
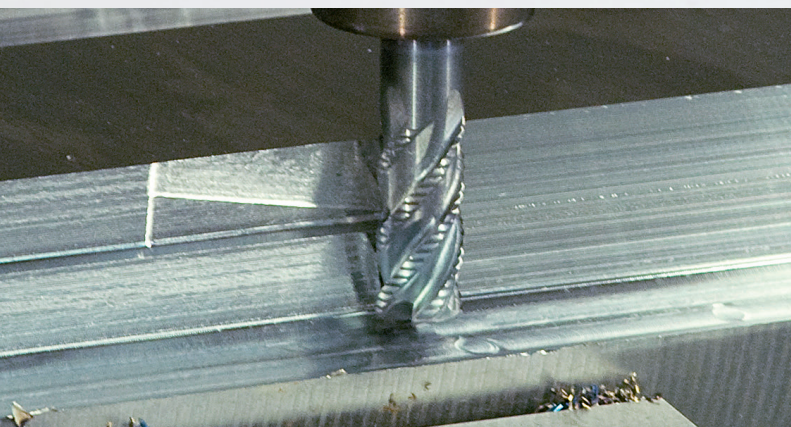


FRANKEN

Frästechnik
Milling Technology
Technique de fraisage

Made in
 Germany



SELECT 03



Sonderaktion · Sales Special · Action spéciale

FRANKEN

EMUGE-FRANKEN, der Systemlieferant

EMUGE-FRANKEN, the System Supplier

EMUGE-FRANKEN, votre fournisseur de solutions complètes



Rund 100 Jahre Präzision und Innovation

Nearly 100 Years of Precision and Innovation
Près de 100 ans de précision et d'innovation

FRANKEN als Teil der EMUGE-FRANKEN Unternehmensgruppe beschäftigt sich seit seiner Gründung mit der Entwicklung und Produktion von Fräswerkzeugen. Präzision und Innovation prägen das breite Angebot von Fräsern aus Hartmetall und HSS sowie PKD-, CBN- oder wendepplattenbestückten Fräskörpern.

Die Fertigung am deutschen Produktionsstandort in Rückersdorf reicht von Standard-Schaft- und Bohrungsfräsern bis hin zu hochgenauen Form- und Profil-Sonderfräsern. Mit seiner Typen- und Schneidstoffvielfalt, dem hohen Standard und der kompromisslosen Präzision entspricht das Fräserprogramm den höchsten Qualitätsanforderungen.

Als Ergänzung zu den Fräswerkzeugen führen wir ein durchgängiges Programm an Fräspannmitteln und Zubehör für die verschiedensten Adaptierungsmöglichkeiten.

Ever since its foundation FRANKEN as part of the EMUGE-FRANKEN company association has been developing and manufacturing milling tools. The wide range of end mills of solid carbide and HSS as well as PCD and CBN inserts or milling cutters with indexable inserts is characterised by precision and innovation.

The production in our German manufacturing plant in Rückersdorf includes standard end mills and bore cutters as well as highly precise special form and profile milling tools. With its large variety of tool types and cutting materials, the consistently high standards and uncompromising precision, our product range of milling cutters meets even the highest quality requirements.

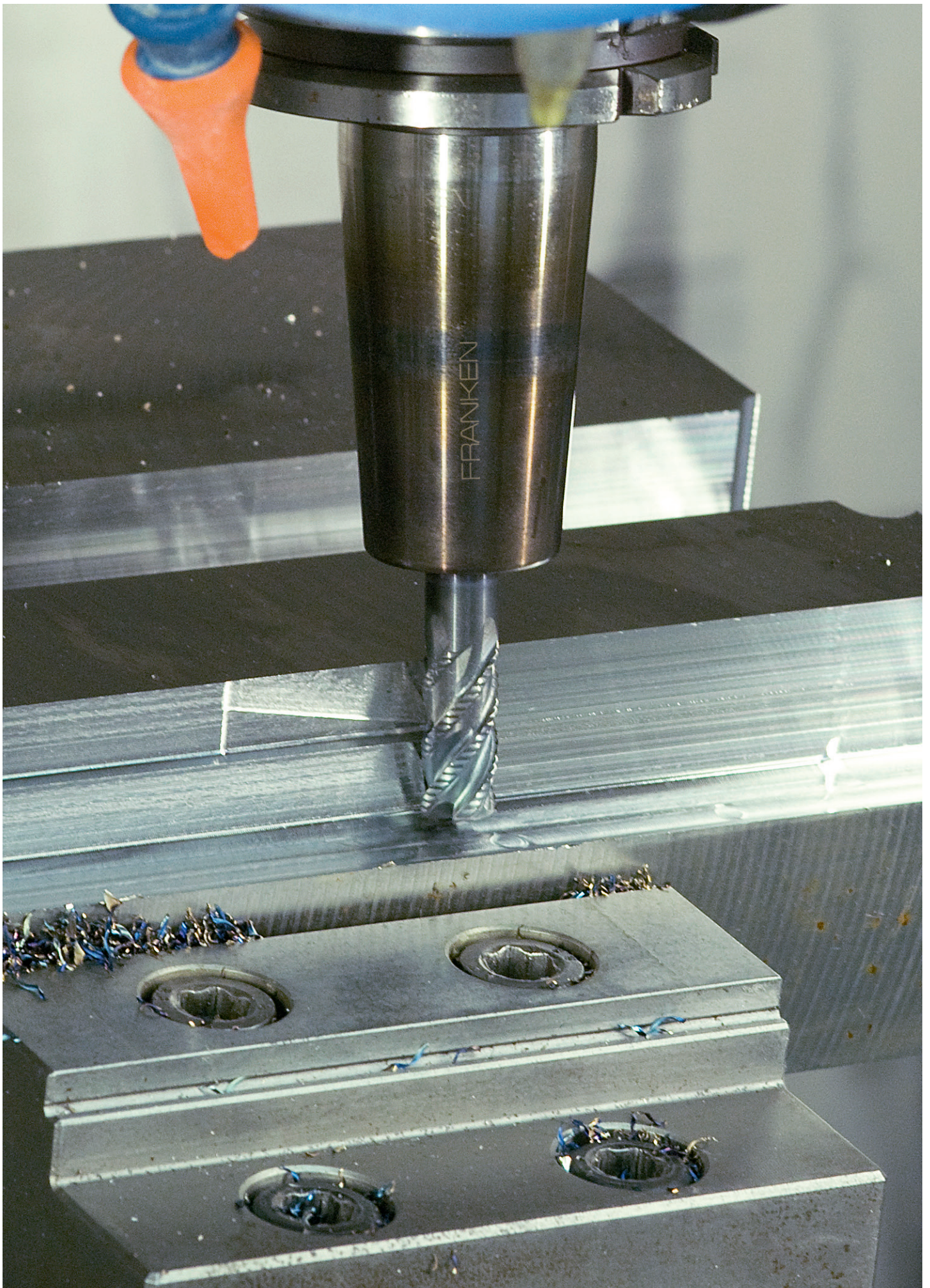
In addition to our selection of milling tools, we also offer a comprehensive range of clamping systems, tool holders and accessories.

Depuis sa fondation, la société FRANKEN, qui fait partie du groupe EMUGE-FRANKEN, conçoit et fabrique des outils de fraisage. La gamme étendue des fraises en carbure ou en acier rapide et des fraises PCD, CBN ou à plaquettes se caractérise par une haute précision et une grande force d'innovation.

Notre programme sur le site de production de Rückersdorf en Allemagne comprend des fraises deux tailles et des fraises à trou standard ainsi que des fraises de forme et des fraises profil spécial très sophistiquées. Avec une telle diversité de types et de substrats outils, un standard supérieur et une précision très rigoureuse, le programme des fraises FRANKEN satisfait aux exigences les plus élevées de qualité.



























En complément des outils de fraisage, nous pouvons vous proposer une gamme complète d'attachements et d'accessoires.





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2451L				2401C			
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2453L		N	8	2449K			
2454L				2444K		W	9
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2439L				2446K		W	10
2448K		2447K					
2449K		W	11	2452K			
2444K							
2445K							

Ein Nachschärfen ist ab \varnothing 10 mm möglich, Preise auf Anfrage
 Regrinding is possible from dia. 10 mm, prices upon request
 Réaffûtage possible à partir de \varnothing 10 mm, prix sur demande

Solid Carbide End Mills – Short Design

Fraises deux tailles en carbure monobloc – version courte

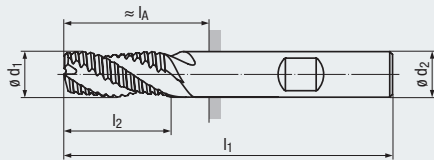
NR



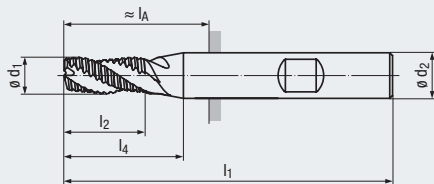
2450L



2451L



Design l_4 :



$\varnothing d_1$ h11	l_2	l_1	l_4	$\varnothing d_2$ h6	l_A	Z (Flutes)	Artikel-Nr. Art. no. Code article	€	Artikel-Nr. Art. no. Code article	€
6	10	54	–	6	18	4	2450L.006	●	2451L.006	●
8	12	58	–	8	22	4	2450L.008	●	2451L.008	●
10	14	66	–	10	26	4	2450L.010	●	2451L.010	●
12	16	73	–	12	28	4	2450L.012	●	2451L.012	●
16	22	82	–	16	34	4	2450L.016	●	2451L.016	●
20	26	92	–	20	42	4	2450L.020	●	2451L.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe bis 44 HRC • Gusswerkstoffe • NE-Metalle 	<ul style="list-style-type: none"> • Steel materials up to 44 HRC • Cast materials • Non-ferrous materials 	<ul style="list-style-type: none"> • Aciers jusqu'à 44 HRC • Fontes • Matières non ferreuses
Schnittwerte siehe Seite 17	Cutting conditions, see page 17	Valeurs de coupe, voir page 17

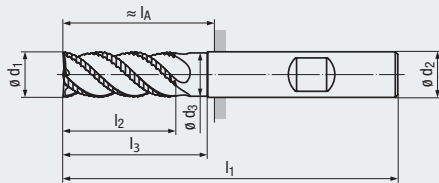
Hartmetall-Schafffräser – Kurze Ausführung

DIN 6527 K

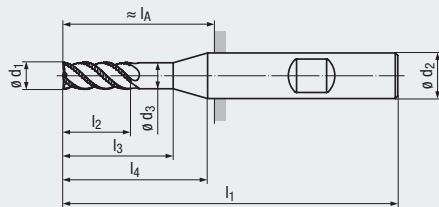
Solid Carbide End Mills – Short Design

Fraises deux tailles en carbure monobloc – version courte

NR



Design I₄:



$\varnothing d_1$ h11	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A (Flutes)	Z	Artikel-Nr. Art. no. Code article	€	Artikel-Nr. Art. no. Code article	€
3	5	9	50	2,9	14	6	14	3	2455L.003	●	2413L.003	●
4	8	12	54	3,8	18	6	18	3	2455L.004	●	2413L.004	●
5	9	16	54	4,8	18	6	18	3	2455L.005	●	2413L.005	●
6	10	16	54	5,8	–	6	18	4	2455L.006	●	2413L.006	●
8	12	20	58	7,7	–	8	22	4	2455L.008	●	2413L.008	●
10	14	24	66	9,7	–	10	26	4	2455L.010	●	2413L.010	●
12	16	26	73	11,6	–	12	28	4	2455L.012	●	2413L.012	●
16	22	32	82	15,5	–	16	34	4	2455L.016	●	2413L.016	●
20	26	40	92	19,5	–	20	42	4	2455L.020	●	2413L.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe bis 44 HRC • Gusswerkstoffe • VA, Inox • NE-Metalle • Titan 	<ul style="list-style-type: none"> • Steel materials up to 44 HRC • Cast materials • VA, Inox • Non-ferrous materials • Titanium 	<ul style="list-style-type: none"> • Aciers jusqu'à 44 HRC • Fontes • VA, Inox • Matières non ferreuses • Titane

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Valeurs de coupe, voir page 18

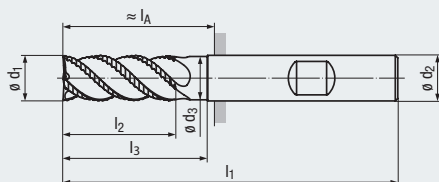
Hartmetall-Schafffräser – Lange Ausführung

DIN 6527 L

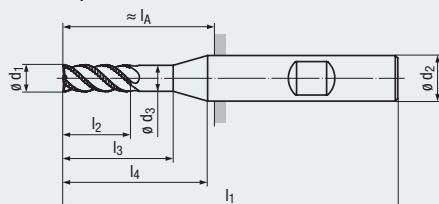
Solid Carbide End Mills – Long Design

Fraises deux tailles en carbure monobloc – version longue

NR



Design I₄:



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3	8	14	57	2,9	20	6	21	3	2456L.003	●	2414L.003	●
4	11	18	57	3,8	20	6	21	3	2456L.004	●	2414L.004	●
5	13	18	57	4,8	20	6	21	3	2456L.005	●	2414L.005	●
6	13	20	57	5,8	–	6	21	4	2456L.006	●	2414L.006	●
8	19	25	63	7,7	–	8	27	4	2456L.008	●	2414L.008	●
10	22	30	72	9,7	–	10	32	4	2456L.010	●	2414L.010	●
12	26	35	83	11,6	–	12	38	4	2456L.012	●	2414L.012	●
16	32	40	92	15,5	–	16	44	4	2456L.016	●	2414L.016	●
20	38	50	104	19,5	–	20	54	4	2456L.020	●	2414L.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe bis 44 HRC • Gusswerkstoffe • VA, Inox • NE-Metalle • Titan 	<ul style="list-style-type: none"> • Steel materials up to 44 HRC • Cast materials • VA, Inox • Non-ferrous materials • Titanium 	<ul style="list-style-type: none"> • Aciers jusqu'à 44 HRC • Fontes • VA, Inox • Matières non ferreuses • Titane

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Cutting conditions, see page 18

Valeurs de coupe, voir page 18

Solid Carbide End Mills – Short Design

Fraises deux tailles en carbure monobloc – version courte

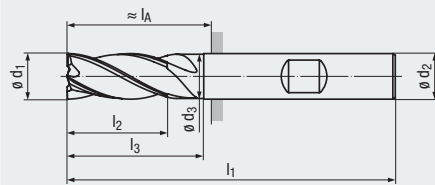
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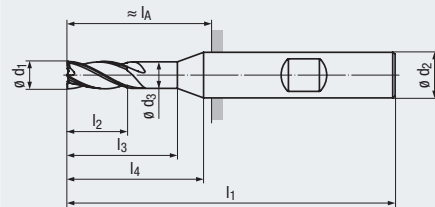
2453L



2454L



Design I₄:



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5	9	16	54	4,8	18	6	18	4	2453L.005	●	2454L.005	●
6	10	16	54	5,8	–	6	18	4	2453L.006	●	2454L.006	●
8	12	20	58	7,7	–	8	22	4	2453L.008	●	2454L.008	●
10	15	24	66	9,5	–	10	26	4	2453L.010	●	2454L.010	●
12	18	26	73	11,5	–	12	28	4	2453L.012	●	2454L.012	●
16	24	32	82	15,5	–	16	34	4	2453L.016	●	2454L.016	●
20	30	40	92	19,5	–	20	42	4	2453L.020	●	2454L.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe bis 44 HRC • Gusswerkstoffe • VA, Inox • NE-Metalle • Titan 	<ul style="list-style-type: none"> • Steel materials up to 44 HRC • Cast materials • VA, Inox • Non-ferrous materials • Titanium 	<ul style="list-style-type: none"> • Aciers jusqu'à 44 HRC • Fontes • VA, Inox • Matières non ferreuses • Titane

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Valeurs de coupe, voir page 19

Hartmetall-Schaftfräser – Lange Ausführung

Solid Carbide End Mills – Long Design

Fraises deux tailles en carbure monobloc – version longue

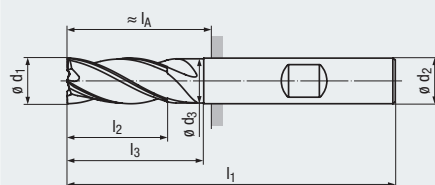
N



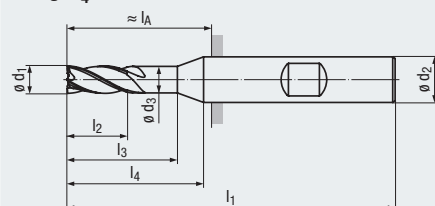
2457L



2439L



Design I₄:



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3	8	14	57	2,9	20	6	21	4	2457L.003	●	2439L.003	●
4	11	18	57	3,8	20	6	21	4	2457L.004	●	2439L.004	●
5	13	19	57	4,8	20	6	21	4	2457L.005	●	2439L.005	●
6	13	20	57	5,8	–	6	21	4	2457L.006	●	2439L.006	●
8	19	25	63	7,7	–	8	27	4	2457L.008	●	2439L.008	●
10	22	30	72	9,5	–	10	32	4	2457L.010	●	2439L.010	●
12	26	35	83	11,5	–	12	38	4	2457L.012	●	2439L.012	●
16	32	40	92	15,5	–	16	44	4	2457L.016	●	2439L.016	●
20	38	50	104	19,5	–	20	54	4	2457L.020	●	2439L.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe bis 44 HRC • Gusswerkstoffe • VA, Inox • NE-Metalle • Titan 	<ul style="list-style-type: none"> • Steel materials up to 44 HRC • Cast materials • VA, Inox • Non-ferrous materials • Titanium 	<ul style="list-style-type: none"> • Aciers jusqu'à 44 HRC • Fontes • VA, Inox • Matières non ferreuses • Titane

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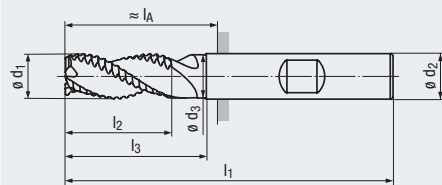
Hartmetall-Schafffräser – Lange Ausführung

DIN 6527 L

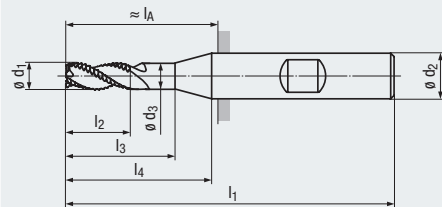
Solid Carbide End Mills – Long Design

Fraises deux tailles en carbure monobloc – version longue

WR



Design I₄:



$\varnothing d_1$ h11	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A (Flutes)	Z	Artikel-Nr. Art. no. Code article	€	Artikel-Nr. Art. no. Code article	€
3	7	14	57	2,9	20	6	21	3	2448K.003	●	2449K.003	●
4	8	18	57	3,8	20	6	21	3	2448K.004	●	2449K.004	●
5	10	19	57	4,8	20	6	21	3	2448K.005	●	2449K.005	●
6	13	20	57	5,8	–	6	21	3	2448K.006	●	2449K.006	●
8	19	25	63	7,7	–	8	34	3	2448K.008	●	2449K.008	●
10	22	30	72	9,5	–	10	32	3	2448K.010	●	2449K.010	●
12	26	35	83	11,5	–	12	38	3	2448K.012	●	2449K.012	●
16	32	40	92	15,5	–	16	44	3	2448K.016	●	2449K.016	●
20	38	50	104	19,5	–	20	54	3	2448K.020	●	2449K.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> Aluminium NE-Metalle 	<ul style="list-style-type: none"> Aluminium Non-ferrous materials 	<ul style="list-style-type: none"> Aluminium Matières non ferreuses
Schnittwerte siehe Seite 21	Cutting conditions, see page 21	Valeurs de coupe, voir page 21

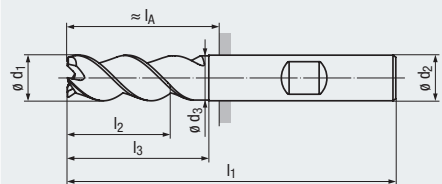
Hartmetall-Schafffräser – Lange Ausführung

DIN 6527 L

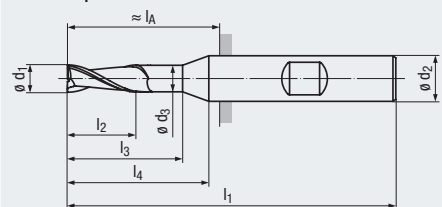
Solid Carbide End Mills – Long Design

Fraises deux tailles en carbure monobloc – version longue

W



Design I₄:



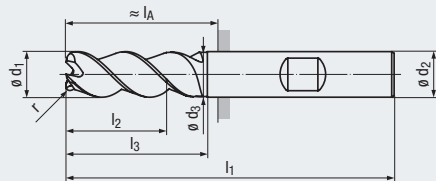
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2	6	10	57	1,9	20	6	21	2	2444K.002	●	2445K.002	●
3	7	14	57	2,9	20	6	21	2	2444K.003	●	2445K.003	●
4	8	18	57	3,8	20	6	21	2	2444K.004	●	2445K.004	●
5	10	19	57	4,8	20	6	21	2	2444K.005	●	2445K.005	●
6	13	20	57	5,8	–	6	21	3	2444K.006	●	2445K.006	●
8	19	25	63	7,7	–	8	34	3	2444K.008	●	2445K.008	●
10	22	30	72	9,5	–	10	32	3	2444K.010	●	2445K.010	●
12	26	35	83	11,5	–	12	38	3	2444K.012	●	2445K.012	●
16	32	40	92	15,5	–	16	44	3	2444K.016	●	2445K.016	●
20	38	50	104	19,5	–	20	54	3	2444K.020	●	2445K.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> Aluminium NE-Metalle 	<ul style="list-style-type: none"> Aluminium Non-ferrous materials 	<ul style="list-style-type: none"> Aluminium Matières non ferreuses
Schnittwerte siehe Seite 22	Cutting conditions, see page 22	Valeurs de coupe, voir page 22

Solid Carbide End Mills with Corner Radius – Long Design

Fraises deux tailles rayonnées en carbure monobloc – version longue

W



$\varnothing d_1$ h10	r $\pm 0,02$	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A (Flutes)	Z	Artikel-Nr. Art. no. Code article	€	Artikel-Nr. Art. no. Code article	€
6	0,5	13	20	57	5,8	6	21	3	2446K.006005	●	2447K.006005	●
6	1	13	20	57	5,8	6	21	3	2446K.006010	●	2447K.006010	●
8	1	19	25	63	7,7	8	27	3	2446K.008010	●	2447K.008010	●
8	1,5	19	25	63	7,7	8	27	3	2446K.008015	●	2447K.008015	●
8	2	19	25	63	7,7	8	27	3	2446K.008020	●	2447K.008020	●
10	1	22	30	72	9,5	10	32	3	2446K.010010	●	2447K.010010	●
10	1,5	22	30	72	9,5	10	32	3	2446K.010015	●	2447K.010015	●
10	2	22	30	72	9,5	10	32	3	2446K.010020	●	2447K.010020	●
12	1	26	35	83	11,5	12	38	3	2446K.012010	●	2447K.012010	●
12	1,5	26	35	83	11,5	12	38	3	2446K.012015	●	2447K.012015	●
12	2	26	35	83	11,5	12	38	3	2446K.012020	●	2447K.012020	●
12	2,5	26	35	83	11,5	12	38	3	2446K.012025	●	2447K.012025	●
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12	4	26	35	83	11,5	12	38	3	2446K.012040	●	2447K.012040	●
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16	1,5	32	40	92	15,5	16	44	3	2446K.016015	●	2447K.016015	●
16	2	32	40	92	15,5	16	44	3	2446K.016020	●	2447K.016020	●
16	2,5	32	40	92	15,5	16	44	3	2446K.016025	●	2447K.016025	●
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20	1,5	38	50	104	19,5	20	54	3	2446K.020015	●	2447K.020015	●
20	2	38	50	104	19,5	20	54	3	2446K.020020	●	2447K.020020	●
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20	4	38	50	104	19,5	20	54	3	2446K.020040	●	2447K.020040	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> Aluminium NE-Metalle 	<ul style="list-style-type: none"> Aluminium Non-ferrous materials 	<ul style="list-style-type: none"> Aluminium Matières non ferreuses

Schnittwerte siehe Seite 22

Cutting conditions, see page 22

Valeurs de coupe, voir page 22

Hartmetall-Kugelfräser – Kurze Ausführung

Werksnorm

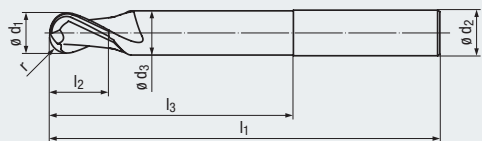
Solid Carbide Ball Nose End Mills – Short Design

Internal Standard

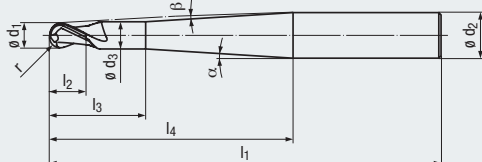
Fraises à bout hémisphérique en carbure monobloc – version courte

Norme usine

W



Design I₄:



$\varnothing d_1$ $\pm 0,01$	r $\pm 0,005$	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h_5	α	β	Z (Flutes)	Artikel-Nr. Art. no. Code article	€
0,5	0,25	1	2	38	0,45	9	3	10°	8°	2	2452K.0005	●
1	0,5	2	4	38	0,95	9	3	12,5°	6,5°	2	2452K.001	●
1,5	0,75	2,5	7,5	38	1,4	9	3	32°	5°	2	2452K.0015	●
2	1	3	8	38	1,8	9	3	31°	3,5°	2	2452K.002	●
3	1,5	3,5	10	57	2,8	20	6	11,5°	5°	2	2452K.003	●
4	2	4	12	57	3,8	20	6	11°	3,5°	2	2452K.004	●
5	2,5	5	14	57	4,7	20	6	10°	2°	2	2452K.005	●
6	3	6	20	57	5,6	–	6	–	–	2	2452K.006	●
8	4	7	25	63	7,6	–	8	–	–	2	2452K.008	●
10	5	8	30	72	9,6	–	10	–	–	2	2452K.010	●
12	6	10	35	83	11,5	–	12	–	–	2	2452K.012	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> Aluminium NE-Metalle 	<ul style="list-style-type: none"> Aluminium Non-ferrous materials 	<ul style="list-style-type: none"> Aluminium Matières non ferreuses

Schnittwerte siehe Seite 23

Cutting conditions, see page 23

Valeurs de coupe, voir page 23

HSS-Schaftfräser – Extra kurze Ausführung

Werksnorm

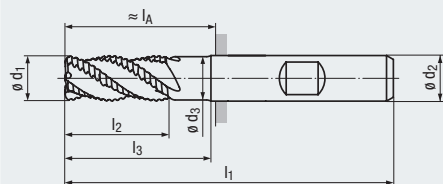
HSS End Mills – Extra Short Design

Internal Standard

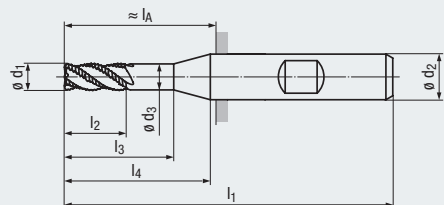
Fraises deux tailles en HSS – version extra courte

Norme usine

HR



Design I₄:



$\varnothing d_1$ k12	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A	Z	Artikel-Nr. Art. no. Code article	€
6	8	14	52	5,5	–	6	16	4	2400C.006	●
8	11	17	61	7,5	19	10	21	4	2400C.008	●
10	13	21	63	9,5	–	10	23	4	2400C.010	●
12	16	26	73	11,5	–	12	28	4	2400C.012	●
14	16	26	73	11,5	–	12	28	4	2400C.014	●
16	19	29	79	15	–	16	31	4	2400C.016	●
18	19	29	79	15	–	16	31	4	2400C.018	●
20	22	36	88	19	–	20	38	4	2400C.020	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe • Gusswerkstoffe • Kupfer, Bronze, Messing 	<ul style="list-style-type: none"> • Steel materials • Cast materials • Copper, Bronze, Brass 	<ul style="list-style-type: none"> • Aciers • Fontes • Cuivre, Bronzes, Laitons

Schnittwerte siehe Seite 24

Cutting conditions, see page 24

Valeurs de coupe, voir page 24

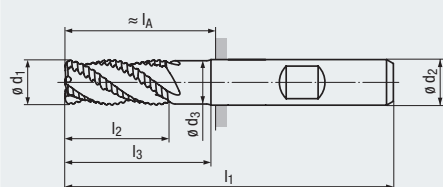
HSS-Schaftfräser – Kurze Ausführung

DIN 844 K

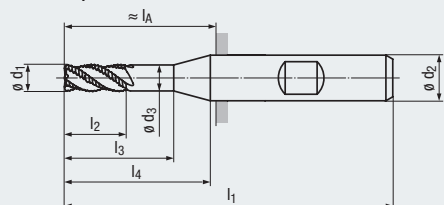
HSS End Mills – Short Design

Fraises deux tailles en HSS – version courte

HR



Design I₄:



$\varnothing d_1$ k12	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A	Z	Artikel-Nr. Art. no. Code article	€
4	11	17	55	–	–	6	19	3	2401C.004	●
5	13	19	57	–	–	6	21	3	2401C.005	●
6	13	19	57	5,5	–	6	21	4	2401C.006	●
8	19	25	69	7,5	27	10	29	4	2401C.008	●
10	22	30	72	9,5	–	10	32	4	2401C.010	●
12	26	36	83	11,5	–	12	38	4	2401C.012	●
14	26	36	83	11,5	–	12	38	4	2401C.014	●
16	32	42	92	15	–	16	44	4	2401C.016	●
18	32	42	92	15	–	16	44	4	2401C.018	●
20	38	52	104	19	–	20	54	4	2401C.020	●
25	45	63	121	24	–	25	65	4	2401C.025	●
28	45	63	121	24	–	25	65	5	2401C.028	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe • Gusswerkstoffe • Kupfer, Bronze, Messing 	<ul style="list-style-type: none"> • Steel materials • Cast materials • Copper, Bronze, Brass 	<ul style="list-style-type: none"> • Aciers • Fontes • Cuivre, Bronzes, Laitons

Schnittwerte siehe Seite 24

Cutting conditions, see page 24

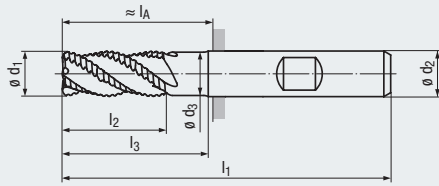
Valeurs de coupe, voir page 24

HSS-Schaftfräser – Lange Ausführung

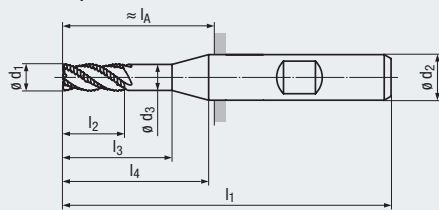
HSS End Mills – Long Design

Fraises deux tailles en HSS – version longue

HR



Design I₄:



$\emptyset d_1$ k12	l_2	l_3	l_1	$\emptyset d_3$	l_4	$\emptyset d_2$ h6	l_A	Z	Artikel-Nr. Art. no. Code article	€
6	24	30	68	5,5	–	6	32	4	2402C.006	●
8	38	44	88	7,5	46	10	48	4	2402C.008	●
10	45	53	95	9,5	–	10	55	4	2402C.010	●
12	53	63	110	11,5	–	12	65	4	2402C.012	●
16	63	73	123	15	–	16	75	4	2402C.016	●
20	75	89	141	19	–	20	91	4	2402C.020	●
25	90	108	166	24	–	25	110	4	2402C.025	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe • Gusswerkstoffe • Kupfer, Bronze, Messing 	<ul style="list-style-type: none"> • Steel materials • Cast materials • Copper, Bronze, Brass 	<ul style="list-style-type: none"> • Aciers • Fontes • Cuivre, Bronzes, Laitons

Schnittwerte siehe Seite 25

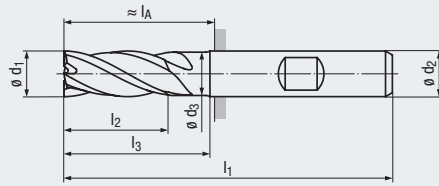
Cutting conditions, see page 25

Valeurs de coupe, voir page 25

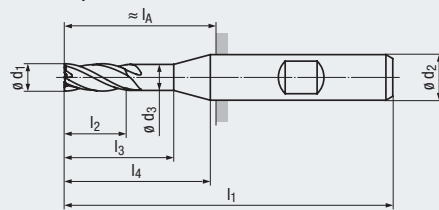
HSS End Mills – Short Design

Fraises deux tailles en HSS – version courte

N



Design I₄:



$\varnothing d_1$ k10	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A	Z	Artikel-Nr. Art. no. Code article	€
4	11	17	55	–	–	6	19	4	2403C.004	●
5	13	19	57	–	–	6	21	4	2403C.005	●
6	13	19	57	5,5	–	6	21	4	2403C.006	●
8	19	25	69	7,5	27	10	29	4	2403C.008	●
10	22	30	72	9,5	–	10	32	4	2403C.010	●
12	26	36	83	11,5	–	12	38	4	2403C.012	●
14	26	36	83	11,5	–	12	38	4	2403C.014	●
16	32	42	92	15	–	16	44	4	2403C.016	●
18	32	42	92	15	–	16	44	4	2403C.018	●
20	38	52	104	19	–	20	54	4	2403C.020	●
22	38	52	104	19	–	20	54	5	2403C.022	●
25	45	63	121	24	–	25	65	5	2403C.025	●
28	45	63	121	24	–	25	65	5	2403C.028	●
30	45	63	121	24	–	25	65	5	2403C.030	●
32	53	70	133	31	–	32	73	6	2403C.032	●
36	53	70	133	31	–	32	73	6	2403C.036	●
40	63	80	155	38	–	40	85	6	2403C.040	●

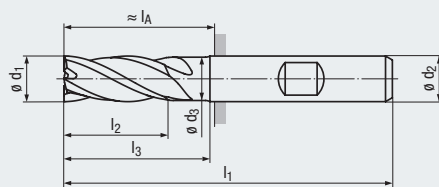
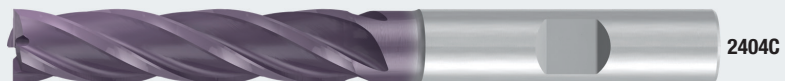
Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe • NE-Metalle (kurzspanend) 	<ul style="list-style-type: none"> • Steel materials • Non-ferrous materials (short-chipping) 	<ul style="list-style-type: none"> • Aciers • Matières non ferreuses (copeaux courts)
Schnittwerte siehe Seite 26	Cutting conditions, see page 26	Valeurs de coupe, voir page 26

HSS-Schaftfräser – Lange Ausführung

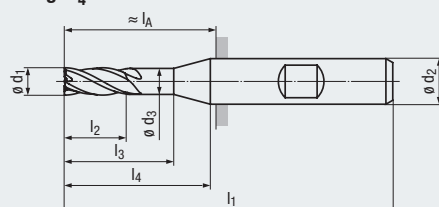
HSS End Mills – Long Design

Fraises deux tailles en HSS – version longue

N



Design I₄:



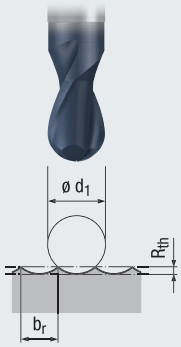
$\varnothing d_1$ k10	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A	Z	Artikel-Nr. Art. no. Code article	€
6	24	30	68	5,5	–	6	32	4	2404C.006	●
8	38	44	88	7,5	46	10	48	4	2404C.008	●
10	45	53	95	9,5	–	10	55	4	2404C.010	●
12	53	63	110	11,5	–	12	65	4	2404C.012	●
14	53	63	110	11,5	–	12	65	4	2404C.014	●
16	63	73	123	15	–	16	75	4	2404C.016	●
18	63	73	123	15	–	16	75	4	2404C.018	●
20	75	89	141	19	–	20	91	4	2404C.020	●
22	75	89	141	19	–	20	91	5	2404C.022	●
25	90	108	166	24	–	25	110	5	2404C.025	●
28	90	108	166	24	–	25	110	5	2404C.028	●
30	90	108	166	24	–	25	110	5	2404C.030	●
32	106	123	186	31	–	32	126	6	2404C.032	●

Einsatzgebiete	Applications	Utilisations
<ul style="list-style-type: none"> • Stahlwerkstoffe • NE-Metalle (kurzspanend) 	<ul style="list-style-type: none"> • Steel materials • Non-ferrous materials (short-chipping) 	<ul style="list-style-type: none"> • Aciers • Matières non ferreuses (copeaux courts)
Schnittwerte siehe Seite 27	Cutting conditions, see page 27	Valeurs de coupe, voir page 27

Einsatzdaten-Berechnung

Work Data Calculation

Calcul des paramètres de fraisage



$$R_{th} = \frac{d_1}{2} - \sqrt{\frac{d_1^2 - b_r^2}{4}}$$

$$b_r = 2 \sqrt{R_{th} (d_1 - R_{th})}$$

d_1 = Schneidendurchmesser [mm]
Cutting diameter
Diamètre de coupe

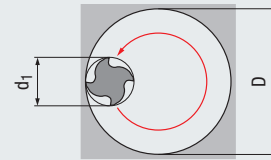
R_{th} = Rautiefe [mm]
Surface roughness
Rugosité (hauteur de profil)

b_r = Zeilensprung [mm]
Line offset
Pas des stries

Innenkontur

Internal contour
Contour intérieur

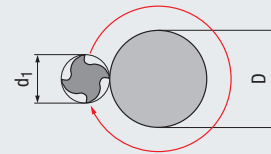
$$v_{fM} = \frac{v_f \times (D - d_1)}{D} \text{ [mm/min]}$$



Außenkontur

External contour
Contour extérieur

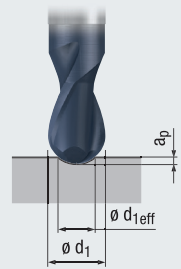
$$v_{fM} = \frac{v_f \times (D + d_1)}{D} \text{ [mm/min]}$$



Effektiver Schneidendurchmesser d_{1eff}

Effective cutting diameter d_{1eff}

Diamètre de coupe effectif d_{1eff}



$$d_{1eff} = 2 \sqrt{a_p (d_1 - a_p)}$$

d_1 = Schneidendurchmesser [mm]
Cutting diameter
Diamètre de coupe

d_{1eff} = Effektiver Schneidendurchmesser [mm]
Effective cutting diameter
Diamètre de coupe effectif

a_p = Axiale Zustellung [mm]
Axial depth of cut
Prise de passe axiale

Drehzahl

Speed/rpm

Vitesse de rotation

$$n = \frac{v_c \times 1000}{d_1 \times \pi} \text{ [min}^{-1}\text{]}$$

Vorschub pro Umdrehung

Feed per revolution

Avance par tour

$$f = f_z \times Z \text{ (flutes) [mm]}$$

Schnittgeschwindigkeit

Cutting speed

Vitesse de coupe

$$v_c = \frac{d_1 \times \pi \times n}{1000} \text{ [m/min]}$$

Vorschubgeschwindigkeit

Feed speed

Vitesse d'avance

$$v_f = f_z \times Z \text{ (flutes) } \times n \text{ [mm/min]}$$

Vorschub pro Zahn

Feed per tooth

Avance par dent

$$f_z = \frac{v_f}{Z \text{ (flutes) } \times n} \text{ [mm]}$$

Mittenspanndicke

Chip thickness

Épaisseur moyenne du copeau

$$h_m = f_z \times \sqrt{\frac{a_e}{d_1}} \text{ [mm]}$$

a_e = Radiale Zustellung [mm]
Radial depth of cut
Prise de passe radiale

Einsatzgebiete – Material Applications – material Utilisations – matière				Mat.-Beispiele Mat. exemples Exemples de mat.	Mat.-Nrn. Mat. nos. Nos de mat.	
P	Stahlwerkstoffe	Steel materials	Aciers			
	1.1 Kaltfließpresstähle, Baustähle, Automatenstähle, u.a.	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	Aciers pour déformation à froid, Aciers de construction, Aciers de décolletage, etc.	≤ 600 N/mm ²	Cq15 S235JR (St37-2) 10SPb20	1.1132 1.0037 1.0722
	2.1 Baustähle, Einsatzstähle, Stahlguss, u.a.	Construction steels, Case-hardened steels, Steel castings, etc.	Aciers de construction, Aciers de cémentation, Aciers moulés, etc.	≤ 800 N/mm ²	E360 (St70-2) 16MnCr5 GS-25CrMo4	1.0070 1.7131 1.7218
	3.1 Einsatzstähle, Vergütungsstähle, Kaltarbeitsstähle, u.a.	Case-hardened steels, Heat-treatable steels, Cold work steels, etc.	Aciers de cémentation, Aciers pour traitements thermiques, Aciers d'outillage à froid, etc.	≤ 1000 N/mm ²	20MoCr3 42CrMo4 102Cr6	1.7320 1.7225 1.2067
	4.1 Vergütungsstähle, Kaltarbeitsstähle, Nitrierstähle, u.a.	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	Aciers pour traitements thermiques, Aciers d'outillage à froid, Aciers nitrurés, etc.	≤ 1200 N/mm ²	50CrMo4 X45NiCrMo4 31CrMo12	1.7228 1.2767 1.8515
	5.1 Hochlegierte Stähle, Kaltarbeitsstähle, Warmarbeitsstähle, u.a.	High-alloyed steels, Cold work steels, Hot work steels, etc.	Aciers fortement alliés, Aciers d'outillage à froid, Aciers d'outillage à chaud, etc.	≤ 1400 N/mm ²	X38CrMoV5-3 X100CrMoV8-1-1 X40CrMoV5-1	1.2367 1.2990 1.2344
M	Nichtrostende Stahlwerkstoffe	Stainless steel materials	Aciers inoxydables			
	1.1 Ferritisch, martensitisch	Ferritic, martensitic	Ferritiques, martensitiques	≤ 950 N/mm ²	X2CrTi12	1.4512
	2.1 Austenitisch	Austenitic	Austénitiques	≤ 950 N/mm ²	X6CrNiMoTi17-12-2	1.4571
	3.1 Austenitisch-ferritisch (Duplex)	Austenitic-ferritic (Duplex)	Austénitiques-ferritiques (Duplex)	≤ 1100 N/mm ²	X2CrNiMoN22-5-3	1.4462
4.1 Austenitisch-ferritisch hitzebeständig (Super Duplex)	Austenitic-ferritic heat-resistant (Super Duplex)	Austénitiques-ferritiques réfractaires (Super Dupl.)	≤ 1250 N/mm ²	X2CrNiMoN25-7-4	1.4410	
K	Gusswerkstoffe	Cast materials	Fontes			
	1.1 Gusseisen mit Lamellengrafit (GJL)	Cast iron with lamellar graphite (GJL)	Fontes graphite lamellaire (GJL)	100-250 N/mm ²	EN-GJL-200 (GG20)	EN-JL-1030
	1.2 Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	Fontes graphite sphéroïdal (GJS)	250-450 N/mm ²	EN-GJL-300 (GG30)	EN-JL-1050
	2.1 Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	Fontes graphite sphéroïdal (GJS)	350-500 N/mm ²	EN-GJS-400-15 (GGG40)	EN-JS-1030
	2.2 Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	Fontes graphite sphéroïdal (GJS)	500-900 N/mm ²	EN-GJS-700-2 (GGG70)	EN-JS-1070
	3.1 Gusseisen mit Vermiculargrafit (GJV)	Cast iron with vermicular graphite (GJV)	Fontes vermiculaires (GJV)	300-400 N/mm ²	GJV 300	
3.2 Gusseisen mit Vermiculargrafit (GJV)	Cast iron with vermicular graphite (GJV)	Fontes vermiculaires (GJV)	400-500 N/mm ²	GJV 450		
4.1 Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	Fontes malléables (GTMW, GTMB)	250-500 N/mm ²	EN-GJMW-350-4 (GTW-35)	EN-JM-1010	
4.2 Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	Fontes malléables (GTMW, GTMB)	500-800 N/mm ²	EN-GJMB-450-6 (GTS-45)	EN-JM-1140	
N	Nichteisenwerkstoffe	Non-ferrous materials	Matières non ferreuses			
	Aluminium-Legierungen	Aluminium alloys	Alliages d'aluminium			
	1.1 Aluminium-Knetlegierungen	Wrought aluminium alloys	Alliages d'aluminium corroyés	≤ 200 N/mm ²	EN AW-AlMn1	EN AW-3103
	1.2 Aluminium-Knetlegierungen	Wrought aluminium alloys	Alliages d'aluminium corroyés	≤ 350 N/mm ²	EN AW-AlMgSi	EN AW-6060
	1.3 Aluminium-Knetlegierungen	Wrought aluminium alloys	Alliages d'aluminium corroyés	≤ 550 N/mm ²	EN AW-AlZn5Mg3Cu	EN AW-7022
	1.4 Aluminium-Knetlegierungen	Wrought aluminium alloys	Alliages d'aluminium corroyés	Si ≤ 7%	EN AC-AlMg5	EN AC-51300
	1.5 Aluminium-Gusslegierungen	Aluminium cast alloys	Fontes d'aluminium	7% < Si ≤ 12%	EN AC-AlSi9Cu3	EN AC-46500
	1.6 Aluminium-Gusslegierungen	Aluminium cast alloys	Fontes d'aluminium	12% < Si ≤ 17%	GD-ALSi17Cu4FeMg	
	Kupfer-Legierungen	Copper alloys	Alliages de cuivre			
	2.1 Reinkupfer, niedriglegiertes Kupfer	Pure copper, low-alloyed copper	Cuivre pur, Cuivre faiblement allié	≤ 400 N/mm ²	E-Cu 57	EN CW 004 A
	2.2 Kupfer-Zink-Legierungen (Messing, langspanend)	Copper-zinc alloys (brass, long-chipping)	Alliages cuivre-zinc (laitons, copeaux longs)	≤ 550 N/mm ²	CuZn37 (Ms63)	EN CW 508 L
	2.3 Kupfer-Zink-Legierungen (Messing, kurzspanend)	Copper-zinc alloys (brass, short-chipping)	Alliages cuivre-zinc (laitons, copeaux courts)	≤ 550 N/mm ²	CuZn36Pb3 (Ms58)	EN CW 603 N
	2.4 Kupfer-Aluminium-Legierungen (Alubronze, langsp.)	Copper-alum.alloys (alu bronze, long-chip.)	Alliages cuivre-alum. (alubronze, copeaux longs)	≤ 800 N/mm ²	CuAl10Ni5Fe4	EN CW 307 G
	2.5 Kupfer-Zinn-Legierungen (Zinnbronze, langspanend)	Copper-tin alloys (tin bronze, long-chipping)	Alliages cuivre-étain (bronze, copeaux longs)	≤ 700 N/mm ²	CuSn8P	EN CW 459 K
	2.6 Kupfer-Zinn-Legierungen (Zinnbronze, kurzspanend)	Copper-tin alloys (tin bronze, short-chipping)	Alliages cuivre-étain (bronze, copeaux courts)	≤ 400 N/mm ²	CuSn7 ZnPb (Rg7)	2.1090
	2.7 Kupfer-Sonderlegierungen	Special copper alloys	Alliages de cuivre spéciaux	≤ 600 N/mm ²	(AMPCO® 8)	
2.8 Kupfer-Sonderlegierungen	Special copper alloys	Alliages de cuivre spéciaux	≤ 1400 N/mm ²	(AMPCO® 45)		
Magnesium-Legierungen	Magnesium alloys	Alliages de magnésium				
3.1 Magnesium-Knetlegierungen	Magnesium wrought alloys	Alliages de magnésium corroyés	≤ 500 N/mm ²	MgAl6Zn	3.5612	
3.2 Magnesium-Gusslegierungen	Magnesium cast alloys	Fontes d'alliages de magnésium	≤ 500 N/mm ²	EN-MCMgAl9Zn1	EN-MC21120	
Kunststoffe	Synthetics	Matières synthétiques				
4.1 Duroplaste (kurzspanend)	Duroplastics (short-chipping)	Thermodurcissables (copeaux courts)		Bakelit, Pertinax		
4.2 Thermoplaste (langspanend)	Thermoplastics (long-chipping)	Thermoplastiques (copeaux longs)		PMMA, POM, PVC		
4.3 Faserverstärkte Kunststoffe (Fasergehalt ≤ 30%)	Fibre-reinforced synthetics (fibre content ≤ 30%)	Plastiques chargés en fibres (taux de fibres ≤ 30%)		GFK, CFK, AFK		
4.4 Faserverstärkte Kunststoffe (Fasergehalt > 30%)	Fibre-reinforced synthetics (fibre content > 30%)	Plastiques chargés en fibres (taux de fibres > 30%)		GFK, CFK, AFK		
Besondere Werkstoffe	Special materials	Matières particulières				
5.1 Grafit	Graphite	Graphites		C 8000		
5.2 Wolfram-Kupfer-Legierungen	Tungsten-copper alloys	Alliages cuivre-tungstène		W-Cu 80/20		
5.3 Verbundwerkstoffe	Composite materials	Matières composites		Hylite, Alucobond		
S	Spezialwerkstoffe	Special materials	Matières spéciales			
	Titan-Legierungen	Titanium alloys	Alliages de titane			
	1.1 Reintitan	Pure titanium	Titane pur	≤ 450 N/mm ²	Ti1	3.7025
	1.2 Titan-Legierungen	Titanium alloys	Alliages de titane	≤ 900 N/mm ²	TiAl6V4	3.7165
	1.3 Titan-Legierungen	Titanium alloys	Alliages de titane	≤ 1250 N/mm ²	TiAl4Mo4Sn2	3.7185
	Nickel-, Kobalt- und Eisen-Legierungen	Nickel alloys, cobalt alloys and iron alloys	Alliages de nickel, cobalt et fer			
	2.1 Reinnickel	Pure nickel	Nickel pur	≤ 600 N/mm ²	Ni 99.6	2.4060
	2.2 Nickel-Basis-Legierungen	Nickel-base alloys	Alliages base nickel	≤ 1000 N/mm ²	Monel 400	2.4360
	2.3 Nickel-Basis-Legierungen	Nickel-base alloys	Alliages base nickel	≤ 1600 N/mm ²	Inconel 718	2.4668
	2.4 Kobalt-Basis-Legierungen	Cobalt-base alloys	Alliages base cobalt	≤ 1000 N/mm ²	Udimet 605	
2.5 Kobalt-Basis-Legierungen	Cobalt-base alloys	Alliages base cobalt	≤ 1600 N/mm ²	Haynes 25	2.4964	
2.6 Eisen-Basis-Legierungen	Iron-base alloys	Alliages base fer	≤ 1500 N/mm ²	Incoloy 800	1.4958	
H	Harte Werkstoffe	Hard materials	Matières dures			
	1.1 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	Aciers à résistance élevée, Aciers traités, Fontes trempées	44 - 50 HRC	Weldox 1100	
	1.2 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	Aciers à résistance élevée, Aciers traités, Fontes trempées	50 - 55 HRC	Hardox 550	
	1.3 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	Aciers à résistance élevée, Aciers traités, Fontes trempées	55 - 60 HRC	Armoxx 600T	
	1.4 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	Aciers à résistance élevée, Aciers traités, Fontes trempées	60 - 63 HRC	Ferro-Titanit	
1.5 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	Aciers à résistance élevée, Aciers traités, Fontes trempées	63 - 66 HRC	HSSE		

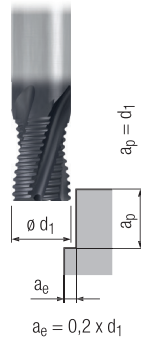
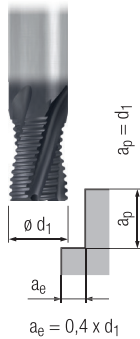
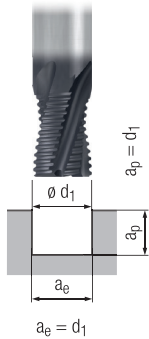
Schnittwerte für Hartmetall-Schaftfräser – Kurze Ausführung

Cutting Conditions for Solid Carbide End Mills – Short Design

Valeurs de coupe pour fraises deux tailles en carbure monobloc – version courte



NR



Gültig für
Valid for
Valable pour

2450L
2451L

		V _C [m/min]		f _z [mm]				MMS MQL			
		1	2	1	2						
P	1.1	110	0,005 x d ₁	120	0,006 x d ₁	140	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	100	0,004 x d ₁	110	0,006 x d ₁	130	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	90	0,004 x d ₁	100	0,005 x d ₁	110	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	80	0,003 x d ₁	90	0,005 x d ₁	100	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	5.1	70	0,003 x d ₁	80	0,004 x d ₁	90	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
M	1.1										
	2.1										
	3.1										
	4.1										
K	1.1	110	0,005 x d ₁	130	0,006 x d ₁	160	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2	110	0,005 x d ₁	130	0,006 x d ₁	160	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.1	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.1	80	0,004 x d ₁	100	0,005 x d ₁	120	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2	80	0,004 x d ₁	100	0,005 x d ₁	120	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.2	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N	1.1										
	1.2										
	1.3										
	1.4										
	1.5										
	1.6										
	2.1										
	2.2										
	2.3	100	0,005 x d ₁	120	0,006 x d ₁	140	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4										
	2.5	100	0,005 x d ₁	110	0,005 x d ₁	120	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6										
	2.7										
	2.8										
	3.1										
	3.2										
4.1											
4.2											
4.3											
4.4											
5.1											
5.2	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3											
S	1.1										
	1.2										
	1.3										
	2.1										
	2.2										
	2.3										
	2.6										
H	1.1	60	0,003 x d ₁	70	0,003 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2										
	1.3										
	1.4										
	1.5										

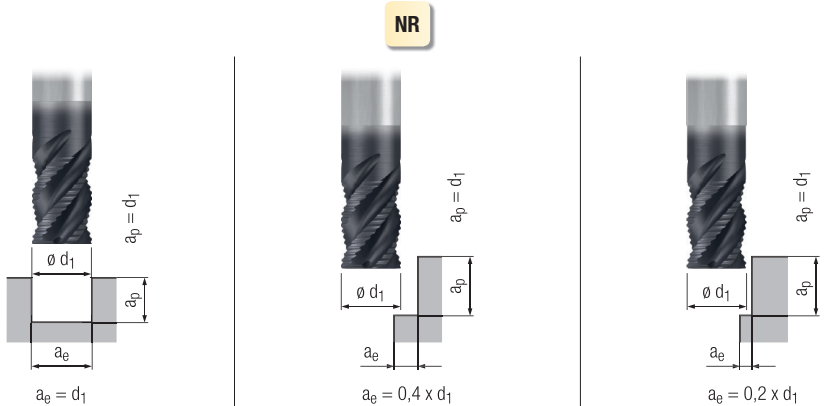
V_C = Schnittgeschwindigkeit · Cutting speed · Vitesse de coupe
f_z = Vorschub pro Zahn · Feed per tooth · Avance par dent

■ = sehr gut geeignet · very suitable · très approprié
□ = gut geeignet · suitable · approprié

Schnittwerte für Hartmetall-Schafffräser – Kurze und Lange Ausführung

Cutting Conditions for Solid Carbide End Mills – Short and Long Design

Valeurs de coupe pour fraises deux tailles en carbure monobloc – version courte et longue



Gültig für
Valid for
Valable pour
2413L
2414L
2455L
2456L

		NR							
		V_c [m/min]	f_z [mm]						
P	1.1	120	$0,005 \times d_1$	140	$0,006 \times d_1$	170	$0,007 \times d_1$	□	■
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	□	■
	3.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	□	■
	4.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	□	■
	5.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	□	■
M	1.1	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$		■
	2.1	50	$0,003 \times d_1$	60	$0,004 \times d_1$	70	$0,004 \times d_1$		■
	3.1								
	4.1								
K	1.1	120	$0,005 \times d_1$	140	$0,006 \times d_1$	170	$0,007 \times d_1$	■	■
	1.2	120	$0,005 \times d_1$	140	$0,006 \times d_1$	170	$0,007 \times d_1$	■	■
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	■	■
	2.2	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	■	■
	3.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,006 \times d_1$	■	■
	3.2	90	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,006 \times d_1$	■	■
	4.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	■	■
	4.2	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	■	■
N	1.1								
	1.2								
	1.3								
	1.4								
	1.5								
	1.6								
	2.1	110	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$		■
	2.2	110	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$		■
	2.3	110	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$	□	■
	2.4	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$		■
	2.5	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$		■
	2.6	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	□	■
	2.7								
	2.8								
	3.1								
3.2									
4.1	240	$0,008 \times d_1$	290	$0,009 \times d_1$	340	$0,011 \times d_1$	□	■	
4.2									
4.3									
4.4									
5.1									
5.2	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$		■	
5.3									
S	1.1	60	$0,004 \times d_1$	70	$0,004 \times d_1$	80	$0,005 \times d_1$		■
	1.2								
	1.3								
	2.1								
	2.2								
	2.3								
	2.4								
H	1.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	□	■
	1.2								
	1.3								
	1.4								
	1.5								



MMS MQL

Schnittwerte für Hartmetall-Schafffräser – Kurze Ausführung

Cutting Conditions for Solid Carbide End Mills – Short Design

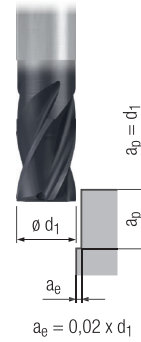
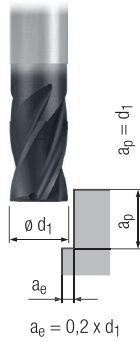
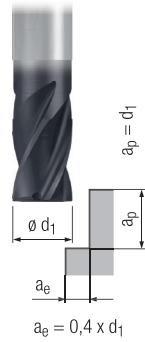
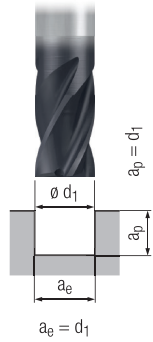
Valeurs de coupe pour fraises deux tailles en carbure monobloc – version courte



N

Gültig für
Valid for
Valable pour

2453L
2454L



	V _c [m/min]	f _z [mm]	V _c [m/min]	f _z [mm]	V _c [m/min]	f _z [mm]	V _c [m/min]	f _z [mm]					
											MMS MQL		
P	1.1	170	0,005 x d ₁	190	0,006 x d ₁	200	0,007 x d ₁	240	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	150	0,004 x d ₁	170	0,005 x d ₁	180	0,006 x d ₁	210	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	130	0,004 x d ₁	140	0,005 x d ₁	160	0,005 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	120	0,003 x d ₁	130	0,004 x d ₁	140	0,004 x d ₁	170	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	100	0,003 x d ₁	110	0,003 x d ₁	120	0,004 x d ₁	140	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	80	0,003 x d ₁	90	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	70	0,003 x d ₁	80	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	50	0,002 x d ₁	60	0,003 x d ₁	60	0,003 x d ₁	70	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	30	0,002 x d ₁	30	0,003 x d ₁	40	0,003 x d ₁	40	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	170	0,005 x d ₁	190	0,006 x d ₁	200	0,007 x d ₁	240	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	170	0,005 x d ₁	190	0,006 x d ₁	200	0,007 x d ₁	240	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	150	0,004 x d ₁	170	0,005 x d ₁	180	0,006 x d ₁	210	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	150	0,004 x d ₁	170	0,005 x d ₁	180	0,006 x d ₁	210	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	130	0,004 x d ₁	140	0,005 x d ₁	160	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	130	0,004 x d ₁	140	0,005 x d ₁	160	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	100	0,003 x d ₁	110	0,004 x d ₁	120	0,004 x d ₁	140	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.2	80	0,003 x d ₁	90	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
N	1.1	220	0,009 x d ₁	250	0,010 x d ₁	280	0,011 x d ₁	300	0,013 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	220	0,008 x d ₁	250	0,009 x d ₁	280	0,010 x d ₁	300	0,011 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	220	0,007 x d ₁	250	0,008 x d ₁	280	0,009 x d ₁	300	0,010 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	200	0,008 x d ₁	250	0,009 x d ₁	280	0,010 x d ₁	300	0,011 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5												
	1.6												
	2.1	150	0,005 x d ₁	170	0,006 x d ₁	180	0,007 x d ₁	210	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	150	0,005 x d ₁	170	0,006 x d ₁	180	0,007 x d ₁	210	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	150	0,005 x d ₁	170	0,006 x d ₁	180	0,007 x d ₁	210	0,008 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	130	0,004 x d ₁	140	0,005 x d ₁	160	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	130	0,004 x d ₁	140	0,005 x d ₁	160	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	130	0,004 x d ₁	140	0,005 x d ₁	160	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	80	0,003 x d ₁	90	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	80	0,003 x d ₁	90	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	340	0,009 x d ₁	370	0,011 x d ₁	410	0,013 x d ₁	480	0,014 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2	340	0,007 x d ₁	370	0,008 x d ₁	410	0,010 x d ₁	480	0,011 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1	340	0,008 x d ₁	370	0,009 x d ₁	410	0,011 x d ₁	480	0,012 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.2	500	0,008 x d ₁	550	0,009 x d ₁	600	0,011 x d ₁	700	0,012 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.3													
4.4													
5.1													
5.2	80	0,003 x d ₁	90	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁				<input checked="" type="checkbox"/>	
5.3													
S	1.1	80	0,004 x d ₁	90	0,004 x d ₁	100	0,005 x d ₁	110	0,006 x d ₁				<input checked="" type="checkbox"/>
	1.2	70	0,003 x d ₁	80	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁				<input checked="" type="checkbox"/>
	1.3	40	0,003 x d ₁	40	0,003 x d ₁	50	0,004 x d ₁	60	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.1	70	0,002 x d ₁	80	0,002 x d ₁	80	0,003 x d ₁	100	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.2	30	0,002 x d ₁	30	0,002 x d ₁	35	0,003 x d ₁	40	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.3	20	0,002 x d ₁	25	0,002 x d ₁	25	0,003 x d ₁	30	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.4	20	0,002 x d ₁	25	0,002 x d ₁	25	0,003 x d ₁	30	0,003 x d ₁				<input checked="" type="checkbox"/>
2.5	20	0,002 x d ₁	20	0,002 x d ₁	20	0,003 x d ₁	30	0,003 x d ₁				<input checked="" type="checkbox"/>	
2.6	20	0,002 x d ₁	20	0,002 x d ₁	20	0,003 x d ₁	30	0,003 x d ₁				<input checked="" type="checkbox"/>	
H	1.1	100	0,003 x d ₁	110	0,003 x d ₁	120	0,004 x d ₁	140	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	80	0,003 x d ₁	90	0,003 x d ₁	100	0,004 x d ₁	110	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3			90	0,003 x d ₁	100	0,003 x d ₁	110	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.4												
	1.5												

V_c = Schnittgeschwindigkeit · Cutting speed · Vitesse de coupe
f_z = Vorschub pro Zahn · Feed per tooth · Avance par dent

■ = sehr gut geeignet · very suitable · très approprié
□ = gut geeignet · suitable · approprié

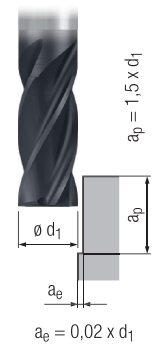
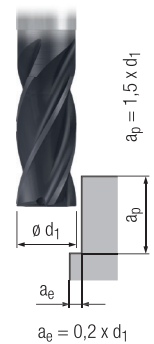
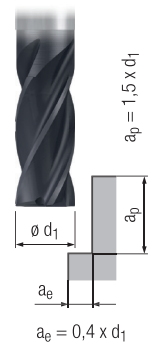
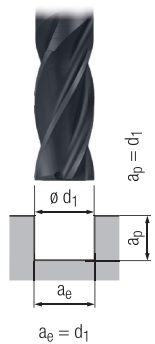
Schnittwerte für Hartmetall-Schafffräser – Lange Ausführung

Cutting Conditions for Solid Carbide End Mills – Long Design

Valeurs de coupe pour fraises deux tailles en carbure monobloc – version longue



N



Gültig für
Valid for
Valable pour

2457L
2439L

	V_C [m/min]	f_z [mm]	V_C [m/min]	f_z [mm]	V_C [m/min]	f_z [mm]	V_C [m/min]	f_z [mm]			MMS MQL		
P	1.1	140	$0,005 \times d_1$	150	$0,005 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	110	$0,004 \times d_1$	120	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	5.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,003 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
M	1.1	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	40	$0,002 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	30	$0,002 \times d_1$	30	$0,003 \times d_1$	40	$0,003 \times d_1$	40	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	140	$0,005 \times d_1$	150	$0,006 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	140	$0,005 \times d_1$	150	$0,006 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	110	$0,004 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2	110	$0,004 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
N	1.1	220	$0,009 \times d_1$	250	$0,010 \times d_1$	280	$0,011 \times d_1$	300	$0,013 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	220	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,011 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	220	$0,007 \times d_1$	250	$0,008 \times d_1$	280	$0,009 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	200	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,011 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5												
	1.6												
	2.1	130	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	130	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	130	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	170	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	170	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	170	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	290	$0,009 \times d_1$	320	$0,010 \times d_1$	350	$0,011 \times d_1$	410	$0,013 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2	290	$0,007 \times d_1$	320	$0,008 \times d_1$	350	$0,009 \times d_1$	410	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1	290	$0,008 \times d_1$	320	$0,009 \times d_1$	350	$0,009 \times d_1$	410	$0,011 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.2	430	$0,008 \times d_1$	470	$0,009 \times d_1$	520	$0,009 \times d_1$	600	$0,011 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.3													
4.4													
5.1													
5.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3													
S	1.1	70	$0,004 \times d_1$	80	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	40	$0,003 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	60	$0,002 \times d_1$	70	$0,002 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	20	$0,002 \times d_1$	15	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.5	20	$0,002 \times d_1$	20	$0,002 \times d_1$	20	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2.6	20	$0,002 \times d_1$	20	$0,002 \times d_1$	20	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H	1.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,003 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,003 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3			70	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4												
	1.5												

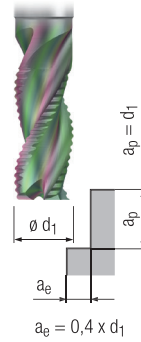
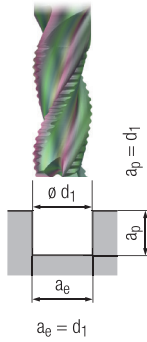
Schnittwerte für Hartmetall-Schafffräser – Lange Ausführung

Cutting Conditions for Solid Carbide End Mills – Long Design

Valeurs de coupe pour fraises deux tailles en carbure monobloc – version longue



WR



Gültig für
Valid for
Valable pour

2448K
2449K

	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL	
P	1.1							
	2.1							
	3.1							
	4.1							
	5.1							
M	1.1							
	2.1							
	3.1							
	4.1							
K	1.1							
	1.2							
	2.1							
	2.2							
	3.1							
	3.2							
	4.1							
	4.2							
N	1.1	300	$0,009 \times d_1$	420	$0,011 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	430	$0,008 \times d_1$	620	$0,010 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	385	$0,007 \times d_1$	550	$0,008 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	270	$0,008 \times d_1$	380	$0,010 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5							
	1.6							
	2.1	100	$0,005 \times d_1$	160	$0,006 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	100	$0,005 \times d_1$	160	$0,006 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	100	$0,005 \times d_1$	160	$0,006 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	80	$0,004 \times d_1$	140	$0,005 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	80	$0,004 \times d_1$	140	$0,005 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	80	$0,004 \times d_1$	140	$0,005 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	60	$0,003 \times d_1$	100	$0,004 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8							
	3.1							
	3.2							
4.1								
4.2								
4.3								
4.4								
5.1								
5.2								
5.3								
S	1.1							
	1.2							
	1.3							
	2.1							
	2.2							
	2.3							
	2.4							
2.5								
2.6								
H	1.1							
	1.2							
	1.3							
	1.4							
	1.5							

V_c = Schnittgeschwindigkeit · Cutting speed · Vitesse de coupe
 f_z = Vorschub pro Zahn · Feed per tooth · Avance par dent

■ = sehr gut geeignet · very suitable · très approprié
□ = gut geeignet · suitable · approprié

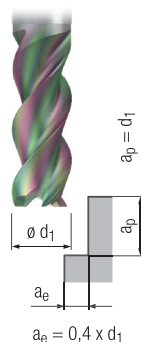
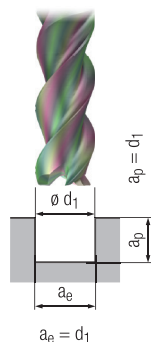
Schnittwerte für Hartmetall-Schafffräser – Lange Ausführung

Cutting Conditions for Solid Carbide End Mills – Long Design

Valeurs de coupe pour fraises deux tailles en carbure monobloc – version longue



W



Gültig für
Valid for
Valable pour

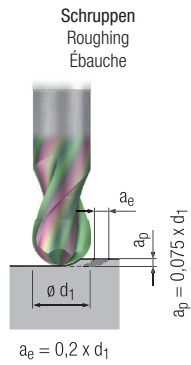
2444K
2445K
2446K
2447K

	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL	
P	1.1							
	2.1							
	3.1							
	4.1							
	5.1							
M	1.1							
	2.1							
	3.1							
	4.1							
K	1.1							
	1.2							
	2.1							
	2.2							
	3.1							
	3.2							
	4.1							
	4.2							
N	1.1	300	$0,006 \times d_1$	420	$0,011 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	430	$0,005 \times d_1$	620	$0,010 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	385	$0,005 \times d_1$	550	$0,008 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	270	$0,005 \times d_1$	380	$0,010 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5							
	1.6							
	2.1	100	$0,005 \times d_1$	160	$0,006 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	100	$0,005 \times d_1$	160	$0,006 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	100	$0,005 \times d_1$	160	$0,006 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	80	$0,004 \times d_1$	140	$0,005 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	80	$0,004 \times d_1$	140	$0,005 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	80	$0,004 \times d_1$	140	$0,005 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	60	$0,003 \times d_1$	100	$0,004 \times d_1$		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8							
	3.1							
	3.2							
4.1								
4.2								
4.3								
4.4								
5.1								
5.2								
5.3								
S	1.1							
	1.2							
	1.3							
	2.1							
	2.2							
	2.3							
	2.6							
H	1.1							
	1.2							
	1.3							
	1.4							
	1.5							

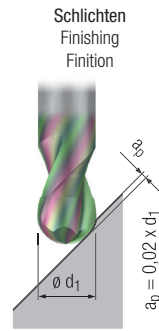
Schnittwerte für Hartmetall-Kugelfräser – Kurze Ausführung

Cutting Conditions for Solid Carbide Ball Nose End Mills – Short Design

Valeurs de coupe pour fraises à bout hémisphérique en carbure monobloc – version courte



W



Gültig für
Valid for
Valable pour
2452K

	Schruppen (Roughing)		Schlichten (Finishing)						
	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]					
P	1.1								
	2.1								
	3.1								
	4.1								
	5.1								
M	1.1								
	2.1								
	3.1								
	4.1								
K	1.1								
	1.2								
	2.1								
	2.2								
	3.1								
	3.2								
	4.1								
	4.2								
N	1.1	900	$0,022 \times d_1$	1200	$0,016 \times d_1$				
	1.2	900	$0,020 \times d_1$	1200	$0,014 \times d_1$				
	1.3	900	$0,017 \times d_1$	1200	$0,012 \times d_1$				
	1.4	600	$0,020 \times d_1$	800	$0,014 \times d_1$				
	1.5								
	1.6								
	2.1	200	$0,014 \times d_1$	260	$0,010 \times d_1$				
	2.2	200	$0,014 \times d_1$	260	$0,010 \times d_1$				
	2.3	200	$0,014 \times d_1$	260	$0,010 \times d_1$				
	2.4	160	$0,011 \times d_1$	220	$0,008 \times d_1$				
	2.5	160	$0,011 \times d_1$	220	$0,008 \times d_1$				
	2.6	160	$0,011 \times d_1$	220	$0,008 \times d_1$				
	2.7	100	$0,008 \times d_1$	140	$0,006 \times d_1$				
	2.8	100	$0,008 \times d_1$	140	$0,006 \times d_1$				
	3.1	450	$0,025 \times d_1$	600	$0,018 \times d_1$				
	3.2	450	$0,020 \times d_1$	600	$0,014 \times d_1$				
	4.1	350	$0,021 \times d_1$	450	$0,015 \times d_1$				
	4.2	500	$0,021 \times d_1$	650	$0,015 \times d_1$				
	4.3	200	$0,017 \times d_1$	250	$0,012 \times d_1$				
	4.4	140	$0,017 \times d_1$	180	$0,012 \times d_1$				
5.1									
5.2									
5.3	220	$0,017 \times d_1$	300	$0,012 \times d_1$					
S	1.1	110	$0,010 \times d_1$	150	$0,007 \times d_1$				
	1.2	90	$0,010 \times d_1$	120	$0,006 \times d_1$				
	1.3	50	$0,008 \times d_1$	70	$0,005 \times d_1$				
	2.1	80	$0,008 \times d_1$	110	$0,006 \times d_1$				
	2.2	30	$0,006 \times d_1$	50	$0,004 \times d_1$				
	2.3	20	$0,006 \times d_1$	40	$0,004 \times d_1$				
	2.4								
	2.5								
2.6									
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

V_c = Schnittgeschwindigkeit · Cutting speed · Vitesse de coupe
 f_z = Vorschub pro Zahn · Feed per tooth · Avance par dent

■ = sehr gut geeignet · very suitable · très approprié
 □ = gut geeignet · suitable · approprié

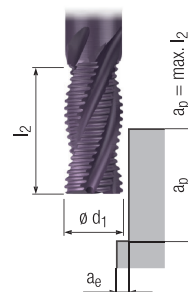
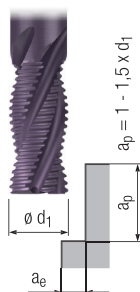
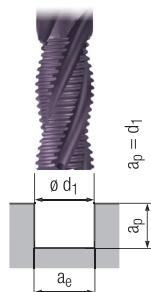
Schnittwerte für HSS-Schaftfräser – Extra kurze und kurze Ausführung

Cutting Conditions for HSS End Mills – Extra Short and Short Design

Valeurs de coupe pour fraises deux tailles en HSS – version extra courte et courte



HR



Gültig für
Valid for
Valable pour

2400C
2401C

	V_c [m/min]	a_e			No Coolant	MQL	Coolant
		$a_e = d_1$	$a_e = 0,5 \times d_1$	$a_e = 0,25 \times d_1$			
		f_z [mm]	f_z [mm]	f_z [mm]			
P	1.1	60	$0,0035 \times d_1$	$0,0046 \times d_1$	$0,0056 \times d_1$	□	■
	2.1	55	$0,0032 \times d_1$	$0,0042 \times d_1$	$0,0052 \times d_1$		■
	3.1	40	$0,0029 \times d_1$	$0,0038 \times d_1$	$0,0047 \times d_1$		■
	4.1						
	5.1						
M	1.1						
	2.1						
	3.1						
	4.1						
K	1.1	48	$0,0035 \times d_1$	$0,0046 \times d_1$	$0,0056 \times d_1$	□	■
	1.2	42	$0,0032 \times d_1$	$0,0042 \times d_1$	$0,0052 \times d_1$	□	■
	2.1	38	$0,0032 \times d_1$	$0,0042 \times d_1$	$0,0052 \times d_1$		■
	2.2	34	$0,0029 \times d_1$	$0,0038 \times d_1$	$0,0047 \times d_1$		■
	3.1						
	3.2						
	4.1	40	$0,0032 \times d_1$	$0,0042 \times d_1$	$0,0052 \times d_1$	□	■
N	1.1						
	1.2						
	1.3						
	1.4						
	1.5						
	1.6						
	2.1	43	$0,0035 \times d_1$	$0,0046 \times d_1$	$0,0056 \times d_1$		■
	2.2	47	$0,0032 \times d_1$	$0,0042 \times d_1$	$0,0052 \times d_1$		■
	2.3	85	$0,0035 \times d_1$	$0,0046 \times d_1$	$0,0056 \times d_1$	□	■
	2.4	44	$0,0026 \times d_1$	$0,0034 \times d_1$	$0,0042 \times d_1$		■
	2.5	67	$0,0029 \times d_1$	$0,0038 \times d_1$	$0,0047 \times d_1$	□	■
	2.6	77	$0,0035 \times d_1$	$0,0046 \times d_1$	$0,0056 \times d_1$		■
	2.7						
	2.8						
	3.1						
3.2							
4.1							
4.2							
4.3							
4.4							
5.1							
5.2	28	$0,0026 \times d_1$	$0,0034 \times d_1$	$0,0042 \times d_1$		■	
5.3							
S	1.1	40	$0,0029 \times d_1$	$0,0038 \times d_1$	$0,0047 \times d_1$		■
	1.2	28	$0,0026 \times d_1$	$0,0034 \times d_1$	$0,0042 \times d_1$		■
	1.3						
	2.1	26	$0,0029 \times d_1$	$0,0038 \times d_1$	$0,0047 \times d_1$		■
	2.2	12	$0,0023 \times d_1$	$0,0030 \times d_1$	$0,0038 \times d_1$		■
	2.3						
2.4							
2.5							
2.6							
H	1.1						
	1.2						
	1.3						
	1.4						
	1.5						

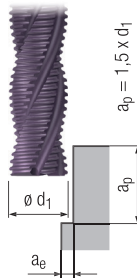
Schnittwerte für HSS-Schaftfräser – Lange Ausführung

Cutting Conditions for HSS End Mills – Long Design

Valeurs de coupe pour fraises deux tailles en HSS – version longue



HR



Gültig für
Valid for
Valable pour
2402C

	V_c [m/min]	$a_e = 0,25 \times d_1$		$a_e = 0,1 \times d_1$				MMS MQL	
		f_z [mm]	f_z [mm]	f_z [mm]	f_z [mm]				
P	1.1	35	$0,0038 \times d_1$	$0,0048 \times d_1$				<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	33	$0,0035 \times d_1$	$0,0044 \times d_1$					<input checked="" type="checkbox"/>
	3.1	15	$0,0032 \times d_1$	$0,0040 \times d_1$					<input checked="" type="checkbox"/>
	4.1								
	5.1								
M	1.1								
	2.1								
	3.1								
	4.1								
K	1.1	29	$0,0038 \times d_1$	$0,0048 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.2	25	$0,0035 \times d_1$	$0,0044 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.1	23	$0,0035 \times d_1$	$0,0044 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.2	15	$0,0032 \times d_1$	$0,0040 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	3.1								
	3.2								
	4.1	24	$0,0035 \times d_1$	$0,0044 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.2									
N	1.1								
	1.2								
	1.3								
	1.4								
	1.5								
	1.6								
	2.1	26	$0,0038 \times d_1$	$0,0048 \times d_1$				<input checked="" type="checkbox"/>	
	2.2	28	$0,0035 \times d_1$	$0,0044 \times d_1$				<input checked="" type="checkbox"/>	
	2.3	40	$0,0038 \times d_1$	$0,0048 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.4	27	$0,0029 \times d_1$	$0,0036 \times d_1$				<input checked="" type="checkbox"/>	
	2.5	40	$0,0032 \times d_1$	$0,0040 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.6	40	$0,0038 \times d_1$	$0,0048 \times d_1$				<input checked="" type="checkbox"/>	
	2.7								
	2.8								
	3.1								
3.2									
4.1									
4.2									
4.3									
4.4									
5.1									
5.2	17	$0,0029 \times d_1$	$0,0036 \times d_1$				<input checked="" type="checkbox"/>		
5.3									
S	1.1	15	$0,0032 \times d_1$	$0,0040 \times d_1$				<input checked="" type="checkbox"/>	
	1.2								
	1.3								
	2.1	15	$0,0032 \times d_1$	$0,0040 \times d_1$				<input checked="" type="checkbox"/>	
	2.2	10	$0,0026 \times d_1$	$0,0032 \times d_1$				<input checked="" type="checkbox"/>	
	2.3								
	2.4								
2.5									
2.6									
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

V_c = Schnittgeschwindigkeit · Cutting speed · Vitesse de coupe
 f_z = Vorschub pro Zahn · Feed per tooth · Avance par dent

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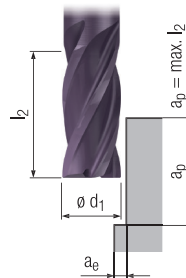
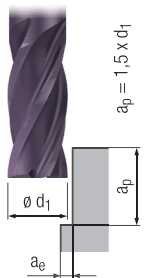
Schnittwerte für HSS-Schaftfräser – Kurze Ausführung

Cutting Conditions for HSS End Mills – Short Design

Valeurs de coupe pour fraises deux tailles en HSS – version courte



N



Gültig für
Valid for
Valable pour
2403C

	V_c [m/min]	$a_e = 0,25 \times d_1$		$a_e = 0,1 \times d_1$		$a_e = 0,2 \text{ mm}$						
		f_z [mm]		f_z [mm]		f_z [mm]						
		$d_1 < 32 \text{ mm}$	$d_1 \geq 32 \text{ mm}$	$d_1 < 32 \text{ mm}$	$d_1 \geq 32 \text{ mm}$	$d_1 < 32 \text{ mm}$	$d_1 \geq 32 \text{ mm}$					
P	1.1	60	$0,0037 \times d_1$	$0,0026 \times d_1$	$0,0052 \times d_1$	$0,0036 \times d_1$	$0,0066 \times d_1$	$0,0040 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.1	55	$0,0034 \times d_1$	$0,0024 \times d_1$	$0,0047 \times d_1$	$0,0033 \times d_1$	$0,0061 \times d_1$	$0,0036 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.1	40	$0,0031 \times d_1$	$0,0022 \times d_1$	$0,0043 \times d_1$	$0,0030 \times d_1$	$0,0055 \times d_1$	$0,0033 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	38	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	30	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	28	$0,0031 \times d_1$	$0,0022 \times d_1$	$0,0043 \times d_1$	$0,0030 \times d_1$	$0,0055 \times d_1$	$0,0033 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.1	24	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.1	20	$0,0025 \times d_1$	$0,0018 \times d_1$	$0,0034 \times d_1$	$0,0024 \times d_1$	$0,0044 \times d_1$	$0,0026 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	18	$0,0022 \times d_1$	$0,0015 \times d_1$	$0,0030 \times d_1$	$0,0021 \times d_1$	$0,0039 \times d_1$	$0,0023 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K	1.1	48	$0,0037 \times d_1$	$0,0026 \times d_1$	$0,0052 \times d_1$	$0,0036 \times d_1$	$0,0066 \times d_1$	$0,0040 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2	42	$0,0034 \times d_1$	$0,0024 \times d_1$	$0,0047 \times d_1$	$0,0033 \times d_1$	$0,0061 \times d_1$	$0,0036 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.1	38	$0,0034 \times d_1$	$0,0024 \times d_1$	$0,0047 \times d_1$	$0,0033 \times d_1$	$0,0061 \times d_1$	$0,0036 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2	34	$0,0031 \times d_1$	$0,0022 \times d_1$	$0,0043 \times d_1$	$0,0030 \times d_1$	$0,0055 \times d_1$	$0,0033 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.1	29	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2	25	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.2								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N	1.1											
	1.2											
	1.3											
	1.4											
	1.5											
	1.6											
	2.1	43	$0,0037 \times d_1$	$0,0026 \times d_1$	$0,0052 \times d_1$	$0,0036 \times d_1$	$0,0066 \times d_1$	$0,0040 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2	47	$0,0034 \times d_1$	$0,0024 \times d_1$	$0,0047 \times d_1$	$0,0033 \times d_1$	$0,0061 \times d_1$	$0,0036 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.3	85	$0,0037 \times d_1$	$0,0026 \times d_1$	$0,0052 \times d_1$	$0,0036 \times d_1$	$0,0066 \times d_1$	$0,0040 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4	44	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.5	67	$0,0031 \times d_1$	$0,0022 \times d_1$	$0,0043 \times d_1$	$0,0030 \times d_1$	$0,0055 \times d_1$	$0,0033 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.6	77	$0,0037 \times d_1$	$0,0026 \times d_1$	$0,0052 \times d_1$	$0,0036 \times d_1$	$0,0066 \times d_1$	$0,0040 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.8								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.1								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.1								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.2								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.3								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.4								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.1								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.2	28	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.3								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
S	1.1	40	$0,0031 \times d_1$	$0,0022 \times d_1$	$0,0043 \times d_1$	$0,0030 \times d_1$	$0,0055 \times d_1$	$0,0033 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2	28	$0,0028 \times d_1$	$0,0020 \times d_1$	$0,0039 \times d_1$	$0,0027 \times d_1$	$0,0050 \times d_1$	$0,0030 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.3								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.1	26	$0,0031 \times d_1$	$0,0022 \times d_1$	$0,0043 \times d_1$	$0,0030 \times d_1$	$0,0055 \times d_1$	$0,0033 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2	12	$0,0025 \times d_1$	$0,0018 \times d_1$	$0,0034 \times d_1$	$0,0024 \times d_1$	$0,0044 \times d_1$	$0,0026 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.3								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.5								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.6								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
H	1.1								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.3								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.4								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.5								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

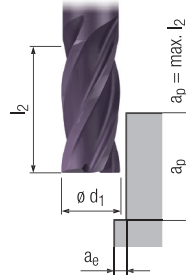
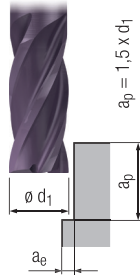
Schnittwerte für HSS-Schaftfräser – Lange Ausführung

Cutting Conditions for HSS End Mills – Long Design

Valeurs de coupe pour fraises deux tailles en HSS – version longue



N



Gültig für
Valid for
Valable pour
2404C

	V_c [m/min]	$a_e = 0,1 \times d_1$		$a_e = 0,2 \text{ mm}$				MMS MQL		
		f_z [mm]		f_z [mm]						
		$d_1 < 32 \text{ mm}$	$d_1 \geq 32 \text{ mm}$	$d_1 < 32 \text{ mm}$	$d_1 \geq 32 \text{ mm}$					
P	1.1	35	$0,0035 \times d_1$	$0,0029 \times d_1$	$0,0048 \times d_1$	$0,0037 \times d_1$		□	□	■
	2.1	33	$0,0032 \times d_1$	$0,0026 \times d_1$	$0,0044 \times d_1$	$0,0034 \times d_1$			□	■
	3.1	15	$0,0029 \times d_1$	$0,0024 \times d_1$	$0,0040 \times d_1$	$0,0031 \times d_1$				■
	4.1	15	$0,0026 \times d_1$	$0,0022 \times d_1$	$0,0036 \times d_1$	$0,0028 \times d_1$				■
	5.1	15	$0,0026 \times d_1$	$0,0022 \times d_1$	$0,0036 \times d_1$	$0,0028 \times d_1$				■
M	1.1	15	$0,0029 \times d_1$	$0,0024 \times d_1$	$0,0040 \times d_1$	$0,0031 \times d_1$				■
	2.1	14	$0,0026 \times d_1$	$0,0022 \times d_1$	$0,0036 \times d_1$	$0,0028 \times d_1$				■
	3.1	12	$0,0023 \times d_1$	$0,0019 \times d_1$	$0,0032 \times d_1$	$0,0025 \times d_1$				■
	4.1	11	$0,0020 \times d_1$	$0,0017 \times d_1$	$0,0028 \times d_1$	$0,0022 \times d_1$				■
K	1.1	29	$0,0035 \times d_1$	$0,0029 \times d_1$	$0,0048 \times d_1$	$0,0037 \times d_1$	□	□	□	■
	1.2	25	$0,0032 \times d_1$	$0,0026 \times d_1$	$0,0044 \times d_1$	$0,0034 \times d_1$	□	□	□	■
	2.1	23	$0,0032 \times d_1$	$0,0026 \times d_1$	$0,0044 \times d_1$	$0,0034 \times d_1$			□	■
	2.2	15	$0,0029 \times d_1$	$0,0024 \times d_1$	$0,0040 \times d_1$	$0,0031 \times d_1$			□	■
	3.1	15	$0,0026 \times d_1$	$0,0022 \times d_1$	$0,0036 \times d_1$	$0,0028 \times d_1$				■
	3.2	15	$0,0026 \times d_1$	$0,0022 \times d_1$	$0,0036 \times d_1$	$0,0028 \times d_1$				■
	4.1									■
N	1.1									
	1.2									
	1.3									
	1.4									
	1.5									
	1.6									
	2.1	26	$0,0035 \times d_1$	$0,0029 \times d_1$	$0,0048 \times d_1$	$0,0037 \times d_1$				■
	2.2	28	$0,0032 \times d_1$	$0,0026 \times d_1$	$0,0044 \times d_1$	$0,0034 \times d_1$				■
	2.3	40	$0,0035 \times d_1$	$0,0029 \times d_1$	$0,0048 \times d_1$	$0,0037 \times d_1$			□	■
	2.4	27	$0,0026 \times d_1$	$0,0022 \times d_1$	$0,0036 \times d_1$	$0,0028 \times d_1$				■
	2.5	40	$0,0029 \times d_1$	$0,0024 \times d_1$	$0,0040 \times d_1$	$0,0031 \times d_1$			□	■
	2.6	40	$0,0035 \times d_1$	$0,0029 \times d_1$	$0,0048 \times d_1$	$0,0037 \times d_1$				■
	2.7									
	2.8									
	3.1									
	3.2									
4.1										
4.2										
4.3										
4.4										
5.1										
5.2	17	$0,0026 \times d_1$	$0,0022 \times d_1$	$0,0036 \times d_1$	$0,0028 \times d_1$					■
5.3										
S	1.1	15	$0,0029 \times d_1$	$0,0024 \times d_1$	$0,0040 \times d_1$	$0,0031 \times d_1$				■
	1.2									
	1.3									
	2.1	15	$0,0029 \times d_1$	$0,0024 \times d_1$	$0,0040 \times d_1$	$0,0031 \times d_1$				■
	2.2	10	$0,0023 \times d_1$	$0,0019 \times d_1$	$0,0032 \times d_1$	$0,0025 \times d_1$				■
	2.3									
2.4										
2.5										
2.6										
H	1.1									
	1.2									
	1.3									
	1.4									
	1.5									

V_c = Schnittgeschwindigkeit · Cutting speed · Vitesse de coupe
 f_z = Vorschub pro Zahn · Feed per tooth · Avance par dent

■ = sehr gut geeignet · very suitable · très approprié
□ = gut geeignet · suitable · approprié



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