

Frezy do płaszczyzn



Garant 43° Octo indexable face mills for milling inserts OF.. 050405

43° indexable face mill with up to 8 edges per milling insert.

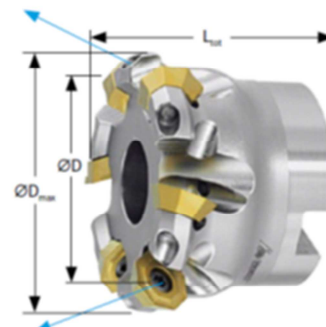
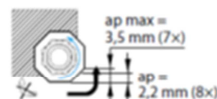
Application: Very good surface finishes are obtained due to the positive geometry. Soft-cutting indexable face mill.

Note: To use all 8 cutting edges, the insert always has to be turned in the indicated direction.

Standard application values for $a_e = 0.5 \dots 1 \times D$.

$a_{p \max} = 2.2 \text{ mm}$ ($Z = 8$).

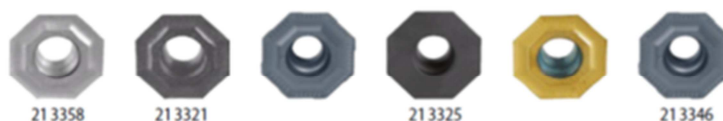
$a_{p \max} = 3.5 \text{ mm}$ ($Z = 7$).



a_e / D	0,5 ... 10	0,3	0,1
Correction factor f_z	1	1,4	2,2

$\varnothing D$ / number of teeth Z	21 3300	$\varnothing D_{\max}$	L_{tot}	Mounting bore $\varnothing$	Pack of insert screws
mm	Indexable face mill 43° Octo with bore	mm	mm	mm	
32/3	XXX	41	40	16	219808 (15IP; 3.8 Nm)
40/5	XXX	49	40	16	219808 (15IP; 3.8 Nm)
50/4	XXX	59	40	22	219808 (15IP; 3.8 Nm)
50/6	XXX	59	40	22	219808 (15IP; 3.8 Nm)
63/5	XXX	72	40	22	219808 (15IP; 3.8 Nm)
63/7	XXX	72	40	22	219808 (15IP; 3.8 Nm)
80/6	XXX	89	50	27	219808 (15IP; 3.8 Nm)
100/7	XXX	109	50	32	219808 (15IP; 3.8 Nm)
125/8	XXX	134	63	40	219808 (15IP; 3.8 Nm)

Suitable for/ v _c [m/min]	Alu plates	Alu 	Alu cast > 10 % Si									INOX	INOX	Ti	GG(G)	CuZn	Graphite GRP CRP	Uni					
ISO code	N	N	N	P	P	P	P	P	H	H	H	M	M	S	K	N	N						
21 3358	1350	1150	700													690				●	○	○	
21 3361	1350	1350	950														●			●		○	
21 3320				280	260	200	135	110				160	145		170					○		●	
21 3321				350	240	210	200	180				220	140		160				●		●		●
21 3322						250	180	150											○			●	
21 3324				275	250	190	160	130				160	110		140					○		○	
21 3325				390	275	245	230	210				280	180		180				●		○		●
21 3340	795	720	645	260	185	150	140	135				190	120	45	120				○	●	○		
21 3345				300	210	180	170	160				210	130	45	140				●	●	●		○
21 3346			280	280	270	240	160	120	60	40	30	230	170	45	150	400	○	●		○	●	●	○



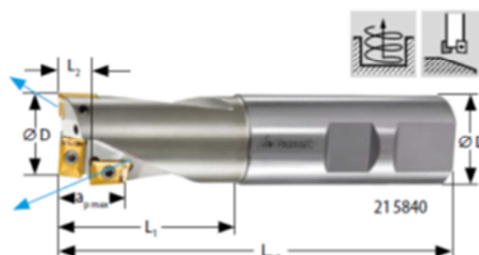
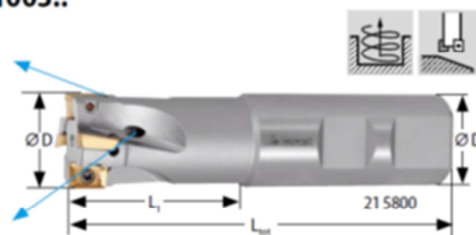
Type	ALU	ST900	ST1100	ST1400	INOX	UNI	
21 3358	OFMT 050405 TN	HU7815	XXX	—	—	—	10
21 3361	OFMT 050405 diamond-coated	HB7810	XXX	—	—	—	1
21 3320		HB7525	—	XXX	—	—	10
21 3321	OFMT 050405 TR	HB7525	—	XXX	—	—	10
21 3322		HB8520	—	—	XXX	—	10
21 3324	OFEW 050405 TR	HB7520	—	—	XXX	—	10
21 3325	OFEW 050405 TN	HB7515	—	—	XXX	—	10
21 3340	OFMT 050405 TR	HB7635	—	—	—	XXX	10
21 3345	XDHW 050405	HB735	—	—	—	XXX	10
21 3346	OFMT 050405 TR	HB720	—	—	—	XXX	10
f_z	mm	0.18	0.17	0.15	0.14	0.14	●

Frezy składowe



90° high-performance indexable end mill MTC for AP.. 1003..

$\varnothing D /$ number of teeth Z	21 5800	L_1	L_{tot}	$\varnothing D_1$ h6	Pack of insert screws
mm	Indexable end mill 90° Weldon shank	mm	mm	mm	
10/1	XXX	28	80	16	219814 (8IP; 1.2 Nm)
12/1	XXX	28	80	16	219814 (8IP; 1.2 Nm)
14/1	XXX	37	85	16	219814 (8IP; 1.2 Nm)
16/2	XXX	37	85	16	219814 (8IP; 1.2 Nm)
18/2	XXX	40	90	20	219814 (8IP; 1.2 Nm)
20/2S	XXX	40	200	18	219814 (8IP; 1.2 Nm)
20/2	XXX	40	90	20	219814 (8IP; 1.2 Nm)
20/2L	XXX	50	150	20	219814 (8IP; 1.2 Nm)
20/3	XXX	40	90	20	219814 (8IP; 1.2 Nm)
25/2	XXX	55	220	20	219814 (8IP; 1.2 Nm)
25/2L	XXX	55	170	25	219814 (8IP; 1.2 Nm)
25/3	XXX	49	105	25	219814 (8IP; 1.2 Nm)
25/4	XXX	49	105	25	219814 (8IP; 1.2 Nm)
32/3L	XXX	55	195	25	219814 (8IP; 1.2 Nm)
32/5	XXX	54	110	25	219814 (8IP; 1.2 Nm)

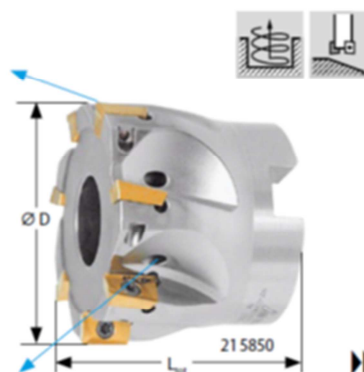


Application:

21 5840 – For drilling and for machining of slots.

$\varnothing D / Z_{eff}$	21 5840	number of effective inserts Z_{eff}	Number of inserts	$a_{p,max}$	L_1	L_2	L_{tot}	$\varnothing D_1$ h6	Pack of insert screws
mm	Indexable end mill 90° Weldon shank			mm	mm	mm	mm	mm	
20/2	XXX	2	3	17	35	9	90	20	219814 (8IP; 1.2 Nm)
25/2	XXX	2	3	19	50	9	110	25	219814 (8IP; 1.2 Nm)

$\varnothing D /$ number of teeth Z	21 5850	L_{tot}	Mounting bore $\varnothing$	suitable indexable insert	Pack of insert screws
mm	Indexable end mill 90° with bore	mm	mm		
40/4	XXX	40	16	AP.. 1003..	219814 (8IP; 1.2 Nm)
40/6	XXX	40	16	AP.. 1003..	219814 (8IP; 1.2 Nm)
50/6	XXX	40	22	AP.. 1003..	219814 (8IP; 1.2 Nm)
50/7	XXX	40	22	AP.. 1003..	219814 (8IP; 1.2 Nm)
63/8	XXX	40	22	AP.. 1003..	219814 (8IP; 1.2 Nm)
63/9	XXX	40	22	AP.. 1003..	219814 (8IP; 1.2 Nm)
80/10	XXX	50	27	AP.. 1003..	219814 (8IP; 1.2 Nm)
100/12	XXX	50	32	AP.. 1003..	219814 (8IP; 1.2 Nm)





Inserts with highly positive geometry and helical cutting edges.

Note: Standard application values apply for milling cutters No. 215800, 215850, 215870: for $a_e = 0.3 \times D / a_{p \max} = 4.8 \text{ mm}$.

Suitable for/ v_c [m/min]	Alu plastics c/202	Alu cast c/202	Alu cast > 10 % Si	< 500 N	< 750 N	< 900 N	< 1100 N	< 1400 N	< 55 HRC	< 60 HRC	< 65 HRC	INOX < 900 N	INOX > 900 N	Ti > 850 N	GG(G)	CuZn	Graphite GRP CRP	Uni					
ISO code	N	N	N	P	P	P	P	P	H	H	H	M	M	S	K	N	N						
21 5939/5935	700	600	400											50		500	400						
21 5944	1200	1200	450																				
21 5877				390	270	230	220	200				250	160		180								
21 5879/5885				180	160	150	80	75	65	60					220								
21 5918–21 5928	700	600		440	310	260	250	230				320	210		210								
21 5880				180	160	150	130	110				90	80	50									
21 5881	1200	400	250	300	250	240	160	125				180	160		220								
21 5882				320	180	160	120	80				190	180	40	170	280	80						
				330	255	205	175	150				220	155	50									



Type			ALU	ST900	ST1400	INOX	UNI		Worktop thickness mm
21A 21 5935	APGT 1003 PDTR	new HU7815	XXX	–	–	–	–	10	3.05
21A 21 5939	APHT 100304 FR	HU7815	XXX	–	–	–	–	10	3.18
21A 21 5944	APGT 1003 PDTR	HB7805	XXX	–	–	–	–	10	3.18
21A 21 5946	APMT 100305 TR	HB7525	–	XXX	–	–	–	10	3.5
21A 21 5947	APMT 100308 TR	HB7525	–	XXX	–	–	–	10	3.5
21A 21 5879	APMT 100305 TR	HB7515	–	–	XXX	–	–	10	3.5
21A 21 5885	APMT 100308 TR	HB7515	–	–	XXX	–	–	10	3.5
21A 21 5918	APMT 100302 TR	HB7635	–	–	–	XXX	–	10	3.5
21A 21 5920	APMT 100305 TR	HB7635	–	–	–	XXX	–	10	3.5
21A 21 5922	APMT 100308 TR	HB7635	–	–	–	XXX	–	10	3.5
21A 21 5924	APMT 100312 TR	HB7635	–	–	–	XXX	–	10	3.5
21A 21 5928	APMT 100320 TR	HB7635	–	–	–	XXX	–	10	3.5
21A 21 5880	APMT 100305 TR	HB7520	–	–	–	–	XXX	10	3.55
21A 21 5881	APLX 1003 PDTR	HB720	–	–	–	–	XXX	10	3.18
21A 21 5882	APMT 100305 TR	HB735	–	–	–	–	XXX	10	3.5
f_z		mm	0.12	0.12	0.1	0.12	●		

Frezy monolityczne



Frezy trzpieniowe VHM

Wymiary zbliżone do DIN 6527.

Ulepszona powłoka dla uniwersalnych zastosowań w stali i żeliwie.

Wskazówka:

20 2290 – następca produktu nr 20 2280.

20 2294 – następca produktu nr 20 2320.

20 2296 – następca produktu nr 20 2370.

[illegible]

Ø e8 D _c	HRC 20 2290				HRC 20 2292				HRC 20 2294				HRC 20 2296					kształt chwytu			
	ZuGarant				HOLEX.																
	Frezy trzpieniowe YHM																				
mm	AlCrN	AlCrN	AlCrN	AlCrN	mm	mm	mm	mm	mm	20 2294	mm	mm	mm								
1	XXX	XXX	XXX	—	3	—	—	50	3	HA	0,1	0,005	0,006								
1,2	XXX	XXX	XXX	—	4	—	—	50	3	HA	0,1	0,005	0,006								
1,5	XXX	XXX	XXX	—	4	—	—	50	3	HA	0,1	0,005	0,006								
1,8	XXX	XXX	XXX	—	5	—	—	50	3	HA	0,1	0,005	0,006								
2	XXX	XXX	XXX	—	5	—	—	50	3	HA	0,1	0,01	0,011								
2,5	XXX	XXX	XXX	—	6	—	—	50	6	HB	0,1	0,01	0,011								
3	XXX	XXX	XXX	XXX	8	15	2,8	57	6	HB	0,13	0,02	0,025								
3,5	XXX	XXX	XXX	XXX	11	15	3,3	57	6	HB	0,13	0,02	0,025								
4	XXX	XXX	XXX	XXX	11	15	3,8	57	6	HB	0,18	0,02	0,025								
4,5	XXX	XXX	XXX	XXX	13	21	4,3	57	6	HB	0,18	0,02	0,025								
5	XXX	XXX	XXX	XXX	13	21	4,8	57	6	HB	0,2	0,03	0,04								
5,5	XXX	XXX	XXX	XXX	13	21	5,3	57	6	HB	0,2	0,03	0,04								
5,75	XXX	XXX	XXX	XXX	13	21	5,55	57	6	HB	0,2	0,03	0,04								
6	XXX	XXX	XXX	XXX	13	21	5,8	57	6	HB	0,2	0,04	0,05								
6,5	XXX	XXX	XXX	XXX	16	27	6,3	63	8	HB	0,2	0,04	0,05								
7	XXX	XXX	XXX	XXX	16	27	6,8	63	8	HB	0,2	0,04	0,05								
7,5	XXX	XXX	XXX	XXX	19	27	7,3	63	8	HB	0,2	0,04	0,05								
8	XXX	XXX	XXX	XXX	19	27	7,8	63	8	HB	0,2	0,05	0,08								
8,5	XXX	XXX	XXX	XXX	19	32	8,3	72	10	HB	0,3	0,05	0,08								
9	XXX	XXX	XXX	XXX	19	32	8,8	72	10	HB	0,3	0,05	0,08								
9,5	XXX	XXX	XXX	XXX	22	32	9,3	72	10	HB	0,3	0,05	0,08								
10	XXX	XXX	XXX	XXX	22	32	9,8	72	10	HB	0,3	0,06	0,09								
12	XXX	XXX	XXX	XXX	26	38	11,8	83	12	HB	0,3	0,07	0,1								
14	XXX	XXX	XXX	XXX	26	38	13,8	83	14	HB	0,3	0,07	0,1								
16	XXX	XXX	XXX	XXX	32	44	15,7	92	16	HB	0,4	0,08	0,13								
18	XXX	XXX	XXX	XXX	32	44	17,7	92	18	HB	0,4	0,09	0,15								
20	XXX	XXX	XXX	XXX	38	54	19,7	104	20	HB	0,5	0,1	0,15								

Nawiertaki



Garant NC spotting drill plain shank

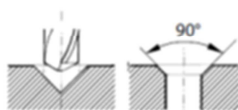
≥ Ø 6 mm with drive flat to DIN 1835-B.

Centred point grinding with thin chisel edge - gives easy spot drilling and high accuracy of the centre hole form. Very sturdy due to short flutes.

11 2010/2060 – High-performance NC spotting drill.

Tool substrate made of sintered powder metallurgy for applications demanding high standards of tool life and accurate centring. Very good wear resistance in stainless steels.

Note: Use speed for the actual hole Ø (not necessarily the speed for the drill outer Ø).



HSS E



Suitable for/ v _c [m/min]	Alu plastics cast	Alu cast > 10% Si	Alu cast > 10% Si	Cast < 500 N	Cast < 750 N	Cast < 900 N	Cast < 1100 N	Cast < 1400 N	Cast < 55 HRC	Cast < 60 HRC	Cast < 65 HRC	Cast < 67 HRC	INOX < 900 N	INOX > 900 N	Ti > 850 N	Gg(G) > 850 N	CuZn > 850 N	Uni	Oil	Water	Air	Gas	Steam
ISO code	N	N	N	P	P	P	P	P	H	H	H	H	M	M	S	K	N						
11 2000	70	45		40	30	25	10	8					12	8			80	●	●	●	●	●	●
11 2010	80	50		45	33	28	12	10					14	10			88	●	●	●	●	●	●
11 2020/2100	87	56	50	50	37	31	12	10					15	10	6	31	100	●	●	●	●	●	●
11 2060	96	62	55	55	42	35	14	12					18	13	8	35	112	●	●	●	●	●	●

Ø h6	11 2000	11 2010	11 2020	11 2060	11 2100					
	NC spotting drill HSS-E	NC spotting drill HSS-E-PM	NC spotting drill HSS-E	NC spotting drill HSS-E-PM	NC spotting drill HSS-E					
	90° N									
	TiAlN									
mm						mm	mm	mm	mm	mm/rev
3	XXX	XXX	XXX	XXX	XXX	12	46	80	3	0.03
4	XXX	XXX	XXX	XXX	XXX	12	55	100	4	0.03
5	XXX	XXX	XXX	XXX	XXX	15	60	120	5	0.04
6	XXX	XXX	XXX	XXX	XXX	20	66	140	6	0.05
8	XXX	XXX	XXX	XXX	XXX	25	79	140	8	0.07
10	XXX	XXX	XXX	XXX	XXX	25	89	170	10	0.07
12	XXX	XXX	XXX	XXX	XXX	30	102	170	12	0.07
16	XXX	XXX	XXX	XXX	XXX	35	115	200	16	0.07
20	XXX	XXX	XXX	XXX	XXX	40	131	200	20	0.07



11 3020 – Bright finish flutes, nitrided lands.

Advantage: Ideal for drilling shallow holes (approx. 2 - 4×D) on NC machines and automatic machines.



Ø h8	11 3020		11 3140					f	mm/rev	Ø h8	11 3020		11 3140					f	mm/rev
	Stub drill FS										Stub drill FS								
	HSS-E		HSS-Co8								HSS-E		HSS-Co8						
mm					mm	L _{min}				mm					mm	L _{min}			
1	XXX	XXX	10	6	26	0.03	7,3	XXX	XXX	10	34	74	0.07						
1,1	XXX	XXX	10	7	28	0.03	7,4	XXX	—	10	34	74	0.07						
1,2	XXX	XXX	10	8	30	0.03	7,45	XXX	—	10	34	74	0.07						
1,3	XXX	XXX	10	8	30	0.03	7,5	XXX	XXX	10	34	74	0.07						
1,4	XXX	XXX	10	9	32	0.03	7,6	XXX	—	5	37	79	0.07						
1,5	XXX	XXX	10	9	32	0.03	7,7	XXX	XXX	5	37	79	0.07						
1,6	XXX	XXX	10	10	34	0.03	7,8	XXX	XXX	5	37	79	0.07						
1,7	XXX	XXX	10	10	34	0.03	7,9	XXX	XXX	5	37	79	0.07						
1,8	XXX	XXX	10	11	36	0.03	8	XXX	XXX	5	37	79	0.1						
1,9	XXX	XXX	10	11	36	0.03	8,1	XXX	XXX	5	37	79	0.1						
2	XXX	XXX	10	12	38	0.03	8,2	XXX	XXX	5	37	79	0.1						
2,1	XXX	XXX	10	12	38	0.03	8,3	XXX	XXX	5	37	79	0.1						
2,2	XXX	XXX	10	13	40	0.03	8,4	XXX	XXX	5	37	79	0.1						
2,3	XXX	XXX	10	13	40	0.03	8,5	XXX	XXX	5	37	79	0.1						
2,4	XXX	XXX	10	14	43	0.03	8,6	XXX	XXX	5	40	84	0.1						
2,5	XXX	XXX	10	14	43	0.03	8,7	XXX	XXX	5	40	84	0.1						
2,6	XXX	XXX	10	14	43	0.03	8,8	XXX	XXX	5	40	84	0.1						
2,7	XXX	XXX	10	16	46	0.03	8,9	XXX	—	5	40	84	0.1						
2,8	XXX	XXX	10	16	46	0.03	9	XXX	XXX	5	40	84	0.1						
2,9	XXX	XXX	10	16	46	0.03	9,1	XXX	XXX	5	40	84	0.1						
3	XXX	XXX	10	16	46	0.03	9,2	XXX	XXX	5	40	84	0.1						
3,1	XXX	XXX	10	18	49	0.03	9,25	XXX	—	5	40	84	0.1						
3,2	XXX	XXX	10	18	49	0.03	9,3	XXX	XXX	5	40	84	0.1						
3,3	XXX	XXX	10	18	49	0.03	9,4	XXX	XXX	5	40	84	0.1						
3,4	XXX	XXX	10	20	52	0.03	9,5	XXX	XXX	5	40	84	0.1						
3,5	XXX	XXX	10	20	52	0.03	9,6	XXX	—	5	43	89	0.1						
3,6	XXX	XXX	10	20	52	0.03	9,7	XXX	—	5	43	89	0.1						
3,7	XXX	XXX	10	20	52	0.03	9,8	XXX	XXX	5	43	89	0.1						
3,8	XXX	XXX	10	22	55	0.03	9,9	XXX	XXX	5	43	89	0.1						
3,9	XXX	XXX	10	22	55	0.03	10	XXX	XXX	5	43	89	0.1						
4	XXX	XXX	10	22	55	0.03	10,1	XXX	—	5	43	89	0.1						
4,1	XXX	XXX	10	22	55	0.03	10,2	XXX	XXX	5	43	89	0.1						
4,2	XXX	XXX	10	22	55	0.03	10,3	XXX	—	5	43	89	0.1						
4,3	XXX	XXX	10	24	58	0.03	10,5	XXX	—	5	43	89	0.1						
4,4	XXX	XXX	10	24	58	0.03	10,8	XXX	—	5	47	95	0.1						
4,5	XXX	XXX	10	24	58	0.03	11	XXX	XXX	5	47	95	0.1						
4,6	XXX	XXX	10	24	58	0.03	11,2	XXX	—	5	47	95	0.1						
4,65	XXX	—	10	24	58	0.03	11,3	XXX	—	5	47	95	0.1						
4,7	XXX	XXX	10	24	58	0.03	11,5	XXX	XXX	5	47	95	0.1						
4,8	XXX	XXX	10	26	62	0.03	11,8	XXX	XXX	5	47	95	0.1						
4,9	XXX	XXX	10	26	62	0.03	12	XXX	XXX	5	51	102	0.16						
5	XXX	XXX	10	26	62	0.07	12,5	XXX	—	5	51	102	0.16						
5,1	XXX	XXX	10	26	62	0.07	12,8	XXX	—	5	51	102	0.16						
5,2	XXX	XXX	10	26	62	0.07	13	XXX	—	5	51	102	0.16						
5,3	XXX	XXX	10	26	62	0.07	13,3	XXX	—	5	54	107	0.16						
5,4	XXX	XXX	10	28	66	0.07	13,5	XXX	—	5	54	107	0.16						
5,5	XXX	XXX	10	28	66	0.07	13,8	XXX	—	5	54	107	0.16						
5,55	XXX	XXX	10	28	66	0.07	14	XXX	—	5	54	107	0.16						
5,6	XXX	XXX	10	28	66	0.07	14,5	XXX	—	5	56	111	0.16						
5,7	XXX	XXX	10	28	66	0.07	14,8	XXX	—	5	56	111	0.16						
5,8	XXX	XXX	10	28	66	0.07	15	XXX	—	5	56	111	0.16						
5,9	XXX	XXX	10	28	66	0.07	15,3	XXX	—	5	58	115	0.16						
6	XXX	XXX	10	28	66	0.07	15,5	XXX	—	5	58	115	0.16						
6,1	XXX	XXX	10	31	70	0.07	15,75	XXX	—	5	58	115	0.16						
6,2	XXX	XXX	10	31	70	0.07	16	XXX	—	1	58	115	0.2						
6,3	XXX	XXX	10	31	70	0.07	16,5	XXX	—	1	60	119	0.2						
6,4	XXX	XXX	10	31	70	0.07	17	XXX	—	1	60	119	0.2						
6,5	XXX	XXX	10	31	70	0.07	17,5	XXX	—	1	62	123	0.2						
6,6	XXX	XXX	10	31	70	0.07	17,75	XXX	—	1	62	123	0.2						
6,7	XXX	XXX	10	31	70	0.07	18	XXX	—	1	62	123	0.2						
6,8	XXX	XXX	10	34	74	0.07	18,5	XXX	—	1	64	127	0.2						
6,9	XXX	XXX	10	34	74	0.07	19	XXX	—	1	64	127	0.2						
7	XXX	XXX	10	34	74	0.07	19,5	XXX	—	1	66	131	0.2						
7,1	XXX	XXX	10	34	74	0.07	19,75	XXX	—	1	66	131	0.2						
7,2	XXX	XXX	10	34	74	0.07	20	XXX	—	1	66	131	0.2						

Pogłębiacze

Countersink 90°



Suitable for/ v _c [m/min]	Alu plastics v _c 222	Alu cast v _c 250	Alu cast > 10% Si v _c 250	< 500 N	< 750 N	< 900 N	< 1100 N	< 1400 N	< 55 HRC	< 60 HRC	< 65 HRC	< 67 HRC	< 70 HRC	INOX < 900 N	INOX > 900 N	Ti > 850 N	CuZn	Uni					
ISO code	N	N	N	P	P	P	P	P	H	H	H	H	H	M	M	S	N						
15 0150/0152	70	33		28	27	27								9	8		80	•	•	•	•	•	•
15 0170			25	34	32	32												•	•	•	•	•	•
15 0175	70	33		28	27	27	8											•	•	•	•	•	•
15 0180		38		34	32	32								9			80	•	•	•	•	•	•

Countersink 90°



All countersinks have 3 cutting edges, radially relieved. Flutes are ground from solid.

15 0150/0152 – High-precision countersink, produced with tight manufacturing tolerances similar to DIN 335-C.

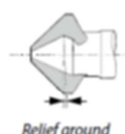
15 0152 – Three **drive flats on the shank** for use in a 3-jaw chuck.

15 0170 – Precision countersink for considerable performance improvement.

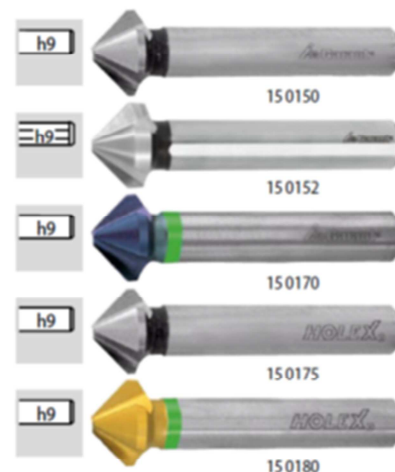
15 0175 – Economy countersink version.

15 0180 – Economy version, improved performance due to coating.

Application: High precision countersinks for chatter-free countersinking.



Three-flute countersinks for accurate centring.



External Ø	15 0150	15 0152	15 0170	15 0175	15 0180	smallest countersink Ø for holes from	L _{tot}	L _{cut}	for counter- sunk screws ISO 2009, 2010, 7046, 7047	for counter- sunk screws DIN 7991	f mm/rev
mm	High-precision countersink			Countersink		mm	mm	mm			
			90°								
			TiAlN		TiN						
4,3	XXX	—	XXX	XXX	—	1.3	40	4	M2	—	0.07
5	XXX	—	XXX	XXX	XXX	1.5	40	4	M2.5	—	0.07
6	XXX	XXX	XXX	XXX	XXX	1.5	45	5	M3	—	0.09
6,3	XXX	XXX	XXX	XXX	XXX	1.5	45	5	—	M3	0.09
7	XXX	XXX	XXX	XXX	—	1.8	50	6	M3.5	—	0.09
8	XXX	XXX	XXX	XXX	XXX	2	50	6	M4	—	0.09
8,3	XXX	XXX	XXX	XXX	XXX	2	50	6	—	M4	0.09
10	XXX	XXX	XXX	XXX	XXX	2.5	50	6	M5	—	0.12
10,4	XXX	XXX	XXX	XXX	XXX	2.5	50	6	—	M5	0.12
11,5	XXX	XXX	XXX	XXX	XXX	2.8	56	8	M6	—	0.12
12,4	XXX	XXX	XXX	XXX	XXX	2.8	56	8	—	M6	0.12
15	XXX	XXX	XXX	XXX	XXX	3.2	60	10	M8	—	0.12
16,5	XXX	XXX	XXX	XXX	XXX	3.2	60	10	—	M8	0.14
19	XXX	XXX	XXX	XXX	XXX	3.5	63	10	M10	—	0.14
20,5	XXX	XXX	XXX	XXX	XXX	3.5	63	10	—	M10	0.16
23	XXX	XXX	XXX	XXX	XXX	3.8	67	10	M12	—	0.16
25	XXX	XXX	XXX	XXX	XXX	3.8	67	10	—	M12	0.2
31	XXX	XXX	XXX	XXX	XXX	4.2	71	12	—	M16	0.2
40	XXX	XXX	XXX	—	—	10	75	12	—	—	0.25

Gwintowniki



Through hole machine tap

Spiral point with oil grooves.

Guide section with oil grooves, but without chip flutes.

13 2640 – Size M1.7, M2.3, and M2.6 with old DIN profile.

13 2700/2705 – Low tendency to edge build-up.

13 2700 – (Form CS) 2 – 3 turns chamfer lead – **With spiral point.**

13 2720 – For particularly high hardness and toughness expectations.

13 2722 – **All sizes: Shank to DIN 376 (= shank Ø relieved);**

thus suitable for greater operating depths.

Tolerance class: ISO2X / 6HX.

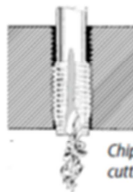
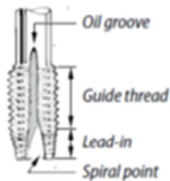
13 2725 – **Tolerance class: ISO 3 / 6G**

= with oversize approx. 0.02 – 0.04 mm.

Advantage: Particularly strong, optimal self-guidance.

Application:

13 2725 – For components which are **galvanised** after threading or shrink slightly when hardened.



Chip evacuation in the cutting direction.

DIN 371	DIN 376	ISO 1 4H	ISO 2 6H
≤ M10 except for 13 2722	≥ M12	≤ M1.4	≥ M1.6



Suitable for/ v _c [m/min]	Alu plastics ISO 222	Alu cast 10% Si	Alu cast < 500 N	Alu cast < 750 N	Alu cast < 900 N	Alu cast < 1100 N	Alu cast < 1400 N	Alu cast < 55 HRC	Alu cast < 60 HRC	Alu cast < 65 HRC	Alu cast < 67 HRC	Alu cast < 70 HRC	INOX < 900 N	INOX > 900 N	Ti > 850 N	CuZn	Uni	Steel	Cast Iron	Brass
ISO code	N	N	N	P	P	P	P	H	H	H	H	H	M	M	S	N				
13 2640		13		15	15	15	6						6				13	●	●	○
13 2645		11		12	8	7	4						4				12	●	●	○
13 2700/2720		16		20	19	19	9						8				16	●	●	○
13 2705		14		14	10	9	5						5				14	●	●	○
13 2722/2725		28		27	23	23	13						10				28	●	●	○

M	13 2640	13 2645	13 2700	13 2705	13 2720	13 2722	13 2725				
	HSS-E Form B	HSS-E Form B	HSS-E Form CS	HSS-E Form B	HSS-E Form B	HSS-E-PM Form B DIN 376 6HX	HSS-E-PM Form B 6G				
	vaporised	vaporised	TiN	TiN	TiCN	TiCN	TiAlN				
M1	XXX	—	—	—	—	—	—	0.25	40	2.5	—
M1.2	XXX	—	—	—	—	—	—	0.25	40	2.5	—
M1.4	XXX	—	—	—	—	—	—	0.3	40	2.5	—
M1.6	XXX	—	—	—	—	—	—	0.35	40	2.5	—
M1.7	XXX	—	—	—	—	—	—	0.35	40	2.5	—
M1.8	XXX	—	—	—	—	—	—	0.35	40	2.5	—
M2	XXX	—	—	—	—	—	—	0.4	45	2.8	—
M2.2	XXX	—	—	—	—	—	—	0.45	45	2.8	—
M2.3	XXX	—	—	—	—	—	—	0.4	45	2.8	—
M2.5	XXX	—	—	—	—	—	—	0.45	50	2.8	—
M2.6	XXX	—	—	—	—	—	—	0.45	50	2.8	—
M3	XXX	XXX	XXX	XXX	XXX	—	XXX	0.5	56	3.5	—
M3.5	XXX	—	—	—	—	—	—	0.6	56	4	—
M4	XXX	XXX	XXX	XXX	XXX	XXX	XXX	0.7	63	4.5	2.8
M5	XXX	XXX	XXX	XXX	XXX	XXX	XXX	0.8	70	6	3.5
M6	XXX	XXX	XXX	XXX	XXX	XXX	XXX	1	80	6	4.5
M7	XXX	—	—	—	—	—	—	1	80	7	—
M8	XXX	XXX	XXX	XXX	XXX	XXX	XXX	1.25	90	8	6
M10	XXX	XXX	XXX	XXX	XXX	XXX	XXX	1.5	100	10	7
M12	XXX	XXX	XXX	XXX	XXX	—	XXX	1.75	110	9	—
M14	XXX	—	XXX	—	—	—	—	2	110	11	—
M16	XXX	—	XXX	—	XXX	—	XXX	2	110	12	—
M18	XXX	—	—	—	—	—	—	2.5	125	14	—
M20	XXX	—	—	—	—	—	XXX	2.5	140	16	—
M22	XXX	—	—	—	—	—	—	2.5	140	18	—
M24	XXX	—	—	—	—	—	—	3	160	18	—
M27	XXX	—	—	—	—	—	—	3	160	20	—
M30	XXX	—	—	—	—	—	—	3.5	180	22	—

Frezy kuliste



Frezy kuliste VHM



e8



207106



f8



207115



h10



207125

Przydatność/ v _c [m/min]	Al termoplast.	Al 	Al-Si odlew > 10 % Si										INOX	INOX	GG(G)	Cu-Zn	uniw.					
	N	N	P	P	P	P	H	H	H	H	H	H	M	M	K	N	●	●	○	○	○	○
20 7106	230	180	140	90	80	70	45						40	35	70	160	●	●	○			
20 7115/7125		350	250	160	140	130	80	70	50				80	70	120	320	●	●	○	○	○	○

Ø D _c	1X 20 7106		1X 20 7115		1X 20 7125		 L ₂		 L ₄		 Ø D ₄ L _{calc}		 f _z		 f _z < 900 N	
	Frezy kuliste VHM						20 7106 20 7115	20 7125	20 7106 20 7115	20 7106 20 7115						
	mm		TiAlN	TiAlN			mm	mm	mm	mm	mm	mm	mm	mm		
1	26,34	37,15	17,42			2	3	3	0,95	50	6	0,006	0,006			
1,2	26,34	38,76	18,86			2	3	3	1,15	50	6	0,006	0,006			
1,5	26,34	37,15	17,42			2	4	5	1,44	50	6	0,006	0,006			
1,8	—	38,76	18,86			2	5	5,5	1,74	50	6	0,006	0,006			
2	26,34	37,15	17,42			2	5	6	1,92	50	6	0,011	0,013			
2,5	—	37,15	—			5	—	9	2,42	50	6	0,011	0,013			
3	31,74	37,15	17,42			5	5	9	2,9	50	6	0,011	0,013			
4	31,05	37,15	17,42			8	8	12	3,9	54	6	0,023	0,025			
5	31,74	37,15	17,42			9	9	15	4,9	54	6	0,023	0,025			
6	31,05	37,15	17,42			10	10	17	5,9	54	6	0,033	0,037			
8	36,57	48,65	23,46			11	12	19	7,8	58	8	0,045	0,051			
10	46,69	54,40	35,88			14	14	26	9,8	66	10	0,06	0,068			
12	62,10	72,91	46,81			16	16	28	11,8	73	12	0,08	0,09			
14	—	108,33	—			18	—	30	13,8	75	14	0,08	0,09			
16	109,48	135,70	76,13			22	22	32	15,7	82	16	0,1	0,113			
18	—	160,43	—			24	—	35	17,7	84	18	0,1	0,113			
20	175,38	210,45	124,78			26	26	40	19,7	92	20	0,12	0,135			