

STANDARD SOLID CARBIDE K30 END MILLS

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Europa Tool 8TH EDITION




STANDARD SOLID CARBIDE K30

(General purpose carbide material up to Hrc 50)




PRODUCTS	SERIES	DESCRIPTION	PAGE
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Europa Standard


2 FLUTE MICRO GRAIN CARBIDE (METRIC)

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3 FLUTE MICRO GRAIN CARBIDE (METRIC)

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4 FLUTE MICRO GRAIN CARBIDE (METRIC)

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STANDARD SOLID CARBIDE K30




(General purpose carbide material up to Hrc 50)

STANDARD SOLID CARBIDE K30

(General purpose carbide material up to Hrc 50)

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4 FLUTE BALL NOSE MICRO GRAIN CARBIDE (METRIC)





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3 FLUTE THROW AWAY MICRO GRAIN CARBIDE (METRIC)




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DIN Standard




2 FLUTE MICRO GRAIN CARBIDE (METRIC)

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3 FLUTE MICRO GRAIN CARBIDE (METRIC)

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4 FLUTE MICRO GRAIN CARBIDE (METRIC)

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Europa Standard


2 FLUTE MICRO GRAIN CARBIDE (IMPERIAL)

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4 FLUTE MICRO GRAIN CARBIDE (IMPERIAL)

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2 FLUTE BALL NOSE MICRO GRAIN CARBIDE (IMPERIAL)

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	513303	STANDARD LENGTH STRAIGHT SHANK	141
	514303	LONG LENGTH STRAIGHT SHANK	142

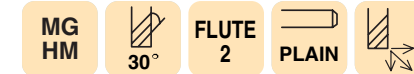
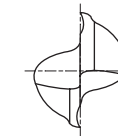
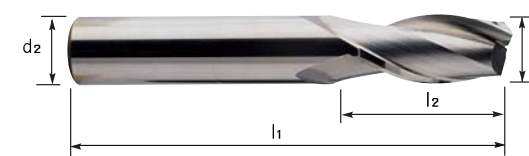
3 FLUTE BALL NOSE MICRO GRAIN CARBIDE (IMPERIAL)

	518303	SHORT LENGTH STRAIGHT SHANK	143
	519303	STANDARD LENGTH STRAIGHT SHANK	144
	520303	LONG LENGTH STRAIGHT SHANK	145

STANDARD SOLID CARBIDE K30

(General purpose carbide material up to Hrc 50)

2 FLUTE, SHORT, STRAIGHT SHANK



Series No. 300303

PRODUCTS

SERIES

DESCRIPTION

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4 FLUTE BALL NOSE MICRO GRAIN CARBIDE (IMPERIAL)

	516303	SHORT LENGTH STRAIGHT SHANK	146
	515303	STANDARD LENGTH STRAIGHT SHANK	147
	517303	LONG LENGTH STRAIGHT SHANK	148

3 FLUTE THROW AWAY MICRO GRAIN CARBIDE (IMPERIAL)

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CUTTING DATA

150/162

TWO FLUTE MICRO GRAIN CARBIDE END MILLS

Short Length, 2 Flute, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 2 Schneiden, Zentrumschneidend, mit Zylinderschaft

FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Korte lengte, 2 groeven, centerfrees met rechte schacht

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Corta, 2 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3003030100	3003230100	3003090100
2.0		4.0		3003030200	3003230200	3003090200
3.0		6.0		3003030300	3003230300	3003090300
4.0	4.0	8.0	51.0	3003030400	3003230400	3003090400
5.0	6.0	10.0		3003030500	3003230500	3003090500
6.0		12.0		3003030600	3003230600	3003090600
8.0	10.0	12.0	51.0	3003030800	3003230800	3003090800
10.0	10.0	16.0	51.0	3003031000	3003231000	3003091000
12.0	12.0	19.0	63.0	3003031200	3003231200	3003091200

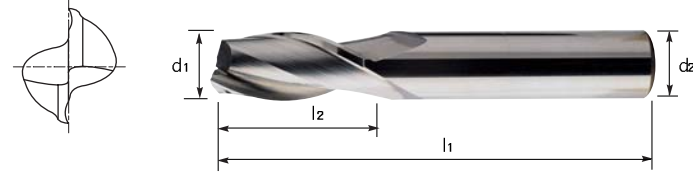
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in μm / Tolerance range in μm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, STANDARD, STRAIGHT SHANK



Series No. 301303



TWO FLUTE MICRO GRAIN CARBIDE END MILLS

Standard Length, 2 Flute, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 2 Schneiden, Zentrumschneidend, mit Zylinderschaft

FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Korte lengte, 2 groeven, centerfrees met rechte schacht

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Corta, 2 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3013030100	3013230100	3013090100
1.5		4.5		3013030150	3013230150	3013090150
2.0		6.3		3013030200	3013230200	3013090200
2.5		9.5		3013030250	3013230250	3013090250
3.0		12.0		3013030300	3013230300	3013090300
3.5	4.0	12.0	50.0	3013030350	3013230350	3013090350
4.0		14.0		3013030400	3013230400	3013090400
4.5		16.0		3013030450	3013230450	3013090450
5.0	6.0	16.0	58.0	3013030500	3013230500	3013090500
6.0		19.0		3013030600	3013230600	3013090600
7.0	8.0	19.0	63.0	3013030700	3013230700	3013090700
8.0		20.0		3013030800	3013230800	3013090800
9.0	10.0	22.0	75.0	3013030900	3013230900	3013090900
10.0		22.0		3013031000	3013231000	3013091000
11.0	12.0	25.0	89.0	3013031100	3013231100	3013091100
12.0		25.0		3013031200	3013231200	3013091200
14.0	14.0	32.0	100.0	3013031400	3013231400	3013091400
16.0	16.0	32.0		3013031600	3013231600	3013091600
18.0	18.0	38.0	3013031800	3013231800	3013091800	
20.0	20.0	38.0	3013032000	3013232000	3013092000	
25.0	25.0	38.0	3013032500	3013232500	3013092500	

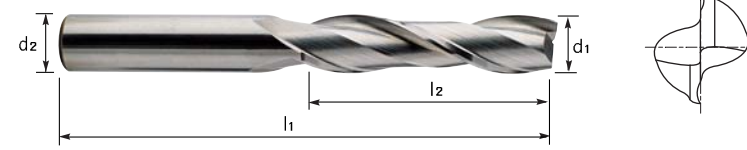
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, LONG, STRAIGHT SHANK



Series No. 302303



TWO FLUTE MICRO GRAIN CARBIDE END MILLS

Long Length, 2 Flute, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Lange Ausführung, 2 Schneiden, Zentrumschneidend, mit Zylinderschaft

FRAISES À RAINURER CARBURE MONOBLOC

Série Longue, 2 Dents, Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Lange lengte, 2 groeven, centerfrees met rechte schacht

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Lunge, 2 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	65.0	3023030300	3023230300	3023090300
4.0	4.0	25.0		3023030400	3023230400	3023090400
5.0	5.0	25.0	75.0	3023030500	3023230500	3023090500
6.0	6.0	25.0		3023030600	3023230600	3023090600
8.0	8.0	25.0		3023030800	3023230800	3023090800
10.0	10.0	38.0	100.0	3023031000	3023231000	3023091000
12.0	12.0	50.0		3023031200	3023231200	3023091200
14.0	14.0	75.0	150.0	3023031400	3023231400	3023091400
16.0	16.0	75.0		3023031600	3023231600	3023091600
18.0	18.0	75.0		3023031800	3023231800	3023091800
20.0	20.0	75.0		3023032000	3023232000	3023092000
25.0	25.0	75.0		3023032500	3023232500	3023092500

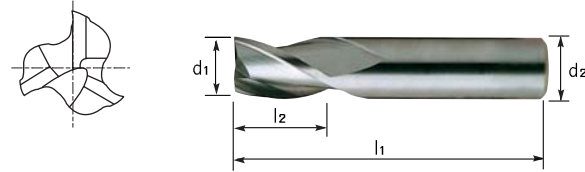
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, SHORT, STRAIGHT SHANK



Series No. 303303



3 FLUTE MICRO GRAIN CARBIDE END MILLS

Short Length, 3 Flute, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 3 Schneiden, Zentrumschneidend, mit Zylinderschaft

FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 3 Dents, Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Korte lengte, 3 groeven, centerfrees met rechte schacht

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Corta, 3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3033030100	3033230100	3033090100
2.0		4.0		3033030200	3033230200	3033090200
3.0		6.0		3033030300	3033230300	3033090300
4.0	4.0	8.0	51.0	3033030400	3033230400	3033090400
5.0	6.0	10.0		3033030500	3033230500	3033090500
6.0		12.0		3033030600	3033230600	3033090600
8.0	8.0	12.0	51.0	3033030800	3033230800	3033090800
10.0	10.0	16.0	51.0	3033031000	3033231000	3033091000
12.0	12.0	19.0	63.0	3033031200	3033231200	3033091200

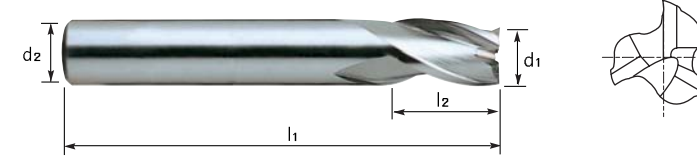
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, STANDARD, STRAIGHT SHANK



Series No. 304303



THREE FLUTE MICRO GRAIN CARBIDE END MILLS

Standard Length, 3 Flute, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 3 Schneiden, Zentrumschneidend, mit Zylinderschaft

FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 3 Dents, Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Korte lengte, 2 groeven, centerfrees met rechte schacht

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Corta, 3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3043030100	3043230100	3043090100
1.5		4.5		3043030150	3043230150	3043090150
2.0		6.3		3043030200	3043230200	3043090200
2.5	4.0	9.5	50.0	3043030250	3043230250	3043090250
3.0		12.0		3043030300	3043230300	3043090300
3.5		14.0		3043030350	3043230350	3043090350
4.0	6.0	16.0	58.0	3043030400	3043230400	3043090400
4.5		19.0		3043030450	3043230450	3043090450
5.0		22.0		3043030500	3043230500	3043090500
6.0	8.0	19.0	63.0	3043030600	3043230600	3043090600
7.0		20.0		3043030700	3043230700	3043090700
8.0		25.0		3043030800	3043230800	3043090800
9.0	10.0	22.0	75.0	3043030900	3043230900	3043090900
10.0		25.0		3043031000	3043231000	3043091000
11.0		25.0		3043031100	3043231100	3043091100
12.0	14.0	25.0	89.0	3043031200	3043231200	3043091200
14.0		32.0		3043031400	3043231400	3043091400
16.0		32.0		3043031600	3043231600	3043091600
18.0	20.0	38.0	100.0	3043031800	3043231800	3043091800
20.0		38.0		3043032000	3043232000	3043092000
25.0		38.0		3043032500	3043232500	3043092500

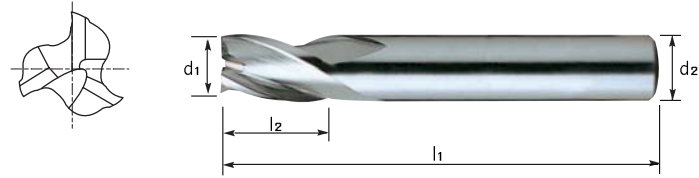
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, LONG, STRAIGHT SHANK



Series No. 305303



THREE FLUTE MICRO GRAIN CARBIDE END MILLS

Long Length, 3 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC

Série Longue, 3 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Lunga, 3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER

Lange Ausführung, 3 Schneiden, Zentrumschneidend, mit Zylinderschaft

DRIE GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Lange lengte, 3 groeven, centerfrees met rechte schacht

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	65.0	3053030300	3053230300	3053090300
4.0	4.0	25.0		3053030400	3053230400	3053090400
5.0	5.0	25.0		3053030500	3053230500	3053090500
6.0	6.0	25.0	75.0	3053030600	3053230600	3053090600
8.0	8.0	25.0		3053030800	3053230800	3053090800
10.0	10.0	38.0	100.0	3053031000	3053231000	3053091000
12.0	12.0	50.0		3053031200	3053231200	3053091200
14.0	14.0	75.0	150.0	3053031400	3053231400	3053091400
16.0	16.0	75.0		3053031600	3053231600	3053091600
18.0	18.0	75.0		3053031800	3053231800	3053091800
20.0	20.0	75.0		3053032000	3053232000	3053092000
25.0	25.0	75.0		3053032500	3053232500	3053092500

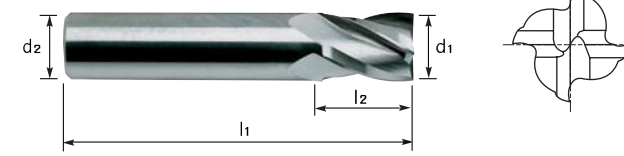
**Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, SHORT, STRAIGHT SHANK



Series No. 309303



FOUR FLUTE MICRO GRAIN CARBIDE END MILLS

Short Length, 4 Flute, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Corta, 4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 4 Schneiden, Zentrumschneidend, mit Zylinderschaft

VIER GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN

Korte lengte, 4 groeven, kogel vinger centerfrees met rechte schacht

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3093030100	3093230100	3093090100
2.0		4.0		3093030200	3093230200	3093090200
3.0		6.0		3093030300	3093230300	3093090300
4.0	4.0	8.0	51.0	3093030400	3093230400	3093090400
5.0	6.0	10.0		3093030500	3093230500	3093090500
6.0		12.0		3093030600	3093230600	3093090600
8.0	8.0	12.0		3093030800	3093230800	3093090800
10.0	10.0	16.0		3093031000	3093231000	3093091000
12.0	12.0	19.0	63.0	3093031200	3093231200	3093091200

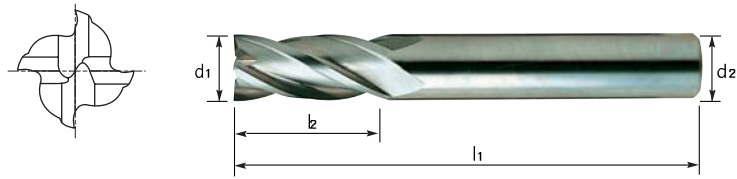
**Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, STANDARD, STRAIGHT SHANK



Series No. 310303



FOUR FLUTE MICRO GRAIN CARBIDE END MILLS

Standard Short Length, 4 Flute, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 4 Schneiden, Zentrumschneidend, mit Zylinderschaft

FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN

Korte lengte, 4 groeven, kogel vinger centerfrees met rechte schacht

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Corta, 4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3103030100	3103230100	3103090100
1.5		4.5		3103030150	3103230150	3103090150
2.0		6.3		3103030200	3103230200	3103090200
2.5		9.5		3103030250	3103230250	3103090250
3.0		12.0		3103030300	3103230300	3103090300
3.5	4.0	12.0	50.0	3103030350	3103230350	3103090350
4.0		14.0		3103030400	3103230400	3103090400
4.5		16.0		3103030450	3103230450	3103090450
5.0	6.0	16.0	58.0	3103030500	3103230500	3103090500
6.0		19.0		3103030600	3103230600	3103090600
7.0	8.0	19.0	63.0	3103030700	3103230700	3103090700
8.0		20.0		3103030800	3103230800	3103090800
9.0	10.0	22.0	75.0	3103030900	3103230900	3103090900
10.0		22.0		3103031000	3103231000	3103091000
11.0		25.0		3103031100	3103231100	3103091100
12.0	12.0	25.0		3103031200	3103231200	3103091200
14.0	14.0	32.0	89.0	3103031400	3103231400	3103091400
16.0	16.0	32.0		3103031600	3103231600	3103091600
18.0	18.0	38.0	100.0	3103031800	3103231800	3103091800
20.0	20.0	38.0		3103032000	3103232000	3103092000
25.0	25.0	38.0		3103032500	3103232500	3103092500

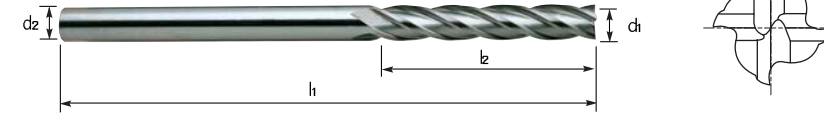
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, LONG, STRAIGHT SHANK



Series No. 311303



FOUR FLUTE MICRO GRAIN CARBIDE END MILLS

Long Length, 4 Flute, Centre Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Lange Ausführung, 4 Schneiden, Zentrumschneidend, mit Zylinderschaft

FRAISES À RAINURER CARBURE MONOBLOC

Série Longue, 4 Dents, Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Lange lengte, 4 groeven, centerfrees met rechte schacht

FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Lunga, 4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	65.0	3113030300	3113230300	3113090300
4.0	4.0	25.0		3113030400	3113230400	3113090400
5.0	5.0	25.0	75.0	3113030500	3113230500	3113090500
6.0	6.0	25.0		3113030600	3113230600	3113090600
8.0	8.0	25.0		3113030800	3113230800	3113090800
10.0	10.0	38.0	100.0	3113031000	3113231000	3113091000
12.0	12.0	50.0		3113031200	3113231200	3113091200
12.0		75.0	3113039001	3113239001	3113099001	
14.0	14.0	75.0	150.0	3113031400	3113231400	3113091400
16.0	16.0	75.0		3113031600	3113231600	3113091600
18.0	18.0	75.0		3113031800	3113231800	3113091800
20.0	20.0	75.0		3113032000	3113232000	3113092000
25.0	25.0	75.0		3113032500	3113232500	3113092500

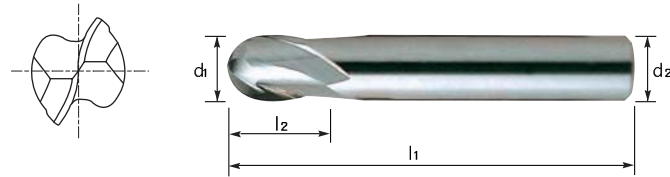
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, SHORT, BALL NOSE, SHORT REACH



Series No. 312303



TWO FLUTE MICRO GRAIN CARBIDE BALL END MILLS

Short Length, 2 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL RADIUSFRÄSER

KurzeAusführung, 2 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES À BOUT SPHERIQUE CARBURE MONOBLOC

Série Courte, 2 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN

Korte lengte, 2 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Corta, 2 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3123030100	3123230100	3123090100
2.0		4.0		3123030200	3123230200	3123090200
3.0		6.0		3123030300	3123230300	3123090300
4.0	4.0	8.0	51.0	3123030400	3123230400	3123090400
5.0	6.0	10.0		3123030500	3123230500	3123090500
6.0		12.0		3123030600	3123230600	3123090600
8.0	10.0	12.0		3123030800	3123230800	3123090800
10.0	10.0	16.0		3123031000	3123231000	3123091000
12.0	12.0	19.0	63.0	3123031200	3123231200	3123091200

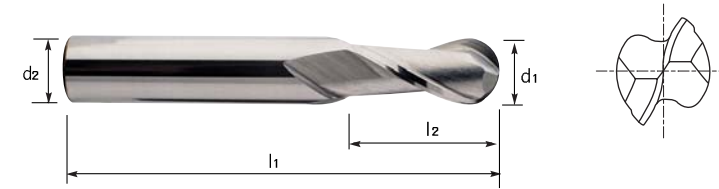
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, STANDARD, BALL NOSE



Series No. 313303



TWO FLUTE MICRO GRAIN CARBIDE BALL END MILLS

Standard Length, 2 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL RADIUSFRÄSER

KurzeAusführung, 2 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES À BOUT SPHERIQUE CARBURE MONOBLOC

Série Courte, 2 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN

Korte lengte, 2 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Corta, 2 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3133030100	3133230100	3133090100
1.5		4.5		3133030150	3133230150	3133090150
2.0		6.3		3133030200	3133230200	3133090200
2.5	4.0	9.5	50.0	3133030250	3133230250	3133090250
3.0		12.0		3133030300	3133230300	3133090300
3.5	6.0	12.0	58.0	3133030350	3133230350	3133090350
4.0		14.0		3133030400	3133230400	3133090400
4.5	8.0	16.0	75.0	3133030450	3133230450	3133090450
5.0		19.0		3133030500	3133230500	3133090500
6.0	10.0	19.0	89.0	3133030600	3133230600	3133090600
7.0		20.0		3133030700	3133230700	3133090700
8.0	12.0	20.0	100.0	3133030800	3133230800	3133090800
9.0		22.0		3133030900	3133230900	3133090900
10.0	14.0	22.0	89.0	3133031000	3133231000	3133091000
11.0		25.0		3133031100	3133231100	3133091100
12.0	16.0	25.0	100.0	3133031200	3133231200	3133091200
14.0		32.0		3133031400	3133231400	3133091400
16.0	18.0	32.0	89.0	3133031600	3133231600	3133091600
18.0		38.0		3133031800	3133231800	3133091800
20.0	20.0	38.0	100.0	3133032000	3133232000	3133092000
25.0		38.0		3133032500	3133232500	3133092500

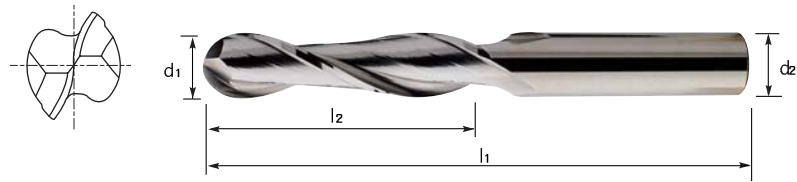
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, BALL NOSE, LONG REACH



Series No. 314303



TWO FLUTE MICRO GRAIN CARBIDE BALL END MILLS

Long Length, 2 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Lange Ausführung, 2 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES À BOUT SPHERIQUE CARBURE MONOBLOC

Série Longue, 2 Dents, à Bout Sphérique Coupe au Centre, à Queue Cylindrique

TWEE GROEVEN MICROKORREL CARBIDE KOGEL VINGERFREZEN

Lange lengte, 2 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Lunga, 2 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	75.0	3143030300	3143230300	3143090300
4.0	4.0	25.0		3143030400	3143230400	3143090400
5.0	6.0	25.0		3143030500	3143230500	3143090500
6.0	6.0	25.0		3143030600	3143230600	3143090600
8.0	8.0	25.0		3143030800	3143230800	3143090800
10.0	10.0	38.0	100.0	3143031000	3143231000	3143091000
12.0	12.0	50.0		3143031200	3143231200	3143091200
14.0	14.0	75.0	150.0	3143031400	3143231400	3143091400
16.0	16.0	75.0		3143031600	3143231600	3143091600
18.0	18.0	75.0		3143031800	3143231800	3143091800
20.0	20.0	75.0		3143032000	3143232000	3143092000
25.0	25.0	75.0		3143032500	3143232500	3143092500

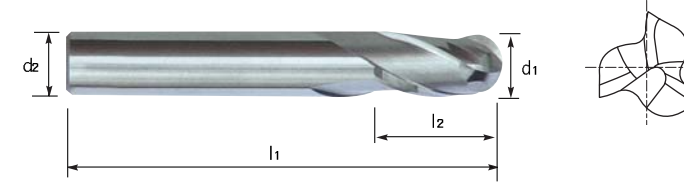
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, SHORT, BALL NOSE, SHORT REACH



Series No. 306303



THREE FLUTE MICRO GRAIN CARBIDE CUTTERS

Short Length, 3 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 3 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES POUR MATRICES CARBURE MONOBLOC

Série Courte, 3 Dents, à Bout Sphérique Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN

Korte lengte, 3 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Corta, 3 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3063030100	3063230100	3063090100
2.0		4.0		3063030200	3063230200	3063090200
3.0		6.0		3063030300	3063230300	3063090300
4.0	4.0	8.0	51.0	3063030400	3063230400	3063090400
5.0	6.0	10.0		3063030500	3063230500	3063090500
6.0		12.0		3063030600	3063230600	3063090600
8.0	8.0	12.0		3063030800	3063230800	3063090800
10.0	10.0	16.0		3063031000	3063231000	3063091000
12.0	12.0	19.0	63.0	3063031200	3063231200	3063091200

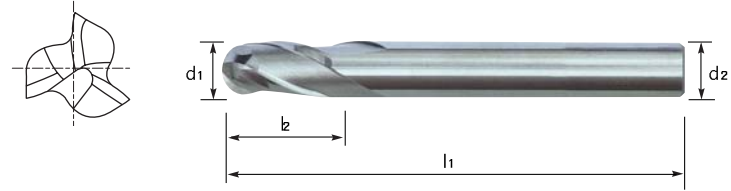
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, STANDARD, BALL NOSE



Series No. 307303



THREE FLUTE MICRO GRAIN CARBIDE CUTTERS

Standard Length, 3 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 3 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES POUR MATRICES CARBURE MONOBLOC

Série Courte, 3 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN

Korte lengte, 3 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Corta, 3 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3073030100	3073230100	3073090100
2.0		6.3		3073030200	3073230200	3073090200
3.0		12.0		3073030300	3073230300	3073090300
4.0	4.0	14.0	50.0	3073030400	3073230400	3073090400
5.0	6.0	16.0		3073030500	3073230500	3073090500
6.0		19.0	3073030600	3073230600	3073090600	
8.0		8.0	20.0	63.0	3073030800	3073230800
10.0	10.0	22.0	75.0	3073031000	3073231000	3073091000
12.0	12.0	25.0		3073031200	3073231200	3073091200
16.0	16.0	32.0		89.0	3073031600	3073231600

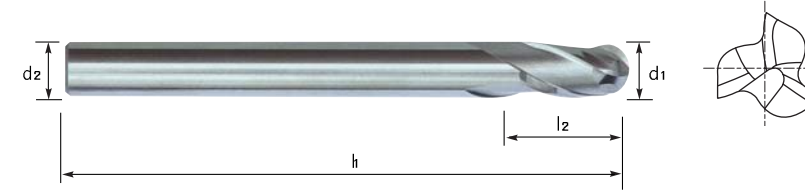
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, LONG, BALL NOSE



Series No. 308303



THREE FLUTE MICRO GRAIN CARBIDE CUTTERS

Long Length, 3 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL GESENKFRÄSER

Lange Ausführung, 3 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES POUR MATRICES CARBURE MONOBLOC

Série Longue, 3 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN

Lange lengte, 3 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Lunga, 3 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	75.0	3083030300	3083230300	3083090300
4.0	4.0	25.0		3083030400	3083230400	3083090400
5.0	6.0	25.0		3083030500	3083230500	3083090500
6.0	6.0	25.0		3083030600	3083230600	3083090600
8.0	8.0	25.0	100.0	3083030800	3083230800	3083090800
10.0	10.0	38.0		3083031000	3083231000	3083091000
12.0	12.0	50.0		3083031200	3083231200	3083091200
16.0	16.0	75.0		3083031600	3083231600	3083091600
20.0	20.0	75.0	150.0	3083032000	3083232000	3083092000
25.0	25.0	75.0		3083032500	3083232500	3083092500

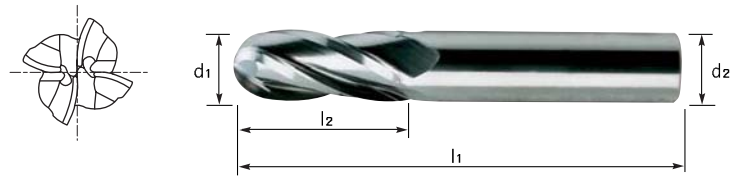
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, BALL NOSE, SHORT REACH



Series No. 317303



FOUR FLUTE MICRO GRAIN CARBIDE CUTTERS

Short Length, 4 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 4 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES POUR MATRICES CARBURE MONOBLOC

Série Courte, 4 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN

Korte lengte, 4 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Corta, 4 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	2.0	39.0	3173030100	3173230100	3173090100
2.0		4.0		3173030200	3173230200	3173090200
3.0		6.0		3173030300	3173230300	3173090300
4.0	4.0	8.0	51.0	3173030400	3173230400	3173090400
5.0	6.0	10.0		3173030500	3173230500	3173090500
6.0		12.0		3173030600	3173230600	3173090600
8.0	8.0	12.0		3173030800	3173230800	3173090800
10.0	10.0	16.0		3173031000	3173231000	3173091000
12.0	12.0	19.0	63.0	3173031200	3173231200	3173091200

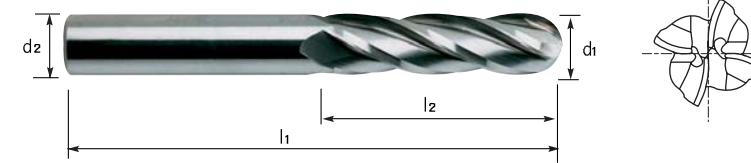
**Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, STANDARD, BALL NOSE



Series No. 315303



FOUR FLUTE MICRO GRAIN CARBIDE CUTTERS

Standard Length, 4 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 4 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES POUR MATRICES CARBURE MONOBLOC

Série Courte, 4 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN

Korte lengte, 4 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Corta, 4 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1.0	3.0	4.0	38.0	3153030100	3153230100	3153090100
1.5		4.5		3153030150	3153230150	3153090150
2.0		6.3		3153030200	3153230200	3153090200
2.5		9.5		3153030250	3153230250	3153090250
3.0		12.0		3153030300	3153230300	3153090300
3.5	4.0	12.0	50.0	3153030350	3153230350	3153090350
4.0		14.0		3153030400	3153230400	3153090400
4.5		16.0		3153030450	3153230450	3153090450
5.0	6.0	16.0	58.0	3153030500	3153230500	3153090500
6.0		19.0		3153030600	3153230600	3153090600
7.0	8.0	19.0	63.0	3153030700	3153230700	3153090700
8.0		20.0		3153030800	3153230800	3153090800
9.0		22.0		3153030900	3153230900	3153090900
10.0	10.0	22.0	75.0	3153031000	3153231000	3153091000
11.0		25.0		3153031100	3153231100	3153091100
12.0	12.0	25.0	89.0	3153031200	3153231200	3153091200
14.0		32.0		3153031400	3153231400	3153091400
16.0	16.0	32.0	100.0	3153031600	3153231600	3153091600
18.0		38.0		3153031800	3153231800	3153091800
20.0		38.0		3153032000	3153232000	3153092000
25.0	25.0	38.0		3153032500	3153232500	3153092500

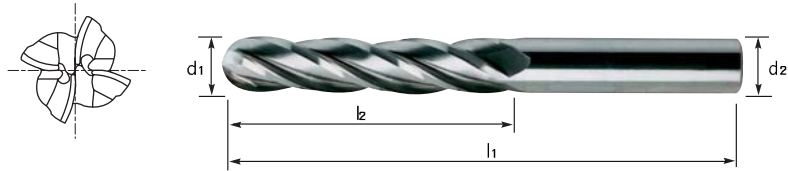
**Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161**

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, BALL NOSE, LONG LENGTH



Series No. 316303



FOUR FLUTE MICRO GRAIN CARBIDE CUTTERS

Long Length, 4 Flute, Ball end, Center Cutting, with Straight Shank

VOLLHARTMETAL GESENKFRÄSER

Lange Ausführung, 4 Schneiden, Runder Stirn Zentrumschneidend, mit Zylinderschaft

FRAISES POUR MATRICES CARBURE MONOBLOC

Série Longue, 4 Dents, à Bout Spherique Coupe au Centre, à Queue Cylindrique

VIER GROEVEN MICROKORREL CARBIDE MATRIJZENFREZEN

Lange lengte, 4 groeven kogel vinger centerfrees met rechte schacht

FRESE PER STAMPI IN CARBURO MONOBLOCCO

Serie Lunga, 4 Taglienti, per Stampi, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	25.0	75.0	3163030300	3163230300	3163090300
4.0	4.0	25.0		3163030400	3163230400	3163090400
5.0	6.0	25.0		3163030500	3163230500	3163090500
6.0	6.0	25.0		3163030600	3163230600	3163090600
8.0	8.0	25.0		3163030800	3163230800	3163090800
10.0	10.0	38.0	100.0	3163031000	3163231000	3163091000
12.0	12.0	50.0		3163031200	3163231200	3163091200
16.0	16.0	75.0	150.0	3163031600	3163231600	3163091600
20.0	20.0	75.0		3163032000	3163232000	3163092000
25.0	25.0	75.0		3163032500	3163232500	3163092500

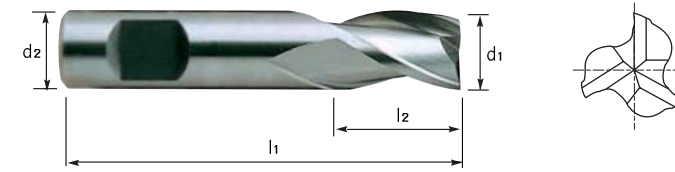
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, SHORT LENGTH, THROW AWAY



Series No. 128103



THREE FLUTE THROW AWAY MICRO GRAIN CARBIDE END MILLS

3 Flute, Center Cutting, with Flatted Shank

VOLLHARTMETAL SCHAFTFRÄSER

3 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

FRAISES À RAINURER CARBURE MONOBLOC

3 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DRIE GROEVEN, WERWERP MICROKORREL CARBIDE VINGERFREZEN

3 groeven centerfrees met geplette schacht

FRESE PER SCANALATURE CARBURO MONOBLOCCO

3 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinamento Laterale

Mill Dia. e8(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
2.0	6.0	4.0	35.0	1281030200	1281230200	1281090200
3.0		5.0	36.0	1281030300	1281230300	1281090300
4.0		7.0	38.0	1281030400	1281230400	1281090400
5.0		8.0	39.0	1281030500	1281230500	1281090500
6.0		8.0		1281030600	1281230600	1281090600
8.0	8.0	11.0	43.0	1281030800	1281230800	1281090800
10.0	10.0	13.0	50.0	1281031000	1281231000	1281091000

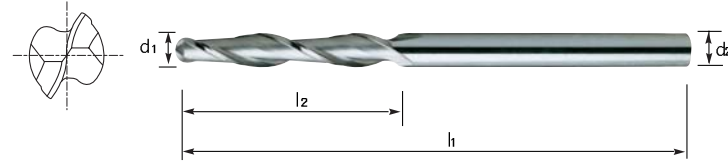
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
e8	- 14 - 28	- 20 - 38	- 25 - 47	- 32 - 59	- 40 - 73
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, BALL NOSE, EXTRA LONG LENGTH



Series No. 162303



TWO FLUTE MICRO GRAIN CARBIDE END MILLS
2 Flute, Helix 30°, Center Cutting, with Straight Shank

FRAISES À RAINURER CARBURE MONOBLOC POUR ALLAGES
2 Dents, Hélice 30° Coupe au Centre, à Queue Cylindrique

FRESE PER MACCHINE ELU SCANALATURE IN CARBURO MONOBLOCCO
2 Taglienti, Elica 30° Tagliente al Centro, Gambo Cilindrico

VOLLHARTMERAL SCHAFTFRÄSER
2 Schneiden, Rechtsspirale 30°, Zentrumschneidend, mit Zylinderschaft

TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN VOOR ALUMINIUM
2 groeven, helix 30°, centerfrees, met rigitte schacht

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	3.0	30	75	1623030300	1623230300	1623090300
4.0	4.0	30	75	1623030400	1623230400	1623090400
5.0	5.0	40	100	1623030500	1623230500	1623090500
6.0	6.0	50	150	1623030600	1623230600	1623090600
8.0	8.0	50	150	1623030800	1623230800	1623090800
10.0	10.0	60	150	1623031000	1623231000	1623091000
12.0	12.0	75	150	1623031200	1623231200	1623091200
14.0	14.0	75	150	1623031400	1623231400	1623091400
16.0	16.0	75	150	1623031600	1623231600	1623091600
18.0	18.0	75	150	1623031800	1623231800	1623091800
20.0	20.0	75	150	1623032000	1623232000	1623092000

- ▶ High alloy steels, steel casting, chill casting, malleable cast iron, CrNi-steels, brass, copper, aluminum with a high percentage of silicon and abrasive plastics.
- ▶ Applicable to the fields of K10, K20, K40, and P40

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, SHORT LENGTH



Series No. 100103



DIN 6527, TWO FLUTE MICRO GRAIN CARBIDE END MILLS
Short Length, 2 Flute, Center Cutting with Flatted Shank

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinamento Laterale

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, TWEE GROEVEN VINGERFREZEN
Korte lengte, 2 groeven, centerfrees met geplette schacht

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	4.0	50.0	1001030300	1001230300	1001090300
3.5		4.0		1001030350	1001230350	1001090350
4.0		5.0		1001030400	1001230400	1001090400
4.5	8.0	5.0	54.0	1001030450	1001230450	1001090450
5.0		6.0		1001030500	1001230500	1001090500
6.0		7.0		1001030600	1001230600	1001090600
7.0	10.0	8.0	58.0	1001030700	1001230700	1001090700
8.0		9.0		1001030800	1001230800	1001090800
9.0		10.0		1001030900	1001230900	1001090900
10.0	12.0	11.0	66.0	1001031000	1001231000	1001091000
12.0		12.0		1001031200	1001231200	1001091200
14.0		14.0		1001031400	1001231400	1001091400
16.0	18.0	16.0	75.0	1001031600	1001231600	1001091600
18.0		18.0		1001031800	1001231800	1001091800
20.0		20.0		1001032000	1001232000	1001092000
20.0	20.0	20.0	82.0	1001031600	1001231600	1001091600
18.0		18.0		1001031800	1001231800	1001091800
16.0		16.0		1001031400	1001231400	1001091400
14.0	20.0	14.0	73.0	1001031200	1001231200	1001091200
12.0		12.0		1001031000	1001231000	1001091000
10.0		10.0		1001030900	1001230900	1001090900
8.0	20.0	8.0	58.0	1001030800	1001230800	1001090800
7.0		7.0		1001030700	1001230700	1001090700
6.0		6.0		1001030600	1001230600	1001090600
5.0	20.0	5.0	54.0	1001030500	1001230500	1001090500
4.5		4.5		1001030450	1001230450	1001090450
4.0		4.0		1001030400	1001230400	1001090400
3.5	20.0	3.5	50.0	1001030350	1001230350	1001090350
3.0		3.0		1001030300	1001230300	1001090300

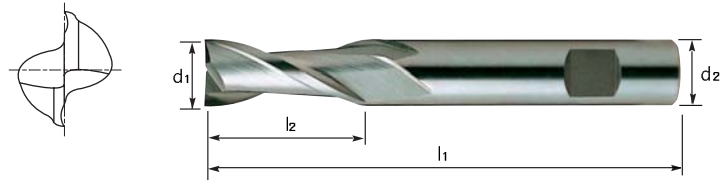
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, LONG LENGTH



Series No. 102103



DIN 6527, TWO FLUTE MICRO GRAIN CARBIDE END MILLS
Long Length, 2 Flute, Center Cutting with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Lange Ausführung, 2 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Longue, 2 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Lange lengte, 2 groeven, centerfrees met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Lunga, 2 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinamento Laterale

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	7.0	57.0	1021030300	1021230300	1021090300
3.5		7.0		1021030350	1021230350	1021090350
4.0		8.0		1021030400	1021230400	1021090400
4.5		8.0		1021030450	1021230450	1021090450
5.0		10.0		1021030500	1021230500	1021090500
6.0		10.0		1021030600	1021230600	1021090600
7.0	8.0	13.0	63.0	1021030700	1021230700	1021090700
8.0		16.0		1021030800	1021230800	1021090800
9.0	10.0	16.0	72.0	1021030900	1021230900	1021090900
10.0		19.0		1021031000	1021231000	1021091000
12.0	12.0	22.0	83.0	1021031200	1021231200	1021091200
14.0	14.0	22.0		1021031400	1021231400	1021091400
16.0	16.0	26.0	92.0	1021031600	1021231600	1021091600
18.0	18.0	26.0		1021031800	1021231800	1021091800
20.0	20.0	32.0		1021032000	1021232000	1021092000

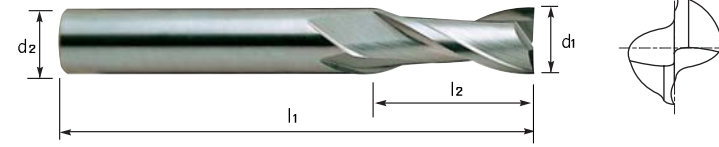
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, STANDARD LENGTH



Series No. 101103



DIN 6528, TWO FLUTE MICRO GRAIN CARBIDE END MILLS
2 Flute, Center Cutting, with Straight Shank

DIN 6528, VOLLHARTMETAL SCHAFTFRÄSER
2 Schneiden, Zentrumschneidend mit Zylinderschaft

DIN 6528, FRAISES À RAINURER CARBURE MONOBLOC
2 Dents, Coupe au Centre, à Queue Cylindrique

DIN 6528, TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN
2 groeven, centerfrees met rechte schacht

DIN 6528, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
2 Taglienti, Tagliente al Centro, Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.5	3.5	7.0	50.0	1011030350	1011230350	1011090350
4.0	4.0	8.0		1011030400	1011230400	1011090400
4.5	4.5	8.0		1011030450	1011230450	1011090450
5.0	5.0	10.0		1011030500	1011230500	1011090500
5.5	5.5	10.0	57.0	1011030550	1011230550	1011090550
6.0	6.0	10.0		1011030600	1011230600	1011090600
6.5	6.5	13.0	60.0	1011030650	1011230650	1011090650
7.0	7.0	13.0		1011030700	1011230700	1011090700
7.5	7.5	16.0	63.0	1011030750	1011230750	1011090750
8.0	8.0	16.0		1011030800	1011230800	1011090800
8.5	8.5	16.0	67.0	1011030850	1011230850	1011090850
9.0	9.0	16.0		1011030900	1011230900	1011090900
9.5	9.5	19.0	72.0	1011030950	1011230950	1011090950
10.0	10.0	19.0		1011031000	1011231000	1011091000
11.0	11.0	22.0	83.0	1011031100	1011231100	1011091100
12.0	12.0	22.0		1011031200	1011231200	1011091200
13.0	13.0	22.0		1011031300	1011231300	1011091300
14.0	14.0	22.0		1011031400	1011231400	1011091400
15.0	15.0	26.0	92.0	1011031500	1011231500	1011091500
16.0	16.0	26.0		1011031600	1011231600	1011091600
18.0	18.0	26.0		1011031800	1011231800	1011091800
20.0	20.0	32.0		1011032000	1011232000	1011092000

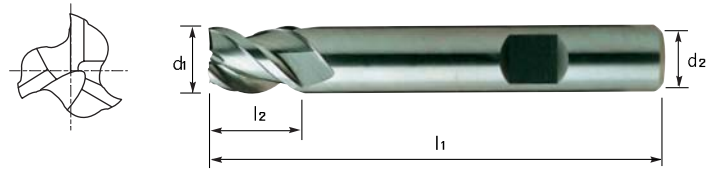
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, 45° HELIX, SHORT LENGTH



Series No. 140103



DIN 6527, THREE FLUTE MICRO GRAIN CARBIDE 45° HELIX END MILLS

Short Length, 3 Flute, Center Cutting, 45° Helix, with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER

Kurze Ausführung, 3 Schneiden, Zentrumschneidend, 45° Rechtsspirale, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 3 Dents, Coupe au Centre, 45° Helice, à Queue Cylindrique avec Plats

DIN 6527, DRIE GROEVEN MICROKORREL CARBIDE 45° HELIX VINGERFREZEN

Korte lengte, 3 groeven, centerfrees, 45° helix met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Corta, 3 Taglienti, Tagliente al Centro, 45° Elica, Gambo Cilindrico con Trascinamento Laterale

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	4.0	50.0	1401030300	1401230300	1401090300
3.5		4.0		1401030350	1401230350	1401090350
4.0		5.0	54.0	1401030400	1401230400	1401090400
4.5		5.0		1401030450	1401230450	1401090450
5.0		6.0		1401030500	1401230500	1401090500
6.0	8.0	7.0	58.0	1401030600	1401230600	1401090600
7.0		8.0		1401030700	1401230700	1401090700
8.0		9.0	1401030800	1401230800	1401090800	
9.0	10.0	10.0	66.0	1401030900	1401230900	1401090900
10.0		11.0		1401031000	1401231000	1401091000
12.0	12.0	12.0	73.0	1401031200	1401231200	1401091200
14.0	14.0	14.0	75.0	1401031400	1401231400	1401091400
16.0	16.0	16.0	82.0	1401031600	1401231600	1401091600
18.0	18.0	18.0	84.0	1401031800	1401231800	1401091800
20.0	20.0	20.0	92.0	1401032000	1401232000	1401092000

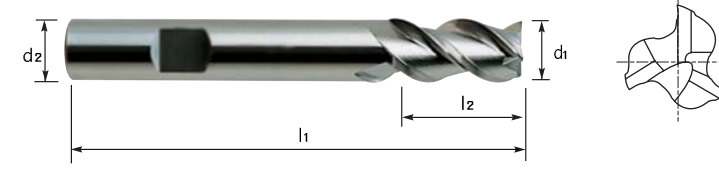
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, 45° HELIX, LONG LENGTH



Series No. 141103



DIN 6527, THREE FLUTE MICRO GRAIN CARBIDE 45° HELIX END MILLS

Long Length, 3 Flute, Center Cutting, 45° Helix, with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER

Lange Ausführung, 3 Schneiden, Zentrumschneidend, 45° Rechtsspirale, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC

Série Longue, 3 Dents, Coupe au Centre, 45° Helice, à Queue Cylindrique avec Plats

DIN 6527, DRIE GROEVEN MICROKORREL CARBIDE 45° HELIX VINGERFREZEN

Lange lengte, 3 groeven, centerfrees, 45° helix met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Lunga, 3 Taglienti, Tagliente al Centro, 45° Elica, Gambo Cilindrico con Trascinamento Laterale

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	7.0	57.0	1411030300	1411230300	1411090300
3.5		7.0		1411030350	1411230350	1411090350
4.0		8.0		1411030400	1411230400	1411090400
4.5		8.0		1411030450	1411230450	1411090450
5.0		10.0		1411030500	1411230500	1411090500
6.0	8.0	10.0	63.0	1411030600	1411230600	1411090600
7.0		13.0		1411030700	1411230700	1411090700
8.0		16.0	1411030800	1411230800	1411090800	
9.0	10.0	16.0	72.0	1411030900	1411230900	1411090900
10.0		19.0		1411031000	1411231000	1411091000
12.0	12.0	22.0	83.0	1411031200	1411231200	1411091200
14.0	14.0	22.0		1411031400	1411231400	1411091400
16.0	16.0	26.0	92.0	1411031600	1411231600	1411091600
18.0	18.0	26.0		1411031800	1411231800	1411091800
20.0	20.0	32.0		1411032000	1411232000	1411092000

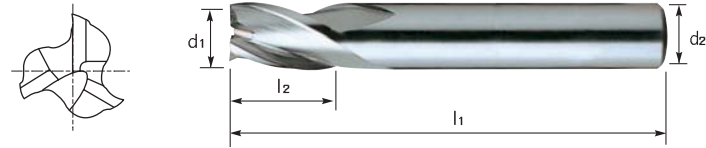
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

3 FLUTE, LONG LENGTH



Series No. 104103



DIN 6528, THREE FLUTE MICRO GRAIN CARBIDE END MILLS
3 Flute, Center Cutting, with Straight Shank

DIN 6528, FRAISES À RAINURER CARBURE MONOBLOC
3 Dents, Coupe au Centre, à Queue Cylindrique

DIN 6528, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
3 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

DIN 6528, VOLLHARTMETAL SCHAFTFRÄSER
3 Schneiden, Zentrumschneidend mit Zylinderschaft

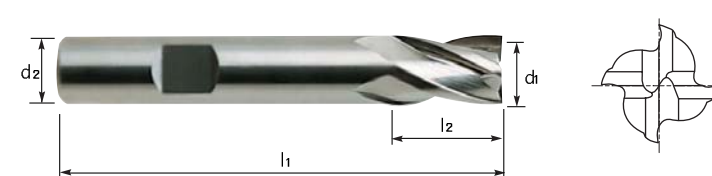
DIN 6528, TWEË GROEVEN MICROKORREL CARBIDE VINGERFREZEN
3 groeven, centerfrees met rechte schacht

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.5	3.5	7.0	50.0	1041030350	1041230350	1041090350
4.0	4.0	8.0		1041030400	1041230400	1041090400
4.5	4.5	8.0		1041030450	1041230450	1041090450
5.0	5.0	10.0	57.0	1041030500	1041230500	1041090500
5.5	5.5	10.0		1041030550	1041230550	1041090550
6.0	6.0	10.0	60.0	1041030600	1041230600	1041090600
6.5	6.5	13.0		1041030650	1041230650	1041090650
7.0	7.0	13.0	63.0	1041030700	1041230700	1041090700
7.5	7.5	16.0		1041030750	1041230750	1041090750
8.0	8.0	16.0	67.0	1041030800	1041230800	1041090800
8.5	8.5	16.0		1041030850	1041230850	1041090850
9.0	9.0	16.0	72.0	1041030900	1041230900	1041090900
9.5	9.5	19.0		1041030950	1041230950	1041090950
10.0	10.0	19.0	83.0	1041031000	1041231000	1041091000
11.0	11.0	22.0		1041031100	1041231100	1041091100
12.0	12.0	22.0		1041031200	1041231200	1041091200
13.0	13.0	22.0		1041031300	1041231300	1041091300
14.0	14.0	22.0	92.0	1041031400	1041231400	1041091400
15.0	15.0	26.0		1041031500	1041231500	1041091500
16.0	16.0	26.0		1041031600	1041231600	1041091600
18.0	18.0	26.0		1041031800	1041231800	1041091800
20.0	20.0	32.0	104.0	1041032000	1041232000	1041092000

Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, SHORT LENGTH



Series No. 109103

DIN 6527, FOUR FLUTE MICRO GRAIN CARBIDE END MILLS
Short Length, 4 Flute, Center Cutting, with Flatted Shank

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC
Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO
Serie Corta, 4 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinamento Laterale

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER
Kurze Ausführung, 4 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, VIER GROEVEN MICROKORREL CARBIDE VINGERFREZEN
Korte lengthe, 4 groeven, centerfrees met geplette schacht

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	5.0	50.0	1091030300	1091230300	1091090300
3.5		6.0	54.0	1091030350	1091230350	1091090350
4.0		8.0		1091030400	1091230400	1091090400
4.5	8.0	8.0	58.0	1091030450	1091230450	1091090450
5.0		9.0		1091030500	1091230500	1091090500
6.0	10.0	10.0	66.0	1091030600	1091230600	1091090600
7.0		11.0		1091030700	1091230700	1091090700
8.0	12.0	12.0	73.0	1091030800	1091230800	1091090800
9.0		13.0		1091030900	1091230900	1091090900
10.0	14.0	14.0	75.0	1091031000	1091231000	1091091000
12.0		16.0		1091031200	1091231200	1091091200
14.0	16.0	18.0	82.0	1091031400	1091231400	1091091400
16.0		22.0		1091031600	1091231600	1091091600
18.0	18.0	24.0	84.0	1091031800	1091231800	1091091800
20.0		26.0		1091032000	1091232000	1091092000

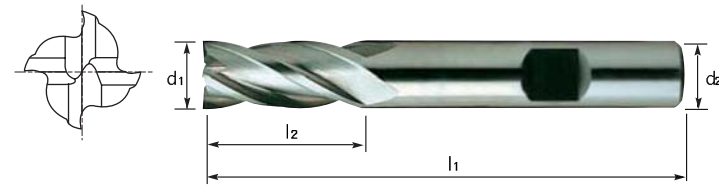
Tolerances according to DIN 7160 & 7161
Toleranzen nach DIN 7160 & 7161

Toleranzwerte in µm / Tolerance range in µm					
Nennmaßbereich in mm / Nominal-Diameter in mm					
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, LONG LENGTH



Series No. 111103



DIN 6527, FOUR FLUTE MICRO GRAIN CARBIDE END MILLS

Long Length, 4 Flute, Center Cutting, with Flatted Shank

DIN 6527, VOLLHARTMETAL SCHAFTFRÄSER

Lange Ausführung, 4 Schneiden, Zentrumschneidend, Zylinderschaft mit Mitnahmefläche

DIN 6527, FRAISES À RAINURER CARBURE MONOBLOC

Série Courte, 4 Dents, Coupe au Centre, à Queue Cylindrique avec Plats

DIN 6527, VIER GROEVEN MICROKORREL CARBIDE VINGERFREZEN

Lange lengte, 4 groeven, centerfrees met geplette schacht

DIN 6527, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

Serie Lunga, 4 Taglienti, Tagliente al Centro, Gambo Cilindrico con Trascinamento Laterale

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.0	6.0	8.0	57.0	1111030300	1111230300	1111090300
3.5		10.0		1111030350	1111230350	1111090350
4.0		11.0		1111030400	1111230400	1111090400
4.5		11.0		1111030450	1111230450	1111090450
5.0		13.0		1111030500	1111230500	1111090500
6.0		13.0		1111030600	1111230600	1111090600
7.0	8.0	16.0	63.0	1111030700	1111230700	1111090700
8.0		19.0		1111030800	1111230800	1111090800
9.0	10.0	19.0	72.0	1111030900	1111230900	1111090900
10.0		22.0		1111031000	1111231000	1111091000
12.0	12.0	26.0	83.0	1111031200	1111231200	1111091200
14.0	14.0	26.0		1111031400	1111231400	1111091400
16.0	16.0	32.0	92.0	1111031600	1111231600	1111091600
18.0	18.0	32.0		1111031800	1111231800	1111091800
20.0	20.0	38.0		1111032000	1111232000	1111092000

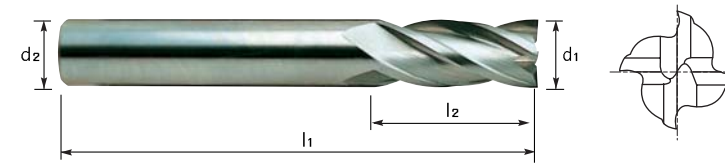
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

4 FLUTE, SHORT LENGTH



Series No. 110103



DIN 6528, FOUR FLUTE MICRO GRAIN CARBIDE END MILLS

4 Flute, Center Cutting, with Straight Shank

DIN 6528, VOLLHARTMETAL SCHAFTFRÄSER

4 Schneiden, Zentrumschneidend, mit Zylinderschaft

DIN 6528, FRAISES À RAINURER CARBURE MONOBLOC

4 Dents, Coupe au Centre, à Queue Cylindrique

DIN 6528, TWEE GROEVEN MICROKORREL CARBIDE VINGERFREZEN

4 groeven, centerfrees met rechte schacht

DIN 6528, FRESE PER SCANALATURE IN CARBURO MONOBLOCCO

4 Taglienti, Tagliente al Centro, a Codolo Gambo Cilindrico

Mill Dia. h10(d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
3.5	3.5	10.0	50.0	1101030350	1101230350	1101090350
4.0	4.0	11.0		1101030400	1101230400	1101090400
4.5	4.5	11.0		1101030450	1101230450	1101090450
5.0	5.0	13.0		1101030500	1101230500	1101090500
5.5	5.5	13.0	57.0	1101030550	1101230550	1101090550
6.0	6.0	16.0		1101030600	1101230600	1101090600
6.5	6.5	16.0	60.0	1101030650	1101230650	1101090650
7.0	7.0	19.0		1101030700	1101230700	1101090700
7.5	7.5	19.0	63.0	1101030750	1101230750	1101090750
8.0	8.0	19.0		1101030800	1101230800	1101090800
8.5	8.5	19.0	67.0	1101030850	1101230850	1101090850
9.0	9.0	19.0		1101030900	1101230900	1101090900
9.5	9.5	22.0	72.0	1101030950	1101230950	1101090950
10.0	10.0	22.0		1101031000	1101231000	1101091000
11.0	11.0	26.0	83.0	1101031100	1101231100	1101091100
12.0	12.0	26.0		1101031200	1101231200	1101091200
13.0	13.0	26.0		1101031300	1101231300	1101091300
14.0	14.0	26.0		1101031400	1101231400	1101091400
15.0	15.0	32.0	92.0	1101031500	1101231500	1101091500
16.0	16.0	32.0		1101031600	1101231600	1101091600
18.0	18.0	32.0		1101031800	1101231800	1101091800
20.0	20.0	32.0		1101032000	1101232000	1101092000

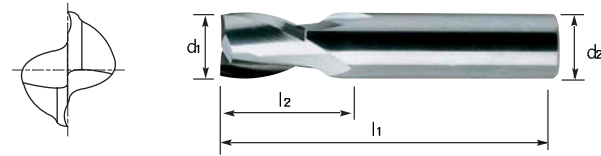
Tolerances according to DIN 7160 & 7161 Toleranzen nach DIN 7160 & 7161

	Toleranzwerte in µm / Tolerance range in µm				
	Nennmaßbereich in mm / Nominal-Diameter in mm				
	von 1 bis 3 from 1 to 3	über 3 bis 6 over 3 to 6	über 6 bis 10 over 6 to 10	über 10 bis 18 over 10 to 18	über 18 bis 30 over 18 to 30
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13

2 FLUTE, SHORT, STRAIGHT SHANK



Series No. 500303

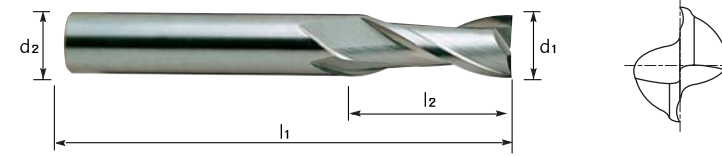


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5003030040	5003230040	5003090040
1/8	1/8	1/4	1.1/2	5003030080	5003230080	5003090080
3/16	3/16	3/8	2	5003030120	5003230120	5003090120
1/4	1/4	1/2	2	5003030160	5003230160	5003090160
3/8	3/8	1/2	2	5003030240	5003230240	5003090240
1/2	1/2	1/2	2	5003030320	5003230320	5003090320

2 FLUTE, STANDARD, STRAIGHT SHANK



Series No. 501303

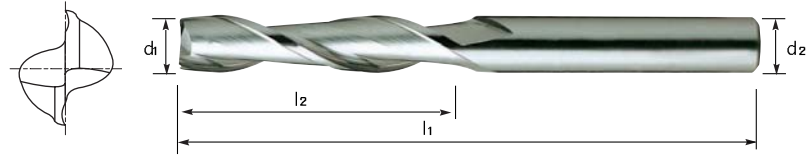


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5013030040	5013230040	5013090040
3/32	1/8	9/32	1.1/2	5013030060	5013230060	5013090060
1/8	1/8	1/2	1.1/2	5013030080	5013230080	5013090080
5/32	3/16	1/2	2	5013030100	5013230100	5013090100
3/16	3/16	5/8	2	5013030120	5013230120	5013090120
7/32	1/4	5/8	2.1/2	5013030140	5013230140	5013090140
1/4	1/4	3/4	2.1/2	5013030160	5013230160	5013090160
9/32	5/16	3/4	2.1/2	5013030180	5013230180	5013090180
5/16	5/16	13/16	2.1/2	5013030200	5013230200	5013090200
11/32	3/8	1	2.1/2	5013030220	5013230220	5013090220
3/8	3/8	1	2.1/2	5013030240	5013230240	5013090240
13/32	7/16	1	2.3/4	5013030260	5013230260	5013090260
7/16	7/16	1	2.3/4	5013030280	5013230280	5013090280
15/32	1/2	1	3	5013030300	5013230300	5013090300
1/2	1/2	1	3	5013030320	5013230320	5013090320
9/16	9/16	1.1/8	3.1/2	5013030360	5013230360	5013090360
5/8	5/8	1.1/4	3.1/2	5013030400	5013230400	5013090400
11/16	3/4	1.3/8	4	5013030440	5013230440	5013090440
3/4	3/4	1.1/2	4	5013030480	5013230480	5013090480
1	1	1.1/2	4	5013030640	5013230640	5013090640

2 FLUTE, LONG, STRAIGHT SHANK



Series No. 502303

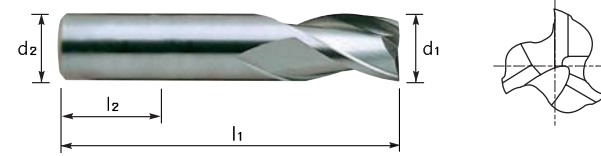


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5023030080	5023230080	5023090080
3/16	3/16	3/4	2.1/2	5023030120	5023230120	5023090120
1/4	1/4	1.1/8	3	5023030160	5023230160	5023090160
5/16	5/16	1.1/8	3	5023030200	5023230200	5023090200
3/8	3/8	1.1/8	3	5023030240	5023230240	5023090240
7/16	7/16	2	4.1/2	5023030280	5023230280	5023090280
1/2	1/2	2	4.1/2	5023030320	5023230320	5023090320
5/8	5/8	1.1/4	5	5023030400	5023230400	5023090400
3/4	3/4	1.1/4	5	5023030480	5023230480	5023090480
1	1	1.1/4	5	5023030640	5023230640	5023090640

3 FLUTE, SHORT, STRAIGHT SHANK



Series No. 506303

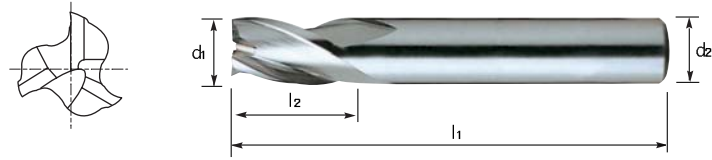


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5063030040	5063230040	5063090040
1/8	1/8	1/4	1.1/2	5063030080	5063230080	5063090080
3/16	3/16	3/8	2	5063030120	5063230120	5063090120
1/4	1/4	1/2	2	5063030160	5063230160	5063090160
3/8	3/8	1/2	2	5063030240	5063230240	5063090240
1/2	1/2	1/2	2	5063030320	5063230320	5063090320

3 FLUTE, STANDARD, STRAIGHT SHANK



Series No. 507303

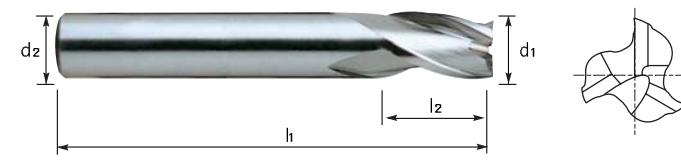


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5073030040	5073230040	5073090040
1/8	1/8	1/2	1.1/2	5073030080	5073230080	5073090080
3/16	3/16	5/8	2	5073030120	5073230120	5073090120
1/4	1/4	3/4	2.1/2	5073030160	5073230160	5073090160
5/16	5/16	13/16	2.1/2	5073030200	5073230200	5073090200
3/8	3/8	1	2.1/2	5073030240	5073230240	5073090240
7/16	7/16	1	2.3/4	5073030280	5073230280	5073090280
1/2	1/2	1	3	5073030320	5073230320	5073090320
5/8	5/8	1.1/4	3.1/2	5073030400	5073230400	5073090400
3/4	3/4	1.1/2	4	5073030480	5073230480	5073090480
1	1	1.1/2	4	5073030640	5073230640	5073090640

3 FLUTE, LONG, STRAIGHT SHANK



Series No. 508303

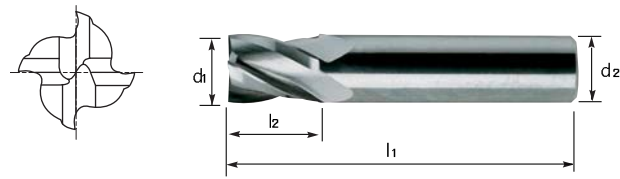


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5083030080	5083230080	5083090080
1/4	1/4	1	3	5083030160	5083230160	5083090160
3/8	3/8	1.1/2	4	5083030240	5083230240	5083090240
1/2	1/2	2	4	5083030320	5083230320	5083090320
1	1	1.1/4	5	5083030640	5083230640	5083090640

4 FLUTE, SHORT, STRAIGHT SHANK



Series No. 509303

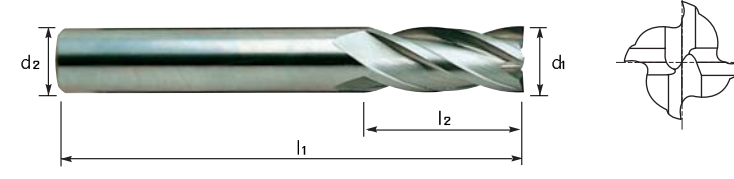


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5093030040	5093230040	5093090040
1/8	1/8	1/4	1.1/2	5093030080	5093230080	5093090080
3/16	3/16	3/8	2	5093030120	5093230120	5093090120
1/4	1/4	1/2	2	5093030160	5093230160	5093090160
3/8	3/8	1/2	2	5093030240	5093230240	5093090240
1/2	1/2	1/2	2	5093030320	5093230320	5093090320

4 FLUTE, STANDARD, STRAIGHT SHANK



Series No. 510303

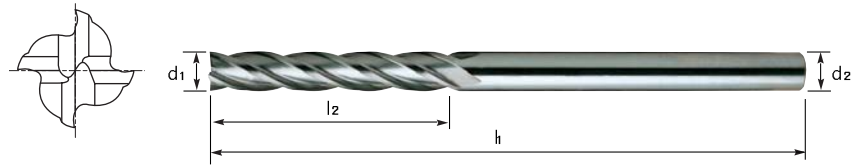


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5103030040	5103230040	5103090040
3/32	1/8	9/32	1.1/2	5103030060	5103230060	5103090060
1/8	1/8	1/2	1.1/2	5103030080	5103230080	5103090080
5/32	3/16	1/2	2	5103030100	5103230100	5103090100
3/16	3/16	5/8	2	5103030120	5103230120	5103090120
7/32	1/4	5/8	2.1/2	5103030140	5103230140	5103090140
1/4	1/4	3/4	2.1/2	5103030160	5103230160	5103090160
9/32	5/16	3/4	2.1/2	5103030180	5103230180	5103090180
5/16	5/16	13/16	2.1/2	5103030200	5103230200	5103090200
11/32	3/8	1	2.1/2	5103030220	5103230220	5103090220
3/8	3/8	1	2.1/2	5103030240	5103230240	5103090240
13/32	7/16	1	2.3/4	5103030260	5103230260	5103090260
7/16	7/16	1	2.3/4	5103030280	5103230280	5103090280
15/32	1/2	1	3	5103030300	5103230300	5103090300
1/2	1/2	1	3	5103030320	5103230320	5103090320
9/16	9/16	1.1/8	3.1/2	5103030360	5103230360	5103090360
5/8	5/8	1.1/4	3.1/2	5103030400	5103230400	5103090400
11/16	3/4	1.3/8	4	5103030440	5103230440	5103090440
3/4	3/4	1.1/2	4	5103030480	5103230480	5103090480
1	1	1.1/2	4	5103030640	5103230640	5103090640

4 FLUTE, LONG, STRAIGHT SHANK



Series No. 511303

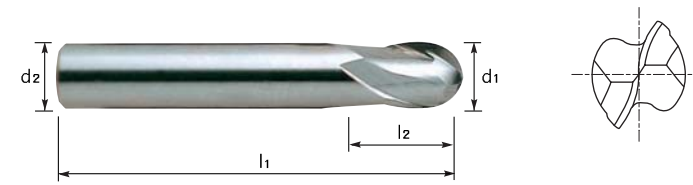


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5113030080	5113230080	5113090080
3/16	3/16	3/4	2.1/2	5113030120	5113230120	5113090120
1/4	1/4	1.1/8	3	5113030160	5113230160	5113090160
5/16	5/16	1.1/8	3	5113030200	5113230200	5113090200
3/8	3/8	1.1/8	3	5113030240	5113230240	5113090240
7/16	7/16	2	4.1/2	5113030280	5113230280	5113090280
1/2	1/2	2	4.1/2	5113030320	5113230320	5113090320
5/8	5/8	1.1/4	5	5113030400	5113230400	5113090400
3/4	3/4	1.1/4	5	5113030480	5113230480	5113090480
1	1	1.1/4	5	5113030640	5113230640	5113090640

2 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK



Series No. 512303

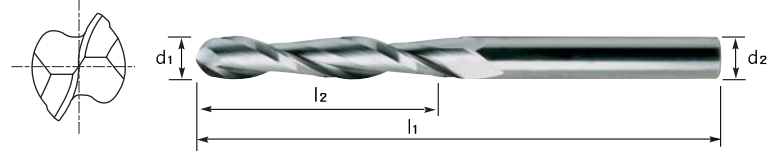


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5123030040	5123230040	5123090040
1/8	1/8	1/4	1.1/2	5123030080	5123230080	5123090080
3/16	3/16	3/8	2	5123030120	5123230120	5123090120
1/4	1/4	1/2	2	5123030160	5123230160	5123090160
3/8	3/8	1/2	2	5123030240	5123230240	5123090240
1/2	1/2	1/2	2	5123030320	5123230320	5123090320

2 FLUTE, STANDARD, BALL NOSE, STRAIGHT SHANK



Series No. 513303

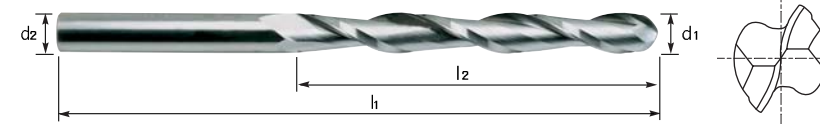


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5133030040	5133230040	5133090040
3/32	1/8	9/32	1.1/2	5133030060	5133230060	5133090060
1/8	1/8	1/2	1.1/2	5133030080	5133230080	5133090080
5/32	3/16	1/2	2	5133030100	5133230100	5133090100
3/16	3/16	5/8	2	5133030120	5133230120	5133090120
7/32	1/4	5/8	2.1/2	5133030140	5133230140	5133090140
1/4	1/4	3/4	2.1/2	5133030160	5133230160	5133090160
9/32	5/16	3/4	2.1/2	5133030180	5133230180	5133090180
5/16	5/16	13/16	2.1/2	5133030200	5133230200	5133090200
3/8	3/8	1	2.1/2	5133030240	5133230240	5133090240
7/16	7/16	1	2.3/4	5133030280	5133230280	5133090280
1/2	1/2	1	3	5133030320	5133230320	5133090320
9/16	9/16	1.1/8	3.1/2	5133030360	5133230360	5133090360
5/8	5/8	1.1/4	3.1/2	5133030400	5133230400	5133090400
11/16	3/4	1.3/8	4	5133030440	5133230440	5133090440
3/4	3/4	1.1/2	4	5133030480	5133230480	5133090480
1	1	1.1/2	4	5133030640	5133230640	5133090640

2 FLUTE, LONG, BALL NOSE, STRAIGHT SHANK



Series No. 514303

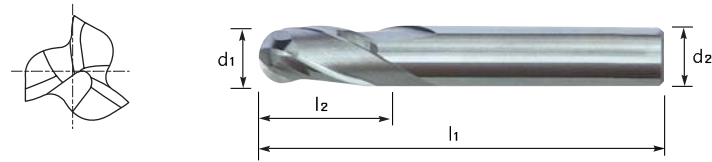


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5143030080	5143230080	5143090080
3/16	3/16	3/4	2.1/2	5143030120	5143230120	5143090120
1/4	1/4	1.1/8	3	5143030160	5143230160	5143090160
5/16	5/16	1.1/8	3	5143030200	5143230200	5143090200
3/8	3/8	1.1/8	3	5143030240	5143230240	5143090240
7/16	7/16	2	4.1/2	5143030280	5143230280	5143090280
1/2	1/2	2	4.1/2	5143030320	5143230320	5143090320
5/8	5/8	1.1/4	5	5143030400	5143230400	5143090400
3/4	3/4	1.1/4	5	5143030480	5143230480	5143090480

3 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK



Series No. 518303

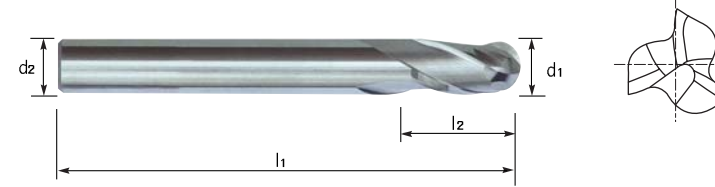


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5183030040	5183230040	5183090040
1/8	1/8	1/4	1.1/2	5183030080	5183230080	5183090080
3/16	3/16	3/8	2	5183030120	5183230120	5183090120
1/4	1/4	1/2	2	5183030160	5183230160	5183090160
3/8	3/8	1/2	2	5183030240	5183230240	5183090240
1/2	1/2	1/2	2	5183030320	5183230320	5183090320

3 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK



Series No. 519303

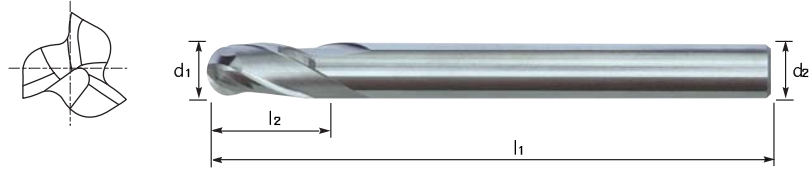


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5193030040	5193230040	5193090040
1/8	1/8	1/2	1.1/2	5193030080	5193230080	5193090080
3/16	3/16	5/8	2	5193030120	5193230120	5193090120
1/4	1/4	3/4	2.1/2	5193030160	5193230160	5193090160
5/16	5/16	13/16	2.1/2	5193030200	5193230200	5193090200
3/8	3/8	1	2.1/2	5193030240	5193230240	5193090240
7/16	7/16	1	2.3/4	5193030280	5193230280	5193090280
1/2	1/2	1	3	5193030320	5193230320	5193090320
3/4	3/4	1.1/2	4	5193030480	5193230480	5193090480
1	1	1.1/2	4	5193030640	5193230640	5193090640

3 FLUTE, STANDARD, BALL NOSE, STRAIGHT SHANK

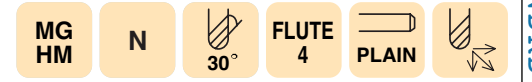


Series No. 520303

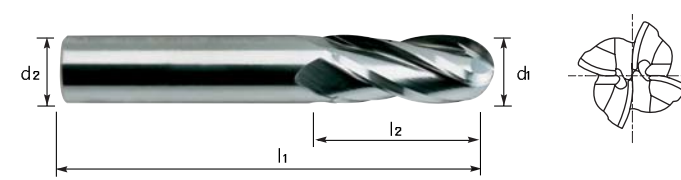


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5203030080	5203230080	5203090080
1/4	1/4	1.1/8	3	5203030160	5203230160	5203090160
3/8	3/8	1.1/2	4	5203030240	5203230240	5203090240
1/2	1/2	2	4	5203030320	5203230320	5203090320
3/4	3/4	1.1/4	5	5203030480	5203230480	5203090480

4 FLUTE, SHORT, BALL NOSE, STRAIGHT SHANK



Series No. 516303

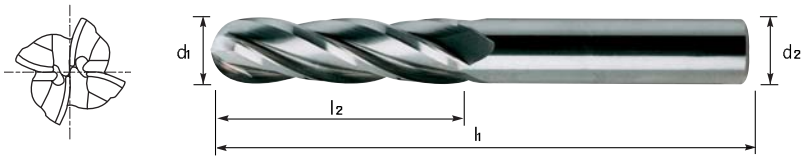


Mill Dia. (d ₁)	Shank Dia. h6(d ₂)	Length of Cut l ₂	Overall Length l ₁	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	1/8	1.1/2	5163030040	5163230040	5163090040
1/8	1/8	1/4	1.1/2	5163030080	5163230080	5163090080
3/16	3/16	3/8	2	5163030120	5163230120	5163090120
1/4	1/4	1/2	2	5163030160	5163230160	5163090160
3/8	3/8	1/2	2	5163030240	5163230240	5163090240
1/2	1/2	1/2	2	5163030320	5163230320	5163090320

4 FLUTE, STANDARD, BALL NOSE, STRAIGHT SHANK

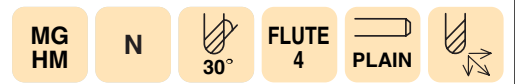


Series No. 515303

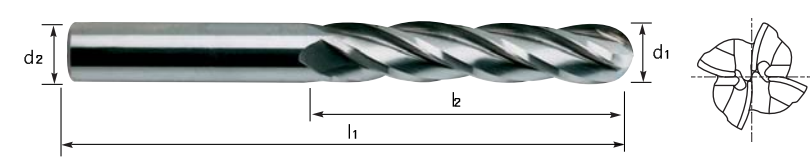


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/8	3/16	1.1/2	5153030040	5153230040	5153090040
3/32	1/8	9/32	1.1/2	5153030060	5153230060	5153090060
1/8	1/8	1/2	1.1/2	5153030080	5153230080	5153090080
5/32	3/16	1/2	2	5153030100	5153230100	5153090100
3/16	3/16	5/8	2	5153030120	5153230120	5153090120
7/32	1/4	5/8	2.1/2	5153030140	5153230140	5153090140
1/4	1/4	3/4	2.1/2	5153030160	5153230160	5153090160
9/32	5/16	3/4	2.1/2	5153030180	5153230180	5153090180
5/16	5/16	13/16	2.1/2	5153030200	5153230200	5153090200
3/8	3/8	1	2.1/2	5153030240	5153230240	5153090240
7/16	7/16	1	2.3/4	5153030280	5153230280	5153090280
1/2	1/2	1	3	5153030320	5153230320	5153090320
9/16	9/16	1.1/8	3.1/2	5153030360	5153230360	5153090360
5/8	5/8	1.1/4	3.1/2	5153030400	5153230400	5153090400
11/16	3/4	1.3/8	4	5153030440	5153230440	5153090440
3/4	3/4	1.1/2	4	5153030480	5153230480	5153090480
1	1	1.1/2	4	5153030640	5153230640	5153090640

4 FLUTE, LONG, BALL NOSE, STRAIGHT SHANK

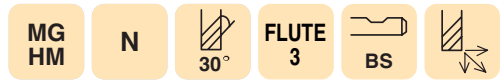


Series No. 517303

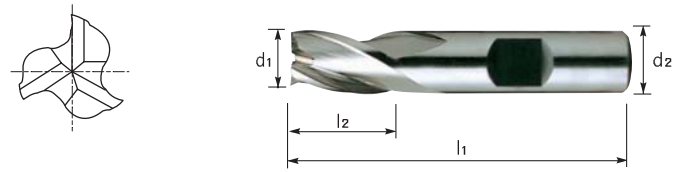


Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/8	1/8	1	3	5173030080	5173230080	5173090080
1/4	1/4	1	3	5173030160	5173230160	5173090160
3/8	3/8	1.1/2	4	5173030240	5173230240	5173090240
1/2	1/2	2	4	5173030320	5173230320	5173090320
1	1	2.1/4	5	5173030640	5173030640	5173030640

3 FLUTE , SHORT, THROW AWAY, FLATTED SHANK



Series No. 528103



Mill Dia. (d1)	Shank Dia. h6(d2)	Length of Cut l2	Overall Length l1	Carbide	TiAlN Carbide	TiCN Carbide
1/16	1/4	3/32	31/32	5281030040	5281230040	5281090040
3/32	1/4	5/32	1.1/16	5281030060	5281230060	5281090060
1/8	1/4	3/16	1.3/32	5281030080	5281230080	5281090080
5/32	1/4	1/4	1.9/32	5281030100	5281230100	5281090100
3/16	1/4	9/32	1.11/32	5281030120	5281230120	5281090120
7/32	1/4	5/16	1.13/32	5281030140	5281230140	5281090140
1/4	1/4	3/8	1.13/32	5281030160	5281230160	5281090160

i Available Whilest Stocks Last.

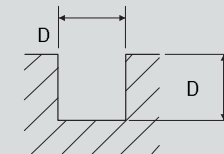
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

2 FLUTE, STRAIGHT SHANK

300303, 301303, 302303, 502303, 501303

500303, 100103, 102103, 101103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~ HRC20		HRC20~HRC30		HRC30~HRC40									
HARDNESS	500 ~800N/mm ²		800 ~1000N/mm ²		1000 ~1300N/mm ²									
STRENGTH	500 ~800N/mm ²		800 ~1000N/mm ²		1000 ~1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	80	4800	70	4000	55	8000	65	6500	150	16000	320	12000	240
3	3700	90	3200	80	2600	60	5300	65	4200	150	11000	320	8000	240
4	2800	90	2400	80	2000	60	4000	65	3200	150	8000	320	6000	240
5	2200	90	1900	80	1600	60	3200	65	2500	150	6400	320	4800	240
6	1800	90	1600	80	1300	60	2600	65	2100	180	5300	340	4000	260
8	1400	90	1200	80	1000	60	2000	65	1600	190	4000	340	3000	260
10	1100	90	950	80	800	60	1600	65	1300	200	3200	340	2400	260
12	900	90	800	80	660	60	1300	65	1000	210	2600	340	2000	260
14	800	90	700	80	570	60	1100	65	900	220	2300	340	1700	260
16	700	100	600	85	500	75	1000	75	800	225	2000	340	1500	260
20	550	100	480	85	400	75	800	80	640	240	1600	340	1200	260



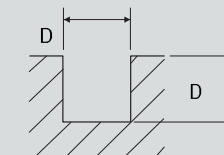
RPM=REVOLUTION PER MIN. Feed=mm / min

2 FLUTE, STRAIGHT SHANK, TiCN-COATED

300303, 301303, 302303, 502303, 501303

500303, 100103, 102103, 101103

MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~HRC20		HRC20~HRC30		HRC30~HRC40									
HARDNESS	500 ~800N/mm ²		800 ~1000N/mm ²		1000 ~1300N/mm ²									
STRENGTH	500 ~800N/mm ²		800 ~1000N/mm ²		1000 ~1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	100	6200	90	5200	70	10000	85	8500	200	20000	420	15000	310
3	4800	120	4200	105	3400	80	6900	85	5500	200	14000	420	10000	310
4	3640	120	3100	105	2600	80	5200	85	4200	200	10000	420	8000	310
5	2860	120	2500	105	2000	80	4200	85	3300	200	8300	420	6200	310
6	2400	120	2000	105	1700	80	3400	85	2700	230	6900	440	5200	340
8	1800	120	1500	105	1300	80	2600	85	2000	250	5200	440	4000	340
10	1400	120	1200	105	1000	80	2000	85	1700	260	4200	440	3100	340
12	1200	120	1000	105	860	80	1700	85	1300	270	3400	440	2600	340
14	1000	120	900	105	740	80	1400	85	1200	280	3000	440	2200	340
16	900	130	800	110	650	100	1300	100	1000	290	2600	440	2000	340
20	720	130	620	110	520	100	1000	100	830	310	2000	440	1560	340



RPM=REVOLUTION PER MIN. Feed=mm / min

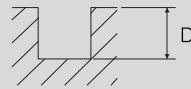
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SLOTTING

304303, 104103, 128103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm ²		800 ~ 1000N/mm ²		1000 ~ 1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	70	4800	60	4000	50	8000	55	6500	140	16000	290	12000	220
3	3700	80	3200	75	2600	55	5300	55	4200	140	11000	300	8000	220
4	2800	80	2400	75	2000	55	4000	55	3200	130	8000	290	6000	220
5	2200	80	1900	70	1600	55	3200	55	2500	135	6400	290	4800	220
6	1800	80	1600	70	1300	55	2600	60	2100	160	5300	305	4000	240
8	1400	80	1200	70	1000	55	2000	60	1600	170	4000	310	3000	230
10	1100	80	950	70	800	55	1600	60	1300	180	3200	305	2400	230
12	900	80	800	70	660	55	1300	60	1000	190	2600	300	2000	230
14	800	80	700	70	570	55	1100	60	900	200	2300	300	1700	230
16	700	90	600	75	500	65	1000	70	800	200	2000	300	1500	230
20	550	90	480	75	400	65	800	70	640	215	1600	300	1200	230



※ The FEED, in long & extra long types, should be reduced by around 50%

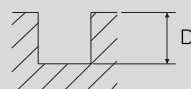
RPM =rev/min
FEED =mm/min

3 FLUTE, FINISH SLOTTING, TiCN-COATED

304303, 104103, 128103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm ²		800 ~ 1000N/mm ²		1000 ~ 1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	90	6200	80	5200	65	10000	70	8500	180	20000	380	15000	280
3	4800	105	4200	100	3400	70	6900	70	5500	180	14000	390	10000	280
4	3640	105	3100	100	2600	70	5200	70	4200	170	10000	380	8000	280
5	2860	105	2500	90	2000	70	4200	70	3300	180	8300	380	6200	280
6	2400	105	2000	90	1700	70	3400	80	2700	210	6900	400	5200	310
8	1800	105	1500	90	1300	70	2600	80	2000	220	5200	400	4000	300
10	1400	105	1200	90	1000	70	2000	80	1700	230	4200	400	3100	300
12	1200	105	1000	90	860	70	1700	80	1300	250	3400	390	2600	300
14	1000	105	900	90	740	70	1400	80	1200	260	3000	390	2200	300
16	900	120	800	100	650	85	1300	90	1000	260	2600	390	2000	300
20	720	120	620	100	520	85	1000	90	830	280	2000	390	1560	300



※ The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

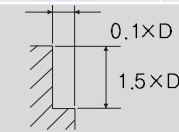
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SIDE CUTTING

304303, 104103, 128103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm ²		800 ~ 1000N/mm ²		1000 ~ 1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	180	4800	160	4000	120	8000	140	6500	330	16000	720	12000	540
3	3700	200	3200	170	2600	130	5300	140	4200	330	11000	690	8000	530
4	2800	200	2400	180	2000	130	4000	140	3200	340	8000	720	6000	540
5	2200	200	1900	180	1600	130	3200	140	2500	340	6400	710	4800	530
6	1800	200	1600	180	1300	130	2600	150	2100	400	5300	760	4000	580
8	1400	200	1200	180	1000	130	2000	150	1600	430	4000	760	3000	580
10	1100	200	950	180	800	130	1600	150	1300	450	3200	760	2400	580
12	900	200	800	180	660	130	1300	150	1000	470	2600	760	2000	580
14	800	200	700	180	570	130	1100	150	900	490	2300	760	1700	580
16	700	220	600	190	500	160	1000	170	800	510	2000	760	1500	580
20	550	220	480	190	400	160	800	180	640	540	1600	760	1200	580



※ The FEED, in long & extra long types, should be reduced by around 50%

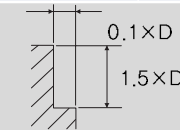
RPM =rev/min
FEED =mm/min

3 FLUTE, FINISH SIDE CUTTING, TiCN-COATED

304303, 104103, 128103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm ²		800 ~ 1000N/mm ²		1000 ~ 1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	230	6200	210	5200	160	10000	180	8500	430	20000	940	15000	700
3	4800	260	4200	220	3400	170	6900	180	5500	430	14000	900	10000	690
4	3640	260	3100	230	2600	170	5200	180	4200	440	10000	940	8000	700
5	2860	260	2500	230	2000	170	4200	180	3300	440	8300	920	6200	690
6	2400	260	2000	230	1700	170	3400	200	2700	520	6900	1000	5200	750
8	1800	260	1500	230	1300	170	2600	200	2000	560	5200	1000	4000	750
10	1400	260	1200	230	1000	170	2000	200	1700	580	4200	1000	3100	750
12	1200	260	1000	230	860	170	1700	200	1300	610	3400	1000	2600	750
14	1000	260	900	230	740	170	1400	200	1200	640	3000	1000	2200	750
16	900	280	800	250	650	210	1300	220	1000	660	2600	1000	2000	750
20	720	280	620	250	520	210	1000	230	830	700	2000	1000	1560	750



※ The FEED, in long & extra long types, should be reduced by around 50%

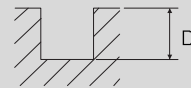
RPM =rev/min
FEED =mm/min

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SLOTTING, 45° HELIX 140103, 141103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1600	95	1300	65	2100	220	5300	410	4000	310
8	1200	95	1000	65	1600	230	4000	410	3000	310
10	950	95	800	65	1300	240	3200	410	2400	310
12	800	95	660	65	1000	250	2600	410	2000	310
14	700	95	570	65	900	260	2300	410	1700	310
16	600	100	500	80	800	270	2000	410	1500	310
20	480	100	400	80	640	290	1600	410	1200	310



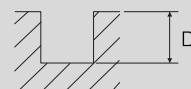
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=rev/min
FEED=mm/min.

3 FLUTE, FINISH SLOTTING, 45° HELIX, TiCN-COATED 140103, 141103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2000	125	1700	85	2700	280	6900	530	5200	400
8	1560	125	1300	85	2000	300	5200	530	3900	400
10	1240	125	1000	85	1700	310	4200	530	3100	400
12	1000	125	860	85	1300	330	3400	530	2600	400
14	900	125	740	85	1200	340	3000	530	2200	400
16	800	130	650	100	1000	350	2600	530	2000	400
20	620	130	520	100	830	380	2000	530	1560	400



※The FEED, in long & extra long types, should be reduced by around 50%

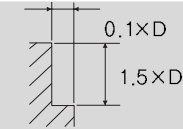
RPM=rev/min
FEED=mm/min.

TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

3 FLUTE, FINISH SIDE CUTTING, 45° HELIX 140103, 141103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	1600	190	1300	130	2100	440	5300	820	4000	620
8	1200	190	1000	130	1600	460	4000	820	3000	620
10	950	190	800	130	1300	480	3200	820	2400	620
12	800	190	660	130	1000	500	2600	820	2000	620
14	700	190	570	130	900	520	2300	820	1700	620
16	600	200	500	160	800	540	2000	820	1500	620
20	480	200	400	160	640	580	1600	820	1200	620



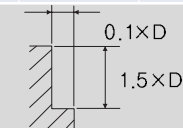
※The FEED, in long & extra long types, should be reduced by around 50%

RPM=rev/min
FEED=mm/min.

3 FLUTE, FINISH SIDE CUTTING, 45° HELIX, TiCN-COATED 140103, 141103



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~ HRc30		HRc30 ~ HRc40							
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2							
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	2000	250	1700	170	2700	570	6900	1000	5200	800
8	1560	250	1300	170	2000	600	5200	1000	3900	800
10	1240	250	1000	170	1700	620	4200	1000	3100	800
12	1000	250	860	170	1300	650	3400	1000	2600	800
14	900	250	740	170	1200	680	3000	1000	2200	800
16	800	260	650	210	1000	700	2600	1000	2000	800
20	620	260	520	210	830	750	2000	1000	1560	800



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=rev/min
FEED=mm/min.

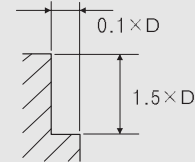
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, STRAIGHT SHANK

511303, 510303, 509303,



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~HRC20		HRC20 ~ HRC30		HRC30 ~ HRC40									
HARDNESS	~HRC20		HRC20 ~ HRC30		HRC30 ~ HRC40									
STRENGTH	500~800N/mm ²		800 ~ 1000N/mm ²		1000 ~ 1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	240	4800	210	4000	160	8000	200	6500	450	16000	960	12000	720
3	3700	270	3200	240	2600	180	5300	200	4200	450	11000	960	8000	720
4	2800	270	2400	240	2000	180	4000	200	3200	450	8000	960	6000	720
5	2200	270	1900	240	1600	180	3200	200	2500	450	6400	960	4800	720
6	1800	270	1600	240	1300	180	2600	200	2100	540	5300	1020	4000	780
8	1400	270	1200	240	1000	180	2000	200	1600	570	4000	1020	3000	780
10	1100	270	950	240	800	180	1600	200	1300	600	3200	1020	2400	780
12	900	270	800	240	660	180	1300	200	1000	630	2600	1020	2000	780
14	800	270	700	240	570	180	1100	200	900	660	2300	1020	1700	780
16	700	300	600	260	500	220	1000	225	800	680	2000	1020	1500	780
20	550	300	480	260	400	220	800	240	640	720	1600	1020	1200	780



* The FEED, in long & extra long types, should be reduced by around 50%

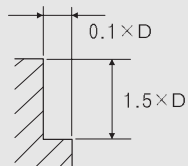
RPM=REVOLUTION PER MIN.
FEED=mm/min.

4 FLUTE, STRAIGHT SHANK, TiCN-COATED

511303, 510303, 509303,



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
	~HRC20		HRC20 ~ HRC30		HRC30 ~ HRC40									
HARDNESS	~HRC20		HRC20 ~ HRC30		HRC30 ~ HRC40									
STRENGTH	500~800N/mm ²		800 ~ 1000N/mm ²		1000 ~ 1300N/mm ²									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	310	6200	270	5200	210	10000	260	8500	580	20000	1200	15000	940
3	4800	350	4200	310	3400	230	6900	260	5500	580	14000	1200	10000	940
4	3640	350	3100	310	2600	230	5200	260	4200	580	10000	1200	8000	940
5	2860	350	2500	310	2000	230	4200	260	3300	580	8600	1200	6200	940
6	2400	350	2000	310	1700	230	3400	260	2700	700	6900	1300	5200	1000
8	1800	350	1500	310	1300	230	2600	260	2000	740	5200	1300	4000	1000
10	1400	350	1200	310	1000	230	2000	260	1700	480	4200	1300	3100	1000
12	1200	350	1000	310	860	230	1700	260	1300	820	3400	1300	2600	1000
14	1000	350	900	310	740	230	1400	260	1200	860	3000	1300	2200	1000
16	900	390	800	340	650	290	1300	290	1000	880	2600	1300	2000	1000
20	720	390	620	340	520	290	1000	310	830	940	2000	1300	1560	1000



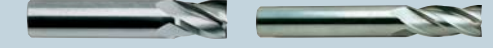
* The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

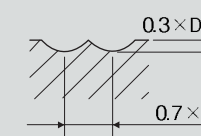
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, STRAIGHT SHANK

309303, 310303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	~HRC30		HRC30~HRC40					
HARDNESS	~HRC30		HRC30~HRC40					
STRENGTH	~1000N/mm ²		1000 ~1300N/mm ²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	5200	90	4400	45	7300	150	21500	280
R 1.5 × 3.0	3500	100	2900	45	4900	160	14300	280
R 2.0 × 4.0	2600	100	2100	45	3600	200	10900	280
R 2.5 × 5.0	2100	105	1700	45	2900	230	8800	330
R 3.0 × 6.0	1700	100	1430	45	2400	250	7260	330
R 4.0 × 8.0	1270	95	1100	45	1800	320	5500	380
R 5.0 × 10.0	1000	95	870	45	1430	320	4300	380
R 6.0 × 12.0	870	85	730	45	1200	320	3600	440
R 7.0 × 14.0	750	85	620	45	1000	325	3000	440
R 8.0 × 16.0	650	85	540	45	920	325	2700	380
R 9.0 × 18.0	580	85	480	45	810	325	2400	380
R 10.0 × 20.0	500	85	430	45	730	290	2100	380



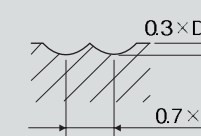
RPM=REVOLUTION PER MIN.
Feed=mm / min

4 FLUTE, STRAIGHT SHANK, TiCN-COATED

309303, 310303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	~HRC30		HRC30~HRC40					
HARDNESS	~HRC30		HRC30~HRC40					
STRENGTH	~1000N/mm ²		1000 ~1300N/mm ²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 × 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 × 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 × 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 × 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 × 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 × 10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 × 12.0	1100	110	950	60	1600	420	4700	570
R 7.0 × 14.0	980	110	800	60	1300	420	3900	570
R 8.0 × 16.0	850	110	700	60	1200	420	3500	490
R 9.0 × 18.0	750	110	620	60	1000	420	3100	490
R 10.0 × 20.0	650	110	560	60	950	380	2700	490



RPM=REVOLUTION PER MIN.
Feed=mm / min

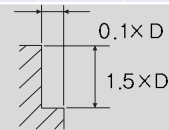
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, FINISH SIDE CUTTING

109103, 111103, 110103, 311303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRC20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	5500	240	4800	210	4000	160	8000	200	6500	450	16000	960	12000	720
3	3700	270	3200	240	2600	180	5300	200	4200	450	11000	960	8000	720
4	2800	270	2400	240	2000	180	4000	200	3200	450	8000	960	6000	720
5	2200	270	1900	240	1600	180	3200	200	2500	450	6400	960	4800	720
6	1800	270	1600	240	1300	180	2600	200	2100	540	5300	1020	4000	780
8	1400	270	1200	240	1000	180	2000	200	1600	570	4000	1020	3000	780
10	1100	270	950	240	800	180	1600	200	1300	600	3200	1020	2400	780
12	900	270	800	240	660	180	1300	200	1000	630	2600	1020	2000	780
14	800	270	700	240	570	180	1100	200	900	660	2300	1020	1700	780
16	700	300	600	260	500	220	1000	225	800	680	2000	1020	1500	780
20	550	300	480	260	400	220	800	240	640	720	1600	1020	1200	780



※ The FEED, in long & extra long types, should be reduced by around 50%

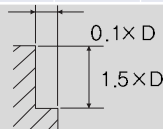
RPM =rev/min
FEED =mm/min

4 FLUTE, FINISH SIDE CUTTING, TiCN-COATED

109103, 111103, 110103, 311303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		STAINLESS STEELS TITANIUM ALLOYS		CAST IRON		ALUMINUM ALLOYS		COPPER. BRASS NON-FERROUS METALS	
HARDNESS	~ HRC20		HRc20 ~ HRc30		HRc30 ~ HRc40									
STRENGTH	500 ~ 800N/mm2		800 ~ 1000N/mm2		1000 ~ 1300N/mm2									
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	7200	310	6200	270	5200	210	10000	260	8500	580	20000	1200	15000	940
3	4800	350	4200	310	3400	230	6900	260	5500	580	14000	1200	10000	940
4	3640	350	3100	310	2600	230	5200	260	4200	580	10000	1200	8000	940
5	2860	350	2500	310	2000	230	4200	260	3300	580	8300	1200	6200	940
6	2400	350	2000	310	1700	230	3400	260	2700	700	6900	1300	5200	1000
8	1800	350	1500	310	1300	230	2600	260	2000	740	5200	1300	4000	1000
10	1400	350	1200	310	1000	230	2000	260	1700	780	4200	1300	3100	1000
12	1200	350	1000	310	860	230	1700	260	1300	820	3400	1300	2600	1000
14	1000	350	900	310	740	230	1400	260	1200	860	3000	1300	2200	1000
16	900	390	800	340	650	290	1300	290	1000	880	2600	1300	2000	1000
20	720	390	620	340	520	290	1000	310	830	940	2000	1300	1560	1000



※ The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

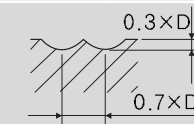
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

2 FLUTE, BALL NOSE

162303, 314303, 312303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRC30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 x 2.0	5200	90	4400	45	7300	150	21500	280
R 1.5 x 3.0	3500	100	2900	45	4900	160	14300	280
R 2.0 x 4.0	2600	100	2100	45	3600	200	10900	280
R 2.5 x 5.0	2100	105	1700	45	2900	230	8800	330
R 3.0 x 6.0	1700	100	1430	45	2400	250	7260	330
R 4.0 x 8.0	1270	95	1100	45	1800	320	5500	380
R 5.0 x 10.0	1000	95	870	45	1430	320	4300	380
R 6.0 x 12.0	870	85	730	45	1200	320	3600	440
R 7.0 x 14.0	750	85	620	45	1000	325	3000	440
R 8.0 x 16.0	650	85	540	45	920	325	2700	380
R 9.0 x 18.0	580	85	480	45	810	325	2400	380
R 10.0 x 20.0	500	85	430	45	730	290	2100	380



※ The FEED, in long & extra long types, should be reduced by around 50%

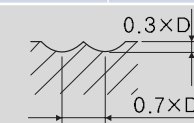
RPM =rev/min
FEED =mm/min

2 FLUTE, BALL NOSE, TiCN-COATED

162303, 314303, 312303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRC30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm2		1000 ~ 1300N/mm2					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 x 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 x 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 x 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 x 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 x 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 x 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 x 10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 x 12.0	1100	110	950	60	1600	420	4700	570
R 7.0 x 14.0	980	110	800	60	1300	420	3900	570
R 8.0 x 16.0	850	110	700	60	1200	420	3500	490
R 9.0 x 18.0	750	110	620	60	1000	420	3100	490
R 10.0 x 20.0	650	110	560	60	950	380	2700	490



※ The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

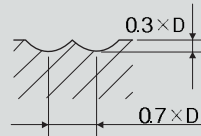
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

2 FLUTE, STANDARD, BALL NOSE

313303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	~HRc30		HRc30~HRc40					
STRENGTH	~1000N/mm ²		1000~1300N/mm ²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R1.0 × 2.0	5200	90	4400	45	7300	150	21500	280
R1.5 × 3.0	3500	100	2900	45	4900	160	14300	280
R2.0 × 4.0	2600	100	2100	45	3600	200	10900	280
R2.5 × 5.0	2100	105	1700	45	2900	230	8800	330
R3.0 × 6.0	1700	100	1430	45	2400	250	7260	330
R4.0 × 8.0	1270	95	1100	45	1800	320	5500	380
R5.0 × 10.0	1000	95	870	45	1430	320	4300	380
R6.0 × 12.0	870	85	730	45	1200	320	3600	440
R7.0 × 14.0	750	85	620	45	1000	325	3000	440
R8.0 × 16.0	650	85	540	45	920	325	2700	380
R9.0 × 18.0	580	85	480	45	810	325	2400	380
R10.0 × 20.0	500	85	430	45	730	290	2100	380



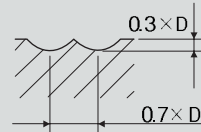
RPM=REVOLUTION PER MIN.
Feed=mm / min

2 FLUTE, STANDARD, BALL NOSE, TiCN-COATED

313303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	~HRc30		HRc30~HRc40					
STRENGTH	~1000N/mm ²		1000~1300N/mm ²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 × 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 × 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 × 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 × 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 × 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 × 10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 × 12.0	1100	110	950	60	1600	420	4700	570
R 7.0 × 14.0	980	110	800	60	1300	420	3900	570
R 8.0 × 16.0	850	110	700	60	1200	420	3500	490
R 9.0 × 18.0	750	110	620	60	1000	420	3100	490
R 10.0 × 20.0	650	110	560	60	950	380	2700	490



RPM=REVOLUTION PER MIN.
Feed=mm / min

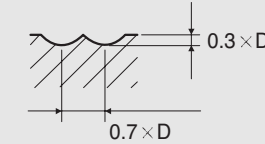
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

2 FLUTE, BALL NOSE, STRAIGHT SHANK

512303, 513303, 514303,



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/mm ²		1000 ~ 1300N/mm ²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	5200	90	4400	45	7300	150	21500	280
R 1.5 × 3.0	3500	100	2900	45	4900	160	14300	280
R 2.0 × 4.0	2600	100	2100	45	3600	200	10900	280
R 2.5 × 5.0	2100	105	1700	45	2900	230	8800	330
R 3.0 × 6.0	1700	100	1430	45	2400	250	7260	330
R 4.0 × 8.0	1270	95	1100	45	1800	320	5500	380
R 5.0 × 10.0	1000	95	870	45	1430	320	4300	380
R 6.0 × 12.0	870	85	730	45	1200	320	3600	440
R 7.0 × 14.0	750	85	620	45	1000	325	3000	440
R 8.0 × 16.0	650	85	540	45	920	325	2700	380
R 9.0 × 18.0	580	85	480	45	810	325	2400	380
R 10.0 × 20.0	500	85	430	45	730	290	2100	380



※ The FEED, in long & extra long types, should be reduced by around 50%

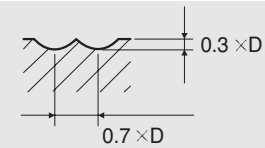
RPM=REVOLUTION PER MIN.
FEED=mm/min.

2 FLUTE, BALL NOSE, STRAIGHT SHANK, TiCN-COATED

512303, 513303, 514303,



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/mm ²		1000 ~ 1300N/mm ²					
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R 1.0 × 2.0	6760	120	5700	60	9500	200	28000	360
R 1.5 × 3.0	4500	130	3800	60	6400	210	18600	360
R 2.0 × 4.0	3400	130	2700	60	4700	260	14000	360
R 2.5 × 5.0	2700	135	2200	60	3800	300	11000	430
R 3.0 × 6.0	2200	130	1860	60	3100	330	9400	430
R 4.0 × 8.0	1600	120	1400	60	2300	420	7200	490
R 5.0 × 10.0	1300	120	1100	60	1860	420	5600	490
R 6.0 × 12.0	1100	110	950	60	1600	420	4700	570
R 7.0 × 14.0	980	110	800	60	1300	420	3900	570
R 8.0 × 16.0	850	110	700	60	1200	420	3500	490
R 9.0 × 18.0	750	110	620	60	1000	420	3100	490
R 10.0 × 20.0	650	110	560	60	950	380	2700	490



※ The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.

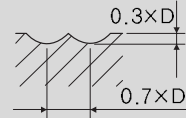
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, BALL NOSE

317303, 316303, 315303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~ HRc30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm ²		1000 ~ 1300N/mm ²					
R 1.0 × 2.0	5200	140	4400	70	7300	230	21500	420
R 1.5 × 3.0	3500	150	2900	70	4900	240	14300	420
R 2.0 × 4.0	2600	150	2100	70	3600	300	10900	420
R 2.5 × 5.0	2100	160	1700	70	2900	350	8800	500
R 3.0 × 6.0	1700	150	1430	70	2400	380	7260	500
R 4.0 × 8.0	1270	140	1100	70	1800	480	5500	570
R 5.0 × 10.0	1000	140	870	70	1430	480	4300	570
R 6.0 × 12.0	870	130	730	70	1200	480	3600	660
R 7.0 × 14.0	750	130	620	70	1000	490	3000	660
R 8.0 × 16.0	650	130	540	70	920	490	2700	570
R 9.0 × 18.0	580	130	480	70	810	490	2400	570
R 10.0 × 20.0	500	130	430	70	730	440	2100	570



※The FEED, in long & extra long types, should be reduced by around 50%

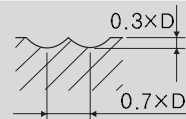
RPM =rev/min
FEED =mm/min

4 FLUTE, BALL NOSE, TiCN-COATED

317303, 316303, 315303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~ HRc30		HRc30 ~ HRc40					
STRENGTH	~ 1000N/mm ²		1000 ~ 1300N/mm ²					
R 1.0 × 2.0	6760	180	5700	90	9500	300	28000	550
R 1.5 × 3.0	4500	200	3800	90	6400	310	18600	550
R 2.0 × 4.0	3400	200	2700	90	4700	390	14000	550
R 2.5 × 5.0	2700	210	2200	90	3800	450	11000	650
R 3.0 × 6.0	2200	200	1860	90	3100	490	9400	650
R 4.0 × 8.0	1600	180	1400	90	2300	620	7200	740
R 5.0 × 10.0	1300	180	1100	90	1860	620	5600	740
R 6.0 × 12.0	1100	170	950	90	1600	620	4700	860
R 7.0 × 14.0	980	170	800	90	1300	640	3900	860
R 8.0 × 16.0	850	170	700	90	1200	640	3500	740
R 9.0 × 18.0	750	170	620	90	1000	640	3100	740
R 10.0 × 20.0	650	170	560	90	950	570	2700	740



※The FEED, in long & extra long types, should be reduced by around 50%

RPM =rev/min
FEED =mm/min

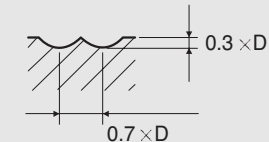
TABLE OF CUTTING CONDITION (MICRO GRAIN CARBIDE)

4 FLUTE, BALL NOSE, STRAIGHT SHANK

516303, 515303, 517303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/㎟		1000 ~ 1300N/㎟					
R 1.0 × 2.0	5200	140	4400	70	7300	230	21500	420
R 1.5 × 3.0	3500	150	2900	70	4900	240	14300	420
R 2.0 × 4.0	2600	150	2100	70	3600	300	10900	420
R 2.5 × 5.0	2100	160	1700	70	2900	350	8800	500
R 3.0 × 6.0	1700	150	1430	70	2400	380	7260	500
R 4.0 × 8.0	1270	140	1100	70	1800	480	5500	570
R 5.0 × 10.0	1000	140	870	70	1430	480	4300	570
R 6.0 × 12.0	870	130	730	70	1200	480	3600	660
R 7.0 × 14.0	750	130	620	70	1000	490	3000	660
R 8.0 × 16.0	650	130	540	70	920	490	2700	570
R 9.0 × 18.0	580	130	480	70	810	490	2400	570
R 10.0 × 20.0	500	130	430	70	730	440	2100	570



※The FEED, in long & extra long types, should be reduced by around 50%

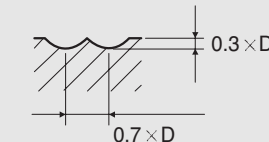
RPM=REVOLUTION PER MIN.
FEED=mm/min.

4 FLUTE, BALL NOSE, STRAIGHT SHANK, TiCN-COATED

516303, 515303, 517303



MATERIAL	CARBON STEELS ALLOY STEELS TOOL STEELS		CARBON STEELS ALLOY STEELS TOOL STEELS		CAST IRON		ALUMINUM ALLOYS	
	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
HARDNESS	~HRc30		HRc30 ~ HRc40					
STRENGTH	~1000N/㎟		1000 ~ 1300N/㎟					
R 1.0 × 2.0	6760	180	5700	90	9500	300	28000	550
R 1.5 × 3.0	4500	200	3800	90	6400	310	18600	550
R 2.0 × 4.0	3400	200	2700	90	4700	390	14000	550
R 2.5 × 5.0	2700	210	2200	90	3800	450	11000	650
R 3.0 × 6.0	2200	200	1860	90	3100	490	9400	650
R 4.0 × 8.0	1600	180	1400	90	2300	620	7200	740
R 5.0 × 10.0	1300	180	1100	90	1860	620	5600	740
R 6.0 × 12.0	1100	170	950	90	1600	620	4700	860
R 7.0 × 14.0	980	170	800	90	1300	640	3900	860
R 8.0 × 16.0	850	170	700	90	1200	640	3500	740
R 9.0 × 18.0	750	170	620	90	1000	640	3100	740
R 10.0 × 20.0	650	170	560	90	950	570	2700	740



※The FEED, in long & extra long types, should be reduced by around 50%

RPM=REVOLUTION PER MIN.
FEED=mm/min.