

ARTEX

CUTTING TOOLS



QUICK SEARCH
ARTEX PRODUCTS

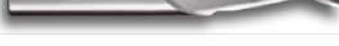
www.artex.com.tr





 K10 F	Solid Carbide K10F	 Artex Tool Standard
 K30 F	Solid Carbide K30F	 Artex Tool Standard
 K44UF	Solid Carbide K44UF	 Artex Tool Standard
 TiAlN	Coating	 Cutting Data Page
 TiSiN	Coating	 Suited for Hardened Standart
 HARD	Hard Coating	 Suited for Hardened Standart
 CROS CART	Coating	 Suited for Hardened Standart
 no COAT	Uncoated	 Helix Angle
 Z₁	Solid Carbide 1 Flute End Mill	 Helix Angle
 Z₂	Solid Carbide 2 Flute End Mill	 Helix Angle
 Z₃	Solid Carbide 3 Flute End Mill	 Helix Angle
 Z₄	Solid Carbide 4 Flute End Mill	
 Z₆	Solid Carbide 6 Flute End Mill	
 Z₈	Solid Carbide 8 Flute End Mill	

Products	Type	Diameter	Z	Coating	Page
	D200	Ø3-Ø25	4	●	8
	D210	Ø3-Ø12	4	●	9
	D200C	Ø3-Ø25	4	●	10
	D210C	Ø3-Ø25	4	●	11
	D200R	Ø3-Ø20	4	●	12
	D210R	Ø3-Ø20	4	●	13
	S200R	Ø3-Ø20	4	●	16
	S210R	Ø3-Ø20	4	●	17
	S200C	Ø3-Ø25	4	●	18
	S210C	Ø3-Ø20	4	●	19
	H200R	Ø3-Ø20	4	●	21
	H210R	Ø3-Ø20	4	●	22
	C200	Ø6-Ø20	4	●	23
	K400	Ø1-Ø4	2	●	24-25
	M200	Ø3-Ø25	4	●	27
	M210	Ø3-Ø25	4	●	28
	M200R	Ø3-Ø20	4	●	29

Products	Type	Diameter	Z	Coating	Page
	M210R	Ø3-Ø20	4	●	31
	K200R	Ø6-Ø20	4	●	32
	K210R	Ø6-Ø20	4	●	33
	HS200	Ø4-Ø12	4	●	34
	K300	Ø2-Ø25	2	●	36
	K310	Ø3-Ø25	2	●	37
	T100	Ø3-Ø12	1	●	38
	T110	Ø3-Ø12	1	●	39
	T200	Ø3-Ø20	2	●	40
	T210	Ø3-Ø20	2	●	41
	T200R	Ø3-Ø20	2	●	42
	T210R	Ø3-Ø20	4	●	43
	T300	Ø3-Ø20	3	●	45
	T310	Ø3-Ø25	2	●	46
	DK300	Ø2-Ø12	2	●	47-48
	DK500	Ø2,5-Ø8	3	●	49
	DK600	Ø2-Ø12	2	●	50-51

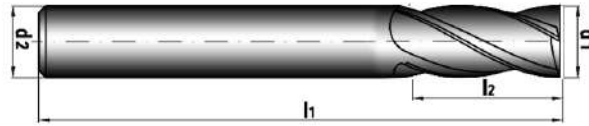
Products	Type	Diameter	Z	Coating	Page
	A300	Ø2-Ø20	4	●	53
	A500	Ø2-Ø20	4	●	54
	M300	Ø3-Ø20	2	●	55
	M500	Ø4-Ø20	2	●	56
	M700	Ø5-Ø20	1	●	57
	S300	Ø2-Ø20	1	●	58
	P300	Ø1-Ø8	2	●	59
	P400	Ø3-Ø6	1	●	60
	N300	Ø4-Ø20	2	●	61
	H300	Ø6,3-Ø31	3	●	62
	D300	Ø6-Ø10	4	●	63
	T400	Ø4,5-Ø45,5	6,10,12	●	65
	R300	Ø3-Ø20	4,6,8	●	66
	R310	Ø3-Ø20	4,6,8	●	67
	AF500	Ø3-Ø20	2	●	68
	AF510	Ø8-Ø20	3	●	69
	AF520	Ø3-Ø20	2	●	70

Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

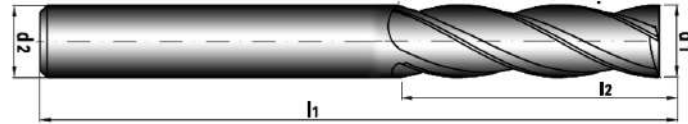


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	D ₂	Z
D200 030 008 4	3	8	40	3	4
D200 040 010 4	4	10	50	4	4
D200 050 012 4	5	12	50	5	4
D200 060 014 4	6	14	57	6	4
D200 080 019 4	8	19	63	8	4
D200 100 022 4	10	22	72	10	4
D200 120 028 4	12	28	83	12	4
D200 140 030 4	14	28	83	14	4
D200 160 032 4	16	32	92	16	4
D200 180 035 4	18	35	92	18	4
D200 200 038 4	20	38	104	20	4
D200 220 038 4	22	38	104	22	4
D200 250 045 4	25	45	121	25	4



APPLICATION RANGE

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Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU Z:4 ORDER CODE	d ₁	L2	L1	d ₂	Z
D210 030 010 4	3.0	10	75	3	4
D2 10 040 020 4	4.0	20	75	4	4
D210 050 020 4	5.0	20	75	5	4
D210 060 030 4	6.0	30	75	6	4
D210 060 040 4	6.0	40	100	6	4
D210 060 045 6	6.0	45	150	6	4
D210 080 030 4	8.0	30	75	8	4
D210 080 040 4	8.0	40	100	8	4
D210 080 050 4	8.0	50	150	8	4
D210 100 040 4	10.0	40	100	10	4
D210 100 065 4	10.0	65	150	10	4
D210 120 045 4	12.0	45	100	12	4

SİPARİŞ KODU Z:4 ORDER CODE	d ₁	L2	L1	d ₂	Z
D210 120 065 4	12.0	65	150	12	4
D210 140 045 4	14.0	45	100	14	4
D210 140 065 4	14.0	65	150	14	4
D210 160 045 4	16.0	45	100	16	4
D210 160 075 4	16.0	75	150	16	4
D210 180 045 4	18.0	45	100	18	4
D210 180 075 4	18.0	75	150	18	4
D210 200 045 4	20.0	45	150	20	4
D210 200 075 4	20.0	75	150	20	4
D210 220 075 4	22.0	75	150	22	4
D210 250 075 4	25.0	75	150	25	4

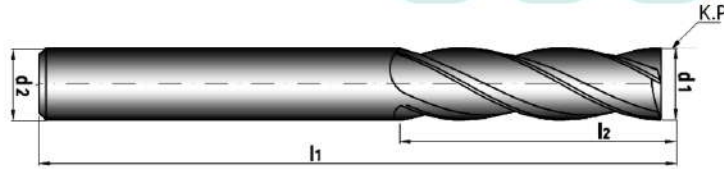


Standart KARBÜR Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

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Machining Steels
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Copper and Copper Alloys
Plastics
Graphite

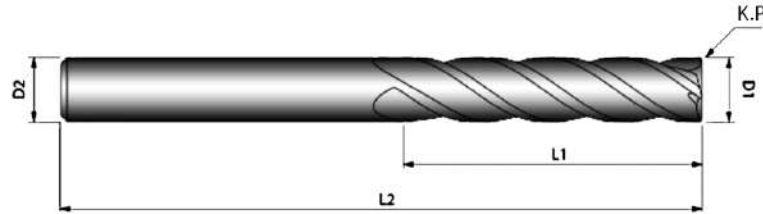


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	K.P	Z
D200C 030 008 4	3.0	8	40	3.0	0.15X45°	4
D200C 040 010 4	4.0	10	50	4.0	0.15X45°	4
D200C 050 012 4	5.0	12	50	5.0	0.15X45°	4
D200C 060 014 4	6.0	14	57	6.0	0.20X45°	4
D200C 080 019 4	8.0	19	63	8.0	0.20X45°	4
D200C 100 022 4	10.0	22	72	10.0	0.25X45°	4
D200C 120 028 4	12.0	28	83	12.0	0.25X45°	4
D200C 140 028 4	14.0	28	83	14.0	0.40X45°	4
D200C 160 032 4	16.0	32	92	16.0	0.40X45°	4
D200C 180 035 4	18.0	35	92	18.0	0.50X45°	4
D200C 200 038 4	20.0	38	104	20.0	0.50X45°	4
D200C 220 038 4	22.0	38	104	22.0	0.60X45°	4
D200C 250 045 4	25.0	45	121	25.0	0.60X45°	4



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Copper and Copper Alloys
Plastics
Graphite



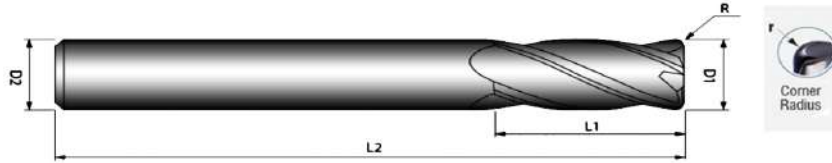
SİPARİŞ KODU Z:4 ORDER CODE	d ₁	L2	L1	d ₂	K.P	Z
D210C 030 010 4	3.0	10	75	3	0.15X45°	4
D210C 040 020 4	4.0	20	75	4	0.15X45°	4
D210C 050 020 4	5.0	20	75	5	0.15X45°	4
D210C 060 030 4	6.0	30	75	6	0.20X45°	4
D210C 060 040 4	6.0	40	100	6	0.20X45°	4
D210C 060 045 6	6.0	45	150	6	0.20X45°	4
D210C 080 030 4	8.0	30	75	8	0.20X45°	4
D210C 080 040 4	8.0	40	100	8	0.20X45°	4
D210C 080 050 4	8.0	50	150	8	0.20X45°	4
D210C 100 040 4	10.0	40	100	10	0.25X45°	4
D210C 100 065 4	10.0	65	150	10	0.25X45°	4
D210C 120 045 4	12.0	45	100	12	0.25X45°	4

SİPARİŞ KODU Z:4 ORDER CODE	d ₁	L2	L1	d ₂	K.P	Z
D210C 120 065 4	12.0	65	150	12	0.25X45°	4
D210C 140 045 4	14.0	45	100	14	0.40X45°	4
D210C 140 065 4	14.0	65	150	14	0.40X45°	4
D210C 160 045 4	16.0	45	100	16	0.40X45°	4
D210C 160 075 4	16.0	75	150	16	0.40X45°	4
D210C180 045 4	18.0	45	100	18	0.50X45°	4
D210C 180 075 4	18.0	75	150	18	0.50X45°	4
D210C 200 045 4	20.0	45	150	20	0.50X45°	4
D210C 200 075 4	20.0	75	150	20	0.50X45°	4
D210C 220 075 4	22.0	75	150	22	0.60X45°	4
D210C 250 075 4	25.0	75	150	25	0.60X45°	4



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Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU Z:4 ORDER CODE	d ₁	L2	L1	d ₂	R	Z
D200R 035 008 4	3.0	8	40	3	0.5	4
D200R 031 008 4	3.0	8	40	3	1	4
D200R 045 010 4	4.0	10	50	4	0.5	4
D200R 041 010 4	4.0	10	50	4	1	4
D200R 055 013 4	5.0	13	50	5	0.5	4
D200R 051 013 4	5.0	13	50	5	1	4
D200R 065 014 4	6.0	14	57	6	0.5	4
D200R 061 014 4	6.0	14	57	6	1	4
D200R 085 019 4	8.0	19	63	8	0.5	4
D200R 081 019 4	8.0	19	63	8	1	4
D200R 105 022 4	10.0	22	72	10	0.5	4

SİPARİŞ KODU Z:4 ORDER CODE	d ₁	L2	L1	d ₂	R	Z
D200R 101 022 4	10.0	22	72	10	1	4
D200R 102 022 4	10.0	22	72	10	2	4
D200R 125 028 4	12.0	28	83	12	0.5	4
D200R 121 028 4	12.0	28	83	12	1	4
D200R 122 028 4	12.0	28	83	12	2	4
D200R 161 032 4	16.0	32	92	16	1	4
D200R 162 032 4	16.0	32	92	16	2	4
D200R 163 032 4	16.0	32	92	16	3	4
D200R 201 038 4	20.0	38	104	20	1	4
D200R 202 038 4	20.0	38	104	20	2	4
D200R 203 038 4	20.0	38	104	20	3	4

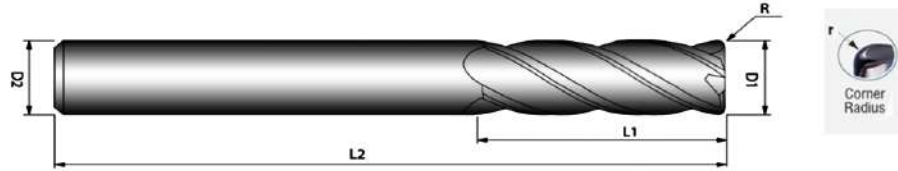


Radiuslu Uzun Karbür Parmak Frezesi

Long Carbide End Mill
Smooth-edged, radius version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
D210R 035 010 4	3.0	10	75	3	0.5	4
D210R 031 010 4	3.0	10	75	3	1	4
D210R 045 020 4	4.0	20	75	4	0.5	4
D210R 041 020 4	4.0	20	75	4	1	4
D210R 055 020 4	5.0	20	75	5	0.5	4
D210R 051 020 4	5.0	20	75	5	1	4
D210R 065 040 4	6.0	40	100	6	0.5	4
D210R 061 040 4	6.0	40	100	6	1	4
D210R 085 040 4	8.0	40	100	8	0.5	4
D210R 081 040 4	8.0	40	100	8	1	4
D210R 105 040 4	10.0	40	100	10	0.5	4

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
D210R 101 040 4	10.0	40	100	10	1	4
D210R 102 040 4	10.0	40	100	10	2	4
D210R 125 045 4	12.0	45	150	12	0.5	4
D210R 121 045 4	12.0	45	150	12	1	4
D210R 122 045 4	12.0	45	150	12	2	4
D210R 161 050 4	16.0	50	150	16	1	4
D210R 162 050 4	16.0	50	150	16	2	4
D210R 163 050 4	16.0	50	150	16	3	4
D210R 201 055 4	20.0	55	150	20	1	4
D210R 202 055 4	20.0	55	150	20	2	4
D210R 203 055 4	20.0	55	150	20	3	4



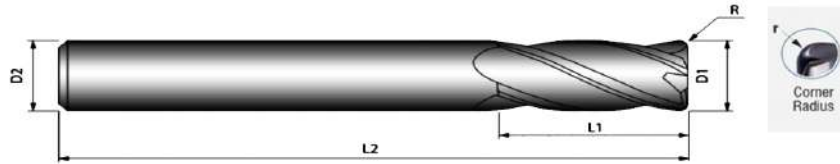




ARTEZ
CUTTING TOOLS

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
S200R 035 006 4	3.0	6	40	3	0.5	4
S200R 031 006 4	3.0	6	40	3	1	4
S200R 045 008 4	4.0	8	50	4	0.5	4
S200R 041 008 4	4.0	8	50	4	1	4
S200R 055 010 4	5.0	10	50	5	0.5	4
S200R 051 010 4	5.0	10	50	5	1	4
S200R 065 012 4	6.0	12	57	6	0.5	4
S200R 061 012 4	6.0	12	57	6	1	4
S200R 085 015 4	8.0	15	63	8	0.5	4
S200R 081 015 4	8.0	15	63	8	1	4
S200R 105 018 4	10.0	18	72	10	0.5	4

SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
S200R 101 018 4	10.0	18	72	10	1	4
S200R 102 018 4	10.0	18	72	10	2	4
S200R 125 025 4	12.0	25	83	12	0.5	4
S200R 121 025 4	12.0	25	83	12	1	4
S200R 122 025 4	12.0	25	83	12	2	4
S200R 161 030 4	16.0	30	92	16	1	4
S200R 162 030 4	16.0	30	92	16	2	4
S200R 163 030 4	16.0	30	92	16	3	4
S200R 201 035 4	20.0	35	104	20	1	4
S200R 202 035 4	20.0	35	104	20	2	4
S200R 203 035 4	20.0	35	104	20	3	4

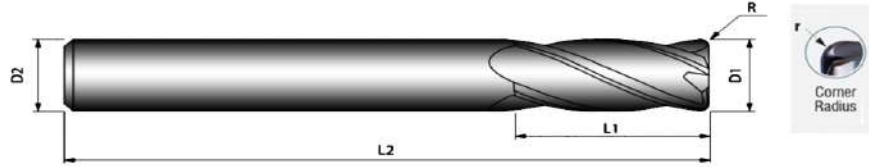


Radiuslu Uzun Karbür Parmak Frezesi

Long Carbide End Mill
Smooth-edged, Radius version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
S210R 035 010 4	3.0	10	75	3	0.5	4
S210R 031 010 4	3.0	10	75	3	1	4
S210R 045 020 4	4.0	20	75	4	0.5	4
S210R 041 020 4	4.0	20	75	4	1	4
S210R 055 020 4	5.0	20	75	5	0.5	4
S210R 051 020 4	5.0	20	75	5	1	4
S210R 065 040 4	6.0	40	100	6	0.5	4
S210R 061 040 4	6.0	40	100	6	1	4
S210R 085 040 4	8.0	40	100	8	0.5	4
S210R 081 040 4	8.0	40	100	8	1	4
S210R 105 040 4	10.0	40	100	10	0.5	4

SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
S210R 101 040 4	10.0	40	100	10	1	4
S210R 102 040 4	10.0	40	100	10	2	4
S210R 125 045 4	12.0	45	150	12	0.5	4
S210R 121 045 4	12.0	45	150	12	1	4
S210R 122 045 4	12.0	45	150	12	2	4
S210R 161 050 4	16.0	50	150	16	1	4
S210R 162 050 4	16.0	50	150	16	2	4
S210R 163 050 4	16.0	50	150	16	3	4
S210R 201 055 4	20.0	55	150	20	1	4
S210R 202 055 4	20.0	55	150	20	2	4
S210R 203 055 4	20.0	55	150	20	3	4

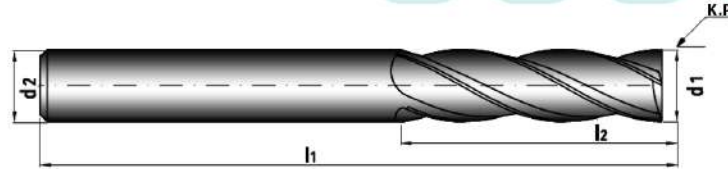


Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
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Copper and Copper Alloys
Plastics
Graphite

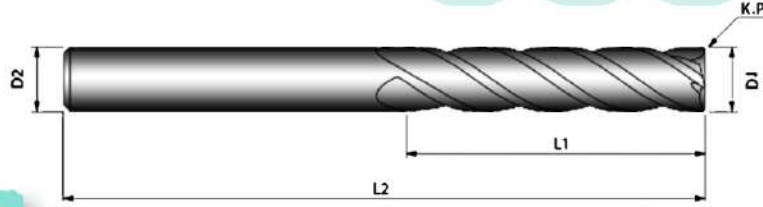


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	K.P.	Z
S200C 030 008 4	3.0	8	40	3	0.15X45°	4
S200C 040 010 4	4.0	10	50	4	0.15X45°	4
S200C 050 012 4	5.0	12	50	5	0.15X45°	4
S200C 060 014 4	6.0	14	57	6	0.20X45°	4
S200C 080 019 4	8.0	19	63	8	0.20X45°	4
S200C 100 022 4	10.0	22	72	10	0.25X45°	4
S200C 120 028 4	12.0	28	83	12	0.25X45°	4
S200C 140 028 4	14.0	28	83	14	0.40X45°	4
S200C 160 032 4	16.0	32	92	16	0.40X45°	4
S200C 180 035 4	18.0	35	92	18	0.50X45°	4
S200C 200 038 4	20.0	38	104	20	0.50X45°	4
S200C 220 038 4	22.0	38	104	22	0.60X45°	4
S200C 250 045 4	25.0	45	121	25	0.60X45°	4



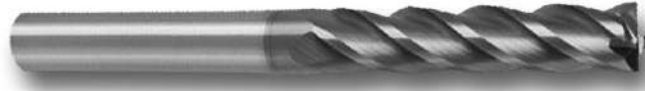
APPLICATION RANGE

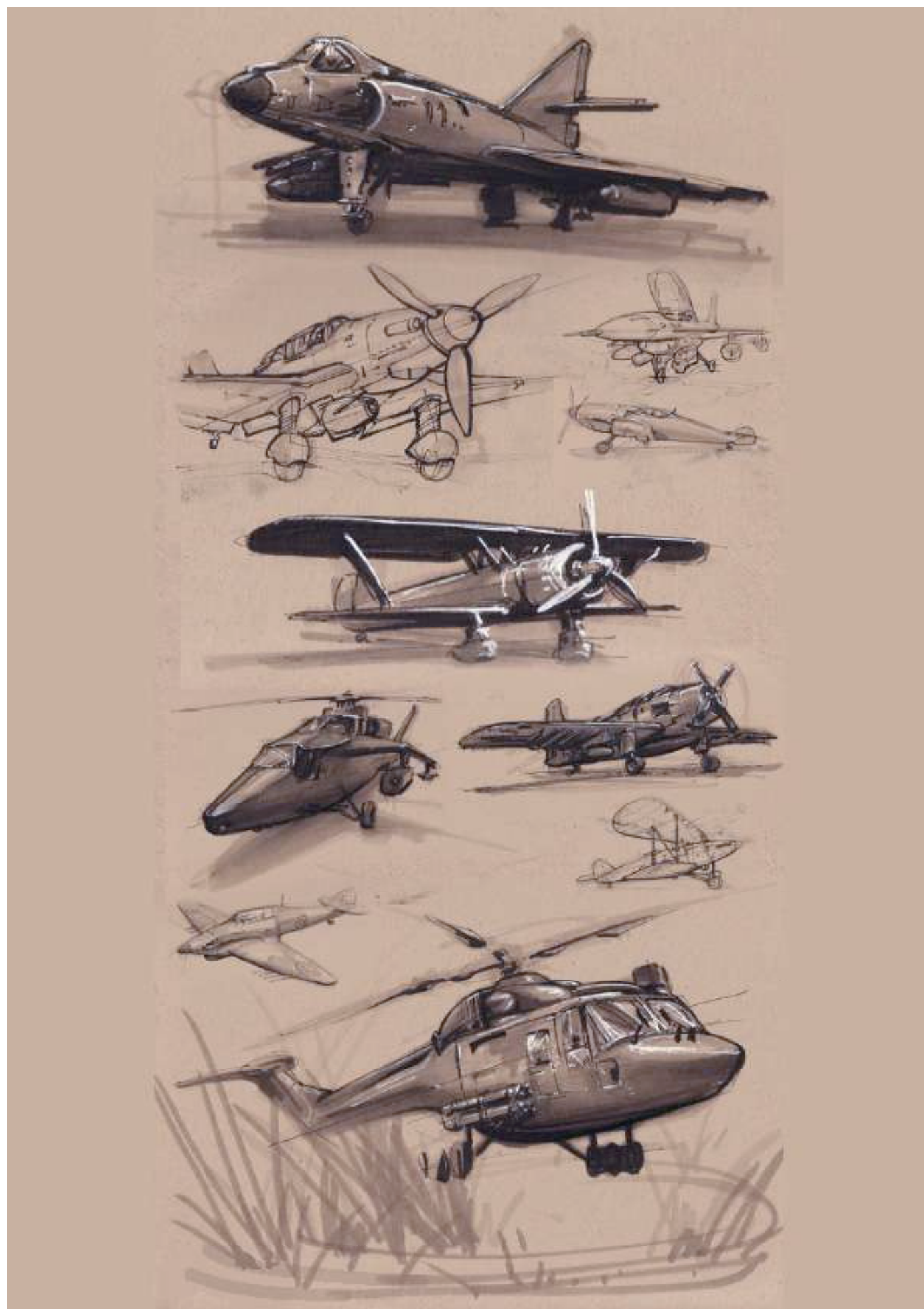
Unalloyed Steels
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Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	K.P	Z
S210C 035 010 4	3.0	10	75	3	0.5	4
S210C 031 010 4	3.0	10	75	3	1	4
S210C 045 020 4	4.0	20	75	4	0.5	4
S210C 041 020 4	4.0	20	75	4	1	4
S210C 055 020 4	5.0	20	75	5	0.5	4
S210C 051 020 4	5.0	20	75	5	1	4
S210C 065 040 4	6.0	40	100	6	0.5	4
S210C 061 040 4	6.0	40	100	6	1	4
S210C 085 040 4	8.0	40	100	8	0.5	4
S210C 081 040 4	8.0	40	100	8	1	4
S210C 105 040 4	10.0	40	100	10	0.5	4

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	K.P	Z
S210C 101 040 4	10.0	40	100	10	1	4
S210C 102 040 4	10.0	40	100	10	2	4
S210C 125 045 4	12.0	45	150	12	0.5	4
S210C 121 045 4	12.0	45	150	12	1	4
S210C 122 045 4	12.0	45	150	12	2	4
S210C 161 050 4	16.0	50	150	16	1	4
S210C 162 050 4	16.0	50	150	16	2	4
S210C 163 050 4	16.0	50	150	16	3	4
S210C 201 055 4	20.0	55	150	20	1	4
S210C 202 055 4	20.0	55	150	20	2	4
S210C 203 055 4	20.0	55	150	20	3	4



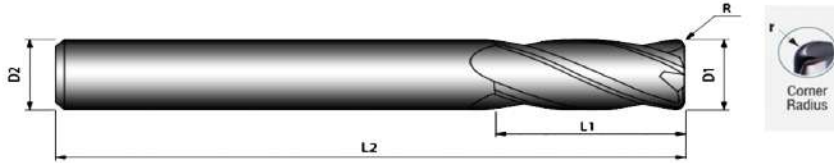


Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



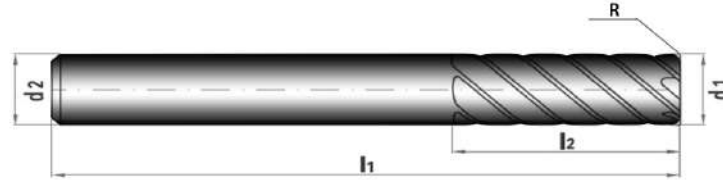
SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
H200R 035 008 4	3.0	8	40	3	0.5	4
H200R 031 008 4	3.0	8	40	3	1	4
H200R 045 010 4	4.0	10	50	4	0.5	4
H200R 041 010 4	4.0	10	50	4	1	4
H200R 055 013 4	5.0	13	50	5	0.5	4
H200R 051 013 4	5.0	13	50	5	1	4
H200R 065 014 4	6.0	14	57	6	0.5	4
H200R 061 014 4	6.0	14	57	6	1	4
H200R 085 019 4	8.0	19	63	8	0.5	4
H200R 081 019 4	8.0	19	63	8	1	4
H200R 105 022 4	10.0	22	72	10	0.5	4

SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
H200R 101 022 4	10.0	22	72	10	1	4
H200R 102 022 4	10.0	22	72	10	2	4
H200R 125 028 4	12.0	28	83	12	0.5	4
H200R 121 028 4	12.0	28	83	12	1	4
H200R 122 028 4	12.0	28	83	12	2	4
H200R 161 032 4	16.0	32	92	16	1	4
H200R 162 032 4	16.0	32	92	16	2	4
H200R 163 032 4	16.0	32	92	16	3	4
H200R 201 038 4	20.0	38	104	20	1	4
H200R 202 038 4	20.0	38	104	20	2	4
H200R 203 038 4	20.0	38	104	20	3	4



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened M
Aluminium /
Copper and
Plastics
Graphite



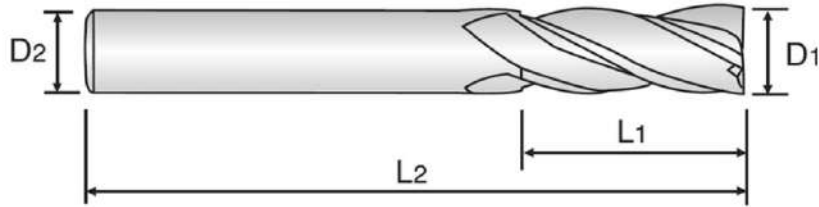
SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
H210R 035 010 4	3.0	10	75	3	0.5	4
H210R 031 010 4	3.0	10	75	3	1	4
H210R 045 020 4	4.0	20	75	4	0.5	4
H210R 041 020 4	4.0	20	75	4	1	4
H210R 055 020 4	5.0	20	75	5	0.5	4
H210R 051 020 4	5.0	20	75	5	1	4
H210R 065 040 4	6.0	40	100	6	0.5	4
H210R 061 040 4	6.0	40	100	6	1	4
H210R 085 040 4	8.0	40	100	8	0.5	4
H210R 081 040 4	8.0	40	100	8	1	4
H210R105 040 4	10.0	40	100	10	0.5	4

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
H210R 101 040 4	10.0	40	100	10	1	4
H210R 102 040 4	10.0	40	100	10	2	4
H210R 125 045 4	12.0	45	150	12	0.5	4
H210R 121 045 4	12.0	45	150	12	1	4
H210R 122 045 4	12.0	45	150	12	2	4
H210R 161 050 4	16.0	50	150	16	1	4
H210R 162 050 4	16.0	50	150	16	2	4
H210R 163 050 4	16.0	50	150	16	3	4
H210R 201 055 4	20.0	55	150	20	1	4
H210R 202 055 4	20.0	55	150	20	2	4
H210R 203 055 4	20.0	55	150	20	3	4



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

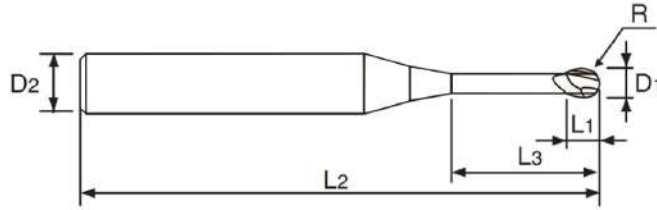


SİPARİŞ KODU ORDER CODE	d ₁	L ₁	L ₂	L ₃	d ₂	Z
C200 060 014 4	6	6	12	57	6	4
C200 080 019 4	8	9	19	63	8	4
C200 100 022 4	10	11	22	72	10	4
C200 120 028 4	12	14	28	83	12	4
C200 140 030 4	14	14	28	83	14	4
C200 160 032 4	16	16	32	92	16	4
C200 180 035 4	18	18	35	92	18	4
C200 200 038 4	20	18	38	104	20	4



APPLICATION RANGE

Unalloyed Steels
 Machining Steels
 Low Alloy Steels
 Stainless Steels
 Heat Resistant Materials
 Titanium and Titanium Alloys
 Cast Iron
 Hardened Materials
 Aluminium Alloys
 Copper and Copper Alloys
 Plastics
 Graphite



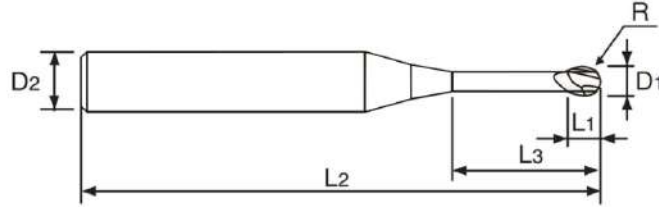
SİPARİŞ KODU ORDER CODE	d ₁	L1	L2	L3	d2h6	d3	R	Z
K400 010 002 2	1	50	0,8	2	4	0,96	0,5	2
K400 010 004 2	1	50	0,8	4	4	0,96	0,5	2
K400 010 006 2	1	50	0,8	6	4	0,96	0,5	2
K400 010 008 2	1	50	0,8	8	4	0,96	0,5	2
K400 010 010 2	1	50	0,8	10	4	0,96	0,5	2
K400 010 012 2	1	50	0,8	12	4	0,96	0,5	2
K400 010 014 2	1	50	0,8	14	4	0,96	0,5	2
K400 010 016 2	1	50	0,8	16	4	0,96	0,5	2
K400 010 018 2	1	65	0,8	18	4	0,96	0,5	2
K400 010 020 2	1	65	0,8	20	4	0,96	0,5	2
K400 012 008 2	1,2	50	1,1	8	4	1,15	0,6	2

SİPARİŞ KODU ORDER CODE	d ₁	L1	L2	L3	d2h6	d3	R	Z
K400 012 012 2	1,2	50	1,1	12	4	1,15	0,6	2
K400 014 008 2	1,4	50	1,3	8	4	1,35	0,7	2
K400 014 012 2	1,4	50	1,3	12	4	1,35	0,7	2
K400 014 016 2	1,4	50	1,3	16	4	1,35	0,7	2
K400 016 008 2	1,6	50	1,4	8	4	1,54	0,8	2
K400 016 012 2	1,6	50	1,4	12	4	1,54	0,8	2
K400 016 016 2	1,6	50	1,4	16	4	1,54	0,8	2
K400 016 020 2	1,6	65	1,4	20	4	1,54	0,8	2
K400 018 008 2	1,8	50	1,6	8	4	1,73	0,9	2
K400 018 012 2	1,8	50	1,6	12	4	1,73	0,9	2
K400 018 016 2	1,8	50	1,6	16	4	1,73	0,9	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L1	L2	L3	d2h6	d3	R	Z
K400 018 020 2	1,8	65	1,6	20	4	1,73	0,9	2
K400 020 003 2	2	50	1,7	3	4	1,92	1	2
K400 020 004 2	2	50	1,7	4	4	1,92	1	2
K400 020 006 2	2	50	1,7	6	4	1,92	1	2
K400 020 008 2	2	50	1,7	8	4	1,92	1	2
K400 020 010 2	2	50	1,7	10	4	1,92	1	2
K400 020 012 2	2	50	1,7	12	4	1,92	1	2
K400 020 016 2	2	50	1,7	16	4	1,92	1	2
K400 020 020 2	2	65	1,7	20	4	1,92	1	2
K400 020 025 2	2	65	1,7	25	4	1,92	1	2
K400 020 030 2	2	65	1,7	30	4	1,92	1	2

SİPARİŞ KODU ORDER CODE	d ₁	L1	L2	L3	d2h6	d3	R	Z
K400 030 008 2	3	57	2,5	8	6	2,88	1,5	2
K400 030 010 2	3	57	2,5	10	6	2,88	1,5	2
K400 030 016 2	3	57	2,5	16	6	2,88	1,5	2
K400 030 025 2	3	80	2,5	25	6	2,88	1,5	2
K400 030 030 2	3	80	2,5	30	6	2,88	1,5	2
K400 030 035 2	3	80	2,5	35	6	2,88	1,5	2
K400 040 010 2	4	57	3	10	6	3,9	2	2
K400 040 016 2	4	57	3	16	6	3,9	2	2
K400 040 025 2	4	57	3	25	6	3,9	2	2
K400 040 035 2	4	80	3	35	6	3,9	2	2
K400 040 040 2	4	80	3	40	6	3,9	2	2



ARTEX
CUTTING TOOLS

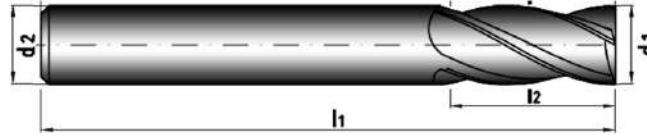


Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
M200 030 008 4	3.0	8	40	3	4
M200 040 010 4	4.0	10	50	4	4
M200 050 012 4	5.0	12	50	5	4
M200 060 014 4	6.0	14	57	6	4
M200 080 019 4	8.0	19	63	8	4
M200 100 022 4	10.0	22	72	10	4
M200 120 028 4	12.0	28	83	12	4
M200 140 030 4	14.0	28	83	14	4
M200 160 032 4	16.0	32	92	16	4
M200 180 035 4	18.0	35	92	18	4
M200 200 038 4	20.0	38	104	20	4
M200 220 038 4	22.0	38	104	22	4
M200 250 045 4	25.0	45	121	25	4

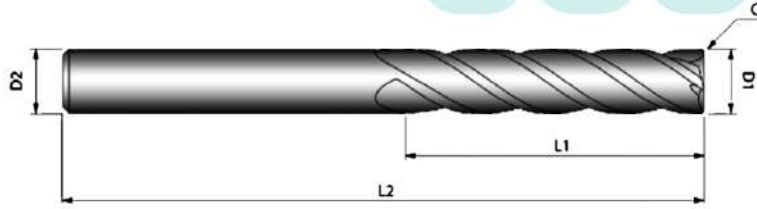


M-210

- Standart Karbür Parmak Frezesi
- Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



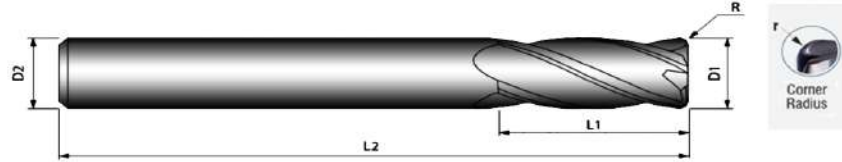
SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
M210 030 010 4	3.0	10	75	3	4
M210 040 020 4	4.0	20	75	4	4
M210 050 020 4	5.0	20	75	5	4
M210 060 030 4	6.0	30	75	6	4
M210 060 040 4	6.0	40	100	6	4
M210 060 045 6	6.0	45	150	6	4
M210 080 030 4	8.0	30	75	8	4
M210 080 040 4	8.0	40	100	8	4
M210 080 050 4	8.0	50	150	8	4
M210 100 040 4	10.0	40	100	10	4
M210 100 065 4	10.0	65	150	10	4
M210 120 045 4	12.0	45	100	12	4

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
M210 120 065 4	12.0	65	150	12	4
M210 140 045 4	14.0	45	100	14	4
M210 140 065 4	14.0	65	150	14	4
M210 160 045 4	16.0	45	100	16	4
M210 160 075 4	16.0	75	150	16	4
M210 180 045 4	18.0	45	100	18	4
M210 180 075 4	18.0	75	150	18	4
M210 200 045 4	20.0	45	150	20	4
M210 200 075 4	20.0	75	150	20	4
M210 220 075 4	22.0	75	150	22	4
M210 250 075 4	25.0	75	150	25	4



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
M200R 035 008 4	3.0	8	40	3	0.5	4
M200R 031 008 4	3.0	8	40	3	1	4
M200R 045 010 4	4.0	10	50	4	0.5	4
M200R 041 010 4	4.0	10	50	4	1	4
M200R 055 013 4	5.0	13	50	5	0.5	4
M200R 051 013 4	5.0	13	50	5	1	4
M200R 065 014 4	6.0	14	57	6	0.5	4
M200R 061 014 4	6.0	14	57	6	1	4
M200R 085 019 4	8.0	19	63	8	0.5	4
M200R 081 019 4	8.0	19	63	8	1	4
M200R 105 022 4	10.0	22	72	10	0.5	4

SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	R	Z
M200R 101 022 4	10.0	22	72	10	1	4
M200R 102 022 4	10.0	22	72	10	2	4
M200R 125 028 4	12.0	28	83	12	0.5	4
M200R 121 028 4	12.0	28	83	12	1	4
M200R 122 028 4	12.0	28	83	12	2	4
M200R 161 032 4	16.0	32	92	16	1	4
M200R 162 032 4	16.0	32	92	16	2	4
M200R 163 032 4	16.0	32	92	16	3	4
M200R 201 038 4	20.0	38	104	20	1	4
M200R 202 038 4	20.0	38	104	20	2	4
M200R 203 038 4	20.0	38	104	20	3	4

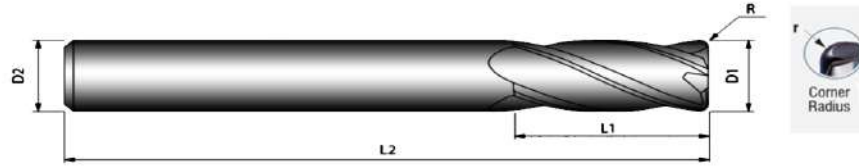


Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

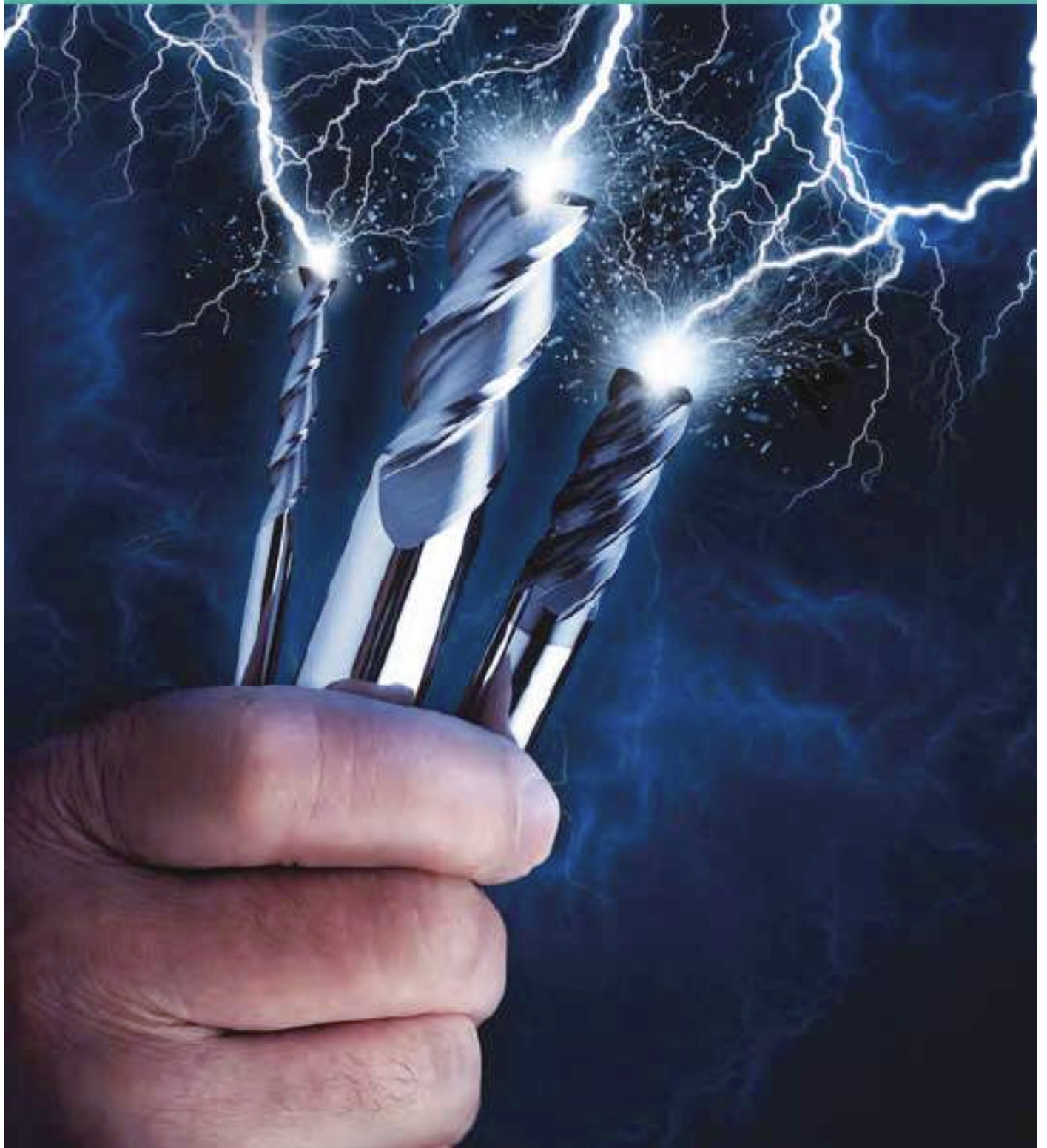
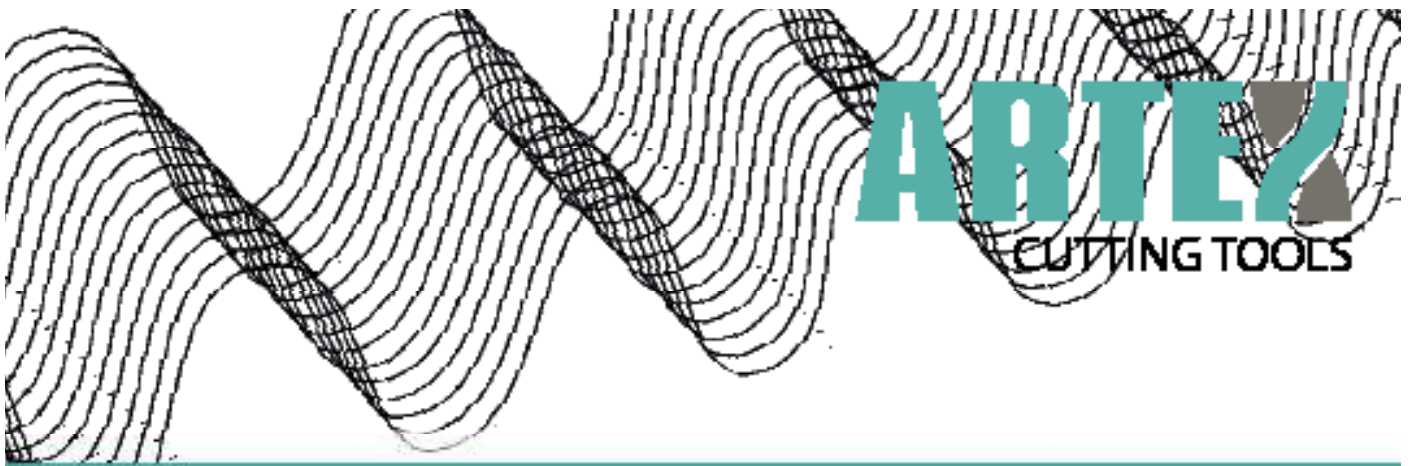
Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU Z:4 ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
M210R 035 010 4	3.0	10	75	3	0.5	4
M210R 031 010 4	3.0	10	75	3	1	4
M210R 045 020 4	4.0	20	75	4	0.5	4
M210R 041 020 4	4.0	20	75	4	1	4
M210R 055 020 4	5.0	20	75	5	0.5	4
M210R 051 020 4	5.0	20	75	5	1	4
M210R 065 040 4	6.0	40	100	6	0.5	4
M210R 061 040 4	6.0	40	100	6	1	4
M210R 085 040 4	8.0	40	100	8	0.5	4
M210R 081 040 4	8.0	40	100	8	1	4
M210R 105 040 4	10.0	40	100	10	0.5	4

SİPARİŞ KODU Z:4 ORDER CODE	d	L ₂	L ₁	d ₂	R	Z
M210R 101 040 4	10.0	40	100	10	1	4
M210R 102 040 4	10.0	40	100	10	2	4
M210R 125 045 4	12.0	45	150	12	0.5	4
M210R 121 045 4	12.0	45	150	12	1	4
M210R 122 045 4	12.0	45	150	12	2	4
M210R 161 050 4	16.0	50	150	16	1	4
M210R 162 050 4	16.0	50	150	16	2	4
M210R 163 050 4	16.0	50	150	16	3	4
M210R 201 055 4	20.0	55	150	20	1	4
M210R 202 055 4	20.0	55	150	20	2	4
M210R 203 055 4	20.0	55	150	20	3	4





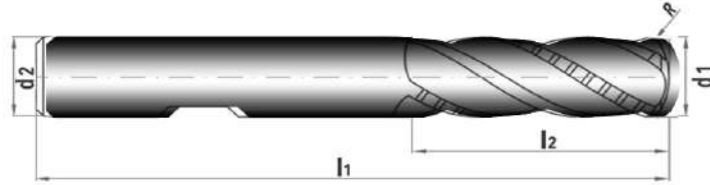
K-200R

Standart Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
K200R 060 014 4	6.0	10	57	6	1	4
K200R 080 019 4	8.0	10	63	8	1	4
K200R 100 022 4	10.0	20	72	10	1	4
K200R 120 028 4	12.0	20	83	12	2	4
K200R 140 030 4	14.0	20	83	14	2	4
K200R 160 032 4	16.0	20	92	16	2	4
K200R 180 035 4	18.0	40	92	18	2	4
K200R 200 040 4	20.0	40	104	20	2	4



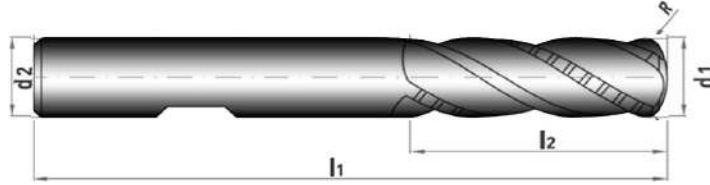
K-210R

Standart Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

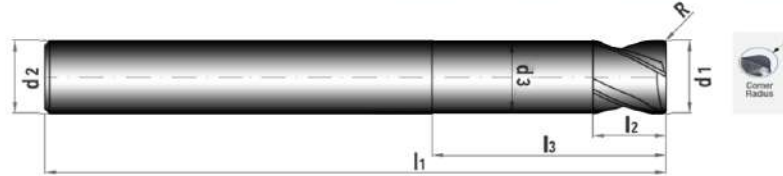


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
K210R 061 040 4	6.0	40	100	6	1	4
K210R 081 040 4	8.0	40	100	8	1	4
K210R 101 040 4	10.0	40	100	10	1	4
K210R 122 045 4	12.0	45	150	12	2	4
K210R 162 050 4	16.0	50	150	16	2	4
K210R 182 055 4	18.0	55	150	18	2	4
K210R 202 055 4	20.0	55	150	20	2	4



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₁	L ₂	L ₃	d ₂	d ₃	R	Z
HS200 045 010 4	4	75	1,6	10	6	3,5	0,5	4
HS200 041 010 4	4	75	1,6	10	6	3,5	1	4
HS200 051 012 4	5	75	2	12	6	4,5	1	4
HS200 052 012 4	5	75	2	12	6	4,5	1,2	4
HS200 061 013 4	6	100	2,5	13	6	5,5	1	4
HS200 065 013 4	6	100	2,5	13	6	5,5	1,5	4
HS200 081 016 4	8	100	3,5	16	8	7,5	1	4
HS200 082 016 4	8	100	3,5	16	8	7,5	2	4
HS200 101 020 4	10	100	4	20	10	9,5	1	4
HS200 102 020 4	10	100	4	20	10	9,5	2	4
HS200 121 024 4	12	100	5	24	12	11,5	1	4
HS200 122 024 4	12	100	5	24	12	11,5	2	4
HS200 123 024 4	12	100	5	24	12	11,5	3	4

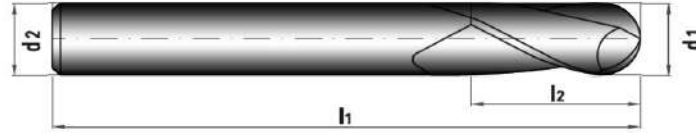




ARTEX
CUTTING TOOLS

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

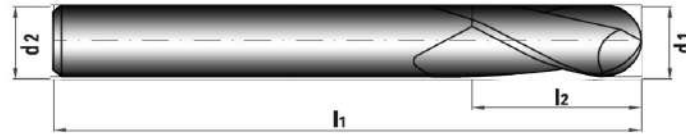
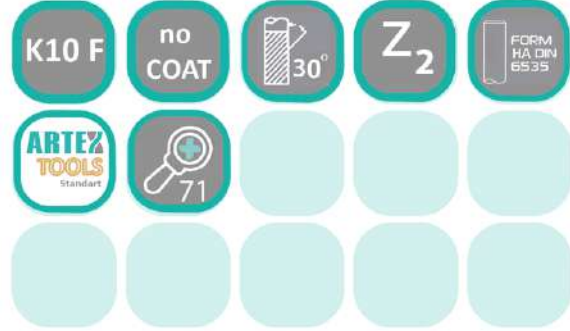


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
K300 020 006 2	2	6	40	3	1	2
K300 030 008 2	3	8	40	3	1,5	2
K300 040 011 2	4	11	50	4	2	2
K300 050 013 2	5	13	50	5	2,5	2
K300 060 013 2	6	13	57	6	3	2
K300 080 019 2	8	19	63	8	4	2
K300 100 022 2	10	22	72	10	5	2
K300 120 026 2	12	26	83	12	6	2
K300 140 026 2	14	26	83	14	7	2
K300 160 032 2	16	32	92	16	8	2
K300 180 032 2	18	32	92	18	9	2
K300 200 038 2	20	38	104	20	10	2
K300 220 038 2	22	38	104	22	11	2
K300 240 038 2	24	40	110	24	12	2
K300 250 040 2	25	40	110	25	12,5	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
K310 030 010 2	3.0	10	75	3	2
K310 040 020 2	4.0	20	75	4	2
K310 050 020 2	5.0	20	75	5	2
K310 060 030 2	6.0	30	75	6	2
K310 060 040 2	6.0	40	100	6	2
K310 060 045 2	6.0	45	150	6	2
K310 080 030 2	8.0	30	75	8	2
K310 080 040 2	8.0	40	100	8	2
K310 080 050 2	8.0	50	150	8	2
K310 100 040 2	10.0	40	100	10	2
K310 100 065 2	10.0	65	150	10	2
K310 120 045 2	12.0	45	100	12	2

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
K310 120 065 2	12.0	65	150	12	2
K310 140 045 2	14.0	45	100	14	2
K310 140 065 2	14.0	65	150	14	2
K310 160 045 2	16.0	45	100	16	2
K310 160 075 2	16.0	75	150	16	2
K310 180 045 2	18.0	45	100	18	2
K310 180 075 2	18.0	75	150	18	2
K310 200 045 2	20.0	45	150	20	2
K310 200 075 2	20.0	75	150	20	2
K310 220 075 2	22.0	75	150	22	2
K310 250 075 2	25.0	75	150	25	2

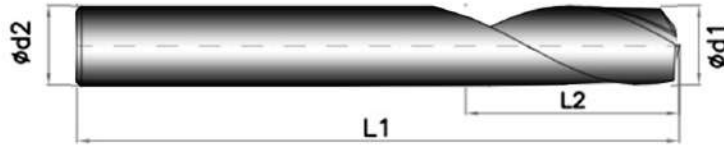
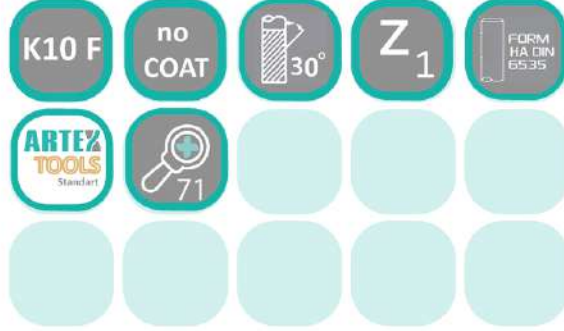


Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T100 030 009 1	3	9	40	3	1
T100 030 012 1	3	12	50	6	1
T100 040 010 1	4	10	50	4	1
T100 040 014 1	4	14	50	6	1
T100 050 012 1	5	12	50	5	1
T100 050 015 1	5	15	50	6	1
T100 060 014 1	6	14	60	6	1
T100 080 018 1	8	18	63	8	1
T100 100 022 1	10	22	72	10	1
T100 120 026 1	12	26	83	12	1



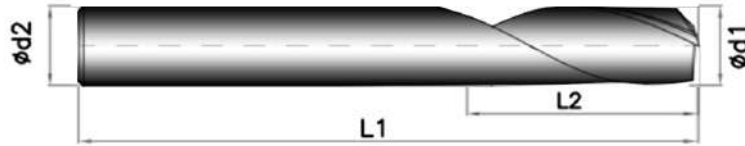
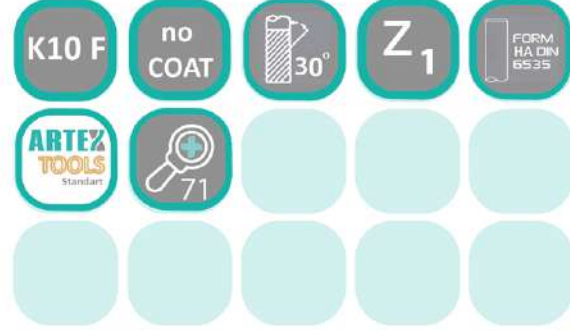
T-110

Standart Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

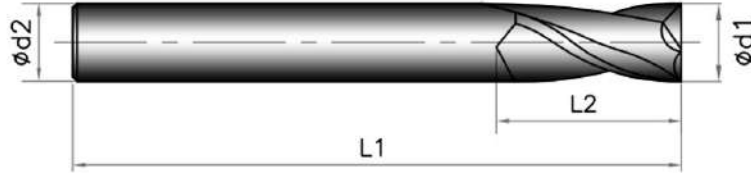
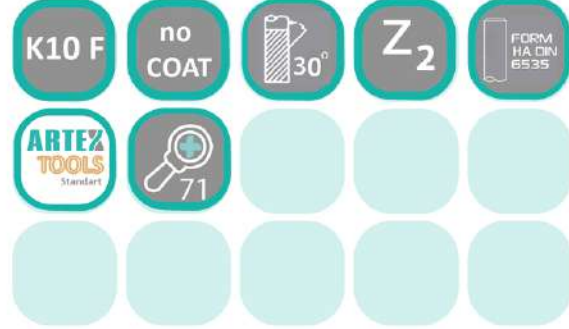


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T110 030 014 1	3	14	60	3	1
T110 030 016 1	3	16	60	6	1
T110 040 015 1	4	15	60	4	1
T110 040 018 1	4	18	60	6	1
T110 050 014 1	5	14	60	5	1
T110 050 019 1	5	19	60	6	1
T110 060 024 1	6	24	75	6	1
T110 080 032 1	8	32	75	8	1
T110 100 040 1	10	40	100	10	1
T110 120 040 1	12	40	100	12	1



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

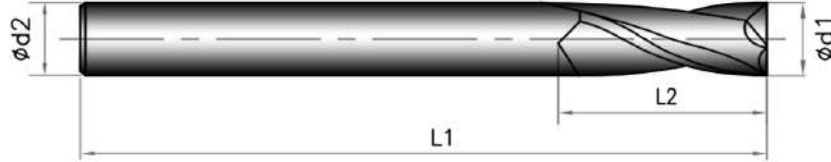
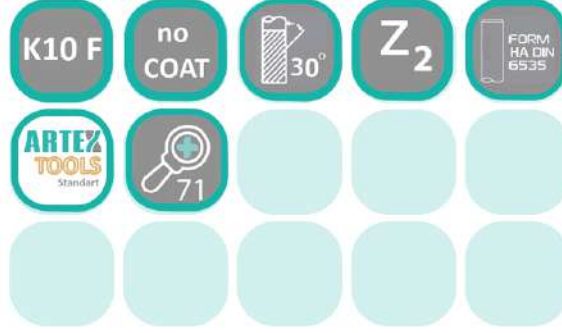


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T200 030 008 2	3	8	57	3	2
T200 040 010 2	4	10	57	4	2
T200 050 013 2	5	13	57	5	2
T200 060 014 2	6	14	57	6	2
T200 080 019 2	8	19	63	8	2
T200 100 022 2	10	22	72	10	2
T200 120 026 2	12	26	83	12	2
T200 140 026 2	14	26	83	14	2
T200 160 032 2	16	32	92	16	2
T200 180 032 2	18	32	92	18	2
T200 200 038 2	20	38	104	20	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
T210 030 016 2	3	16	65	3	2
T210 040 018 2	4	18	65	4	2
T210 050 020 2	5	20	65	5	2
T210 060 024 2	6	24	70	6	2
T210 080 038 2	8	38	100	8	2
T210 100 045 2	10	45	100	10	2
T210 120 055 2	12	55	110	12	2
T210 140 055 2	14	55	110	14	2
T210 160 065 2	16	65	110	16	2
T210 180 065 2	18	65	110	18	2
T210 200 075 2	20	75	150	20	2



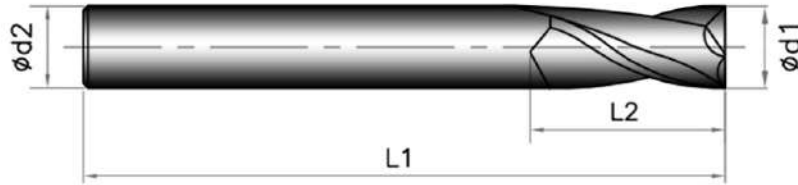
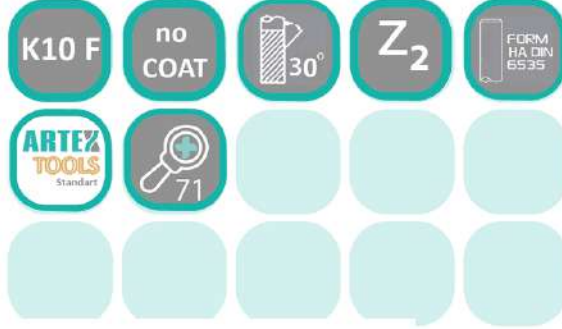
T-200R

Standart Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
T200R 035 008 2	3.0	8	40	3	0.5	2
T200R 031 008 2	3.0	8	40	3	1	2
T200R 045 010 2	4.0	10	50	4	0.5	2
T200R 041 010 2	4.0	10	50	4	1	2
T200R 055 013 2	5.0	13	50	5	0.5	2
T200R 051 013 2	5.0	13	50	5	1	2
T200R 065 014 2	6.0	14	57	6	0.5	2
T200R 061 014 2	6.0	14	57	6	1	2
T200R 085 019 2	8.0	19	63	8	0.5	2
T200R 081 019 2	8.0	19	63	8	1	2
T200R 105 022 2	10.0	22	72	10	0.5	2

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
T200R 101 022 2	10.0	22	72	10	1	2
T200R 102 022 2	10.0	22	72	10	2	2
T200R 125 028 2	12.0	28	83	12	0.5	2
T200R 121 028 2	12.0	28	83	12	1	2
T200R 122 028 2	12.0	28	83	12	2	2
T200R 161 032 2	16.0	32	92	16	1	2
T200R 162 032 2	16.0	32	92	16	2	2
T200R 163 032 2	16.0	32	92	16	3	2
T200R 201 038 2	20.0	38	104	20	1	2
T200R 202 038 2	20.0	38	104	20	2	2
T200R 203 038 2	20.0	38	104	20	3	2



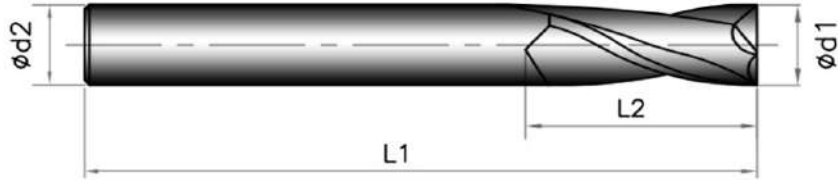
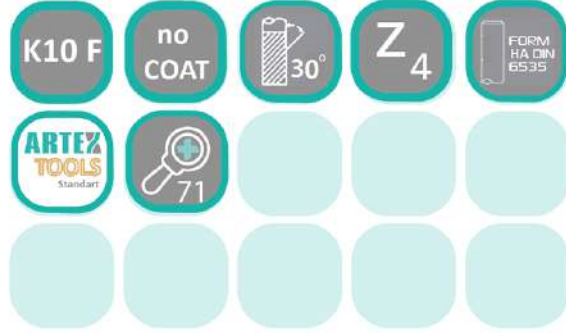
T-210R

Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
T210R 035 010 2	3.0	10	75	3	0.5	4
T210R 031 010 2	3.0	10	75	3	1	4
T210R 045 020 2	4.0	20	75	4	0.5	4
T210R 041 020 2	4.0	20	75	4	1	4
T210R 055 020 2	5.0	20	75	5	0.5	4
T210R 051 020 2	5.0	20	75	5	1	4
T210R 065 040 2	6.0	40	100	6	0.5	4
T210R 061 040 2	6.0	40	100	6	1	4
T210R 085 040 2	8.0	40	100	8	0.5	4
T210R 081 040 2	8.0	40	100	8	1	4
T210R 105 040 2	10.0	40	100	10	0.5	4

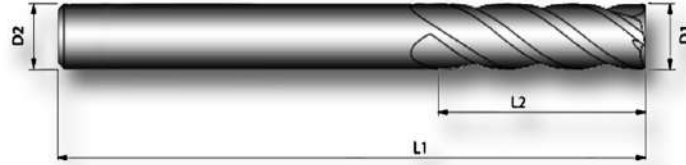
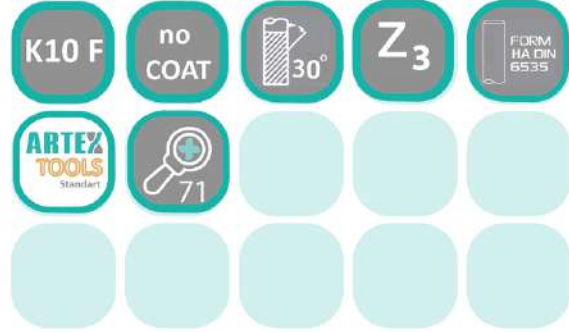
SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	R	Z
T210R 101 040 2	10.0	40	100	10	1	4
T210R 102 040 2	10.0	40	100	10	2	4
T210R 125 045 2	12.0	45	150	12	0.5	4
T210R 121 045 2	12.0	45	150	12	1	4
T210R 122 045 2	12.0	45	150	12	2	4
T210R 161 050 2	16.0	50	150	16	1	4
T210R 162 050 2	16.0	50	150	16	2	4
T210R 163 050 2	16.0	50	150	16	3	4
T210R 201 055 2	20.0	55	150	20	1	4
T210R 202 055 2	20.0	55	150	20	2	4
T210R 203 055 2	20.0	55	150	20	3	4





APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

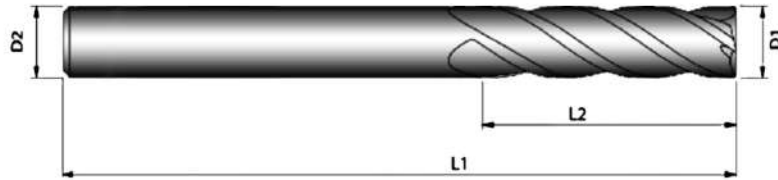


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T300 030 008 3	3	8	57	3	3
T300 040 010 3	4	10	57	4	3
T300 050 013 3	5	13	57	5	3
T300 060 014 3	6	14	57	6	3
T300 080 019 3	8	19	63	8	3
T300 100 022 3	10	22	72	10	3
T300 120 026 3	12	26	83	12	3
T300 140 026 3	14	26	83	14	3
T300 160 032 3	16	32	92	16	3
T300 180 032 3	18	32	92	18	3
T300 200 038 3	20	38	104	20	3



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



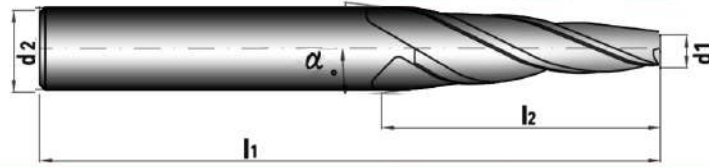
SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T310 030 010 2	3.0	10	75	3	2
T310 040 020 2	4.0	20	75	4	2
T310 050 020 2	5.0	20	75	5	2
T310 060 030 2	6.0	30	75	6	2
T310 060 040 2	6.0	40	100	6	2
T310 060 045 2	6.0	45	150	6	2
T310 080 030 2	8.0	30	75	8	2
T310 080 040 2	8.0	40	100	8	2
T310 080 050 2	8.0	50	150	8	2
T310 100 040 2	10.0	40	100	10	2
T310 100 065 2	10.0	65	150	10	2
T310 120 045 2	12.0	45	100	12	2

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T310 120 065 2	12.0	65	150	12	2
T310 140 045 2	14.0	45	100	14	2
T310 140 065 2	14.0	65	150	14	2
T310 160 045 2	16.0	45	100	16	2
T310 160 075 2	16.0	75	150	16	2
T310 180 045 2	18.0	45	100	18	2
T310 180 075 2	18.0	75	150	18	2
T310 200 045 2	20.0	45	150	20	2
T310 200 075 2	20.0	75	150	20	2
T310 220 075 2	22.0	75	150	22	2
T310 250 075 2	25.0	75	150	25	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



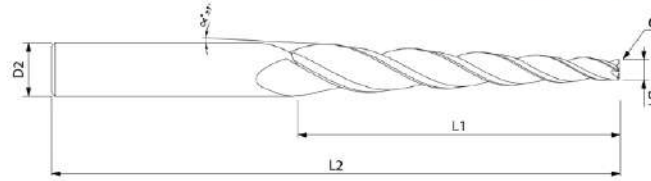
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DK300 030 030 2	3	25	65	4	3,45	30'	2
DK300 040 030 2	4	30	65	5	4,5	30'	2
DK300 050 030 2	5	30	68	6	5,5	30'	2
DK300 060 030 2	6	40	88	8	6,8	30'	2
DK300 080 030 2	8	45	100	10	8,8	30'	2
DK300 100 030 2	10	45	100	12	10,8	30'	2
DK300 120 030 2	12	45	100	14	12,8	30'	2
DK300 020 100 2	2	20	65	3	2,7	1°	2
DK300 030 100 2	3	28	65	4	4	1°	2
DK300 040 100 2	4	28	65	5	5	1°	2
DK300 050 100 2	5	28	68	6	6	1°	2
DK300 060 100 2	6	40	88	8	7,4	1°	2
DK300 080 100 2	8	45	100	10	9,6	1°	2
DK300 100 100 2	10	45	100	12	11,6	1°	2
DK300 120 100 2	12	45	100	14	13,6	1°	2



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d2h6	d3	ACI	Z
DK300 020 130 2	2	19	65	3	3	1°30'	2
DK300 030 130 2	3	19	65	4	4,3	1°30'	2
DK300 040 130 2	4	19	68	5	5,6	1°30'	2
DK300 050 130 2	5	19	68	6	7	1°30'	2
DK300 060 130 2	6	38	88	8	8	1°30'	2
DK300 080 130 2	8	38	100	10	10	1°30'	2
DK300 100 130 2	10	38	100	12	12	1°30'	2
DK300 120 130 2	12	38	100	14	14	1°30'	2
DK300 020 200 2	2	20	65	4	3,4	2°	2
DK300 030 200 2	3	28	65	5	5	2°	2
DK300 040 200 2	4	28	68	6	6	2°	2
DK300 050 200 2	5	42	88	8	8	2°	2
DK300 060 200 2	6	45	100	10	9,14	2°	2
DK300 080 200 2	8	45	100	12	11,14	2°	2
DK300 100 200 2	10	45	100	14	13,14	2°	2
DK300 120 200 2	12	45	100	16	15,14	2°	2
DK300 020 300 2	2	19	65	4	4	3°	2
DK300 030 300 2	3	28	68	6	6	3°	2
DK300 040 300 2	4	38	88	8	8	3°	2
DK300 050 300 2	5	48	100	10	10	3°	2
DK300 060 300 2	6	48	100	12	11	3°	2
DK300 080 300 2	8	48	100	14	13	3°	2
DK300 100 300 2	10	48	100	16	15	3°	2
DK300 120 300 2	12	48	100	18	17	3°	2
DK300 020 500 2	2	20	68	6	5,5	5°	2
DK300 030 500 2	3	28	68	8	8	5°	2
DK300 040 500 2	4	34	100	10	10	5°	2
DK300 050 500 2	5	40	100	12	12	5°	2
DK300 060 500 2	6	45	100	14	14	5°	2
DK300 080 500 2	8	45	100	16	16	5°	2
DK300 100 500 2	10	45	100	18	18	5°	2
DK300 120 500 2	12	45	100	20	20	5°	2

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

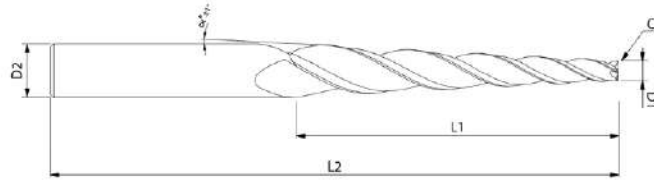


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DK500 025 035 3	2,5	35	82	6	1,5	1,5	3
DK500 025 035 3	2,5	40	82	6	3	3	3
DK500 030 040 3	3	40	82	8	3	3	3
DK500 030 048 3	3	48	110	8	3	3	3
DK500 035 040 3	3,5	40	82	8	3	3	3
DK500 035 060 3	3,5	60	110	10	5	5	3
DK500 040 040 3	4	40	82	12	5	5	3
DK500 045 042 3	4,5	42	82	12	5	5	3
DK500 045 050 3	4,5	50	110	14	5	5	3
DK500 045 060 3	4,5	60	110	16	5	5	3
DK500 050 070 3	5	70	110	14	5	5	3
DK500 060 050 3	6	50	110	14	10	10	3
DK500 060 080 3	6	80	150	20	10	10	3
DK500 080 080 3	8	80	150	24	10	10	3



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂ h6	R	d ₃	AÇI	Z
DK600 020 030 2	2	20	65	3	1	2,35	30°	2
DK600 030 030 2	3	25	65	4	1,5	3,45	30°	2
DK600 040 030 2	4	30	65	5	2	4,5	30°	2
DK600 050 030 2	5	30	68	6	2,5	5,5	30°	2
DK600 060 030 2	6	40	88	8	3	6,8	30°	2
DK600 080 030 2	8	45	100	10	4	8,8	30°	2
DK600 100 030 2	10	45	100	12	5	10,8	30°	2
DK600 120 030 2	12	45	100	14	6	12,8	30°	2
DK600 020 100 2	2	20	65	3	1	2,7	1°	2
DK600 030 100 2	3	28	65	4	1,5	4	1°	2
DK600 040 100 2	4	28	65	5	2	5	1°	2
DK600 050 100 2	5	28	68	6	2,5	6	1°	2
DK600 060 100 2	6	40	88	8	3	7,4	1°	2
DK600 080 100 2	8	45	100	10	4	9,6	1°	2
DK600 100 100 2	10	45	100	12	5	11,6	1°	2
DK600 120 100 2	12	45	100	14	6	13,6	1°	2



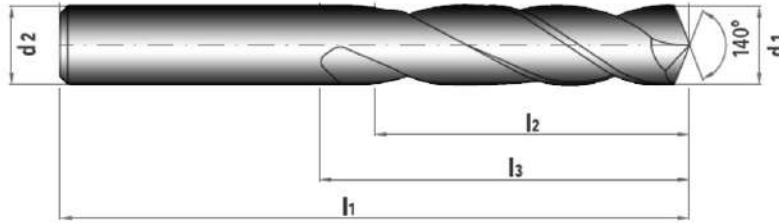


SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂ h6	R	d ₃	AÇI	Z
DK600 020 130 2	2	19	65	3	1	3	1°30'	2
DK600 030 130 2	3	19	65	4	1,5	4,3	1°30'	2
DK600 040 130 2	4	19	68	5	2	5,6	1°30'	2
DK600 050 130 2	5	19	68	6	2,5	7	1°30'	2
DK600 060 130 2	6	38	88	8	3	8	1°30'	2
DK600 080 130 2	8	38	100	10	4	10	1°30'	2
DK600 100 130 2	10	38	100	12	5	12	1°30'	2
DK600 120 130 2	12	38	100	14	6	14	1°30'	2
DK600 020 200 2	2	20	65	4	1	3,4	2°	2
DK600 030 200 2	3	28	65	5	1,5	5	2°	2
DK600 040 200 2	4	28	68	6	2	6	2°	2
DK600 050 200 2	5	42	88	8	2,5	8	2°	2
DK600 060 200 2	6	45	100	10	3	9,14	2°	2
DK600 080 200 2	8	45	100	12	4	11,14	2°	2
DK600 100 200 2	10	45	100	14	5	13,14	2°	2
DK600 120 200 2	12	45	100	16	6	15,14	2°	2
DK600 020 300 2	2	19	65	4	1	4	3°	2
DK600 030 300 2	3	28	68	6	1,5	6	3°	2
DK600 040 300 2	4	38	88	8	2	8	3°	2
DK600 050 300 2	5	48	100	10	2,5	10	3°	2
DK600 060 300 2	6	48	100	12	3	11	3°	2
DK600 080 300 2	8	48	100	14	4	13	3°	2
DK600 100 300 2	10	48	100	16	5	15	3°	2
DK600 120 300 2	12	48	100	18	6	17	3°	2
DK600 020 500 2	2	20	68	6	1	5,5	5°	2
DK600 030 500 2	3	28	68	8	1,5	8	5°	2
DK600 040 500 2	4	34	100	10	2	10	5°	2
DK600 050 500 2	5	40	100	12	2,5	12	5°	2
DK600 060 500 2	6	45	100	14	3	14	5°	2
DK600 080 500 2	8	45	100	16	4	16	5°	2
DK600 100 500 2	10	45	100	18	5	18	5°	2
DK600 120 500 2	12	45	100	20	6	20	5°	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Gr:

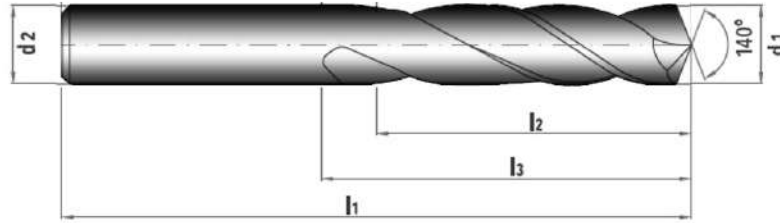


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z	SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
A300 020 012 2	2	12	40	2	2	A300 095 040 2	9,5	40	84	10	2
A300 025 014 2	2,5	14	43	3	2	A300 100 043 2	10	43	89	10	2
A300 030 016 2	3	16	46	3	2	A300 102 043 2	10,2	43	89	12	2
A300 035 020 2	3,5	20	52	4	2	A300 105 043 2	10,5	43	89	12	2
A300 040 022 2	4	22	55	4	2	A300 110 047 2	11	47	95	12	2
A300 045 024 2	4,5	24	58	5	2	A300 115 047 2	11,5	47	95	12	2
A300 050 026 2	5	26	62	5	2	A300 120 051 2	12	51	102	12	2
A300 055 028 2	5,5	28	66	6	2	A300 125 051 2	12,5	51	102	13	2
A300 060 028 2	6	28	66	6	2	A300 130 051 2	13	51	102	13	2
A300 068 031 2	6,8	31	70	7	2	A300 135 051 2	13,5	51	102	14	2
A300 070 034 2	7	34	74	7	2	A300 140 054 2	14	54	107	14	2
A300 075 034 2	7,5	34	74	8	2	A300 150 056 2	15	56	111	15	2
A300 080 037 2	8	37	79	8	2	A300 160 058 2	16	58	115	16	2
A300 085 037 2	8,5	37	79	9	2	A300 180 062 2	18	62	123	18	2
A300 090 040 2	9	40	84	9	2	A300 200 066 2	20	66	131	20	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
A500 020 024 2	2	24	49	2	2
A500 025 030 2	2,5	30	57	3	2
A500 030 033 2	3	33	61	3	2
A500 035 035 2	3,5	39	70	4	2
A500 040 043 2	4	43	75	4	2
A500 045 047 2	4,5	47	80	5	2
A500 050 052 2	5	52	86	5	2
A500 055 055 2	5,5	57	93	6	2
A500 060 057 2	6	57	93	6	2
A500 068 063 2	6,8	63	101	7	2
A500 070 069 2	7	69	109	7	2
A500 075 069 2	7,5	69	109	8	2
A500 080 075 2	8	75	117	8	2
A500 085 075 2	8,5	75	117	9	2
A500 090 081 2	9	81	125	9	2

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
A500 095 081 2	9,5	81	125	10	2
A500 100 087 2	10	87	133	10	2
A500 102 087 2	10,2	87	133	12	2
A500 105 092 2	10,5	92	133	12	2
A500 110 094 2	11	94	142	12	2
A500 115 094 2	11,5	94	142	12	2
A500 120 101 2	12	101	151	12	2
A500 125 101 2	12,5	101	151	13	2
A500 130 101 2	13	101	151	13	2
A500 135 101 2	13,5	101	151	14	2
A500 140 120 2	14	120	175	14	2
A500 150 120 2	15	120	175	15	2
A500 160 120 2	16	120	175	16	2
A500 180 120 2	18	120	175	18	2
A500 200 120 2	20	120	175	20	2



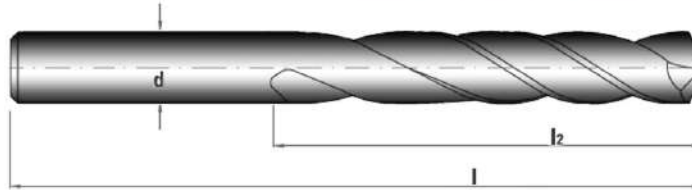
M-300

Standart Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

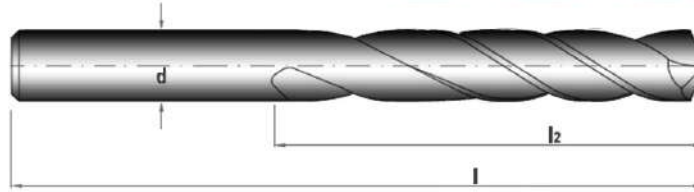


SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z	SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
M300 030 020 2	3	20	62	3	2	M300 100 047 2	10	47	89	10	2
M300 035 020 2	3,5	20	62	4	2	M300 102 055 2	10,2	55	102	12	2
M300 040 024 2	4	24	66	4	2	M300 105 055 2	10,5	55	102	12	2
M300 045 024 2	4,5	24	66	5	2	M300 110 055 2	11	55	102	12	2
M300 050 026 2	5	26	62	5	2	M300 115 055 2	11,5	55	102	12	2
M300 055 028 2	5,5	28	66	6	2	M300 120 055 2	12	55	102	12	2
M300 060 028 2	6	28	66	6	2	M300 125 060 2	12,5	60	107	13	2
M300 068 034 2	6,8	34	79	7	2	M300 130 060 2	13	60	107	13	2
M300 070 034 2	7	34	79	7	2	M300 135 060 2	13,5	60	107	14	2
M300 075 041 2	7,5	41	79	8	2	M300 140 060 2	14	60	107	14	2
M300 080 041 2	8	41	79	8	2	M300 150 065 2	15	65	115	15	2
M300 085 047 2	8,5	47	79	9	2	M300 160 065 2	16	65	115	16	2
M300 090 047 2	9	47	89	9	2	M300 180 065 2	18	65	115	18	2
M300 095 047 2	9,5	47	89	10	2	M300 200 066 2	20	66	115	20	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z	SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
M500 040 036 2	4	36	74	4	2	M500 102 055 2	10,2	71	118	12	2
M500 045 036 2	4,5	36	74	5	2	M500 105 055 2	10,5	71	118	12	2
M500 050 044 2	5	44	82	5	2	M500 110 055 2	11	71	118	12	2
M500 055 044 2	5,5	44	82	6	2	M500 115 055 2	11,5	71	118	12	2
M500 060 028 2	6	44	82	6	2	M500 120 055 2	12	71	118	12	2
M500 068 034 2	6,8	53	91	7	2	M500 125 060 2	12,5	77	124	13	2
M500 070 034 2	7	53	91	7	2	M500 130 060 2	13	77	124	13	2
M500 075 041 2	7,5	53	91	8	2	M500 135 060 2	13,5	77	124	14	2
M500 080 041 2	8	53	91	8	2	M500 140 060 2	14	77	124	14	2
M500 085 047 2	8,5	61	103	9	2	M500 150 065 2	15	83	133	15	2
M500 090 047 2	9	61	103	9	2	M500 160 065 2	16	83	133	16	2
M500 095 047 2	9,5	61	103	10	2	M500 180 065 2	18	93	143	18	2
M500 100 047 2	10	61	103	10	2	M500 200 066 2	20	101	153	20	2



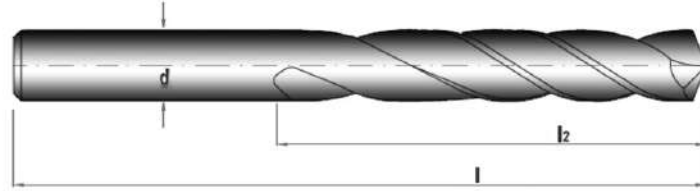
M-700

Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

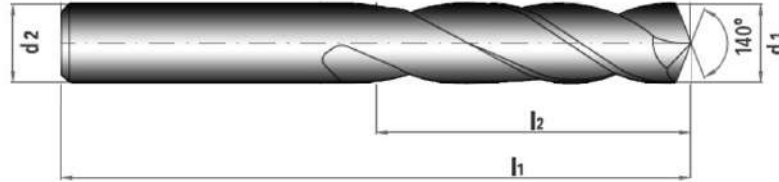


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M700 050 050 2	5	50	90	5	2	M700 105 106 2	10,5	106	155	12	2
M700 055 057 2	5,5	57	97	6	2	M700 110 106 2	11	106	155	12	2
M700 060 057 2	6	57	97	6	2	M700 115 114 2	11,5	114	163	12	2
M700 068 058 2	6,8	58	106	7	2	M700 120 114 2	12	114	163	12	2
M700 070 076 2	7	76	116	7	2	M700 125 120 2	12,5	120	170	13	2
M700 075 076 2	7,5	76	116	8	2	M700 130 120 2	13	120	170	13	2
M700 080 076 2	8	76	116	8	2	M700 135 120 2	13,5	120	170	14	2
M700 085 087 2	8,5	87	131	9	2	M700 140 120 2	14	120	170	14	2
M700 090 087 2	9	87	131	9	2	M700 150 132 2	15	132	182	15	2
M700 095 095 2	9,5	95	139	10	2	M700 160 132 2	16	132	182	16	2
M700 100 095 2	10	95	139	10	2	M700 180 146 2	18	146	195	18	2
M700 102 095 2	10,2	95	139	12	2	M700 200 165 2	20	165	210	20	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



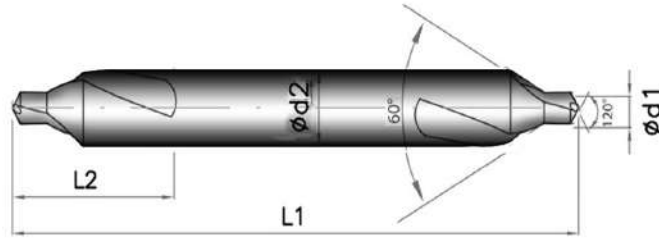
SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z	SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
S300 020 012 3	2	12	40	2	3	S300 095 040 3	9,5	40	84	10	3
S300 025 014 3	2,5	14	43	3	3	S300 100 043 3	10	43	89	10	3
S300 030 016 3	3	16	46	3	3	S300 102 043 3	10,2	43	89	12	3
S300 035 020 3	3,5	20	52	4	3	S300 105 043 3	10,5	43	89	12	3
S300 040 022 3	4	22	55	4	3	S300 110 047 3	11	47	95	12	3
S300 045 024 3	4,5	24	58	5	3	S300 115 047 3	11,5	47	95	12	3
S300 050 026 3	5	26	62	5	3	S300 120 051 3	12	51	102	12	3
S300 055 028 3	5,5	28	66	6	3	S300 125 051 3	12,5	51	102	13	3
S300 060 028 3	6	28	66	6	3	S300 130 051 3	13	51	102	13	3
S300 068 031 3	6,8	31	70	7	3	S300 135 051 3	13,5	51	102	14	3
S300 070 034 3	7	34	74	7	3	S300 140 054 3	14	54	107	14	3
S300 075 034 3	7,5	34	74	8	3	S300 150 056 3	15	56	111	15	3
S300 080 037 3	8	37	79	8	3	S300 160 058 3	16	58	115	16	3
S300 085 037 3	8,5	37	79	9	3	S300 180 062 3	18	62	123	18	3
S300 090 040 3	9	40	84	9	3	S300 200 066 3	20	66	131	20	3



- Standart KARBÜR Parmak Frezesi
- Standard Carbide End Mill
- Smooth-edged, normal version

APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

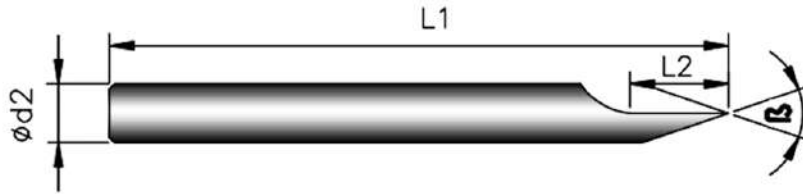


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P300 010 013 2	1	1,3	40	3	60°	2
P300 012 016 2	1,25	1,6	40	3	60°	2
P300 016 020 2	1,6	2	40	4	60°	2
P300 052 025 2	2	2,5	40	5	60°	2
P300 025 031 2	2,5	3,1	45	6	60°	2
P300 031 039 2	3,15	3,9	50	8	60°	2
P300 040 050 2	4	5	56	10	60°	2
P300 050 063 2	5	6,3	63	12	60°	2
P300 063 080 2	6,3	8	71	16	60°	2
P300 080 101 2	8	10,1	80	20	60°	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite

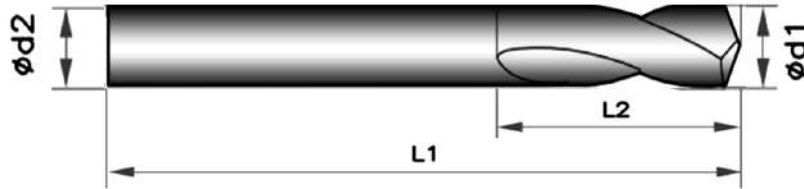


SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	AÇI	Z
P400 030 406 1	3	4	40	3	60°	1
P400 030 106 1	3	4	100	3	60°	1
P400 040 506 1	4	5	50	4	60°	1
P400 040 106 1	4	5	100	4	60°	1
P400 060 576 1	6	7	57	5	60°	1
P400 060 106 1	6	7	100	5	60°	1
P400 030 409 1	3	4	40	3	90°	1
P400 030 109 1	3	4	100	3	90°	1
P400 040 509 1	4	5	50	4	90°	1
P400 040 109 1	4	5	100	4	90°	1
P400 060 579 1	6	7	57	5	90°	1
P400 060 109 1	6	7	100	5	90°	1



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



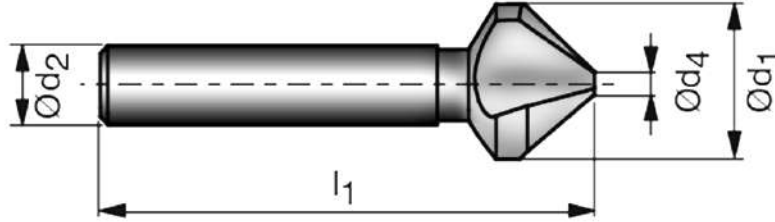
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N300 040 090 2	4	11	50	4	90°	2
N300 050 090 2	5	13	50	5	90°	2
N300 060 090 2	6	13	57	6	90°	2
N300 080 090 2	8	19	63	8	90°	2
N300 100 090 2	10	22	72	10	90°	2
N300 120 090 2	12	26	83	12	90°	2
N300 140 090 2	14	26	83	14	90°	2
N300 160 090 2	16	32	92	16	90°	2
N300 180 090 2	18	32	92	18	90°	2
N300 200 090 2	20	38	104	20	90°	2

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	AÇI	Z
N300 030 120 2	4	11	50	4	120°	2
N300 030 120 2	5	13	50	5	120°	2
N300 040 120 2	6	13	57	6	120°	2
N300 040 120 2	8	19	63	8	120°	2
N300 060 120 2	10	22	72	10	120°	2
N300 060 120 2	12	26	83	12	120°	2
N300 060 120 2	14	26	83	14	120°	2
N300 060 120 2	16	32	92	16	120°	2
N300 060 120 2	18	32	92	18	120°	2
N300 060 120 2	20	38	104	20	120°	2



APPLICATION RANGE

Unalloyed Steels
Machining Steels
Low Alloy Steels
Stainless Steels
Heat Resistant Materials
Titanium and Titanium Alloys
Cast Iron
Hardened Materials
Aluminium Alloys
Copper and Copper Alloys
Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	D ₃	L ₁	d ₂	AÇI	Z
H300 063 013 2	6,3	2	45	5	90°	3
H300 083 016 2	8,3	2	50	6	90°	3
H300 104 020 2	10,4	2,5	50	6	90°	3
H300 124 025 2	12,4	2,8	56	8	90°	3
H300 150 031 2	15	3,2	60	10	90°	3
H300 165 039 2	16,5	3,2	60	10	90°	3
H300 205 050 2	20,5	3,5	63	10	90°	3
H300 250 063 2	25	3,8	67	10	90°	3
H300 310 080 2	31	4,2	71	12	90°	3



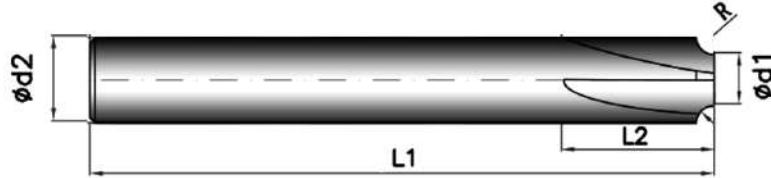
D-300

Standard Karbür Parmak Frezesi

Standard Carbide End Mill
Smooth-edged, normal version

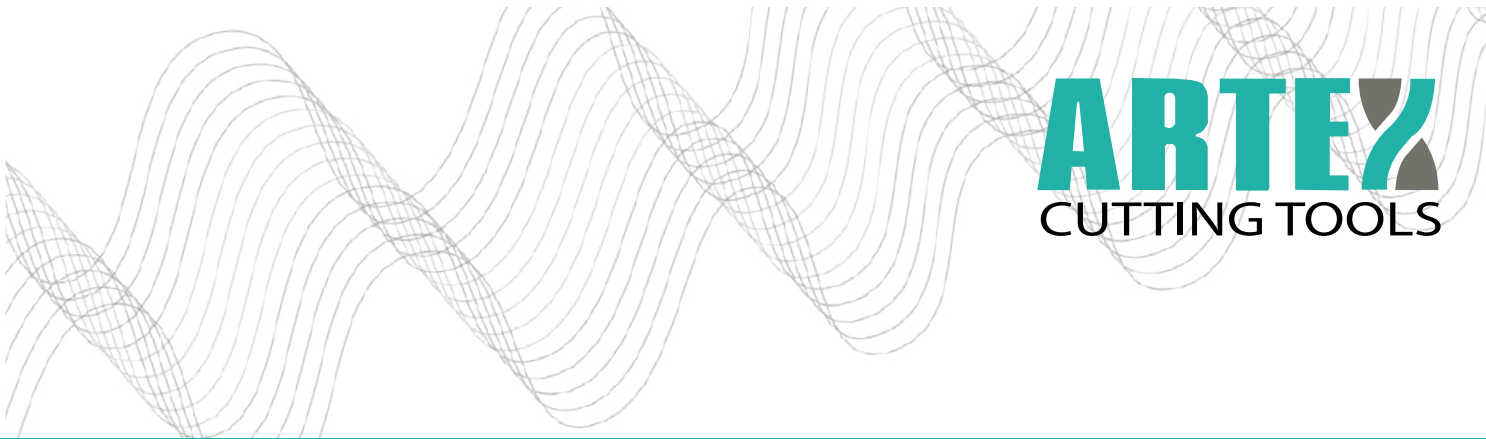
APPLICATION RANGE

Unalloyed Steels
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SİPARİŞ KODU ORDER CODE	d ₁	L1	d ₂	R	Z
D300 080 005 4	7	63	8	0,5	4
D300 080 010 4	6	63	8	1	4
D300 100 015 4	7	72	10	1,5	4
D300 100 020 4	6	83	10	2	4
D300 120 025 4	7	83	12	2,5	4
D300 120 030 4	6	83	12	3	4
D300 160 035 4	9	92	16	3,5	4
D300 160 040 4	8	92	16	4	4
D300 160 045 4	7	92	16	4,5	4
D300 200 050 4	10	104	20	5	4
D300 200 060 4	8	104	20	6	4



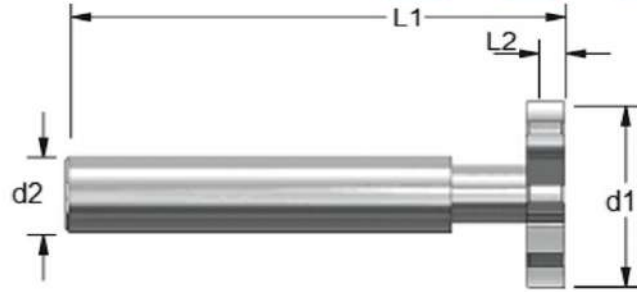


ARTEZ
CUTTING TOOLS



APPLICATION RANGE

Unalloyed Steels
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Stainless Steels
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Titanium and Titanium Alloys
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Plastics
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SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T400 045 005 4	4,5	1	50	6	6
T400 075 010 4	7,5	1,5	50	6	6
T400 075 015 4	7,5	2	50	6	6
T400 105 020 4	10,5	2	50	6	6
T400 120 025 4	10,5	2,5	50	6	6
T400 120 030 4	10,5	3	50	6	6
T400 160 035 4	13,5	3	56	10	8
T400 160 040 4	13,5	4	56	10	8
T400 160 045 4	16,5	3	56	10	8
T400 200 050 4	16,5	4	56	10	8
T400 200 060 4	16,5	5	56	10	8
T400 200 060 5	19,5	3	63	10	10
T400 200 060 6	19,5	4	63	10	10
T400 200 060 7	19,5	5	63	10	10
T400 200 060 8	22,5	4	63	10	10

SİPARİŞ KODU ORDER CODE	d ₁	L ₂	L ₁	d ₂	Z
T400 200 060 9	22,5	5	63	10	10
T400 200 060 10	22,5	6	63	10	10
T400 200 060 11	25,5	5	63	10	10
T400 200 060 12	25,5	6	63	10	10
T400 200 060 13	25,5	7	63	10	10
T400 200 060 14	25,5	8	63	10	10
T400 200 060 15	28,5	5	63	10	10
T400 200 060 16	28,5	6	63	10	10
T400 200 060 17	28,5	7	63	10	10
T400 200 060 18	28,5	8	63	10	10
T400 200 060 19	32,5	5	71	12	12
T400 200 060 20	32,5	6	71	12	12
T400 200 060 21	32,5	8	71	12	12
T400 200 060 22	45,5	10	71	12	12



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Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	L3	d ₂	Z
R300 030 006 4	3	6	40	20	3	4
R300 040 006 4	4	8	50	30	4	4
R300 050 010 6	5	10	50	30	5	6
R300 060 012 6	6	12	57	37	6	6
R300 070 014 6	7	14	57	37	7	6
R300 080 016 6	8	16	63	43	8	6
R300 090 018 6	9	18	63	43	9	6
R300 100 020 6	10	20	72	43	10	6
R300 110 020 6	11	20	72	43	11	6
R300 120 024 6	12	24	83	48	12	6
R300 130 024 6	13	24	83	48	13	6
R300 140 024 6	14	24	83	48	14	6
R300 150 024 6	15	24	83	48	15	6
R300 160 024 8	16	24	92	48	16	8
R300 180 024 8	18	24	92	48	18	8
R300 200 024 8	20	24	104	48	20	8

APPLICATION RANGE

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SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	L3	d	Z
R310 030 006 4	3	12	61	40	3	4
R310 040 006 4	4	16	75	50	4	4
R310 050 010 6	5	20	86	56	5	6
R310 060 012 6	6	24	93	56	6	6
R310 070 014 6	7	28	109	65	7	6
R310 080 016 6	8	32	117	66	8	6
R310 090 018 6	9	36	125	66	9	6
R310 100 020 6	10	38	133	66	10	6
R310 110 020 6	11	41	142	70	11	6
R310 120 024 6	12	4	151	75	12	6
R310 130 024 6	13	44	151	75	13	6
R310 140 024 6	14	47	160	80	14	6
R310 150 024 6	15	50	165	80	15	6
R310 160 024 8	16	52	165	80	16	8
R310 180 024 8	18	56	165	80	18	8
R310 200 024 8	20	60	165	80	20	8

APPLICATION RANGE

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Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
A500 030 012 2	3	12	40	3	2
A500 040 015 2	4	15	40	4	2
A500 050 016 2	5	16	50	5	2
A500 060 017 2	6	17	50	6	2
A500 060 025 2	6	25	60	6	2
A500 080 022 2	8	22	63	8	2
A500 080 032 2	8	32	72	8	2
A500 100 032 2	10	32	72	10	2
A500 100 042 2	10	42	100	10	2
A500 120 032 2	12	32	73	12	2
A500 120 042 2	12	42	100	12	2

SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
A500 120 052 2	12	52	100	12	2
A500 120 042 2	14	42	100	14	2
A500 140 052 2	14	52	100	14	2
A500 160 042 2	16	42	100	16	2
A500 160 052 2	16	52	100	16	2
A500 160 062 2	16	62	106	16	2
A500 180 052 2	18	52	100	18	2
A500 180 075 2	18	75	125	18	2
A500 200 052 2	20	52	100	20	2
A500 200 075 2	20	75	125	20	2



APPLICATION RANGE

Unalloyed Steels
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Plastics
Graphite



SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
A510 080 022 3	8	22	63	8	3
A510 080 032 3	8	32	72	8	3
A510 100 032 3	10	32	72	10	3
A510 100 042 3	10	42	100	10	3
A510 120 032 3	12	32	73	12	3
A510 120 042 3	12	42	100	12	3
A510 120 052 3	12	52	100	12	3
A510 120 042 3	14	42	100	14	3
A510 140 052 3	14	52	100	14	3
A510 160 042 3	16	42	100	16	3
A510 160 052 3	16	52	100	16	3
A510 160 062 3	16	62	106	16	3
A510 180 052 3	18	52	100	18	3
A510 180 075 3	18	75	125	18	3
A510 200 052 3	20	52	100	20	3
A510 200 075 3	20	75	125	20	3
A510 200 102 3	20	102	160	20	3



APPLICATION RANGE

Unalloyed Steels
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SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
A520 030 012 2	3	12	40	3	2
A520 040 015 2	4	15	40	4	2
A520 050 016 2	5	16	50	5	2
A520 060 017 2	6	17	50	6	2
A520 060 025 2	6	25	60	6	2
A520 080 022 2	8	22	63	8	2
A520 080 032 2	8	32	72	8	2
A520 100 032 2	10	32	72	10	2
A520 100 042 2	10	42	100	10	2
A520 120 032 2	12	32	73	12	2
A520 120 042 2	12	42	100	12	2

SİPARİŞ KODU ORDER CODE	d ₁	L2	L1	d ₂	Z
A520 120 052 2	12	52	100	12	2
A520 120 042 2	14	42	100	14	2
A520 140 052 2	14	52	100	14	2
A520 160 042 2	16	42	100	16	2
A520 160 052 2	16	52	100	16	2
A520 160 062 2	16	62	106	16	2
A520 180 052 2	18	52	100	18	2
A520 180 075 2	18	75	125	18	2
A520 200 052 2	20	52	100	20	2
A520 200 075 2	20	75	125	20	2



Cutting Speed

$$V_c = \frac{\pi \times d_1 \times n}{1000}$$

Feed Rate For End Mills

$$V_f = n \times f_z \times f_n$$

$$n = \frac{1000 \times V_c}{\pi \times d_1}$$

V_c : Cutting speed (m / min)
 d_1 : End Mill diameter (mm)
 n : Revolution (rpm)

V_f : Feed speed (mm / min)
 f_z : Feed per tooth (mm / tooth)
 f_n : Number of teeth

General recommendations for solid carbide end mills

- ▶ In case of vibration, reduce feed and speed.
- ▶ When slotting Stainless Steel it may be necessary to reduce spindle and feed per tooth.
- ▶ For side milling, modify feed to obtain required finish quality.
- ▶ Use high precision machine set up for rigidity.
- ▶ For Ball Nose End Mills with 4 cutting edge use following recommendation is useful if surface have over 30 degree, increase feedrate up to 30%.

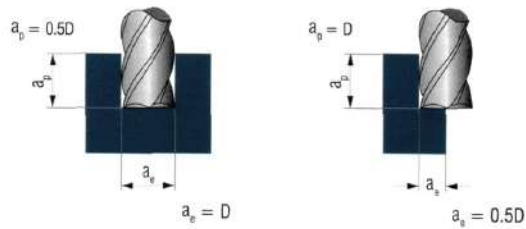
ISO		P									
Material		Non-alloy steel and cast steel, free cutting steel					Low alloy steel and cast steel (less than)		High alloy steel and cast steel		
		< 0.25 %C	< 0.25 %C	< 0.55 %C	< 0.55 %C	≥ 0.55 %C					
Condition		Annealed	Annealed	Quenched and tempered	Annealed	Quenched and tempered	Annealed	Quenched and tempered	Annealed	Quenched and tempered	
Tensile Strength [N/mm ²]		420	650	850	750	1000	600	930	1000	1200	680 1100
Hardness HB		125	190	250	220	300	200	275	300	350	200 325
Speed (m/min)	V min.	210	160	140	140	120	130	100	110	120	110 65
	V max.	230	190	150	150	130	150	110	120	130	130 70

ISO		M			ISO		K					
Material		Stainless steel and Cast Steel			Material		Cast Iron Modular (GGG)		Grey Cast Iron (GG)		Malleable Cast Iron	
Condition		Ferritic / Martensitic	Martensitic	Austenitic	Condition		Ferritic Pearlitic	Pearlitic	Ferritic	Pearlitic	Ferritic	Pearlitic
Tensile Strength [N/mm ²]		680	820	600	Tensile Strength [N/mm ²]							
Hardness HB		200	240	180	Hardness HB		160	260	160	250	130	230
Speed (m/min)	V min.	100	60	70	Speed (m/min)	V min.	70	110	130	70	130	110
	V max.	170	150	100		V max.	220	200	230	230	230	200

ISO		N						
Material		Aluminum-wrought alloy		Aluminum-cast, alloyed		Copper Alloys		
Condition		Not cureable	Cured	≤ 12% Si Not cureable	>12% Si Cured	>1% Pb Quenched and tempered	High Temperature	Brass Electrolytic copper
Tensile Strength [N/mm ²]								
Hardness HB		60	100	75	90	130	110	90 100
Speed (m/min)	V min.	650	600	650	600	250	310	310 220
	V max.	700	690	700	690	280	350	350 250

ISO		S						
Material		High Temp. Alloys					Titanium an Ti Alloys	
		Fe Based		Fe Based		Cast		
Condition		Annealed	Cured	Annealed	Cured	Cast		Alpha+beta alloys cured
Tensile Strength [N/mm ²]							RM400	RM1050
Hardness HB		200	280	250	350	320		
Speed (m/min)	V min.	20	20	20	20	30	30	30
	V max.	30	20	20	20	60	60	60

ISO		H			
Material		Hardened Steel		Chilled cast iron	Cast iron
		Hardened		Cast	Hardened
Condition		Annealed	Cured	Annealed	Cured
Tensile Strength [N/mm ²]					
Hardness HB		55 HRC	60 HRC	400	55 HRC
Speed (m/min)	V min.	30	30	50	30
	V max.	40	30	60	40

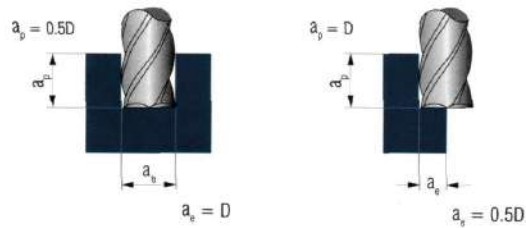


D Series

D (mm)	Slotting		Shouldering	
	Fz (min)	Fz (max)	Fz (min)	Fz (max)
1	0.003	0.005	0.003	0.007
2	0.005	0.030	0.005	0.033
3	0.010	0.040	0.010	0.044
4	0.015	0.045	0.015	0.049
5	0.025	0.050	0.020	0.055
6	0.030	0.060	0.025	0.066
8	0.030	0.080	0.030	0.088
10	0.035	0.090	0.030	0.098
12	0.040	0.100	0.035	0.108
14	0.050	0.110	0.040	0.119
16	0.050	0.120	0.050	0.130
18	0.050	0.130	0.050	0.140
20	0.050	0.150	0.050	0.170
25	0.060	0.150	0.060	0.180

- For Slotting M type materials — $a_{pmax} = 0.5D$
- For Slotting S type materials — $a_{pmax} = 0.25D$
- For Finishing P type materials — $a_{pmax} = 1.5D$

D (mm)	Slotting		Shouldering	
	Fz (min)	Fz (max)	Fz (min)	Fz (max)
1	0.006	0.01	0.006	0.014
2	0.01	0.06	0.01	0.066
3	0.02	0.08	0.02	0.088
4	0.03	0.09	0.03	0.098
5	0.04	0.10	0.04	0.110
6	0.05	0.12	0.05	0.132
8	0.06	0.16	0.06	0.176
10	0.06	0.18	0.06	0.196
12	0.07	0.20	0.07	0.216
14	0.08	0.22	0.08	0.238
16	0.10	0.24	0.10	0.260
18	0.10	0.26	0.10	0.280
20	0.10	0.30	0.10	0.340
25	0.12	0.30	0.12	0.360



Material	Alloy Steels, Cast Iron		Alloy Steels Tempered Steels		Hardened Steels		High Hardened Steels	
Hardness	- HRC30		HRC30 - HRC45		HRC50 - HRC60		HRC60 - HRC65	
Strength	-850 N/mm ²		850-1600 N/mm ²		1600-2000 N/mm ²		2000 N/mm ² -	
Diameter	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)
6	5600	1900	3900	1250	1600	200	1100	130
8	4200	1900	3000	1250	1200	200	900	130
10	3400	1900	2400	1250	1000	200	700	130
12	2800	1600	2000	1000	900	200	600	110
14	2450	1400	1750	900	900	175	525	90
16	2100	1200	1500	800	900	150	450	70
18	1900	1100	1350	750	700	135	375	65
20	1700	1000	1200	700	500	120	300	60

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For High Speed

Material	Hardened Steels Tempered Steels		Hardened Steels		High Hardened Steels	
Hardness	- HRC50		HRC50 - HRC60		HRC60 - HRC65	
Strength	-1600 N/mm ²		1600-2000 N/mm ²		2000 N/mm ² -	
Diameter	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)
6	17000	6100	8400	3000	4200	1500
8	13000	6100	6300	3000	3200	1500
10	10000	6000	5000	3000	2500	1500
12	8400	5000	4200	2500	2100	1300
14	7350	4500	3700	2200	1850	1150
16	6300	4000	3200	1900	1600	1000
18	5650	3550	2850	1685	1450	900
20	5000	3100	2500	1470	1300	800

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Material	Alloy Steels, Cast Iron		Alloy Steels Tempered Steels		Hardened Steels		High Hardened Steels	
Hardness	- HRC30		HRC30 - HRC45		HRC50 - HRC60		HRC50 - HRC65	
Strength	-850 N/mm ²		850-1600 N/mm ²		1600-2000 N/mm ²		2000 N/mm ² -	
Diameter	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)
6	2400	500	1700	360	1400	250	1110	200
8	1800	460	1300	340	1100	240	850	180
10	1400	430	1000	300	900	230	680	160
12	1150	400	900	280	700	210	580	150
14	1025	375	775	260	625	190	515	140
16	900	350	650	240	550	170	450	130
18	800	325	557	220	500	160	390	125
20	700	300	500	200	450	150	330	120

ap = 3D ae = 0.02D	ap = 3D ae = 0.01D	ap = 3D ae = 0.005D
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ISO	Materials		V_c (m/min)	f_z max. (mm)	a_p max. (mm)	a_e max. (mm)
P	Cold-extrusion steels, Magnetic soft iron	$\leq 400 \text{ N/mm}^2$	280 - 300	$0.04 \times d_f$	$0.06 \times d_f$	$0.6 \times d_f$
	Free-cutting steels, General construction steels	$\leq 600 \text{ N/mm}^2$	260 - 280	$0.04 \times d_f$	$0.05 \times d_f$	$0.6 \times d_f$
	Free-cutting steels, Construction steels, Alloyed steels, Steel casting	$\leq 850 \text{ N/mm}^2$	240 - 260	$0.025 \times d_f$	$0.04 \times d_f$	$0.6 \times d_f$
	Cementation steels, Heat-treatable steels, Nitriding steels, Cold work steels	$\leq 1100 \text{ N/mm}^2$	220 - 240	$0.025 \times d_f$	$0.04 \times d_f$	$0.6 \times d_f$
	Heat-treatable steels, Hot work steels, Nitriding steels, Hardened Steels up to 44 HRC, Cold work steels	$\leq 1400 \text{ N/mm}^2$	180 - 200	$0.02 \times d_f$	$0.035 \times d_f$	$0.6 \times d_f$
	Hardened Steels > 44 - 45		120 - 160	$0.015 \times d_f$	$0.03 \times d_f$	$0.6 \times d_f$
	Hardened Steels > 55 - 60		100 - 120	$0.01 \times d_f$	$0.025 \times d_f$	$0.6 \times d_f$
	Hardened Steels > 60 - 63		80 - 100	$0.01 \times d_f$	$0.02 \times d_f$	$0.6 \times d_f$
	Hardened Steels > 63 - 66		60 - 80	$0.007 \times d_f$	$0.015 \times d_f$	$0.6 \times d_f$
K	Cast iron	GG20-GG30	180 - 200	$0.05 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$
	Cast iron with nodular graphite	GGG40-GGG70	180 - 200	$0.05 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$
	Cast iron with vermicular graphite	GGV(80%Perlit)	160 - 180	$0.04 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$
	Malleable cast iron		160 - 180	$0.04 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$
N	Copper-zinc alloys (brass, long-chipping)		180 - 200	$0.04 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$
	Copper-zinc alloys (brass, short-chipping)		180 - 200	$0.04 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$
	Copper-aluminium alloys (alubronze, long chipping),		160 - 180	$0.04 \times d_f$	$0.06 \times d_f$	$0.6 \times d_f$
	Copper-tin alloys (bronze, long chipping)		160 - 180	$0.04 \times d_f$	$0.06 \times d_f$	$0.6 \times d_f$
	Duroplastics (Short chipping)		200 - 220	$0.05 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$
	Tungsten-copper alloys		100 - 140	$0.035 \times d_f$	$0.07 \times d_f$	$0.6 \times d_f$

Material	Vc (m/min)	Slotting	Ø3		Ø4		Ø5		Ø6		Ø8		Ø10		Ø12		Ø16		Ø20	
			Medium		Heavy		Medium		Heavy		Medium		Heavy		Medium		Heavy		Medium	
			Medium	Heavy	Medium	Heavy	Medium	Heavy	Medium	Heavy	Medium	Heavy	Medium	Heavy	Medium	Heavy	Medium	Heavy	Medium	Heavy
Non-alloy steel and cast steel, free cutting steel $\geq 0.25\%C$.	200	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Non-alloy steel and cast steel, free cutting steel $< 0.55\%C$.	160	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Low alloy & cast steel (less than 5% of alloying elements).	130	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
High alloyed steel, cast steel and tool steel.	80	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Stainless steel and cast steel.	150	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Stainless steel and cast steel.	120	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Stainless steel and cast steel.	80	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Cast iron nodular (GGG).	180	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Grey cast iron (GG).	170	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Aluminum-cast, alloyed $< 12\% Si$.	770	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Aluminum-cast, alloyed $> 12\% Si$.	310	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Copper alloys.	270	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Titanium Ti alloys.	50	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Hardened steel.	40	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40
Hardened steel.	30	f_z (mm/tooth)	0.02	0.012	0.024	0.014	0.028	0.017	0.034	0.021	0.044	0.026	0.048	0.029	0.054	0.033	0.068	0.041	0.08	0.048
		a_p (mm)	3.20	6.40	5.00	7.00	6.00	8.40	7.00	9.80	9.00	12.60	11.00	15.40	13.00	18.20	17.00	23.80	21.00	29.40

Material		Aluminium si < %10			Aluminium si > %10		
Vc (m / min)		700			300		
Slotting / Shouldering Processing		fz (mm/tooth)	ap (mm)	ae (mm)	fz (mm/tooth)	ap (mm)	ae (mm)
Ø4	Shouldering	0.040	4.0	2.0	0.032	4.0	2.0
	Slotting	0.032	4.0	-	0.026	4.0	-
Ø5	Shouldering	0.050	5.0	2.5	0.040	5.0	2.5
	Slotting	0.040	5.0	-	0.032	5.0	-
Ø6	Shouldering	0.060	6.0	3.0	0.048	6.0	3.0
	Slotting	0.048	6.0	-	0.038	6.0	-
Ø8	Shouldering	0.080	8.0	4.0	0.064	8.0	4.0
	Slotting	0.064	8.0	-	0.051	8.0	-
Ø10	Shouldering	0.100	10.0	5.0	0.080	10.0	5.0
	Slotting	0.080	10.0	-	0.064	10.0	-
Ø12	Shouldering	0.120	12.0	6.0	0.096	12.0	6.0
	Slotting	0.096	12.0	-	0.077	12.0	-
Ø14	Shouldering	0.140	14.0	7.0	0.112	14.0	7.0
	Slotting	0.112	14.0	-	0.090	14.0	-
Ø16	Shouldering	0.160	16.0	8.0	0.128	16.0	8.0
	Slotting	0.128	16.0	-	0.102	16.0	-
Ø20	Shouldering	0.200	20.0	10.0	0.160	20.0	10.0
	Slotting	0.160	20.0	-	0.128	20.0	-

K Series

Shoulder Processing		ap = 0,3 x Ød, (Below R1,0 ; 0,2xØd.)		ae = 0,7 x Ød, (Below R1,0 ; 0,6xØd.)		
R	Vc / fz	Material				
		Carbon Steel , Alloy Steel (Below HRC25) (Below HRC48)		Hardened Steel (Below HRC48)	Cast Iron	Stainless Steel, Ti-alloy etc.
R0,5 ~ R1,4	Vc	160 - 200 - 240	80 - 120 - 160	80 - 100 - 120	80 - 100 - 120	50 - 60 - 75
	fz	0,005 ~ 0,010	0,003 ~ 0,005	0,002 ~ 0,003	0,008 ~ 0,015	0,003 ~ 0,005
R1,5 ~ R2,9	Vc	160 - 200 - 240	80 - 120 - 160	80 - 100 - 120	80 - 100 - 120	50 - 60 - 75
	fz	0,013 ~ 0,025	0,007 ~ 0,013	0,005 ~ 0,008	0,017 ~ 0,042	0,007 ~ 0,013
R3,0 ~ R6,4	Vc	160 - 200 - 240	80 - 120 - 160	80 - 100 - 120	80 - 100 - 120	50 - 60 - 75
	fz	0,030 ~ 0,050	0,017 ~ 0,033	0,010 ~ 0,020	0,056 ~ 0,136	0,017 ~ 0,033
R6,5 ~ R9,9	Vc	160 - 200 - 240	80 - 120 - 160	80 - 100 - 120	80 - 100 - 120	50 - 60 - 75
	fz	0,070 ~ 0,100	0,040 ~ 0,057	0,020 ~ 0,040	0,167 ~ 0,238	0,040 ~ 0,057
R10,0 ~ R20,0	Vc	160 - 200 - 240	80 - 120 - 160	80 - 100 - 120	80 - 100 - 120	50 - 60 - 75
	fz	0,118 ~ 0,167	0,085 ~ 0,095	0,045 ~ 0,080	0,250 ~ 0,350	0,085 ~ 0,095
Vc - m / min fz - mm/tooth						

K Series for High Speed

Corner Radius (mm)	Material									
	Carbon steel, Cast iron (HB150 ~ 250)		Alloy steel, Prehardened steel (HRC 25 ~ 35)		Heat resistant alloys, Titanium alloy (HRC 35 ~ 45)		Hardened steel (HRC 45 ~ 55)		Stainless steel	
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
r = 1	51000	2100	39800	1300	35700	960	35700	960	23700	640
r = 2	25500	2700	19900	1700	17900	1300	17900	1300	11900	830
r = 3	17000	3000	13300	1900	11900	1400	11900	1400	7900	920
r = 4	12800	3100	10000	2000	9000	1500	9000	1500	6000	960
r = 5	10200	3100	8000	2000	7200	1500	7200	1500	4800	960
r = 6	8500	3100	6700	2000	6000	1500	6000	1500	4000	960
Depth and wide of cut	a _p	0,05 x Ø d ₁				0,02 x Ø d ₁		0,05 x Ø d ₁		
	a _e	0,1 x Ø d ₁				0,05 x Ø d ₁		0,1 x Ø d ₁		

Material		Carbon Steels, Alloy Steels (180-250HB)			Stainless Steels, Tool Steels (25-35HRC)			Pre-hardened Steels, Tool Steels (35-45HRC)			Hardened Steels, (45-55HRC)			Hardened Steels, (55-65HRC)			Copper		
d _c (mm)	l _s (mm)	a _p (mm)	RPM (rev/min)	Feed (mm/rev)	a _p (mm)	RPM (rev/min)	Feed (mm/rev)	a _p (mm)	RPM (rev/min)	Feed (mm/rev)	a _p (mm)	RPM (rev/min)	Feed (mm/rev)	a _p (mm)	RPM (rev/min)	Feed (mm/rev)	a _p (mm)	RPM (rev/min)	Feed (mm/rev)
1.0	2	0.100	28750	1350	0.090	26000	1250	0.070	24500	930	0.050	21600	700	0.055	20150	560	0.120	34550	1630
	4	0.070	28750	1350	0.063	26000	1250	0.049	24500	930	0.035	21600	700	0.039	20150	560	0.084	34550	1630
	6	0.040	25900	1120	0.036	23350	1000	0.028	22000	770	0.020	19450	575	0.022	18150	465	0.048	31100	1345
	8	0.040	25900	1120	0.036	23350	1000	0.028	22000	770	0.020	19450	575	0.022	18150	465	0.048	31100	1345
	10	0.025	25900	1120	0.023	23350	1000	0.018	22000	770	0.013	19450	575	0.014	18150	465	0.030	31100	1345
	12	0.025	23000	870	0.023	20750	785	0.018	19600	500	0.013	17300	445	0.014	16150	350	0.030	27650	1045
	14	0.025	23000	870	0.023	20750	785	0.018	19600	500	0.013	17300	445	0.014	16150	350	0.030	27650	1045
1.2	16	0.015	23000	750	0.014	20750	670	0.011	19600	475	0.008	17300	375	0.008	16150	280	0.018	27650	895
	6	0.084	25500	1200	0.076	23000	1100	0.059	21750	760	0.042	19200	570	0.046	17900	460	0.101	30700	1450
1.4	12	0.030	23000	1000	0.027	20750	900	0.021	19600	685	0.015	17300	515	0.017	16150	415	0.036	27650	1200
	6	0.100	22500	1060	0.090	20200	950	0.070	19000	670	0.050	16800	500	0.055	15700	400	0.120	26900	1270
	10	0.056	20000	870	0.050	18200	785	0.039	17150	600	0.028	15100	450	0.031	14100	360	0.067	24200	1045
	16	0.035	18000	680	0.032	16150	600	0.025	15250	390	0.018	13450	345	0.019	12550	270	0.042	21500	810
1.5	4	0.110	22500	1060	0.099	20200	950	0.077	19000	670	0.055	16800	500	0.061	15700	400	0.132	26900	1270
	6	0.110	22500	1060	0.099	20200	950	0.077	19000	670	0.055	16800	500	0.061	15700	400	0.132	26900	1270
	10	0.060	20000	870	0.054	18150	785	0.042	17150	600	0.030	15100	450	0.033	14100	360	0.072	24200	1045
	12	0.060	20000	870	0.054	18150	785	0.042	17150	600	0.030	15100	450	0.033	14100	360	0.072	24200	1045
	16	0.038	18000	680	0.034	16150	610	0.027	15250	390	0.019	13450	345	0.021	12550	270	0.046	21500	810
	18	0.038	18000	680	0.034	16150	610	0.027	15250	390	0.019	13450	345	0.021	12550	270	0.046	21500	810
	25	0.023	13500	440	0.021	12100	390	0.016	11450	380	0.012	10100	220	0.013	9400	185	0.028	16150	525
1.6	6	0.110	20800	1100	0.099	18750	985	0.077	17700	690	0.055	15600	515	0.061	14550	415	0.132	25000	1310
	12	0.064	18700	960	0.058	16850	810	0.045	16000	620	0.032	14000	465	0.035	13100	370	0.077	22500	1080
	20	0.040	16550	760	0.036	15000	630	0.028	14150	400	0.020	12500	355	0.022	11700	290	0.048	20000	840
1.8	8	0.130	20800	1100	0.117	18750	985	0.091	17700	690	0.065	15600	515	0.072	14600	415	0.156	25000	1310
	14	0.072	18700	960	0.065	16850	810	0.050	16000	620	0.036	14000	465	0.040	13100	370	0.086	22500	1080
	20	0.045	16550	760	0.041	15000	630	0.032	14150	400	0.023	12500	355	0.025	11700	290	0.054	20000	840
2.0	4	0.200	16800	1060	0.180	15100	950	0.140	14300	670	0.100	12600	500	0.110	11750	400	0.240	20150	1270
	6	0.200	16800	1060	0.180	15100	950	0.140	14300	670	0.100	12600	500	0.110	11750	400	0.240	20150	1270
	8	0.140	16800	1060	0.126	15100	950	0.098	14300	670	0.070	12600	500	0.077	11750	400	0.168	20150	1270
	10	0.140	16800	1060	0.126	15100	950	0.098	14300	670	0.070	12600	500	0.077	11750	400	0.168	20150	1270
	12	0.080	15100	870	0.072	13600	785	0.056	12850	600	0.040	11350	450	0.044	10600	360	0.096	18150	1045
	16	0.080	15100	870	0.072	13600	785	0.056	12850	600	0.040	11350	450	0.044	10600	360	0.096	18150	1045
	20	0.050	15100	870	0.045	13600	785	0.035	12850	600	0.025	11350	450	0.028	10600	360	0.060	18150	1045
	25	0.050	13450	680	0.045	12100	610	0.035	11450	390	0.025	10100	345	0.028	9400	270	0.060	16150	810
	30	0.030	13450	680	0.027	12100	610	0.021	11450	390	0.015	10100	345	0.017	9400	270	0.036	16150	810
	12	0.180	14400	1140	0.162	13000	1000	0.126	12250	715	0.090	10800	535	0.099	10000	430	0.216	17300	1360
2.5	20	0.100	12950	940	0.090	11700	850	0.070	11000	640	0.050	9700	480	0.055	9080	390	0.120	15550	1120
	8	0.300	12800	1010	0.270	11500	910	0.210	10900	635	0.150	9600	475	0.165	8950	380	0.360	15360	1210
	12	0.210	12800	1010	0.189	11500	910	0.147	10900	635	0.105	9600	475	0.116	8950	380	0.252	15360	1210
	20	0.120	11500	830	0.108	10400	750	0.084	9800	570	0.060	8650	430	0.066	8070	345	0.144	13825	995
3.0	30	0.080	11500	830	0.072	10400	750	0.056	9800	570	0.040	8650	430	0.044	8070	345	0.096	13825	995
	12	0.400	9400	1900	0.360	8500	1500	0.280	8000	1360	0.200	7050	900	0.220	6600	730	0.480	11500	2300
	20	0.280	8450	1700	0.252	7600	1370	0.196	7200	1220	0.140	6350	810	0.154	5920	655	0.336	10350	2070
	30	0.160	8450	1530	0.144	7600	1250	0.112	7200	1100	0.080	6350	810	0.088	5920	655	0.192	10350	1863
4.0	40	0.100	7600	1370	0.090	6850	1110	0.070	6480	990	0.050	5710	730	0.055	5330	590	0.120	9140	1645

Material			Carbon Steels, Alloy Steels (180-250HB)			Stainless Steels, Tool Steels (25-35HRC)			Pre-hardened Steels, Tool Steels (35-45HRC)			Hardened Steels, (45-55HRC)			Hardened Steels, (55-65HRC)			Copper		
d ₁ (mm)	R (mm)	L ₂ (mm)	a _p (mm)	RPM (rev/min)	Feed (mm/min)	a _p (mm)	RPM (rev/min)	Feed (mm/min)	a _p (mm)	RPM (rev/min)	Feed (mm/min)	a _p (mm)	RPM (rev/min)	Feed (mm/min)	a _p (mm)	RPM (rev/min)	Feed (mm/min)	a _p (mm)	RPM (rev/min)	Feed (mm/min)
1.0	0.2	2																		
		4	0.070	32400	1360	0.063	29150	1220	0.056	27540	1040	0.046	24300	815	0.042	22700	670	0.084	39000	1630
		6	0.040	26250	990	0.036	23600	890	0.032	22300	840	0.026	19680	660	0.024	18370	540	0.048	31500	1190
		8	0.040	23330	880	0.036	21000	790	0.032	19630	750	0.026	17500	590	0.024	16330	480	0.048	28000	1060
		10	0.025	20400	770	0.023	18370	690	0.020	17350	655	0.016	15310	515	0.015	14300	420	0.030	25000	925
		12	0.025	18150	610	0.023	16300	550	0.020	15420	450	0.016	13600	400	0.015	12700	320	0.030	21800	730
		14																		
		16	0.015	18150	530	0.014	16300	480	0.012	15420	420	0.010	13600	345	0.009	12700	270	0.018	21800	640
		18																		
20	0.010	13600	400	0.009	12250	360	0.008	11570	315	0.007	10200	260	0.006	9530	200	0.012	16350	480		
1.5	0.2	4	0.070	24950	1130	0.063	22450	1020	0.056	20960	870	0.046	18710	680	0.042	17370	560	0.084	30000	1360
		8	0.060	22700	1030	0.054	20400	925	0.048	19280	875	0.039	17010	685	0.036	15880	560	0.072	27250	1230
		12	0.060	18150	820	0.054	16330	740	0.048	15400	700	0.039	13610	550	0.036	12700	450	0.072	21800	990
		15	0.038	14100	570	0.034	12700	510	0.030	12000	425	0.025	10585	375	0.023	9880	300	0.046	17000	680
		20	0.030	14100	570	0.027	12700	510	0.024	12000	425	0.020	10585	375	0.018	9880	300	0.036	17000	680
2.0	0.2	4																		
		8	0.070	18900	1490	0.063	17000	1340	0.056	16070	1265	0.046	14175	890	0.042	13230	800	0.084	22700	1780
		12	0.040	15300	1085	0.036	13780	975	0.032	13000	920	0.026	11480	720	0.024	10715	730	0.048	18400	1300
		16	0.040	13600	970	0.036	12250	870	0.032	11570	820	0.026	10200	640	0.024	9530	590	0.048	16350	1160
		20	0.035	11900	845	0.032	10700	760	0.028	10120	715	0.023	8930	560	0.021	8335	525	0.042	14300	1010
	25	0.025	11900	845	0.023	10700	760	0.020	10120	715	0.016	8930	560	0.015	8335	460	0.030	14300	1010	
	30	0.017	11300	800	0.015	10180	720	0.014	9615	680	0.011	8485	535	0.010	7920	460	0.020	13600	960	
	0.5	4																		
		8	0.140	18900	1650	0.126	17000	1490	0.112	16065	1400	0.091	14175	990	0.084	13230	800	0.168	22700	1980
		12	0.080	15300	1204	0.072	13780	1080	0.064	13000	1025	0.052	11480	800	0.048	10715	810	0.096	18400	1450
16		0.080	13600	1070	0.072	12250	965	0.064	11570	910	0.052	10200	710	0.048	9530	655	0.096	16350	1280	
20		0.050	11900	940	0.045	10700	845	0.040	10120	800	0.033	8930	625	0.030	8335	585	0.060	14300	1120	
3.0	0.2	25	0.050	11900	940	0.045	10700	845	0.040	10120	800	0.033	8930	625	0.030	8335	510	0.060	14300	1120
		30	0.030	11300	890	0.027	10180	800	0.024	9615	760	0.020	8485	595	0.018	7920	510	0.036	13600	1070
		8	0.090	14400	1415	0.081	12960	1275	0.072	12240	1205	0.059	10800	850	0.054	10080	695	0.108	17300	1700
		12	0.070	14400	1415	0.063	12960	1275	0.056	12240	1205	0.046	10800	850	0.042	10080	695	0.084	17300	1700
		16	0.050	14400	1415	0.045	12960	1275	0.040	12240	1205	0.033	10800	850	0.030	10080	695	0.060	17300	1700
	0.5	20	0.050	11670	1150	0.045	10500	1030	0.040	9915	975	0.033	8750	765	0.030	8165	625	0.060	14000	1380
		30	0.040	9070	1150	0.036	8170	1030	0.032	7710	975	0.026	6800	765	0.024	6350	625	0.048	10900	1380
		8	0.180	14400	1570	0.162	12960	1415	0.144	12240	1340	0.117	10800	945	0.108	10080	770	0.216	17300	1890
		12	0.130	14400	1570	0.117	12960	1415	0.104	12240	1340	0.085	10800	945	0.078	10080	770	0.156	17300	1890
		16	0.100	14400	1570	0.090	12960	1415	0.080	12240	1340	0.065	10800	945	0.060	10080	770	0.120	17300	1890
	0.5	20	0.100	11670	1275	0.090	10500	1150	0.080	9915	1085	0.065	8750	850	0.060	8165	695	0.120	14000	1530
		30	0.080	9070	1275	0.072	8170	1150	0.064	7710	1085	0.052	6800	850	0.048	6350	695	0.096	10900	1530

Material			Carbon Steels, Alloy Steels (180-250HB)			Stainless Steels, Tool Steels (25-35HRC)			Pre-hardened Steels, Tool Steels (35-45HRC)			Hardened Steels, (45-55HRC)			Hardened Steels, (55-65HRC)			Copper		
d ₁ (mm)	R (mm)	l ₁ (mm)	a _p (mm)	RPM	Feed (mm/min)	a _p (mm)	RPM	Feed (mm/min)	a _p (mm)	RPM	Feed (mm/min)	a _p (mm)	RPM	Feed (mm/min)	a _p (mm)	RPM	Feed (mm/min)	a _p (mm)	RPM	Feed (mm/min)
1.0	0.5	10	0.025	32400	1460	0.023	29150	1310	0.020	27540	1115	0.016	24300	920	0.015	22700	815	0.030	39000	1750
		12	0.025	28800	1275	0.023	25920	1100	0.020	24480	940	0.016	21600	770	0.015	20150	685	0.030	34560	1470
		14	0.020	28800	1225	0.018	25920	1100	0.016	24480	940	0.013	21600	770	0.012	20150	685	0.024	34560	1470
		16	0.015	28800	1225	0.014	25920	1100	0.012	24480	940	0.010	21600	770	0.009	20150	685	0.018	34560	1470
		18	0.012	25200	1010	0.011	22630	910	0.010	21420	770	0.008	18900	635	0.007	17650	565	0.014	30240	1210
		20	0.010	21600	865	0.009	19450	730	0.008	18350	650	0.007	16200	545	0.006	15120	485	0.012	25920	1040
1.2	0.6	8	0.040	28800	1500	0.036	25920	1350	0.032	24480	1225	0.026	21600	950	0.024	20150	805	0.048	34560	1800
		12	0.030	28800	1350	0.027	25920	1215	0.024	24480	1100	0.020	21600	855	0.018	20150	725	0.036	34560	1620
1.4	0.7	8	0.055	25200	1510	0.050	22630	1360	0.044	21420	1160	0.036	18900	985	0.033	17650	880	0.066	30240	1815
		12	0.035	25200	1360	0.032	22630	1225	0.028	21420	1040	0.023	18900	885	0.021	17650	795	0.042	30240	1635
1.5	0.75	16	0.035	22400	1140	0.032	20150	1030	0.028	19040	875	0.023	16800	745	0.021	15680	665	0.042	27000	1370
		4	0.100	28000	1850	0.090	25200	1665	0.080	23800	1430	0.065	21000	1135	0.060	19600	980	0.120	33600	2220
		8	0.060	25200	1500	0.054	22630	1350	0.048	21420	1160	0.039	18900	920	0.036	17640	795	0.072	30240	1800
		12	0.060	25200	1500	0.054	22630	1350	0.048	21420	1160	0.039	18900	920	0.036	17640	795	0.072	30240	1800
		16	0.038	22400	1260	0.034	20150	1130	0.030	19040	970	0.025	16800	770	0.023	15680	665	0.046	27000	1510
		20	0.038	22400	1260	0.034	20150	1130	0.030	19040	970	0.025	16800	770	0.023	15680	665	0.046	27000	1510
1.6	0.8	8	0.110	26000	1820	0.099	23400	1640	0.088	22130	1370	0.072	19500	1170	0.066	18200	1020	0.132	31200	2185
		12	0.065	23400	1475	0.059	21090	1330	0.052	19900	1110	0.042	17550	950	0.039	16380	825	0.078	28000	1770
		16	0.040	23400	1475	0.036	21090	1330	0.032	19900	1110	0.026	17550	950	0.024	16380	825	0.048	28000	1770
		20	0.040	20800	1240	0.036	18750	1115	0.032	17680	930	0.026	15600	780	0.024	14560	695	0.048	25000	1485
1.8	0.9	8	0.130	26000	2080	0.117	23400	1670	0.104	22130	1550	0.085	19500	1290	0.078	18200	1090	0.156	31200	2500
		12	0.070	23400	1685	0.063	21090	1520	0.056	19900	1255	0.046	17550	1045	0.042	16380	885	0.084	28000	2020
		16	0.045	23400	1685	0.041	21090	1520	0.036	19900	1255	0.029	17550	1045	0.027	16380	885	0.054	28000	2020
		20	0.045	20800	1415	0.041	18750	1280	0.036	17680	1050	0.029	15600	875	0.027	14560	745	0.054	26000	1700
2.0	1.0	3	0.200	21000	2100	0.180	18900	1890	0.160	17850	1610	0.130	15750	1355	0.120	14700	1175	0.240	23200	2320
		4	0.200	21000	2100	0.180	18900	1890	0.160	17850	1610	0.130	15750	1355	0.120	14700	1175	0.240	23200	2320
		6	0.200	21000	1890	0.180	18900	1700	0.160	17850	1430	0.130	15750	1200	0.120	14700	1060	0.240	23200	2270
		8	0.140	21000	1630	0.126	18900	1700	0.112	17850	1430	0.091	15750	1200	0.084	14700	1060	0.160	23200	2270
		10	0.140	21000	1630	0.126	18900	1510	0.112	17850	1285	0.091	15750	1070	0.084	14700	940	0.160	23200	2020
		12	0.080	18900	1510	0.072	17000	1360	0.064	16055	1160	0.052	14175	965	0.048	13230	850	0.095	22700	1815
		16	0.080	18900	1330	0.072	17000	1225	0.064	16055	1041	0.052	14175	868	0.048	13230	760	0.095	22700	1635
		20	0.050	18900	1350	0.045	17000	1225	0.040	16055	1041	0.033	14175	868	0.031	13230	760	0.060	22700	1635
		25	0.050	16800	1140	0.045	15150	1030	0.040	14280	875	0.033	12000	730	0.031	11760	640	0.060	20200	1370
		30	0.030	16800	1140	0.027	15150	1030	0.024	14280	875	0.020	12600	730	0.018	11760	640	0.035	20200	1370
		35	0.025	14700	940	0.023	13250	850	0.020	12500	720	0.015	11025	600	0.015	10300	530	0.030	17650	1130
		40	0.022	12600	805	0.020	11350	730	0.018	10700	620	0.014	9450	515	0.013	8800	450	0.025	15150	970
3.0	1.5	8	0.300	16000	2400	0.270	14400	2160	0.240	13600	1820	0.195	12000	1512	0.181	11200	1345	0.360	19200	2900
		10	0.210	16000	2400	0.189	14400	2160	0.168	13600	1820	0.137	12000	1512	0.125	11200	1345	0.252	19200	2900
		16	0.210	16000	2150	0.189	14400	1945	0.168	13600	1640	0.137	12000	1360	0.125	11200	1210	0.252	19200	2600
		25	0.080	14400	1945	0.072	13000	1750	0.064	12250	1480	0.052	10800	1225	0.048	10100	1090	0.095	17300	2335
		30	0.080	14400	1945	0.072	13000	1750	0.064	12250	1480	0.052	10800	1225	0.048	10100	1090	0.095	17300	2335
		35	0.080	12800	1630	0.072	11500	1470	0.064	10900	1240	0.052	9600	1030	0.048	8950	915	0.095	15350	1960
4.0	2.0	10	0.400	11500	2300	0.360	10350	2070	0.320	9800	1760	0.260	8625	1465	0.240	8050	1290	0.480	13600	2760
		16	0.280	11500	2300	0.252	10350	2070	0.221	9800	1760	0.182	8625	1465	0.168	8050	1290	0.335	13600	2760
		25	0.160	10350	1855	0.144	9300	1680	0.128	8800	1425	0.104	7765	1200	0.095	7250	1045	0.192	12400	2240
4.0	2.0	35	0.100	10350	1055	0.090	9300	1680	0.080	8800	1425	0.065	7765	1200	0.060	7250	1045	0.120	12400	2240

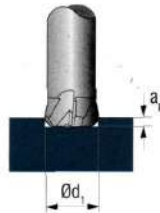
Material	Carbon Steel, Alloy Steel (<30 HRC) Ck55, 070M55, Cast iron GG25		Alloy Steel, Tool Steel (30-45 HRC) W.Nr. 1.2344 (H13)		Austenitic Stainless Steel X5CrNi18-10 X5CrNiMo17-12-2 Titanium alloy		Hardened Steel (45-55 HRC) W.Nr. 1.2344 (H13)		Heat Resistant Alloys Inconel	
Operation	Shoulder Milling		Shoulder Milling		Shoulder Milling		Shoulder Milling		Shoulder Milling	
Dia (mm)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)	RPM (rev/min)	Feed (mm/min)
2	16000	530	10000	320	10000	300	7400	140	3800	55
3	12000	820	7600	470	7600	440	5600	280	2500	80
4	9500	950	6000	520	6000	510	4500	310	1900	110
5	7600	1000	4800	550	4800	540	3600	330	1500	110
6	6300	1100	4000	610	4000	600	3000	330	1300	110
8	4700	1100	3000	630	3000	600	2200	330	960	100
10	3800	1000	2400	610	2400	570	1800	310	760	100
12	3100	980	2000	580	2000	520	1500	280	640	80
16	2300	810	1500	480	1500	420	1100	240	480	65
20	1900	740	1200	430	1200	390	900	220	380	50
Depth of cut	ae ≤ 0.1D ap ≤ 2.5D				ae ≤ 0.05D ap ≤ 2.5D				ae ≤ 0.02D ap ≤ 2.5D	

- When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective. When cutting heat-resistant alloys, the use non water-soluble cutting fluid is recommended.
- The irregular helix flute end mill has a larger effect on controlling the vibrations when compared to standard end mills. However, if the rigidity or the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set the depth of cut smaller.
- For shoulder milling, climb cutting is recommended.

Solid Carbide End Mills

Recommended Cutting Data

Diametres (mm)	Material																	
	Mild Steel Carbon steel, Cast iron (~750 N/mm²)		Alloy steel, Tool Steel, Prehardened Steel (HRC 25 ~ 38)		Hardened Steel Stainless Steel (HRC 38 - 45)		Hardened Steel Heat Resistant Alloys, Titanium Alloy (HRC 45 ~ 55 HRC)		Hardened Steel (HRC 55 ~ 60 HRC)									
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)								
4	15200	12350	15200	11400	11400	8550	11400	7790	7550	3370								
5	11870	13300	11870	12060	9070	9070	9070	8170	6030	3610								
6	10070	13300	10070	12060	7550	9070	7550	8170	5030	3610								
8	7550	13300	7550	12060	5650	9070	5650	8170	3800	3610								
10	6030	13300	6030	12060	4510	9070	4510	8170	3040	3610								
12	5030	13300	5030	12060	3800	9070	3800	8170	2520	3610								
Depth of cut	ap : 0.1 x R						ap		ae		ap		ae					
	ae : 0.3 x Ø d ₁						R ≤ 2		0.1 x R		0.3 x Ø d ₁		R ≤ 2		0.05 x R		0.3 x Ø d ₁	
							2 < r		0.2 mm		0.3 x Ø d ₁		2 < r		0.1 mm		0.3 x Ø d ₁	



Cutting Speed

$$V_c = \frac{\pi \times d_1 \times n}{1000}$$

Feed Rate For End Mills

$$V_f = n \times f_z \times f_n$$

$$n = \frac{1000 \times V_c}{\pi \times d_1}$$

V_c : Cutting speed (m / min)
 d_1 : End Mill diameter (mm)
 n : Revolution (rpm)

V_f : Feed speed (mm / min)
 f_z : Feed per tooth (mm / tooth)
 f_n : Number of teeth

General recommendations for solid carbide end mills

- ▶ In case of vibration, reduce feed and speed.
- ▶ When slotting Stainless Steel it may be necessary to reduce spindle and feed per tooth.
- ▶ For side milling, modify feed to obtain required finish quality.
- ▶ Use high precision machine set up for rigidity.
- ▶ For Ball Nose End Mills with 4 cutting edge use following recommendation is useful if surface have over 30 degree, increase feedrate up to 30%.

Material Group			Cutting Speed Vc m/min.	f, mm/rev.				
				Drill Diameter (mm)				
				3 - 5 mm	5 - 8 mm	8 - 12 mm	12 - 16 mm	16 - 20 mm
Steel and Cast Steel	Low-alloy steel and cast steel up to 600 N/mm ²	Si37 - Si42 - C22 - GS38	65 - 145	0,09 - 0,13	0,16 - 0,23	0,2 - 0,30	0,26 - 0,37	0,28 - 0,40
	Steel and cast steel up to 600 N/mm ²	Si50 - Si60 - C35 - GS52	60 - 140	0,09 - 0,13	0,16 - 0,23	0,2 - 0,30	0,26 - 0,35	0,28 - 0,40
	Steel and cast steel 700 - 1000 N/mm ²	Si70 - C45 - GS62	50 - 120	0,06 - 0,14	0,11 - 0,25	0,14 - 0,31	0,17 - 0,39	0,19 - 0,44
	Steel and cast steel 1000 - 1300 N/mm ²	90MnCrV8 - 100Cr6	40 - 70	0,05 - 0,09	0,09 - 0,16	0,12 - 0,20	0,15 - 0,25	0,16 - 0,27
	Steel and cast steel 1300 - 1600 N/mm ²	X210Cr12 - 34CrAlNi7	30 - 40	0,03 - 0,05	0,06 - 0,08	0,07 - 0,11	0,09 - 0,13	0,1 - 0,15
	Steel hardened	45 - 55 HRC	15 - 30	0,025 - 0,036	0,032 - 0,06	0,05 - 0,072	0,067 - 0,096	0,075 - 0,11
	Steel hardened	55 - 65HRC	10 - 15	0,008 - 0,012	0,009 - 0,015	0,017 - 0,024	0,025 - 0,036	0,025 - 0,036
	Stainless steel ferritic		35 - 85	0,069 - 0,12	0,85 - 0,14	0,15 - 0,26	0,19 - 0,32	0,22 - 0,38
	Stainless steel austenitic, sulphured		40 - 80	0,04 - 0,07	0,07 - 0,13	0,10 - 0,17	0,13 - 0,22	0,15 - 0,25
	Stainless steel hardened		25 - 45	0,04 - 0,07	0,07 - 0,12	0,08 - 0,14	0,11 - 0,18	0,12 - 0,21
Ni and Co alloys	up to 900 N/mm ²		15 - 30	0,03 - 0,05	0,05 - 0,08	0,07 - 0,11	0,09 - 0,13	-
	between 900 - 1200 N/mm ²		10 - 20	0,02 - 0,04	0,05 - 0,07	0,06 - 0,09	0,07 - 0,11	-
	above 1200 N/mm ²		5 - 15	0,02 - 0,03	0,04 - 0,05	0,06 - 0,08	0,07 - 0,09	
Grey and Nodular Cast Iron	up to 200 HB	GG20, GGG40, GTS45	75 - 90	0,15 - 0,25	0,20 - 0,35	0,25 - 0,45	0,30 - 0,50	0,35 - 0,55
	up to 250 HB	GG30, GGG60, GTW40	65 - 80					
	above 250 HB	GG40, GGG70, GTS70	55 - 70	0,12 - 0,20	0,15 - 0,25	0,20 - 0,35	0,25 - 0,40	0,30 - 0,45
Malleable cast iron	between 350 - 450 HB		35 - 60	0,06 - 0,10	0,08 - 0,12	0,10 - 0,14	0,12 - 0,16	0,14 - 0,18
Aluminium	Aluminium ← 10% Si		80 - 300	0,07-0,15	0,10 - 0,25	0,15 - 0,35	0,25 - 0,45	0,30 - 0,50
	Aluminium → 10% Si		70 - 200	0,07-0,15	0,10 - 0,25	0,15 - 0,35	0,25 - 0,45	0,30 - 0,50
Titanium	WASPALOY	NiCr20Co14MoTi	10 - 30	0,02 - 0,5	0,02 - 0,07	0,04 - 0,10	0,06 - 0,12	0,08 - 0,15
	INCONEL	NiCr20Co18MoNb						
	NIMONIC	NiCr20Co18Ti						
	RENE 41	NiCr20Co11TiAl						

MP401 - MP402 - NC90 - NC120, reduce cutting data 30%.

Material Group			Cutting Speed Vc m/min.	f _s mm/rev.				
				Drill Diameter (mm)				
				3 - 5 mm	5 - 8 mm	8 - 12 mm	12 - 16 mm	16 - 20 mm
Steel and Cast Steel	Low-alloy steel and cast steel up to 600 N/mm ²	Si37 - Si42 - C22 - GS38	75 - 180	0,09 - 0,13	0,16 - 0,23	0,2 - 0,29	0,26 - 0,37	0,28 - 0,41
	Steel and cast steel up to 600 N/mm ²	Si50 - Si60 - C35 - GS52	65 - 155	0,09 - 0,13	0,16 - 0,23	0,2 - 0,29	0,26 - 0,37	0,28 - 0,41
	Steel and cast steel 700 - 1000 N/mm ²	Si70 - C45 - GS62	55 - 135	0,06 - 0,14	0,11 - 0,25	0,14 - 0,31	0,17 - 0,39	0,19 - 0,44
	Steel and cast steel 1000 - 1300 N/mm ²	90MnCrV8 - 100Cr6	45 - 80	0,05 - 0,09	0,09 - 0,16	0,12 - 0,2	0,15 - 0,25	0,16 - 0,27
	Steel and cast steel 1300 - 1600 N/mm ²	X210Cr12 - 34CrAlNi7	45 - 80	0,05 - 0,09	0,09 - 0,16	0,12 - 0,2	0,15 - 0,25	0,16 - 0,27
	Steel hardened	45 - 55 HRC	25 - 40	0,025 - 0,036	0,04 - 0,06	0,05 - 0,07	0,065 - 0,095	0,075 - 0,11
	Steel hardened	55 - 65HRC	20 - 30	0,015 - 0,025	0,02 - 0,04	0,03 - 0,05	0,045 - 0,075	0,055 - 0,09
	Stainless steel ferritic		45 - 105	0,070 - 0,12	0,13 - 0,22	0,16 - 0,27	0,2 - 0,34	0,22 - 0,38
	Stainless steel austenitic, sulphured		45 - 85	0,035 - 0,075	0,09 - 0,16	0,12 - 0,21	0,15 - 0,25	0,18 - 0,3
	Stainless steel hardened		35 - 55	0,045 - 0,080	0,075 - 0,13	0,11 - 0,18	0,13 - 0,22	0,15 - 0,25
Ni and Co alloys	up to 900 N/mm ²		25 - 40	0,030 - 0,045	0,055 - 0,080	0,75 - 0,11	0,090 - 0,13	0,11 - 0,16
	between 900 - 1200 N/mm ²		15 - 25	0,025 - 0,035	0,040 - 0,060	0,05 - 0,070	0,065 - 0,095	0,075 - 0,11
	above 1200 N/mm ²		10 - 15	0,020 - 0,030	0,040 - 0,055	0,045 - 0,065	0,060 - 0,080	0,070 - 0,095
Grey and Nodular Cast Iron	up to 200 HB	GG20, GGG40, GTS45	85 - 105	0,15 - 0,25	0,20 - 0,35	0,25 - 0,45	0,30 - 0,50	0,35 - 0,55
	up to 250 HB	GG30, GGG60, GTW40	75 - 90	0,15 - 0,26	0,20 - 0,36	0,25 - 0,46	0,30 - 0,51	0,35 - 0,56
	above 250 HB	GG40, GGG70, GTS70	65 - 80	0,12 - 0,20	0,15 - 0,25	0,20 - 0,35	0,25 - 0,40	0,30 - 0,45
Malleable cast iron	between 350 - 450 HB		40 - 70	0,06 - 0,10	0,08 - 0,12	0,10 - 0,14	0,12 - 0,16	0,14 - 0,18
Aluminium	Aluminium ← 10% Si		100 - 400	0,10 - 0,25	0,15 - 0,35	0,25 - 0,45	0,30 - 0,50	0,35 - 0,55
	Aluminium → 10% Si		90 - 300	0,10 - 0,26	0,15 - 0,36	0,25 - 0,46	0,30 - 0,51	0,35 - 0,56
Titanium	WASPALOY	NiCr20Co14MoTi	15 - 35	0,02 - 0,07	0,04 - 0,10	0,06 - 0,12	0,08 - 0,15	0,08 - 0,18
	INCONEL	NiCr20Co18MoNb						
	NIMONIC	NiCr20Co18Ti						
	RENE 41	NiCr20Co11TiAl						

Material Group			Drilling Depth	Cutting Speed	f, mm/rev.			
			diameter x d	Vc m/min.	Drill Diameter (mm)			
Steel and Cast Steel	Low-alloy steel and cast steel up to 600 N/mm ²	St37 - St42 - C22 - GS38	between 8-12 x d	75 - 150	0,09 - 0,27	0,17 - 0,32	0,24 - 0,32	0,30 - 0,43
			between 12-16 x d	60 - 120	0,08 - 0,26	0,16 - 0,30	0,23 - 0,31	0,28 - 0,40
	Steel and cast steel up to 600 N/mm ²	St50 - St60 - C35 - GS52	between 8-12 x d	75 - 150	0,08 - 0,26	0,16 - 0,30	0,23 - 0,31	0,25 - 0,40
			between 12-16 x d	60 - 120	0,07 - 0,25	0,15 - 0,29	0,21 - 0,30	0,24 - 0,38
	Steel and cast steel 700 - 1000 N/mm ²	St70 - C45 - GS62	between 8-12 x d	60 - 120	0,07 - 0,25	0,14 - 0,29	0,22 - 0,39	0,24 - 0,39
			between 12-16 x d	60 - 100	0,07 - 0,24	0,14 - 0,28	0,20 - 0,28	0,23 - 0,38
	Steel and cast steel 1000 - 1600 N/mm ²	90MnCrVB - 100Cr6	between 8-12 x d	40 - 100	0,04 - 0,16	0,10 - 0,18	0,12 - 0,20	0,14 - 0,22
			between 12-16 x d	30 - 80	0,04 - 0,16	0,10 - 0,18	0,12 - 0,20	0,14 - 0,22
	Stainless steel ferritic		between 8-12 x d	25 - 40	0,05 - 0,16	0,12 - 0,18	0,14 - 0,20	0,16 - 0,24
			between 12-16 x d	20 - 40	0,05 - 0,16	0,12 - 0,18	0,14 - 0,20	0,16 - 0,24
	Stainless steel austenitic, sulphured		between 8-12 x d	40 - 60	0,05 - 0,16	0,12 - 0,18	0,14 - 0,20	0,16 - 0,24
			between 12-16 x d	30 - 50	0,05 - 0,16	0,12 - 0,18	0,14 - 0,20	0,16 - 0,24
Grey and Nodular Cast Iron		GG20, GGG40, GTS45	between 8-12 x d	80 - 140	0,10 - 0,25	0,12 - 0,30	0,14 - 0,35	0,16 - 0,45
			between 12-16 x d	70 - 120	0,08 - 0,27	0,10 - 0,28	0,12 - 0,34	0,15 - 0,42
	up to 250 HB	GG30, GGG40, GTW40	between 8-12 x d	75 - 130	0,10 - 0,25	0,12 - 0,30	0,14 - 0,35	0,16 - 0,45
			between 12-16 x d	60 - 120	0,08 - 0,28	0,10 - 0,28	0,12 - 0,34	0,15 - 0,42
	above 250 HB	GG40, GGG70, GTS70	between 8-12 x d	75 - 100	0,08 - 0,20	0,10 - 0,25	0,12 - 0,30	0,14 - 0,40
			between 12-16 x d	40 - 80	0,06 - 0,18	0,08 - 0,22	0,10 - 0,28	0,12 - 0,35
Malleable cast iron	between 350 - 450 HB		between 8-12 x d	50 - 100	0,07 - 0,19	0,09 - 0,24	0,11 - 0,29	0,13 - 0,39
			between 12-16 x d	40 - 70	0,05 - 0,18	0,07 - 0,22	0,09 - 0,28	0,11 - 0,35
Aluminium	Aluminium ← 10% Si		between 8-12 x d	200 - 450	0,10 - 0,30	0,14 - 0,35	0,18 - 0,40	0,20 - 0,50
			between 12-16 x d	175 - 350	0,09 - 0,28	0,13 - 0,33	0,17 - 0,38	0,19 - 0,48
	Aluminium → 10% Si		between 8-12 x d	150 - 300	0,09 - 0,29	0,13 - 0,34	0,17 - 0,39	0,19 - 0,49
Titanium	WASPALLOY	Ni Cr 20 Co 14 Mo Ti	between 8-12 x d	20 - 40	0,04 - 0,08	0,06 - 0,11	0,08 - 0,14	0,10 - 0,17
	INCONEL	Ni Cr 20 Co 18 Mo Nb	between 12-16 x d	10 - 30	0,03 - 0,07	0,05 - 0,10	0,07 - 0,13	0,09 - 0,16
	NIMONIC	Ni Cr 20 Co 18 Ti						
	RENE 41	Ni Cr 20 Co 11 Ti Al						

R _m [N/mm ²]	HV 10	HB	HRC
240	75	71	
255	80	76	
270	85	81	
285	90	86	
305	95	90	
320	100	95	
335	105	100	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	157	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	
785	245	233	
800	250	238	22
820	255	242	23
835	260	247	24
860	268	255	25
870	272	258	26
900	280	266	27

R _m [N/mm ²]	HV 10	HB	HRC
920	287	273	28
940	293	278	29
970	302	287	30
995	310	295	31
1020	317	301	32
1050	327	311	33
1080	336	319	34
1110	345	328	35
1140	355	337	36
1170	364	346	37
1200	373	354	38
1230	382	363	39
1260	392	372	40
1300	403	383	41
1330	413	393	42
1360	423	402	43
1400	434	413	44
1440	446	424	45
1480	458	435	46
1530	473	449	47
1570	484	460	48
1620	497	472	49
1680	514	488	50
1730	527	501	51
1790	544	517	52
1845	560	532	53
1910	578	549	54
1980	596	567	55
2050	615	584	56
2140	639	607	57
	655	622	58
	675		59
	698		60
	720		61
	745		62
	773		63
	800		64
	829		65
	864		66
	900		67
	940		68

