

Symbole für Fräswerkzeuge
 Icônes pour fraises
 Icons for endmills

Types	Kühlkanal conduites d'huile internal cooling		Anzahl Schneiden Z Numéro dents Z Number of teeth Z		
Normen Normes Standards			Werksnorm Norme usine Factory standard		
Werkzeug-Material Matériaux d'outils Tool material	Schnellarbeitsstahl Aciers rapid High Speed Steel		Kobalt leg. Schnellarbeitsstahl Acier rapid allié de cobalt High speed Cobalt Steel	 	Hartmetall Feinstkorn Métal dur grain fin Carbide Microfin
	Pulver-Schnellarbeitsstahl Aciers rapid de poudre High Speed Powder Steel	 	Schnellstahl/Hartmetall Acier rapide/métal dur High Speed Steel/Carbide		
Beschichtung Revêtement Coating	Blank Blanche Bright		Dampf angelassen Vapeuriser Steam tempered		Acrona Pro
	Bronze Bronze Bronze		Titanium Nitrid Titane Nitride Titanium nitride		Helica
	X.CEED		Futura(TIALN)		Titancarbonitrid MP Titanium Carbo Nitride MP Titanium Carbo Nitride MP
	ALUMASTAR		CromNitrid Cromium Nitride Chromium Nitride		Vorbearbeitung Oberfläche préparation de la surface Surfac preparation
	Diamant Diamant Diamond		Hardlupe		Eckenbehandlung Traitement du chanfrein Edge Treatment
	TitaniumCarboNitrid TitaneCarboNitride Titanium Carbo Nitride				
Schrupp-Profil Profils d'ébauche Profiles roughing	Standards Standards Standards	 			Werksnorm Normes d'usine Factory standards
Tolernaz Schaft Tolérance tige Shank tolerance	IT.Toleranzwert Valeur de tol. IT Tol. Value IT	 			
Anwendungsbereich Types d'application Application types	Nutenfräsen Rainurage Slotting	 	Schruppen/Schlichten Ébaucher, finir Roughing, Finishing		
	Radius-Fräsen à bout hémisph. Ball nose		Eckenradius-Berab. Contourner à radius Corner rounding		
Schaft Tige Shank	Zylindrisch(HA) Cylindrique(HA) Straight Shank(HA)		mit Weklon Spannfläche à tige weldon (HB) Flatted Shank Weldon (HB)		HB

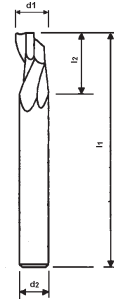
Einzahnfräser

Fraises à un dent

Mill with 1 tooth

2505..

Werkstoff matières material	Schneidentyp Type de dent typ of tooth	Spanwinkel Angle de coupe rake angle	Spiralwinkel Angle hélice helix angle	Schneiden dents teeth	Länge longueur length	Haupteinsatz appl.princip. main application	Norm standard	Norm Schaft stand.queue shank	Weitere Ang. autres spec. addit.specif.
HSS-Co5	N	20°	30°	1	mittel moyennes médium	Nuten rainures slotting	Werk usine factory	DIN 1835A ISO 3338	
Zu bearb. Material / matières applicables/material to be machined:					HRC < 42	ALU	CU	Plastic	D2505.200



Best.Nr./order no.						Best.Nr./order no.							
d1	d2	l2	l1	Z	no. cde.	CHF	d1	d2	l2	l1	Z	no. cde.	CHF
3.0	8.0	12	60	1	2505. 040	26.80	7.0	8	14	60	1	2505. 070	28.65
4.0	8.0	12	60	1	2505. 040	26.80	8.0	8	14	80	1	2505. 080	28.65
4.0	8.0	12	100	1	2505L. 040	67.85	8.0	8	14	120	1	2505.L 080	42.85
5.0	8.0	12	60	1	2505. 050	26.80	9.0	8	14	80	1	2505. 090	38.90
6.0	8.0	14	60	1	2505. 060	28.65	10.0	10	14	80	1	2505. 100	38.90
6.0	8.0	14	100	1	2505L. 060	48.00	10.0	10	14	120	1	2505L. 100	45.50
2.505215							12.0	12	14	80	1	2505. 120	43.05

Nutenfräser, zwei Schn.

Fraises à rainurer, 2 dts.

Slotting end mills, 2 teeth

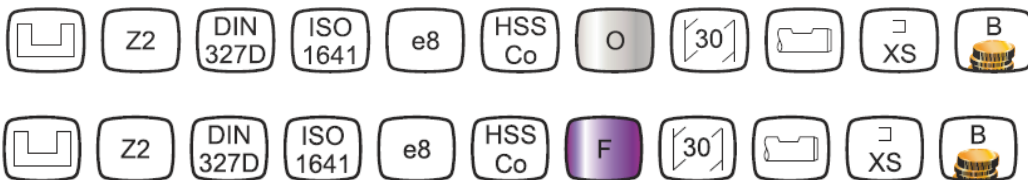
2504..

Nutenfräser, kurz

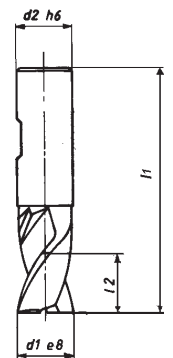
Fraises à rainurer, court.

Slotting end mills, short

250410..
(FUTURA TIALN)



2.504215		HSS-Co		Futura (TIALN)		HSS-Co		Futura (TIALN)	
d1	d2 l2 l1 Z	Best.Nr. 2504.. order no. no. cde.	CHF	Best.Nr. 250410.. order no. no. cde.	CHF	Best.Nr. 2504.. order no. no. cde.	CHF	Best.Nr. 250410.. order no. no. cde.	CHF
1.0	6 2.5 47 2	2504. 010	26.50			13.0	12 16 73 2	2504. 137	36.60
1.5	6 3 47 2	2504. 015	17.90	250410. 020	30.20	13.5	12 16 73 2	2504. 137	36.60
2.0	6 4 48 2	2504. 020	18.00			14.0	12 16 73 2	2504. 140	31.00
2.5	6 5 49 2	2504. 025	16.80	250410. 030	28.80	14.5	12 16 73 2	2504. 140	31.00
3.0	6 5 49 2	2504. 030	24.20	250410. 035	33.20	15.0	12 16 73 2	2504. 150	45.00
3.5	6 6 50 2	2504. 035	8.50			15.5	16 19 79 2	2504. 157	43.60
4.0	6 7 51 2	2504. 040	24.20	250410. 045	33.10	16.0	16 19 79 2	2504. 160	38.30
4.5	6 7 51 2	2504. 045	19.30	250410. 050	29.70	16.5	16 19 79 2	2504. 160	38.30
5.0	6 8 52 2	2504. 050	20.90	250410. 055	31.50	17.0	16 19 79 2	2504. 170	54.40
5.5	6 8 52 2	2504. 055	20.90			17.5	16 19 79 2	2504. 177	54.10
6.0	6 8 52 2	2504. 060	23.70	250410. 065	45.70	18.0	16 19 79 2	2504. 180	44.80
6.5	8 10 60 2	2504. 065	28.20			18.5	16 19 79 2	2504. 180	44.80
7.0	8 10 60 2	2504. 070	23.20			19.0	16 19 79 2	2504. 190	64.50
7.5	8 11 60 2	2504. 075	26.30			19.5	16 22 88 2	2504. 197	61.70
8.0	8 11 61 2	2504. 080	21.30			20.0	16 22 82 2	2504. 200	61.70
8.5	10 11 61 2	2504. 085	24.00	250410. 090	39.80	22.0	20 22 88 2	2504. 220	80.00
9.0	10 11 61 2	2504. 090	26.30	250410. 095	49.80	24.0	25 26 102 2	2504. 240	102.20
9.5	10 11 61 2	2504. 095	25.20			25.0	25 26 102 2	2504. 250	102.70
10.0	10 13 63 2	2504. 100	29.80	250410. 110	55.40	26.0	25 26 102 2	2504. 260	119.80
10.5	10 13 70 2	2504. 105	29.80	250410. 110	55.40	28.0	25 26 102 2	2504. 280	124.50
11.0	12 13 70 2	2504. 110	31.10			30.0	25 26 102 2	2504. 300	136.80



2507..(HSS-Co)

**Nutenfräser mittel,
Z=2**

**Fraise à rainurer moy-
enne, Z=2**

**Slotting end mills,
medium, Z=2**



2.507215							2507..		2507..								
d1	x	d2	%	l2	l1	z	Best.Nr.	CHF	d1	x	d2	%	l2	l1	z	Best.Nr.	CHF
e8		h6					no.cde./ord.no.		e8		h6					no.cde./ord.no.	
2.5*	x	6	8%	8	52	2	2507.025	19.10	7.0	x	10	8%	16	80	2	2507.071	29.70
3.0	x	6	8%	8	56	2	2507.030	20.00	7.5*	x	8	8%	19	63	2	2507.075	20.20
3.5*	x	6	8%	10	54	2	2507.035	23.30	9.0	x	10	8%	19	69	2	2507.090	28.90
4.0*	x	6	8%	11	55	2	2507.040	19.10	10	x	10	8%	22	72	2	2507.100	23.70
4.5*	x	6	8%	11	55	2	2507.045	25.90	14	x	12	8%	26	110	2	2507.100	23.70
5.0	x	6	8%	13	68	2	2507.050	19.10	16*	x	16	8%	32	92	2	2507.160	49.30
5.5*	x	6	8%	13	57	2	2507.055	22.10	17*	x	16	8%	32	92	2	2507.170	62.80
6.0*	x	6	8%	13	57	2	2507.060	19.30	18*	x	16	8%	32	92	2	2507.180	56.50

* solange Vorrat, jusqu'à l'épuisement du stock, as long as stock lasts

250710..Futura(TIALN)

**Nutenfräser mittel, Z=2
Futura(TIALN) be-
schichtet**

**Fraises à rainurer,
moyenne, Z=2, revête-
ment Futura (TIALN)**

**Slotting end mills, me-
dium, Z=2, Futura
(TIALN) coated**



2.50710215							250710..	
d1	x	d2	% Co	l2	l1	z	Best.Nr.	CHF
e8		h6					no.cde./ord.no.	
3.0	x	6	8%	8	56	2	250710.030	20.00
5.0	x	6	8%	13	68	2	250710.050	19.10
8.0	x	10	8%	19	88	2	250710.075	20.20
9.0	x	10	8%	19	88	2	250710.090	28.90
10.0	x	10	8%	22	95	2	250710.090	28.90
12.0	x	12	8%	26	110	2	250710.100	23.70
14.0	x	12	8%	26	110	2	250710.100	23.70
18.0	x	16	8%	32	123	2	250710.180	56.50
20.0	x	20	8%	38	141	2	250710.200	56.50

Einwegsparfräser

Fraiser à jeter

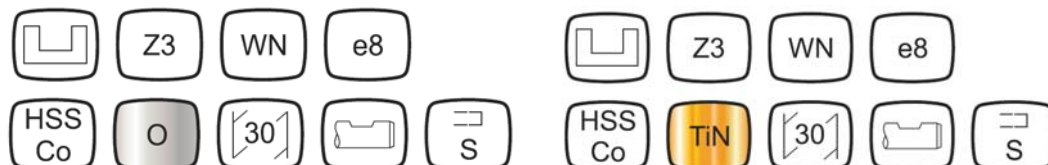
Disposable mills

2512TA..
2512TATIN..



Kurze Sorte / série courte / short serie

D [mm]	D1 Schaft queue shank	I Schnitt coupe cut	L Total totale total	HSS-Co Best.Nr. 2512TA.. no.cde. order no.	CHF	HSS-Co-TIN Best.Nr. 2512TATIN.. no.cde. order no.	CHF
2512TA215							
1.0	6	2	34	2512TA. 010	22.50	2512TATIN. 010	33.40
1.5	6	3	34	2512TA. 015	22.10	2512TATIN. 015	33.40
2.0	6	4	35	2512TA. 020	14.90	2512TATIN. 020	27.70
2.5	6	5	36	2512TA. 025	14.90	2512TATIN. 025	27.70
3.0	6	5	36	2512TA. 030	14.90	2512TATIN. 030	27.70
3.5	6	6	37	2512TA. 035	14.90	2512TATIN. 035	27.70
3.8*	6	7	38	2512TA. 038*	15.00	2512TATIN. 038*	19.10
4.0	6	7	38	2512TA. 040	14.90	2512TATIN. 040	27.70
4.5	6	7	38	2512TA. 045	14.90	2512TATIN. 045	27.70
5.0	6	8	39	2512TA. 050	14.90	2512TATIN. 050	27.70
5.5	6	8	39	2512TA. 055	14.90	2512TATIN. 055	27.70
5.8*	6	8	39	2512TA. 058	15.00	2512TATIN. 055*	19.10
6.0	6	8	39	2512TA. 060	14.90	2512TATIN. 060	27.70
6.5	8	10	50	2512TA. 065	18.80	2512TATIN. 065	33.60
7.0	8	10	42	2512TA. 070	18.80	2512TATIN. 070	33.60
7.5	8	10	42	2512TA. 075	18.80	2512TATIN. 075	33.60
8.0	8	11	43	2512TA. 080	18.80	2512TATIN. 080	33.60
9.0	10	11	48	2512TA. 090	20.70	2512TATIN. 090	36.80
9.5*	10	13	50	2512TA. 100	15.20	2512TATIN. 100*	27.10
10.0	10	13	50	2512TA. 100	20.70	2512TATIN. 100	36.80
12.0	12	16	58	2512TA. 120	23.50	2512TATIN. 120	42.00



2513TA..
2513TATIN..

Mittlere Sorte / série moyenne / Medium serie

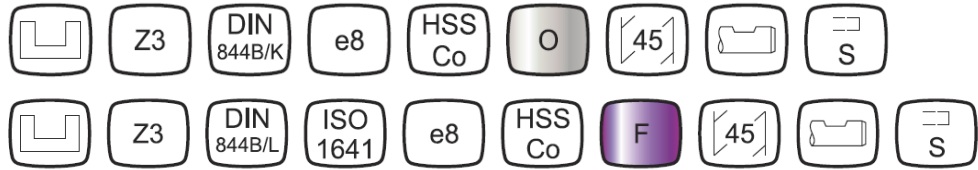
D [mm]	D1 Schaft queue shaft	I Schnitt coupe cut	L Total totale total	HSS-Co Best.Nr. 2513TA.. no.cde. order no.	CHF	HSS Co-TIN Best.Nr. 2513TATIN.. no.cde. order no.	CHF
2.513TA215							
2.0	6	7	38	2513TA. 020	16.10	2513TATIN. 020	28.60
2.5	6	6	40	2513TA. 025	16.10	2513TATIN. 025	28.60
3.0	6	7.5	40	2513TA. 030	16.10	2513TATIN. 030	28.60
3.5	6	8.5	40	2513TA. 035	16.10	2513TATIN. 035	28.60
4.0	6	9.5	47	2513TA. 040	16.10	2513TATIN. 040	28.60
4.5	6	11	47	2513TA. 045	16.10	2513TATIN. 045	28.60
5.0	6	12	47	2513TA. 050	16.10	2513TATIN. 050	28.60
5.5	6	14	47	2513TA. 055	16.10	2513TATIN. 055	28.60
6.0	6	16	47	2513TA. 060	16.10	2513TATIN. 060	28.60
6.5	10	16	60	2513TA. 065	19.80	2513TATIN. 065	35.20
7.0	10	16	60	2513TA. 070	19.80	2513TATIN. 070	35.20
7.5	10	18	60	2513TA. 075	19.80	2513TATIN. 075	35.20
8.0	10	19	60	2513TA. 080	19.80	2513TATIN. 080	35.20
9.0	10	20	70	2513TA. 090	20.80	2513TATIN. 090	37.50
9.5*	10	22	70			2513TATIN. 095	28.80
10.0	10	22	70	2513TA. 100	20.80	2513TATIN. 100	37.50
18.0*	20	40	105	2513TA. 180	67.10		



* solange Vorrat / jusqu'à épuisement du stock / as long stock lasts

**2512.. HSS-CO
251210..Futura(TIALN)**

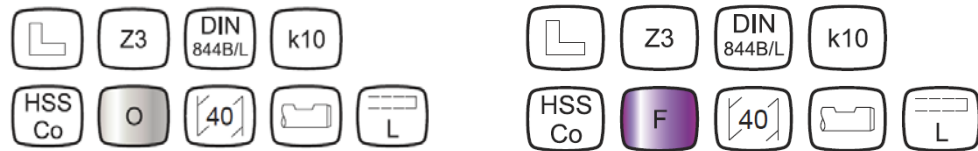
Nutenfräser, mittel, z=3 *Fraises à rainurer, 3- dents* Slotting end mill, z = 3



d1e8	d2h6	l2	l1	Z	Best. N 2512.. no.cde.HSSCO	CHF	Best.Nr. 251210.. no.cde.TIALN	CHF	d1e8	d2 h6	l2	l1	Z	Best.Nr. 2512.. no.cde.HSSCO	CHF	Best.Nr. 251210.. no.cde.TIALN	CHF	
2.512215																		
3.0	6	8	52	3	2512.030	19.70	251210.030	32.40	9.5	10	22	72	3	2512.095	28.90	251210.095	49.40	
3.5	6	10	54	3	2512.036	24.60	251210.035	38.40	10.0	10	22	72	3	2512.100	24.50	251210.100	44.80	
4.0	6	11	55	3	2512.040	19.70	251210.040	32.40	11.0	12	22	79	3	2512.110	34.40	251210.110	58.10	
4.5	6	11	55	3	2512.046	23.90	251210.045	36.30	12.0	12	26	83	3	2512.120	28.90	251210.120	50.60	
5.0	6	13	57	3	2512.050	18.80	251210.050	32.40	14.0	12	26	83	3	2512.140	36.20	251210.140	66.20	
5.5	6	13	57	3	2512.055	23.10	251210.055	35.40	16.0	16	32	92	3	2512.160	44.90	251210.160	72.80	
6.0	6	13	57	3	2512.060	18.10	251210.060	29.20	18.0	16	32	92	3	2512.180	54.80	251210.180	88.60	
6.5	10	16	66	3	2512.066	33.20	251210.065	38.40	20.0	20	38	104	3	2512.200	64.10	251210.200	110.30	
7.0	10	16	66	3	2512.071	29.60	251210.070	32.40	22.0	20	38	104	3	2512.220	88.20			
7.5	10	19	69	3	2512.076	30.70	251210.075	35.40	24.0	25	45	121	3	2512.240	133.30			
8.0	10	19	69	3	2512.081	24.60	251210.080	29.20	25.0	25	45	121	3	2512.250	117.60	251210.250	169.10	
8.5	10	19	69	3	2512.085	34.00	251210.085	47.30	32.0	32	53	133	3	2512.323	198.60	251210.320	259.40	
9.0	10	19	69	3	2512.090	30.60	251210.090	49.50										

**2513N..
2513N10..(Futura)**

Nutenfräser lang *Fraises à rain., longue* Slotting end mill long

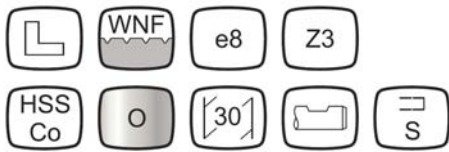


D [mm]	d Schaft queue shaft	l2 Schnitt coupe cut	l1 Total totale total	HSS-Co Best.Nr. 2513N.. no.cde. order no.	CHF	HSSCO-Futuro Best.Nr. 2513N10.. no.cde. order no.	CHF
2.513N215							
4.0	6	19	63	2513N.040	22.30	2513N10.040	32.30
5.0	6	24	68	2513N.050	22.30	2513N10.050	32.30
6.0	6	24	68	2513N.060	19.90	2513N10.060	29.90
8.0	10	38	88	2513N.080	24.50	2513N10.080	34.50
10.0	10	45	95	2513N.100	28.10	2513N10.100	38.10
12.0	12	53	110	2513N.120	36.20	2513N10.120	46.20
14.0	12	53	110	2513N.140	50.30	2513N10.140	60.30
16.0	16	63	123	2513N.160	55.40	2513N10.160	65.40
18.0	16	63	123	2513N.180	69.90	2513N10.180	79.90
20.0	20	75	141	2513N.200	79.20	2513N10.200	89.20

Schruppfräser extra kurz, *Fraises d'ébauche extra courtes*, Z=3

Roughing mills, extra short, Z=3

20513TA.. HSS-Co
20513TATN..TIN



2.0513TA116					HSS-Co8	
d1 e8	d2 h6	l2	l1	Z	Best.Nr. 20513TA.. no. cde. order no.	CHF
6,0	6	13	44	3	20513TA. 060	28,80
7,0	8,0	16	60	3	20513TA. 070	35,90
8,0	8,0	19	51	3	20513TA. 080	35,90
9,0	10,0	19	56	3	20513TA. 090	39,50
10,0	10,0	22	59	3	20513TA. 100	39,50

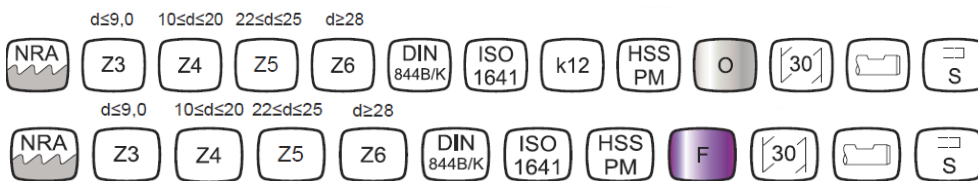


Schruppfräser mittel, 3-lip-pig, mit Zentrumsschnitt

Fraises d'ébauche, moy., Z=3, coupe au centre

Roughing mill, medium, Z=3, center cut

2514.. HSS-Co
251410..Futura (TIALN)



2.514116					HSS-Co		Futura TIALN	
d1 k 12	d2 h6	l2	l1	Z	Bst.Nr. 2514.. no. cde. order no.	CHF	Bst.Nr. 251410.. no. cde. order no.	CHF
6,0	6	13	57	4	2514. 060	45,60	251410. 060	52,40
7,0	8	16	66	4	2514. 070	48,70	251410. 070	60,20
8,0	8	19	69	4	2514. 080	44,10	251410. 080	55,70
9,0	10	19	69	4	2514. 090	52,90	251410. 090	63,90
10,0	10	22	72	4	2514. 100	43,50	251410. 100	55,10
12,0	10	26	83	4	2514. 120	56,50	251410. 120	68,90
13,0	10	26	83	4	2514. 130	76,20		
14,0	14	26	83	4	2514. 140	61,40	251410. 140	78,10
15,0	12	26	83	4	2514. 150	89,10		
16,0	16	32	92	4	2514. 160	75,10	251410. 160	103,80
17,0	16	32	92	4	2514. 170	87,50		
18,0	18	32	92	4	2514. 180	80,00	251410. 180	112,30
19,0	18	32	92	4	2514. 190	115,00		
20,0	20	38	104	4	2514. 200	98,20	251410. 200	129,10
22,0	20	38	104	5	2514. 220	114,10	251410. 220	140,20
25,0	25	45	121	5	2514. 250	139,80	251410. 250	175,00
25,0 *	25	45	121	5	2514. 256	80,00		
28,0	25	45	121	6	2514. 280	164,40	251410. 280	200,30
30,0	25	45	121	6	2514. 300	192,70	251410. 300	231,30
32,0	32	53	133	6	2514. 320	197,60	251410. 320	240,80
36,0	32	53	133	6	2514. 360	260,30	251410. 360	317,70
40,0	32	63	155	6	2514. 400	316,70	251410. 400	404,40

* ohne Weldon/sans Weldon/without Weldon



Schruppfräser mittel, Z=3-6, feine Rillenteilung HR, Zentrums Schnitt

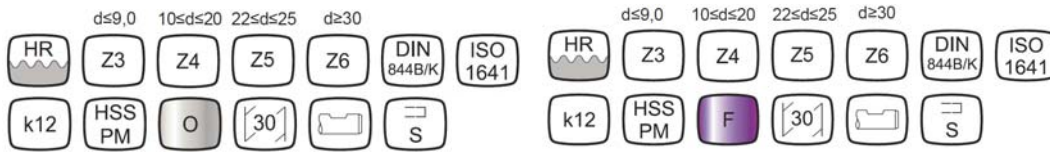
Fraises d'ebauche, moyenne 3-6 dents, pas fin HR, coupe au centre

Roughing end mill medium, Z=3-6, fine pitch HR and center cut

2514LF..HSS-Co

2514GR.LF..Futura TIALN

251450..Granit-Dry PM



d1	d2h6	I2	I2	Z	HSS-Co	Futura TIALN	Granit-Dry PM
js 14	Schaft	Schnitt	Total	Zähne	Best.Nr. 2514LF..	Best.Nr. 2514GR.LF..	Best.Nr. 251450..*
	queue	coupe	totale	dents	no. cde.	no. cde.	no. cde.
2.514LF112	shaft	cut	total	teeth	order no.	order no.	order no.
					CHF	CHF	CHF
6.0	6	13	57	3	2514LF. 060	2514GR.LF. 060	251450. 060
7.0	8	16	60	3	2514LF. 070	2514GR.LF. 070	251450. 070
8.0	8	19	63	3	2514LF. 080	2514GR.LF. 080	251450. 080
9.0	10	19	69	3	2514LF. 090	2514GR.LF. 090	251450. 090
10.0	10	22	72	4	2514LF. 100	2514GR.LF. 100	251450. 100
11.0	12	22	79	4			251450. 110
12.0	12	26	83	4	2514LF. 120	2514GR.LF. 120	251450. 120
13.0	12	26	83	4			251450. 130
14.0	14	26	83	4	2514LF. 140	2514GR.LF. 140	251450. 140
15.0	12	26	83	4			251450. 150
16.0	16	32	92	4	2514LF. 160	2514GR.LF. 160	251450. 160
17.0	16	32	92	4			251450. 170
18.0	18	32	92	4	2514LF. 180	2514GR.LF. 180	251450. 180
20.0	20	38	104	4	2514LF. 200	2514GR.LF. 200	251450. 200
22.0	20	38	104	5	2514LF. 220	2514GR.LF. 220	
25.0	25	45	121	5	2514LF. 250	2514GR.LF. 250	
28.0	25	45	121	4	2514LF. 280	2514GR.LF. 280	
30.0	25	45	121	6	2514LF. 300	2514GR.LF. 300	
32.0	32	53	133	6	2514LF. 320	2514GR.LF. 320	

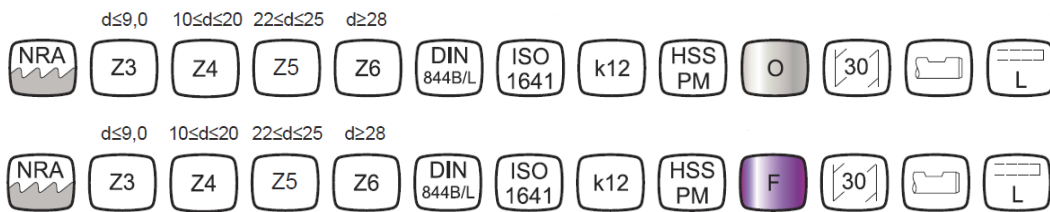


Schruppfräser lang 4-6 lippig

Fraises d'ebauche longues, 4-6 dents

Rouging endmill, long 4-6 teeth

2514L...
2514L10...

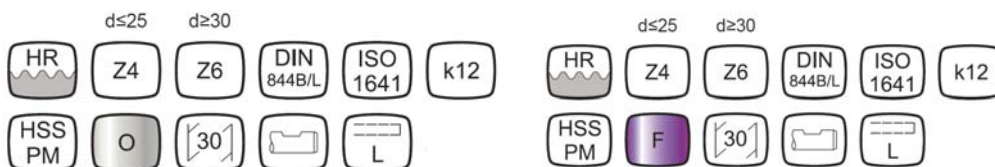


d1	d2	I2	I2	Z	HSS-Co	Futura TIALN	2514L215
Durchm.	Schaft	Schnitt	Total	Zähne	Best.Nr.2514L..	Best.Nr.2514L10..	
diamètre	queue	coupe	totale	dents	no. cde.	no. cde.	
diameter	shaft	cut	total	teeth	order no.	order no.	
					CHF	CHF	
8.0	10	38	88	4	2514L. 081	2514L10. 080	82.00
10.0	10	45	95	4	2514L. 100	2514L10. 100	96.80
12.0	12	53	110	4	2514L. 120	2514L10. 120	101.80
14.0	14	53	110	4	2514L. 140	2514L10. 140	111.50
16.0	16	63	123	4	2514L. 160	2514L10. 160	134.30
18.0	18	63	123	4	2514L. 180	2514L10. 180	148.60
20.0	20	75	141	4	2514L. 200	2514L10. 200	184.10
22.0	20	75	141	4	2514L. 220	2514L10. 220	222.90
25.0	25	90	166	5	2514L. 250	2514L10. 250	274.80
28.0	25	90	166	5	2514L. 280	2514L10. 280	319.40
30.0	30	90	166	5	2514L. 300	2514L10. 300	381.90
32.0	32	106	186	5	2514L. 320	2514L10. 320	373.90
36.0	32	106	186	5	2514L. 360	2514L10. 360	388.00
40.0	32	125	217	6	2514L. 400	2514L10. 400	498.00



Schruppfräser lang, 4/6 lipp. *Fraises d'ebauche, long., 4/6 dts, pas fin HR, c. au cen.* Roughing end mill long, Z=4-6, fine pitch HR, centre cut

251475..HSS-CO
251480..Futura TIALN



2.51475215		Best.Nr. 251475..					Best.Nr. 251480..				
d1	d2	l2	l1	Z	no. cde.	<i>HSS-CO</i>	no. cde.	<i>Futura TIALN</i>	Z		
js14	h6				order no.	CHF	order no.	CHF			
10.0	10	45	95	4	251475. 100	59.40	251480. 100	72.60	4		
12.0	12	53	110	4	251475. 120	75.40	251480. 120	83.80	4		
14.0	12	53	110	4			251480. 140	91.60	4		
16.0	16	63	123	4	251475. 160	107.60	251480. 160	113.30	4		
18.0	16	63	123	4	251475. 180	112.30					
20.0	20	75	141	4	251475. 200	141.80					
25.0	25	90	166	4	251475. 250	207.20	251480. 250	231.00	4		
30.0	25	90	166	6	251475. 300	249.50	251480. 300	312.00	6		
32.0	32	106	186	6	251475. 320	299.60					

