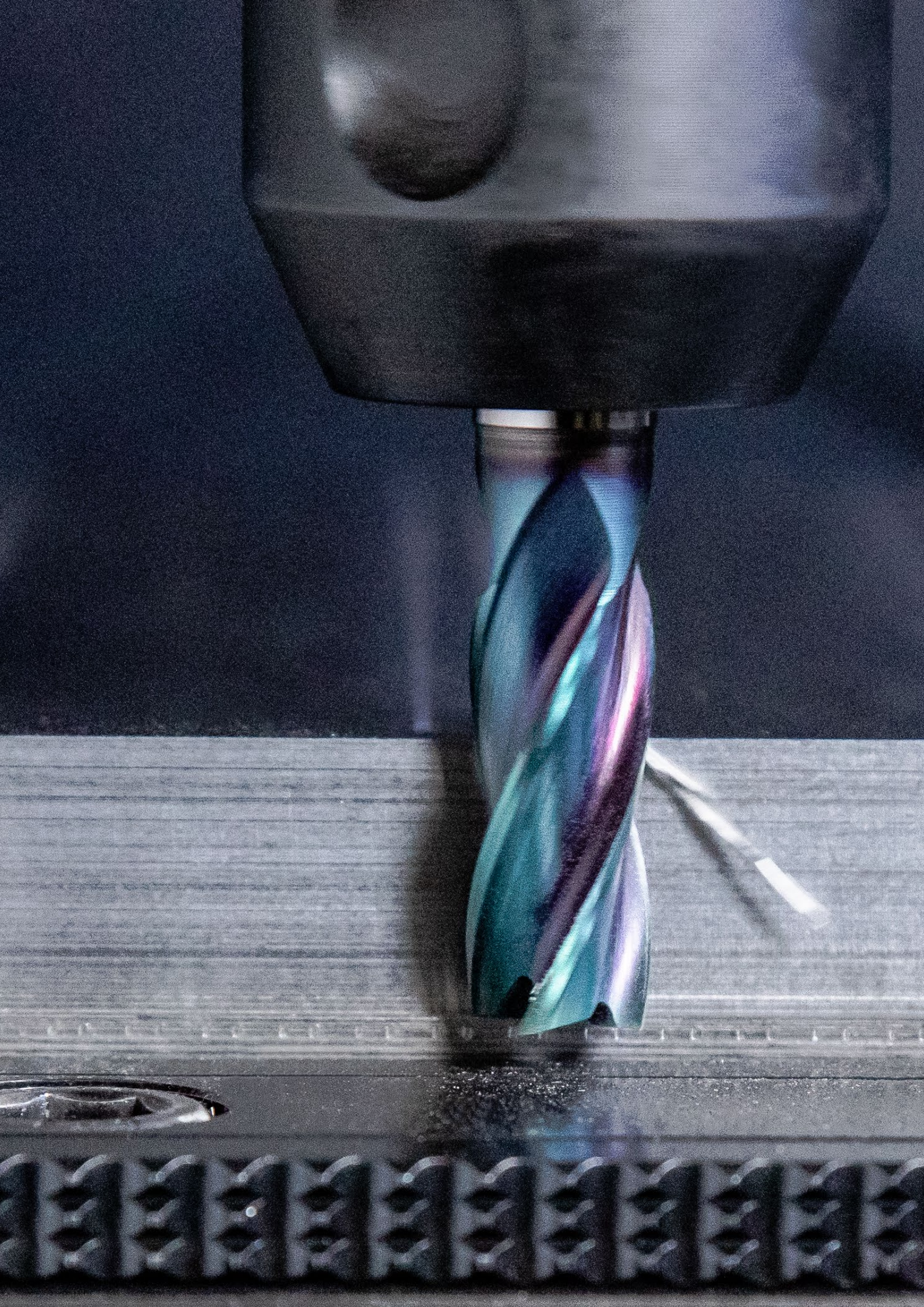






Dolu malzeme delme ve delik işleme

1 HSS Matkaplar

2 Karbür Matkaplar

3 Takma Uçlu Matkaplar

4 Raybalar ve havşa matkapları

5 Delik işleme takımları

Diş açma

6 Kılavuzlar ve ovalama kılavuzları

7 Diş açma frezeleri

8 Diş açma

Tornalama

9 Tornalama Takımları

10 Multi Fonksiyonel Takımlar – EcoCut ve FreeTurn

11 Kesme ve Kanal Açma Takımları

12 UltraMini + MiniCut

Frezeleme

13 HSS-Frezeler

14 Karbür Frezeler

15 Takma uçlu freze takımlar

Bağlama Teknikleri Kataloğu

16 Tutucular ve Aksesuarlar

17 İş parçası bağlama

18 Malzeme örnekleri ve malzeme no listesi

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WNT \ Performance

En yüksek performans için üstün kaliteli ürün.

WNT Performance grubundaki üstün kaliteli ürünler özel kullanım için üretilmiştir ve üstün performans yakalamanızı sağlar. Eğer sizde üretiminde üretim performansı isteğiniz ve çok iyi sonuçlar elde etmek istiyorsanız, **WNT Performance** grubundaki üstün kaliteli ürünler i tavsiye ederiz.

Sembol açıklaması

Şaft



Sap versiyonu



Boy:
Çok kısa / kısa / orta / uzun / çok uzun



Pah



Keskin



Köşe pahı (CHW = mm cinsinden pah genişliği)



Tam radüs



Uygulama



Uygulama örneği



Kırmızı oklar takımın kesme yapabileceği yönleri göstermektedir.



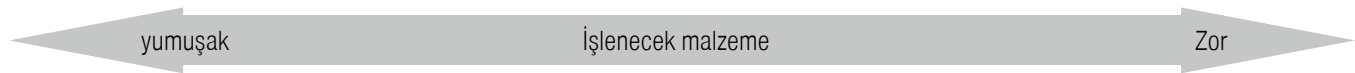
Ağız sayısı



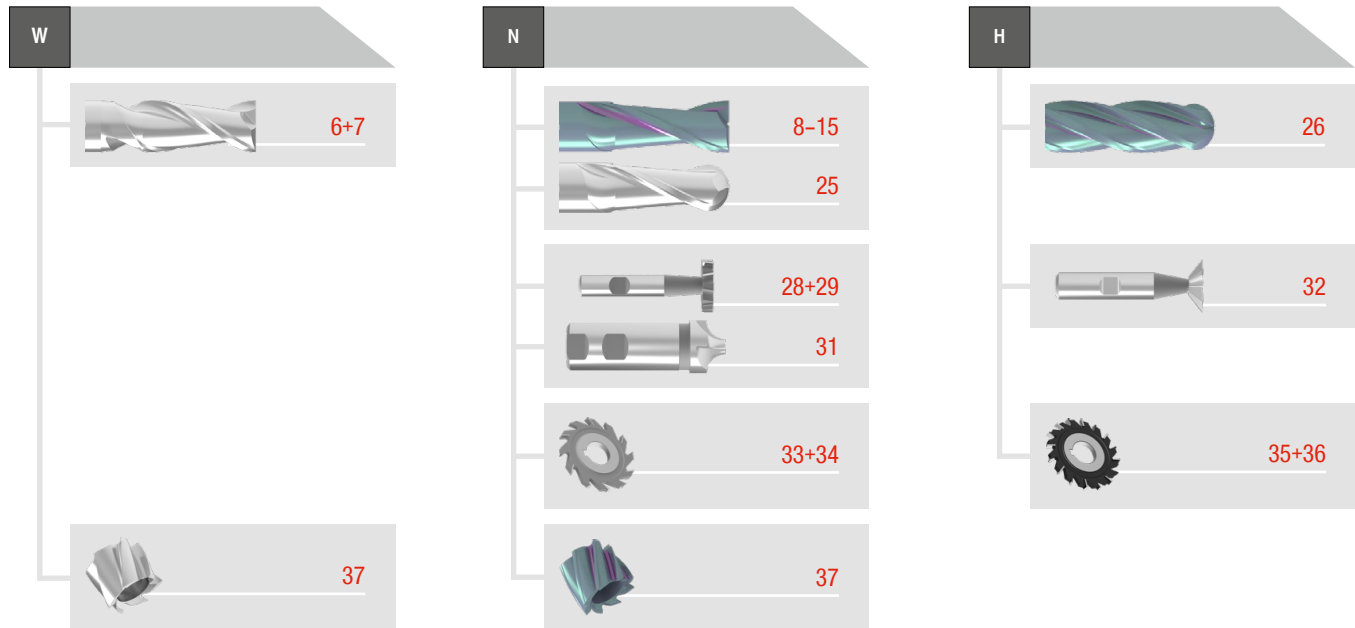
Kesme geometrisi
 $\lambda_s = 30^\circ$
 λ_s = Helis açısı
 $\gamma_s = 12^\circ$
 γ_s = Talaş açısı

- = Ana uygulama
- = Ek uygulamalar

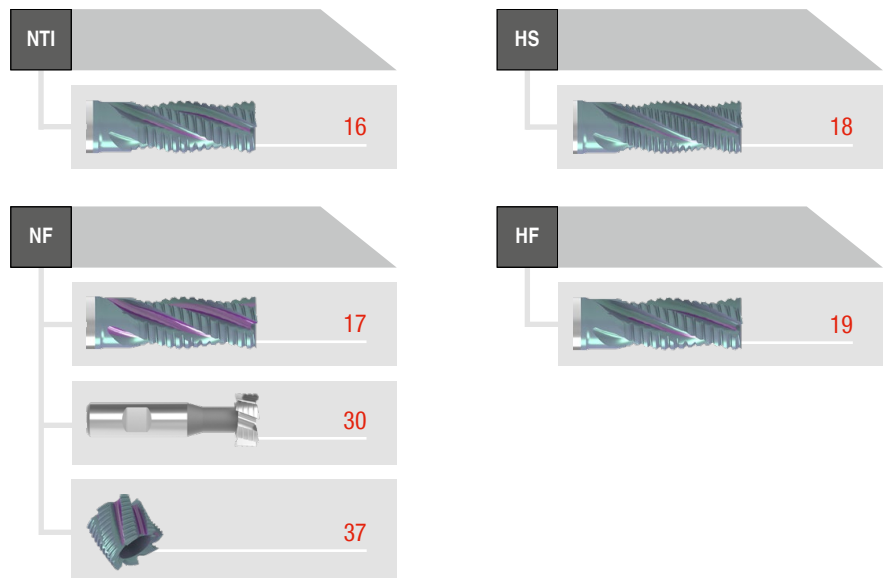
Toolfinder



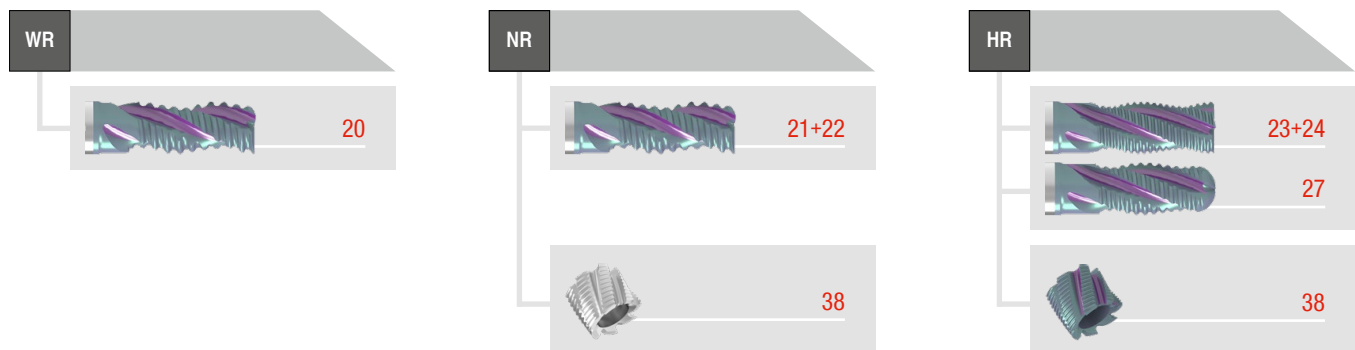
Finiş işleme



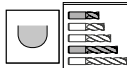
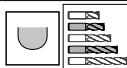
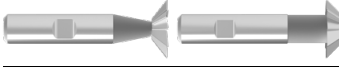
kaba- finish işlem



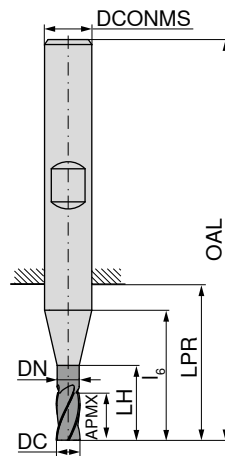
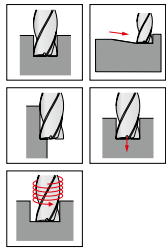
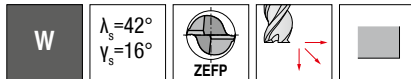
Kaba talaş kaldırma



HSS Freze genel bakış

Takım tipi	Ağız sayısı ZEFP	Çap mm Ø DC	Çelik P	Paslanmaz çelik M	Dökme demir K	Demir dışı metaller N	Isıya dayanıklı alaşımlar S	Sertleştirilmiş malzemeler H	Metal dışı malzemeler O	Keskin	Köşe pahı	Köşe radyusu	Tam radius	Boy	Malzeme, z.B. PM = Toz metal	Kaplamalı	Kaplamasız	
Radüs freze																		
	N	2	2-30	●	○	○	○	○	○						HSS-E	☒	☐	25
	H	4-5	6-25	●	○	○	○	○	○						HSS-E	☒	☐	26
	HR	4	6-20	●	○	○	○	○	○						HSS-E	☒	☐	27
Form / Kanal / Vals frezeler																		
	N	6-10	11-60	●	○	○	○	○	○						HSS-E	☐	☐	28
	N	6-12	10,5-45,5	●	○	○	○	○	○						HSS-E	☐	☐	29
	NF	6-8	21-45	●	○	○	○	○	○						HSS-E	☐	☐	30
	N	4-6	6-16	●	○	○	○	○	○						HSS-E	☐	☐	31
	H	10	16-25	●	○	○	○	○	○						HSS-E	☐	☐	32
	N	14-28	40-125	●	○	○	○	○	○						HSS-E	☐	☐	33
		12-52	50-160	●	○	○	○	○	○						HSS-E	☐	☐	34-36
		6-12	40-100	●	○	○	○	○	○						HSS-E	☒	☐	37+38

Kanal Frezeleri HSS-E Co 8



DIN 844



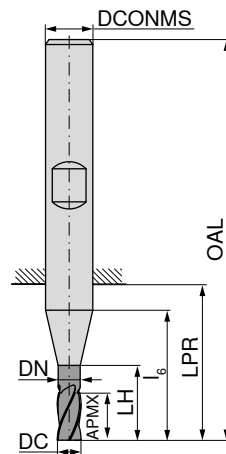
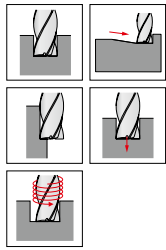
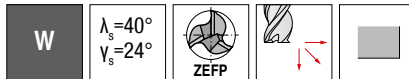
50 144 ...

DC _{es} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP	
2,0	7		7	13	15	51	6	2	020
2,5	8		8	14	16	52	6	2	025
3,0	8		8	14	16	52	6	2	030
3,5	10		10	16	18	54	6	2	035
4,0	11		11	17	19	55	6	2	040
4,5	11		11	17	19	55	6	2	045
5,0	13		13	19	21	57	6	2	050
5,5	13		13	19	21	57	6	2	055
6,0	13		13	19	21	57	6	2	060
6,5	16	6,0	22	24	26	66	10	2	065
7,0	16	6,5	22	24	26	66	10	2	070
8,0	19	7,5	25	27	29	69	10	2	080
9,0	19	8,5	26	27	29	69	10	2	090
10,0	22	9,5	30	30	32	72	10	2	100
12,0	26	11,5	36	36	38	83	12	2	120
14,0	26	11,5	36	36	38	83	12	2	140
16,0	32	15,0	42	42	44	92	16	2	160
18,0	32	15,0	42	42	44	92	16	2	180
20,0	38	19,0	52	52	54	104	20	2	200
22,0	38	19,0	52	52	54	104	20	2	220

P	
M	
K	
N	•
S	
H	
O	•

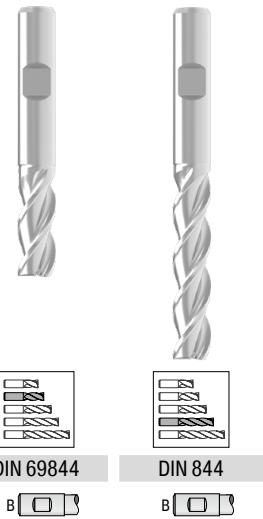
→ v_c/f_z Sayfa 40-42

Parmak Freze, HSS-E Co 8



DC _{k10} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
2	7		7	13	15	51	6	3
3	8		8	14	16	52	6	3
3	12		12	18	20	56	6	3
4	11		11	17	19	55	6	3
4	19		19	25	27	63	6	3
5	13		13	19	21	57	6	3
5	24		24	30	32	68	6	3
6	13	5,5	19	19	21	57	6	3
6	24	5,5	30	30	32	68	6	3
7	16	6,5	22	24	26	66	10	3
7	30	6,5	36	38	40	80	10	3
8	19	7,5	25	27	29	69	10	3
8	38	7,5	44	46	48	88	10	3
9	19	8,5	26	27	29	69	10	3
9	38	8,5	45	46	48	88	10	3
10	22	9,5	30	30	32	72	10	3
10	45	9,5	53	53	55	95	10	3
12	26	11,5	36	36	38	83	12	3
12	53	11,5	63	63	65	110	12	3
14	26	11,5	36	36	38	83	12	3
14	53	11,5	63	63	65	110	12	3
16	32	15,0	42	42	44	92	16	3
16	63	15,0	73	73	75	123	16	3
18	32	15,0	42	42	44	92	16	3
18	63	15,0	73	73	75	123	16	3
20	38	19,0	52	52	54	104	20	3
20	75	19,0	89	89	91	141	20	3
22	38	19,0	52	52	54	104	20	3
22	75	19,0	89	89	91	141	20	3
24	90	23,0	106	108	110	166	25	3
25	45	24,0	63	45	65	121	25	4
25	90	24,0	108	108	110	166	25	4
28	90	24,0	108	108	110	166	25	4
30	90	24,0	108	108	110	166	25	4
32	106	31,0	123	123	126	186	32	4
36	106	31,0	123	123	126	186	32	4
40	125	38,0	142	142	147	217	40	4

P	
M	
K	
N	•
S	
H	
O	•

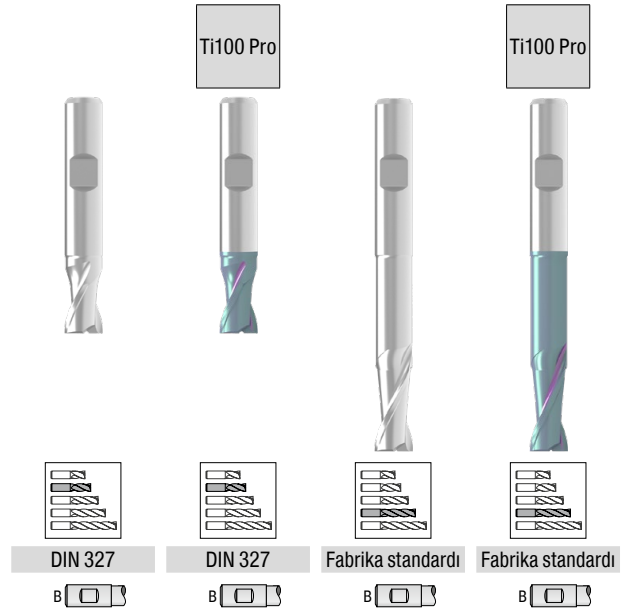
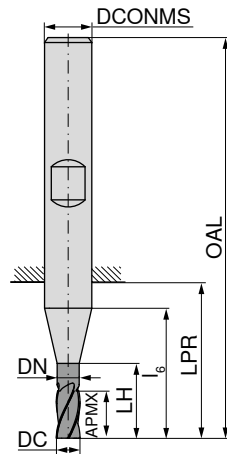
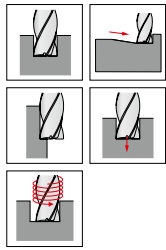
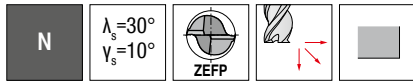
→ v_c/f_z Sayfa 40-42

50 120 ...

50 121 ...

020	
030	
	030
040	
	040
050	
	050
060	
	060
070	
	070
080	
	080
090	
	090
100	
	100
120	
	120
140	
	140
160	
	160
180	
	180
200	
	200
220	
	220
	240
250	
	250
	280
	300
	320
	360
	400

Kanal Frezeleri HSS-E Co 8



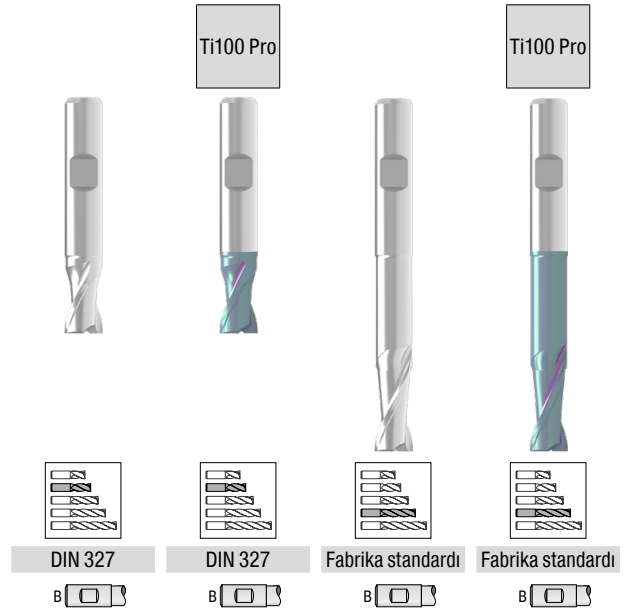
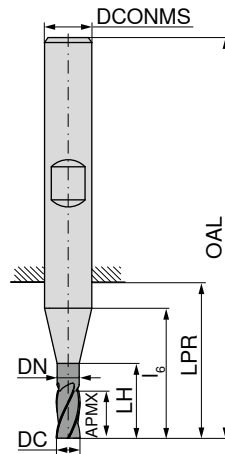
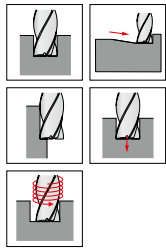
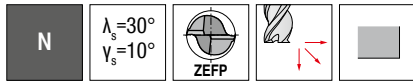
DC mm	ToI.	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP	50 100 ...	54 025 ...	50 122 ...	54 020 ...
1,00	h10	2,5		2,5	9	11	47	6	2	010 ¹⁾	010 ¹⁾		
1,50	h10	3,0		3,0	9	11	47	6	2	015 ¹⁾	015 ¹⁾		
1,80	h10	4,0		4,0	10	12	48	6	2	018	018		
2,00	e8	4,0		4,0	10	12	48	6	2	020	020		
2,50	e8	5,0		5,0	11	13	49	6	2	025	025		
2,80	h10	5,0		5,0	11	13	49	6	2	028	028		
3,00	e8	5,0		5,0	11	13	49	6	2	030	030		
3,00	e8	8,0		8,0	18	20	56	6	2			030	030
3,50	h10	6,0		6,0	12	14	50	6	2	035	035	035	035
3,50	h10	10,0		10,0	21	23	59	6	2				
3,80	h10	7,0		7,0	13	15	51	6	2	038	038		
4,00	e8	7,0		7,0	13	15	51	6	2	040	040		
4,00	e8	11,0		11,0	25	27	63	6	2			040	040
4,50	h10	7,0		7,0	13	15	51	6	2	045	045	045	045
4,50	h10	11,0		11,0	25	27	63	6	2				
4,80	h10	8,0		8,0	14	16	52	6	2	048	048		
5,00	e8	8,0		8,0	14	16	52	6	2	050	050	050	050
5,00	e8	13,0		13,0	30	32	68	6	2				
5,50	h10	8,0		8,0	14	16	52	6	2	055	055	055	055
5,50	h10	13,0		13,0	30	32	68	6	2				
5,75	h10	8,0		8,0	14	16	52	6	2	057	057		
6,00	e8	8,0	5,50	14,0	14	16	52	6	2	060	060	060	060
6,00	e8	13,0	5,50	30,0	30	32	68	6	2			060	060
6,50	h10	10,0	6,00	16,0	18	20	60	10	2	065	065	065	065
6,50	h10	16,0	6,35	36,0	38	40	80	10	2				
6,75	h10	10,0	6,50	16,0	18	20	60	10	2	067	067		
7,00	e8	10,0	6,50	16,0	18	20	60	10	2	070	070		
7,00	e8	16,0	6,35	36,0	38	40	80	10	2			070	070
7,50	h10	10,0	7,00	16,0	18	20	60	10	2	075	075	075	075
7,50	h10	16,0	7,35	36,0	38	40	80	10	2				
7,75	h10	11,0	7,50	17,0	19	21	61	10	2	077	077		
8,00	e8	11,0	7,50	17,0	19	21	61	10	2	080	080	080	080
8,00	e8	19,0	7,35	44,0	46	48	88	10	2				
8,50	h10	11,0	8,00	18,0	19	21	61	10	2	085	085	085	085
8,50	h10	19,0	8,35	45,0	46	48	88	10	2				
8,70	h10	11,0	8,50	18,0	19	21	61	10	2	087	087		
9,00	h10	11,0	8,50	18,0	19	21	61	10	2	090	090	090	090
9,00	h10	19,0	8,35	45,0	46	48	88	10	2				
9,50	h10	11,0	9,00	18,0	19	21	61	10	2	095	095	095	095
9,50	h10	19,0	9,35	45,0	46	48	88	10	2				
9,70	h10	13,0	9,50	21,0	21	23	63	10	2	097	097		
10,00	e8	13,0	9,50	21,0	21	23	63	10	2	100	100	100	100
10,00	e8	22,0	9,35	53,0	53	55	95	10	2				
10,50	h10	13,0	10,00	21,0	23	25	70	12	2	105	105		
10,70	h10	13,0	10,50	21,0	23	25	70	12	2	107	107		
11,00	h10	13,0	10,50	21,0	23	25	70	12	2	110	110	110	110
11,00	h10	22,0	10,50	53,0	55	57	102	12	2				

P	●	●	●	●
M	○	●	○	●
K	●	●	●	●
N	○	○	○	○
S	○	○	○	○
H				
O	○	○	○	○

1) Fabrika standardı

→ v_c/f_z Sayfa 40-42

Kanal Frezeleri HSS-E Co 8



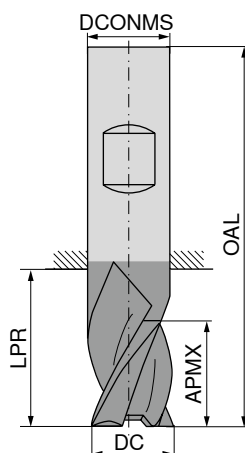
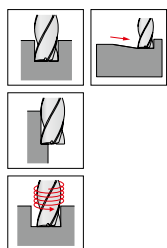
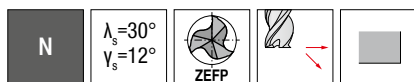
DC	ToI.	APMX	DN	LH	l ₆	LPR	OAL	DCONMS _{h6}	ZEFP	50 100 ...	54 025 ...	50 122 ...	54 020 ...
mm		mm	mm	mm	mm	mm	mm	mm					
11,50	h10	13,0	11,00	21,0	23	25	70	12	2	115	115		
11,70	h10	16,0	11,50	26,0	26	28	73	12	2	117	117		
12,00	e8	16,0	11,50	26,0	26	28	73	12	2	120	120		
12,00	e8	26,0	11,50	63,0	63	65	110	12	2			120	120
12,70	h10	16,0	11,50	26,0	26	28	73	12	2	127	127		
13,00	h10	16,0	11,50	26,0	26	28	73	12	2	130	130		
13,00	h10	26,0	11,50	63,0	63	65	110	12	2			130	130
13,70	h10	16,0	11,50	26,0	26	28	73	12	2	137	137		
14,00	e8	16,0	11,50	26,0	26	28	73	12	2	140	140		
14,00	e8	26,0	11,50	63,0	63	65	110	12	2			140	140
14,70	h10	16,0	11,50	26,0	26	28	73	12	2	147			
15,00	h10	16,0	11,50	26,0	26	28	73	12	2	150	150		
15,00	h10	26,0	11,50	63,0	63	65	110	12	2			150	150
15,70	h10	19,0	15,00	29,0	29	31	79	16	2	157	157		
16,00	e8	19,0	15,00	29,0	29	31	79	16	2	160	160		
16,00	e8	32,0	15,00	73,0	73	75	123	16	2			160	160
16,70	h10	19,0	15,00	29,0	29	31	79	16	2	167			
17,00	h10	19,0	15,00	29,0	29	31	79	16	2	170	170		
17,00	h10	32,0	15,00	73,0	73	75	123	16	2			170	170
17,70	h10	19,0	15,00	29,0	29	31	79	16	2	177	177		
18,00	e8	19,0	15,00	29,0	29	31	79	16	2	180	180		
18,00	e8	32,0	15,00	73,0	73	75	123	16	2			180	180
19,00	h10	19,0	15,00	29,0	29	31	79	16	2	190	190		
19,00	h10	32,0	15,00	73,0	73	75	123	16	2			190	190
19,70	h10	22,0	19,00	36,0	36	38	88	20	2	197	197		
20,00	e8	22,0	19,00	36,0	36	38	88	20	2	200	200		
20,00	e8	38,0	19,00	89,0	89	91	141	20	2			200	200
21,70	h10	22,0	19,00	36,0	36	38	88	20	2	217	217		
22,00	e8	22,0	19,00	36,0	36	38	88	20	2	220	220		
22,00	e8	38,0	19,00	89,0	89	91	141	20	2			220	220
23,70	h10	26,0	23,00	42,0	44	46	102	25	2	237	237		
24,00	e8	26,0	23,00	42,0	44	46	102	25	2	240	240		
24,00	e8	45,0	23,00	106,0	108	110	166	25	2			240	240
24,70	h10	26,0	24,00	44,0	44	46	102	25	2	247	247		
25,00	e8	26,0	24,00	44,0	44	46	102	25	2	250	250		
25,00	e8	45,0	24,00	108,0	108	110	166	25	2			250	250
26,00	h10	26,0	24,00	44,0	44	46	102	25	2	260	260		
P										●	●	●	●
M										○	●	○	●
K										●	●	●	●
N										○	○	○	○
S										○	○	○	○
H													
O										○	○	○	○

1) Fabrika standardı

→ v_c/f_z Sayfa 40-42

Kullan-At Freze, HSS-E Co 8

▲ Sap tipi: DIN 1835 B



Ti100 Pro



Ti100 Pro



Fabrika standardı



50 092 ...



Fabrika standardı



54 014 ...



Fabrika standardı



50 093 ...



Fabrika standardı



54 042 ...

DC _{e8} mm	APMX mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
1,00	2	8	34	6	3
1,50	3	8	34	6	3
1,50	4	10	35	6	3
1,80	3	8	34	6	3
2,00	4	9	35	6	3
2,00	7	12	38	6	3
2,30	4	9	35	6	3
2,50	5	10	36	6	3
2,50	8	13	39	6	3
2,80	5	10	36	6	3
3,00	5	10	36	6	3
3,00	8	13	39	6	3
3,30	6	11	37	6	3
3,50	6	11	37	6	3
3,50	10	15	41	6	3
3,80	7	12	38	6	3
4,00	7	12	38	6	3
4,00	11	16	42	6	3
4,30	7	12	38	6	3
4,50	7	12	38	6	3
4,50	11	16	42	6	3
4,80	8	13	39	6	3
5,00	8	13	39	6	3
5,00	13	18	44	6	3
5,30	8	13	39	6	3
5,50	8	13	39	6	3
5,50	13	18	44	6	3
5,75	8	13	39	6	3
6,00	8	13	39	6	3
6,00	13	18	44	6	3
6,50	10	14	42	8	3
6,50	16	20	48	8	3
7,00	10	14	42	8	3
7,00	16	20	48	8	3
7,50	10	14	42	8	3
7,50	16	20	48	8	3
8,00	11	15	43	8	3
8,00	19	23	51	8	3
8,50	11	16	48	10	3
8,50	19	24	56	10	3
9,00	11	16	48	10	3
9,00	19	24	56	10	3
9,50	11	16	48	10	3
9,50	19	24	56	10	3
10,00	13	18	50	10	3
10,00	22	27	59	10	3

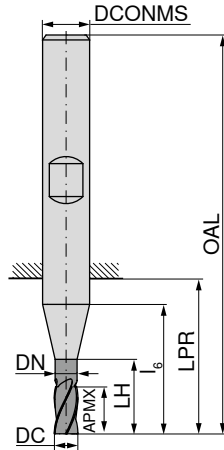
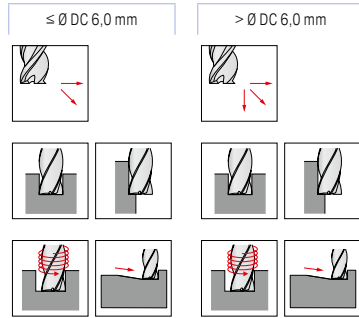
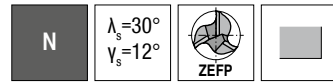
P	●	●	●	●
M	○	●	○	●
K	●	●	●	●
N	○	○	○	○
S	○	○	○	○
H				
O	○	○	○	○

1) Sap toleransı -0,025 / -0,0323

→ v_c/f_z Sayfa 40-42

Parmak Freze, HSS-E Co 8

▲ Ø ≤ 6 mm, merkeze kadar 3 kesici ağızlı



DIN 327



50 105 ...



DIN 327



54 021 ...



DIN 844 K



50 106 ...



DIN 844 K



54 016 ...

DC mm	ToL	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP	50 105 ...	54 021 ...	50 106 ...	54 016 ...
1,80	h10	4		4	10	12	48	6	3	018	018		
2,00	e8	4		4	10	12	48	6	3	020	020		
2,50	e8	5		5	11	13	49	6	3	025	025		
2,80	h10	5		5	11	13	49	6	3	028	028		
2,80	h10	8		8	18	20	56	6	3			028 ¹⁾	028 ¹⁾
3,00	e8	5		5	11	13	49	6	3	030	030		
3,00	e8	8		8	14	16	52	6	3			030	030
3,50	h10	6		6	12	14	50	6	3	035	035		
3,50	h10	10		10	16	18	54	6	3			035	035
3,80	h10	7		7	13	15	51	6	3	038	038		
3,80	h10	11		11	25	27	63	6	3			038 ¹⁾	038 ¹⁾
4,00	e8	7		7	13	15	51	6	3	040	040		
4,00	e8	11		11	17	19	55	6	3			040	040
4,50	h10	7		7	13	15	51	6	3	045	045		
4,50	h10	11		11	17	19	55	6	3			045	045
4,80	h10	8		8	14	16	52	6	3	048	048		
5,00	e8	8		8	14	16	52	6	3	050	050		
5,00	e8	13		13	19	21	57	6	3			050	050
5,50	h10	8		8	14	16	52	6	3	055	055		
5,50	h10	13		13	19	21	57	6	3			055	055
5,75	h10	8		8	14	16	52	6	3	057	057		
6,00	e8	8	5,5	14	14	16	52	6	3	060	060		
6,00	e8	13	5,5	19	19	21	57	6	3			060	060
6,50	h10	10	6,0	16	18	20	60	10	3	065	065		
6,50	h10	16	6,0	22	24	26	66	10	3			065	065
6,75	h10	10	6,5	16	18	20	60	10	3	067	067		
7,00	e8	10	6,5	16	18	20	60	10	3	070	070		
7,00	e8	16	6,5	22	24	26	66	10	3			070	070
7,50	h10	10	7,0	16	18	20	60	10	3	075	075		
7,50	h10	16	7,0	22	24	26	66	10	3			075	075
7,75	h10	11	7,5	17	19	21	61	10	3	077	077		
8,00	e8	11	7,5	17	19	21	61	10	3	080	080		
8,00	e8	19	7,5	25	27	29	69	10	3			080	080
8,50	h10	11	8,0	18	19	21	61	10	3	085	085		
8,50	h10	19	8,0	26	27	29	69	10	3			085	085
8,70	h10	11	8,5	18	19	21	61	10	3	087	087		
9,00	h10	11	8,5	18	19	21	61	10	3	090	090		
9,00	h10	19	8,5	26	27	29	69	10	3			090	090
9,50	h10	11	9,0	18	19	21	61	10	3	095	095		
9,50	h10	19	9,0	26	27	29	69	10	3			095	095
9,70	h10	13	9,5	21	21	23	63	10	3	097	097		
10,00	e8	13	9,5	21	21	23	63	10	3	100	100		
10,00	e8	22	9,5	30	30	32	72	10	3			100	100
10,50	h10	13	10,0	21	23	25	70	12	3	105	105		
10,70	h10	13	10,5	21	23	25	70	12	3	107	107		
11,00	h10	13	10,5	21	23	25	70	12	3	110	110		

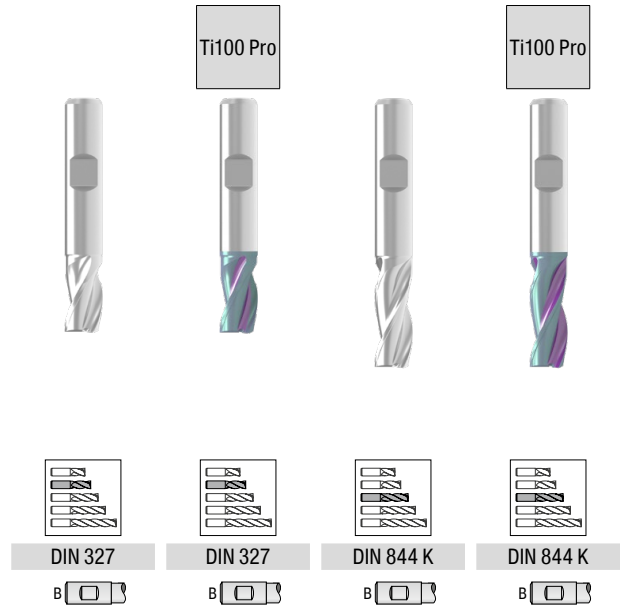
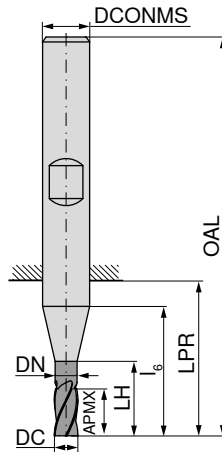
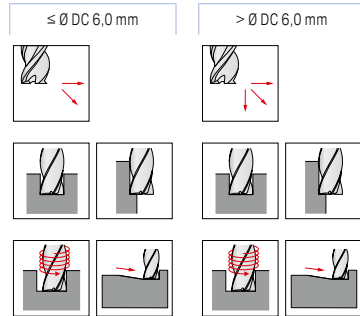
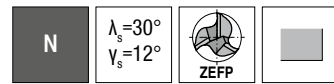
P	●	●	●	●
M	○	●	○	●
K	●	●	●	●
N	○	○	○	○
S	○	○	○	○
H				
O	○	○	○	○

1) Fabrika standardı

→ v_c/f_z Sayfa 40-42

Parmak Freze, HSS-E Co 8

▲ Ø ≤ 6 mm, merkeze kadar 3 kesici ağızlı



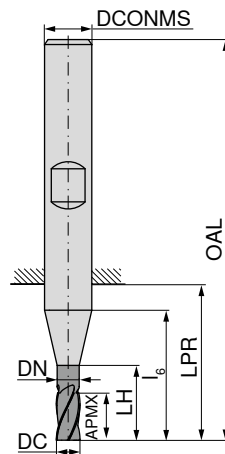
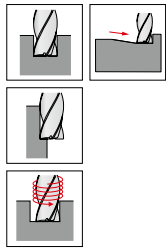
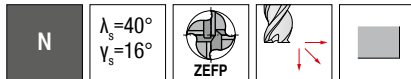
DC mm	Tol.	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
11,00	h10	22	10,5	30	32	34	79	12	3
11,50	h10	13	11,0	21	23	25	70	12	3
11,50	h10	22	11,0	30	32	34	79	12	3
11,70	h10	16	11,5	26	26	28	73	12	3
12,00	e8	16	11,5	26	26	28	73	12	3
12,00	e8	26	11,5	36	36	38	83	12	3
12,70	h10	16	11,5	26	26	28	73	12	3
13,00	h10	16	11,5	26	26	28	73	12	3
13,00	h10	26	11,5	36	36	38	83	12	3
13,70	h10	16	11,5	26	26	28	73	12	3
14,00	e8	16	11,5	26	26	28	73	12	3
14,00	e8	26	11,5	36	36	38	83	12	3
15,00	h10	16	11,5	26	26	28	73	12	3
15,00	h10	26	11,5	36	36	38	83	12	3
15,50	h10	32	15,0	42	42	44	92	16	3
15,70	h10	19	15,0	29	29	31	79	16	3
16,00	e8	19	15,0	29	29	31	79	16	3
16,00	e8	32	15,0	42	42	44	92	16	3
17,00	h10	19	15,0	29	29	31	79	16	3
17,00	h10	32	15,0	42	42	44	92	16	3
17,70	h10	19	15,0	29	29	31	79	16	3
18,00	e8	19	15,0	29	29	31	79	16	3
18,00	e8	32	15,0	42	42	44	92	16	3
19,00	h10	19	15,0	29	29	31	79	16	3
19,00	h10	32	15,0	42	42	44	92	16	3
19,50	h10	38	19,0	52	52	54	104	20	3
19,70	h10	22	19,0	36	36	38	88	20	3
20,00	e8	22	19,0	36	36	38	88	20	3
20,00	e8	38	19,0	52	52	54	104	20	3
21,70	h10	22	19,0	36	36	38	88	20	3
22,00	e8	22	19,0	36	36	38	88	20	3
22,00	e8	38	19,0	52	52	54	104	20	3
23,70	h10	26	23,0	42	44	46	102	25	3
24,00	e8	26	23,0	42	44	46	102	25	3
24,70	h10	26	24,0	44	44	46	102	25	3

P	●	●	●	●
M	○	●	○	●
K	●	●	●	●
N	○	○	○	○
S	○	○	○	○
H				
O	○	○	○	○

1) Fabrika standardı

→ v_c/f_z Sayfa 40-42

Parmak Freze, HSS-E Co 8



Fabrika standardı



54 017 ...



DIN 844



50 124 ...



DIN 844



54 011 ...

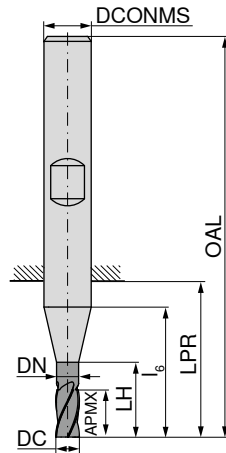
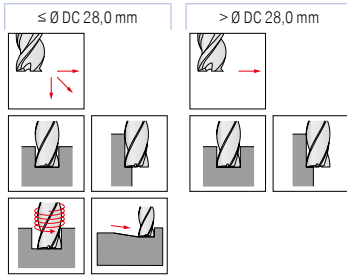
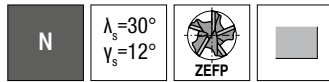
DC mm	ToI.	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS mm	h ₆	ZEFP
4	k10	11		11	17	19	55	6		4
5	k10	13		13	19	21	57	6		4
6	e8	8	5,5	14	14	16	52	6		4
6	k10	13	5,5	19	19	21	57	6		4
8	e8	11	7,5	17	19	21	61	10		4
8	k10	19	7,5	25	27	29	69	10		4
9	k10	19	8,5	26	27	29	69	10		4
10	e8	13	9,5	21	21	23	63	10		4
10	k10	22	9,5	30	30	32	72	10		4
12	e8	16	11,5	26	26	28	73	12		4
12	k10	26	11,5	36	36	38	83	12		4
14	e8	16	11,5	26	26	28	73	12		4
14	k10	26	11,5	36	36	38	83	12		4
15	k10	26	11,5	36	36	38	83	12		4
16	e8	19	15,0	29	29	31	79	16		4
16	k10	32	15,0	42	42	44	92	16		4
17	k10	32	15,0	42	42	44	92	16		4
18	e8	19	15,0	29	29	31	79	16		4
18	k10	32	15,0	42	42	44	92	16		4
20	e8	22	19,0	36	36	38	88	20		4
20	k10	38	19,0	52	52	54	104	20		4
25	k10	45	24,0	63	63	65	121	25		5

P	○	○	○
M	●	●	●
K	○	○	○
N	●	●	●
S	●	●	●
H			
O	●	●	●

→ v_c/f_z Sayfa 40-42

Parmak Freze, HSS-E Co 8

▲ > Ø 28,0 mm boş merkezlidir (merkez kesme yapmaz).



DIN 69844

DIN 69844

DIN 844

DIN 844

Fabrika standardı



50 110 ...

54 018 ...

50 111 ...

54 019 ...

50 104 ...

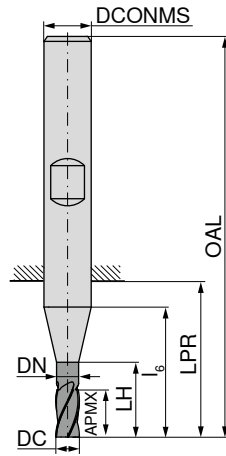
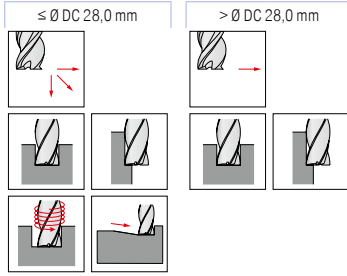
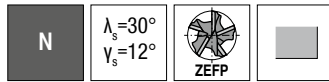
DC _{k10} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
2,0	7		7	13	15	51	6	4
2,5	8		8	14	16	52	6	4
3,0	8		8	14	16	52	6	4
3,0	12		12	18	20	56	6	4
3,5	10		10	16	18	54	6	4
4,0	11		11	17	19	55	6	4
4,0	19		19	25	27	63	6	4
4,5	11		11	17	19	55	6	4
5,0	13		13	19	21	57	6	4
5,0	24		24	30	32	68	6	4
5,5	13		13	19	21	57	6	4
6,0	13	5,5	19	19	21	57	6	4
6,0	24	5,5	30	30	32	68	6	4
6,0	56	5,5	62	62	64	100	6	4
6,5	16	6,0	22	24	26	66	10	4
7,0	16	6,5	22	24	26	66	10	4
7,0	30	6,5	36	38	40	80	10	4
7,5	16	7,0	22	24	26	66	10	4
8,0	19	7,5	25	27	29	69	10	4
8,0	38	7,5	44	46	48	88	10	4
8,0	70	7,5	73	73	75	115	10	4
8,5	19	8,0	26	27	29	69	10	4
9,0	19	8,5	26	27	29	69	10	4
9,0	38	8,5	45	46	48	88	10	4
9,5	19	9,0	26	27	29	69	10	4
10,0	22	9,5	30	30	32	72	10	4
10,0	45	9,5	53	53	55	95	10	4
10,0	75	9,5	79	79	81	121	10	4
10,5	22	10,0	30	32	34	79	12	4
11,0	22	10,5	30	32	34	79	12	4
11,0	45	10,5	53	55	57	102	12	4
11,5	22	11,0	30	32	34	79	12	4
12,0	26	11,5	36	36	38	83	12	4
12,0	53	11,5	63	63	65	110	12	4
12,0	85		85	85	85	130	12	4
13,0	26	11,5	36	36	38	83	12	4
14,0	26	11,5	36	36	38	83	12	4
14,0	53	11,5	63	63	65	110	12	4
14,0	85		85	85	85	130	12	4

P	●	●	●	●	●
M	○	●	○	●	○
K	●	●	●	●	●
N	○	○	○	○	○
S	○	○	○	○	○
H					
O	○	○	○	○	○

→ v_c/f_z Sayfa 40-42

Parmak Freze, HSS-E Co 8

▲ > Ø 28,0 mm boş merkezlidir (merkez kesme yapmaz).



DIN 69844

DIN 69844

DIN 844

DIN 844

Fabrika standardı



50 110 ...

54 018 ...

50 111 ...

54 019 ...

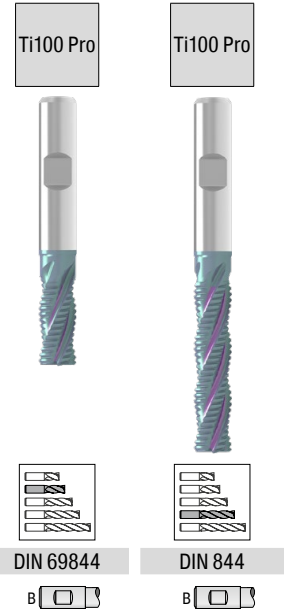
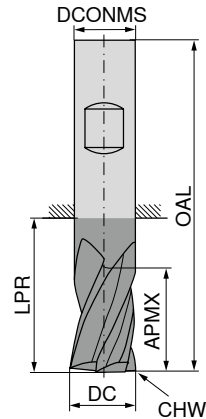
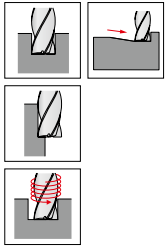
50 104 ...

DC _{k10} mm	APMX mm	DN mm	LH mm	lg mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
15,0	26	11,5	36	36	38	83	12	4
15,0	53	11,5	63	63	65	110	12	4
16,0	32	15,0	42	42	44	92	16	4
16,0	63	15,0	73	73	75	123	16	4
16,0	90	15,0	95	95	97	145	16	4
18,0	32	15,0	42	42	44	92	16	4
18,0	63	15,0	73	73	75	123	16	4
18,0	100	15,0	110	110	112	160	16	5
20,0	38	19,0	52	52	54	104	20	4
20,0	75	19,0	89	89	91	141	20	4
20,0	110	19,0	128	128	130	180	20	5
22,0	38	19,0	52	52	54	104	20	5
22,0	75	19,0	89	89	91	141	20	5
22,0	110	19,0	128	128	130	180	20	5
24,0	45	23,0	61	63	65	121	25	5
24,0	90	23,0	106	108	110	166	25	5
25,0	45	24,0	63	63	65	121	25	5
25,0	90	24,0	108	108	110	166	25	5
25,0	125	24,0	142	142	144	200	25	6
28,0	45	24,0	63	63	65	121	25	5
28,0	90	24,0	108	108	110	166	25	5
28,0	140	24,0	147	147	149	205	25	6
30,0	45	24,0	63	63	65	121	25	5
30,0	90	24,0	108	108	110	166	25	5
32,0	53	31,0	70	70	73	133	32	6
32,0	53	31,0	70	70	73	133	32	5
32,0	106	31,0	123	123	126	186	32	6
32,0	160	31,0	167	167	170	230	32	6
36,0	53	31,0	70	70	73	133	32	6
40,0	63	38,0	80	80	85	155	40	6
40,0	125	38,0	142	142	147	217	40	6
40,0	180	31,0	197	197	200	260	32	8
45,0	125	38,0	142	142	147	217	40	8
50,0	150	48,0	172	172	172	252	50	8

P	●	●	●	●	●
M	○	●	○	●	○
K	●	●	●	●	●
N	○	○	○	○	○
S	○	○	○	○	○
H					
O	○	○	○	○	○

→ v_c/f_z Sayfa 40-42

Toz Metal Çelik - Kaba Talaş Finiş İşleme Frezesi

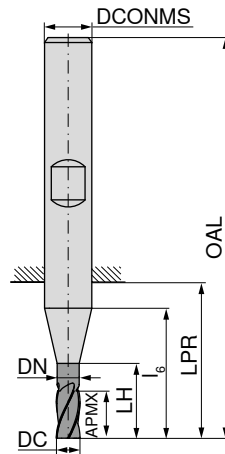
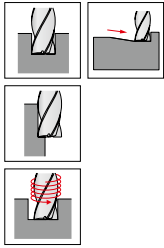
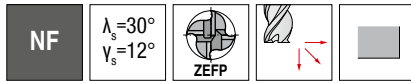


DC _{k12} mm	APMX mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP
6	13	21	57	6	0,3	4
6	24	32	68	6	0,3	4
7	16	26	66	10	0,3	4
8	19	29	69	10	0,3	4
8	38	48	88	10	0,3	4
9	19	29	69	10	0,5	4
10	22	32	72	10	0,5	4
10	45	55	95	10	0,5	4
12	26	38	83	12	0,7	4
12	53	65	110	12	0,7	4
14	26	38	83	12	0,8	4
14	53	65	110	12	0,8	4
16	32	44	92	16	0,8	4
16	63	75	123	16	0,8	4
18	32	44	92	16	0,8	4
18	63	75	123	16	0,8	4
20	38	54	104	20	0,8	4
20	75	91	141	20	0,8	4
25	45	65	121	25	1,0	5
25	90	110	166	25	1,0	4
30	90	110	166	25	1,3	5
32	53	73	133	32	1,3	6
32	106	126	186	32	1,3	5
40	63	85	155	40	1,3	6
40	125	147	217	40	1,3	6

	54 007 ...	54 008 ...
P	○	○
M	●	●
K	○	○
N	○	○
S	●	●
H		
O	○	○

→ v_c/f_z Sayfa 40-42

Kaba Talaş - Finiş İşleme Frezesi HSS-E Co 5

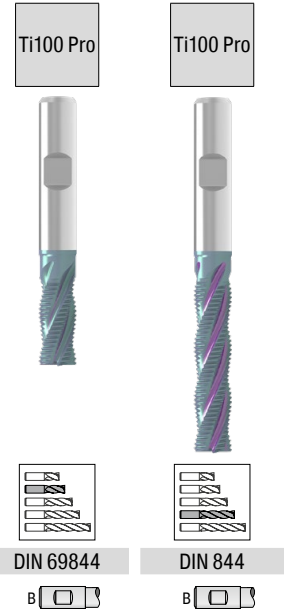
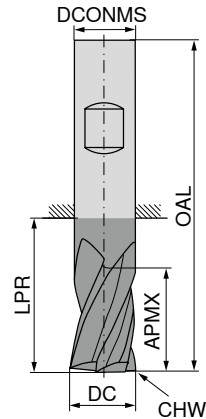
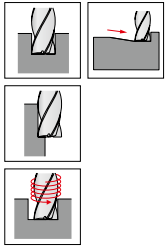


DC _{k12} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
6	13	5,5	19	19	21	57	6	4
6	24	5,5	30	30	32	68	6	4
7	16	6,5	22	24	26	66	10	4
8	19	7,5	25	27	29	69	10	4
8	38	7,5	44	46	48	88	10	4
9	19	8,5	26	27	29	69	10	4
10	22	9,5	30	30	32	72	10	4
10	45	9,5	53	53	55	95	10	4
11	22	10,5	30	32	32	79	12	4
11	45	10,5	53	55	57	102	12	4
12	26	11,5	36	36	38	83	12	4
12	53	11,5	63	63	65	110	12	4
13	26	11,5	36	36	38	83	12	4
14	26	11,5	36	36	38	83	12	4
15	26	11,5	36	36	38	83	12	4
15	53	11,5	63	63	65	110	12	4
16	32	15,0	42	42	44	92	16	4
16	63	15,0	73	73	75	123	16	4
18	32	15,0	42	42	44	92	16	4
20	38	19,0	52	52	54	104	20	4
20	75	19,0	89	89	91	141	20	4
22	75	19,0	89	89	91	141	20	4
22	38	19,0	52	52	54	104	20	4
25	90	24,0	108	108	110	166	25	4
25	45	24,0	63	63	65	121	25	4
28	90	24,0	108	108	110	166	25	5

	54 028 ...	54 029 ...
P	●	●
M	○	○
K	●	●
N	○	○
S	○	○
H		
O	○	○

→ v_c/f_z Sayfa 40-42

Toz Metal Çelik - Kaba Talaş Finiş İşleme Frezesi

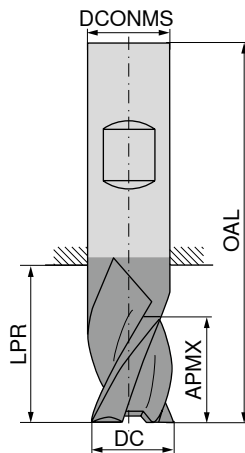
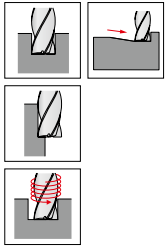


DC _{k12} mm	APMX mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP
6	13	21	57	6	0,45	4
6	24	32	68	6	0,45	4
8	19	29	69	10	0,45	4
8	38	48	88	10	0,45	4
10	22	32	72	10	0,45	4
10	45	55	95	10	0,45	4
12	26	38	83	12	0,45	4
12	53	65	110	12	0,45	4
14	26	38	83	12	0,45	4
14	53	65	110	12	0,45	4
16	32	44	92	16	0,60	4
16	63	75	123	16	0,60	4
18	32	44	92	16	0,60	4
18	63	75	123	16	0,60	4
20	38	54	104	20	0,60	4
20	75	91	141	20	0,60	4
22	38	54	104	20	0,60	5
25	45	65	121	25	0,75	5
25	90	110	166	25	0,75	5
28	45	65	121	25	0,75	5
28	90	110	166	25	0,75	5
30	45	65	121	25	0,75	5
30	90	110	166	25	0,75	5
32	53	73	133	32	0,75	6
32	106	126	186	32	0,75	5
40	63	85	155	40	0,90	6

	54 009 ...	54 012 ...
P	○	○
M		
K	●	●
N		
S	●	●
H		
O	○	○

→ v_c/f_z Sayfa 40-42

Toz Metal Çelik - Kaba Talaş Finiş İşleme Frezesi



Ti100 Pro



DIN 844

B

54 034 ...

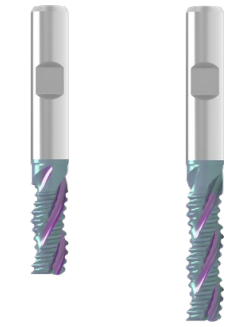
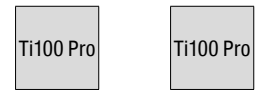
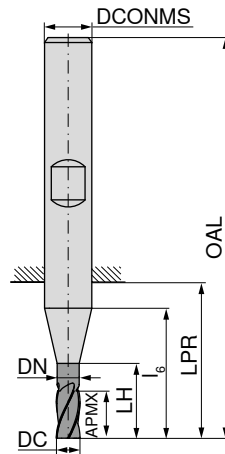
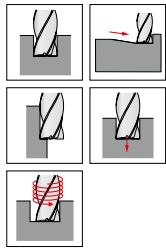
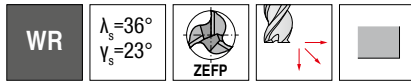
DC _{k12} mm	APMX mm	LPR mm	OAL mm	DCONMS _{n6} mm	ZEFP
6	13	21	57	6	4
8	19	29	69	10	4
10	22	32	72	10	4
12	26	38	83	12	4
14	26	38	83	12	4
16	32	44	92	16	4
18	32	44	92	16	4
20	38	54	104	20	4
25	45	65	121	25	4

060
080
100
120
140
160
180
200
250

P	●
M	○
K	●
N	○
S	○
H	○
O	○

→ v_c/f_z Sayfa 40-42

Kaba Talaş Freze HSS-E Co 8



DIN 844 Fabrika standardı



54 013 ...

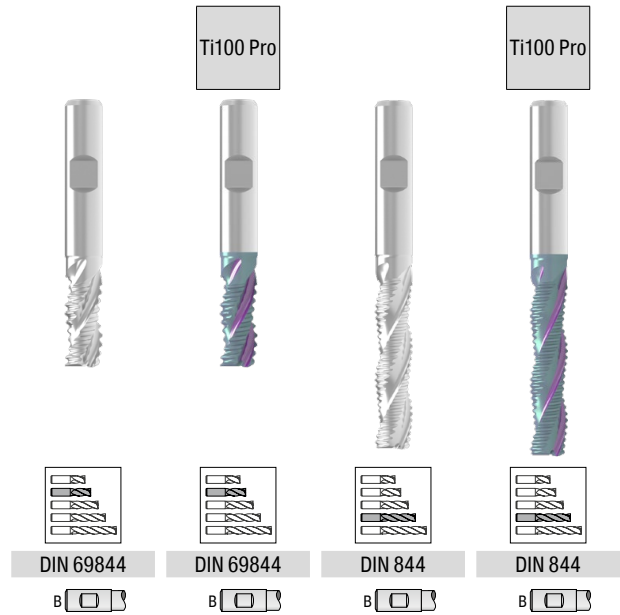
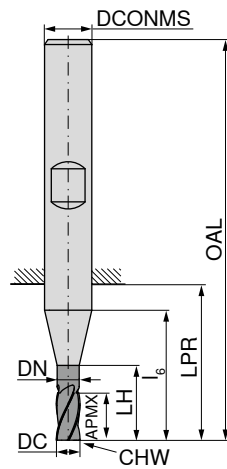
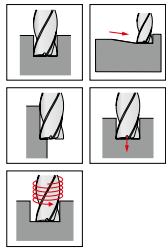
54 010 ...

DC _{K12} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
6	13	5,5	19	19	21	57	6	3
6	19	5,5	25	25	27	63	6	3
8	19	7,5	25	27	29	69	10	3
8	28	7,5	34	36	38	78	10	3
10	22	9,5	30	30	32	72	10	3
10	34	9,5	42	42	44	84	10	3
12	26	11,5	36	36	38	83	12	3
12	40	11,5	50	50	52	97	12	3
16	32	15,0	42	42	44	92	16	3
16	48	15,0	58	58	60	108	16	3
20	38	19,0	52	52	54	104	20	3
20	56	19,0	70	70	72	122	20	3
25	45	24,0	63	63	65	121	25	3
25	68	24,0	86	86	88	144	25	3
32	80	31,0	97	97	100	160	32	3

P		
M		
K		
N	•	•
S		
H		
O	•	•

→ v_c/f_z Sayfa 40-42

Kaba Talaş Freze HSS-E Co 8



DC _{k12} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP
6	13	5,5	19	19	21	57	6	0,5	3
6	24	5,5	30	30	32	68	6	0,5	3
7	16	6,5	22	24	26	66	10	0,5	3
8	19	7,5	25	27	29	69	10	0,7	3
8	38	7,5	44	46	48	88	10	0,7	3
9	19	8,5	26	27	29	69	10	0,7	3
9	38	8,5	45	46	48	88	10	0,7	3
10	22	9,5	30	30	32	72	10	0,7	3
10	45	9,5	53	53	55	95	10	0,7	3
11	22	10,5	30	32	34	79	12	0,7	3
11	45	10,5	53	55	55	102	12	0,7	3
12	26	11,5	36	36	38	83	12	0,7	3
12	53	11,5	63	63	65	110	12	0,7	3
14	26	11,5	36	36	38	83	12	0,9	3
14	53	11,5	63	63	65	110	12	0,9	3
15	26	11,5	36	36	38	83	12	0,9	3
15	53	11,5	63	63	65	110	12	0,9	3
16	32	15,0	42	42	44	92	16	0,9	3
16	63	15,0	73	73	75	123	16	0,9	3
18	32	15,0	42	42	44	92	16	0,9	3
18	63	15,0	73	73	75	123	16	0,9	3
20	38	19,0	52	52	54	104	20	0,9	3
20	75	19,0	89	89	91	141	20	0,9	3
25	45	24,0	63	63	65	121	25	0,9	3
25	90	24,0	108	108	110	166	25	0,9	3

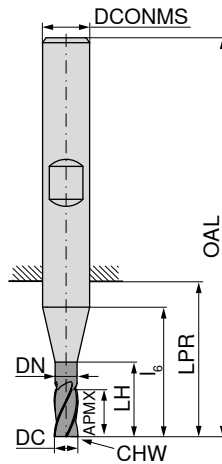
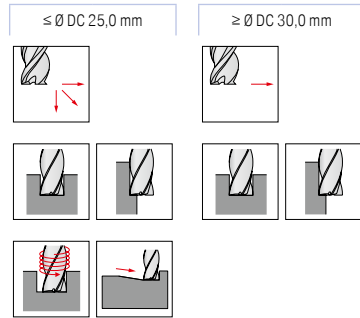
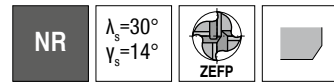
50 153 ...	54 026 ...	50 157 ...	54 027 ...
060	060	060	060
070	070	080	080
080	080	090	090
090	090	100	100
100	100	110	110
110	110	120	120
120	120	140	140
140	140	150	150
150	150	160	160
160	160	180	180
180	180	200	200
200	200	250	250
250	250		

P	●	●	●	●
M	○	○	○	○
K	●	●	●	●
N	○	○	○	○
S	○	○	○	○
H				
O	○	○	○	○

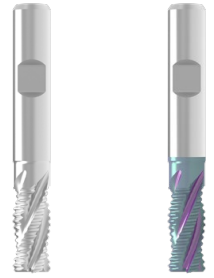
→ v_c/f_z Sayfa 40-42

Kaba Talaş Freze HSS-E Co 5

▲ > Ø 25,0 mm boş merkezlidir (merkez kesme yapmaz).



Ti100 Pro



DIN 69844



DIN 69844



50 125 ...

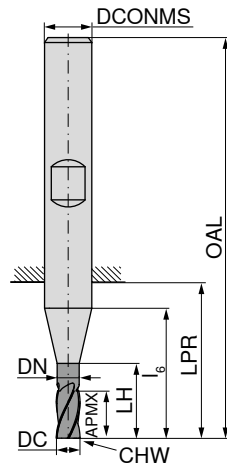
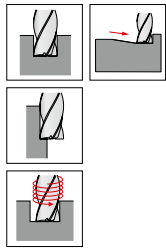
54 030 ...

DC _{k12} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP
6	13	5,5	19	19	21	57	6	0,5	4
7	16	6,5	22	24	26	66	10	0,5	4
8	19	7,5	25	27	29	69	10	0,7	4
9	19	8,5	26	27	29	69	10	0,7	4
10	22	9,5	30	30	32	72	10	0,7	4
11	22	10,5	30	32	32	79	12	0,7	4
12	26	11,5	36	36	38	83	12	0,7	4
13	26	11,5	36	36	38	83	12	0,7	4
14	26	11,5	36	36	38	83	12	0,9	4
15	26	11,5	36	36	38	83	12	0,9	4
16	32	15,0	42	42	44	92	16	0,9	4
18	32	15,0	42	42	44	92	16	0,9	4
20	38	19,0	52	52	54	104	20	0,9	4
22	38	19,0	52	52	54	104	20	0,9	4
24	45	23,0	61	63	65	121	25	0,9	4
25	45	24,0	63	63	65	121	25	0,9	4
30	45	24,0	63	63	65	121	25	1,1	5
32	53	31,0	70	70	73	133	32	1,1	6
40	63	38,0	80	80	85	155	40	1,1	6

P	●	●
M	○	○
K	●	●
N	○	○
S	○	○
H		
O	○	○

→ v_c/f_z Sayfa 40-42

Toz Metal Çelik - İnce profilli Kaba Talaş Freze



Ti100 Pro



Ti100 Pro



Ti100 Pro



Fabrika standardı



54 031 ...



DIN 844



54 032 ...



Fabrika standardı



54 033 ...

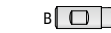
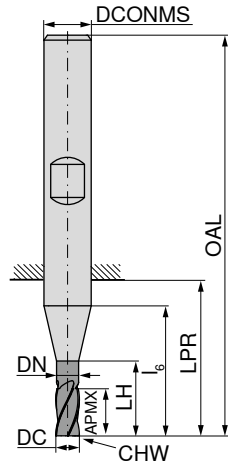
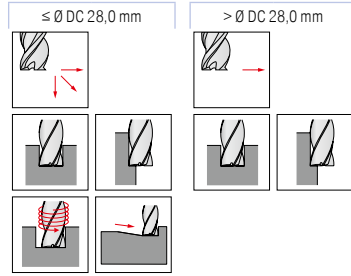
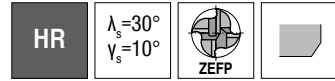
DC _{k12} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP
6	8	5,5	14	14	16	52	6	0,35	4
6	13	5,5	19	19	21	57	6	0,35	4
8	11	7,5	17	19	21	61	10	0,45	4
8	19	7,5	25	27	29	69	10	0,45	4
8	28	7,5	34	36	38	78	10	0,45	4
10	13	9,5	21	21	23	63	10	0,45	4
10	22	9,5	30	30	32	72	10	0,45	4
10	34	9,5	42	42	44	84	10	0,45	4
12	16	11,5	26	26	28	73	12	0,60	4
12	26	11,5	36	36	38	83	12	0,60	4
12	40	11,5	50	50	52	97	12	0,60	4
14	16	11,5	26	26	28	73	12	0,60	4
14	26	11,5	36	36	38	83	12	0,60	4
14	40	11,5	50	50	52	97	12	0,60	4
16	19	15,0	29	29	31	79	16	0,70	4
16	32	15,0	42	42	44	92	16	0,70	4
16	48	15,0	58	58	60	108	16	0,70	4
18	19	15,0	29	29	31	79	16	0,70	4
18	32	15,0	42	42	44	92	16	0,70	4
18	48	15,0	58	58	60	108	16	0,70	4
20	22	19,0	36	36	38	88	20	0,70	4
20	38	19,0	52	52	54	104	20	0,70	4
20	56	19,0	70	70	72	122	20	0,70	4
22	22	19,0	36	36	38	88	20	0,70	4
22	38	19,0	52	52	54	104	20	0,70	4
22	56	19,0	70	70	72	122	20	0,70	4
25	26	24,0	44	44	46	102	25	0,70	4
25	45	24,0	63	63	65	121	25	0,70	4
25	68	24,0	86	86	88	144	25	0,70	4
28	26	24,0	44	44	46	102	25	0,90	5
30	45	24,0	63	63	65	121	25	0,90	5
32	32	31,0	49	49	52	112	32	0,90	6
32	53	31,0	70	70	73	133	32	0,90	6

P	●	●	●
M	●	●	●
K	●	●	●
N	○	○	○
S	○	○	○
H			
O	○	○	○

→ v_c/f_z Sayfa 40-42

İnce Profilli Kaba Talaş Freze, HSS-E Co 8

▲ > Ø 28,0 mm boş merkezlidir (merkez kesme yapmaz).

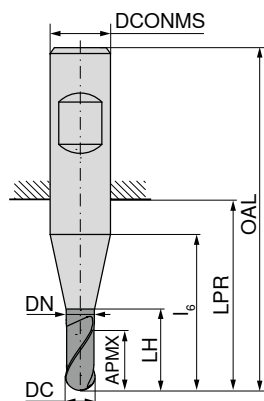


DC _{k12} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP	54 022 ...	50 140 ...	54 023 ...	50 141 ...	54 024 ...
4	11		11	17	19	55	6	0,35	3			040	040	
5	13		13	19	21	57	6	0,35	3			050	050	
6	8	5,5	14	14	16	52	6	0,35	4	060		060		
6	13	5,5	19	19	21	57	6	0,35	4		060	060		
6	24	5,5	30	30	32	68	6	0,35	4				060	060
8	11	7,5	17	19	21	61	10	0,45	4	080		080		
8	19	7,5	25	27	29	69	10	0,45	4		080	080		080
8	38	7,5	44	46	48	88	10	0,45	4				080	080
10	13	9,5	21	21	23	63	10	0,45	4	100		100		
10	22	9,5	30	30	32	72	10	0,45	4		100	100		100
10	45	9,5	53	53	55	95	10	0,45	4				100	100
12	16	11,5	26	26	28	73	12	0,60	4	120		120		
12	26	11,5	36	36	38	83	12	0,60	4		120	120		120
12	53	11,5	63	63	65	110	12	0,60	4				120	120
14	16	11,5	26	26	28	73	12	0,60	4	140		140		
14	26	11,5	36	36	38	83	12	0,60	4		140	140		140
14	53	11,5	63	63	65	110	12	0,60	4				140	140
16	19	15,0	29	29	31	79	16	0,70	4	160		160		
16	32	15,0	42	42	44	92	16	0,70	4		160	160		160
16	63	15,0	73	73	75	123	16	0,70	4				160	160
18	19	15,0	29	29	31	79	16	0,70	4	180		180		
18	32	15,0	42	42	44	92	16	0,70	4		180	180		180
18	63	15,0	73	73	75	123	16	0,70	4				180	180
20	22	19,0	36	36	38	88	20	0,70	4	200		200		
20	38	19,0	52	52	54	104	20	0,70	4		200	200		200
20	75	19,0	89	89	91	141	20	0,70	4				200	200
22	38	19,0	52	52	54	114	20	0,70	4		220	220		220
22	75	19,0	89	89	91	141	20	0,70	4				220	220
25	45	24,0	63	63	65	121	25	0,70	4		250	250		
25	90	24,0	108	108	110	166	25	0,70	4					250
28	45	24,0	63	63	65	121	25	0,90	5			280		
28	90	24,0	108	108	110	166	25	0,90	5					280
30	45	24,0	63	63	65	121	25	0,90	5			300		
30	90	24,0	108	108	110	166	25	0,90	5					300
32	53	31,0	70	70	73	133	32	0,90	6			320		
32	106	31,0	123	123	126	186	32	0,90	6					320

P	●	●	●	●	●
M	●	○	●	○	●
K	●	●	●	●	●
N	○	○	○	○	○
S	○	○	○	○	○
H					
O	○	○	○	○	○

→ v_c/f_z Sayfa 40-42

Küresel Parmak Freze, HSS-E Co 8



DC _{h10} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
2	4		4	10	12	48	6	2
3	5		5	11	13	49	6	2
3	8		8	18	20	56	6	2
4	7		7	13	15	51	6	2
4	11		11	25	27	63	6	2
5	8		8	14	16	52	6	2
5	13		13	30	32	68	6	2
6	8	5,50	14	14	16	52	6	2
6	13	5,50	30	30	32	68	6	2
7	10	6,50	16	18	20	60	10	2
7	16	6,35	36	38	40	80	10	2
8	11	7,50	17	19	21	61	10	2
8	19	7,35	44	46	48	88	10	2
9	11	8,50	18	19	21	61	10	2
9	19	8,35	45	46	48	88	10	2
10	13	9,50	21	21	23	63	10	2
10	22	9,35	53	53	55	95	10	2
11	13	10,50	21	23	25	70	12	2
11	22	10,50	53	55	57	102	12	2
12	16	11,50	26	26	28	73	12	2
12	26	11,50	63	63	65	110	12	2
13	16	11,50	26	26	28	73	12	2
14	16	11,50	26	26	28	73	12	2
14	26	11,50	63	63	65	110	12	2
15	16	11,50	26	26	28	73	12	2
15	26	11,50	63	63	65	110	12	2
16	19	15,50	29	29	31	79	16	2
16	32	15,00	73	73	75	123	16	2
18	19	15,50	29	29	31	79	16	2
18	32	15,00	73	73	75	123	16	2
20	22	19,00	36	36	38	88	20	2
22	22	19,00	36	36	38	88	20	2
24	26	23,00	42	44	46	102	25	2
24	45	23,00	106	108	110	166	25	2
25	26	24,00	44	44	46	102	25	2
25	45	24,00	108	108	110	166	25	2
26	26	24,00	44	44	46	102	25	2
28	26	24,00	44	44	46	102	25	2
30	26	24,00	44	44	46	102	25	2
30	45	24,00	108	108	110	166	25	2

P	●	●	●
M	○	○	○
K	●	●	●
N	○	○	○
S	○	○	○
H			
O	○	○	○

Ti100 Pro



Fabrika standardı

Fabrika standardı

Fabrika standardı

B B

B B

B B

50 320 ...

54 041 ...

50 321 ...

020

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180

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220

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250

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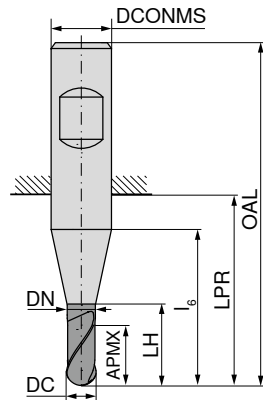
300

300

13

→ v_c/f_z Sayfa 40-42

Küresel Parmak Freze, HSS-E Co 8



DIN 1889 B

DIN 1889 B

DIN 1889 B



50 308 ...

54 038 ...

54 039 ...

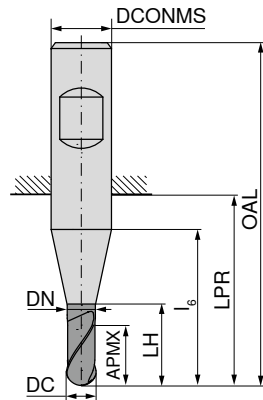
DC _{k12} mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP
6	13	5,5	19	19	21	57	6	4
6	24	5,5	30	30	32	68	6	4
8	19	7,5	25	27	29	69	10	4
8	38	7,5	44	46	48	88	10	4
10	22	9,5	30	30	32	72	10	4
10	45	9,5	53	53	55	95	10	4
12	26	11,5	36	36	38	83	12	4
12	53	11,5	63	63	65	110	12	4
16	32	15,0	42	42	44	92	16	4
16	63	15,0	73	73	75	123	16	4
20	38	19,0	52	52	54	104	20	4
20	75	19,0	89	89	91	141	20	4
25	45	24,0	63	63	65	121	25	5

P	●	●	●
M	○	○	○
K	●	●	●
N	○	○	○
S	○	○	○
H			
O	○	○	○

1) Fabrika standardı

→ v_c/f_z Sayfa 40-42

Küresel İnce Profilli Kaba Talaş Freze, HSS-E Co 8



Ti100 Pro



DIN 1889 B



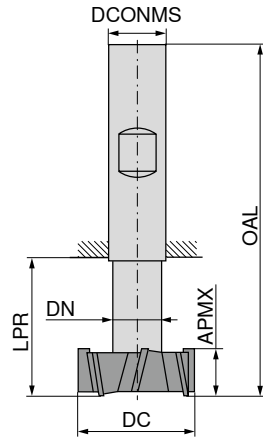
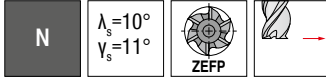
54 040 ...

DC mm	APMX mm	DN mm	LH mm	l ₆ mm	LPR mm	OAL mm	DCONMS mm	ZEFP	
6	13	5,5	19	19	21	57	6	4	060
8	19	7,5	25	27	29	69	10	4	080
10	22	9,5	30	30	32	72	10	4	100
12	26	11,5	36	36	38	83	12	4	120
16	32	15,0	42	42	44	92	16	4	160
20	38	19,0	52	52	54	104	20	4	200
P									●
M									○
K									●
N									○
S									○
H									
O									○

→ v_c/f_z Sayfa 40-42

T-Kanal Frezesi HSS-E Co 5, apraz diřli

▲ DIN 650'ye gre kanallar iin



DIN 851 A

B

50 240 ...

DC _{d11} mm	APMX _{d11} mm	DN _{h12} mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP	
11,0	4	4	13,5	53,5	10	6	110
12,5	6	5	17,0	57,0	10	6	125
16,0	8	7	22,0	62,0	10	6	160
18,0	8	8	25,0	70,0	12	6	180
19,0	9	8	26,0	71,0	12	6	190 ¹⁾
21,0	9	10	29,0	74,0	12	6	210
22,0	10	10	30,0	75,0	12	6	220 ¹⁾
25,0	11	12	34,0	82,0	16	8	250
28,0	12	13	37,0	85,0	16	8	280 ¹⁾
32,0	14	15	42,0	90,0	16	8	320
36,0	16	17	47,0	103,0	25	8	360 ¹⁾
40,0	18	19	52,0	108,0	25	10	400
45,0	20	21	57,0	113,0	25	10	450 ¹⁾
50,0	22	25	64,0	124,0	32	10	500
60,0	28	30	79,0	139,0	32	10	600

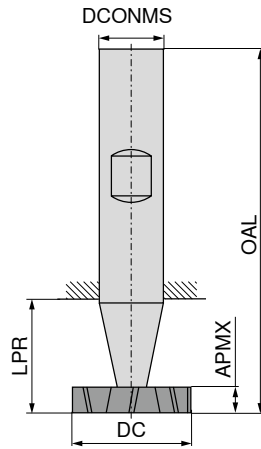
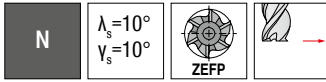
P	●
M	○
K	●
N	○
S	○
H	○
O	○

1) Fabrika standardı

→ v_c/f_z Sayfa 43

T-Kanal Freze HSS-E Co 5, apraz diřli

▲ DIN 6888'e gre kanallar iin

▲ CDX = $a_{p \text{ maks.}}$ 

DIN 850

B

50 234 ...

DC _{h12} mm	APMX _{e8} mm	LPR mm	OAL mm	DCONMS _{h6} mm	CDX mm	ZEFP	
10,5	2,0	14	50	6	3,25	6	100
10,5	2,5	14	50	6	3,15	6	101
10,5	3,0	14	50	6	3,15	6	102
13,5	2,0	16	56	10	4,45	6	130 ¹⁾
13,5	3,0	16	56	10	4,45	6	132
13,5	4,0	16	56	10	4,45	6	133
16,5	3,0	16	56	10	5,95	6	161
16,5	4,0	16	56	10	5,95	6	162
16,5	5,0	16	56	10	5,75	6	163
19,5	3,0	23	63	10	6,95	8	190 ¹⁾
19,5	4,0	23	63	10	6,95	8	191
19,5	5,0	23	63	10	6,75	8	192
22,5	4,0	23	63	10	8,25	8	220 ¹⁾
22,5	5,0	23	63	10	8,25	8	221
22,5	6,0	23	63	10	8,00	8	222
25,5	5,0	23	63	10	9,00	10	250 ¹⁾
25,5	6,0	23	63	10	9,00	10	251
28,5	6,0	23	63	10	10,00	10	281
28,5	8,0	23	63	10	10,00	10	283
32,5	6,0	26	71	12	12,00	10	321 ¹⁾
32,5	8,0	26	71	12	12,00	10	322
38,5	8,0	26	71	12	13,35	10	381 ¹⁾
45,5	10,0	26	71	12	16,85	12	450

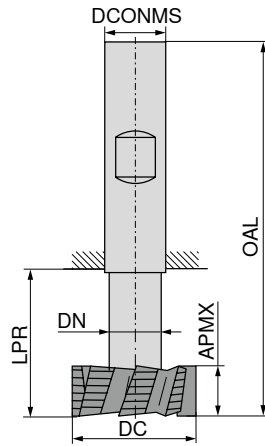
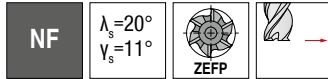
P	•
M	○
K	•
N	○
S	○
H	○
O	○

1) Fabrika standardı

→ v_c/f_z Sayfa 43

T-Kanal Frezesi HSS-E Co 5

▲ DIN 650'ye göre kanallar için



DIN 851 A

B

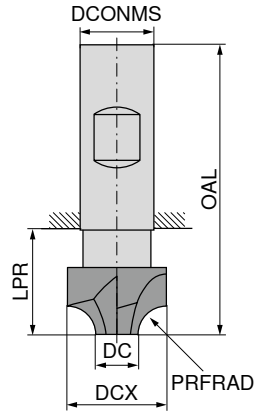
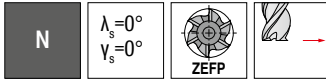
50 241 ...

DC _{d11} mm	APMX mm	DN _{h12} mm	LPR mm	OAL mm	DCONMS _{h6} mm	ZEFP	
21	9	10	29	74	12	6	210
22	10	10	30	75	12	6	220 ¹⁾
25	11	12	34	82	16	6	250
28	12	13	37	85	16	6	280 ¹⁾
32	14	15	42	90	16	6	320
36	16	17	47	103	25	6	360 ¹⁾
40	18	19	52	108	25	8	400
45	20	21	57	113	25	8	450 ¹⁾
P							●
M							○
K							●
N							○
S							○
H							○
O							○

1) Fabrika standardı

→ v_c/f_z Sayfa 43

Dış Radüs Freze HSS-E Co 5, konkav



DIN 6518

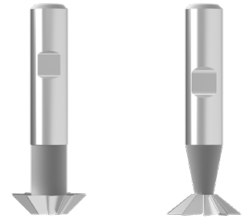
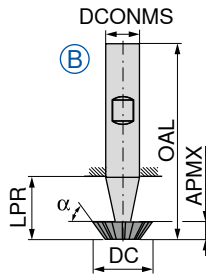
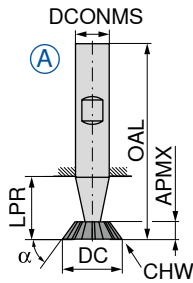
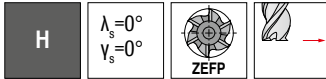


50 248 ...

PRFRAD _{H11}	DCX	DC	LPR	OAL	DCONMS _{H6}	ZEFP	
mm	mm	mm	mm	mm	mm		
1,0	8	6	20	60	10	4	010
1,5	9	6	20	60	10	4	015
2,0	10	6	20	60	10	4	020
2,5	11	6	20	60	10	4	025
3,0	12	6	15	60	12	4	030
4,0	14	6	15	60	12	4	040
5,0	16	6	15	60	12	4	050
6,0	20	8	19	67	16	4	060
8,0	24	8	23	71	16	4	080
9,0	26	8	29	85	25	4	090
10,0	28	8	29	85	25	4	100
12,0	34	10	34	90	25	4	120
15,0	46	16	44	100	25	6	150
16,0	48	16	44	100	25	6	160
P							●
M							○
K							●
N							○
S							○
H							
O							○

→ v_c/f_z Sayfa 43

Kırlangıç Frezeler HSS-E Co 5



α°	DC mm	APMX mm	LPR mm	OAL mm	DCONMS _{h6} mm	CHW mm	ZEFP	Versi- yon
45	16	4,0	15	60	12	0,3	10	A
	16	4,0	15	60	12		10	B
	20	5,0	18	63	12	0,3	10	A
	20	5,0	18	63	12		10	B
	25	6,3	22	67	12	0,3	10	A
	25	6,3	22	67	12		10	B
60	16	6,3	15	60	12	0,3	10	A
	16	6,3	15	60	12		10	B
	20	8,0	18	63	12	0,3	10	A
	20	8,0	18	63	12		10	B
	25	10,0	22	67	12	0,3	10	A
	25	10,0	22	67	12		10	B
70	16	7,0	15	60	12	0,3	10	A
	20	9,0	18	63	12	0,3	10	A
	25	11,0	19	67	16	0,3	10	A

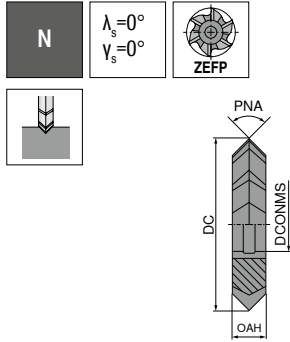
P	●	●
M	○	○
K	●	●
N	○	○
S	○	○
H		
O	○	○

1) Fabrika standardı

→ v_c/f_z Sayfa 44

Prizma Freze HSS

▲ Delik kama kanalı DIN 138'e göre dir.



DIN 847

50 360 ...

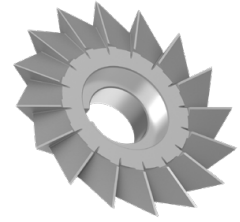
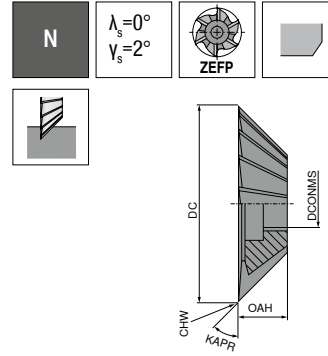
PNA °	DC mm	OAH mm	DCONMS mm	ZEFP	
45	50	8	16	22	045
	63	10	22	24	145
	80	12	27	26	245
	100	18	32	28	345
60	50	10	16	18	060
	63	14	22	20	160
	80	18	27	22	260
	100	25	32	24	360
90	50	14	16	16	090
	63	20	22	18	190
	80	22	27	20	290
	100	32	32	24	390
120	50	14	16	16	120 1)
	63	20	22	16	121 1)
P					●
M					○
K					●
N					○
S					○
H					○
O					○

1) Fabrika standardı

→ v_c/f_z Sayfa 44

Tek Açılı Konik Alın Freze, HSS

▲ Delik kama kanalı DIN 138'e göre dir.



DIN 842 A

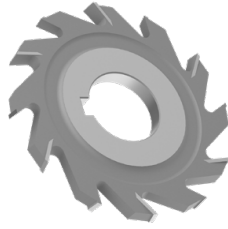
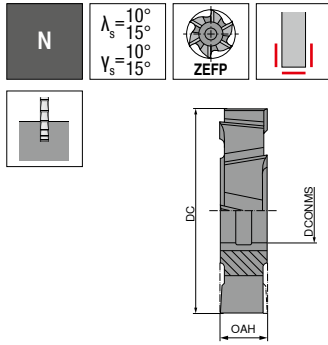
50 362 ...

KAPR °	DC mm	OAH mm	DCONMS mm	CHW mm	ZEFP	
45	40	10	10	0,3	14	045
	50	13	13	0,3	16	145
	63	18	16	0,3	18	245
	80	22	22	0,3	20	345
	100	28	27	0,3	22	445
50	50	16	13	0,3	16	150
60	40	13	10	0,3	14	060
	50	16	13	0,3	16	160
	63	20	16	0,3	18	260
	80	25	22	0,3	20	360
	100	32	27	0,3	22	460
	125	40	32	0,3	28	560
P						●
M						○
K						●
N						○
S						○
H						○
O						○

→ v_c/f_z Sayfa 44

Disk biçimli kanal freze HSS-E Co 5

- ▲ Seyrek dişli çapraz versiyon
▲ Delik kama kanalı DIN 138'e göredir.



DIN 885 A

50 348 ...

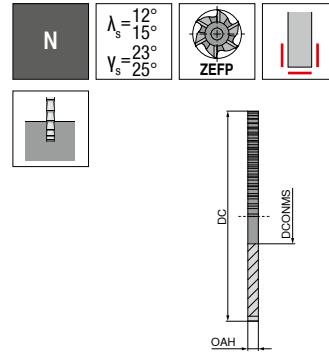
DC _{js16} mm	OAH _{k11} mm	DCONMS _{H7} mm	ZEPF	
50	4	16	12	100
50	5	16	12	102
50	6	16	12	104
50	8	16	12	106
50	10	16	12	108
63	4	22	12	200
63	5	22	12	202
63	6	22	12	204
63	8	22	12	206
63	10	22	12	208
63	12	22	12	210
63	14	22	12	212
80	5	27	14	300
80	6	27	14	302
80	8	27	14	304
80	10	27	14	306
80	12	27	14	308
80	14	27	14	310
80	16	27	14	312
80	18	27	14	314
80	20	27	14	316
100	6	32	14	400
100	8	32	14	402
100	10	32	14	404
100	12	32	14	406
100	14	32	14	408
100	16	32	14	410
100	18	32	14	412
100	20	32	14	414
100	25	32	14	418
125	8	32	16	500
125	10	32	16	502
125	12	32	16	504
125	14	32	16	506
125	16	32	16	508
125	18	32	16	510
125	20	32	16	512
125	25	32	16	516
160	10	40	18	600
160	12	40	18	602
160	14	40	18	604
160	16	40	18	606
160	18	40	18	608
160	20	40	18	610
160	25	40	18	614
160	32	40	18	618

P	○
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 45

Dar Kanal Frezesi HSS-E Co 5

- ▲ Seyrek dişli çapraz versiyon
▲ Delik kama kanalı DIN 138'e göredir.



Fabrika standardı

50 342 ...

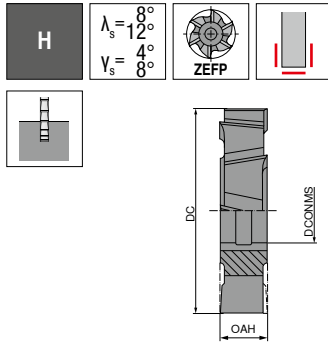
DC _{js16} mm	OAH _{k11} mm	DCONMS _{H7} mm	ZEPF	
63	1,6	22	16	200
63	2,0	22	16	202
63	2,5	22	16	204
63	3,0	22	16	206
80	1,6	27	20	300
80	2,0	27	20	302
80	2,5	27	20	304
80	3,0	27	20	306
80	4,0	27	20	310
100	1,6	32	24	400
100	2,0	32	24	402
100	2,5	32	24	404
100	3,0	32	24	406
100	4,0	32	24	410
100	5,0	32	24	414
125	1,6	32	26	500
125	2,0	32	26	502
125	2,5	32	26	504
125	3,0	32	26	506
125	4,0	32	26	510
125	5,0	32	26	514
125	6,0	32	26	516
160	2,0	40	30	600
160	2,5	40	30	602
160	3,0	40	30	604
160	4,0	40	30	606
160	5,0	40	30	608
160	6,0	40	30	610
160	8,0	40	22	612

P	○
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 45

Disk biçimli kanal freze HSS-E Co 5

- ▲ Sık dişli çapraz versiyon
▲ Delik kama kanalı DIN 138'e göre dir.



DIN 885 A

50 349 ...

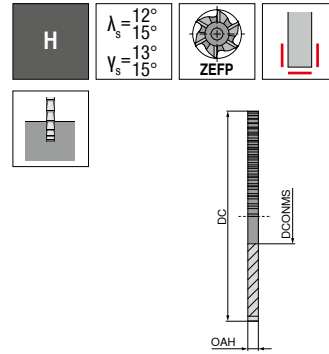
DC _{js16} mm	OAH _{k11} mm	DCONMS _{H7} mm	ZEFP	
50	4	16	16	100
50	5	16	16	102
50	6	16	16	104
50	8	16	16	106
50	10	16	16	108
63	4	22	18	200
63	5	22	18	202
63	6	22	18	204
63	8	22	18	206
63	10	22	18	208
63	12	22	18	210
63	14	22	18	212
80	5	27	20	300
80	6	27	20	302
80	8	27	20	304
80	10	27	18	306
80	12	27	18	308
80	14	27	18	310
80	16	27	18	312
80	18	27	18	314
80	20	27	18	316
100	6	32	22	400
100	8	32	22	402
100	10	32	20	404
100	12	32	20	406
100	14	32	20	408
100	16	32	20	410
100	18	32	20	412
100	20	32	20	414
100	25	32	20	418
125	8	32	24	500
125	10	32	22	502
125	12	32	22	504
125	14	32	22	506
125	16	32	22	508
125	18	32	22	510
125	20	32	22	512
125	25	32	22	516
160	10	40	26	600
160	12	40	26	602
160	14	40	26	604
160	16	40	26	606
160	18	40	26	608
160	20	40	26	610
160	25	40	26	614
160	32	40	26	618

P	●
M	○
K	●
N	●
S	○
H	●
O	●

→ v_c/f_z Sayfa 45

Dar Kanal Frezesi HSS-E Co 5

- ▲ Sık dişli çapraz versiyon
▲ Delik kama kanalı DIN 138'e göre dir.



DIN 1834 A

50 340 ...

DC _{js16} mm	OAH _{k11} mm	DCONMS _{H7} mm	ZEFP	
63	1,6	22	28	200
63	2,0	22	28	202
63	2,5	22	28	204
63	3,0	22	28	206
80	1,6	27	32	300
80	2,0	27	32	302
80	2,5	27	32	304
80	3,0	27	32	306
80	4,0	27	32	310
100	1,6	32	36	400
100	2,0	32	36	402
100	2,5	32	36	404
100	3,0	32	36	406
100	4,0	32	36	410
100	5,0	32	36	414
125	1,6	32	40	500
125	2,0	32	40	502
125	2,5	32	40	504
125	3,0	32	40	506
125	4,0	32	40	510
125	5,0	32	40	514
125	6,0	32	40	516
160	2,0	40	48	600
160	2,5	40	48	602
160	3,0	40	48	604
160	4,0	40	48	606
160	5,0	40	48	608
160	6,0	40	48	610
160	8,0	40	36	612

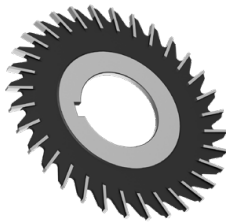
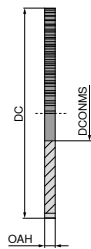
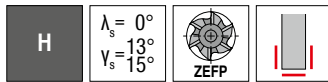
P	●
M	○
K	●
N	●
S	●
H	●
O	●

→ v_c/f_z Sayfa 45

Dar Kanal Frezesi HSS-E Co 5

▲ Düz dişli versiyon

▲ Delik kama kanalı DIN 138'e göredir.



DIN 1834 B

50 341 ...

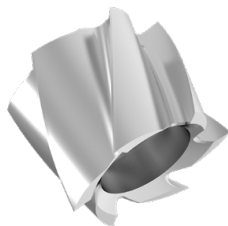
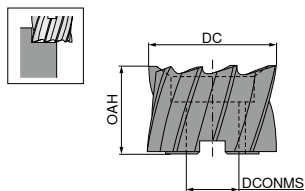
DC _{js16} mm	OAH _{k11} mm	DCONMS _{H7} mm	ZEFP	
63	1,6	22	32	200
63	2,0	22	32	202
63	2,5	22	32	204
63	3,0	22	32	206
80	1,6	27	36	300
80	2,0	27	36	302
80	2,5	27	36	304
80	3,0	27	36	306
80	4,0	27	36	310
100	1,6	32	40	400
100	2,0	32	40	402
100	2,5	32	40	404
100	3,0	32	40	406
100	4,0	32	40	410
100	5,0	32	40	414
125	1,6	32	44	500
125	2,0	32	44	502
125	2,5	32	44	504
125	3,0	32	44	506
125	4,0	32	44	510
125	5,0	32	44	514
125	6,0	32	44	516
160	2,0	40	52	600
160	2,5	40	52	602
160	3,0	40	52	604
160	4,0	40	52	606
160	5,0	40	52	608
160	6,0	40	52	610
160	8,0	40	40	612

P	●
M	○
K	●
N	●
S	○
H	○
O	●

→ v_e/f_z Sayfa 45

Alın Freze, HSS-E Co 5

▲ Delik kama kanalı DIN 138'e göre dir.



DIN 1880

50 255 ...

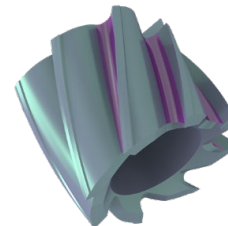
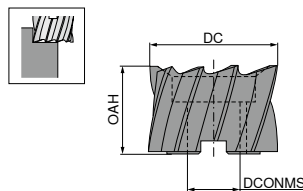
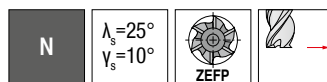
DC _{k10} mm	OAH mm	DCONMS mm	ZEFP	
40	32	16	6	040
50	36	22	6	050
63	40	27	6	063
80	45	27	6	080
100	50	32	6	100

P	
M	
K	
N	●
S	
H	
O	●

→ v_c/f_z Sayfa 46+47

Alın Freze, HSS-E Co 5

▲ Delik kama kanalı DIN 138'e göre dir.

Ti100
Pro

DIN 1880

54 035 ...

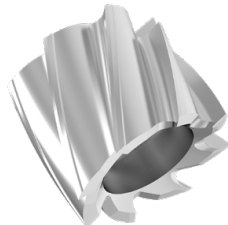
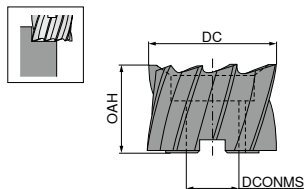
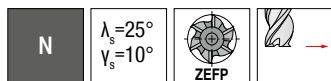
DC _{k10} mm	OAH mm	DCONMS mm	ZEFP	
40	32	16	8	040
50	36	22	8	050
63	40	27	8	063
80	45	27	10	080
100	50	32	12	100

P	●
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 46+47

Alın Freze, HSS-E Co 5

▲ Delik kama kanalı DIN 138'e göre dir.



DIN 1880

50 250 ...

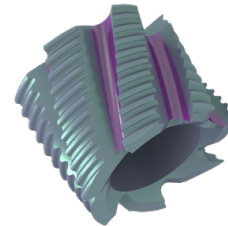
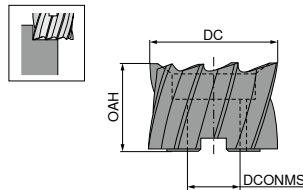
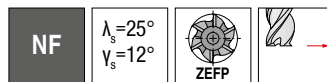
DC _{k10} mm	OAH mm	DCONMS mm	ZEFP	
40	32	16	8	040
50	36	22	8	050
63	40	27	8	063
80	45	27	10	080
100	50	32	12	100

P	●
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 46+47Alın Freze - Kaba Talaş Finiş İşleme,
HSS-E Co 5

▲ Delik kama kanalı DIN 138'e göre dir.

▲ Üretim toleransı, js14 tolerans aralığının pozitif bölgesindedir.

Ti100
Pro

DIN 1880

54 036 ...

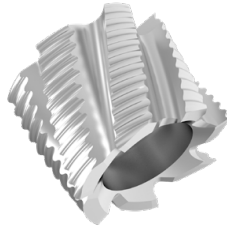
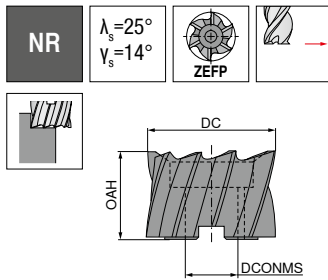
DC _{js14} mm	OAH mm	DCONMS mm	ZEFP	
40	32	16	7	040
50	36	22	8	050
63	40	27	8	063
80	45	27	10	080
100	50	32	12	100

P	●
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 46+47

Alın Freze - Kaba Talaş, HSS-E Co 5

- ▲ Delik kama kanalı DIN 138'e göredir.
- ▲ Üretim toleransı, js14 tolerans aralığının pozitif bölgesindedir.



DIN 1880

50 260 ...

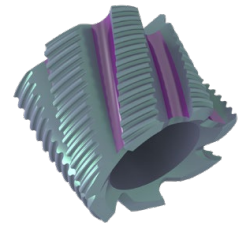
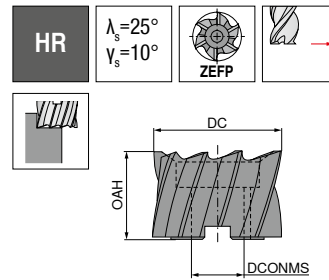
DC _{js14} mm	OAH mm	DCONMS mm	ZEFP	
40	32	16	7	040
50	36	22	8	050
63	40	27	8	063
80	45	27	10	080
100	50	32	12	100

P	●
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 46+47

Alın Freze - İnce Profilli Kaba Talaş, HSS-E Co 8

- ▲ Delik kama kanalı DIN 138'e göredir.
- ▲ Üretim toleransı, js14 tolerans aralığının pozitif bölgesindedir.

Ti100
Pro

DIN 1880

54 037 ...

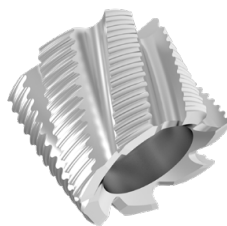
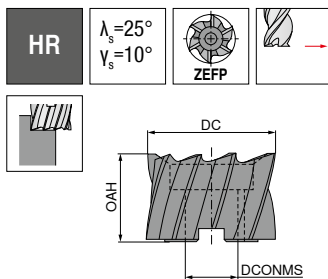
DC _{js14} mm	OAH mm	DCONMS mm	ZEFP	
40	32	16	7	040
50	36	22	8	050
63	40	27	8	063
80	45	27	10	080
100	50	32	12	100

P	●
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 46+47

Alın Freze - İnce Profilli Kaba Talaş, HSS-E Co 8

- ▲ Delik kama kanalı DIN 138'e göredir.
- ▲ Üretim toleransı, js14 tolerans aralığının pozitif bölgesindedir.



DIN 1880

50 297 ...

DC _{js14} mm	OAH mm	DCONMS mm	ZEFP	
40	32	16	7	040
50	36	22	8	050
63	40	27	8	063
80	45	27	10	080
100	50	32	12	100

P	●
M	●
K	●
N	●
S	○
H	
O	●

→ v_c/f_z Sayfa 46+47

Kesme verileri tablolarına ilişkin malzeme örnekleri

	Malzeme alt grubu	Dizin	Bileşim / yapı / ısıtış işlem		Çekme mukavemeti N/mm ² / HB / HRC	Malzeme numarası	Malzeme tanımı	Malzeme numarası	Malzeme tanımı
P	Alaşsımsız çelik	P.1.1	< 0,15 % C	tavllanmış	420 N/mm ² / 125 HB	1.0401	C15	1.1141	Ck15
		P.1.2	< 0,45 % C	tavllanmış	640 N/mm ² / 190 HB	1.1191	C45E	1.0718	9SMnPb28
		P.1.3		temperlenmiş	840 N/mm ² / 250 HB	1.1191	C45E	1.0535	C55
		P.1.4	< 0,75 % C	tavllanmış	910 N/mm ² / 270 HB	1.1223	C60R	1.0535	C55
		P.1.5		temperlenmiş	1010 N/mm ² / 300 HB	1.1223	C60R	1.0727	45S20
	Düşük alaşımlı çelik	P.2.1		tavllanmış	610 N/mm ² / 180 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.2		temperlenmiş	930 N/mm ² / 275 HB	1.7131	16MnCr5	1.6587	17CrNiMo6
		P.2.3		temperlenmiş	1010 N/mm ² / 300 HB	1.7225	42CrMo4	1.3505	100Cr6
		P.2.4		temperlenmiş	1200 N/mm ² / 375 HB	1.7225	42CrMo4	1.3505	100Cr6
	Yüksek alaşımlı çelik ve yüksek alaşımlı takım çeliği	P.3.1		tavllanmış	680 N/mm ² / 200 HB	1.4021	X20Cr13	1.4034	X46Cr13
		P.3.2		sertleştirilmiş ve temperlenmiş	1100 N/mm ² / 300 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
		P.3.3		sertleştirilmiş ve temperlenmiş	1300 N/mm ² / 400 HB	1.2343	X38CrMoV5-1	1.4034	X46Cr13
	Paslanmaz çelik	P.4.1	ferritik / martensitik	tavllanmış	680 N/mm ² / 200 HB	1.4016	X6Cr17	1.2316	X36CrMo16
		P.4.2	martensitik	temperlenmiş	1010 N/mm ² / 300 HB	1.4112	X90CrMoV18	1.2316	X36CrMo16
M	Paslanmaz çelik	M.1.1	östenitik / östenitik-ferritik	su verilmiş	610 N/mm ² / 180 HB	1.4301	X5CrNi18-10	1.4571	X6CrNiMoTi17-12-2
		M.2.1	östenitik	temperlenmiş	300 HB	1.4841	X15CrNiSi25-21	1.4539	X1NiCrMoCu25-20-5
		M.3.1	östenitik / ferritik (dubleks)		780 N/mm ² / 230 HB	1.4462	X2CrNiMoN22-5-3	1.4501	X2CrNiMoCuWN25-7-4
K	Gri dökme demir	K.1.1	perlitik / ferritik		350 N/mm ² / 180 HB	0.6010	GG-10	0.6025	GG-25
		K.1.2	perlitik (martensitik)		500 N/mm ² / 260 HB	0.6030	GG-30	0.6045	GG-45
	Küresel grafitli dökme demir	K.2.1	ferritik		540 N/mm ² / 160 HB	0.7040	GGG-40	0.7060	GGG-60
		K.2.2	perlitik		845 N/mm ² / 250 HB	0.7070	GGG-70	0.7080	GGG-80
	Temper döküm	K.3.1	ferritik		440 N/mm ² / 130 HB	0.8035	GTW-35-04	0.8045	GTW-45
		K.3.2	perlitik		780 N/mm ² / 230 HB	0.8165	GTS-65-02	0.8170	GTS-70-02
N	Alüminyum yoğurma alaşımı	N.1.1	sertleştirilemez		60 HB	3.0255	Al99,5	3.3315	AlMg1
		N.1.2	sertleştirilebilir	sertleştirilmiş	340 N/mm ² / 100 HB	3.1355	AlCuMg2	3.2315	AlMgSi1
	Alüminyum döküm alaşımları	N.2.1	≤ 12 % Si, sertleştirilemez		250 N/mm ² / 75 HB	3.2581	G-AlSi12	3.2163	G-AlSi9Cu3
		N.2.2	≤ 12 % Si, sertleştirilebilir	sertleştirilmiş	300 N/mm ² / 90 HB	3.2134	G-AlSi5Cu1Mg	3.2373	G-AlSi9Mg
		N.2.3	> 12 % Si, sertleştirilemez		440 N/mm ² / 130 HB		G-AlSi17Cu4Mg		G-AlSi18CuNiMg
	Bakır ve bakır alaşımları (Bronz, Piring)	N.3.1	Otomat alaşımları, PB > 1 %		375 N/mm ² / 110 HB	2.0380	CuZn39Pb2 (Ms58)	2.0410	CuZn44Pb2
		N.3.2	CuZn, CuSnZn		300 N/mm ² / 90 HB	2.0331	CuZn15	2.4070	CuZn28Sn1As
		N.3.3	CuSn, kurşunsuz bakır ve elektrolitik bakır		340 N/mm ² / 100 HB	2.0060	E-Cu57	2.0590	CuZn40Fe
	Magnezyum alaşımları	N.4.1	Magnezyum ve magnezyum alaşımları		70 HB	3.5612	MgAl6Zn	3.5312	MgAl3Zn
S	Isıya dayanıklı alaşımlar	S.1.1	FE bazlı	tavllanmış	680 N/mm ² / 200 HB	1.4864	X12NiCrSi 36-16	1.4865	G-X40NiCrSi38-18
		S.1.2		sertleştirilmiş	950 N/mm ² / 280 HB	1.4980	X6NiCrTiMoVB25-15-2	1.4876	X10NiCrAlTi32-20
		S.2.1	Ni veya Co bazlı	tavllanmış	840 N/mm ² / 250 HB	2.4631	NiCr20TiAl (Nimonic80A)	3.4856	NiCr22Mo9Nb
		S.2.2		sertleştirilmiş	1180 N/mm ² / 350 HB	2.4668	NiCr19Nb5Mo3 (Inconel 718)	2.4955	NiFe25Cr20NbTi
		S.2.3		dökülmüş	1080 N/mm ² / 320 HB	2.4765	CoCr20W15Ni	1.3401	G-X120Mn12
	Titanyum alaşımları	S.3.1	Saf titanyum		400 N/mm ²	3.7025	Ti99,8	3.7034	Ti99,7
		S.3.2	Alfa- + Beta alaşımları	sertleştirilmiş	1050 N/mm ² / 320 HB	3.7165	TiAl6V4	Ti-6246	Ti-6Al-2Sn-4Zr-6Mo
		S.3.3	Beta alaşımları		1400 N/mm ² / 410 HB	Ti555.3	Ti-5Al-5V-5Mo-3Cr	R56410	Ti-10V-2Fe-3Al
H	Sertleştirilmiş çelik	H.1.1	sertleştirilmiş ve temperlenmiş		46-55 HRC				
		H.1.2			56-60 HRC				
		H.1.3			61-65 HRC				
		H.1.4			66-70 HRC				
	Sert döküm	H.2.1	dökülmüş	400 HB					
	Sertleştirilmiş dökme demir	H.3.1	sertleştirilmiş ve temperlenmiş	55 HRC					
O	Metal dışı malzemeler	O.1.1	Plastikler, termoset plastik		≤ 150 N/mm ²				
		O.1.2	Plastikler, termoplastik		≤ 100 N/mm ²				
		O.2.1	aramid elyaf takviyeli		≤ 1000 N/mm ²				
		O.2.2	cam / karbon elyaf takviyeli		≤ 1000 N/mm ²				
		O.3.1	Grafit						

* çekme mukavemeti

HSS Kanal Frezeler ve Parmak Frezeler için kesme hızları (v_c)

		Kaplamasız	Ti100 Pro	Toz Metal Çelik	1. Tercih		
				Ti100 Pro	● ○		Uygun
İçindekiler	Kf f _z				Emülsiyon	Basınçlı Hava	Karışım
		v _c m/min					
P.1.1	1,2	20	45	50	●		
P.1.2	1,2	20	45	50	●		
P.1.3	1,2	20	45	50	●		
P.1.4	1,0	15	30	35	●		
P.1.5	1,0	15	30	35	●		
P.2.1	1,2	20	40	45	●		
P.2.2	1,0	15	40	45	●		
P.2.3	0,8	15	30	35	●		
P.2.4	0,8	15	30	35	●		
P.3.1	1,0	15	30	35	●		
P.3.2	0,8	12	25	30	●		
P.3.3	0,8	10	20	25	●		
P.4.1	1,0	10	20	25	●		
P.4.2	1,0	10	20	25	●		
M.1.1	1,0	10	20	25	●		
M.2.1	0,9	7	15	20	●		
M.3.1	1,0	5	10	15	●		
K.1.1	1,0	18	35	40	●		
K.1.2	1,0	18	25	30	●		
K.2.1	1,0	15	30	35	●		
K.2.2	1,0	15	30	35	●		
K.3.1	1,0	15	35	40	●		
K.3.2	0,8	12	25	30	●		
N.1.1	1,9	150	240	260	●		
N.1.2	1,9	100	130	150	●		
N.2.1	1,8		100	140	●		
N.2.2	1,7		60	80	●		
N.2.3							
N.3.1	1,1		100	130	●		
N.3.2	1,2	30	60	80	●		
N.3.3	1,2	30	60	80	●		
N.4.1	1,8	90	140	160		●	
S.1.1							
S.1.2							
S.2.1							
S.2.2							
S.2.3							
S.3.1	1,0	10	15	25	●		
S.3.2	1,1	10	15	25	●		
S.3.3							
H.1.1							
H.1.2							
H.1.3							
H.1.4							
H.2.1							
H.3.1							
O.1.1	2,0	30	50	70	●		
O.1.2	2,0	20	25	40	●		
O.2.1							
O.2.2							
O.3.1	1,0		30	40	o		



Kanal frezeleme yaparken tabloda verilen kesme hızı (Vc) yaklaşık %15 ile %20 oranında azaltılmalıdır!

Kf f_z = Dış başına ilerleme için düzeltme faktörü

HSS Parmak Frezeler için diş başına ilerleme değerleri

Diş başına ilerleme (f_z) için yaklaşık değerler (mm)

Finis ve profil frezeleme												Kanal Frezeleme	

HSS Parmak Frezelerle kanal açmak için dış başına ilerleme değerleri

Dış başına ilerleme (f_z) için yaklaşık değerler (mm)

Tam kanal frezeleme (tek pasoda)		Profil kanal frezeleme (cep boşaltma)				Delik frezeleme				
f_z mm		f_z mm				f_z mm				
Ø DC mm	Kaplamasız	Kaplamalı	Kaplamasız	Kaplamalı	Kaplamasız	Kaplamalı	Kaplamasız	Kaplamalı	Kaplamasız	Kaplamalı
2	0,005	0,006	0,005	0,006	0,008	0,009	0,003	0,003	0,002	0,002
3	0,009	0,010	0,009	0,010	0,015	0,016	0,004	0,005	0,003	0,003
4	0,012	0,013	0,012	0,013	0,022	0,024	0,006	0,007	0,004	0,004
5	0,016	0,017	0,016	0,017	0,030	0,033	0,008	0,009	0,005	0,006
6	0,020	0,022	0,020	0,022	0,039	0,043	0,010	0,011	0,007	0,007
8	0,026	0,029	0,026	0,029	0,055	0,061	0,013	0,014	0,009	0,010
10	0,034	0,037	0,034	0,037	0,075	0,082	0,017	0,019	0,011	0,012
12	0,040	0,044	0,040	0,044	0,093	0,101	0,020	0,022	0,013	0,015
14	0,049	0,054	0,049	0,054	0,117	0,118	0,024	0,027	0,016	0,018
16	0,056	0,062	0,056	0,062	0,135	0,135	0,028	0,031	0,019	0,021
18	0,065	0,072	0,065	0,072	0,151	0,151	0,033	0,036	0,022	0,024
20	0,071	0,078	0,071	0,078	0,167	0,167	0,035	0,039	0,024	0,026
22	0,080	0,088	0,080	0,088	0,184	0,184	0,040	0,044	0,027	0,029
25	0,089	0,098	0,089	0,098	0,208	0,208	0,044	0,049	0,030	0,033
28	0,103	0,113	0,103	0,113	0,233	0,233	0,051	0,056	0,034	0,037
32	0,118	0,130	0,118	0,130	0,260	0,260	0,060	0,065	0,040	0,043
36	0,130	0,143	0,130	0,143	0,260	0,260	0,060	0,065	0,040	0,043
40	0,130	0,143	0,130	0,143	0,260	0,260	0,060	0,065	0,040	0,043
45	0,130	0,143	0,130	0,143	0,260	0,260	0,060	0,065	0,040	0,043
50	0,130	0,143	0,130	0,143	0,260	0,260	0,060	0,065	0,040	0,043

**Dikkat:**

Kaplamasız frezeler için, eş yönlü frezeleme zıt yönlü frezelemeye göre tercih edilir. Kaplamalı frezeler kullanılırken, ideal sonuçlar elde etmek için eş yönlü frezeleme gereklidir.

**İlerleme hızı düzeltmesi:**

Lütfen yukarıdaki f_z değerini → 40. sayfadaki düzeltme faktörü $K_f f_z$ ile çarpınız.

Genel olarak aşağıdakiler geçerlidir:

$$f_z \text{ (Frezeleme)} = f_z \times K_f f_z$$

$$f_z \text{ (Delme)} = f_z \text{ (Frezeleme)} \div \text{Dış sayısı}$$

Kesme verileri referans değerleri – Form frezesi

		50 241 ...			50 240 ...					50 234 ...				50 248 ...				1. Tercih			
		Ø DC = 21-25 mm	Ø DC = 28-36 mm	Ø DC = 40-45 mm	Ø DC = 11-16 mm	Ø DC = 18-22 mm	Ø DC = 25-32 mm	Ø DC = 36-45 mm	Ø DC = 50-60 mm	Ø DC = 10-17 mm	Ø DC = 19-26 mm	Ø DC = 28-33 mm	Ø DC = 33-46 mm	Ø DC = 8-11 mm	Ø DC = 12-24 mm	Ø DC = 26-34 mm	Ø DC = 46-48 mm	Uygun			
İçinde- kiler	v _c m/dak	f _z mm			f _z mm					v _c m/dak	f _z mm				f _z mm				Emülsiyon	Basınçlı hava	Karışım
P.1.1	28	0,07	0,1	0,12	0,015	0,03	0,03	0,03	0,04	28	0,02	0,03	0,04	0,05	0,03	0,06	0,1	0,12			
P.1.2	28	0,07	0,1	0,12	0,015	0,03	0,03	0,03	0,04	28	0,02	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
P.1.3	28	0,07	0,1	0,12	0,015	0,03	0,03	0,03	0,04	28	0,02	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
P.1.4	22	0,06	0,08	0,1	0,015	0,03	0,03	0,03	0,04	22	0,02	0,03	0,035	0,045	0,025	0,055	0,08	0,1	●		
P.1.5	22	0,06	0,08	0,1	0,015	0,03	0,03	0,03	0,04	22	0,02	0,03	0,035	0,045	0,025	0,055	0,08	0,1	●		
P.2.1	22	0,06	0,08	0,1	0,015	0,03	0,03	0,03	0,04	22	0,02	0,03	0,035	0,045	0,025	0,055	0,08	0,1	●		
P.2.2	28	0,07	0,1	0,12	0,015	0,03	0,03	0,03	0,04	28	0,02	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
P.2.3	20	0,06	0,08	0,1	0,015	0,03	0,03	0,03	0,04	20	0,02	0,03	0,035	0,045	0,025	0,055	0,08	0,1	●		
P.2.4	20	0,06	0,08	0,1	0,015	0,03	0,03	0,03	0,04	20	0,02	0,03	0,035	0,045	0,025	0,055	0,08	0,1	●		
P.3.1																					
P.3.2																					
P.3.3																					
P.4.1	10	0,06	0,08	0,1	0,01	0,025	0,025	0,025	0,03	10	0,02	0,025	0,03	0,04	0,02	0,045	0,08	0,09	●		
P.4.2	10	0,06	0,08	0,1	0,01	0,025	0,025	0,025	0,03	10	0,02	0,025	0,03	0,04	0,02	0,045	0,08	0,09	●		
M.1.1	10	0,06	0,08	0,1	0,01	0,025	0,025	0,025	0,03	10	0,02	0,025	0,03	0,04	0,02	0,045	0,08	0,09	●		
M.2.1																					
M.3.1																					
K.1.1	28	0,07	0,1	0,12	0,015	0,03	0,025	0,04	0,035	24	0,025	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
K.1.2																					
K.2.1	22	0,07	0,1	0,12	0,015	0,03	0,025	0,04	0,035	22	0,025	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
K.2.2	20	0,07	0,1	0,12	0,015	0,03	0,025	0,04	0,035	20	0,025	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
K.3.1	15	0,07	0,1	0,12	0,015	0,03	0,025	0,04	0,035	15	0,025	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
K.3.2	15	0,07	0,1	0,12	0,015	0,03	0,025	0,04	0,035	15	0,025	0,03	0,04	0,05	0,03	0,06	0,1	0,12	●		
N.1.1	100	0,1	0,12	0,15	0,02	0,045	0,045	0,045	0,055	90	0,03	0,04	0,06	0,07	0,035	0,07	0,14	0,15	●		
N.1.2	100	0,1	0,12	0,15	0,02	0,045	0,045	0,045	0,055	90	0,03	0,04	0,06	0,07	0,035	0,07	0,14	0,15	●		
N.2.1	80	0,09	0,11	0,13	0,015	0,04	0,035	0,04	0,045	80	0,03	0,035	0,045	0,055	0,03	0,06	0,12	0,12	●		
N.2.2	60	0,09	0,11	0,13	0,015	0,04	0,035	0,04	0,045	60	0,03	0,035	0,045	0,055	0,03	0,06	0,12	0,12	●		
N.2.3																					
N.3.1	25	0,08	0,1	0,12	0,015	0,04	0,035	0,03	0,035	25	0,02	0,035	0,045	0,055	0,03	0,06	0,12	0,12	●		
N.3.2	25	0,08	0,1	0,12	0,015	0,04	0,035	0,03		25	0,02	0,035	0,045	0,055	0,03	0,06	0,12	0,12	●		
N.3.3	25	0,08	0,1	0,12	0,015	0,04	0,035	0,03		25	0,02	0,035	0,045	0,055	0,03	0,06	0,12	0,12	●		
N.4.1	70	0,1	0,12	0,15	0,018	0,04	0,03	0,035	0,045	70	0,03	0,035	0,05	0,06	0,025	0,06	0,1	0,12	●		
S.1.1																					
S.1.2																					
S.2.1																					
S.2.2																					
S.2.3																					
S.3.1	20	0,06	0,08	0,1	0,012	0,025	0,025	0,025	0,035	20	0,015	0,025	0,035	0,045	0,02	0,05	0,07	0,09	●		
S.3.2																					
S.3.3																					
H.1.1																					
H.1.2																					
H.1.3																					
H.1.4																					
H.2.1																					
H.3.1																					
O.1.1	65	0,12	0,15	0,18		0,06	0,055	0,055	0,07	65	0,04	0,05	0,07	0,09	0,045	0,1	0,18	0,18	●		
O.1.2	80	0,12	0,15	0,18		0,06	0,055	0,055	0,07	80	0,04	0,05	0,07	0,09	0,045	0,1	0,18	0,18	●		
O.2.1																					
O.2.2																					
O.3.1																					



Kesme verileri, takım ve iş parçasının bağlantı şartlarına, malzeme ve makine tipine göre değişiklik göstermektedir. Verilen değerler mümkün olan kesme verilerini içermekte olup, uygulama koşullarında gerekirse azaltılıp çoğaltılabilir.

Kesme verileri referans değerleri – Form frezesi

		50 245 ... / 50 246 ...						50 360 ...				50 362 ...				1. Tercih			
		Ø DC = 16 mm a _e = 3,2	Ø DC = 20 mm a _e = 4	Ø DC = 25 mm a _e = 5			Ø DC = 50 mm a _e = 5	Ø DC = 63 mm a _e = 6,3	Ø DC = 80 mm a _e = 8	Ø DC = 100 mm a _e = 10	Ø DC = 40–50 mm	Ø DC = 63 mm	Ø DC = 80 mm	Ø DC = 100 mm	●	Uygun			
																○			
İçindekiler	v _c m/dak	f _z mm						v _c m/dak	f _z mm				f _z mm				Emülsiyon	Basınçlı hava	Karışım
P.1.1	28	0,01	0,015	0,018			22	0,01	0,01	0,015	0,02	0,005	0,008	0,01	0,012	●			
P.1.2	28	0,01	0,015	0,018			22	0,01	0,01	0,015	0,02	0,005	0,008	0,01	0,012	●			
P.1.3	28	0,01	0,015	0,018			22	0,01	0,01	0,015	0,02	0,005	0,008	0,01	0,012	●			
P.1.4	22	0,01	0,015	0,018			20	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
P.1.5	22	0,01	0,015	0,018			20	0,01	0,01	0,015	0,02	0,005	0,008	0,01	0,012	●			
P.2.1	22	0,01	0,015	0,018			20	0,01	0,01	0,015	0,02	0,005	0,008	0,01	0,012	●			
P.2.2	28	0,01	0,015	0,018			22	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
P.2.3	20	0,01	0,015	0,018			20	0,01	0,01	0,015	0,02	0,005	0,008	0,01	0,012	●			
P.2.4	20	0,01	0,015	0,018			20	0,01	0,01	0,015	0,02	0,005	0,008	0,01	0,012	●			
P.3.1																			
P.3.2																			
P.3.3																			
P.4.1	10	0,007	0,01	0,012			10	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
P.4.2	10	0,007	0,01	0,012			10	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
M.1.1	10	0,007	0,01	0,012			10	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
M.2.1																			
M.3.1																			
K.1.1	24	0,01	0,012	0,015			19	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
K.1.2							12	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
K.2.1	22	0,01	0,012	0,015			15	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
K.2.2	20	0,01	0,012	0,015			12	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
K.3.1	15	0,01	0,012	0,015			16	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
K.3.2	15	0,01	0,012	0,015			13	0,008	0,01	0,012	0,018	0,005	0,008	0,01	0,012	●			
N.1.1	90	0,01	0,015	0,02												●			
N.1.2	90	0,01	0,015	0,02			70	0,012	0,015	0,02	0,024	0,008	0,012	0,014	0,018	●			
N.2.1	80	0,01	0,015	0,02			60	0,012	0,015	0,02	0,024	0,008	0,012	0,014	0,018	●			
N.2.2	60	0,01	0,015	0,02			60	0,012	0,015	0,02	0,024	0,008	0,012	0,014	0,018	●			
N.2.3																			
N.3.1	25	0,01	0,015	0,02			20	0,01	0,012	0,015	0,018	0,005	0,008	0,01	0,012	●			
N.3.2	25	0,01	0,015	0,02			20	0,01	0,012	0,015	0,018	0,005	0,008	0,01	0,012	●			
N.3.3	25	0,01	0,015	0,02			20	0,01	0,012	0,015	0,018	0,005	0,008	0,01	0,012	●			
N.4.1	70	0,01	0,015	0,0175			45	0,01	0,012	0,015	0,018	0,005	0,008	0,01	0,01	●			
S.1.1																			
S.1.2																			
S.2.1																			
S.2.2																			
S.2.3																			
S.3.1	20	0,008	0,01	0,015			20	0,008	0,01	0,012	0,016	0,005	0,007	0,009	0,012	●			
S.3.2																			
S.3.3																			
H.1.1																			
H.1.2																			
H.1.3																			
H.1.4																			
H.2.1																			
H.3.1																			
O.1.1	65	0,018	0,02	0,025			60	0,015	0,02	0,025	0,03	0,008	0,012	0,018	0,022	●			
O.1.2	80	0,018	0,02	0,025			65	0,015	0,02	0,025	0,03	0,008	0,012	0,018	0,022	●			
O.2.1																			
O.2.2																			
O.3.1																			



Kesme verileri, takım ve iş parçasının bağlantı şartlarına, malzeme ve makine tipine göre değişiklik göstermektedir. Verilen değerler mümkün olan kesme verilerini içermekte olup, uygulama koşullarında gerekirse azaltılıp çoğaltılabilir.

HSS Kanal Frezeler için kesme verileri

		50 340 ... / 50 341 ... / 50 342 ... / 50 348 ... / 50 349 ...						1. Tercih		
								●	Uygun	
		Ø DC = 50 mm	Ø DC = 63 mm	Ø DC = 80 mm	Ø DC = 100 mm	Ø DC = 125 mm	Ø DC = 160 mm	Emülsiyon	Basınçlı hava	Karışım
İçindekiler	v _c m/min	f _z mm								
P.1.1	30	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,095–0,11	0,1–0,12	●		
P.1.2	20	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,095–0,11	0,1–0,12	●		
P.1.3	20	0,05–0,07	0,06–0,08	0,07–0,09	0,08–0,10	0,095–0,12	0,1–0,13	●		
P.1.4	15	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
P.1.5	15	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
P.2.1	20	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
P.2.2	20	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
P.2.3	10	0,03–0,04	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	●		
P.2.4	10	0,03–0,04	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	●		
P.3.1	15	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
P.3.2	10	0,03–0,04	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	●		
P.3.3	10	0,03–0,04	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	●		
P.4.1	10	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
P.4.2	10	0,04–0,06	0,05–0,07	0,06–0,08	0,07–0,09	0,08–0,10	0,09–0,2	●		
M.1.1	10	0,03–0,04	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	●		
M.2.1	10	0,03–0,04	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	●		
M.3.1	8	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
K.1.1	20	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
K.1.2	18	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
K.2.1	18	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
K.2.2	15	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
K.3.1	18	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
K.3.2	18	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
N.1.1	150	0,06–0,075	0,075–0,09	0,009–0,1	0,01–0,12	0,12–0,135	0,135–0,15	●		
N.1.2	100	0,06–0,075	0,075–0,09	0,009–0,1	0,01–0,12	0,12–0,135	0,135–0,15	●		
N.2.1	80	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,095–0,11	0,1–0,12	●		
N.2.2	40	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,095–0,11	0,1–0,12	●		
N.2.3										
N.3.1	80	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
N.3.2	30	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,095–0,11	0,1–0,12	●		
N.3.3	30	0,05–0,07	0,06–0,08	0,07–0,09	0,08–0,10	0,095–0,12	0,1–0,13	●		
N.4.1	90	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,095–0,11	0,1–0,12		●	
S.1.1										
S.1.2										
S.2.1										
S.2.2										
S.2.3										
S.3.1	10	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
S.3.2	10	0,04–0,05	0,05–0,06	0,06–0,07	0,07–0,08	0,08–0,09	0,09–0,1	●		
S.3.3										
H.1.1										
H.1.2										
H.1.3										
H.1.4										
H.2.1										
H.3.1										
O.1.1	30	0,08–0,1	0,1–0,12	0,12–0,14	0,14–0,16	0,16–0,18	0,18–0,2	●		
O.1.2	20	0,08–0,1	0,1–0,12	0,12–0,14	0,14–0,16	0,16–0,18	0,18–0,2	●		
O.2.1										
O.2.2										
O.3.1										



Kesme genişliğine (a_e): göre kanal frezeler için ilerleme hızı düzeltme faktörü (Kf f_z)

a _e	Kf f _z
0,05 x DC	1,4
0,1 x DC	1,0
0,15 x DC	0,8
0,2 x DC	0,7
0,25 x DC	0,6



Verilen ilerleme değerleri, düz dişli versiyonlar ve kesme derinliğinin maksimum 0,1 x DC olduğu durumlarda geçerlidir. Çapraz dişli versiyonlarda ilerleme değeri %50 azaltılmalıdır!

HSS Alın Frezeler için kesme hızları (v_c)

		50 250 ... / 50 255 ... / 50 260 ... / 50 297 ...	54 035 ... / 54 036 ... / 54 037 ...	● ○	1. Tercih Uygun	
		Kaplamasız	Ti100 Pro	Emülsiyon	Basıncılı hava	Karışım
İçindekiler	Kf f _z	v _c m/min				
P.1.1	1,2	25	45	●		
P.1.2	1,2	20	40	●		
P.1.3	1,2	20	40	●		
P.1.4	1,0	15	30	●		
P.1.5	1,0	15	30	●		
P.2.1	1,2	20	40	●		
P.2.2	1,0	20	40	●		
P.2.3	0,8	10	20	●		
P.2.4	0,8	10	20	●		
P.3.1	1,0	15	30	●		
P.3.2	0,8	10	20	●		
P.3.3	0,8	10	20	●		
P.4.1	1,0	10	15	●		
P.4.2	1,0	10	15	●		
M.1.1	1,0	10	15	●		
M.2.1	0,9	7	15	●		
M.3.1	1,0	5	10	●		
K.1.1	1,0	20	30	●		
K.1.2	1,0	18	30	●		
K.2.1	1,0	18	30	●		
K.2.2	1,0	15	25	●		
K.3.1	1,0	18	30	●		
K.3.2	1,0	18	30	●		
N.1.1	1,5	150				
N.1.2	1,5	100				
N.2.1	1,3	80				
N.2.2	1,3	40				
N.2.3						
N.3.1	1,1	80	110	●		
N.3.2	1,2	30	60	●		
N.3.3	1,2	30	60	●		
N.4.1	1,3	90	120		●	
S.1.1						
S.1.2						
S.2.1						
S.2.2						
S.2.3						
S.3.1	1,0	10	15	●		
S.3.2	1,1	10	15	●		
S.3.3	0,8		10	●		
H.1.1						
H.1.2						
H.1.3						
H.1.4						
H.2.1						
H.3.1						
O.1.1	2,0	30	50	●		
O.1.2	2,0	20	25	●		
O.2.1						
O.2.2						
O.3.1						

HSS Alın Frezeler için diş başına ilerleme değerleri

Diş başına ilerleme (f_z) için yaklaşık değerler (mm)

	N		NF HR NR		W
Ø DC mm	f_z mm		f_z mm		f_z mm
	Kaplamasız	Ti100 Pro	Kaplamasız	Ti100 Pro	Kaplamasız
40	0,049	0,054	0,064	0,070	0,060
50	0,055	0,060	0,071	0,078	0,066
63	0,061	0,067	0,079	0,087	0,074
80	0,065	0,071	0,084	0,092	0,078
100	0,059	0,065	0,076	0,084	0,071



İlerleme hızı düzeltmesi:

Lütfen yukarıdaki f_z değerini → 46. sayfadaki düzeltme faktörü $K_f f_z$ ile çarpınız.

Genel olarak aşağıdakiler geçerlidir:

$$f_z (\text{Frezeleme}) = f_z \times K_f f_z$$

$$f_z (\text{Delme}) = f_z (\text{Frezeleme}) \div \text{Diş sayısı}$$

Kesme verilerini hesaplama formülleri

Tanımlama	Kısa gösterim	Birim	Formüller
Devir sayısı	n	min ⁻¹	$n = \frac{v_c \times 1000}{DC \times \pi}$
Kesme hızı	v_c	m/dak	$v_c = \frac{DC \times \pi \times n}{1000}$
Diş başına ilerleme	f_z	mm	$f_z = \frac{v_f}{ZEFP \times n}$ $f_z = h_m \times \sqrt{\frac{DC}{a_e}}$
Tur başına ilerleme	f	mm	$f = f_z \times ZEFP$
İlerleme oranı	v_f	mm/dak.	$v_f = f_z \times ZEFP \times n$
Ortalama talaş kalınlığı	h_m	mm	$h_m = f_z \times \sqrt{\frac{a_e}{DC}}$

ZEFP = Ağız sayısı

 a_e = Kesme genişliği (Kanal frezeleme için kesme derinliği)

DC = Kesme çapı

Tip tanımı

H	yüksek mukavemetli çelikler ve sertleştirilmiş malzemeler için	NR	çelik ve döküm malzemelerin yanı sıra paslanmaz çeliklerin talaşlı işlenmesi için – yuvarlak tırtıllı profilli
HF	yüksek mukavemetli çelikler ve sertleştirilmiş malzemeler için – düz tırtıllı profilli	NTI	çelik ve döküm malzemelerin yanı sıra paslanmaz çeliklerin talaşlı işlenmesi için – orta talaş kırıcılı
HR	yüksek mukavemetli çelikler ve sertleştirilmiş malzemeler için – yuvarlak tırtıllı profilli	W	yumuşak malzemeler ve (alüminyum, bakır, pirinç gibi) demir dışı metaller için
HS	yüksek mukavemetli çelikler ve sertleştirilmiş malzemeler için – özellikle döküm ve nikel alaşımları için ince talaş kırıcılı	WF	yumuşak malzemeler ve (alüminyum, bakır, pirinç gibi) demir dışı metaller için – düz tırtıllı profilli
N	çelik ve döküm malzemelerin yanı sıra paslanmaz çeliklerin talaşlı işlenmesi için	WR	yumuşak malzemeler ve (alüminyum, bakır, pirinç gibi) demir dışı metaller için – yuvarlak tırtıllı profilli
NF	çelik ve döküm malzemelerin yanı sıra paslanmaz çeliklerin talaşlı işlenmesi için – düz tırtıllı profilli		

Kaplama

Ti100 Pro	▲ Ti çok katmanlı kaplama ▲ HV0,05 = 3500 ▲ Sürtünme katsayısı (çeliğe karşı) = 0,7 ▲ azami uygulama sıcaklığı: 900°C
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