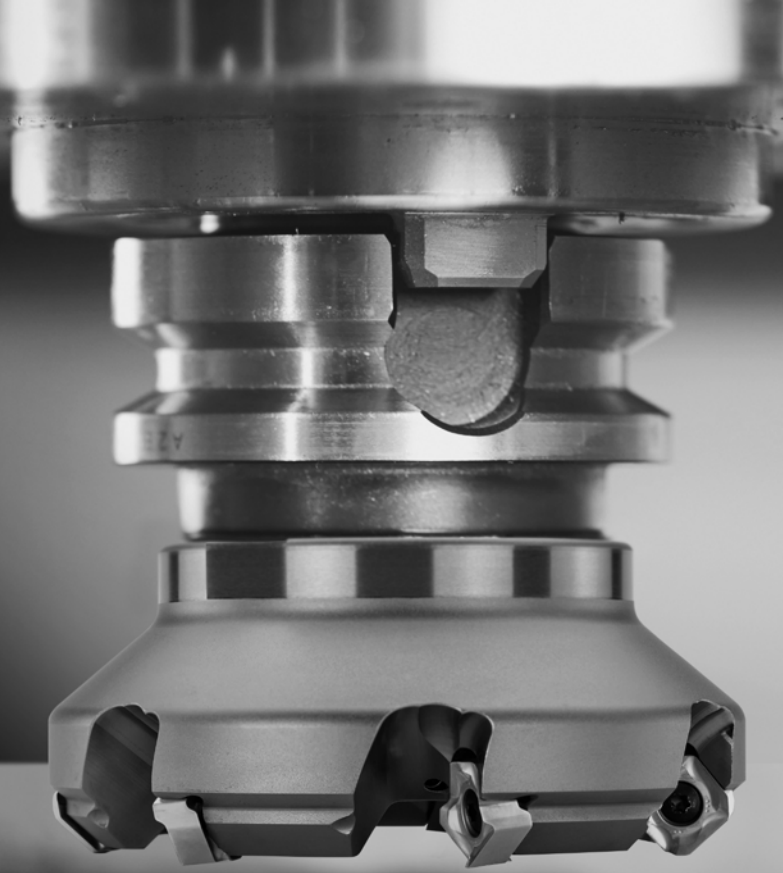
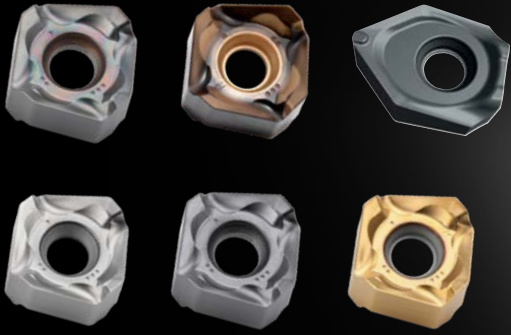


WSX445

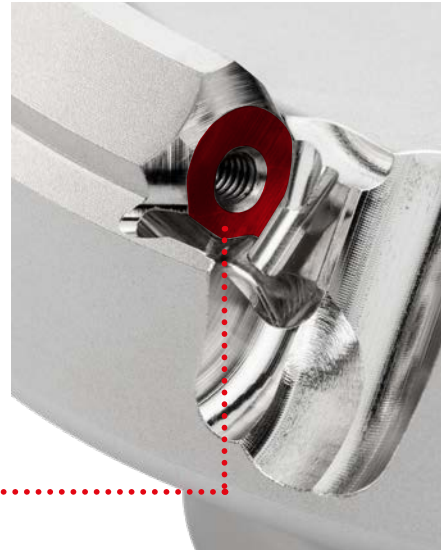
YÜKSEK PERFORMANSLI DÜŞÜK KESME DİRENÇLİ YENİ
NESİL YÜZEY FREZELEME TAKIMI, VERİMLİ VE EKONOMİK
ÇİFT TARAFLI KESİCİ UÇLAR



ÇİFT TARAFLI "Z" GEOMETRİ

DÜŞÜK KESME DİRENCİ VE YÜKSEK AŞINMA DİRENCİ
SAYESİNDE DAYANIKLILIK, VERİMLİ TALAŞ TAHLİYESİ

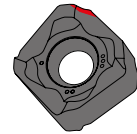
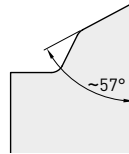
Çift taraflı Z geometrili kesici uçlar, klasik pozitif ve negatif eğimli kesici uçların özelliklerini bir araya getirerek, keskin kesme kenarı sayesinde düşük kesme direnci sunar.



TALAŞ KIRICI DEĞİŞİK KESME DERİNLİKLERİ VE İLERLEME HIZLARI İÇİN BİR DİZİ TALAŞ KIRICI SERİSİ

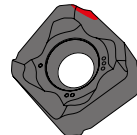
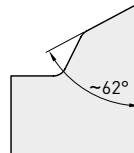
L - KIRICI

Yüksek dalma açısı ile performans artışı.
Düşük kesme direnci sağlayan, dayanıklılığı düşürmeyen pozitif zemin.



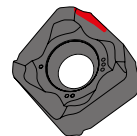
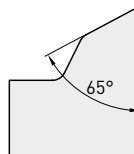
M - KIRICI

Genel uygulamalar için önerilir.
Optimize edilmiş pozitif zemin ve dalma açısı ile kesme kenarı dayanımının ve keskinliğinin dengesi.



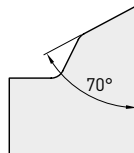
R - KIRICI

Darbeli ağır uygulamalar için.
Negatif zemin pozitif dalma açısı, korunmuş keskinlik ve geliştirilmiş kesme kenarı dayanıklılığı.



H - KIRICI

Ağır uygulamalar için.
Daha güçlü bir zemin ve azaltılmış pozitif eğim açısı maksimum kenar gücü sağlar.



WSX445

ÖZEL MALZEMELER VE BİR ÇOK UYGULAMA ALANLARI İÇİN YÜKSEK PERFORMANSLI KALİTELER

P	CVD		PVD		M	CVD		PVD		K	CVD		PVD		S	PVD		H	PVD			
P10		MV1020		MP6120	VP15TF	M10				VP15TF	K10	MC5020	MV1020	XC5010		S10	MP9120		VP15FT	H10		
P20		MV1030		MP6130		M20	MV1030	MX3030	MP7130		K20		MV1030		VP15TF	S20		MP9130		VP15TF	H20	VP15TF
P30						M30					K30				VP15TF	S30				H30		
P40						M40					K40				VP20RT	S40				H40		

1. MV1030 ile paslanmaz çelik işleme sırasında kuru kesme tavsiye edilir.

MV1020

Bu kalite, gelişmiş aşınma ve termal şok direncine sahiptir. Ayrıca özellikle çelik ve duktıl dökme demir işleme sırasında görülmemiş kesme hızlarında istikrarlı kesme sağlayarak işleme süresini büyük ölçüde kısaltır.

MV1030

Yeni Al-Rich kaplama ayrıca mükemmel aşınma direnci sağlar. Özellikle sorunlu ıslak kesme sırasında ve paslanmaz çeliklerin işlenmesi sırasında ani kırılmalara karşı benzersiz performans elde edilmiştir.

MP6120

Çeliğin genel frezelenmesi için.

MP6130

Çeliğin darbeli frezelenmesi için.

MP7130

Paslanmaz çeliğin frezelenmesi için.

MP7140

Stabil olmayan şartlar altında paslanmaz çelik işlenmesi için.

MC5020

Döküm demirin genel amaçlı frezelenmesi için.

MP9120

HRSA ve Titanyum'un genel amaçlı frezelenmesi için.

MP9130

Dengesiz koşullar altında HRSA ve Titanyumların genel olarak işlenmesi için.

MX3030

Finiş işlemler için ideal.

TF15

Alüminyum'un genel amaçlı frezelenmesi için.

VPTF15

Kaplamanın yüksek aşınma ve kırılmaya karşı dirençli karbür alt yapı ile birleştiği stabil işlemler için.

VP20RT

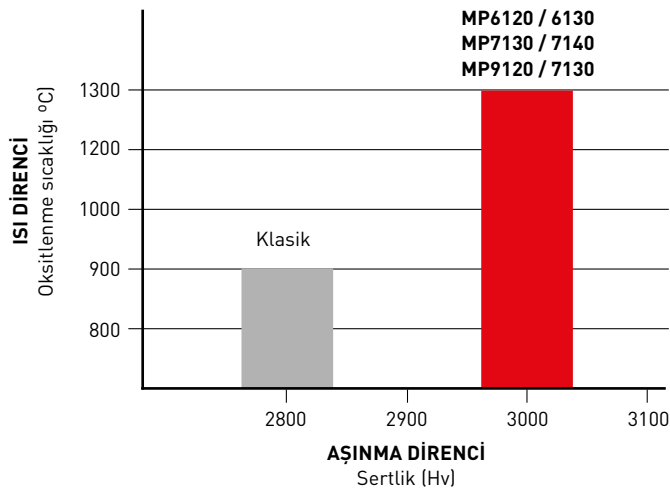
Çok iyi kırılma direnci özelliği sayesinde paslanmaz ve genel çeliklerin ağır darbeli kesilmesi işi için idealdir.

WSX445

SÜRTÜNME KATSAYISI

Malzeme	Kalite	Sürtünme katsayısı (600 derecede ölçülmüş)		
		C55	X10CrNi18-9	Ti6Al4V
P	Karbon Çeliği, Alaşımlı Çelik	MP6100	0.4	
M	Paslanmaz Çelik	MP7100	0.5	
S	Titanyum Alaşım, Isıya Dirençli Alaşım	MP9100	0.7	0.3
	Klasik	0.7		0.7

TOUGH-Σ



MV1000 SERİSİ

FREZELEME İÇİN KAPLAMA KARBÜR KALİTESİ

GELİŞMİŞ AŞINMA DİRENCİ

Yeni geliştirilen Al-Rich kaplama teknolojisi ile yüksek Al içerik oranına sahip (Al,Ti)N'nin sertlik derecesi çok yüksektir. Bu da oksidasyon ve aşınma direncini önemli derecede arttırır.

GELİŞMİŞ TERMAL ŞOK DİRENCİ

Bu yeni serinin aşırı ısıya dirençli olması, yalnız kuru kesme sırasında değil, kesici uçların genelde termal çatlama eğimi gösterdiği ıslak kesme sırasında da olağanüstü stabilite sağlar.



Grafiksel gösterim

MÜKEMMEL YAPIŞMA DİRENCİ

Pürüzsüz yüzey.

ÜSTÜN AŞINMA DİRENCİ

Yeni geliştirilen Al-Rich kaplama.

STABİL İŞLEMEDE MUKEMMEL KIRILMA DİRENCİ

Yeni geliştirilen bağlayıcı katman.

EN ÜST DÜZEY STABİLİTE İÇİN ÇATLAMA DİRENCİ

Özel sinterlenmiş karbür altyapı.

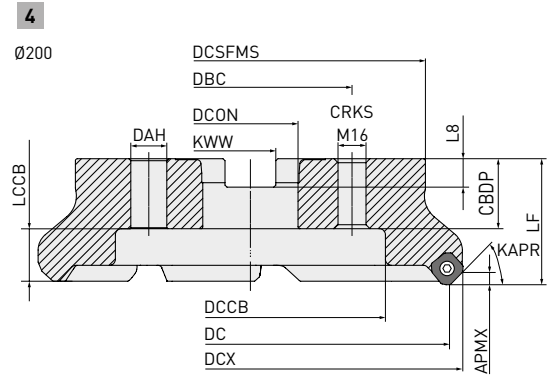
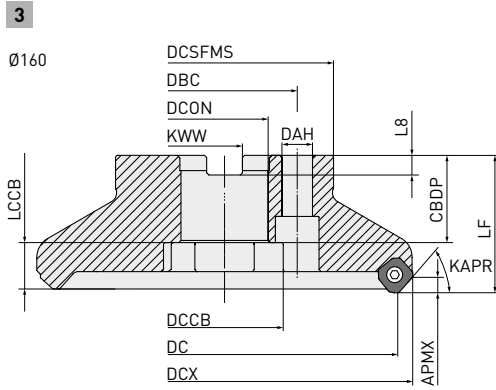
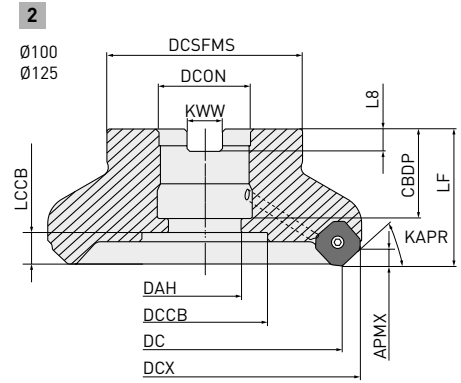
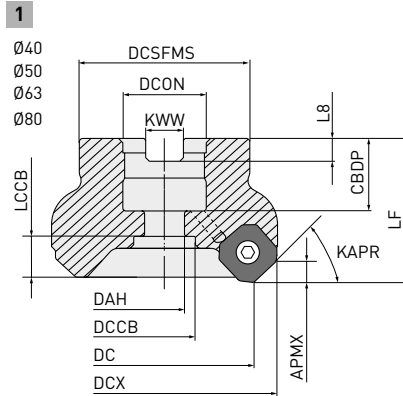
WSX445



P M K N S H



CH: 45°
A.R: +17° T: -7° - -2°
R.R: -6° - +1° I: +16° - +19°



Ayar civatası

Takım Tutucu Tipi



Geometri

WSX445-040A [] AR	HSC08025H	HSC08040	1	
WSX445-050A [] AR	HSC10030H	HSC10035		
WSX445-063A [] AR	HSC10030H	HSC10035		
WSX445-080A [] AR/L	HSC12035H	HSC12035 HSC12045		
WSX445-200C [] NR	◇	—	2	
WSX445-100B [] AR/L	MBA16033H	—		
WSX445-125B [] AR/L	MBA20040H	—		
WSX445-160C [] NR/L	◇	—		

1. ◇ Soğutucu deliksiz tutucu.

MALAFİ TİP TAKIM

Sipariş Numarası	Stok Yön		DC	DCON	LF	WT	ZEFP		Tip
	R	L							
NORMAL DİŞLİ									
WSX445-040A03AR	●		40	16	40	0.3	3	○	1
WSX445-050A03AR	●		50	22	40	0.5	3	○	1
WSX445-063A04AR	●		63	22	40	0.6	4	○	1
WSX445-080A04AR / L	●	★	80	27	50	1.3	4	○	1
WSX445-100B05AR / L	●	★	100	32	50	1.8	5	○	2
WSX445-125B06AR / L	●	★	125	40	63	3.2	6	○	2
WSX445-160C07NR / L	●	★	160	40	63	4.9	7	—	3
WSX445-200C08NR	●		200	60	63	8.7	8	—	4
									1/2

WSX445 – MALAFA TIP TAKIM

Sipariş Numarası	Stok Yön		DC	DCON	LF	WT	ZEFP		Tip
	R	L							
SIK DIŞLI									
WSX445-040A04AR	●		40	16	40	0.3	4	○	1
WSX445-050A04AR	●		50	22	40	0.4	4	○	1
WSX445-063A05AR	●		63	22	40	0.6	5	○	1
WSX445-080A06AR	●		80	27	50	1.2	6	○	1
WSX445-100B07AR	●		100	32	50	1.7	7	○	2
WSX445-125B08AR	●		125	40	63	3.1	8	○	2
WSX445-160C10NR	●		160	40	63	4.8	10	—	3
WSX445-200C12NR	●		200	60	63	8.6	12	—	4
EKSTRA SIK DIŞLI									
WSX445-050A05AR	●		50	22	40	0.4	5	○	1
WSX445-063A06AR	●		63	22	40	0.6	6	○	1
WSX445-080A08AR	●		80	27	50	1.1	8	○	1
WSX445-100B10AR	●		100	32	50	1.6	10	○	2
WSX445-125B12AR	●		125	40	63	3.0	12	○	2
WSX445-160C16NR	●		160	40	63	4.6	16	—	3
WSX445-200C20NR	●		200	60	63	8.4	20	—	4
									2/2

1. ○ = İçten soğutma delikli

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MONTAJ ÖLÇÜLERİ

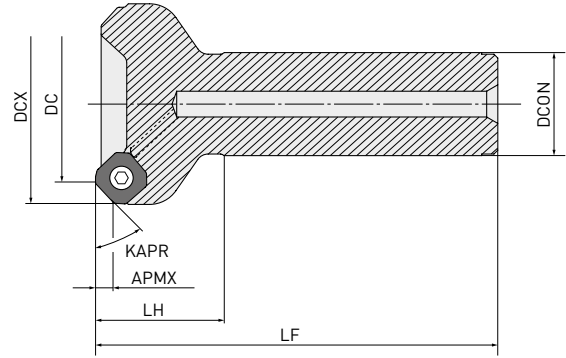
Sipariş Numarası	CBDP	DAH	DCCB	DCSFM5	DCX	KWW	LCCB	L8	Tip
NORMAL DIŞLI									
WSX445-040A03AR	18	9	14	37	52.8	8.4	13.3	5.6	1
WSX445-050A03AR	20	11	17	47	62.9	10.4	11.3	6.3	1
WSX445-063A04AR	20	11	17	50	75.9	10.4	11.3	6.3	1
WSX445-080A04AR / L	23	13	20	56	92.9	12.4	14.3	7	1
WSX445-100B05AR / L	26	26	45	78	112.9	14.4	16.3	8	2
WSX445-125B06AR / L	28	30	56	89	137.9	16.4	21.3	9	2
WSX445-160C07NR / L	40	56	56	100	172.9	16.4	21.3	9	3
WSX445-200C08NR	32	135	135	160	212.9	25.7	29.3	14.22	4
SIK DIŞLI									
WSX445-040A04AR	18	9	14	37	52.8	8.4	13.3	5.6	1
WSX445-050A04AR	20	11	17	47	62.9	10.4	11.3	6.3	1
WSX445-063A05AR	20	11	17	50	75.9	10.4	11.3	6.3	1
WSX445-080A06AR	23	13	20	56	92.9	12.4	14.3	7	1
WSX445-100B07AR	26	26	45	78	112.9	14.4	16.3	8	2
WSX445-125B08AR	28	30	56	89	137.9	16.4	21.3	9	2
WSX445-160C10NR	40	56	56	100	172.9	16.4	21.3	9	3
WSX445-200C12NR	32	135	135	160	212.9	25.7	29.3	14.22	4
EKSTRA SIK DIŞLI									
WSX445-050A05AR	20	11	17	47	62.9	10.4	11.3	6.3	1
WSX445-063A06AR	20	11	17	50	75.9	10.4	11.3	6.3	1
WSX445-080A08AR	23	13	20	56	92.9	12.4	14.3	7	1
WSX445-100B10AR	26	26	45	78	112.9	14.4	16.3	8	2
WSX445-125B12AR	28	30	56	89	137.9	16.4	21.3	9	2
WSX445-160C16NR	40	56	56	100	172.8	16.4	21.3	9	3
WSX445-200C20NR	32	135	135	160	212.8	25.7	29.3	14.22	4
									1/1

● : Avrupa da standart stok. ★ : Japonya da standart stok.

WSX445



P M K N S H



ŞAFTLI TİP TAKIM

Yalnızca sağ takım.

Sipariş Numarası	Stok	APMX	DC	DCON	DCX	LF	LH	WT	ZEFP	
NORMAL DİŞLİ										
WSX445R-4003SA32M	★	≤ 5	40	32	52.8	125	40	0.8	3	○
WSX445R-5003SA32M	★	≤ 5	50	32	62.9	125	40	1.0	3	○
WSX445R-6304SA32M	★	≤ 5	63	32	75.9	125	40	1.2	4	○
WSX445R-8004SA32M	★	≤ 5	80	32	92.9	125	40	1.6	4	○
SIK DİŞLİ										
WSX445R-4004SA32M	★	≤ 5	40	32	52.8	125	40	0.8	4	○
WSX445R-5004SA32M	★	≤ 5	50	32	62.9	125	40	1.0	4	○
WSX445R-6305SA32M	★	≤ 5	63	32	75.9	125	40	1.2	5	○
WSX445R-8006SA32M	★	≤ 5	80	32	92.9	125	40	1.5	6	○
										1/1

1. ○ = İçten soğutma delikli

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YEDEK PARÇALAR

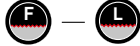
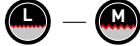
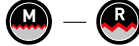
Takım Tutucu Tipi	*	
Malafa Tip Takım	Sıkma vidası	Anahtar (Kesici Uç için)
Şaftlı Tip Takım	TPS4R	TIP15W

* Sıkma Torku (N•m): TPS4R=3.5

WSX445

ÖNERİLEN KESME KOŞULLARI

KURU KESME

Malzeme	Özellikler	Kalite	Vc							
				fz	ap	fz	ap	fz	ap	
P	Yumuşak Çelik	≤ 180HB	MV1020	300 (200 – 400)	0.15 (0.1 – 0.2)	≤ 1.0	0.2 (0.15 – 0.25)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0
			MV1030	250 (200 – 300)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0
			MP6120	250 (200 – 300)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0
			VP15TF							
			MP6130	240 (190 – 290)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0
			VP20RT							
	MX3030	180 (130 – 230)	0.15 (0.1 – 0.2)	< 1.0	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0		
	Karbon Çeliği Alaşımlı Çelik	180 – 350HB	MV1020	260 (170 – 350)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0
			MV1030	220 (170 – 270)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0
			MP6120	220 (170 – 270)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0
			VP15TF							
			MP6130	200 (150 – 250)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0
			VP20RT							
	MX3030	150 (120 – 180)	0.15 (0.1 – 0.2)	< 1.0	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0		
	Alaşımlı Çelik Ön Sertleştirme Yapılmış Çelik	≤ 350HB	MV1020	180 (100 – 250)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0
			MV1030	180 (100 – 250)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0
			MP6120	140 (100 – 180)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0
			VP15TF							
			MP6130	120 (90 – 150)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0
			VP20RT							
MX3030	150 (120 – 180)	0.15 (0.1 – 0.2)	< 1.0	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0			
M	Ostenitik, Feritik ve Martensitik Paslanmaz Çelik	—	MV1030	200 (150 – 250)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—
			MP7130							
			MP7140							
			VP15TF							
			VP20RT							
			MX3030							
	Ostenitli Paslanmaz Çelik	≥ 200HB	MP7130	170 (120 – 220)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—
			MP7140							
			VP15TF							
			VP20RT							
	İki faz Paslanmaz Çelik	≤ 280MPa	MP7130	160 (110 – 210)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—
			MP7140							
VP15TF										
VP20RT										
Sertleştirilmiş Paslanmaz Çelik	≤ 450HB	MP7130	150 (100 – 200)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—	
		MP7140								
		VP15TF								
		VP20RT								

1/2

WSX445 – KURU KESME

Malzeme	Özellikler	Kalite	Vc	 		 		 	
				fz	ap	fz	ap	fz	ap
K	Gri Dökme Demir	≤ 350MPa	MV1020	240 (130 – 350)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
			MC5020	220 (200 – 270)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			VP15TF	180 (130 – 250)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			VP20RT	180 (130 – 250)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			MV1030	160 (110 – 240)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
	Duktil Dökme Demir	≤ 800MPa	MX3030	150 (120 – 180)	0.15 (0.1 – 0.2) < 1.0	0.15 (0.1 – 0.2) < 2.0	0.2 (0.15 – 0.25) < 3.0	0.2 (0.15 – 0.25) < 3.0	0.2 (0.15 – 0.25) < 3.0
			MV1020	220 (80 – 350)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
			MC5020	200 (180 – 250)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			MV1030	180 (110 – 250)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
			VP15TF	160 (110 – 240)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			VP20RT	160 (110 – 240)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
H	Sertleştirilmiş Çelik	40 – 55HRC	VP15TF	50 (30 – 70)	0.05 (0.05 – 0.1) < 1.5	0.1 (0.05 – 0.15) < 2.0	—	—	—

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1. Lütfen kesme koşullarını yukarıdaki tabloya bakarak şartlara göre ayarlayın.
2. Daha iyi finiş yüzey için sulu kesme önerilir.
(Takım ömrü karşılaştırıldığında, kuru kesmeye kıyasla daha kısadır.)

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Malzeme	Özellikler	Kalite	Vc						
				fz	ap	fz	ap	fz	ap
P	Yumuşak Çelik	< 180HB	MV1020	220 (120 – 320)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MP6120	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			MP6130	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP20RT						
	Karbon Çeliği Alaşımlı Çelik	180 – 350HB	MV1020	200 (100 – 300)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MP6120	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			MP6130	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP20RT						
	Alaşımlı Çelik Ön Sertleştirme Yapılmış Çelik	35 – 45HRC	MV1020	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MP6120	100 (80 – 120)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			MP6130	100 (80 – 120)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP20RT						
M	Ostenitik, Feritik ve Martensitik Paslanmaz Çelik	—	MP7130					—	—
			MP7140					—	—
			VP15TF					—	—
			VP20RT					—	—
	Ostenitli Paslanmaz Çelik	>200HB	MP7130					—	—
			MP7140					—	—
			VP15TF					—	—
			VP20RT					—	—
	İki faz Paslanmaz Çelik	≤ 280MPa	MP7130					—	—
			MP7140					—	—
			VP15TF					—	—
			VP20RT					—	—
	Sertleştirilmiş Paslanmaz Çelik	< 450HB	MP7130					—	—
			MP7140					—	—
			VP15TF					—	—
			VP20RT					—	—
K	Gri Dökme Demirler	Çekme Kuvveti <350MPa	MV1020	200 (130 – 250)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MC5020	180 (160 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			VP20RT						
	Duktıl Dökme Demirler	Çekme Kuvveti <800MPa	MV1020	220 (80 – 350)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MC5020	180 (160 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	140 (80 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			VP20RT						
N	Alüminyum Alaşım	—	TF15	500 (200 – 1000)	0.2 (0.1 – 0.3) ≤ 5.0	—	—	—	—

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Malzeme	Özellikler	Kalite	Vc							
				fz	ap	fz	ap	fz	ap	
S	Titanyum Alaşım	MP9120	50 (40 – 60)	0.05 (0.05 – 0.1)	≤ 1.5	0.1 (0.05 – 0.15)	≤ 2.0	—	—	
		MP9130								
		VP15TF								
		VP20RT								
	Isıya Dirençli Alaşım	MP9120	40 (20 – 50)	0.05 (0.05 – 0.1)	≤ 1.5	0.1 (0.05 – 0.15)	≤ 2.0	—	—	
		MP9130								
		VP15TF								
		VP20RT								
H	Sertleştirilmiş Çelik	40 – 55HRC	VP15TF	50 (30 – 70)	0.05 (0.05 – 0.1)	≤ 1.5	0.1 (0.05 – 0.15)	≤ 2.0	—	—
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