

SELECTION GUIDE



HSS-PM, HSS-E & HSS YG TAP FORMING

- For Forming Ductile Materials

Please visit [global.yg1.com/mat](http://global.yg1.com/mat) for material search

◎ : Excellent ○ : Good

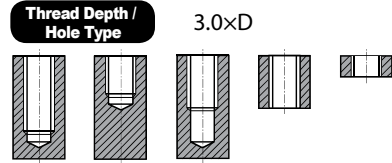
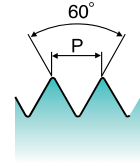
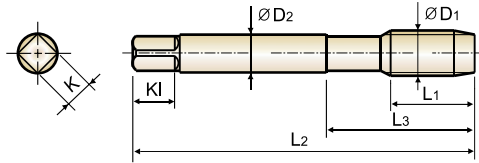
ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment	HB	HRC	HOLETYPE		
						HSS-PM	HSS-E	HSS-E
<p>Max. 3.0xD Blind / Through Hole</p>								
<p>TOOL MATERIAL</p>								
<p>CHAMFER LEAD</p>								
<p>FLUTE TYPE</p>								
<p>SPIRAL FLUTE ANGLE</p>								
<p>SERIES</p>								
<p>M</p>								
<p>M/MF</p>								
<p>UNC</p>								
<p>UNC/UNF</p>								
<p>UNC/UNF/UNS</p>								
<p>UNC/UN8</p>								
<p>NPT</p>								
<p>NPTF</p>								
<p>NPS/NPSF</p>								
<p>SURFACE TREATMENT / COATING</p>								
<p>MODEL</p>								
<p>TICN</p>								
<p>Bright</p>								
<p>Bright</p>								
<p>50-80</p>								
<p>25-50</p>								
<p>25-50</p>								
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<p>400 Rm</p>								
<p>1050 Rm</p>								
<p>550</p>								
<p>55</p>								
<p>630</p>								
<p>60</p>								
<p>400</p>								
<p>42</p>								
<p>550</p>								
<p>55</p>								

HSS-E						
4P-5P	1.5P-2P	HSS-E		4P-5P	1.5P-2P	
-	-	-	-	-	-	
-	-	-	-	-	-	
Z1 (p.B284)	Z2 (p.B284)	Z3 (p.B284)	Z4 (p.B287)	Z5 (p.B287)	Z6 (p.B287)	Z7 (p.B287)
TIN	Bright	TIN	Bright	TIN	Bright	TIN
50-80	25-50	50-80	25-50	50-80	25-50	50-80
50-80	25-50	50-80	25-50	50-80	25-50	50-80
50-80	25-50	50-80	25-50	50-80	25-50	50-80
10-35	6-30	10-35	6-30	10-35	6-30	10-35
20-50	12-35	20-50	12-35	20-50	12-35	20-50
20-50	12-35	20-50	12-35	20-50	12-35	20-50
12-15	12-15	12-15	12-15	12-15	12-15	12-15
50-65	50-65	50-65	50-65	50-65	50-65	50-65
50-65	50-65	50-65	50-65	50-65	50-65	50-65
45-90	40-65	45-90	40-65	45-90	40-65	45-90
45-90	40-65	45-90	40-65	45-90	40-65	45-90
30-65	30-65	30-65	30-65	30-65	30-65	30-65
30-65	30-65	30-65	30-65	30-65	30-65	30-65



Z4 / Z5 / Z6 / Z7 SERIES

Forming Tap with Oil Groove Plug & Bottoming Style



Material groups: **GV** HSS-E UNC UNF USCTI 302A 4P~5P Plug 1.5P~2P Bottoming Bright TiN p.B279

Unit : Inch

Size	T.P.I	EDP No.				Limit	Overall Length	Thread Length	Neck Length	Shank Diameter	Square Size	Square Length	No. of Lobe
		Plug		Bottom			L2	L1	L3	D2	K	KI	
D1		Bright	TiN	Bright	TiN								
#4 - 40UNC		Z4163	Z5163	Z6163	Z7163	H3	1.874	.563	.799	.141	.110	.190	4
#4 - 40UNC		Z4165	Z5165	Z6165	Z7165	H5	1.874	.563	.799	.141	.110	.190	4
#4 - 48UNF		Z4183	Z5183	Z6183	Z7183	H3	1.874	.563	.799	.141	.110	.190	4
#4 - 48UNF		Z4185	Z5185	Z6185	Z7185	H5	1.874	.563	.799	.141	.110	.190	4
#5 - 40UNC		Z4203	Z5203	Z6203	Z7203	H3	1.937	.626	.882	.141	.110	.190	4
#5 - 40UNC		Z4205	Z5205	Z6205	Z7205	H5	1.937	.626	.882	.141	.110	.190	4
#5 - 44UNF		Z4225	Z5225	Z6225	Z7225	H5	1.937	.626	.882	.141	.110	.190	4
#6 - 32UNC		Z4243	Z5243	Z6243	Z7243	H3	2.000	.480	.689	.141	.110	.190	4
#6 - 32UNC		Z4245	Z5245	Z6245	Z7245	H5	2.000	.480	.689	.141	.110	.190	4
#6 - 40UNF		Z4263	Z5263	Z6263	Z7263	H3	2.000	.480	.689	.141	.110	.190	4
#6 - 40UNF		Z4265	Z5265	Z6265	Z7265	H5	2.000	.480	.689	.141	.110	.190	4
#8 - 32UNC		Z4283	Z5283	Z6283	Z7283	H3	2.126	.500	.752	.168	.131	.250	4
#8 - 32UNC		Z4285	Z5285	Z6285	Z7285	H5	2.126	.500	.752	.168	.131	.250	4
#8 - 36UNF		Z4303	Z5303	Z6303	Z7303	H3	2.126	.500	.752	.168	.131	.250	4
#8 - 36UNF		Z4305	Z5305	Z6305	Z7305	H5	2.126	.500	.752	.168	.131	.250	4
#10 - 24UNC		Z4324	Z5324	Z6324	Z7324	H4	2.374	.630	.906	.194	.152	.250	4
#10 - 24UNC		Z4326	Z5326	Z6326	Z7326	H6	2.374	.630	.906	.194	.152	.250	4
#10 - 32UNF		Z4344	Z5344	Z6344	Z7344	H4	2.374	.630	.906	.194	.152	.250	4
#10 - 32UNF		Z4346	Z5346	Z6346	Z7346	H6	2.374	.630	.906	.194	.152	.250	4
#12 - 24UNC		Z4364	Z5364	Z6364	Z7364	H4	2.374	.630	.906	.220	.165	.280	4
#12 - 24UNC		Z4366	Z5366	Z6366	Z7366	H6	2.374	.630	.906	.220	.165	.280	4
1/4 - 20UNC		Z4404	Z5404	Z6404	Z7404	H4	2.500	.858	1.000	.255	.191	.310	4
1/4 - 20UNC		Z4406	Z5406	Z6406	Z7406	H6	2.500	.858	1.000	.255	.191	.310	4
1/4 - 28UNF		Z4424	Z5424	Z6424	Z7424	H4	2.500	.858	1.000	.255	.191	.310	4
1/4 - 28UNF		Z4426	Z5426	Z6426	Z7426	H6	2.720	.858	1.000	.255	.191	.310	4
5/16 - 18UNC		Z4445	Z5445	Z6445	Z7445	H5	2.720	.929	1.126	.318	.238	.380	4

► Hardslick coating is available on your request (Bright Finish EDP No + H)

► NEXT PAGE

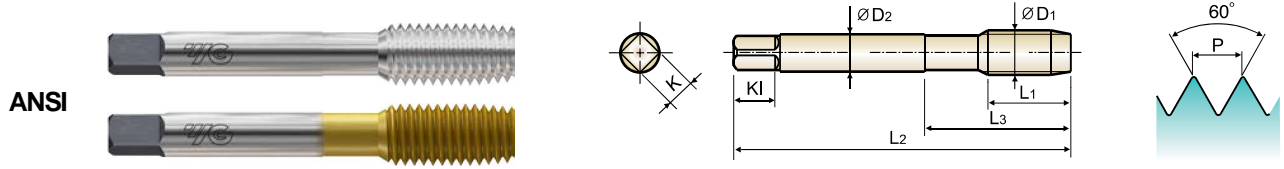
◎ : Excellent ○ : Good

ISO	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	◎	◎	◎	◎	◎							◎	◎	○						

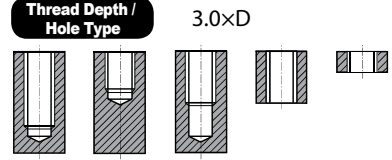
  

ISO	N										S						H				
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys						Titanium Alloys		Hardened steel	Chilled Cast iron	Hardened Cast iron
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	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	400Rm	1050Rm	550	630	400	550
Recommended	◎	◎	○	○	◎	◎	◎														

**Forming Tap with Oil Groove Plug & Bottoming Style**



Material groups: **GV** HSS-E UNC UNF USCTI 302A 4P~5P Plug 1.5P~2P Bottoming Bright TiN p.B279



Unit : Inch

Size	T.P.I	EDP No.				Limit	Overall Length L2	Thread Length L1	Neck Length L3	Shank Diameter D2	Square Size K	Square Length KI	No. of Lobe
		Plug		Bottom									
		Bright	TiN	Bright	TiN								
5/16 - 18UNC		Z4447	Z5447	Z6447	Z7447	H7	2.720	.929	1.126	.318	.238	.380	4
5/16 - 24UNF		Z4465	Z5465	Z6465	Z7465	H5	2.720	.929	1.126	.318	.238	.380	4
5/16 - 24UNF		Z4467	Z5467	Z6467	Z7467	H7	2.937	.929	1.126	.318	.238	.380	4
3/8 - 16UNC		Z4485	Z5485	Z6485	Z7485	H5	2.937	.980	1.252	.381	.286	.440	4
3/8 - 16UNC		Z4487	Z5487	Z6487	Z7487	H7	2.937	.980	1.252	.381	.286	.440	4
3/8 - 24UNF		Z4505	Z5505	Z6505	Z7505	H5	2.937	.980	1.252	.381	.286	.440	4
3/8 - 24UNF		Z4507	Z5507	Z6507	Z7507	H7	2.937	.980	1.252	.381	.286	.440	4
7/16 - 14UNC		Z4528	Z5528	Z6528	Z7528	H8	3.157	.949	1.437	.323	.242	.410	4
7/16 - 20UNF		Z4548	Z5548	Z6548	Z7548	H8	3.157	.949	1.437	.323	.242	.410	4
1/2 - 13UNC		Z4565	Z5565	Z6565	Z7565	H5	3.374	1.000	1.594	.367	.275	.440	4
1/2 - 13UNC		Z4568	Z5568	Z6568	Z7568	H8	3.374	1.000	1.594	.367	.275	.440	4
1/2 - 20UNF		Z4585	Z5585	Z6585	Z7585	H5	3.374	1.000	1.594	.367	.275	.440	4
1/2 - 20UNC		Z4588	Z5588	Z6588	Z7588	H8	3.374	1.000	1.594	.367	.275	.440	4
9/16 - 12UNC		Z4607	Z5607	Z6607	Z7607	H7	3.594	1.000	1.657	.429	.322	.500	4
9/16 - 12UNC		Z4600	Z5600	Z6600	Z7600	H10	3.594	1.000	1.657	.429	.322	.500	4
9/16 - 18UNF		Z4628	Z5628	Z6628	Z7628	H8	3.594	1.000	1.657	.429	.322	.500	4
9/16 - 18UNF		Z4620	Z5620	Z6620	Z7620	H10	3.594	1.000	1.657	.429	.322	.500	4
5/8 - 11UNC		Z4648	Z5648	Z6648	Z7648	H8	3.811	1.000	1.811	.480	.360	.560	4
5/8 - 11UNC		Z4640	Z5640	Z6640	Z7640	H10	3.811	1.000	1.811	.480	.360	.560	4
5/8 - 18UNF		Z4660	Z5660	Z6660	Z7660	H10	3.811	1.000	1.811	.480	.360	.560	4
3/4 - 10UNC		Z4700	Z5700	Z6700	Z7700	H10	4.252	1.000	2.000	.590	.442	.690	4
3/4 - 10UNC		Z470B	Z570B	Z670B	Z770B	H12	4.252	1.000	2.000	.590	.442	.690	4
3/4 - 16UNF		Z4728	Z5728	Z6728	Z7728	H8	4.252	1.000	2.000	.590	.442	.690	4
3/4 - 16UNF		Z4720	Z5720	Z6720	Z7720	H10	4.252	1.000	2.000	.590	.442	.690	4

► Hardslick coating is available on your request (Bright Finish EDP No + H)

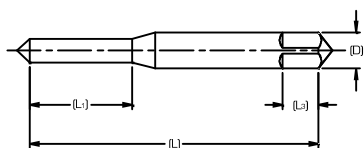
◎ : Excellent ○ : Good

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	◎	◎	◎		◎							◎	◎	○						

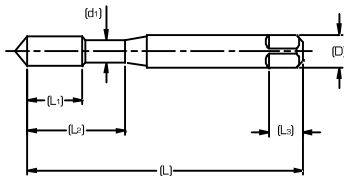
  

ISO Material Description	N										S						H				
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)		Non Metallic Materials			Heat Resistant Super Alloys						Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron
VDI 3323	21	22	23	24	25	26	27	28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

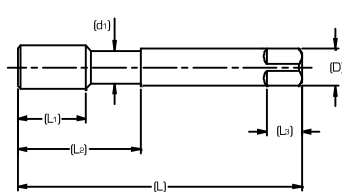
## 8 STANDARD FORMING TAP DIMENSION



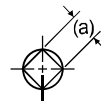
Blank Design (1)



Blank Design (2)



Blank Design (3)



### Forming Tap Blank (Inch)

Nominal Size	Overall Length (L)	Thread Length (L <sub>1</sub> )	Neck Length (L <sub>2</sub> )	Shank Diameter (D)	Square Length (L <sub>3</sub> )	Square Size (a)	Blank Design No.
#0	1.63	.31	—	.141	.19	.110	1
#1	1.69	.38	—	.141	.19	.110	1
#2	1.75	.44	—	.141	.19	.110	1
#3	1.81	.50	—	.141	.19	.110	1
#4	1.88	.56	—	.141	.19	.110	1
#5	1.94	.63	—	.141	.19	.110	1
#6	2.00	.48	.69	.141	.19	.110	1
#8	2.13	.50	.75	.168	.25	.131	1
#10	2.38	.63	.88	.194	.25	.152	1
#12	2.38	.63	.94	.220	.28	.165	1
1/4	2.50	.86	1.00	.255	.31	.191	2
5/16	2.72	.93	1.13	.318	.38	.238	2
3/8	2.94	.98	1.25	.381	.44	.286	2
7/16	3.16	.95	1.44	.323	.41	.242	3
1/2	3.38	1.00	1.60	.367	.44	.275	3
9/16	3.59	1.00	1.66	.429	.50	.322	3
5/8	3.81	1.00	1.81	.480	.56	.360	3
3/4	4.25	1.00	2.0	.590	.69	.442	3

### Forming Tap Blank (Metric)

Nominal Size	Overall Length (L)	Thread Length (L <sub>1</sub> )	Neck Length (L <sub>2</sub> )	Shank Diameter (D)	Square Length (L <sub>3</sub> )	Square Size (a)	Blank Design No.
M2	1.75	.40	—	.141	.19	.110	1
M3	1.94	.63	—	.141	.19	.110	1
M4	2.13	.50	.75	.168	.25	.131	1
M5	2.38	.63	.88	.194	.25	.152	1
M6	2.50	.86	1.0	.255	.31	.191	2
M8	2.72	.93	1.13	.318	.38	.238	2
M10	2.94	.98	1.25	.381	.44	.286	2
M12	3.38	1.00	1.60	.367	.44	.275	3



## TAP DRILL SIZES - UNIFIED THREAD / FORMING TAPS

Size	Threads Per Inch			Minor Diameter			Tap Drill Diameter (Cutting Tap)				
	UNC	UNF	UNEF	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
1/4	-	-	32	.1820	.1900	.1895	.2001	.2011	.2022	.2033	.2043
	20	-	-	.1960	.2070	.2067	.2245	.2262	.2279	.2296	.2313
	-	28	-	.2110	.2200	.2190	.2318	.2330	.2342	.2354	.2366
5/16	-	-	32	.2160	.2240	.2229	.2341	.2351	.2362	.2373	.2383
	18	-	-	.2520	.2650	.2630	.2842	.2861	.2879	.2898	.2917
	-	24	-	.2670	.2770	.2754	.2913	.2927	.2941	.2955	.2969
	-	-	-	.2740	.2820	.2807	.2943	.2955	.2967	.2979	.2991
3/8	-	-	32	.2790	.2860	.2847	.2966	.2976	.2987	.2998	.3008
	16	-	-	.3070	.3210	.3182	.3431	.3453	.3474	.3495	.3516
	-	24	-	.3300	.3400	.3372	.3538	.3552	.3566	.3580	.3594
	-	-	-	.3360	.3450	.3426	.3568	.3580	.3592	.3604	.3616
7/16	-	-	32	.3410	.3490	.3469	.3591	.3601	.3612	.3623	.3633
	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
	-	-	-	.5570	.5710	.5662	.5931	.5953	.5974	.5995	.6016
	-	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

Size	Threads Per Inch			Minor Diameter			Tap Drill Diameter (Cutting Tap)				
	UNC	UNF	UNEF	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