624	1.61	.0634	1.64	.0644	1.66	.0654	1.69	.0665
-	-	0.25	1.729	1.798	1.74	.0685	1.76	.0692	1.77	.0698	1.79	.0704	1.81	.0711
M2.2	0.45	-	1.713	1.838	1.73	.0682	1.76	.0694	1.79	.0705	1.82	.0717	1.85	.0728
-	-	0.25	1.929	1.998	1.94	.0764	1.96	.0770	1.97	.0777	1.99	.0783	2.01	.0789
M2.3	0.4	-	1.867	1.979	1.88	.0742	1.91	.0752	1.94	.0762	1.96	.0773	1.99	.0783
-	-	0.35	1.921	2.021	1.94	.0762	1.96	.0771	1.98	.0780	2.00	.0789	2.03	.0798
-	-	0.25	2.029	2.098	2.04	.0803	2.06	.0810	2.07	.0816	2.09	.0822	2.11	.0829
M2.5	0.45	-	2.013	2.138	2.03	.0800	2.06	.0812	2.09	.0823	2.12	.0835	2.15	.0846
-	-	0.35	2.121	2.221	2.14	.0841	2.16	.0850	2.18	.0859	2.20	.0868	2.23	.0877
M2.6	0.45	-	2.113	2.238	2.13	.0840	2.16	.0851	2.19	.0863	2.22	.0874	2.25	.0886
-	-	0.35	2.221	2.321	2.24	.0880	2.26	.0889	2.28	.0898	2.30	.0907	2.33	.0916
M3	0.5	-	2.459	2.599	2.48	.0997	2.51	.0989	2.55	.1002	2.58	.1015	2.61	.1028
-	-	0.35	2.621	2.721	2.64	.1038	2.66	.1047	2.68	.1056	2.70	.1065	2.73	.1074
M3.5	0.6	-	2.850	3.010	2.88	.1132	2.92	.1148	2.95	.1163	2.99	.1178	3.03	.1194
-	-	0.35	3.121	3.221	3.14	.1235	3.16	.1244	3.18	.1253	3.20	.1262	3.23	.1271
M4	0.7	-	3.242	3.422	3.27	.1288	3.32	.1306	3.36	.1324	3.41	.1342	3.45	.1360
-	-	0.5	3.459	3.599	3.48	.1370	3.51	.1383	3.55	.1396	3.58	.1409	3.61	.1421
M4.5	0.75	-	3.688	3.878	3.72	.1465	3.77	.1484	3.82	.1503	3.87	.1522	3.92	.1542
-	-	0.5	3.959	4.099	3.98	.1567	4.01	.1580	4.05	.1593	4.08	.1605	4.11	.1618
M5	0.9	-	4.026	4.226	4.06	.1600	4.12	.1623	4.18	.1646	4.24	.1669	4.30	.1692
-	-	0.8	4.134	4.334	4.17	.1641	4.22	.1662	4.27	.1682	4.32	.1703	4.38	.1723
-	-	0.5	4.459	4.599	4.48	.1764	4.51	.1777	4.55	.1790	4.58	.1802	4.61	.1815
M5.5	-	0.9	4.526	4.726	4.56	.1797	4.62	.1820	4.68	.1843	4.74	.1866	4.80	.1889
-	-	0.75	4.688	4.878	4.72	.1858	4.77	.1878	4.82	.1897	4.87	.1916	4.92	.1935
-	-	0.5	4.959	5.099	4.98	.1961	5.01	.1974	5.05	.1986	5.08	.1999	5.11	.2012
M6	1	-	4.917	5.153	4.96	.1953	5.03	.1979	5.09	.2004	5.16	.2030	5.22	.2055
-	-	0.75	5.188	5.378	5.22	.2055	5.27	.2075	5.32	.2094	5.37	.2113	5.42	.2132
-	-	0.5	5.459	5.599	5.48	.2158	5.51	.2170	5.55	.2183	5.58	.2196	5.61	.2209
M7	1	-	5.917	6.153	5.96	.2347	6.03	.2372	6.09	.2398	6.16	.2423	6.22	.2449
-	-	0.75	6.188	6.378	6.22	.2449	6.27	.2468	6.32	.2487	6.37	.2507	6.42	.2526
-	-	0.5	6.459	6.599	6.48	.2551	6.51	.2564	6.55	.2577	6.58	.2590	6.61	.2602
M8	1.25	-	6.647	6.912	6.70	.2638	6.78	.2670	6.86	.2702	6.94	.2734	7.03	.2766
-	-	1	6.917	7.153	6.96	.2740	7.03	.2766	7.09	.2792	7.16	.2817	7.22	.2843
-	-	0.75	7.188	7.378	7.22	.2843	7.27	.2862	7.32	.2881	7.37	.2900	7.42	.2919



# M/MF RECOMMENDED TAP DRILL SIZE - METRIC THREAD

Size	Pitch		Minor Diameter		Tap Drill Diameter(Cutting Tap)									
	M	MF	Min. 6H	Max. 6H	80% Thread		75% Thread		70% Thread		65% Thread		60% Thread	
					mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
M9	-	0.5	7.459	7.599	7.48	.2945	7.51	.2958	7.55	.2971	7.58	.2983	7.61	.2996
	1.25	-	7.647	7.912	7.70	.3032	7.78	.3064	7.86	.3096	7.94	.3128	8.03	.3160
M10	-	1	7.917	8.153	7.96	.3134	8.03	.3160	8.09	.3185	8.16	.3211	8.22	.3236
	-	0.75	8.188	8.378	8.22	.3236	8.27	.3256	8.32	.3275	8.37	.3294	8.42	.3313
	-	0.5	8.459	8.599	8.48	.3339	8.51	.3352	8.55	.3364	8.58	.3377	8.61	.3390
	1.5	-	8.376	8.676	8.44	.3323	8.54	.3362	8.64	.3400	8.73	.3438	8.83	.3477
	-	1.25	8.647	8.912	8.70	.3426	8.78	.3458	8.86	.3490	8.94	.3521	9.03	.3553
	-	1	8.917	9.153	8.96	.3528	9.03	.3553	9.09	.3579	9.16	.3605	9.22	.3630
M11	-	0.75	9.188	9.378	9.22	.3630	9.27	.3649	9.32	.3669	9.37	.3688	9.42	.3707
	-	0.5	9.459	9.599	9.48	.3732	9.51	.3745	9.55	.3758	9.58	.3771	9.61	.3784
	1.5	-	9.376	9.676	9.44	.3717	9.54	.3755	9.64	.3794	9.73	.3832	9.83	.3870
	-	1	9.917	10.153	9.96	.3922	10.03	.3947	10.09	.3973	10.16	.3998	10.22	.4024
	-	0.75	10.188	10.378	10.22	.4024	10.27	.4043	10.32	.4062	10.37	.4081	10.42	.4101
	-	0.5	10.459	10.599	10.48	.4126	10.51	.4139	10.55	.4152	10.58	.4164	10.61	.4177
M12	1.75	-	10.106	10.441	10.18	.4008	10.30	.4053	10.41	.4098	10.52	.4143	10.64	.4187
	-	1.5	10.376	10.676	10.44	.4111	10.54	.4149	10.64	.4187	10.73	.4226	10.83	.4264
	-	1.25	10.647	10.912	10.70	.4213	10.78	.4245	10.86	.4277	10.94	.4309	11.03	.4341
	-	1	10.917	11.153	10.96	.4315	11.03	.4341	11.09	.4366	11.16	.4392	11.22	.4418
	-	0.75	11.188	11.378	11.22	.4418	11.27	.4437	11.32	.4456	11.37	.4475	11.42	.4494
	-	0.5	11.459	11.599	11.48	.4520	11.51	.4533	11.55	.4545	11.58	.4558	11.61	.4571
M13	-	1.75	11.106	11.441	11.18	.4402	11.30	.4447	11.41	.4492	11.52	.4536	11.64	.4581
	-	1.5	11.376	11.676	11.44	.4504	11.54	.4543	11.64	.4581	11.73	.4619	11.83	.4658
	-	1.25	11.647	11.912	11.70	.4607	11.78	.4639	11.86	.4671	11.94	.4703	12.03	.4735
	-	1	11.917	12.153	11.96	.4709	12.03	.4735	12.09	.4760	12.16	.4786	12.22	.4811
	-	0.75	12.188	12.378	12.22	.4811	12.27	.4830	12.32	.4850	12.37	.4869	12.42	.4888
	-	0.5	12.459	12.599	12.48	.4914	12.51	.4926	12.55	.4939	12.58	.4952	12.61	.4965
M14	2	-	11.835	12.210	11.92	.4694	12.05	.4745	12.18	.4796	12.31	.4847	12.44	.4898
	-	1.5	12.376	12.676	12.44	.4898	12.54	.4936	12.64	.4975	12.73	.5013	12.83	.5052
	-	1.25	12.647	12.912	12.70	.5000	12.78	.5032	12.86	.5064	12.94	.5096	13.03	.5128
	-	1	12.917	13.153	12.96	.5103	13.03	.5128	13.09	.5154	13.16	.5179	13.22	.5205
	-	0.75	13.188	13.378	13.22	.5205	13.27	.5224	13.32	.5243	13.37	.5262	13.42	.5282
	-	0.5	13.459	13.599	13.48	.5307	13.51	.5320	13.55	.5333	13.58	.5346	13.61	.5358
M15	-	2	12.835	13.210	12.92	.5087	13.05	.5138	13.18	.5190	13.31	.5241	13.44	.5292
	-	1.5	13.376	13.676	13.44	.5292	13.54	.5330	13.64	.5369	13.73	.5407	13.83	.5445
	-	1.25	13.647	13.912	13.70	.5394	13.78	.5426	13.86	.5458	13.94	.5490	14.03	.5522
	-	1	13.917	14.153	13.96	.5496	14.03	.5522	14.09	.5548	14.16	.5573	14.22	.5599
	-	0.75	14.188	14.378	14.22	.5599	14.27	.5618	14.32	.5637	14.37	.5656	14.42	.5675
	-	0.5	14.459	14.599	14.48	.5701	14.51	.5714	14.55	.5727	14.58	.5739	14.61	.5752
M16	2	-	13.835	14.210	13.92	.5481	14.05	.5532	14.18	.5583	14.31	.5634	14.44	.5685
	-	1.5	14.376	14.676	14.44	.5685	14.54	.5724	14.64	.5762	14.73	.5801	14.83	.5839
	-	1	14.917	15.153	14.96	.5890	15.03	.5916	15.09	.5941	15.16	.5967	15.22	.5992
	-	2	14.835	15.210	14.92	.5875	15.05	.5926	15.18	.5977	15.31	.6028	15.44	.6079
	-	1.5	15.376	15.676	15.44	.6079	15.54	.6118	15.64	.6156	15.73	.6194	15.83	.6233
	-	1.25	15.647	15.912	15.70	.6181	15.78	.6213	15.86	.6245	15.94	.6277	16.03	.6309
M17	-	1	15.917	16.153	15.96	.6284	16.03	.6309	16.09	.6335	16.16	.6360	16.22	.6386
	-	0.75	16.188	16.378	16.22	.6386	16.27	.6405	16.32	.6424	16.37	.6444	16.42	.6463
	-	0.5	16.459	16.599	16.48	.6488	16.51	.6501	16.55	.6514	16.58	.6527	16.61	.6539
	2.5	-	15.294	15.744	15.40	.6064	15.56	.6128	15.73	.6192	15.89	.6256	16.05	.6319
	-	2	15.835	16.210	15.92	.6268	16.05	.6319	16.18	.6371	16.31	.6422	16.44	.6473
	-	1.5	16.376	16.676	16.44	.6473	16.54	.6511	16.64	.6550	16.73	.6588	16.83	.6626

▶ NEXT PAGE



# M/MF RECOMMENDED TAP DRILL SIZE - METRIC THREAD

Size	Pitch		Minor Diameter		Tap Drill Diameter(Cutting Tap)									
	M	MF	Min. 6H	Max. 6H	80% Thread		75% Thread		70% Thread		65% Thread		60% Thread	
					mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
M19	-	1	16.917	17.153	16.96	.6677	17.03	.6703	17.09	.6729	17.16	.6754	17.22	.6780
	-	2.5	16.294	16.744	16.40	.6457	16.56	.6521	16.73	.6585	16.89	.6649	17.05	.6713
M20	-	2	16.835	17.210	16.92	.6662	17.05	.6713	17.18	.6764	17.31	.6815	17.44	.6867
	-	1.5	17.376	17.676	17.44	.6867	17.54	.6905	17.64	.6943	17.73	.6982	17.83	.7020
	-	1.25	17.647	17.912	17.70	.6969	17.78	.7001	17.86	.7033	17.94	.7065	18.03	.7097
	-	1	17.917	18.153	17.96	.7071	18.03	.7097	18.09	.7122	18.16	.7148	18.22	.7173
	-	0.75	18.188	18.378	18.22	.7173	18.27	.7193	18.32	.7212	18.37	.7231	18.42	.7250
	-	0.5	18.459	18.599	18.48	.7276	18.51	.7289	18.55	.7301	18.58	.7314	18.61	.7327
M21	2.5	-	17.294	17.744	17.40	.6851	17.56	.6915	17.73	.6979	17.89	.7043	18.05	.7107
	-	2	17.835	18.210	17.92	.7056	18.05	.7107	18.18	.7158	18.31	.7209	18.44	.7260
	-	1.5	18.376	18.676	18.44	.7260	18.54	.7299	18.64	.7337	18.73	.7375	18.83	.7414
	-	1	18.917	19.153	18.96	.7465	19.03	.7490	19.09	.7516	19.16	.7542	19.22	.7567
	-	2.5	18.294	18.744	18.40	.7245	18.56	.7309	18.73	.7373	18.89	.7437	19.05	.7501
	-	1.5	19.376	19.676	19.44	.7654	19.54	.7692	19.64	.7731	19.73	.7769	19.83	.7807
M22	-	1	19.917	20.153	19.96	.7859	20.03	.7884	20.09	.7910	20.16	.7935	20.22	.7961
	2.5	-	19.294	19.744	19.40	.7639	19.56	.7702	19.73	.7766	19.89	.7830	20.05	.7894
	-	2	19.835	20.210	19.92	.7843	20.05	.7894	20.18	.7945	20.31	.7997	20.44	.8048
	-	1.5	20.376	20.676	20.44	.8048	20.54	.8086	20.64	.8124	20.73	.8163	20.83	.8201
	-	1	20.917	21.153	20.96	.8252	21.03	.8278	21.09	.8303	21.16	.8329	21.22	.8355
	-	0.5	21.459	21.599	21.48	.8452	21.51	.8465	21.55	.8478	21.58	.8491	21.61	.8504
M23	-	2.5	20.294	20.744	20.40	.8032	20.56	.8096	20.73	.8160	20.89	.8224	21.05	.8288
	-	2	20.835	21.210	20.92	.8237	21.05	.8288	21.18	.8339	21.31	.8390	21.44	.8441
	-	1.5	21.376	21.676	21.44	.8441	21.54	.8480	21.64	.8518	21.73	.8556	21.83	.8595
	-	1	21.917	22.153	21.96	.8646	22.03	.8672	22.09	.8697	22.16	.8723	22.22	.8748
	-	3	20.752	21.252	20.88	.8221	21.08	.8298	21.27	.8375	21.47	.8452	21.66	.8528
	-	2	21.835	22.210	21.92	.8631	22.05	.8682	22.18	.8733	22.31	.8784	22.44	.8835
M24	-	1.5	22.376	22.676	22.44	.8835	22.54	.8873	22.64	.8912	22.73	.8950	22.83	.8989
	-	1	22.917	23.153	22.96	.9040	23.03	.9065	23.09	.9091	23.16	.9116	23.22	.9142
	-	3	21.752	22.252	21.88	.8615	22.08	.8692	22.27	.8769	22.47	.8845	22.66	.8922
	-	2	22.835	23.210	22.92	.9024	23.05	.9075	23.18	.9127	23.31	.9178	23.44	.9229
	-	1.5	23.376	23.676	23.44	.9229	23.54	.9267	23.64	.9306	23.73	.9344	23.83	.9382
	-	1	23.917	24.153	23.96	.9433	24.03	.9459	24.09	.9485	24.16	.9510	24.22	.9536
M25	-	3	22.752	23.252	22.88	.9009	23.08	.9085	23.27	.9162	23.47	.9239	23.66	.9316
	-	2	23.835	24.210	23.92	.9418	24.05	.						







# UNC/UNF RECOMMENDED TAP DRILL SIZE

- UNIFIED THREAD/FORMING TAPS

Size	Minor Diameter			Minor Diameter			Tap Drill Diameter(Forming Tap)				
	Min. 2B&3B	Max. 2B	Max. 3B	Min. 2B&3B	Max. 2B	Max. 3B	75% Thread	70% Thread	65% Thread	60% Thread	55% Thread
#0	-	80	-	.0465	.0514	.0514	.0536	.0541	.0545	.0549	.0553
#1	64	-	-	.0561	.0623	.0623	.0650	.0656	.0661	.0666	.0672
	-	72	-	.0580	.0635	.0635	.0659	.0664	.0669	.0673	.0678
#2	56	-	-	.0667	.0737	.0737	.0769	.0775	.0781	.0787	.0793
	-	64	-	.0691	.0753	.0753	.0780	.0786	.0791	.0796	.0802
#3	48	-	-	.0764	.0845	.0845	.0884	.0891	.0898	.0905	.0912
	-	56	-	.0797	.0865	.0865	.0899	.0905	.0911	.0917	.0923
#4	40	-	-	.0849	.0939	.0939	.0993	.1001	.1010	.1018	.1027
	-	48	-	.0894	.0968	.0968	.1014	.1021	.1028	.1035	.1042
#5	40	-	-	.0979	.1062	.1062	.1123	.1131	.1140	.1148	.1157
	-	44	-	.1004	.1079	.1079	.1134	.1142	.1150	.1157	.1165
#6	32	-	-	.1040	.1140	.1140	.1221	.1231	.1242	.1253	.1263
	-	40	-	.1110	.1190	.1186	.1253	.1261	.1270	.1278	.1287
#8	32	-	-	.1300	.1390	.1389	.1481	.1491	.1502	.1513	.1523
	-	36	-	.1340	.1420	.1416	.1498	.1508	.1517	.1527	.1536
#10	24	-	-	.1450	.1560	.1555	.1688	.1702	.1716	.1730	.1744
	-	32	-	.1560	.1640	.1641	.1741	.1751	.1762	.1773	.1783
#12	24	-	-	.1710	.1810	.1807	.1948	.1962	.1976	.1990	.2004
	-	28	-	.1770	.1860	.1857	.1978	.1990	.2002	.2014	.2026
	-	-	32	.1820	.1900	.1895	.2001	.2011	.2022	.2033	.2043
1/4	20	-	-	.1960	.2070	.2067	.2245	.2262	.2279	.2296	.2313
	-	28	-	.2110	.2200	.2190	.2318	.2330	.2342	.2354	.2366
	-	-	32	.2160	.2240	.2229	.2341	.2351	.2362	.2373	.2383
5/16	18	-	-	.2520	.2650	.2630	.2842	.2861	.2879	.2898	.2917
	-	24	-	.2670	.2770	.2754	.2913	.2927	.2941	.2955	.2969
	-	-	32	.2790	.2860	.2847	.2966	.2976	.2987	.2998	.3008
3/8	16	-	-	.3070	.3210	.3182	.3431	.3453	.3474	.3495	.3516
	-	24	-	.3300	.3400	.3372	.3538	.3552	.3566	.3580	.3594
	-	-	32	.3410	.3490	.3469	.3591	.3601	.3612	.3623	.3633
7/16	14	-	-	.3600	.3760	.3717	.4011	.4035	.4059	.4084	.4108
	-	20	-	.3830	.3950	.3916	.4120	.4137	.4154	.4171	.4188
	-	-	28	.3990	.4070	.4051	.4193	.4205	.4217	.4229	.4241
1/2	13	-	-	.4170	.4340	.4284	.4608	.4634	.4660	.4686	.4712
	-	20	-	.4460	.4570	.4537	.4745	.4762	.4779	.4796	.4813
	-	-	28	.4610	.4700	.4676	.4818	.4830	.4842	.4854	.4866
9/16	12	-	-	.4720	.4900	.4843	.5200	.5228	.5257	.5285	.5313
	-	18	-	.5020	.5150	.5106	.5342	.5361	.5379	.5398	.5417
	-	-	24	.5170	.5270	.5244	.5413	.5427	.5441	.5455	.5469
5/8	11	-	-	.5270	.5460	.5391	.5786	.5817	.5848	.5879	.5910
	-	18	-	.5650	.5780	.5730	.5967	.5986	.6004	.6023	.6042
	-	-	24	.5800	.5900	.5869	.6038	.6052	.6066	.6080	.6094
3/4	10	-	-	.6420	.6630	.6545	.6990	.7024	.7058	.7092	.7126
	-	16	-	.6820	.6960	.6908	.7181	.7203	.7224	.7245	.7266
	-	-	20	.6960	.7070	.7037	.7245	.7262	.7279	.7296	.7313

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# UNC/UNF RECOMMENDED TAP DRILL SIZE

- UNIFIED THREAD/FORMING TAPS

Size	Minor Diameter			Minor Diameter			Tap Drill Diameter(Forming Tap)				
	Min. 2B&3B	Max. 2B	Max. 3B	Min. 2B&3B	Max. 2B	Max. 3B	75% Thread	70% Thread	65% Thread	60% Thread	55% Thread
7/8	9	-	-	.7550	.7780	.7681	.8183	.8221	.8259	.8297	.8334
	-	14	-	.7980	.8140	.8068	.8386	.8410	.8434	.8459	.8483
	-	-	20	.8210	.8320	.8287	.8495	.8512	.8529	.8546	.8563
1"	8	-	-	.8650	.8900	.8797	.9363	.9405	.9448	.9490	.9533
	-	12	-	.9100	.9280	.9198	.9575	.9603	.9632	.9660	.9688
	-	-	20	.9460	.9570	.9537	.9745	.9762	.9779	.9796	.9813
1*1/8	7	-	-	.9700	.9980	.9875	1.0521	1.0570	1.0619	1.0667	1.0716
	-	12	-	1.0350	1.0530	1.0448	1.0825	1.0853	1.0882	1.0910	1.0938
	-	-	18	1.0650	1.0780	1.0730	1.0967	1.0986	1.1004	1.1023	1.1042
1*1/4	7	-	-	1.0950	1.1230	1.1125	1.1771	1.1820	1.1869	1.1917	1.1966
	-	12	-	1.1600	1.1780	1.1698	1.2075	1.2103	1.2132	1.2160	1.2188
	-	-	18	1.1900	1.2030	1.1980	1.2217	1.2236	1.2254	1.2273	1.2292





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				
	UNC	UNF	Unified Class of Thread		American National Class of Thread		Min. All Class (Basic)	Unified Class of Thread		American National Class of Thread	
			Class 2	Class 3	Class 2B	Class 3B		Max. Class 2	Max. Class 3	Max. Class 2B	Max. Class 3B
#0	-	80	H1	H1	H2	H1	.0519	.0536	.0532	.0542	.0536
#1	64	-	H1	H1	H2	H1	.0629	.0648	.0643	.0655	.0648
#1	-	72	H1	H1	H2	H1	.0640	.0658	.0653	.0665	.0659
#2	56	-	H1	H1	H2	H1	.0744	.0764	.0759	.0772	.0765
#2	-	64	H1	H1	H2	H1	.0759	.0778	.0773	.0786	.0779
#3	48	-	H1	H1	H2	H1	.0855	.0877	.0871	.0885	.0877
#3	-	56	H1	H1	H2	H1	.0874	.0894	.8890	.0902	.0895
#4	40	-	H2	H1	H2	H2	.0958	.0982	.0975	.0991	.0982
#4	-	48	H1	H1	H2	H1	.0985	.1007	.1001	.1016	.1008
#5	40	-	H2	H1	H2	H2	.1088	.1112	.1105	.1121	.1113
#5	-	44	H1	H1	H2	H1	.1102	.1125	.1118	.1134	.1126
#6	32	-	H2	H1	H3	H2	.1177	.1204	.1196	.1214	.1204
#6	-	40	H2	H1	H2	H2	.1218	.1242	.1235	.1252	.1243
#8	32	-	H2	H1	H3	H2	.1437	.1464	.1456	.1475	.1465
#8	-	36	H2	H1	H2	H2	.1460	.1485	.1478	.1496	.1487
#10	24	-	H3	H1	H3	H3	.1629	.1662	.1653	.1672	.1661
#10	-	32	H2	H1	H3	H2	.1697	.1724	.1716	.1736	.1726
#12	24	-	H3	H1	H3	H3	.1889	.1922	.1913	.1933	.1922
#12	-	28	H3	H1	H3	H3	.1928	.1959	.1950	.1970	.1959
1/4	20	-	H3	H2	H5	H3	.2175	.2211	.2201	.2223	.2211
1/4	-	28	H3	H1	H4	H3	.2268	.2299	.2290	.2311	.2300
5/16	18	-	H3	H2	H5	H3	.2764	.2805	.2794	.2817	.2803
5/16	-	24	H3	H1	H4	H3	.2854	.2887	.2878	.2902	.2890
3/8	16	-	H3	H2	H5	H3	.3344	.3389	.3376	.3401	.3387
3/8	-	24	H3	H1	H4	H3	.3479	.3512	.3503	.3528	.3516
7/16	14	-	H5	H3	H5	H3	.3911	.3960	.3947	.3972	.3957
7/16	-	20	H3	H1	H5	H3	.4050	.4086	.4076	.4104	.4091
1/2	13	-	H5	H3	H5	H3	.4500	.4552	.4537	.4565	.4548
1/2	-	20	H3	H1	H5	H3	.4675	.4711	.4701	.4731	.4717
9/16	12	-	H5	H3	H5	H3	.5084	.5140	.5124	.5152	.5135
9/16	-	18	H3	H2	H5	H3	.5264	.5305	.5294	.5323	.5308
5/8	11	-	H5	H3	H5	H3	.5660	.5719	.5702	.5732	.5714
5/8	-	18	H3	H2	H5	H3	.5889	.5930	.5919	.5949	.5934
3/4	10	-	H5	H3	H5	H3	.6850	.6914	.6895	.6927	.6907
3/4	-	16	H3	H2	H5	H3	.7094	.7139	.7126	.7159	.7143
7/8	9	-	H6	H4	H6	H4	.8028	.8098	.8077	.8110	.8089
7/8	-	14	H4	H2	H6	H4	.8286	.8335	.8322	.8356	.8339
1	8	-	H6	H4	H6	H4	.9188	.9264	.9242	.9276	.9254
1	-	12	H4	H2	H6	H4	.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 RECOMMENDATIONS FOR CLASSES OF THREAD - METRIC

Size	Pitch	Recommended Tap for Class of Thread		Pitch Diameter Limits for Class of Thread (mm)			Pitch Diameter Limits for Class of Thread (inch)		
		4H	6H	Min. (Basic)	Max. 4H	Max. 6H	Min. (Basic)	Max. 4H	Max. 6H
M1.6	0.35	D1	D3	1.373	1.426	1.458	.05406	.05614	.05740
M2	0.40	D1	D3	1.740	1.796	1.830	.06850	.07071	.07205
M2.5	0.45	D1	D3	2.208	2.268	2.303	.08693	.08929	.09067
M3	0.50	D1	D3	2.675	2.738	2.775	.10531	.10780	.10925
M3.5	0.60	D1	D4	3.110	3.181	3.222	.12244	.12524	.12685
M4	0.70	D2	D4	3.545	3.620	3.663	.13957	.14252	.14421
M4.5	0.75	D2	D4	4.013	4.088	4.131	.15789	.16094	.16264
M5	0.80	D2	D4	4.480	4.560	4.605	.17638	.17953	.18130
M6	1.00	D3	D5	5.350	5.445	5.500	.21063	.21437	.21654
M7	1.00	D3	D5	6.350	6.445	6.500	.25000	.25374	.25591
M8	1.25	D3	D5	7.188	7.288	7.348	.28299	.28693	.28929
M10	1.50	D3	D6	9.026	9.138	9.206	.35535	.35976	.36244
M12	1.75	D3	D6	10.863	10.988	11.063	.42768	.43260	.43555
M14	2.00	D3	D7	12.701	12.833	12.913	.50004	.50524	.50839
M16	2.00	D4	D7	14.701	14.833	14.913	.57878	.58398	.58713
M20	2.50	D4	D7	18.376	18.516	18.600	.72346	.72898	.73228
M24	3.00	D4	D8	22.051	22.221	22.316	.86815	.87484	.87858
M30	3.50	D5	D9	27.727	27.907	28.007	1.09161	1.0987	1.10264
M36	4.00	D5	D9	33.402	33.592	33.702	1.31504	1.32252	1.32685