

frezeler
end mills

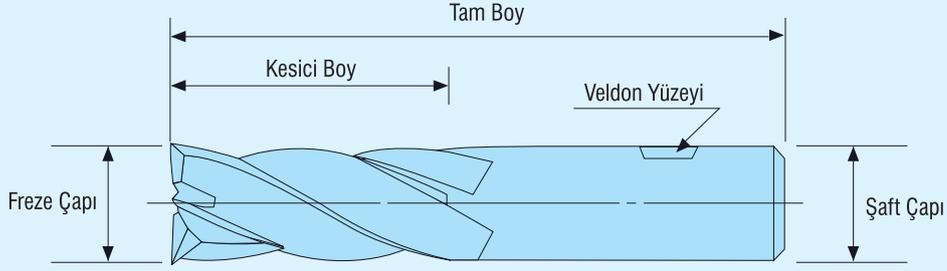


Mermerler Şirketler Grubu

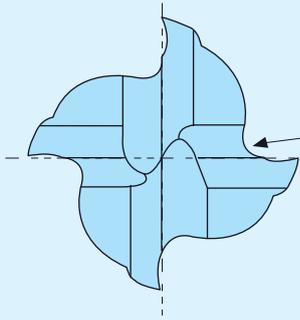
ORM

PARMAK FREZELERE GENEL BAKIŞ

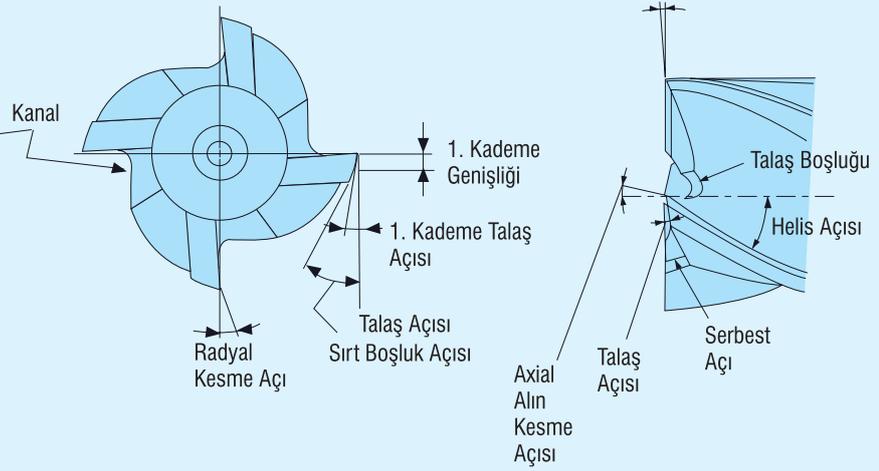
Silindirik Saplı Parmak Freze



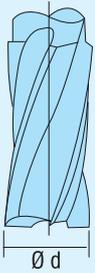
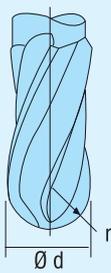
Merkezi Kesmeli



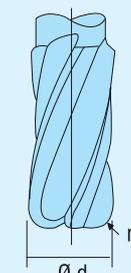
Alın Faturalı Kesmeli



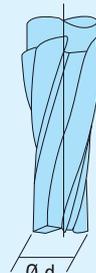
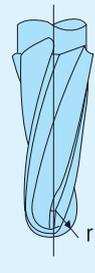
Parmak Freze Tipleri

Silindirik Düz
Alın Kesici

Küresel Alınlı



Köşe Radyüslü

Konik Düz
Alın KesiciKonik Küresel
Alınlı

HSS-E FREZELER İÇİN ÖNERİLEN ÇALIŞMA ŞARTLARI

Malzeme		Freze Tipi				
		HSS-E Şaft Freze DIN 844 ve DIN 327	HSS-E Vals Alın Freze	HSS-E Kanal Freze	HSS-E Form Freze	Lehimli Sert Metal Freze
Sünek Çelik < 500 N/mm ²	Vc	30-50	25-45	25-50	25-45	80-180
	f	0,02 - 0,15	0,03 - 0,20	0,03 - 0,15	0,02 - 0,10	0,03 - 0,20
Takım Çeliği 500-700 N/mm ²	Vc	25-45	25-45	25-45	25-40	70-160
	f	0,02 - 0,12	0,03 - 0,15	0,03 - 0,12	0,02 - 0,10	0,03 - 0,15
Alaşımli Çelik 700-900 N/mm ²	Vc	20 - 40	20 - 40	20 - 40	20 - 35	60 -140
	f	0,02 - 0,10	0,02 - 0,12	0,03 - 0,10	0,02 - 0,08	0,02 - 0,12
Paslanmaz Çelik 900-1100 N/mm ²	Vc	15-30	15-30	20-30	15-30	50 - 120
	f	0,02 - 0,08	0,02 - 0,10	0,02 - 0,08	0,01 - 0,05	0,02 - 0,10
Paslanmaz Çelik 1100-1300 N/mm ²	Vc	10 - 20	10 - 20	15 - 25	10 - 20	40 - 100
	f	0,02 - 0,05	0,02 - 0,08	0,02 - 0,05	0,01 - 0,05	0,02 - 0,08
Paslanmaz Çelik > 1300 N/mm ²	Vc	6 - 15	6 - 15	10 - 20	6 - 15	35 - 80
	f	0,01 - 0,05	0,02 - 0,05	0,02 - 0,05	0,01 - 0,03	0,02 - 0,05
Çelik Döküm 500-700 N/mm ²	Vc	20 - 40	20 - 40	20 - 45	20 - 40	60 - 120
	f	0,02 - 0,12	0,03 - 0,15	0,03 - 0,15	0,02 - 0,10	0,03 - 0,15
Çelik Döküm > 700 N/mm ²	Vc	10 - 30	15 - 30	15 - 35	15 - 30	50 - 100
	f	0,02 - 0,10	0,02 - 0,12	0,02 - 0,10	0,02 - 0,08	0,03 - 0,10
Pik Döküm < 200 HB	Vc	20 - 35	20 - 35	20 - 35	20 - 35	50 - 120
	f	0,02 - 0,20	0,04 - 0,25	0,03 - 0,20	0,03 - 0,15	0,05 - 0,20
Pik Döküm > 200 HB	Vc	15 - 30	15 - 30	15 - 30	15 - 30	50 - 100
	f	0,02 - 0,15	0,03 - 0,15	0,02 - 0,15	0,02 - 0,12	0,03 - 0,15
Bakır	Vc	30 - 100	30 - 100	30 - 100	30 - 100	60 - 200
	f	0,03 - 0,20	0,03 - 0,25	0,03 - 0,25	0,02 - 0,10	0,03 - 0,20
Alüminyum ve Alaşımaları	Vc	100 - 400	100 - 400	100 - 500	100 - 300	150 - 700
	f	0,03 - 0,25	0,03 - 0,25	0,03 - 0,20	0,02 - 0,15	0,03 - 0,25
Titan ve Alaşımaları	Vc	15 - 30	15 - 30	15 - 30	15 - 30	30 - 150
	f	0,01 - 0,10	0,02 - 0,10	0,02 - 0,10	0,01 - 0,08	0,03 - 0,10

Vc: Kesme Hızı (m/dak.)

f: İlerleme (mm/devir)

 Devir : $n = (Vc \times 1000) / (\pi \times d)$ dev/dak


FREZE BIÇAKLARINDA TAKIM TİPLERİ ve KULLANILACAĞI MALZEMELER

Takım Tipi	Kullanım Sahaları
N	Normal Mukavemetli ve sertlik değerine haiz malzemelerde
H	Sert, sert sünek çekme mukavemeti yüksek ve kısa talaş veren malzemelerde
W	Yumuşak, sünek ve/veya uzun talaş veren malzemelerde

Takım Tipi	Kaba talaş frezelerde kırıcı şekilleri
NF HF	İnce profilli talaş kırıcı (Resim-1)
NR HR	Kaba profilli talaş kırıcı (Resim-2)



(Resim-1)



(Resim-2)

İşlenen Malzemenin Tanımı	Çekme Muk. (N/mm ²)	Freze Tipleri							
		üzeri (over)	dahil (incl.)	N	H	W	NF	NR	HF HR
Otomat çeliği	370 550	600 1000	● ●	○ ●	○ ○	● ●	● ●	○ ○	
İmalat çeliği	Alaşimsız	—	600	●	○	○	●	●	○
	Alaşımlı	500	900	●	○	○	●	●	○
Paslanmaz çelikler ve paslanmaz çelik döküm	450	950	●	○	○	●	●	○	
Nitrürasyon çeliği	Yumuşatılmış	700	900	●	○	○	●	●	○
	Toklaştrılmış	800	1250	●	○	○	●	●	●
Çelik döküm	400	110	●	○	○	●	●	○	
Takım çeliği	Yumuşak veya tavlanmış	500	750	●	○	○	●	●	○
	Alaşimsız, Toklaşmış	700	1000	●	○	○	●	●	○
	Alaşımlı, Toklaşmış	700	1000	●	○	○	●	●	○
		900	1250	●	○	○	●	●	●
Alüminyum (ezme) - % 10'a kadar Si ihtiva eden Alüminyum Döküm Al.	—	180	○	○	●	○	○	○	
% 10'un üstünde Si ihtiva eden Alüminyum Döküm Alaşımı	150	250	●	○	○	○	○	○	
Bakır	200	400	○	○	●	○	○	○	
Bakır ve Alaşımaları	Yüksek bakır ihtiva eden düşük mukavemetli	200	550	○	○	●	○	○	○
	Düşük veya yüksek bakır ihtiva eden yüksek mukavemetli	250	850	●	○	○	○	○	○
	Talaş kırıcı özellikte (P _b , P _h , Te alaşımli)	250	500	○	●	○	○	○	○
Magnezyum (ezme) ve Mg. Alaşımaları	150	300	●	○	○	○	○	○	
Titan Alaşımaları	Orta mukavemetli	—	700	●	○	○	●	○	○
	Yüksek mukavemetli	600	1100	○	●	○	○	○	●
Takım Çeliği	Alaşimsız veya Alaşımli, yumuşatılmış	Sertlik (HB)		●	○	○	●	●	○
		180	240						
Dökme demir	Lamelli Grafit	100	240	●	○	●	●	●	○
		230	320	○	●	●	○	○	●
	Yuvarlak Grafit	100	240	●	○	●	○	○	○
		230	320	○	●	●	○	○	●
Temper döküm	100	270	●	○	●	○	○	○	

● Kullanıma uygun

○ Zaruri durumda kullanılabilir

○ Tavsiye edilmez

KARBÜR FREZELER İÇİN ÖNERİLEN ÇALIŞMA ŞARTLARI - I

Malzeme	Çekme Mukavemeti ve Sertlik	Karbür Kalitesi	Muhtelif çaplarda diş başına ilerleme fz(mm)					Kesme Hızı Vc (m/dak.)	Kesme Sıvısı
			2 - 4	5 - 8	9 - 12	13 - 16	18 - 20		
Yapı-Otomat Çelikleri	< 500 N/mm ²	K 10	0,04	0,05	0,06	0,07	0,08	65 - 125	Emülsiyon Kesme Yağı
Toklaştırmış Çelik	500 - 700 N/mm ²	P 40	0,03	0,04	0,05	0,06	0,07	50 - 110	
Nitrit Çelik	> 700 N/mm ²	P 40	0,02	0,03	0,04	0,05	0,06	40 - 85	
Çelik Döküm	< 500 N/mm ²	P 40	0,03	0,05	0,06	0,07	0,08	80 - 135	Emülsiyon Emülsiyon
	> 500 N/mm ²	P 40	0,01	0,03	0,04	0,05	0,06	65 - 110	
Takım Çelikleri	< 1400 N/mm ²	K 10	0,01	0,02	0,03	0,04	0,05	40 - 75	Emülsiyon Kesme Yağı
	> 1400 N/mm ²	K 10	0,01	0,02	0,03	0,04	0,05	30 - 50	
Dökme Demir	< 200 HB	K 10	0,03	0,05	0,07	0,09	0,12	60 - 90	Kuru Emülsiyon
	> 200 HB	K 10	0,02	0,04	0,06	0,08	0,11	50 - 70	
Yüksek Isıya Dayanıklı Paslanmaz Çelikler		K 40	0,02	0,03	0,035	0,04	0,05	25 - 50	Emülsiyon Kesme Yağı
Titan ve Alaşımları		K 40	0,02	0,03	0,04	0,05	0,06	20 - 45	Emülsiyon
Bakır, Prinç, Bronz ve Çinko		K 10	0,02	0,04	0,06	0,08	0,10	80 - 220	Kuru Emülsiyon
Alüminyum ve Magnezyum Alaşımları		K 10	0,03	0,06	0,10	0,15	0,20	180 - 600	Emülsiyon Gaz Yağı
Termoplastik		K 10	0,03	0,06	0,10	0,15	0,20	120 - 200	Kuru Hava
Duroplastik		K 10	0,02	0,04	0,06	0,08	0,10	100 - 150	Kuru Hava
Cam Elyafı Sert Malzm. Sert Epoksi		K 10	0,03	0,04	0,05	0,06	0,07	100 - 140	Kuru Hava

NOT : - Tablo değerleri Kesme Derinliği 1,5 x d ve Kesme Genişliği 0,5 x d içindir.

- Daha detay değerler için bkz : s.219

GENEL AMAÇLI KULLANIM İÇİN KARBÜR FREZELER

Karbür Frezeler çelik, döküm ve birçok malzemenin en etkin şekilde işlenebilmesi için dizayn edilmiştir.

2 Ağız frezeler yank açmak gibi operasyonlarda kullanım için idealdir.

3 Ağız frezeler sert ve hacimli malzemelerin işlenmesi için çok iyi bir seçimdir.

4 Ağız frezeler ise maximum sertlikte hızlı ilerlemeye imkan sağlar.



KARBÜR FREZELERİN KULLANIM YERİ İÇİN ÖNERİLER

Freze Tipi		Parmak Freze z = 2	Parmak Freze z = 3	Parmak Freze z = 4	Finiş Freze z = 6
Operasyon Şekli					
Çok Temiz İşleme					
Temiz İşleme					
Kaba İşleme					
Kanal Frezeleme					
Havuz Boşaltma					

	Kullanıma Uygun
	Zaruri Durumda Kullanılabilir
	Tavsiye Edilmez

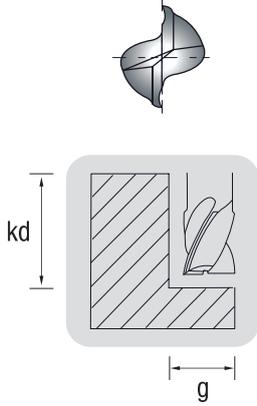


Freze Tipi		Alın Radiuslu z = 2	Alın Radiuslu z = 4	Form Radiuslu z = 2	Form Radiuslu z = 4	Talaş Kırıcılı z = 2
Operasyon Şekli						
Form Frezeleme						
Kanal Frezeleme						
Havuz Boşaltma						

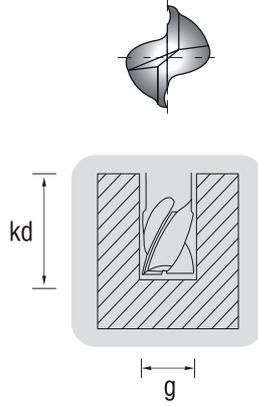
NOT : Kesici boy; çalışma yeri uygunluğu açısından çok önemlidir. Örneğin, kısa kesici boy yüksek stabilite ve iyi sonuç alınmasına yol açar.

KARBÜR TAKIMLARDA MALZEME İŞLEMENE AİT FORMÜLLER

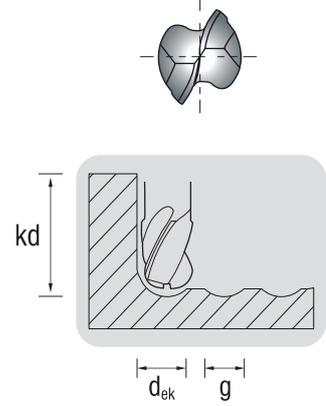
Yan yüzey



Kanal



Profil freze



- d** = Freze çapı (mm)
- d_{ek}** = Etkerif kesme çapı (mm)
- kd** = Kesme derinliđi (mm)
- fz** = Diş başına ilerleme (mm/diş)
- z** = Diş sayısı

- g** = Takım işleme genişliđi (mm)
- T_c** = Kesme zamanı (dak)
- L** = Kesme uzunluđu (mm)
- n** = Devir (dev/dak)

Etkerif Kesme Çapı (mm)

$$d_{ek} = 2 \sqrt{d \times kd - kd^2}$$

Kesme Hızı (m/dak)

$$V_c = \frac{\pi \times d \times n}{1000}$$

Etkerif Kesme Hızı (m/dak)

$$V_c = \frac{\pi \times d_{ek} \times n}{1000}$$

İlerleme (mm/devir)

$$f = fz \times z \times n$$

Kesme Zamanı (dak)

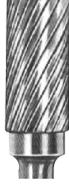
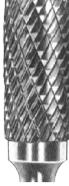
$$T_c = \frac{L}{f}$$

Etkerif kesme çapı (mm)

Ø d mm	kd (mm)																
	0,05	0,10	0,20	0,30	0,40	0,50	1,00	1,50	2,00	2,50	3,00	3,50	4,00	4,50	5,00	5,50	6,00
0,5	0,30	0,40	0,49	0,49	-	-	-	-	-	-	-	-	-	-	-	-	-
1,0	0,44	0,60	0,80	0,92	0,98	1,00	-	-	-	-	-	-	-	-	-	-	-
2,0	0,62	0,87	1,20	1,43	1,60	1,73	2,00	-	-	-	-	-	-	-	-	-	-
3,0	0,77	1,08	1,50	1,80	2,04	2,24	2,83	3,00	-	-	-	-	-	-	-	-	-
4,0	0,89	1,25	1,74	2,11	2,40	2,65	3,46	3,87	4,00	-	-	-	-	-	-	-	-
5,0	0,99	1,40	1,96	2,37	2,71	3,00	4,00	4,58	4,90	5,00	-	-	-	-	-	-	-
6,0	1,09	1,54	2,15	2,62	2,99	3,32	4,47	5,20	5,66	5,92	6,00	-	-	-	-	-	-
7,0	1,18	1,66	2,33	2,84	3,25	3,61	4,90	5,74	6,32	6,71	6,93	7,00	-	-	-	-	-
8,0	1,26	1,78	2,50	3,04	3,49	3,87	5,29	6,24	6,93	7,42	7,75	7,94	8,00	-	-	-	-
9,0	1,34	1,89	2,65	3,23	3,71	4,12	5,66	6,71	7,48	8,06	8,49	8,77	8,94	9,00	-	-	-
10,0	1,41	1,99	2,80	3,41	3,92	4,36	6,00	7,14	8,00	8,66	9,17	9,54	9,80	9,95	10,00	-	-
12,0	1,55	2,18	3,07	3,75	4,31	4,80	6,63	7,94	8,94	9,75	10,39	10,91	11,31	11,62	11,83	11,96	12,00

KARBÜR KALIPÇI FREZE PROGRAMI ve HIZ ÖNERİ TABLOSU

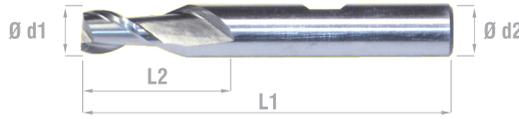
KARBÜR KALIPÇI FREZE PROGRAMI

	<p>DÜZ DİŞ : Bu diş şekil, malzemelerden daha üstün çapak almak ve genel amaçlı kullanım için dizayn edilmiştir. Çelik, çelik alaşımları, döküm, paslanmaz çelik, sert bronz ve bakır malzemelerin işlenmesinde kullanılabilir. Uzun talaş çıkarır.</p>
	<p>ÇAPRAZ DİŞ : Sert malzemelerin çapak alma işlemlerinde etkilidir. Bu diş şekil talaşların granül büyüklüğünde parçalanmasını sağlar ve takımın yüzeyi bozmasını önler. Freze üzerindeki çapraz diş şekli, talaşların kanalların arasına dolmasını önleyerek, takımın daha kolay kullanılmasını ve taşlama işleminin de daha kontrollü yapılmasını sağlar.</p>
	<p>BAKLAVA DİŞ : Diş görünümü üçgen şeklinde (baklava dilim) dizayn edilmiştir. Toz şeklinde talaş oluşmasını sağlar. Çapak alma işleminin rahat yapılmasının yanında, kullanıcıya da kolay kullanımı sağlayarak işin mükemmel bir şekilde bitirilmesine yol açar. Isıl işlem görmüş çelik ve sert alaşımlı çeliklerde kullanıma uygundur.</p>
	<p>TALAŞ KIRICILI : Bu tipte her spiral kanallara ilaveten talaş kırıcılar vardır. Talaşı kırarak, takım üzerinde daha kolay kontrol sağlar. Talaş kırıcı dizaynından dolayı çapak alınırken yüzey finişleri biraz azalabilir. Tüm çeliklerde, döküm, prınç, bronz ve bakır malzemelerde kullanılabilir.</p>
	<p>ALÜMİNYUM KESME : Demir dışı malzemelerin hızlı çapak alma işlemleri için dizayn edilmiştir. Özellikle alüminyum başta olmak üzere, çinko alaşımı, magnezyum, plastik, kauçuk ve ahşap işlemede kullanılması tavsiye edilir.</p>



KALIPÇI FREZELERİ İÇİN HIZ ÖNERİ TABLOSU

Malzeme	Çap - mm							
	3	6	8	10	12	16	20	25
	dev/dak							
Çelik	60-90	30-45	25-35	20-30	15-25	10-18	10-14	8-10
Sertleştirilmiş Takım Çeliği	30-40	15-20	10-15	10-15	8-10	5-8	4-7	3-5
Paslanmaz Çelik	30-50	15-25	12-20	10-15	9-12	7-10	5-7	4-5
Nikel /Titan	30-40	15-20	10-15	10-15	8-10	5-8	4-7	3-5
Döküm	60-90	30-45	25-35	20-30	15-2	10-18	10-14	8-10
Alüminyum/Plastik	30-90	15-60	12-50	10-50	8-35	6-30	5-20	4-15
Prınç	40-50	20-30	15-20	13-17	10-15	8-12	6-8	5-6
Bakır	30-90	15-60	12-50	10-50	8-35	6-30	5-20	4-15
Çinko	60-90	30-45	25-35	20-30	15-25	10-18	10-14	8-10

Silindirik saplı, uzun delik frezeleri - Kısa
Parallel shank, slot drills - Short seriesDüz Kanal
Straight fluteHelis Kanal
Helix flutelKüresel Başlı Helis Kanal
Ball nose helix flute

1200 N/mm² dayanıklılığındaki alaşımlı dövme çelikler, takım çelikleri, paslanmaz ve yüksek ısıya dayanıklı çelikler ile döküm alaşımlı malzemelerde P9 toleranslı uzun düz kama yuvalarının açılmasında kullanılır.

DIN
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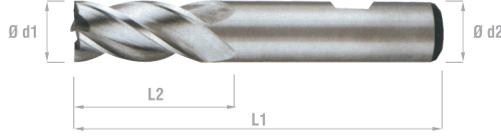
Z
2

Ürün Kodu Product Code			d1	d2	L1 mm	L2 mm
Düz Kanal	Helis Kanal	Küresel Başlı Helis Kanal				
F01200200	F02200200	F03200200	2	6	48	4
F01200250	F02200250	F03200250	2,5	6	49	5
F01200300	F02200300	F03200300	3	6	49	5
F01200400	F02200400	F03200400	4	6	51	7
F01200500	F02200500	F03200500	5	6	52	8
F01200600	F02200600	F03200600	6	6	52	8
F01200700	F02200700	F03200700	7	10	60	10
F01200800	F02200800	F03200800	8	10	61	11
F01201000	F02201000	F03201000	10	10	63	13
F01201200	F02201200	F03201200	12	12	73	16
F01201400	F02201400	F03201400	14	12	73	16
F01201600	F02201600	F03201600	16	16	79	19
F01201800	F02201800	F03201800	18	16	79	19
F01202000	F02202000	F03202000	20	20	88	22
F01202200	F02202200	F03202200	22	20	88	22
F01202400	F02202400	F03202400	24	25	102	26
F01202500	F02202500	F03202500	25	25	102	26
F01202800	F02202800	F03202800	28	25	102	26
F01203200	F02203200	F03203200	32	32	112	32
F01203600	F02203600	F03203600	36	32	112	32
F01204000	F02204000	F03204000	40	40	130	38
F01205000	F02205000	F03205000	50	50	147	45
F01205600	F02205600	F03205600	56	50	147	45





Silindirik saplı parmak freze - Kısa
End mills with straight shanks - Short series



NE-Metal, 1200 N/mm² dayanıklılığındaki yapı çelikleri ve dövme çeliklerin alın ve yan yüzeylerini frezeleme işlemlerinde kullanılır. Malzeme sıvanmasını önlemek ve takımı daha uzun ömürlü kullanmak için TiCN kaplamalı kullanılması önerilir.

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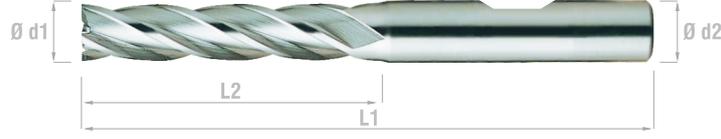
Ürün Kodu Product Code		d1 mm	d2 mm	L1 mm	L2 mm	Kanal sayısı Number of flutes		
Kaplamasız	TiCN					N	H	W
F04200200	F04220200	2,0	6	51	7	3	3	-
F04200250	F04220250	2,5	6	52	8	3	3	-
F04200300	F04220300	3,0	6	52	8	3	3	-
F04200400	F04220400	4,0	6	55	11	3	4	-
F04200500	F04220500	5,0	6	57	13	3	4	3
F04200600	F04220600	6,0	6	57	13	3	5	3
F04200700	F04220700	7,0	10	66	16	3	5	3
F04200800	F04220800	8,0	10	69	19	3	5	3
F04200900	F04220900	9,0	10	69	19	4	6	3
F04201000	F04221000	10,0	10	72	22	4	6	3
F04201100	F04221100	11,0	12	79	22	4	6	4
F04201200	F04221200	12,0	12	83	26	4	6	4
F04201300	F04221300	13,0	12	83	26	4	6	4
F04201400	F04221400	14,0	12	83	26	4	6	4
F04201500	F04221500	15,0	12	83	26	4	7	4
F04201600	F04221600	16,0	16	92	32	4	7	4
F04201700	F04221700	17,0	16	92	32	4	7	4
F04201800	F04221800	18,0	16	92	32	4	7	4
F04201900	F04221900	19,0	16	92	32	4	7	4
F04202000	F04222000	20,0	20	104	38	4	8	4
F04202100	F04222100	21,0	20	104	38	4	8	4
F04202200	F04222200	22,0	20	104	38	5	8	4
F04202300	F04222300	23,0	20	104	38	5	8	4
F04202400	F04222400	24,0	25	121	45	5	8	4
F04202500	F04222500	25,0	25	121	45	5	8	4
F04202600	F04222600	26,0	25	121	45	5	10	4
F04202800	F04222800	28,0	25	121	45	5	10	4
F04203000	F04223000	30,0	25	121	45	5	10	5
F04203200	F04223200	32,0	32	133	53	6	10	5
F04203400	F04223400	34,0	32	133	53	6	11	5
F04203600	F04223600	36,0	32	133	53	6	11	5
F04203800	F04223800	38,0	40	155	63	6	12	5
F04204000	F04224000	40,0	40	155	63	6	12	5
F04204500	F04224500	45,0	40	155	63	6	12	5
F04205000	F04225000	50,0	50	177	75	8	14	-
F04205600	F04225600	56,0	50	177	75	8	14	-
F04206300	F04226300	63,0	50	192	90	10	14	-

İstenildiğinde H ve W tiplerinde üretilir.

H and W available.



Silindirik saplı parmak freze - Uzun
End mills with straight shanks - Long series



NE-Metal, 1200 N/mm² dayanıklılığındaki yapı çelikleri ve dövme çeliklerin alın ve yan yüzeylerini frezeleme işlemlerinde kullanılır. Malzeme sıvanmasını önlemek ve takımı daha uzun ömürlü kullanmak için TiCN kaplamalı kullanılması önerilir.

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Ürün Kodu Product Code		d1 mm	d2 mm	L1 mm	L2 mm	Kanal sayısı Number of flutes		
Kaplamasız	TiCN					N	H	W
F07200200	F07220200	2,0	6	54	10	3	3	-
F07200250	F07220250	2,5	6	56	12	3	3	-
F07200300	F07220300	3,0	6	56	12	3	3	-
F07200400	F07220400	4,0	6	63	19	3	4	-
F07200500	F07220500	5,0	6	68	24	3	4	3
F07200600	F07220600	6,0	6	68	24	3	5	3
F07200700	F07220700	7,0	10	80	30	3	5	3
F07200800	F07220800	8,0	10	88	38	3	5	3
F07200900	F07220900	9,0	10	88	38	4	6	3
F07201000	F07221000	10,0	10	95	45	4	6	3
F07201100	F07221100	11,0	12	102	45	4	6	4
F07201200	F07221200	12,0	12	110	53	4	6	4
F07201300	F07221300	13,0	12	110	53	4	6	4
F07201400	F07221400	14,0	12	110	53	4	6	4
F07201500	F07221500	15,0	12	110	53	4	7	4
F07201600	F07221600	16,0	16	123	63	4	7	4
F07201700	F07221700	17,0	16	123	63	4	7	4
F07201800	F07221800	18,0	16	123	63	4	7	4
F07201900	F07221900	19,0	16	123	63	4	7	4
F07202000	F07222000	20,0	20	141	75	4	8	4
F07202100	F07222100	21,0	20	141	75	4	8	4
F07202200	F07222200	22,0	20	141	75	5	8	4
F07202400	F07222400	24,0	25	166	90	5	8	4
F07202500	F07222500	25,0	25	166	90	5	8	4
F07202600	F07222600	26,0	25	166	90	5	10	4
F07202800	F07222800	28,0	25	166	90	5	10	4
F07203000	F07223000	30,0	25	166	90	5	10	5
F07203200	F07223200	32,0	32	186	106	6	10	5
F07203400	F07223400	34,0	32	186	106	6	11	5
F07203600	F07223600	36,0	32	186	106	6	11	5
F07203800	F07223800	38,0	40	217	125	6	12	5
F07204000	F07224000	40,0	40	217	125	6	12	5
F07204500	F07224500	45,0	40	217	125	6	12	5
F07205000	F07225000	50,0	50	252	150	8	14	-
F07205600	F07225600	56,0	50	252	150	8	14	-
F07206300	F07226300	63,0	50	282	180	10	14	-

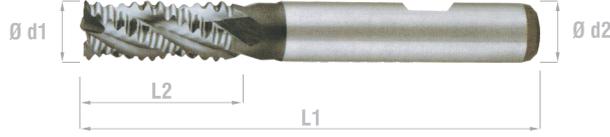


İstenildiğinde H ve W tiplerinde üretilir.

H and W available.



Silindirik saplı parmak freze - Kısa, kaba talaş kaba işleme
End mills with straight shanks - Short series, roughing teeth.



Sementasyon ve takım çelikleri, paslanmaz çelikler, Cr-Ni alaşımlı çelikler, döküm malzemeler, 1200 N/mm² dayanıklılığındaki normal ve sert malzemelerin yüksek hızda talaş kırıncı formları sayesinde ısı iletimini en iyi şekilde dengeleyerek kaliteli alın ve yüzey frezeleme yapar

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Ürün Kodu Product Code	d1 mm	d2 mm	L1 mm	L2 mm	Kanal sayısı Number of flutes		
					N	H	W
F10200200	2,0	6	51	7	3	3	-
F10200250	2,5	6	52	8	3	3	-
F10200300	3,0	6	52	8	3	3	-
F10200400	4,0	6	55	11	3	4	-
F10200500	5,0	6	57	13	3	4	3
F10200600	6,0	6	57	13	3	5	3
F10200700	7,0	10	66	16	3	5	3
F10200800	8,0	10	69	19	3	5	3
F10200900	9,0	10	69	19	4	6	3
F10201000	10,0	10	72	22	4	6	3
F10201100	11,0	12	79	22	4	6	4
F10201200	12,0	12	83	26	4	6	4
F10201300	13,0	12	83	26	4	6	4
F10201400	14,0	12	83	26	4	6	4
F10201500	15,0	12	83	26	4	7	4
F10201600	16,0	16	92	32	4	7	4
F10201700	17,0	16	92	32	4	7	4
F10201800	18,0	16	92	32	4	7	4
F10201900	19,0	16	92	32	4	7	4
F10202000	20,0	20	104	38	4	8	4
F10202100	21,0	20	104	38	4	8	4
F10202200	22,0	20	104	38	5	8	4
F10202300	23,0	20	104	38	5	8	4
F10202400	24,0	25	121	45	5	8	4
F10202500	25,0	25	121	45	5	8	4
F10202600	26,0	25	121	45	5	10	4
F10202800	28,0	25	121	45	5	10	4
F10203000	30,0	25	121	45	5	10	5
F10203200	32,0	32	133	53	6	10	5
F10203400	34,0	32	133	53	6	11	5
F10203600	36,0	32	133	53	6	11	5
F10203800	38,0	40	155	63	6	12	5
F10204000	40,0	40	155	63	6	12	5
F10204500	45,0	40	155	63	6	12	5
F10205000	50,0	50	177	75	8	14	-
F10205600	56,0	50	177	75	8	14	-
F10206300	63,0	50	192	90	10	14	-

İstenildiğinde H ve W tiplerinde üretilir.

H and W available.



Silindirik saplı parmak freze - Uzun, kaba talaş kaba işleme
End mills with straight shanks - Long series, roughing teeth.



Sementasyon ve takım çelikleri, paslanmaz çelikler, Cr-Ni alaşımlı çelikler, döküm malzemeler, 1200 N/mm² dayanıklılığındaki normal ve sert malzemelerin yüksek hızda talaş kırıcı formları sayesinde ısı iletimini en iyi şekilde dengeleyerek kaliteli alın ve yüzey frezeleme yapar



Ürün Kodu Product Code	d1 mm	d2 mm	L1 mm	L2 mm	Kanal sayısı Number of flutes		
					N	H	W
F13200200	2,0	6	54	10	3	3	-
F13200250	2,5	6	56	12	3	3	-
F13200300	3,0	6	56	12	3	3	-
F13200400	4,0	6	63	19	3	4	-
F13200500	5,0	6	68	24	3	4	3
F13200600	6,0	6	68	24	3	5	3
F13200700	7,0	10	80	30	3	5	3
F13200800	8,0	10	88	38	3	5	3
F13200900	9,0	10	88	38	4	6	3
F13201000	10,0	10	95	45	4	6	3
F13201100	11,0	12	102	45	4	6	4
F13201200	12,0	12	110	53	4	6	4
F13201300	13,0	12	110	53	4	6	4
F13201400	14,0	12	110	53	4	6	4
F13201500	15,0	12	110	53	4	7	4
F13201600	16,0	16	123	63	4	7	4
F13201700	17,0	16	123	63	4	7	4
F13201800	18,0	16	123	63	4	7	4
F13201900	19,0	16	123	63	4	7	4
F13202000	20,0	20	141	75	4	8	4
F13202100	21,0	20	141	75	4	8	4
F13202200	22,0	20	141	75	5	8	4
F13202400	24,0	25	166	90	5	8	4
F13202500	25,0	25	166	90	5	8	4
F13202600	26,0	25	166	90	5	10	4
F13202800	28,0	25	166	90	5	10	4
F13203000	30,0	25	166	90	5	10	5
F13203200	32,0	32	186	106	6	10	5
F13203400	34,0	32	186	106	6	11	5
F13203600	36,0	32	186	106	6	11	5
F13203800	38,0	40	217	125	6	12	5
F13204000	40,0	40	217	125	6	12	5
F13204500	45,0	40	217	125	6	12	5
F13205000	50,0	50	252	150	8	14	-
F13205600	56,0	50	252	150	8	14	-
F13206300	63,0	50	282	180	10	14	-

İstenildiğinde H ve W tiplerinde üretilir.

H and W available.



Silindirik saplı parmak freze - Kısa, kaba talaş ince işleme
End mills with straight shanks - Short series, roughing finishing teeth.



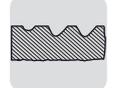
Sementasyon ve takım çelikleri, paslanmaz çelikler, Cr-Ni alaşımlı çelikler, döküm malzemeler, 1200 N/mm² dayanıklılığındaki normal ve sert malzemelerin yüksek hızda talaş kırıcı formları sayesinde ısı iletimini en iyi şekilde dengeleyerek kaliteli alın ve yüzey frezeleme yapar.

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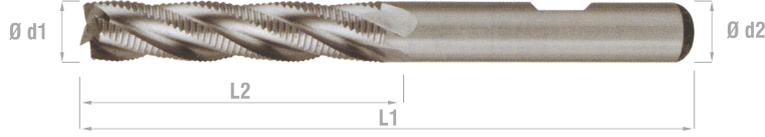
Ürün Kodu Product Code	d1 mm	d2 mm	L1 mm	L2 mm	Kanal sayısı Number of flutes		
					N	H	W
F16200200	2,0	6	51	7	3	3	-
F16200250	2,5	6	52	8	3	3	-
F16200300	3,0	6	52	8	3	3	-
F16200400	4,0	6	55	11	3	4	-
F16200500	5,0	6	57	13	3	4	3
F16200600	6,0	6	57	13	3	5	3
F16200700	7,0	10	66	16	3	5	3
F16200800	8,0	10	69	19	3	5	3
F16200900	9,0	10	69	19	4	6	3
F16201000	10,0	10	72	22	4	6	3
F16201100	11,0	12	79	22	4	6	4
F16201200	12,0	12	83	26	4	6	4
F16201300	13,0	12	83	26	4	6	4
F16201400	14,0	12	83	26	4	6	4
F16201500	15,0	12	83	26	4	7	4
F16201600	16,0	16	92	32	4	7	4
F16201700	17,0	16	92	32	4	7	4
F16201800	18,0	16	92	32	4	7	4
F16201900	19,0	16	92	32	4	7	4
F16202000	20,0	20	104	38	4	8	4
F16202100	21,0	20	104	38	4	8	4
F16202200	22,0	20	104	38	5	8	4
F16202300	23,0	20	104	38	5	8	4
F16202400	24,0	25	121	45	5	8	4
F16202500	25,0	25	121	45	5	8	4
F16202600	26,0	25	121	45	5	10	4
F16202800	28,0	25	121	45	5	10	4
F16203000	30,0	25	121	45	5	10	5
F16203200	32,0	32	133	53	6	10	5
F16203400	34,0	32	133	53	6	11	5
F16203600	36,0	32	133	53	6	11	5
F16203800	38,0	40	155	63	6	12	5
F16204000	40,0	40	155	63	6	12	5
F16204500	45,0	40	155	63	6	12	5
F16205000	50,0	50	177	75	8	14	-
F16205600	56,0	50	177	75	8	14	-
F16206300	63,0	50	192	90	10	14	-

İstenildiğinde H ve W tiplerinde üretilir.

H and W available.



Silindirik saplı parmak freze - Uzun, kaba talaş ince işleme
End mills with straight shanks - Long series, roughing finishing teeth.



Sementasyon ve takım çelikleri, paslanmaz çelikler, Cr-Ni alaşımlı çelikler, döküm malzemeler, 1200 N/mm² dayanıklılığındaki normal ve sert malzemelerin yüksek hızda talaş kırıcı formları sayesinde ısı iletimini en iyi şekilde dengeleyerek kaliteli alın ve yüzey frezeleme yapar

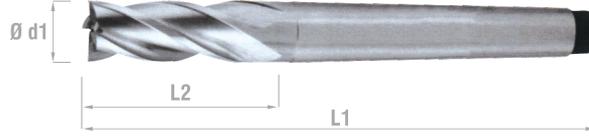


Ürün Kodu Product Code	d1 mm	d2 mm	L1 mm	L2 mm	Kanal sayısı Number of flutes		
					N	H	W
F19200200	2,0	6	54	10	3	3	-
F19200250	2,5	6	56	12	3	3	-
F19200300	3,0	6	56	12	3	3	-
F19200400	4,0	6	63	19	3	4	-
F19200500	5,0	6	68	24	3	4	3
F19200600	6,0	6	68	24	3	5	3
F19200700	7,0	10	80	30	3	5	3
F19200800	8,0	10	88	38	3	5	3
F19200900	9,0	10	88	38	4	6	3
F19201000	10,0	10	95	45	4	6	3
F19201100	11,0	12	102	45	4	6	4
F19201200	12,0	12	110	53	4	6	4
F19201300	13,0	12	110	53	4	6	4
F19201400	14,0	12	110	53	4	6	4
F19201500	15,0	12	110	53	4	7	4
F19201600	16,0	16	123	63	4	7	4
F19201700	17,0	16	123	63	4	7	4
F19201800	18,0	16	123	63	4	7	4
F19201900	19,0	16	123	63	4	7	4
F19202000	20,0	20	141	75	4	8	4
F19202100	21,0	20	141	75	4	8	4
F19202200	22,0	20	141	75	5	8	4
F19202400	24,0	25	166	90	5	8	4
F19202500	25,0	25	166	90	5	8	4
F19202600	26,0	25	166	90	5	10	4
F19202800	28,0	25	166	90	5	10	4
F19203000	30,0	25	166	90	5	10	5
F19203200	32,0	32	186	106	6	10	5
F19203400	34,0	32	186	106	6	11	5
F19203600	36,0	32	186	106	6	11	5
F19203800	38,0	40	217	125	6	12	5
F19204000	40,0	40	217	125	6	12	5
F19204500	45,0	40	217	125	6	12	5
F19205000	50,0	50	252	150	8	14	-
F19205600	56,0	50	252	150	8	14	-
F19206300	63,0	50	282	180	10	14	-



İstenildiğinde H ve W tiplerinde üretilir.

H and W available.

Mors konik saplı parmak freze
End mills with morse taper shanksNE-Metal, 1200 N/mm² dayanıklılığındaki yapı çelikleri ve dövme çeliklerin alın ve yan yüzeylerini frezeleme işlemlerinde kullanılır.

Ürün Kodu Product Code		d1 mm	Kısa - Short		Uzun - Long		Mors Konik No Morse Taper No	Kanal sayısı Number of flutes		
Kısa - Short	Uzun - Long		L1 mm	L2 mm	L1 mm	L2 mm		N	H	W
F22201000	F27201000	10,0	92	22	115	45	1	4	6	3
F22201200	F27201200	12,0	96	26	123	53	1	4	6	4
F22201400	F27201400	14,0	111	26	138	53	2	4	6	4
F22201600	F27201600	16,0	117	32	148	63	2	4	7	4
F22201800	F27201800	18,0	117	32	148	63	2	4	7	4
F22202000	F27202000	20,0	123	38	160	75	2	4	8	4
F22202200	F27202200	22,0	123	38	160	75	2	5	8	4
F22202500	F27202500	25,0	147	45	192	90	3	5	8	4
F22202800	F27202800	28,0	147	45	192	90	3	5	10	4
F22203200	F27203200	32,0	178	53	231	106	4	6	10	5
F22203600	F27203600	36,0	178	53	231	106	4	6	11	5
F22204000	F27204000	40,0	188	63	250	125	4	6	12	5
F22204500	F27204500	45,0	188	63	250	125	4	6	12	5
F22205000	F27205000	50,0	233	75	308	150	5	8	14	-
F22205600	F27205600	56,0	233	75	308	150	5	8	14	-
F22206300	F27206300	63,0	248	90	338	180	5	10	14	-

İstenildiğinde H, W, NR ve NF tiplerinde üretilir.

H, W, NR and NF available.



Silindirik saplı, küresel alınlı kalıpcı freze
With parallel shank, Round face, Die - Sinking cutters



Yüksek dayanıklı otomat çelikleri, yapı ve paslanmaz çelikler ile çelik döküm malzemelerin kopya frezeleme işlerinde kullanılır.

DIN
1889TS
303/29

HSS-E

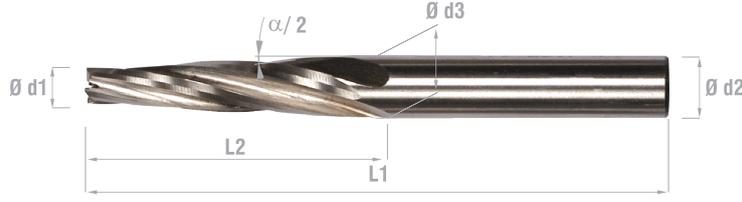
B

Z
4-6

Ürün Kodu Product Code		d1 mm	Kısa - Short		Uzun - Long		r	d2 mm
Kısa - Short	Uzun - Long		L1 mm	L2 mm	L1 mm	L2 mm		
F32200600	F33200600	6	57	13	-	-	3	6
F32200800	F33200800	8	69	19	-	-	4	10
F32201000	F33201000	10	72	22	95	45	5	10
F32201200	F33201200	12	83	26	110	53	6	12
F32201600	F33201600	16	92	32	123	63	8	16
F32202000	F33202000	20	104	38	141	75	10	20
F32202500	F33202500	25	121	45	166	90	12,5	25
F32203200	F33203200	32	133	53	186	106	16	32
F32204000	F33204000	40	155	63	217	125	20	40
F32205000	F33205000	50	177	75	2528	150	25	50



Silindirik saplı, düz alınlı, konik kalıpcı freze
 With parallel shank, straight face, tapered die - sinking cutters

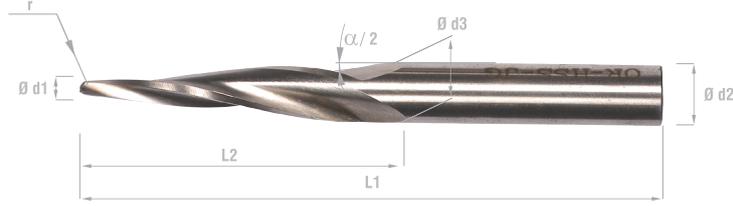


NE-Metal, 1200 N/mm² dayanıklılığındaki yapı çelikleri ve dövme çeliklerin alın ve yan yüzeylerini frezeleme işlemlerinde kullanılır.

**DIN
1889**
**TS
303/29**
HSS-E
E

**Z
4-6**


Ürün Kodu Product Code		d1 (k 12)	Kısa - Short				Orta - Medium				Konik Conic	α / 2
Kısa - Short	Orta - Medium		d2 (h8)	d3	L1	L2	d2 (h8)	d3	L1	L2		
F34200250	F34200251	2,5	12	13	85	31,5	-	-	-	-	1 : 6	9° 28'
F34200400	F34200401	4	16	16	93	36	20	22,7	120	56	1 : 6	9° 28'
F34200600	F34200601	6	20	20	106	42	25	27	135	63	1 : 6	9° 28'
F34200800	F34200801	8	25	25	120	50	32	31,7	145	71	1 : 6	9° 28'
F34201200	F34201201	12	32	33	135	63	-	-	-	-	1 : 6	5° 43'
F35200250	F35200251	2,5	10	10	85	37,5	-	-	-	-	1 : 10	5° 43'
F35200400	F35200401	4	10	12	90	40	16	16,6	125	63	1 : 10	5° 43'
F35200600	F35200601	6	12	14	95	40	16	18,6	125	63	1 : 10	5° 43'
F35200800	F35200801	8	16	17	103	45	20	22,2	135	71	1 : 10	5° 43'
F35201200	F35201201	12	20	21	106	45	25	26,2	140	71	1 : 10	5° 43'
F35201600	F35201601	16	25	26	120	50	-	-	-	-	1 : 10	2° 52'
F36200400	F36200401	4	8	8	90	40	10	10,3	115	63	1 : 20	2° 52'
F36200600	F36200601	6	10	10	95	40	10	12,3	115	63	1 : 20	2° 52'
F36200800	F36200801	8	12	12,5	105	45	16	16	138	80	1 : 20	2° 52'
F36201200	F36201201	12	16	17	109	50	20	20	140	80	1 : 20	2° 52'
F36201600	F36201601	16	20	21,6	120	56	25	25	160	90	1 : 20	2° 52'
F36202000	F36202001	20	25	26,3	135	63	25	30	170	100	1 : 20	2° 52'

Silindirik saplı, küresel alınlı, konik kalıpcı freze
 With parallel shank, round face, tapered die - sinking cutters

 NE-Metal, 1200 N/mm² dayanıklılığındaki yapı çelikleri ve dövme çeliklerin alın ve yan yüzeylerini frezeleme işlemlerinde kullanılır.

**DIN
1889**
**TS
303/29**
HSS-E
F

**Z
4-6**


Ürün Kodu Product Code		d1 (k 12)	Kısa - Short				Orta - Medium				Konik Conic	$\alpha/2$	r
Kısa - Short	Orta - Medium		d2 (h8)	d3	L1	L2	d2 (h8)	d3	L1	L2			
F37200250	F37200251	2,5	12	13	85	31,5	-	-	-	-	1 : 6	9° 28'	1,48
F37200400	F37200401	4	16	16	93	36	20	22,7	120	56	1 : 6	9° 28'	2,36
F37200600	F37200601	6	20	20	106	42	25	27	135	63	1 : 6	9° 28'	3,54
F37200800	F37200801	8	25	25	120	50	32	31,7	145	71	1 : 6	9° 28'	4,72
F37201200	F37201201	12	32	33	135	63	-	-	-	-	1 : 6	5° 43'	7,08
F38200250	F38200251	2,5	10	10	85	37,5	-	-	-	-	1 : 10	5° 43'	1,38
F38200400	F38200401	4	10	12	90	40	16	16,6	125	63	1 : 10	5° 43'	2,21
F38200600	F38200601	6	12	14	95	40	16	18,6	125	63	1 : 10	5° 43'	3,31
F38200800	F38200801	8	16	17	103	45	20	22,2	135	71	1 : 10	5° 43'	4,42
F38201200	F38201201	12	20	21	106	45	25	26,2	140	71	1 : 10	5° 43'	6,63
F38201600	F38201601	16	25	26	120	50	-	-	-	-	1 : 10	2° 52'	8,84
F39200400	F39200401	4	8	8	90	40	10	10,3	115	63	1 : 20	2° 52'	2,10
F39200600	F39200601	6	10	10	95	40	10	12,3	115	63	1 : 20	2° 52'	3,15
F39200800	F39200801	8	12	12,5	105	45	16	16	138	80	1 : 20	2° 52'	4,20
F39201200	F39201201	12	16	17	109	50	20	20	140	80	1 : 20	2° 52'	6,31
F39201600	F39201601	16	20	21,6	120	56	25	25	160	90	1 : 20	2° 52'	8,41
F39202000	F39202001	20	25	26,3	135	63	25	30	170	100	1 : 20	2° 52'	10,51



Silindirik saplı tek ağızlı alüminyum freze
Special end mills for aluminium materials

Alüminyum, PVC doğramalarda delme ve kanal açma işlemlerinde kullanılır.



HSS-E

Z
1

Ürün Kodu Product Code	Tip Type	Ø d1 (h9)	L1	L2	d2 (h8)
F40200360	A	3	60	12	6
F40200460		4	60	12	8
F40200461		4	60	14	6
F40200462		4	120	20	8
F40200560		5	60	12	6
F40200561		5	60	13	8
F40200562		5	60	18	8
F40200570		5	70	25	8
F40200571		5	100	25	8
F40200572		5	120	14	8
F40200660		6	60	14	8
F40200661		6	60	16	8
F40200760		7	60	16	8
F41200490	B	4	90	45	8
F41200580		5	80	35	8
F41200590		5	90	45	8
F41200591		5	100	35	8
F41200592		5	100	55	8
F41200593		5	120	75	8
F41200594		5	120	35	8
F41200680		6	80	35	8
F41200681		6	100	35	8
F41200880		8	80	54	8
F41200881		8	100	68	8
F41200882		8	100	70	8
F41200883		8	120	90	8
F41201090		10	90	45	10
F41201091		10	100	70	10
F41201092	10	120	95	10	
F42200661	C	6	60	14	6
F42200880		8	80	16	8
F42200881		8	100	14	8
F42200882		8	120	14	8
F42200883		8	120	28	8
F42200980		9	80	14	8
F42201080		10	80	14	8
F42201081		10	120	14	10
F42201280		12	80	14	8

Silindirik saplı, yarık freze, düz dişli
With parallel shank, woodruff cutters, straight teeth



Kanal kama yuvası ve benzeri yerlerde kullanılır.

DIN
850

TS
303/30

HSS-E



A



Ürün Kodu Product Code	d1 mm	b mm	d2 mm	L mm
F43201020	10,5	2,0	6	50
F43201025	10,5	2,5	6	50
F43201030	10,5	3,0	6	50
F43201330	13,5	3,0	10	56
F43201340	13,5	4,0	10	56
F43201630	16,5	3,0	10	56
F43201640	16,5	4,0	10	56
F43201650	16,5	5,0	10	56
F43201940	19,5	4,0	10	56
F43201950	19,5	5,0	10	56
F43201960	19,5	6,0	10	56
F43202250	22,5	5,0	10	56
F43202260	22,5	6,0	10	56
F43202280	22,5	8,0	10	56
F43202560	25,5	6,0	10	56
F43202860	28,5	6,0	10	56
F43202880	28,5	8,0	10	56
F43202881	28,5	10,0	12	63
F43203270	32,5	7,0	10	56
F43203280	32,5	8,0	10	56
F43203281	32,5	10,0	12	63
F43204581	45,5	10,0	12	63





Silindirik saplı, yarık freze, çapraz dişi
With parallel shank, woodruff cutters, staggered teeth



Makina tablalarında T kanallarının açılmasında kullanılır.

DIN
850

TS
303/30

HSS-E



B



R



Ürün Kodu Product Code	d1 mm	b mm	d2 mm	L mm
F44201020	10,5	2,0	6	50
F44201025	10,5	2,5	6	50
F44201030	10,5	3,0	6	50
F44201330	13,5	3,0	10	56
F44201340	13,5	4,0	10	56
F44201630	16,5	3,0	10	56
F44201640	16,5	4,0	10	56
F44201650	16,5	5,0	10	56
F44201940	19,5	4,0	10	56
F44201950	19,5	5,0	10	56
F44201960	19,5	6,0	10	56
F44202250	22,5	5,0	10	56
F44202260	22,5	6,0	10	56
F44202280	22,5	8,0	10	56
F44202560	25,5	6,0	10	56
F44202860	28,5	6,0	10	56
F44202880	28,5	8,0	10	56
F44202881	28,5	10,0	12	63
F44203270	32,5	7,0	10	56
F44203280	32,5	8,0	10	56
F44203281	32,5	10,0	12	63
F44204581	45,5	10,0	12	63





Silindirik saplı, T - kanal frezeleri, çapraz dişli
With parallel shanks, T - slot cutters, staggered teeth



Makina tablalarında T kanallarının açılmasında kullanılır.

DIN
851

TS
303/31

HSS-E



Ürün Kodu Product Code	d1 mm	b mm	d2 mm	d3 mm	L1 mm	L2 mm
F45201100	11	3,5	10	4	53,5	6,5
F45201250	12,5	6	10	5	57	7
F45201600	16	8	10	7	62	10
F45201800	18	8	12	8	70	13
F45202100	21	9	12	10	74	16
F45202500	25	11	16	12	82	17
F45202800	28	12	16	13	85	20
F45203200	32	14	16	15	90	22
F45203600	36	16	25	17	103	24
F45204000	40	18	25	19	108	27
F45204500	45	20	25	21	113	30
F45205000	50	22	32	25	124	34
F45205600	56	24	32	28	130	39
F45206000	60	28	32	30	139	43





Silindirik saplı T kanal freze, çapraz dişli, kaba talaş
With parallel shank, T-slot cutters, for roughing and staggered teeth



Makina tablalarında T kanallarının açılmasında kullanılır.

DIN
851

TS
303/31

HSS-E



Ürün Kodu Product Code	d1 mm	b mm	d2 mm	d3 mm	L1 mm	L2 mm
F46201100	11	3,5	10	4	53,5	6,5
F46201250	12,5	6	10	5	57	7
F46201600	16	8	10	7	62	10
F46201800	18	8	12	8	70	13
F46202100	21	9	12	10	74	16
F46202500	25	11	16	12	82	17
F46202800	28	12	16	13	85	20
F46203200	32	14	16	15	90	22
F46203600	36	16	25	17	103	24
F46204000	40	18	25	19	108	27
F46204500	45	20	25	21	113	30
F46205000	50	22	32	25	124	34
F46205600	56	24	32	28	130	39
F46206000	60	28	32	30	139	43



Yüksek hız çeliği / High speed steel

Silindirik saplı, kırlangıç freze
With parallel shank, dovetail cutters



Kızak kanalları ve benzeri yerleri açmada kullanılır.

**DIN
1833**
**TS
303/32**
HSS-E


Ürün Kodu Product Code	d1 mm	α	b mm	d2 mm	L mm	z
F47201600	16,00	45°	4,0	12	60	10
F47202000	20,00	45°	5,0	12	63	10
F47202500	25,00	45°	6,3	12	67	10
F47203200	32,00	45°	8,0	16	71	12
F47201601	16,00	60°	6,3	12	60	8
F47202001	20,00	60°	8,0	12	63	10
F47202501	25,00	60°	10,0	12	67	10
F47203201	32,00	60°	12,5	16	71	12

Yüksek hız çeliği / High speed steel

Silindirik saplı, kırlangıç freze
With parallel shank, dovetail cutters



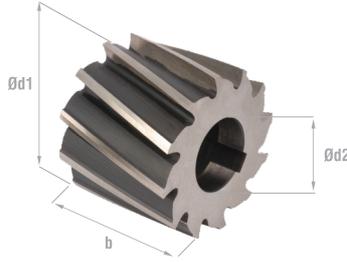
Kızak kanalları ve benzeri yerleri açmada kullanılır.

**DIN
1833**
**TS
303/32**
HSS-E


Ürün Kodu Product Code	d1 mm	α	b mm	d2 mm	L mm	z
F48201600	16,00	45°	4,0	12	60	10
F48202000	20,00	45°	5,0	12	63	10
F48202500	25,00	45°	6,3	12	67	10
F48203200	32,00	45°	8,0	16	71	12
F48201601	16,00	60°	6,3	12	60	8
F48202001	20,00	60°	8,0	12	63	10
F48202501	25,00	60°	10,0	12	67	10
F48203201	32,00	60°	12,5	16	71	12



Vals frezeler
Plain milling cutters

DIN
884TS
303/1

HSS-E

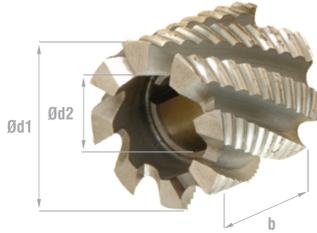
N



Ürün Kodu Product Code	d1 (js 16)	b (js 16)	d2 (H7)
F49200500	50	40	22
F49200501	50	63	22
F49200502	50	80	22
F49200630	63	50	27
F49200631	63	70	27
F49200800	80	63	32
F49200801	80	100	32
F49201000	100	70	40

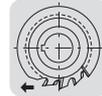


Vals frezeler, kaba talaş
Plain milling cutters, for roughing teeth

DIN
884TS
303/1

HSS-E

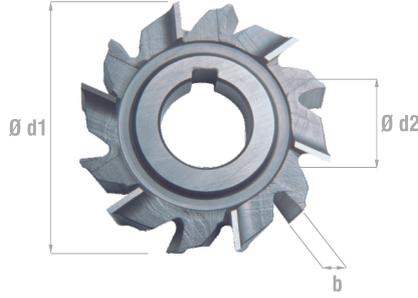
NF



Ürün Kodu Product Code	d1 (js 16)	b (js 16)	d2 (H7)
F50200500	50	40	22
F50200501	50	63	22
F50200502	50	80	22
F50200630	63	50	27
F50200631	63	70	27
F50200800	80	63	32
F50200801	80	100	32
F50201000	100	70	40

Kanal freze, düz diş

Side and face milling cutters, straight teeth



Genel amaçlı kanal açma ve frezeleme işlemlerinde kullanılır.

**DIN
885**
**TS
303/5**
HSS


Ürün Kodu Product Code	d1 (js 16)	b (js 16)	d2 (H7)
F51100500	50	5	16
F51100501	50	6	16
F51100502	50	8	16
F51100503	50	10	16
F51100630	63	5	22
F51100631	63	6	22
F51100632	63	8	22
F51100633	63	10	22
F51100634	63	12	22
F51100635	63	14	22
F51100636	63	16	22
F51100800	80	5	27
F51100801	80	6	27
F51100802	80	8	27
F51100803	80	10	27
F51100804	80	12	27
F51100805	80	14	27
F51100806	80	16	27
F51100807	80	18	27
F51100808	80	20	27
F51101000	100	6	32
F51101001	100	8	32
F51101002	100	10	32
F51101003	100	12	32
F51101004	100	14	32
F51101005	100	16	32
F51101006	100	18	32
F51101007	100	20	32
F51101008	100	22	32
F51101009	100	25	32
F51101250	125	8	32
F51101251	125	10	32
F51101252	125	12	32
F51101253	125	14	32
F51101254	125	16	32
F51101255	125	18	32
F51101256	125	20	32
F51101257	125	22	32
F51101258	125	25	32
F51101259	125	28	32
F51101600	160	10	40
F51101601	160	12	40
F51101602	160	14	40
F51101603	160	16	40
F51101604	160	18	40
F51101605	160	20	40
F51101606	160	22	40
F51102000	200	14	40
F51102001	200	20	40
F51102002	200	28	40
F51102003	200	36	40
F51102004	200	40	40

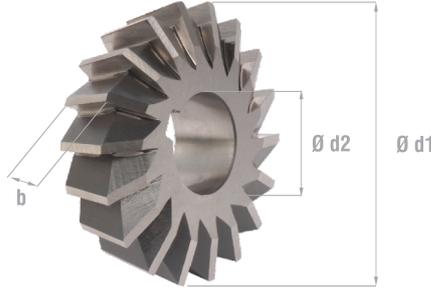


Kanal freze, çapraz diş
 Side and face milling cutters, staggered teeth


Daha ziyade derin kanalların açılması, vuruntusuz çalışması ve rahat talaş atımı istenen yerlerde düz freze yerine tercih edilebilir.

**DIN
885**
**TS
303/5**
HSS

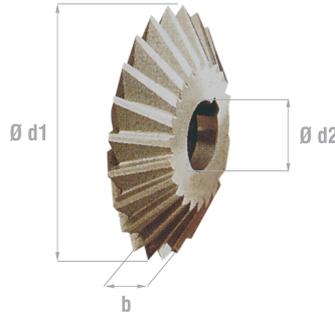

Ürün Kodu Product Code	d1 (js 16)	b (js 16)	d2 (H7)
F52100500	50	5	16
F52100501	50	6	16
F52100502	50	8	16
F52100503	50	10	16
F52100630	63	5	22
F52100631	63	6	22
F52100632	63	8	22
F52100633	63	10	22
F52100634	63	12	22
F52100635	63	14	22
F52100636	63	16	22
F52100800	80	5	27
F52100801	80	6	27
F52100802	80	8	27
F52100803	80	10	27
F52100804	80	12	27
F52100805	80	14	27
F52100806	80	16	27
F52100807	80	18	27
F52100808	80	20	27
F52101000	100	6	32
F52101001	100	8	32
F52101002	100	10	32
F52101003	100	12	32
F52101004	100	14	32
F52101005	100	16	32
F52101006	100	18	32
F52101007	100	20	32
F52101008	100	22	32
F52101009	100	25	32
F52101250	125	8	32
F52101251	125	10	32
F52101252	125	12	32
F52101253	125	14	32
F52101254	125	16	32
F52101255	125	18	32
F52101256	125	20	32
F52101257	125	22	32
F52101258	125	25	32
F52101259	125	28	32
F52101600	160	10	40
F52101601	160	12	40
F52101602	160	14	40
F52101603	160	16	40
F52101604	160	18	40
F52101605	160	20	40
F52101606	160	22	40
F52102000	200	14	40
F52102001	200	20	40
F52102002	200	28	40
F52102003	200	36	40
F52102004	200	40	40

Konik frezeler, çift açılı, Tip B
 Angular cutters, double angle, Type B


Kanal açma, pah kırma ve benzeri uygulamalarda kullanılır.

DIN
1823
TS
303/9
HSS
H

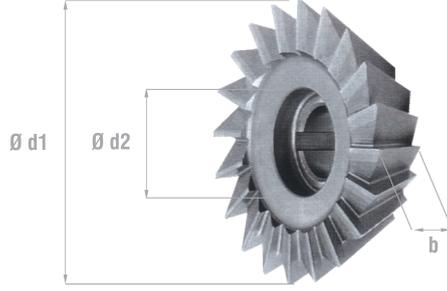

Ürün Kodu Product Code	d1 (js 16)	σ (+ 1°)	b (js 16)	d2 (H7)	z
F53106301	63	60°	14	22	18
F53105001	50	70°	14	16	16
F53106302	63	70°	18	22	18
F53105002	50	75°	16	16	16
F53106303	63	75°	18	22	18
F53105003	50	80°	16	16	16
F53106304	63	80°	20	22	18
F53105004	50	90°	18	16	16

Prizma freze, çift açılı
 Symmetrical cutters, double angle


Kanal açma, pah kırma ve benzeri uygulamalarda kullanılır.

DIN
847
TS
303/10
HSS
H


Ürün Kodu Product Code	d1 (js 16)	σ (+ 1°)	b (js 16)	d2 (H7)	z
F54100501	50	45°	8	16	22
F54100631	63	45°	10	22	24
F54100801	80	45°	12	27	26
F54101001	100	45°	18	32	28
F54100502	50	60°	10	16	18
F54100632	63	60°	14	22	20
F54100802	80	60°	18	27	22
F54101002	100	60°	25	32	24
F54100503	50	90°	14	16	16
F54100633	63	90°	20	22	18
F54100803	80	90°	22	27	20
F54101003	100	90°	32	32	24

Konik alın freze, boyuna kama kanallı, Tip A
 Angular cutters, longitudinal keyway, Type A


Kırılgiç kuyruğu kanalları ve diğler makina konstrüksiyon uygulamalarında kullanılır.

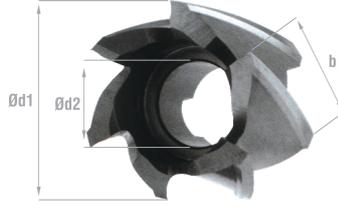
**DIN
842**
**TS
303/11**
HSS
H

Ürün Kodu Product Code	d1 (js 16)	σ (+ 1°)	b (js 16)	d2 (H7)	z
F55100400	40	45°	10	10	14
F55100500	50	45°	13	13	16
F55100630	63	45°	18	16	18
F55100800	80	45°	22	22	20
F55101000	100	45°	28	27	22
F55101250	125	45°	36	32	24
F55101600	160	45°	45	40	28
F55100401	40	50°	13	10	14
F55100501	50	50°	16	13	16
F55100631	63	50°	20	16	18
F55100801	80	50°	25	22	20
F55101001	100	50°	32	27	22
F55101251	125	50°	40	32	24
F55101601	160	50°	50	40	28
F55100402	40	55°	13	10	14
F55100502	50	55°	16	13	16
F55100632	63	55°	20	16	18
F55100802	80	55°	25	22	20
F55101002	100	55°	32	27	22
F55101252	125	55°	40	32	24
F55101602	160	55°	50	40	28
F55100403	40	60°	13	10	14
F55100503	50	60°	16	13	16
F55100633	63	60°	20	16	18
F55100803	80	60°	25	22	20
F55101003	100	60°	32	27	22
F55101253	125	60°	40	32	24
F55101603	160	60°	50	40	28





Vals alın freze, enine kamalı
Shell and mills, with tenon drive



DIN
1880

TS
303/3

HSS

N

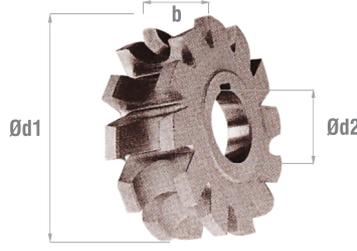
↻R



Ürün Kodu Product Code	d1 (js 16)	b (js 16)	d2 (H7)
F56100400	40	32	16
F56100500	50	36	22
F56100630	63	40	27
F56100800	80	45	27
F56101000	100	50	32
F56101250	125	56	40
F56101600	160	63	600



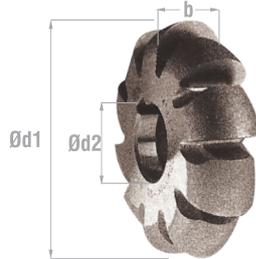
Bu frezeler istenildiğinde H, W, NR, NF olarakta üretilir.
Type H, W, NR, NF available.

İç bükey freze
 Concave cutters


Radius dış köşe kırma, radius frezeleme ve amaca yönelik formlu işlerde kullanılır.

DIN
855
TS
303/14
HSS
A


Ürün Kodu Product Code	d1 (js 16)	r	b	d2 (H7)	z
F57100500	50	1,60	8	16	14
F57100501	50	2,00	9	16	14
F57100630	63	2,50	10	22	12
F57100631	63	3,00	12	22	12
F57100632	63	3,15	12	22	12
F57100633	63	4,00	16	22	12
F57100634	63	5,00	20	22	12
F57100800	80	6,00	24	27	12
F57100801	80	6,30	24	27	12
F57100802	80	8,00	32	27	12
F57101001	100	10,00	36	32	12
F57101002	100	12,00	40	32	12
F57101003	100	12,50	40	32	12
F57101251	125	16,00	50	32	10
F57101252	125	20,00	60	32	10

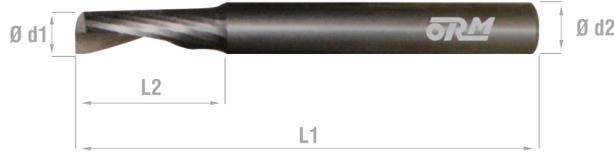
Dış bükey freze
 Convex cutters


Çeşitli kanal yuvarlak form frezeleme ve özel uygulamalarda kullanılır.

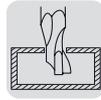
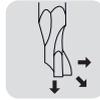
DIN
856
TS
303/13
HSS


Ürün Kodu Product Code	d1 (js 16)	r	b	d2 (H7)	z
F58100500	50	1,60	3,2	16	14
F58100501	50	2,00	4,0	16	14
F58100630	63	2,50	5,0	22	12
F58100631	63	3,00	6,0	22	12
F58100632	63	3,15	6,3	22	12
F58100633	63	4,00	8,0	22	12
F58100634	63	5,00	10,0	22	12
F58100800	80	6,00	12,0	27	12
F58100801	80	6,30	12,6	27	12
F58100802	80	8,00	16,0	27	12
F58101001	100	10,00	20,0	32	12
F58101002	100	12,00	24,0	32	12
F58101003	100	12,50	25,0	32	12
F58101251	125	16,00	32,0	32	12
F58101252	125	20,00	40,0	32	12

Tek ağızlı alüminyum freze
Special end mills for aluminium materials

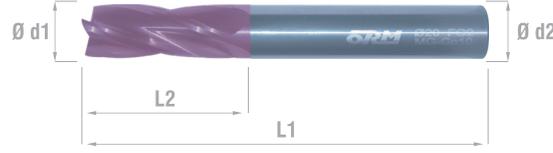


Alüminyum, PVC doğramalarda CNC ile delme ve kanal açma işlemlerinde kullanılır.



Ürün Kodu Product Code		Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
KAPLAMASIZ	CRN KAPLAMALI				
FF01900300	FF01990300	3	45	12	3
FF01900350	FF01990350	3,5	45	12	4
FF01900400	FF01990400	4	50	15	4
FF01900450	FF01990450	4,5	50	15	5
FF01900500	FF01990500	5	50	16	5
FF01900550	FF01990550	5,5	50	16	6
FF01900600	FF01990600	6	57	19	6
FF01900650	FF01990650	6,5	57	19	7
FF01900700	FF01990700	7	60	19	7
FF01900750	FF01990750	7,5	60	19	8
FF01900800	FF01990800	8	60	22	8
FF01900850	FF01990850	8,5	60	22	9
FF01900900	FF01990900	9	72	23	9
FF01900950	FF01990950	9,5	72	23	10
FF01901000	FF01991000	10	72	23	10
FF01901050	FF01991050	10,5	72	23	11
FF01901100	FF01991100	11	75	25	11
FF01901150	FF01991150	11,5	75	25	12
FF01901200	FF01991200	12	75	25	12



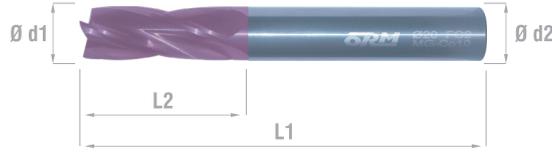
Parmak freze - Kısa
End mills - Short series


Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF02900200	FF02900201	FF02900202	2	38	6	2
FF02900250	FF02900251	FF02900252	2,5	38	6	3
FF02900300	FF02900301	FF02900302	3	38	9	3
FF02900350	FF02900351	FF02900352	3,5	50	14	4
FF02900400	FF02900401	FF02900402	4	50	14	4
FF02900450	FF02900451	FF02900452	4,5	50	16	5
FF02900500	FF02900501	FF02900502	5	50	16	5
FF02900600	FF02900601	FF02900602	6	57	19	6
FF02900700	FF02900701	FF02900702	7	60	19	8
FF02900800	FF02900801	FF02900802	8	60	20	8
FF02900900	FF02900901	FF02900902	9	72	21	10
FF02901000	FF02901001	FF02901002	10	72	21	10
FF02901200	FF02901201	FF02901202	12	75	25	12
FF02901400	FF02901401	FF02901402	14	83	32	14
FF02901600	FF02901601	FF02901602	16	92	32	16
FF02901800	FF02901801	FF02901802	18	100	32	18
FF02902000	FF02902001	FF02902002	20	100	35	20

Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF02940200	FF02940201	FF02940202	2	38	6	2
FF02940250	FF02940251	FF02940252	2,5	38	6	3
FF02940300	FF02940301	FF02940302	3	38	9	3
FF02940350	FF02940351	FF02940352	3,5	50	14	4
FF02940400	FF02940401	FF02940402	4	50	14	4
FF02940450	FF02940451	FF02940452	4,5	50	16	5
FF02940500	FF02940501	FF02940502	5	50	16	5
FF02940600	FF02940601	FF02940602	6	57	19	6
FF02940700	FF02940701	FF02940702	7	60	19	8
FF02940800	FF02940801	FF02940802	8	60	20	8
FF02940900	FF02940901	FF02940902	9	72	21	10
FF02941000	FF02941001	FF02941002	10	72	21	10
FF02941200	FF02941201	FF02941202	12	75	25	12
FF02941400	FF02941401	FF02941402	14	83	32	14
FF02941600	FF02941601	FF02941602	16	92	32	16
FF02941800	FF02941801	FF02941802	18	100	32	18
FF02942000	FF02942001	FF02942002	20	100	35	20

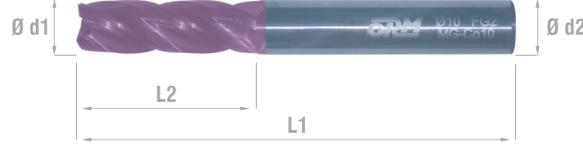
Parmak freze - Uzun
 End mills - Long series


Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.

DIN
6527
SC
H


Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4					
FF03900200	FF03900201	FF03900202	2	38	6	7	3
FF03900250	FF03900251	FF03900252	2,5	38	7	8	3
FF03900300	FF03900301	FF03900302	3	38	7	8	3
FF03900350	FF03900351	FF03900352	3,5	57	7	10	6
FF03900400	FF03900401	FF03900402	4	57	8	11	6
FF03900450	FF03900451	FF03900452	4,5	57	8	11	6
FF03900500	FF03900501	FF03900502	5	57	10	13	6
FF03900600	FF03900601	FF03900602	6	57	10	13	6
FF03900700	FF03900701	FF03900702	7	63	13	16	8
FF03900800	FF03900801	FF03900802	8	63	16	19	8
FF03900900	FF03900901	FF03900902	9	72	16	19	10
FF03901000	FF03901001	FF03901002	10	72	19	22	10
FF03901200	FF03901201	FF03901202	12	83	22	26	12

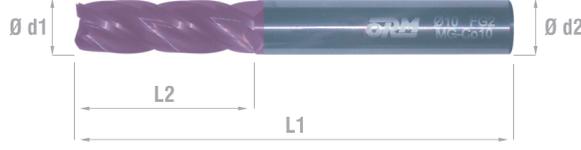
Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI							
Z=2	Z=3	Z=4			Z=2,3	Z=4	
FF03940200	FF03940201	FF03940202	2	38	6	7	3
FF03940250	FF03940251	FF03940252	2,5	38	7	8	3
FF03940300	FF03940301	FF03940302	3	38	7	8	3
FF03940350	FF03940351	FF03940352	3,5	57	7	10	6
FF03940400	FF03940401	FF03940402	4	57	8	11	6
FF03940450	FF03940451	FF03940452	4,5	57	8	11	6
FF03940500	FF03940501	FF03940502	5	57	10	13	6
FF03940600	FF03940601	FF03940602	6	57	10	13	6
FF03940700	FF03940701	FF03940702	7	63	13	16	8
FF03940800	FF03940801	FF03940802	8	63	16	19	8
FF03940900	FF03940901	FF03940902	9	72	16	19	10
FF03941000	FF03941001	FF03941002	10	72	19	22	10
FF03941200	FF03941201	FF03941202	12	83	22	26	12

Parmak freze - Çok uzun
 End mills - Extra long series


Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF04900300	FF04900301	FF04900302	3	100	25	3
FF04900400	FF04900401	FF04900402	4	100	30	4
FF04900500	FF04900501	FF04900502	5	100	30	5
FF04900600	FF04900601	FF04900602	6	100	40	6
FF04900800	FF04900801	FF04900802	8	100	40	8
FF04901000	FF04901001	FF04901002	10	100	40	10
FF05901000	FF05901001	FF05901002	10	150	75	10
FF06901000	FF06901001	FF06901002	10	200	100	10
FF04901200	FF04901201	FF04901202	12	100	45	12
FF05901200	FF05901201	FF05901202	12	150	75	12
FF06901200	FF06901201	FF06901202	12	200	100	12
FF04901400	FF04901401	FF04901402	14	100	45	14
FF05901400	FF05901401	FF05901402	14	150	75	14
FF06901400	FF06901401	FF06901402	14	200	100	14
FF04901600	FF04901601	FF04901602	16	100	45	16
FF05901600	FF05901601	FF05901602	16	150	75	16
FF06901600	FF06901601	FF06901602	16	200	120	16
FF04901800	FF04901801	FF04901802	18	100	45	18
FF05901800	FF05901801	FF05901802	18	150	75	18
FF06901800	FF06901801	FF06901802	18	200	120	18
FF04902000	FF04902001	FF04902002	20	100	45	20
FF05902000	FF05902001	FF05902002	20	150	75	20
FF06902000	FF06902001	FF06902002	20	200	120	20
FF04902500	FF04902501	FF04902502	25	150	75	25
FF05902500	FF05902501	FF05902502	25	200	120	25

Parmak freze - Çok uzun
 End mills - Extra long series


Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF04940300	FF04940301	FF04940302	3	100	25	3
FF04940400	FF04940401	FF04940402	4	100	30	4
FF04940500	FF04940501	FF04940502	5	100	30	5
FF04940600	FF04940601	FF04940602	6	100	40	6
FF04940800	FF04940801	FF04940802	8	100	40	8
FF04941000	FF04941001	FF04941002	10	100	40	10
FF05941000	FF05941001	FF05941002	10	150	75	10
FF06941000	FF06941001	FF06941002	10	200	100	10
FF04941200	FF04941201	FF04941202	12	100	45	12
FF05941200	FF05941201	FF05941202	12	150	75	12
FF06941200	FF06941201	FF06941202	12	200	100	12
FF04941400	FF04941401	FF04941402	14	100	45	14
FF05941400	FF05941401	FF05941402	14	150	75	14
FF06941400	FF06941401	FF06941402	14	200	100	14
FF04941600	FF04941601	FF04941602	16	100	45	16
FF05941600	FF05941601	FF05941602	16	150	75	16
FF06941600	FF06941601	FF06941602	16	200	120	16
FF04941800	FF04941801	FF04941802	18	100	45	18
FF05941800	FF05941801	FF05941802	18	150	75	18
FF06941800	FF06941801	FF06941802	18	200	120	18
FF04942000	FF04942001	FF04942002	20	100	45	20
FF05942000	FF05942001	FF05942002	20	150	75	20
FF06942000	FF06942001	FF06942002	20	200	120	20
FF04942500	FF04942501	FF04942502	25	150	75	25
FF05942500	FF05942501	FF05942502	25	200	120	25



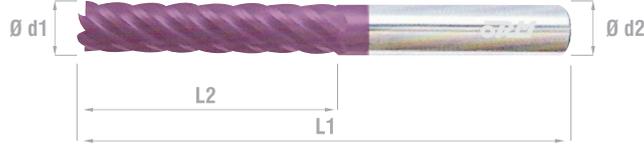
Köşe radiuslu parmak freze - Uzun
 Corner radius end mills - Long series


Özellikle yüksek hızda yüksek hassasiyet ve uzun takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçlar sağlar. Paslanmaz çelik, yüksek ısı alaşımları, sertleştirilmiş çelik, Alüminyum ve demir dışı metallerin işlenmesi için idealdir.

**DIN
6527**
SC
H


Ürün Kodu / Product Code			r	Ø d1 (h10) mm	L1 mm	L2 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4						
FF07900200	FF07900201	FF07900202	0,5	2	38	6	7	3
FF07900250	FF07900251	FF07900252	0,5	2,5	38	7	8	3
FF07900300	FF07900301	FF07900302	0,5	3	38	7	8	3
FF07900400	FF07900401	FF07900402	0,5	4	57	8	11	6
FF07900500	FF07900501	FF07900502	0,5	5	57	10	13	6
FF07900600	FF07900601	FF07900602	1,0	6	57	10	13	6
FF07900700	FF07900701	FF07900702	1,0	7	63	13	16	8
FF07900800	FF07900801	FF07900802	1,0	8	63	16	19	8
FF07900900	FF07900901	FF07900902	1,0	9	72	16	19	10
FF07901000	FF07901001	FF07901002	2,0	10	72	19	22	10
FF07901200	FF07901201	FF07901202	2,0	12	83	22	26	12
FF07901400	FF07901401	FF07901402	2,0	14	83	22	26	14
FF07901600	FF07901601	FF07901602	2,0	16	92	26	32	16
FF07901800	FF07901801	FF07901802	2,0	18	92	26	32	18
FF07902000	FF07902001	FF07902002	2,0	20	104	32	38	20

Ürün Kodu / Product Code			r	Ø d1 (h10) mm	L1 mm	L2 mm	L2 mm	d2 (h6) mm
AİTİN KAPLAMALI								
Z=2	Z=3	Z=4						
FF07940200	FF07940201	FF07940202	0,5	2	38	6	7	3
FF07940250	FF07940251	FF07940252	0,5	2,5	38	7	8	3
FF07940300	FF07940301	FF07940302	0,5	3	38	7	8	3
FF07940400	FF07940401	FF07940402	0,5	4	57	8	11	6
FF07940500	FF07940501	FF07940502	0,5	5	57	10	13	6
FF07940600	FF07940601	FF07940602	1,0	6	57	10	13	6
FF07940700	FF07940701	FF07940702	1,0	7	63	13	16	8
FF07940800	FF07940801	FF07940802	1,0	8	63	16	19	8
FF07940900	FF07940901	FF07940902	1,0	9	72	16	19	10
FF07941000	FF07941001	FF07941002	2,0	10	72	19	22	10
FF07941200	FF07941201	FF07941202	2,0	12	83	22	26	12
FF07941400	FF07941401	FF07941402	2,0	14	83	22	26	14
FF07941600	FF07941601	FF07941602	2,0	16	92	26	32	16
FF07941800	FF07941801	FF07941802	2,0	18	92	26	32	18
FF07942000	FF07942001	FF07942002	2,0	20	104	32	38	20

Çok ağızlı finiş freze
Multiflute finishing end mills


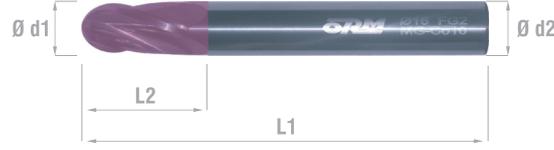
Özellikle yüksek hızda yüksek hassasiyet ve takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçları sağlar. Paslanmaz çelik, yüksek ısı alaşımları sertleştirilmiş çelik, alüminyum ve demir dışı metallerin işlenmesi için idealdir.



Ürün Kodu Product Code		Ø d1 (h7) mm	L1 mm	L2 mm	d2 (h6) mm
Kaplamasız	TIN				
FF08900300	FF08910300	3,0	38	12	3
FF08900400	FF08910400	4,0	51	14	4
FF08900500	FF08910500	5,0	51	20	5
FF08900600	FF08910600	6,0	64	20	6
FF08900700	FF08910700	7,0	64	20	7
FF08900800	FF08910800	8,0	64	20	8
FF08900900	FF08910900	9,0	64	20	9
FF08901000	FF08911000	10,0	70	25	10
FF08901200	FF08911200	12,0	76	25	12
FF08901400	FF08911400	14,0	89	30	14
FF08901600	FF08911600	16,0	89	30	16
FF08901800	FF08911800	18,0	102	35	18
FF08902000	FF08912000	20,0	102	38	20
FF08902200	FF08912200	22,0	102	40	22
FF08902500	FF08912500	25,0	102	40	25



Ürün Kodu Product Code		Ø d1 (h7) mm	L1 mm	L2 mm	d2 (h6) mm
Kaplamasız	TIN				
FF09901600	FF09911600	16,0	89	30	16
FF09901800	FF09911800	18,0	102	35	18
FF09902000	FF09912000	20,0	102	38	20
FF09902200	FF09912200	22,0	102	40	22
FF09902500	FF09912500	25,0	102	40	25

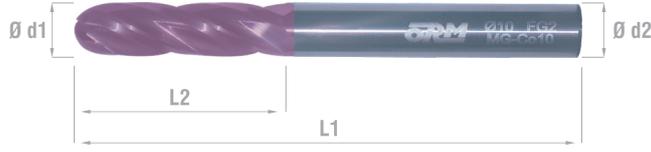
Küresel başlı parmak freze - Kısa
Ball nose end mills - Short series


Özellikle yüksek hızda yüksek hassasiyet ve derin deliklerde uzun takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçlar sağlar. Paslanmaz çelik, yüksek ısı alaşımları, sertleştirilmiş çelik, Alüminyum ve demir dışı metallerin işlenmesi için idealdir.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF10900200	FF10900201	FF10900202	2	38	6	2
FF10900250	FF10900251	FF10900252	2,5	38	6	3
FF10900300	FF10900301	FF10900302	3	38	9	3
FF10900350	FF10900351	FF10900352	3,5	50	14	4
FF10900400	FF10900401	FF10900402	4	50	14	4
FF10900450	FF10900451	FF10900452	4,5	50	16	5
FF10900500	FF10900501	FF10900502	5	50	16	5
FF10900600	FF10900601	FF10900602	6	57	19	6
FF10900700	FF10900701	FF10900702	7	60	19	8
FF10900800	FF10900801	FF10900802	8	60	20	8
FF10900900	FF10900901	FF10900902	9	72	21	10
FF10901000	FF10901001	FF10901002	10	72	21	10
FF10901200	FF10901201	FF10901202	12	75	25	12
FF10901400	FF10901401	FF10901402	14	83	32	14
FF10901600	FF10901601	FF10901602	16	92	32	16
FF10901800	FF10901801	FF10901802	18	100	32	18
FF10902000	FF10902001	FF10902002	20	100	35	20

Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF10940200	FF10940201	FF10940202	2	38	6	2
FF10940250	FF10940251	FF10940252	2,5	38	6	3
FF10940300	FF10940301	FF10940302	3	38	9	3
FF10940350	FF10940351	FF10940352	3,5	50	14	4
FF10940400	FF10940401	FF10940402	4	50	14	4
FF10940450	FF10940451	FF10940452	4,5	50	16	5
FF10940500	FF10940501	FF10940502	5	50	16	5
FF10940600	FF10940601	FF10940602	6	57	19	6
FF10940700	FF10940701	FF10940702	7	60	19	8
FF10940800	FF10940801	FF10940802	8	60	20	8
FF10940900	FF10940901	FF10940902	9	72	21	10
FF10941000	FF10941001	FF10941002	10	72	21	10
FF10941200	FF10941201	FF10941202	12	75	25	12
FF10941400	FF10941401	FF10941402	14	83	32	14
FF10941600	FF10941601	FF10941602	16	92	32	16
FF10941800	FF10941801	FF10941802	18	100	32	18
FF10942000	FF10942001	FF10942002	20	100	35	20

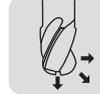
Küresel başlı parmak freze - Uzun
 Ball nose end mills - Long series


Özellikle yüksek hızda yüksek hassasiyet ve derin deliklerde uzun takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçlar sağlar. Paslanmaz çelik, yüksek ısı alaşımları, sertleştirilmiş çelik, Alüminyum ve demir dışı metallerin işlenmesi için idealdir.

 DIN
6527

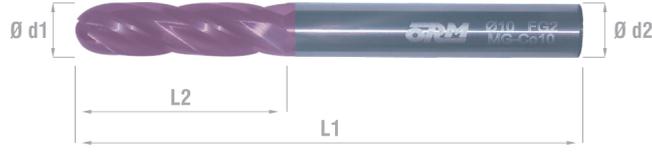
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Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4					
FF11900200	FF11900201	FF11900202	2	38	6	7	3
FF11900250	FF11900251	FF11900252	2,5	38	7	8	3
FF11900300	FF11900301	FF11900302	3	38	7	8	3
FF11900400	FF11900401	FF11900402	4	57	8	11	6
FF11900500	FF11900501	FF11900502	5	57	10	13	6
FF11900600	FF11900601	FF11900602	6	57	10	13	6
FF11900700	FF11900701	FF11900702	7	63	13	16	8
FF11900800	FF11900801	FF11900802	8	63	16	19	8
FF11900900	FF11900901	FF11900902	9	72	16	19	10
FF11901000	FF11901001	FF11901002	10	72	19	22	10
FF11901200	FF11901201	FF11901202	12	83	22	26	12

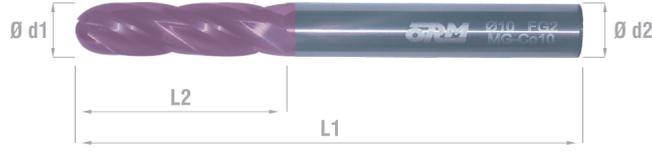
Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI							
Z=2	Z=3	Z=4					
FF11940200	FF11940201	FF11940202	2	38	6	7	3
FF11940250	FF11940251	FF11940252	2,5	38	7	8	3
FF11940300	FF11940301	FF11940302	3	38	7	8	3
FF11940400	FF11940401	FF11940402	4	57	8	11	6
FF11940500	FF11940501	FF11940502	5	57	10	13	6
FF11940600	FF11940601	FF11940602	6	57	10	13	6
FF11940700	FF11940701	FF11940702	7	63	13	16	8
FF11940800	FF11940801	FF11940802	8	63	16	19	8
FF11940900	FF11940901	FF11940902	9	72	16	19	10
FF11941000	FF11941001	FF11941002	10	72	19	22	10
FF11941200	FF11941201	FF11941202	12	83	22	26	12

Küresel başlı parmak freze - Çok uzun
Ball nose end mills - Extra long series


Özellikle yüksek hızda yüksek hassasiyet ve derin deliklerde uzun takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçlar sağlar. Paslanmaz çelik, yüksek ısı alaşımları, sertleştirilmiş çelik, Alüminyum ve demir dışı metallerin işlenmesi için idealdir.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF12900300	FF12900301	FF12900302	3	100	25	3
FF12900400	FF12900401	FF12900402	4	100	30	4
FF12900500	FF12900501	FF12900502	5	100	30	5
FF12900600	FF12900601	FF12900602	6	100	40	6
FF12900800	FF12900801	FF12900802	8	100	40	8
FF12901000	FF12901001	FF12901002	10	100	40	10
FF13901000	FF13901001	FF13901002	10	150	75	10
FF14901000	FF14901001	FF14901002	10	200	100	10
FF12901200	FF12901201	FF12901202	12	100	45	12
FF13901200	FF13901201	FF13901202	12	150	75	12
FF14901200	FF14901201	FF14901202	12	200	100	12
FF12901400	FF12901401	FF12901402	14	100	45	14
FF13901400	FF13901401	FF13901402	14	150	75	14
FF14901400	FF14901401	FF14901402	14	200	100	14
FF12901600	FF12901601	FF12901602	16	100	45	16
FF13901600	FF13901601	FF13901602	16	150	75	16
FF14901600	FF14901601	FF14901602	16	200	120	16
FF12901800	FF12901801	FF12901802	18	100	45	18
FF13901800	FF13901801	FF13901802	18	150	75	18
FF14901800	FF14901801	FF14901802	18	200	120	18
FF12902000	FF12902001	FF12902002	20	100	45	20
FF13902000	FF13902001	FF13902002	20	150	75	20
FF14902000	FF14902001	FF14902002	20	200	120	20
FF12902500	FF12902501	FF12902502	25	150	75	25
FF13902500	FF12902502	FF13902502	25	200	120	25

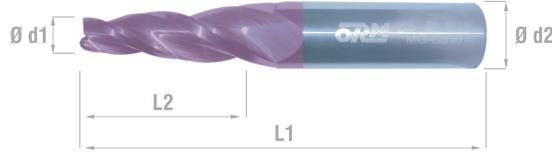
Küresel başlı parmak freze - Çok uzun
Ball nose end mills - Extra long series


Özellikle yüksek hızda yüksek hassasiyet ve derin deliklerde uzun takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçlar sağlar. Paslanmaz çelik, yüksek ısı alaşımları, sertleştirilmiş çelik, Alüminyum ve demir dışı metallerin işlenmesi için idealdir.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF12940300	FF12940301	FF12940302	3	100	25	3
FF12940400	FF12940401	FF12940402	4	100	30	4
FF12940500	FF12940501	FF12940502	5	100	30	5
FF12940600	FF12940601	FF12940602	6	100	40	6
FF12940800	FF12940801	FF12940802	8	100	40	8
FF12941000	FF12941001	FF12941002	10	100	40	10
FF13941000	FF13941001	FF13941002	10	150	75	10
FF14941000	FF14941001	FF14941002	10	200	100	10
FF12941200	FF12941201	FF12941202	12	100	45	12
FF13941200	FF13941201	FF13941202	12	150	75	12
FF14941200	FF14941201	FF14941202	12	200	100	12
FF12941400	FF12941401	FF12941402	14	100	45	14
FF13941400	FF13941401	FF13941402	14	150	75	14
FF14941400	FF14941401	FF14941402	14	200	100	14
FF12941600	FF12941601	FF12941602	16	100	45	16
FF13941600	FF13941601	FF13941602	16	150	75	16
FF14941600	FF14941601	FF14941602	16	200	120	16
FF12941800	FF12941801	FF12941802	18	100	45	18
FF13941800	FF13941801	FF13941802	18	150	75	18
FF14941800	FF14941801	FF14941802	18	200	120	18
FF12942000	FF12942001	FF12942002	20	100	45	20
FF13942000	FF13942001	FF13942002	20	150	75	20
FF14942000	FF14942001	FF14942002	20	200	120	20
FF12942500	FF12942501	FF12942502	25	150	75	25
FF13942500	FF13942501	FF13942502	25	200	120	25



Düz ağızlı parmak freze - 3° konik
 Conic 3° taper cutting


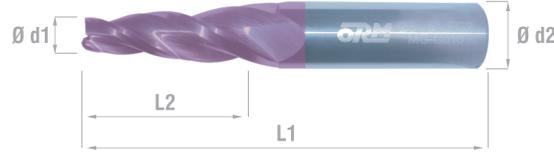
Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF15900200	FF15900201	FF15900202	2	75	20	6
FF15900300	FF15900301	FF15900302	3	75	25	6
FF15900400	FF15900401	FF15900402	4	75	38	8
FF15900500	FF15900501	FF15900502	5	75	48	10
FF15900600	FF15900601	FF15900602	6	100	50	12
FF15900800	FF15900801	FF15900802	8	100	50	14
FF15901000	FF15901001	FF15901002	10	100	50	16
FF15901200	FF15901201	FF15901202	12	100	50	18



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF15940200	FF15940201	FF15940202	2	75	20	6
FF15940300	FF15940301	FF15940302	3	75	25	6
FF15940400	FF15940401	FF15940402	4	75	38	8
FF15940500	FF15940501	FF15940502	5	75	48	10
FF15940600	FF15940601	FF15940602	6	100	50	12
FF15940800	FF15940801	FF15940802	8	100	50	14
FF15941000	FF15941001	FF15941002	10	100	50	16
FF15941200	FF15941201	FF15941202	12	100	50	18

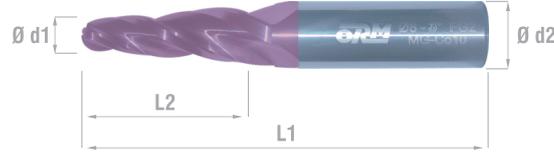
Düz ağızlı parmak freze - 5° konik
Conic 5° taper cutting


Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF16900200	FF16900201	FF16900202	2	75	20	6
FF16900300	FF16900301	FF16900302	3	75	28	8
FF16900400	FF16900401	FF16900402	4	75	34	10
FF16900500	FF16900501	FF16900502	5	75	40	12
FF16900600	FF16900601	FF16900602	6	100	45	14
FF16900800	FF16900801	FF16900802	8	100	45	16
FF16901000	FF16901001	FF16901002	10	100	45	18
FF16901200	FF16901201	FF16901202	12	100	45	20

Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF16940200	FF16940201	FF16940202	2	75	20	6
FF16940300	FF16940301	FF16940302	3	75	28	8
FF16940400	FF16940401	FF16940402	4	75	34	10
FF16940500	FF16940501	FF16940502	5	75	40	12
FF16940600	FF16940601	FF16940602	6	100	45	14
FF16940800	FF16940801	FF16940802	8	100	45	16
FF16941000	FF16941001	FF16941002	10	100	45	18
FF16941200	FF16941201	FF16941202	12	100	45	20

Küresel başlı parmak freze - 3° konik
Conic 3° taper cutting, ball nose end mill


Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.



Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF17900200	FF17900201	FF17900202	2	75	20	6
FF17900300	FF17900301	FF17900302	3	75	25	6
FF17900400	FF17900401	FF17900402	4	75	38	8
FF17900500	FF17900501	FF17900502	5	75	48	10
FF17900600	FF17900601	FF17900602	6	100	50	12
FF17900800	FF17900801	FF17900802	8	100	50	14
FF17901000	FF17901001	FF17901002	10	100	50	16
FF17901200	FF17901201	FF17901202	12	100	50	18

Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF17940200	FF17940201	FF17940202	2	75	20	6
FF17940300	FF17940301	FF17940302	3	75	25	6
FF17940400	FF17940401	FF17940402	4	75	38	8
FF17940500	FF17940501	FF17940502	5	75	48	10
FF17940600	FF17940601	FF17940602	6	100	50	12
FF17940800	FF17940801	FF17940802	8	100	50	14
FF17941000	FF17941001	FF17941002	10	100	50	16
FF17941200	FF17941201	FF17941202	12	100	50	18

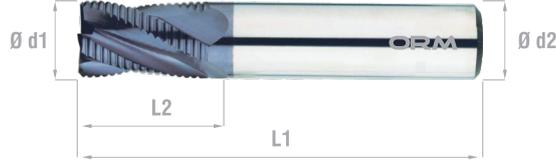
Küresel başlı parmak freze - 5° konik
 Conic 5° taper cutting, ball nose end mill


Takım çeliğinin yeterli olmadığı sertlikteki malzemelerin frezeleme ve işlenmesinde iki ağız geometrisi sayesinde yüksek kanal hacmi sağlar. Yüksek hızlarda CNC tezgahlarda kullanılır.



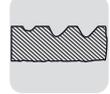
Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
Z=2	Z=3	Z=4				
FF18900200	FF18900201	FF18900202	2	75	20	6
FF18900300	FF18900301	FF18900302	3	75	28	6
FF18900400	FF18900401	FF18900402	4	75	34	8
FF18900500	FF18900501	FF18900502	5	75	40	10
FF18900600	FF18900601	FF18900602	6	100	45	12
FF18900800	FF18900801	FF18900802	8	100	45	14
FF18901000	FF18901001	FF18901002	10	100	45	16
FF18901200	FF18901201	FF18901202	12	100	45	18

Ürün Kodu / Product Code			Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
AITIN KAPLAMALI						
Z=2	Z=3	Z=4				
FF18940200	FF18940201	FF18940202	2	75	20	6
FF18940300	FF18940301	FF18940302	3	75	28	6
FF18940400	FF18940401	FF18940402	4	75	34	8
FF18940500	FF18940501	FF18940502	5	75	40	10
FF18940600	FF18940601	FF18940602	6	100	45	12
FF18940800	FF18940801	FF18940802	8	100	45	14
FF18941000	FF18941001	FF18941002	10	100	45	16
FF18941200	FF18941201	FF18941202	12	100	45	18

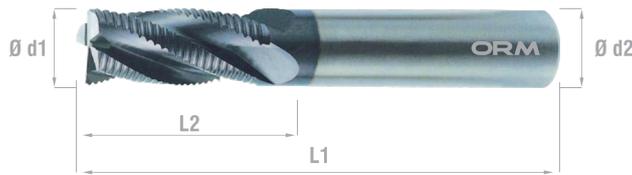
Karbür / Solid Carbide
Kaba talaş freze- Kısa
 Roughing end mills - Short


Özellikle yüksek hızda yüksek hassasiyet ve takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçları sağlar. Paslanmaz çelik, yüksek ısı alaşımları sertleştirilmiş çelik, alüminyum ve demir dışı metallerin işlenmesi için idealdir.


SC
NF

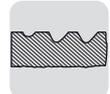
Z 4

Ürün Kodu
 Product Code

		Ø d1 (h7) mm	L1 mm	L2 mm	d2 (h6) mm
Kaplamasız	AITIN KAPLAMALI				
FF19900600	FF19940600	6,0	57	13	6
FF19900700	FF19940700	7,0	60	16	7
FF19900800	FF19940800	8,0	63	19	8
FF19900900	FF19940900	9,0	67	19	9
FF19901000	FF19941000	10,0	72	22	10
FF19901200	FF19941200	12,0	83	26	12
FF19901400	FF19941400	14,0	83	26	14
FF19901600	FF19941600	16,0	92	32	16
FF19901800	FF19941800	18,0	92	32	18
FF19902000	FF19942000	20,0	104	38	20

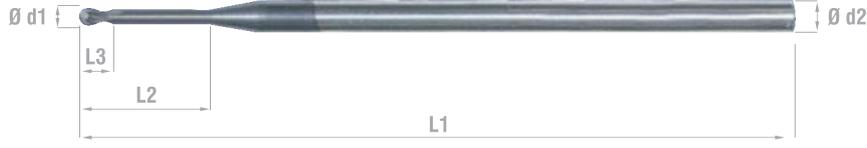
Karbür / Solid Carbide
Kaba talaş freze- Uzun
 Roughing end mills - Long


Özellikle yüksek hızda yüksek hassasiyet ve takım ömrü için dizayn edilmiştir. Normal frezelerin paslanmaz çelikte elde edemediği sonuçları sağlar. Paslanmaz çelik, yüksek ısı alaşımları sertleştirilmiş çelik, alüminyum ve demir dışı metallerin işlenmesi için idealdir.


SC
NF

Z 4

Ürün Kodu
 Product Code

		Ø d1 (h7) mm	L1 mm	L2 mm	d2 (h6) mm
Kaplamasız	AITIN KAPLAMALI				
FF20900600	FF20940600	6,0	68	24	6
FF20900800	FF20940800	8,0	88	38	8
FF20901000	FF20941000	10,0	100	45	10
FF20901200	FF20941200	12,0	110	53	12
FF20901400	FF20941400	14,0	110	53	14
FF20901600	FF20941600	16,0	110	63	16
FF20901800	FF20941800	18,0	110	63	18
FF20902000	FF20942000	20,0	141	75	20



Ürün Kodu Product Code		r	Ø d1 (e8) mm	L1 mm	L2 mm	L3 mm	d2 (h6) mm
Kaplamasız	AITIN KAPLAMALI						
FF21900100	FF21940100	0,50	1,0	45	21	5	3
FF21900130	FF21940130	0,65	1,3	45	21	8	3
FF21900150	FF21940150	0,75	1,5	45	21	8	3
FF21900200	FF21940200	1,00	2,0	45	21	8	3
FF21900250	FF21940250	1,25	2,5	45	21	8	3
FF21900300	FF21940300	1,50	3,0	45	21	12	3
FF21900400	FF21940400	2,00	4,0	45	21	11	3



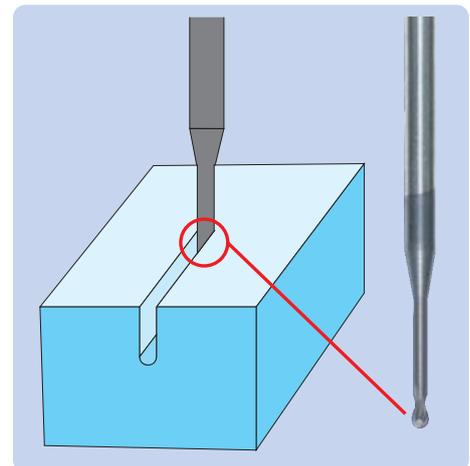
Ürün Kodu Product Code		r	Ø d1 (e8) mm	L1 mm	L2 mm	L3 mm	d2 (h6) mm
Kaplamasız	AITIN KAPLAMALI						
FF22900100	FF22940100	0,50	1,0	45	21	5	4
FF22900130	FF22940130	0,65	1,3	45	21	8	4
FF22900150	FF22940150	0,75	1,5	45	21	8	4
FF22900200	FF22940200	1,00	2,0	45	21	8	4
FF22900250	FF22940250	1,25	2,5	45	21	8	4
FF22900300	FF22940300	1,50	3,0	45	21	12	4
FF22900400	FF22940400	2,00	4,0	45	21	11	4



Karbür / Solid Carbide

Mikro küresel freze
Ball nose end mills micro

Ürün Kodu Product Code		r	Ø d1 (e8) mm	L1 mm	L2 mm	L3 mm	d2 (h6) mm
Kaplamasız	AITİN KAPLAMALI						
FF23900100	FF23940100	0,50	1,0	40	4	2	3
FF23900101	FF23940101	0,50	1,0	40	6	2	3
FF23900102	FF23940102	0,50	1,0	40	8	2	3
FF23900103	FF23940103	0,50	1,0	40	10	2	3
FF23900104	FF23940104	0,50	1,0	40	12	2	3
FF23900150	FF23940150	0,75	1,5	40	4	3	3
FF23900151	FF23940151	0,75	1,5	40	6	3	3
FF23900152	FF23940152	0,75	1,5	40	8	3	3
FF23900153	FF23940153	0,75	1,5	40	10	3	3
FF23900154	FF23940154	0,75	1,5	40	12	3	3
FF23900200	FF23940200	1,00	2,0	40	4	4	3
FF23900201	FF23940201	1,00	2,0	40	6	4	3
FF23900202	FF23940202	1,00	2,0	40	8	4	3
FF23900203	FF23940203	1,00	2,0	40	10	4	3
FF23900204	FF23940204	1,00	2,0	40	12	4	3
FF23900205	FF23940205	1,00	2,0	40	16	4	3



Karbür / Solid Carbide

Pantograf freze
Engraver cutter

CNC router tezgahlarında kullanım içindir.



Ürün Kodu Product Code	Ø d1 mm	L1 mm	L2 mm	d2 mm
FF24900300	3	50	4	3
FF24900400	4	55	5	4
FF24900500	5	62	6	5
FF24900600	6	66	7	6



Ürün Kodu Product Code	Ø d1 mm	L1 mm	L2 mm	d2 mm
FF24900301	3	50	4	3
FF24900401	4	55	5	4
FF24900501	5	62	6	5
FF24900601	6	66	7	6

T kanal freze
T- slot cutters


CNC tezgahlarda T kanallarının açılmasında kullanılır.

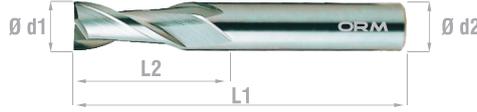


Ürün Kodu Product Code		Ø d1 mm	L1 mm	L2 mm	d2 mm
Kaplamasız	AITIN KAPLAMALI				
FF25900450	FF25940450	4,5	50	1	6
FF25900750	FF25940750	7,5	50	1,5	6
FF25900751	FF25940751	7,5	50	2	6
FF25901050	FF25941050	10,5	50	2	6
FF25901051	FF25941051	10,5	50	2,5	6
FF25901052	FF25941052	10,5	50	3	6
FF25901350	FF25941250	13,5	56	3	10
FF25901351	FF25941251	13,5	56	4	10
FF25901650	FF25941650	16,5	56	3	10
FF25901651	FF25941651	16,5	56	4	10
FF25901652	FF25941652	16,5	56	5	10
FF25901950	FF25941950	19,5	63	3	10
FF25901951	FF25941951	19,5	63	4	10
FF25902250	FF25942250	19,5	63	5	10
FF25902251	FF25942251	22,5	63	4	10
FF25902252	FF25942252	22,5	63	5	10
FF25902550	FF25942550	22,5	63	6	10
FF25902551	FF25942551	25,5	63	5	10
FF25902552	FF25942552	25,5	63	6	10
FF25902553	FF25942553	25,5	63	7	10
FF25902850	FF25942850	25,5	63	8	10
FF25902851	FF25942851	28,5	63	5	10
FF25902852	FF25942852	28,5	63	6	10
FF25902853	FF25942853	28,5	63	7	10
FF25903250	FF25943250	28,5	63	8	10
FF25903251	FF25943251	32,5	71	5	12
FF25903252	FF25943252	32,5	71	6	12
FF25903253	FF25943253	32,5	71	8	12

Karbür / Solid Carbide

Ahşap frezesi Uçcut spiral wood rout

CNC router ahşap, köpük ve metal kesim frezeleri
Wood, foam and metal milling cutters , for CNC router



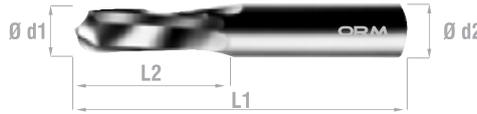
Yukarıya doğru talaş çıkartma, tezgah sabitliği, uzun ömür ve yüksek kaliteli sonuç istenen ahşap, ahşap kompozitler, plastik ve sert yüzeylerin frezeleme işlerinde kullanılır.



Ürün Kodu Product Code	Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
FF26900400	4	64	16	6
FF26900500	5	64	20	6
FF26900600	6	64	25	6
FF26900800	8	64	25	8
FF26901000	10	76	35	10
FF26901200	12	76	35	12

Karbür / Solid Carbide

Üç boyut freze Double edge round bottom



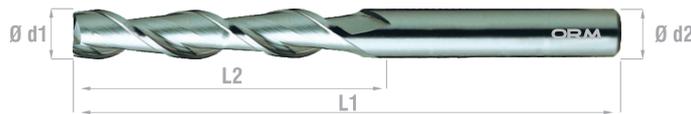
Ahşap, plastik, kompozit ve her türlü hafif metallerde mükemmel üç boyut frezeleme sağlar.



Ürün Kodu Product Code	Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
FF27900400	4	50	14	6
FF27900500	5	50	16	6
FF27900600	6	57	19	6

Karbür / Solid Carbide

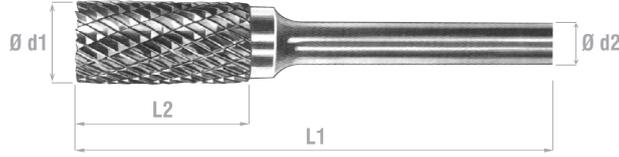
Köpük freze Foam cutters



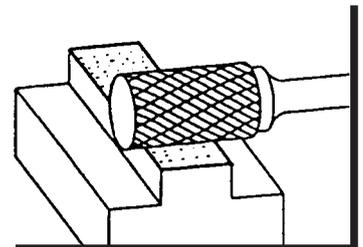
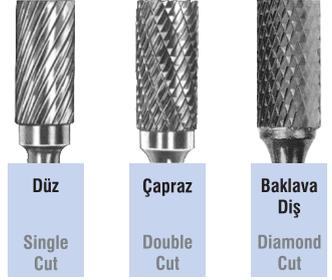
Yukarıya doğru talaş çıkartma özelliği sayesinde strafor gibi kalın malzemelerde frezeleme için kullanılır.



Ürün Kodu / Product Code	Ø d1 (h10) mm	L1 mm	L2 mm	d2 (h6) mm
FF28900500	5	90	50	5
FF28900600	6	100	57	6

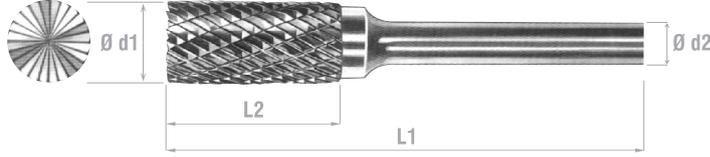
Kalıp frezeleri, SA - Silindirik
End cut burrs, SA - Cylindrical

Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF50900101	Düz	1,5	3	38	6,0
FF50900104	Düz	2,5	3	38	11,0
FF50900107	Düz	3,0	3	38	16,0
FF50900110	Düz	3,0	6	50	12,7
FF50900112	Düz	5,0	6	50	16,0
FF50900113	Düz	6,0	6	50	20,0
FF50900115	Düz	6,0	6	162	20,0
FF50900121	Düz	8,0	6	69	19,0
FF50900122	Düz	9,5	6	69	19,0
FF50900123	Düz	9,5	6	169	19,0
FF50900125	Düz	11,0	6	69	25,0
FF50900128	Düz	12,7	6	75	25,0
FF50900129	Düz	12,7	6	175	25,0
FF50900130	Düz	16,0	6	75	25,0
FF50900132	Düz	19,0	6	70	25,0
FF50900134	Düz	25,0	6	70	25,0
FF50900201	Çapraz	1,5	6	38	6,0
FF50900204	Çapraz	2,5	6	38	11,0
FF50900207	Çapraz	3,0	6	38	16,0
FF50900210	Çapraz	3,0	6	50	12,7
FF50900212	Çapraz	5,0	6	50	16,0
FF50900213	Çapraz	6,0	6	50	20,0
FF50900215	Çapraz	6,0	6	162	20,0
FF50900220	Çapraz	6,3	6	60	16,0
FF50900221	Çapraz	8,0	6	69	19,0
FF50900222	Çapraz	9,5	6	69	19,0
FF50900223	Çapraz	9,5	6	169	19,0
FF50900225	Çapraz	11,0	6	69	25,0
FF50900228	Çapraz	12,7	6	75	25,0
FF50900229	Çapraz	12,7	6	175	25,0
FF50900230	Çapraz	16,0	6	75	25,0
FF50900232	Çapraz	19,0	6	70	25,0
FF50900234	Çapraz	25,0	6	70	25,0
FF50900307	Baklava Diş	3,0	6	38	16,0
FF50900313	Baklava Diş	6,0	6	50	20,0
FF50900321	Baklava Diş	8,0	6	69	19,0
FF50900322	Baklava Diş	9,5	6	69	19,0
FF50900328	Baklava Diş	12,7	6	75	25,0
FF50900330	Baklava Diş	16,0	6	75	25,0
FF50900332	Baklava Diş	19,0	6	70	25,0
FF50900334	Baklava Diş	25,0	6	70	25,0
FF50900413	Talaş kırıcı	6,0	6	50	20,0
FF50900422	Talaş kırıcı	9,5	6	69	19,0
FF50900427	Talaş kırıcı	12,7	6	69	19,0
FF50900430	Talaş kırıcı	16,0	6	75	25,0
FF50900522	Alüminyum	9,5	6	69	19,0
FF50900527	Alüminyum	12,7	6	69	19,0
FF50900530	Alüminyum	16,0	6	75	25,0





Kalıp frezeleri, SB - alın kesme
End cut burrs, SB - with end cut



Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF51900101	Düz	2,5	3	38	11,0
FF51900104	Düz	3,0	3	38	16,0
FF51900107	Düz	3,0	6	50	12,7
FF51900109	Düz	5,0	6	50	16,0
FF51900110	Düz	5,8	6	50	20,0
FF51900112	Düz	5,8	6	162	20,0
FF51900116	Düz	6,3	6	38	12,7
FF51900117	Düz	6,3	6	60	16,0
FF51900118	Düz	8,0	6	69	19,0
FF51900119	Düz	9,5	6	69	19,0
FF51900120	Düz	9,5	6	169	19,0
FF51900122	Düz	11,0	6	69	25,0
FF51900123	Düz	12,7	6	64	14,0
FF51900125	Düz	12,7	6	75	25,0
FF51900126	Düz	12,7	6	175	25,0
FF51900127	Düz	16,0	6	75	25,0
FF51900129	Düz	19,0	6	75	25,0
FF51900131	Düz	25,0	6	70	25,0
FF51900201	Çapraz	2,5	3	38	11,0
FF51900204	Çapraz	3,0	3	38	16,0
FF51900207	Çapraz	3,0	6	50	12,7
FF51900209	Çapraz	5,0	6	50	16,0
FF51900210	Çapraz	5,8	6	50	20,0
FF51900212	Çapraz	5,8	6	162	20,0
FF51900216	Çapraz	6,3	6	38	12,7
FF51900217	Çapraz	6,3	6	60	16,0
FF51900218	Çapraz	8,0	6	69	19,0
FF51900219	Çapraz	9,5	6	69	19,0
FF51900220	Çapraz	9,5	6	169	19,0
FF51900222	Çapraz	11,0	6	69	25,0
FF51900223	Çapraz	12,7	6	64	14,0
FF51900225	Çapraz	12,7	6	75	25,0
FF51900226	Çapraz	12,7	6	175	25,0
FF51900227	Çapraz	16,0	6	75	25,0
FF51900229	Çapraz	19,0	6	75	25,0
FF51900231	Çapraz	25,0	6	70	25,0
FF51900304	Baklava Diş	3,0	3	38	16,0
FF51900310	Baklava Diş	5,8	6	50	20,0
FF51900318	Baklava Diş	8,0	6	69	19,0
FF51900319	Baklava Diş	9,5	6	69	19,0
FF51900323	Baklava Diş	12,7	6	64	14,0
FF51900325	Baklava Diş	12,7	6	75	25,0
FF51900327	Baklava Diş	16,0	6	75	25,0
FF51900329	Baklava Diş	19,0	6	75	25,0
FF51900331	Baklava Diş	25,0	6	70	25,0
FF51900410	Talaş kırıcılı	5,8	6	50	20,0
FF51900419	Talaş kırıcılı	9,5	6	69	19,0
FF51900424	Talaş kırıcılı	12,7	6	75	25,0
FF51900427	Talaş kırıcılı	16,0	6	75	25,0



Düz
Single
Cut



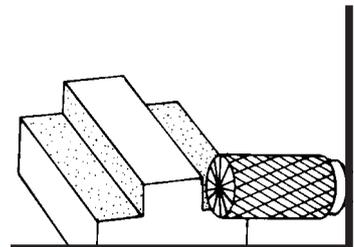
Çapraz
Double
Cut

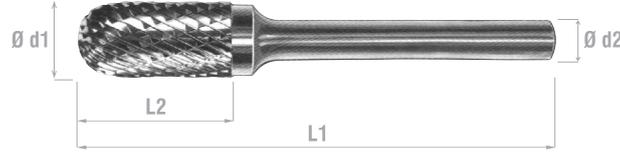


Baklava
Diş
Diamond
Cut

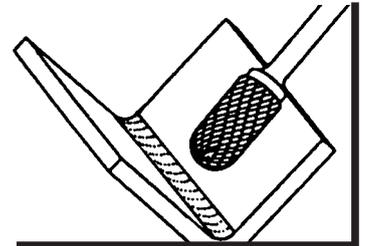
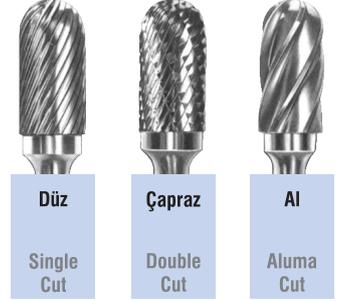


Talaş
Kırıcılı
Chipbreak
Cut



Kalıp frezeleri, SC - radius uç
End cut burrs, SC - radius end

Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF52900101	Düz	2,5	3	38	11,0
FF52900102	Düz	3,0	3	38	16,0
FF52900103	Düz	3,0	3	50	16,0
FF52900104	Düz	3,0	3	75	16,0
FF52900105	Düz	3,0	6	60	16,0
FF52900107	Düz	5,0	6	70	19,0
FF52900108	Düz	6,0	6	50	20,0
FF52900110	Düz	6,0	6	162	20,0
FF52900112	Düz	6,3	6	50	12,7
FF52900113	Düz	6,3	6	60	16,0
FF52900114	Düz	8,0	6	69	19,0
FF52900115	Düz	9,5	6	69	19,0
FF52900116	Düz	9,5	6	169	19,0
FF52900117	Düz	10,0	6	69	25,0
FF52900118	Düz	11,0	6	69	25,0
FF52900120	Düz	12,7	6	75	25,0
FF52900121	Düz	12,7	6	175	25,0
FF52900122	Düz	16,0	6	75	25,0
FF52900124	Düz	19,0	6	75	25,0
FF52900126	Düz	25,0	6	70	25,0
FF52900201	Çapraz	2,5	3	38	11,0
FF52900202	Çapraz	3,0	3	38	16,0
FF52900203	Çapraz	3,0	3	50	16,0
FF52900204	Çapraz	3,0	3	75	16,0
FF52900205	Çapraz	3,0	6	60	16,0
FF52900207	Çapraz	5,0	6	70	19,0
FF52900208	Çapraz	6,0	6	50	20,0
FF52900210	Çapraz	6,0	6	162	20,0
FF52900212	Çapraz	6,3	6	50	12,7
FF52900213	Çapraz	6,3	6	60	16,0
FF52900214	Çapraz	8,0	6	69	19,0
FF52900215	Çapraz	9,5	6	69	19,0
FF52900216	Çapraz	9,5	6	169	19,0
FF52900217	Çapraz	10,0	6	69	25,0
FF52900218	Çapraz	11,0	6	69	25,0
FF52900220	Çapraz	12,7	6	75	25,0
FF52900221	Çapraz	12,7	6	175	25,0
FF52900222	Çapraz	16,0	6	75	25,0
FF52900224	Çapraz	19,0	6	75	25,0
FF52900226	Çapraz	25,0	6	70	25,0
FF52900302	Baklava Diş	3,0	3	38	16,0
FF52900303	Baklava Diş	3,0	3	50	16,0
FF52900307	Baklava Diş	5,0	6	70	19,0
FF52900308	Baklava Diş	6,0	6	50	20,0
FF52900312	Baklava Diş	6,3	6	50	12,7
FF52900314	Baklava Diş	8,0	6	69	19,0
FF52900315	Baklava Diş	9,5	6	69	19,0
FF52900317	Baklava Diş	10,0	6	69	25,0
FF52900318	Baklava Diş	11,0	6	69	25,0
FF52900320	Baklava Diş	12,7	6	75	25,0
FF52900322	Baklava Diş	16,0	6	75	25,0
FF52900324	Baklava Diş	19,0	6	75	25,0
FF52900326	Baklava Diş	25,0	6	70	25,0
FF52900410	Talaş kırıncılı	6,0	6	162	20,0
FF52900415	Talaş kırıncılı	9,5	6	69	19,0
FF52900420	Talaş kırıncılı	12,7	6	75	25,0
FF52900422	Talaş kırıncılı	16,0	6	75	25,0
FF52900515	Alüminyum	9,5	6	69	19,0
FF52900520	Alüminyum	12,7	6	75	25,0
FF52900522	Alüminyum	16,0	6	75	25,0



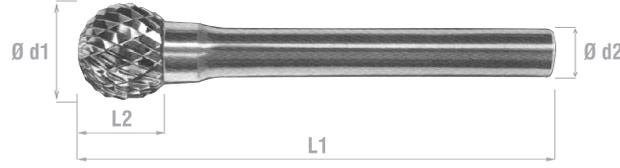


Mermerler Şirketler Grubu

FREZELER - END MILLS

ORM

Karbür / Solid Carbide

Kalıp frezeleri, SD - misket başlı
End cut burrs, SD - ball

SC



Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF53900101	Düz	2,5	3	38	2,3
FF53900102	Düz	3,0	3	38	2,5
FF53900103	Düz	3,0	3	50	2,5
FF53900104	Düz	3,0	3	75	2,5
FF53900106	Düz	6,3	6	50	6,3
FF53900107	Düz	6,3	6	150	5,0
FF53900108	Düz	8,0	6	50	6,4
FF53900109	Düz	9,5	6	60	8,0
FF53900110	Düz	9,5	6	158	8,0
FF53900111	Düz	11,0	6	60	9,5
FF53900112	Düz	12,7	6	62	11,0
FF53900113	Düz	12,7	6	161	11,0
FF53900114	Düz	16,0	6	65	14,0
FF53900115	Düz	19,0	6	70	16,0
FF53900117	Düz	25,0	6	69	21,0
FF53900201	Çapraz	2,5	3	38	2,3
FF53900202	Çapraz	3,0	3	38	2,5
FF53900203	Çapraz	3,0	3	50	2,5
FF53900204	Çapraz	3,0	3	75	2,5
FF53900206	Çapraz	6,3	6	50	6,3
FF53900207	Çapraz	6,3	6	150	5,0
FF53900208	Çapraz	8,0	6	50	6,4
FF53900209	Çapraz	9,5	6	60	8,0
FF53900210	Çapraz	9,5	6	158	8,0
FF53900211	Çapraz	11,0	6	60	9,5
FF53900212	Çapraz	12,7	6	62	11,0
FF53900213	Çapraz	12,7	6	161	11,0
FF53900214	Çapraz	16,0	6	65	14,0
FF53900215	Çapraz	19,0	6	70	16,0
FF53900217	Çapraz	25,0	6	69	21,0
FF53900306	Baklava Diş	6,3	6	50	6,3
FF53900308	Baklava Diş	8,0	6	50	6,4
FF53900309	Baklava Diş	9,5	6	60	8,0
FF53900312	Baklava Diş	12,7	6	62	11,0
FF53900314	Baklava Diş	16,0	6	65	14,0
FF53900315	Baklava Diş	19,0	6	70	16,0
FF53900317	Baklava Diş	25,0	6	69	21,0
FF53900407	Talaş kırıcılı	6,3	6	150	5,0
FF53900409	Talaş kırıcılı	9,5	6	60	8,0
FF53900412	Talaş kırıcılı	12,7	6	62	11,0
FF53900414	Talaş kırıcılı	16	6	65	14,0
FF53900509	Alüminyum	9,5	6	60	8,0
FF53900512	Alüminyum	12,7	6	62	11,0
FF53900514	Alüminyum	16	6	65	14,0



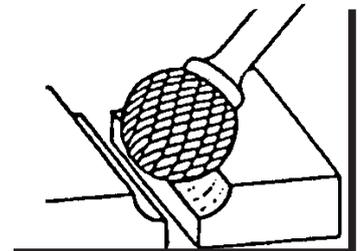
Düz

Single
Cut

Çapraz

Double
CutBaklava
DişDiamond
Cut

Al

Aluma
Cut



Mermerler Şirketler Grubu

FREZELER - END MILLS

ORM

Karbür / Solid Carbide

Kalıp frezeleri, SE - oval uç
End cut burrs, SE - oval

SC



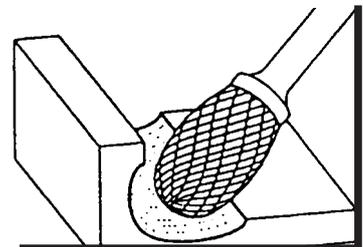
Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF54900101	Düz	3,0	3	38	8,0
FF54900102	Düz	3,0	3	50	8,0
FF54900103	Düz	3,0	3	75	8,0
FF54900105	Düz	6,3	3	50	9,5
FF54900107	Düz	6,3	6	60	10,0
FF54900108	Düz	6,3	6	160	10,0
FF54900109	Düz	8,0	6	62	12,0
FF54900110	Düz	9,5	6	65	16,0
FF54900111	Düz	9,5	6	166	16,0
FF54900113	Düz	12,7	6	71	22,0
FF54900114	Düz	12,7	6	172	22,0
FF54900115	Düz	16,0	6	75	25,0
FF54900117	Düz	19,0	6	69	25,0
FF54900201	Çapraz	3,0	3	38	8,0
FF54900202	Çapraz	3,0	3	50	8,0
FF54900203	Çapraz	3,0	3	75	8,0
FF54900205	Çapraz	6,3	3	50	9,5
FF54900207	Çapraz	6,3	6	60	10,0
FF54900208	Çapraz	6,3	6	160	10,0
FF54900209	Çapraz	8,0	6	62	12,0
FF54900210	Çapraz	9,5	6	65	16,0
FF54900211	Çapraz	9,5	6	166	16,0
FF54900213	Çapraz	12,7	6	71	22,0
FF54900214	Çapraz	12,7	6	172	22,0
FF54900215	Çapraz	16,0	6	75	25,0
FF54900217	Çapraz	19,0	6	69	25,0
FF54900307	Baklava Diş	6,3	6	60	10,0
FF54900309	Baklava Diş	8,0	6	62	12,0
FF54900310	Baklava Diş	9,5	6	65	16,0
FF54900313	Baklava Diş	12,7	6	71	22,0
FF54900315	Baklava Diş	16,0	6	75	25,0
FF54900317	Baklava Diş	19,0	6	69	25,0
FF54900410	Talaş kırıcı	9,5	6	65	16,0
FF54900413	Talaş kırıcı	12,7	6	71	22,0
FF54900415	Talaş kırıcı	16,0	6	75	25,0
FF54900510	Alüminyum	9,5	6	65	16,0
FF54900513	Alüminyum	12,7	6	71	22,0
FF54900515	Alüminyum	16,0	6	75	25,0



Düz

Single
Cut

Çapraz

Double
CutBaklava
Diş
Diamond
CutAl
Aluma
Cut

Kalıp frezeleri, SF - kavisli
End cut burrs, SF - tree radius

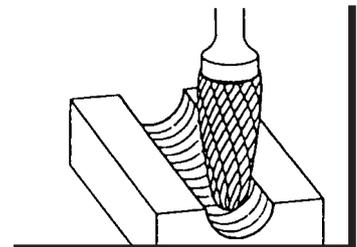
Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF55900101	Düz	3,0	3	38	6,0
FF55900102	Düz	3,0	3	38	12,7
FF55900103	Düz	3,0	3	50	12,7
FF55900104	Düz	3,0	3	75	12,7
FF55900105	Düz	6,0	6	69	19,0
FF55900106	Düz	6,0	6	169	19,0
FF55900107	Düz	6,3	6	65	16,0
FF55900108	Düz	8,0	6	69	19,0
FF55900109	Düz	9,5	6	69	19,0
FF55900110	Düz	9,5	6	169	19,0
FF55900112	Düz	12,7	6	75	25,0
FF55900113	Düz	12,7	6	175	25,0
FF55900114	Düz	16,0	6	75	25,0
FF55900118	Düz	19,0	6	69	25,0
FF55900201	Çapraz	3,0	3	38	6,0
FF55900202	Çapraz	3,0	3	38	12,7
FF55900203	Çapraz	3,0	3	50	12,7
FF55900204	Çapraz	3,0	3	75	12,7
FF55900205	Çapraz	6,0	6	69	19,0
FF55900206	Çapraz	6,0	6	169	19,0
FF55900207	Çapraz	6,3	6	65	16,0
FF55900208	Çapraz	8,0	6	69	19,0
FF55900209	Çapraz	9,5	6	69	19,0
FF55900210	Çapraz	9,5	6	169	19,0
FF55900212	Çapraz	12,7	6	75	25,0
FF55900213	Çapraz	12,7	6	175	25,0
FF55900214	Çapraz	16,0	6	75	25,0
FF55900218	Çapraz	19,0	6	69	25,0
FF55900305	Baklava Diş	6,0	6	69	19,0
FF55900308	Baklava Diş	8,0	6	69	19,0
FF55900309	Baklava Diş	9,5	6	69	19,0
FF55900312	Baklava Diş	12,7	6	75	25,0
FF55900314	Baklava Diş	16,0	6	75	25,0
FF55900318	Baklava Diş	19,0	6	69	25,0
FF55900405	Talaş kırıcı	6,0	6	69	19,0
FF55900409	Talaş kırıcı	9,5	6	69	19,0
FF55900412	Talaş kırıcı	12,7	6	75	25,0
FF55900416	Talaş kırıcı	16,0	6	82	32,0
FF55900509	Alüminyum	9,5	6	69	19,0
FF55900512	Alüminyum	12,7	6	75	25,0
FF55900516	Alüminyum	16,0	6	82	32,0



Düz

Single
Cut

Çapraz

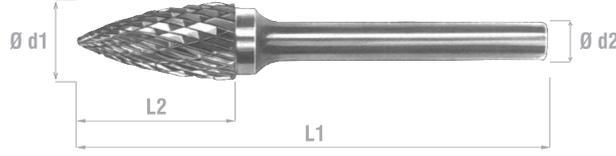
Double
CutBaklava
Diş
Diamond
CutAl
Alüminyum
Cut



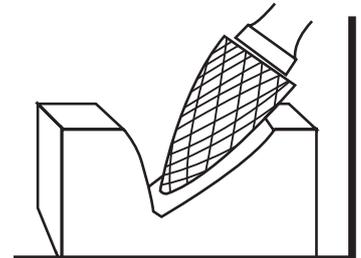
Mermerler Şirketler Grubu

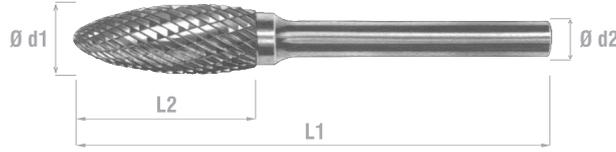
FREZELER - END MILLS

ORM

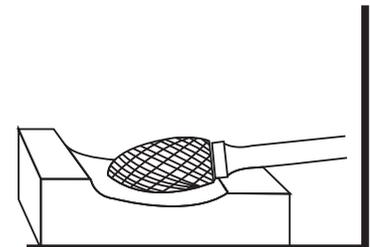
Karbür / Solid Carbide**Kalıp frezeleri, SG - sivri kavis**
End cut burrs, SG - tree pointed

Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF56900101	Düz	3,0	3	38	6,0
FF56900102	Düz	3,0	3	38	16,0
FF56900104	Düz	3,0	3	38	12,7
FF56900105	Düz	6,0	6	50	19,0
FF56900106	Düz	6,0	6	169	19,0
FF56900108	Düz	6,3	6	50	16,0
FF56900109	Düz	8,0	6	69	19,0
FF56900110	Düz	9,5	6	69	19,0
FF56900111	Düz	9,5	6	169	19,0
FF56900112	Düz	12,7	6	75	25,0
FF56900113	Düz	12,7	6	175	25,0
FF56900114	Düz	16,0	6	82	25,0
FF56900118	Düz	19,0	6	69	25,0
FF56900201	Çapraz	3,0	3	38	6,0
FF56900202	Çapraz	3,0	3	38	16,0
FF56900204	Çapraz	3,0	3	38	12,7
FF56900205	Çapraz	6,0	6	50	19,0
FF56900206	Çapraz	6,0	6	169	19,0
FF56900208	Çapraz	6,3	6	50	16,0
FF56900209	Çapraz	8,0	6	69	19,0
FF56900210	Çapraz	9,5	6	69	19,0
FF56900211	Çapraz	9,5	6	169	19,0
FF56900212	Çapraz	12,7	6	75	25,0
FF56900213	Çapraz	12,7	6	175	25,0
FF56900214	Çapraz	16,0	6	82	25,0
FF56900218	Çapraz	19,0	6	69	25,0
FF56900305	Baklava Diş	6,0	6	50	19,0
FF56900308	Baklava Diş	6,3	6	50	16,0
FF56900309	Baklava Diş	8,0	6	69	19,0
FF56900310	Baklava Diş	9,5	6	69	19,0
FF56900311	Baklava Diş	9,5	6	169	19,0
FF56900312	Baklava Diş	12,7	6	75	25,0
FF56900314	Baklava Diş	16,0	6	82	25,0
FF56900318	Baklava Diş	19,0	6	69	25,0
FF56900405	Talaş kırıcılı	6,0	6	50	19,0
FF56900410	Talaş kırıcılı	9,5	6	69	19,0
FF56900412	Talaş kırıcılı	12,7	6	75	25,0
FF56900414	Talaş kırıcılı	16,0	6	82	25,0

**Düz**
Single Cut**Çapraz**
Double Cut**Baklava Diş**
Diamond Cut

Kalıp frezeleri, SH - çam kavis
End cut burrs, SH - flame

Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm
FF57900101	Düz	3,0	3	38	6,3
FF57900102	Düz	3,0	3	50	6,3
FF57900103	Düz	6,3	6	50	16,0
FF57900104	Düz	8,0	6	69	19,0
FF57900105	Düz	9,5	6	65	25,0
FF57900106	Düz	12,7	6	76	32,0
FF57900107	Düz	12,7	6	182	32,0
FF57900108	Düz	16,0	6	80	34,0
FF57900110	Düz	19,0	6	85	41,0
FF57900201	Çapraz	3,0	3	38	6,3
FF57900202	Çapraz	3,0	3	50	6,3
FF57900203	Çapraz	6,3	6	50	16,0
FF57900204	Çapraz	8,0	6	69	19,0
FF57900205	Çapraz	9,5	6	65	25,0
FF57900206	Çapraz	12,7	6	76	32,0
FF57900207	Çapraz	12,7	6	182	32,0
FF57900208	Çapraz	16,0	6	80	34,0
FF57900210	Çapraz	19,0	6	85	41,0
FF57900303	Baklava Diş	6,3	6	50	16,0
FF57900304	Baklava Diş	8,0	6	69	19,0
FF57900305	Baklava Diş	9,5	6	65	25,0
FF57900306	Baklava Diş	12,7	6	76	32,0
FF57900404	Talaş kırıcılı	8,0	6	69	19,0
FF57900406	Talaş kırıcılı	12,7	6	76	32,0
FF57900408	Talaş kırıcılı	16,0	6	80	34,0
FF57900504	Alüminyum	8,0	6	69	19,0
FF57900506	Alüminyum	12,7	6	76	32,0
FF57900508	Alüminyum	16,0	6	80	34,0

Düz
Single
CutÇapraz
Double
CutBaklava
Diş
Diamond
Cut

Kalıp frezeleri, SL - konik yuvarlak uç
End cut burrs, SL - taper radius

Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm	a
FF58900101	Düz	3,0	3	38	8,0	10°
FF58900103	Düz	3,0	3	38	12,7	8°
FF58900107	Düz	6,3	6	50	16,0	14°
FF58900109	Düz	9,5	6	64	19,0	16°
FF58900111	Düz	9,5	6	177	26,0	14°
FF58900114	Düz	12,7	6	74	28,0	14°
FF58900115	Düz	12,7	6	178	28,0	14°
FF58900116	Düz	16,0	6	77	33,0	17°
FF58900120	Düz	19,0	6	85	40,0	14°
FF58900201	Çapraz	3,0	3	38	8,0	10°
FF58900203	Çapraz	3,0	3	38	12,7	8°
FF58900207	Çapraz	6,3	6	50	16,0	14°
FF58900209	Çapraz	9,5	6	64	19,0	16°
FF58900211	Çapraz	9,5	6	177	26,0	14°
FF58900214	Çapraz	12,7	6	74	28,0	14°
FF58900215	Çapraz	12,7	6	178	28,0	14°
FF58900216	Çapraz	16,0	6	77	33,0	17°
FF58900220	Çapraz	19,0	6	85	40,0	14°
FF58900309	Baklava Diş	9,5	6	64	19,0	16°
FF58900314	Baklava Diş	12,7	6	74	28,0	14°
FF58900316	Baklava Diş	16,0	6	77	33,0	17°
FF58900320	Baklava Diş	19,0	6	85	40,0	14°
FF58900410	Talaş kırıcı	9,5	6	72	26,0	14°
FF58900414	Talaş kırıcı	12,7	6	74	28,0	14°
FF58900418	Talaş kırıcı	16,0	6	77	33,0	14°
FF58900510	Alüminyum	9,5	6	72	26,0	14°
FF58900514	Alüminyum	12,7	6	74	28,0	14°
FF58900518	Alüminyum	16,0	6	77	33,0	14°



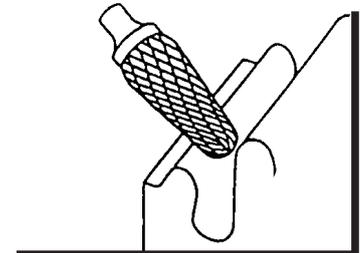
Düz

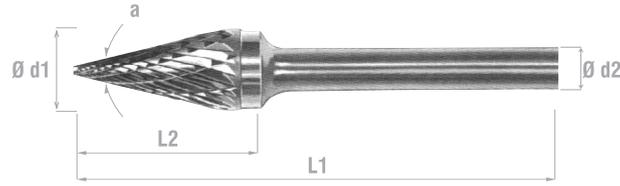
Single
Cut

Çapraz

Double
CutBaklava
DişDiamond
Cut

Al

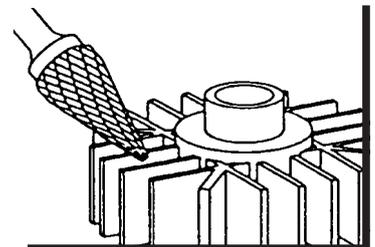
Aluma
Cut

Kalıp frezeleri, SM - konik sivri uç
End cut burrs, SM - cone pointed

SC



Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm	a
FF59900101	Düz	3,0	3	38	8,0	20°
FF59900102	Düz	3,0	3	38	11,0	14°
FF59900103	Düz	3,0	3	50	11,0	14°
FF59900104	Düz	3,0	3	75	11,0	14°
FF59900107	Düz	6,0	6	50	19,0	17°
FF59900109	Düz	8,0	6	68	18,0	24°
FF59900112	Düz	9,5	6	70	20,0	24°
FF59900115	Düz	12,7	6	75	25,0	28°
FF59900116	Düz	12,7	6	175	25,0	28°
FF59900118	Düz	16,0	6	66	16,0	60°
FF59900119	Düz	16,0	6	75	25,0	31°
FF59900201	Çapraz	3,0	3	38	8,0	20°
FF59900202	Çapraz	3,0	3	38	11,0	14°
FF59900203	Çapraz	3,0	3	50	11,0	14°
FF59900204	Çapraz	3,0	3	75	11,0	14°
FF59900207	Çapraz	6,0	6	50	19,0	17°
FF59900209	Çapraz	8,0	6	68	18,0	24°
FF59900212	Çapraz	9,5	6	70	20,0	24°
FF59900215	Çapraz	12,7	6	75	25,0	28°
FF59900216	Çapraz	12,7	6	175	25,0	28°
FF59900218	Çapraz	16,0	6	66	16,0	60°
FF59900219	Çapraz	16,0	6	75	25,0	31°
FF59900307	Baklava Diş	6,0	6	50	19,0	17°
FF59900309	Baklava Diş	8,0	6	68	18,0	24°
FF59900312	Baklava Diş	9,5	6	70	20,0	24°
FF59900315	Baklava Diş	12,7	6	75	25,0	28°
FF59900316	Baklava Diş	12,7	6	175	25,0	28°
FF59900318	Baklava Diş	16,0	6	66	16,0	60°
FF59900319	Baklava Diş	16,0	6	75	25,0	31°
FF59900407	Talaş kırıcılı	6,0	6	50	19,0	17°
FF59900413	Talaş kırıcılı	10,0	6	68	18,0	28°
FF59900415	Talaş kırıcılı	12,7	6	75	25,0	28°

Düz
Single CutÇapraz
Double CutBaklava Diş
Diamond Cut



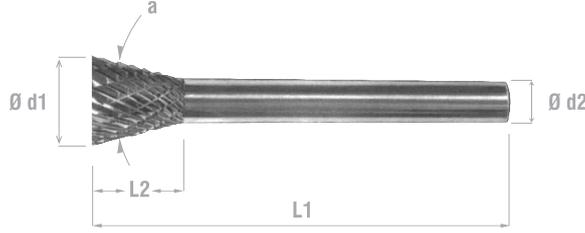
Mermerler Şirketler Grubu

FREZELER - END MILLS

ORM

Karbür / Solid Carbide

Kalıp frezeleri, SN - ters konik
End cut burrs, SN - inverted taper



SC



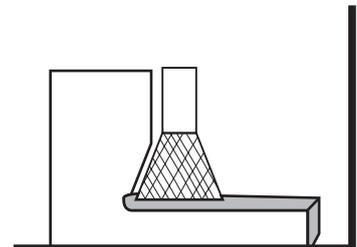
Ürün Kodu Product Code	Tip Type	d1	d2 mm	L1 mm	L2 mm	a
FF60900101	Düz	3,0	3	38	8,5	10°
FF60900102	Düz	6,3	3	38	8,0	15°
FF60900103	Düz	6,3	6	50	8,0	10°
FF60900104	Düz	12,7	6	69	12,7	16°
FF60900201	Çapraz	3,0	3	38	8,5	10°
FF60900202	Çapraz	6,3	3	38	8,0	15°
FF60900203	Çapraz	6,3	6	50	8,0	10°
FF60900204	Çapraz	12,7	6	69	12,7	16°



Düz
Single
Cut



Çapraz
Double
Cut



KARBÜR FREZELERİ İÇİN ÖNERİLEN ÇALIŞMA ŞARTLARI - II

FİNİŞ FREZELER

Malzeme	Alaşım ve Alaşım dışı çelikler		Sıcak iş çelikleri		Paslanmaz çelikler	
	Dökme Demir		Alaşım çelikler		HRc55	
Sertlik	HRc30		HRc45		HRc55	
Mukavemet	1000N/mm ²		1000 ~ 1500N/mm ²		1500N/mm ²	
Ø Çap (mm)	Devir	İlerleme		Devir	İlerleme	
		6-8	5560		2000	3880
10	3360	2000	2320	1370	680	130
12	2840	1680	2000	1160	560	110
16	2100	1260	1480	880	420	70
20	1680	1010	1160	690	320	60
25	1500	900	1100	600	260	50

KÜRESEL BAŞLI EXTRA UZUN TİP N FREZELER

Malzeme	Alaşım ve Alaşım dışı çelikler				Sıcak iş çelikleri				Paslanmaz çelikler			
	Dökme Demir				Alaşım çelikler				HRc55			
Sertlik	HRc30				HRc45				HRc55			
Mukavemet	1000N/mm ²				1000 ~ 1500N/mm ²				1500N/mm ²			
Ø Çap (mm)	Devir	İlerleme			Devir	İlerleme			Devir	İlerleme		
		Z2	Z3	Z4		Z2	Z3	Z4		Z2	Z3	Z4
4	9.554	573	860	1.146	6.369	191	287	382	3.981	32	48	64
6	6.369	510	764	1.019	4.246	170	255	340	2.654	32	48	64
8	4.777	478	717	955	3.185	159	239	318	1.990	32	48	64
10	3.822	459	688	917	2.548	153	229	306	1.592	32	48	64
12	3.185	446	669	892	2.123	149	223	297	1.327	32	48	64
14	2.730	437	655	874	1.820	146	218	291	1.137	32	48	64
16	2.389	430	645	860	1.592	143	215	287	995	32	48	64
18	2.123	425	637	849	1.415	142	212	283	885	32	48	64
20	1.911	420	631	841	1.274	140	210	280	796	32	48	64



DÜZ AĞIZLI TİP N KONİK FREZELER

Malzeme	Alaşım ve Alaşım dışı çelikler				Sıcak iş çelikleri				Paslanmaz çelikler			
	Dökme Demir				Alaşım çelikler				HRc55			
Sertlik	HRc30				HRc45				HRc55			
Mukavemet	1000N/mm ²				1000 ~ 1500N/mm ²				1500N/mm ²			
Ø Çap (mm)	Devir	İlerleme			Devir	İlerleme			Devir	İlerleme		
		Z2	Z3	Z4		Z2	Z3	Z4		Z2	Z3	Z4
2	9.554	382	573	764	6.369	127	191	255	4.777	19	29	38
4	4.777	287	430	573	3.185	96	143	191	2.389	19	29	38
6	3.185	255	382	510	2.123	85	127	170	1.592	19	29	38
8	2.389	239	358	478	1.592	80	119	159	1.194	19	29	38
10	1.911	229	344	459	1.274	76	115	153	955	19	29	38

KÜRESEL BAŞLI TİP N KONİK FREZELER

Malzeme	Alaşım ve Alaşım dışı çelikler				Sıcak iş çelikleri				Paslanmaz çelikler			
	Dökme Demir				Alaşım çelikler				HRc55			
Sertlik	HRc30				HRc45				HRc55			
Mukavemet	1000N/mm ²				1000 ~ 1500N/mm ²				1500N/mm ²			
Ø Çap (mm)	Devir	İlerleme			Devir	İlerleme			Devir	İlerleme		
		Z2	Z3	Z4		Z2	Z3	Z4		Z2	Z3	Z4
2	10.350	414	621	828	7.166	143	215	287	5.573	22	33	45
4	5.175	311	466	621	3.583	107	161	215	2.787	22	33	45
6	3.450	276	414	552	2.389	96	143	191	1.858	22	33	45
8	2.588	259	388	518	1.791	90	134	179	1.393	22	33	45
10	2.070	248	373	497	1.433	86	129	172	1.115	22	33	45

NOT: Kaplamalı takımlarda yukarıdaki değerler minimum 1,3 ile çarpılabilir.

FREZELERİN TANITIM SEMBOLLERİ

STANDART

DIN
327DIN
851

MALZEME

HSS

HSS-E
Co 5

SC

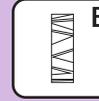
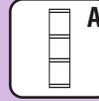
TOLERANS



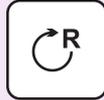
TAKIM TİPİ

BN

E



KESME YÖNÜ



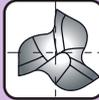
HELİS AÇISI



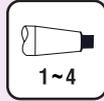
UÇ AÇISI



UÇ GEOMETRİSİ



SAP ŞEKLİ



AĞIZ SAYISI

Z
2Z
4

YÜZEY İŞLEM

TIN

TiCN

AlTiN

UYGULAMA

