

Advanced
Engineering

Hitachi Tool

HITACHI
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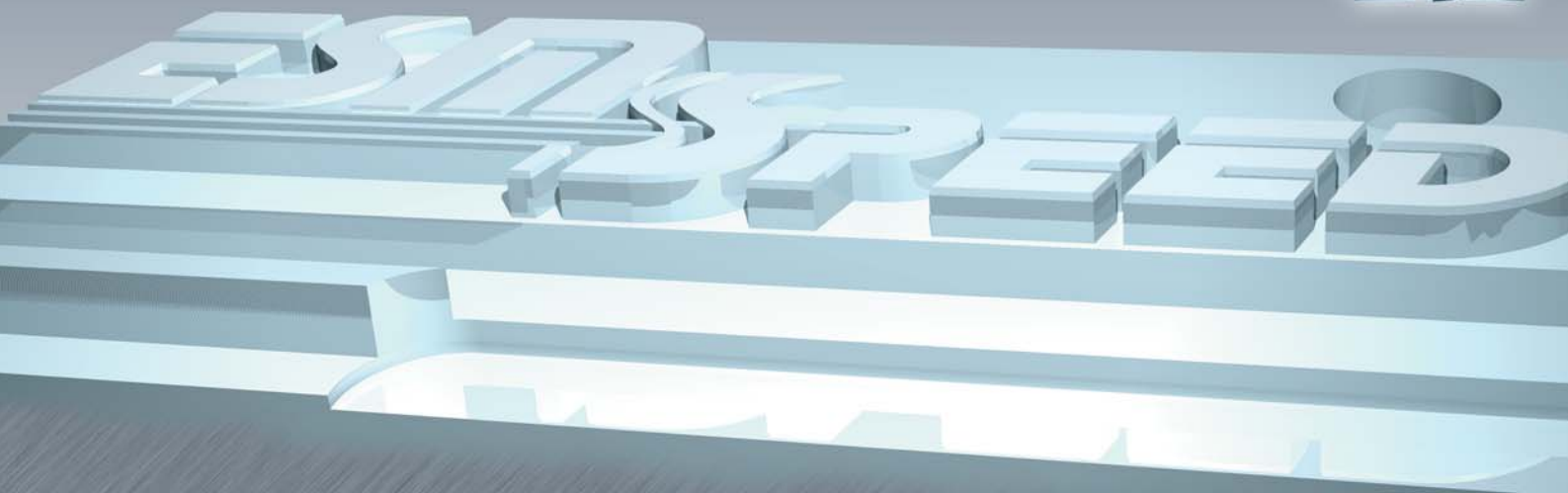
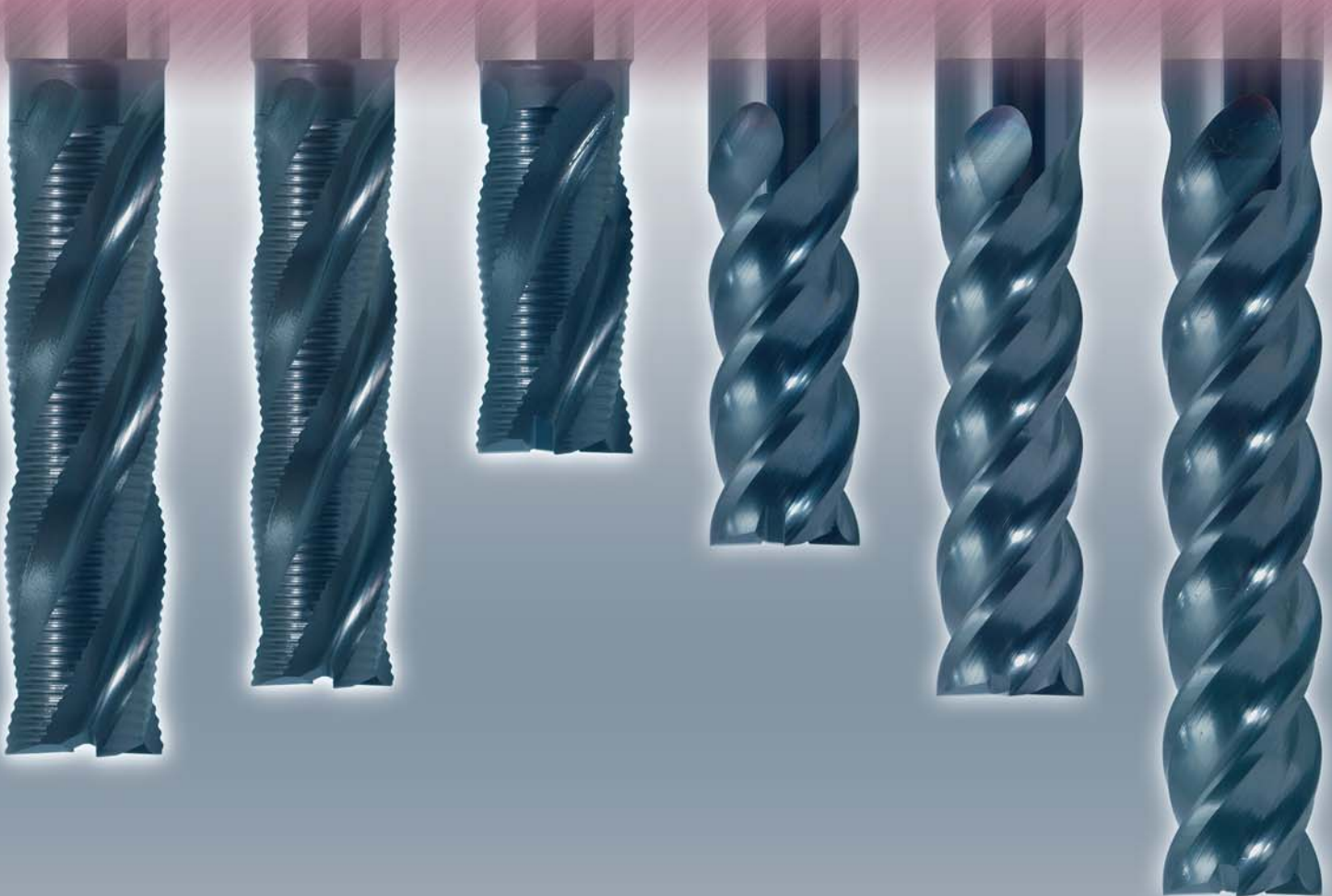
No. 504.2

ESN
SPEED

Powder Steel End Mills

HITACHI Standard & Weldon DIN1835B

Century-Coating



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 **SPEED END MILLS MADE OF ESM-POWDERSTEEL**
Substrate "ESM"

ESM is a sintered powder metallurgy H.S.S. which combines the features of toughness from H.S.S. and hardness from cemented carbide.

Alloying elements contribute properties that increase the cutting tool performance.

Result in comparison with HSS-E 8%Co :

- 1 - **20%** **higher** cutting speed
- 2 - **100%** **higher** cutting feed
- 3 - **Up to 70%** **longer** tool life

CENTURY Coating is a multi-layer PVD coating process which improves cutter performance even further by :

- Increasing surface Hardness **3300 HV**
- Raises the Oxidation temperature **850° C**
- Reduces coefficient of friction **0.25 µm**
- Maintains a coating thickness to retain sharp edges **3 - 5 µm**

 **SPEED FRÄSER AUS ESM-PULVERSTAHL**
Grundmaterial "ESM"

ESM ist ein Pulverstahl mit den wichtigsten Eigenschaften von HSS-E und gesintertem Hartmetall.


Erhöhte Legierungsanteile mit verbessertem Resultat.

Ergebnis im Vergleich zu HSS-E 8%Co :

- 1 - **20%** **gesteigerte** Schnittgeschwindigkeit
- 2 - **100%** **gesteigerte** Vorschübe
- 3 - **Bis zu 70%** **längere** Standzeiten

CENTURY Beschichtung ist eine Multi-PVD-Schicht mit folgenden Eigenschaften :

- Gesteigerte Oberflächenhärte **3300 HV**
- Gesteigerte Oxidationstemperatur **850° C**
- Reduzierter Reibungskoeffizient **0,25 µm**
- Geringere Kantenverrundung bei gleichbleibender Schichtdicke **3 - 5 µm**

 **FRESAS SPEED EN ACERO SINTERIZADO ESM**
Substrato "ESM"

ESM es un HSS (acero rápido) sinterizado que combina la tenacidad del HSS y la dureza metal duro.

La aleación de elementos confiere propiedades que aumentan las prestaciones de la herramienta.

Resultados comparados con el HSS-E 8%Co :

- 1 - **20%** mas de velocidad de corte
- 2 - **100%** mas de avance
- 3 - **hasta un 70%** mas de duración

El acabado **CENTURY** es un recubrimiento PVD multi-capas que mejora las prestaciones de la herramienta :

- Incrementando la dureza de la superficie a **3300 HV**
- Elevando la temperatura de oxidación a **850° C**
- Reduciendo el coeficiente de fricción a **0,25 µm**
- Manteniendo un grosor de capa que preserva el afilado de la arista en **3 - 5 µm**

 **FRESA SPEED IN ACCIAIO IN POLVERE ESM**
Materiale base "ESM"

Un acciaio in polvere con le principali proprietà dell'acciaio superrapido e del carburo metallico sinterizzato.

Maggiori percentuali di lega con un risultato migliore.

Risultato in confronto con l'HSS-E 8%Co :

- 1 - Velocità di taglio aumentata del **20%**
- 2 - Avanzamenti maggiorati del **100%**
- 3 - Durata maggiore fino al **70%**

Il rivestimento **CENTURY** è un PVD multistrato con le seguenti proprietà :

- Durezza superficiale maggiore **3300 HV**
- Temperatura d'ossidazione più alta **850° C**
- Coefficiente d'attrito inferiore **0,25 µm**
- Minor arrotondamento degli spigoli a spessore costante dello strato **3-5 µm**

 **FRAISES SPEED FABRIQUÉES EN ACIER FRITTÉ ESM**
Matériau "ESM"

L'ESM est un acier HSS obtenu par frittage, ce qui associe les qualités de résistance de l'HSS et la dureté des carbures.

Les éléments de l'alliage génèrent des propriétés qui augmentent les performances de coupe.

Résultats comparés à ceux de l'acier HSS-E à 8% de cobalt :

- 1- Vitesse de coupe augmentée de **20%**
- 2 - Avances augmentées de **100%**
- 3 - Durée de vie de l'outil prolongée de **70%**

Le revêtement **CENTURY** est obtenu par un procédé de revêtement PVD multicouche qui améliore les performances de coupe par :

- Un accroissement de la dureté superficielle **3300 HV**
- Une élévation de la température d'oxydation **850° C**
- Une réduction du coefficient de frottement **0,25 µm**
- Un maintien de l'épaisseur de revêtement pour éviter la détérioration des arêtes de coupe **3-5 µm**

Chemical Composition in % | Chemische Zusammensetzung in % Composición química en % | Composizione chimica in % | Composition chimique en %

Material	Name	C	Cr	W	Mo	V	Co	Total%
HSS-E	M35	0.85	4.00	6.00	5.00	2.00	5.00	22.00
	M42	1.10	3.75	1.50	9.50	1.15	8.00	25.00
Powder-steel	ASP30	1.30	4.00	6.50	5.00	3.00	8.00	27.00
	ASP60	2.30	4.00	6.00	7.00	6.00	10.00	35.00
	ESM	2.00	4.00	10.00	8.00	5.00	10.00	39.00

ESM QS(W)-QL(W) Fine Mill



Roughing end mills with fine pitch ripper form for difficult materials. Short series are centre cutting up to 40mm dia. Manufactured to HITACHI standards.

Type-W

Straight shank and drive flat to DIN1835B.
Dimension: HITACHI

Typ HR mit Zylinderschaft. Profil hinterschliffen. Kurze Serie zentrumschneidend bis Ø 40 mm. Gefertigt nach HITACHI Norm.

Typ-W

Mit Mitnahmefläche nach DIN1835B.
Abmessung: HITACHI

Fresas de desbaste con paso fino para materiales difíciles. La serie corta tiene corte al centro hasta los 40mm de diámetro. Fabricadas según los standards de HITACHI.

Type-W

Mango cilíndrico con plano según DIN1835B.
Medidas: según los standards de HITACHI.

Tipo HR con codolo cilindrico. Profilo di spoglia e taglio centrale fino a Ø40mm. Fabbricato secondo norma interna HITACHI.

Tipo-W

Codolo con codolo di serraggio secondo DIN1835B.
Fabbricato secondo norma interna HITACHI.

Fraises d'ébauche à profil fin pour matériaux difficiles. Les séries courtes ont la coupe au centre jusqu'au diamètre 40mm. Elles sont fabriquées selon les normes constructeur HITACHI.

Modèle-W

Queue cylindrique avec méplat selon norme DIN1835B.
Dimensions selon normes constructeur HITACHI.

ESM HKR(W)-HKM-HKL(W) Power Helical



End mills for difficult materials. All sizes are centre cutting. Manufactured to HITACHI Standards.

Type-W

Straight shank and drive flat to DIN1835B.
Dimension: HITACHI

Super Helical Fräser. Für Schrupp- und Schlichtbearbeitungen. Alle Durchmesser zentrumschneidend.

Typ-W

Mit Mitnahmefläche nach DIN1835B.
Abmessung: HITACHI

Fresas de acabado para materiales difíciles. Todos las medidas son con corte al centro. Fabricado según los standards de HITACHI.

Type-W

Mango cilíndrico con plano según DIN1835B. Medidas: según los standards de HITACHI.

Fresa Super Helical. Per lavorazione di sgrossatura e finitura. Tutti i con taglio centrale. Fabbricato secondo norma HITACHI.

Tipo-W

Codolo con codolo di serraggio secondo DIN1835B.
Fabbricato secondo norma interna HITACHI.

Fraises pour matériaux difficiles. Tous les diamètres sont avec coupe au centre. Fabrication selon les normes constructeur HITACHI.

Modèle-W

Queue cylindrique avec méplat selon norme DIN1835B.
Dimensions selon normes constructeur HITACHI.

ESM Fine Mill

Fine Mill - Short
ESMQS



6 – 40 mm

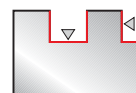
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Fine Mill - Short with Weldon DIN1835B
ESMQS-W

6 – 40 mm

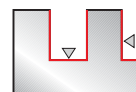
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Fine Mill - Long
ESMQL

10 – 30 mm

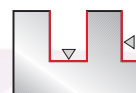
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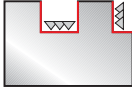

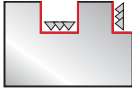

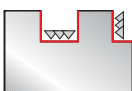

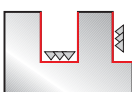

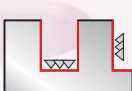
Fine Mill - Long with Weldon DIN1835B
ESMQL-W

10 – 30 mm

9



ESM Power Helical

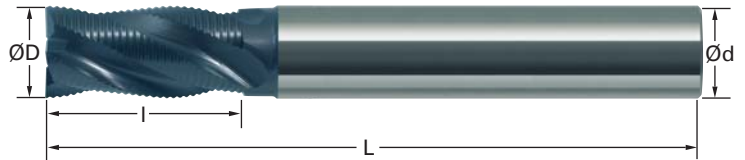
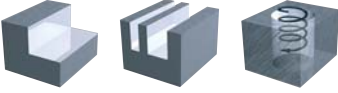
			
Power Helical - Regular ESMHKR	12 – 30 mm		10
			
Power Helical - Regular with Weldon DIN1835B ESMHKR-W	12 – 30 mm		11
			
Power Helical - Medium ESMHKM	12 – 30 mm		12
			
Power Helical - Long ESMHKL	12 – 30 mm		13
			
Power Helical - Long with Weldon DIN1835B ESMHKL-W	12 – 30 mm		14
			

Recommended cutting conditions · Empfohlene Schnittwerte
 Condiciones de corte recomendadas · Condizioni di taglio raccomandate
 Conditions de coupe recommandées

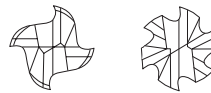
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ESMQS | Fine Mill - Short

Q max High Efficient	 Roughing	HRC 45	No. of Teeth 4	No. of Teeth 6
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ESM Premium P/M HSS	C Century Coating
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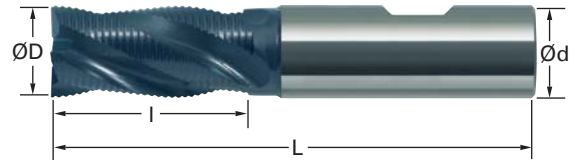
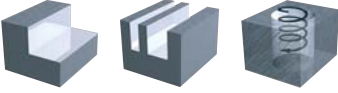
Ø6 ~ Ø12	0/-0.05
Ø16 ~ Ø40	0/-0.1
d	h6

ID Code	Item No.	Stock	Z	R	ØD	l	dn	l ₁	l _{n1}	l _{n2}	l _s	L	d	Type
ES 1	QS-6	■	4		6	15						80	6	
ES 2	QS-8	■	4		8	20						90	8	
ES 3	QS-10	■	4		10	25						100	10	
ES 4	QS-12	■	4		12	30						110	12	
ES 5	QS-16	■	4		16	35						125	16	
ES 6	QS-20	■	4		20	40						140	20	
ES 7	QS-25	■	4		25	45						160	25	
ES 8	QS-30	■	4		30	45						160	25	
ES 9	QS-32	■	6		32	55						180	32	
ES 10	QS-40	■	6		40	65						200	32	
ES 32	ES SET-0100	■			8,10,12									
ES 59	ES SET-0200	■			6,8,10,12,16,20									

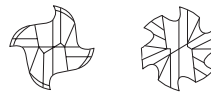
■ = Stock | Germany

ESMQS-W | Fine Mill - Short with Weldon DIN1835B

Q max High Efficient	Roughing	HRC 45	No. of Teeth 4	No. of Teeth 6
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ESM Premium P/M HSS	C Century Coating
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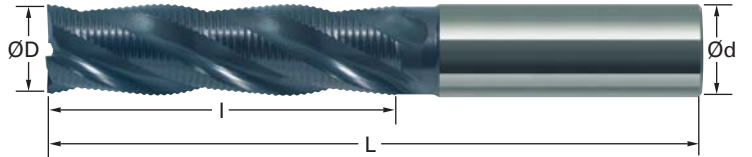
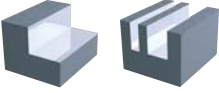
Ø6 ~ Ø12	0/-0.05
Ø16 ~ Ø40	0/-0.1
d	h6

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ES 33	QS-6W	■	4		6	15						59	6	
ES 34	QS-8W	■	4		8	20						70	8	
ES 35	QS-10W	■	4		10	25						75	10	
ES 36	QS-12W	■	4		12	30						87	12	
ES 37	QS-16W	■	4		16	35						95	16	
ES 38	QS-20W	■	4		20	40						104	20	
ES 39	QS-25W	■	4		25	45						121	25	
ES 40	QS-30W	■	4		30	45						121	25	
ES 41	QS-32W	■	6		32	55						133	32	
ES 42	QS-40W	■	6		40	65						143	32	
ES 60	ES SET-0100W	■			8,10,12									
ES 61	ES SET-0200W	■			6,8,10,12,16,20									

■ = Stock | Germany

ESMQL | Fine Mill - Long

Q max High Efficient	 Roughing	HRC 45	No. of Teeth 4	No. of Teeth 6
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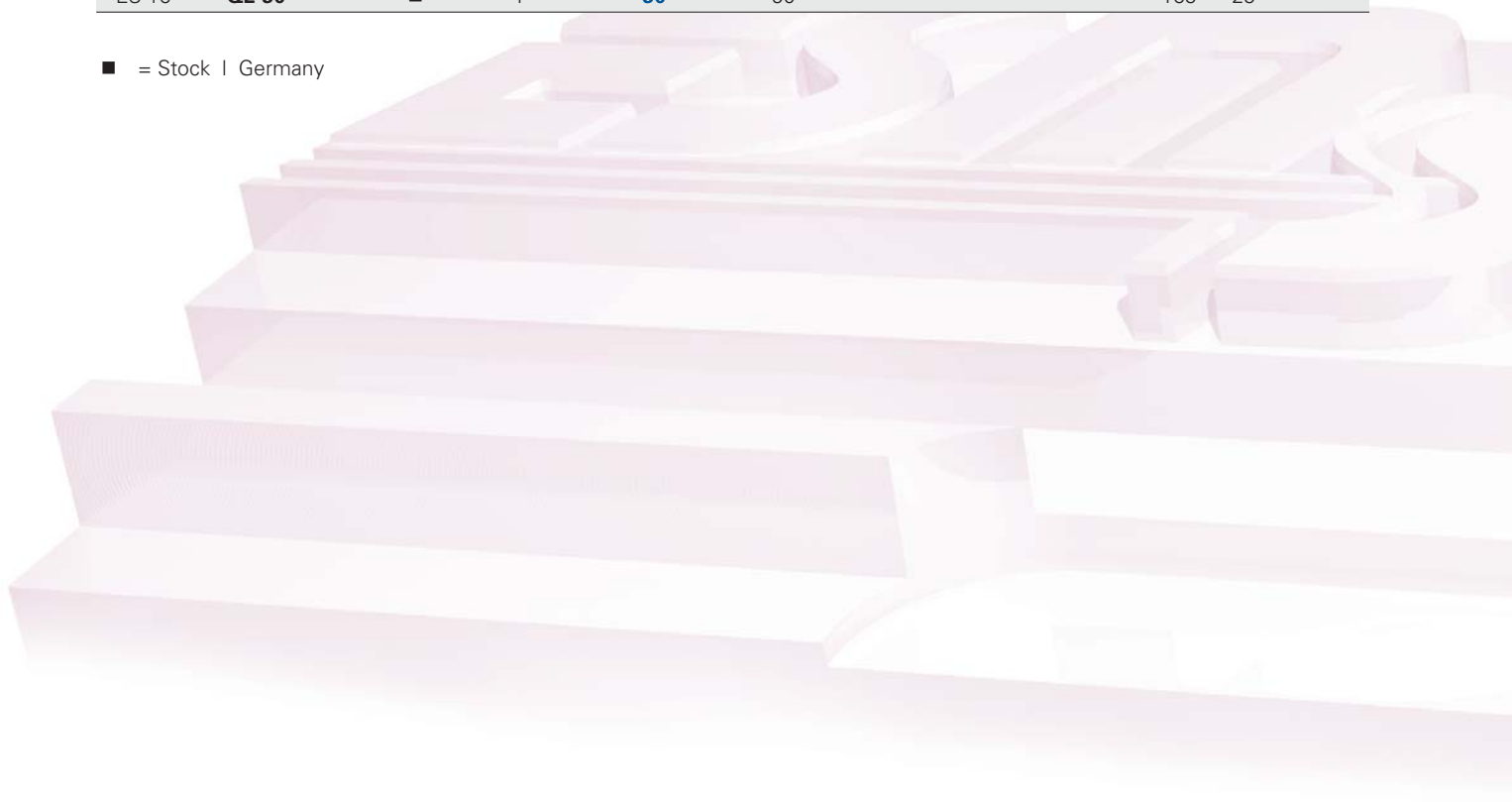
ESM Premium P/M HSS	C Century Coating
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Ø10 ~ Ø12	0/-0.05
Ø16 ~ Ø30	0/-0.1
d	h7

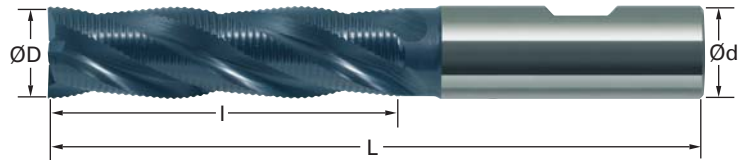
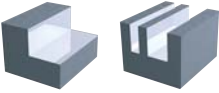
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ES 11	QL-10	■	4		10	45						100	10	
ES 12	QL-12	■	4		12	55						110	12	
ES 13	QL-16	■	4		16	65						125	16	
ES 14	QL-20	■	4		20	75						140	20	
ES 15	QL-25	■	4		25	90						165	25	
ES 16	QL-30	■	4		30	90						165	25	

■ = Stock | Germany



ESMQL-W | Fine Mill - Long with Weldon DIN1835B

Q max High Efficient	Roughing	HRC 45	No. of Teeth 4	No. of Teeth 6
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ESM Premium P/M HSS	C Century Coating
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Ø10 ~ Ø12	0/-0.05
Ø16 ~ Ø30	0/-0.1
d	h7

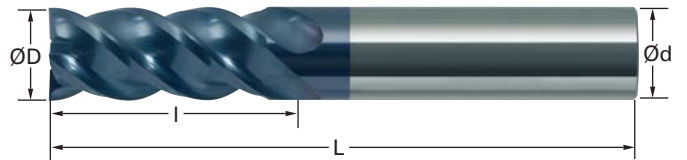
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ES 43	QL-10W	■	4		10	45						100	10	
ES 44	QL-12W	■	4		12	55						110	12	
ES 45	QL-16W	■	4		16	65						125	16	
ES 46	QL-20W	■	4		20	75						140	20	
ES 47	QL-25W	■	4		25	90						165	25	
ES 48	QL-30W	■	4		30	90						165	25	

■ = Stock | Germany



ESMHKR | Power Helical - Regular

 Roughing	 Semi-Finishing	 Finishing	HRC 45	No. of Teeth 4
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ESM Premium P/M HSS	C Century Coating
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ØD	0/-0.03
d	h7

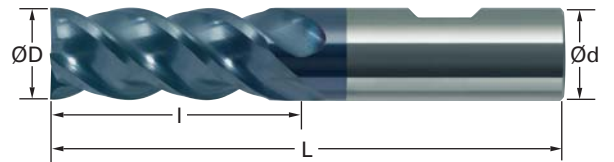
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ES 17	HKR-12	■	4		12	30						95	12	
ES 18	HKR-16	■	4		16	42						110	16	
ES 19	HKR-20	■	4		20	45						125	20	
ES 20	HKR-25	■	4		25	50						140	25	
ES 21	HKR-30	■	4		30	55						145	25	

■ = Stock | Germany



ESMHKR-W | Power Helical - Regular with Weldon DIN1835B

Roughing	Semi-Finishing	Finishing	HRC 45	No. of Teeth 4
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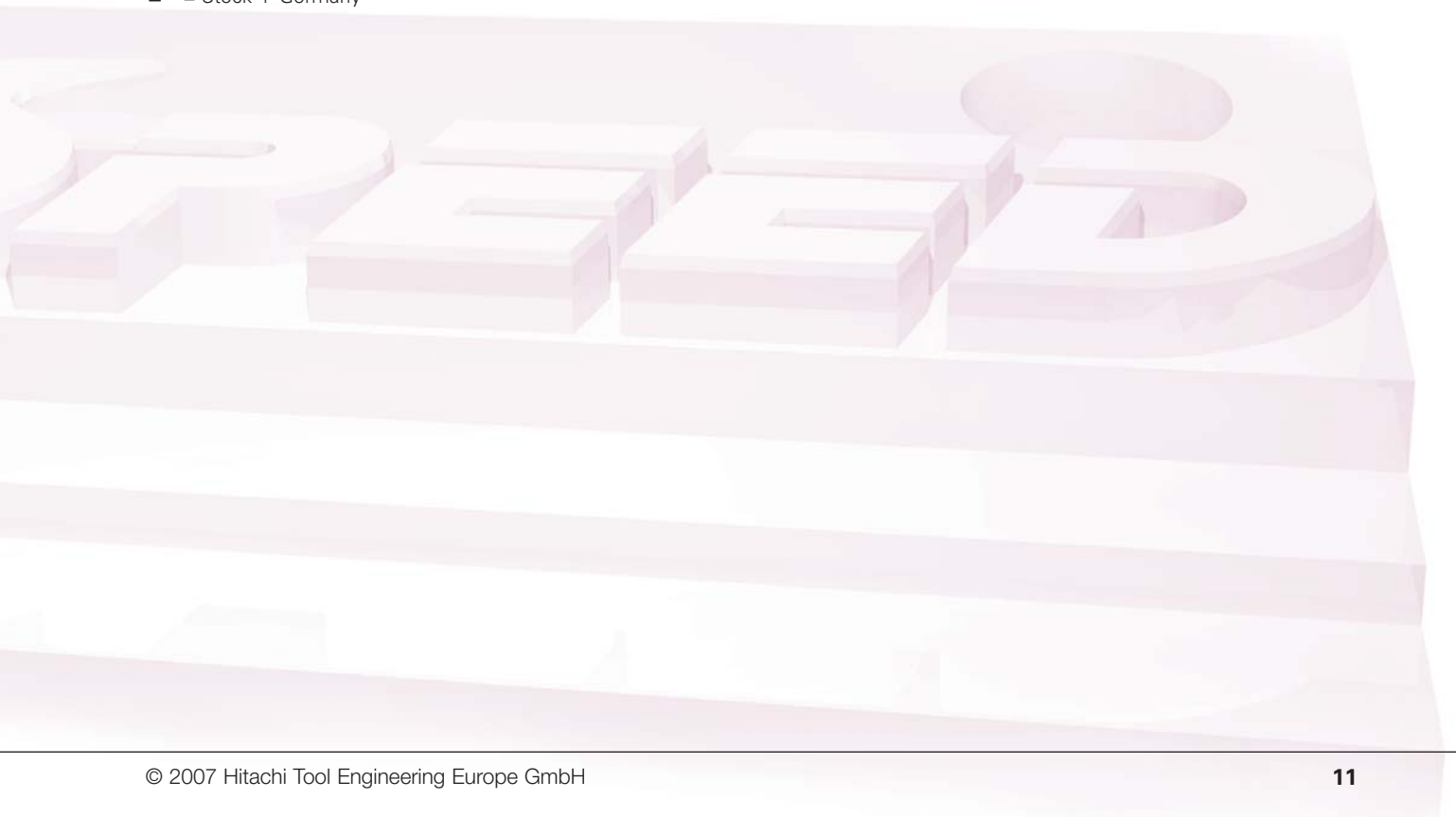
ESM Premium P/M HSS	C Century Coating
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ØD	0/-0.03
d	h7

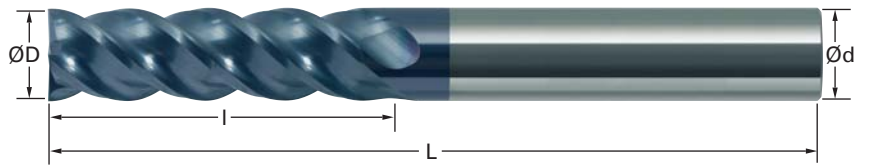
ID Code	Item No.	Stock	Z	R	ØD	l	dn	I ₁	I _{n1}	I _{n2}	I _s	L	d	Type
ES 49	HKR-12W	■	4		12	30						87	12	
ES 50	HKR-16W	■	4		16	42						103	16	
ES 51	HKR-20W	■	4		20	45						110	20	
ES 52	HKR-25W	■	4		25	50						124	25	
ES 53	HKR-30W	■	4		30	55						125	25	

■ = Stock | Germany



ESMHKM | Power Helical - Medium

 Roughing	 Semi-Finishing	 Finishing	HRC 45	No. of Teeth 4
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ESM Premium P/M HSS	C Century Coating
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ØD	0/-0.03
d	h7

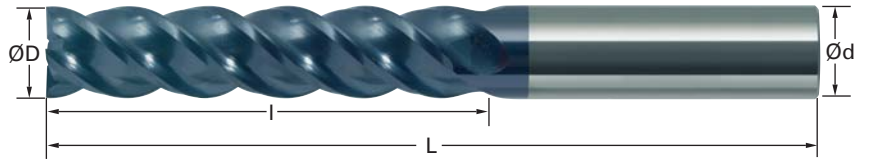
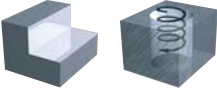
ID Code	Item No.	Stock	Z	R	ØD	l	dn	I ₁	I _{n1}	I _{n2}	I _s	L	d	Type
ES 22	HKM-12	■	4		12	45						120	12	
ES 23	HKM-16	■	4		16	55						140	16	
ES 24	HKM-20	■	4		20	65						165	20	
ES 25	HKM-25	■	4		25	75						195	25	
ES 26	HKM-30	■	4		30	80						200	25	

■ = Stock | Germany



ESMHKL | Power Helical - Long

Roughing	Semi-Finishing	Finishing	HRC 45	No. of Teeth 4
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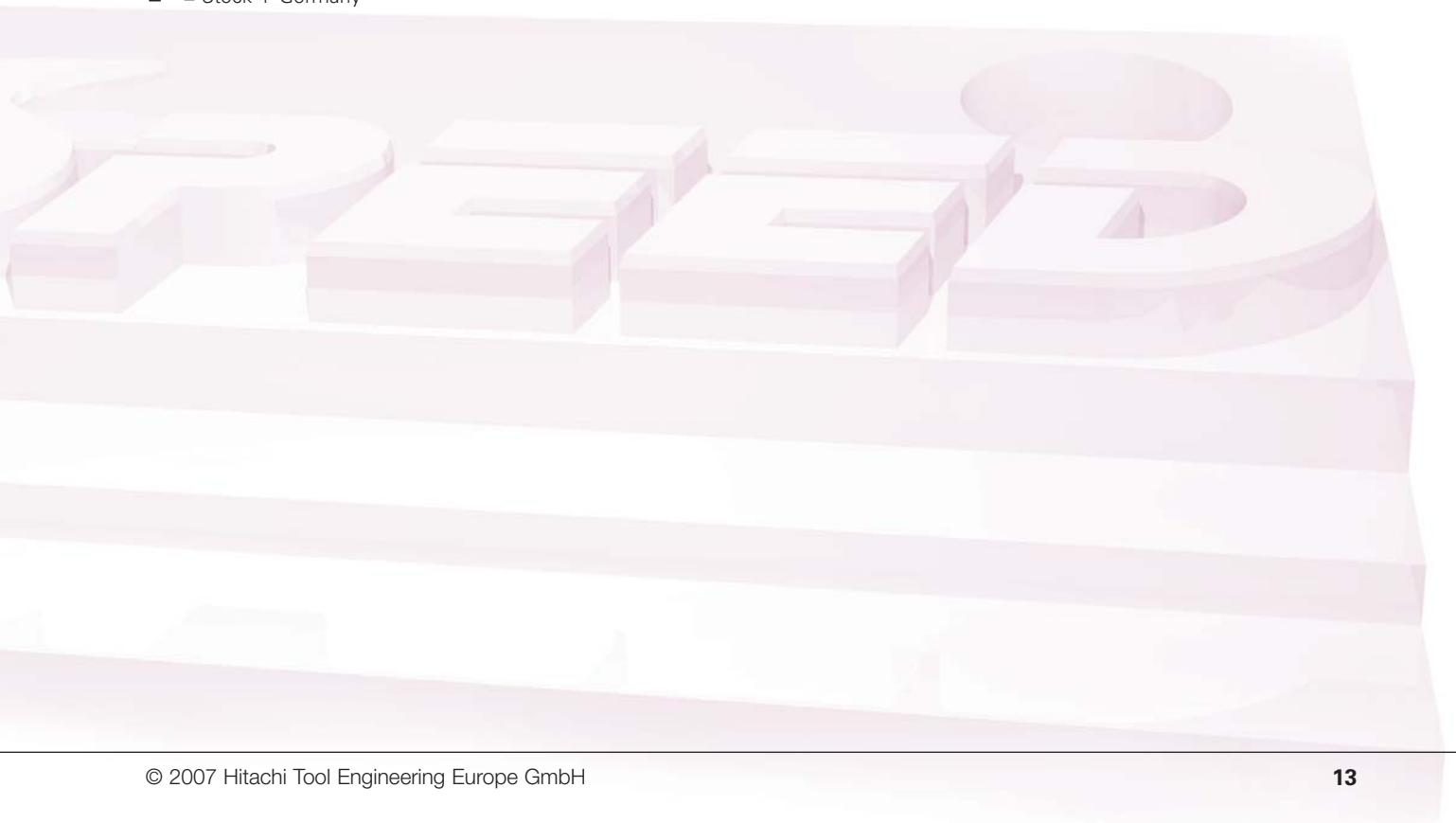
ESM Premium P/M HSS	C Century Coating
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ØD	0/-0.03
d	h7

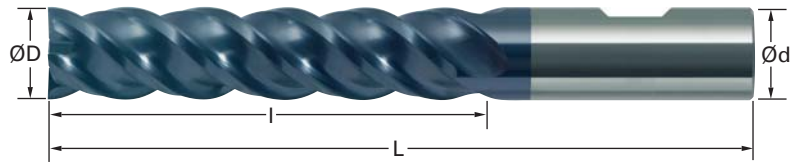
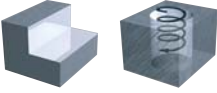
ID Code	Item No.	Stock	Z	R	ØD	l	dn	I ₁	I _{n1}	I _{n2}	I _s	L	d	Type
ES 27	HKL-12	■	4		12	55						120	12	
ES 28	HKL-16	■	4		16	65						140	16	
ES 29	HKL-20	■	4		20	85						165	20	
ES 30	HKL-25	■	4		25	100						195	25	
ES 31	HKL-30	■	4		30	105						200	25	

■ = Stock | Germany



ESMHKL-W | Power Helical - Long with Weldon DIN1835B

 Roughing	 Semi-Finishing	 Finishing	HRC 45	No. of Teeth 4
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ESM Premium P/M HSS	C Century Coating
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ØD	0/-0.03
d	h7

ID Code	Item No.	Stock	Z	R	ØD	l	dn	l ₁	l _{n1}	l _{n2}	l _s	L	d	Type
ES 54	HKL-12W	■	4		12	55						112	12	
ES 55	HKL-16W	■	4		16	65						126	16	
ES 56	HKL-20W	■	4		20	85						150	20	
ES 57	HKL-25W	■	4		25	100						174	25	
ES 58	HKL-30W	■	4		30	105						175	25	

■ = Stock | Germany



Recommended cutting conditions · Empfohlene Schnittwerte · Conditions de coupe recommandées · Condiciones de corte recomendadas · Condizioni di taglio raccomandate

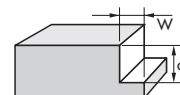
	Carbon Steels Cast Iron	Alloyed Steels	Tool-, Die and Stainless Steels	Hardened Steels	Inconel Titanium Alloys
	Kohlenstoffstähle Gusseisen	Legierte Stähle	Werkzeug- und Rostfreie Stähle	Gehärtete Stähle	Inconel Titan-Legierungen
	Acero Fundición	Acero aleado	Acero de herramienta Acero inoxidable	Acero endurecido	Inconel Aleaciones exóticas Ti-
	Acciaio al carbonio Ghisa	Acciaio legato	Acciaio per utensile Acciaio inossidabile	Acciaio temprato	Inconel Ti- legato
	Acier au carbone Fonte malléable	Acier allié	Acier à outil Acier inoxydable	Acier traité	Inconel Titane
HB/HRC	200 HB	200 ~ 250 HB	25 ~ 35 HRC	35 ~ 45 HRC	

ESM - QS = 100%

DIN1835B = (N + V_f) -20%

W=0.5D x d=1.5W

V _c	70 ~ 100 m/min			60 ~ 80 m/min			35 ~ 55 m/min			25 ~ 45 m/min			20 ~ 30 m/min			
	DØ	Z	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z
6	4	4,500	0.026	470	3,700	0.026	385	2,400	0.026	250	1,850	0.026	190	1,350	0.013	70
8	4	3,375	0.039	530	2,800	0.045	500	1,800	0.045	325	1,400	0.039	220	1,000	0.026	100
10	4	2,700	0.065	700	2,250	0.065	585	1,450	0.065	375	1,150	0.052	240	800	0.026	85
12	4	2,250	0.078	700	1,850	0.078	570	1,200	0.078	375	930	0.078	290	660	0.039	100
16	4	1,690	0.117	790	1,400	0.117	655	890	0.117	415	700	0.091	260	500	0.052	100
20	4	1,350	0.156	840	1,100	0.156	690	715	0.156	445	560	0.117	260	400	0.078	125
25	4	1,080	0.182	790	890	0.169	600	570	0.156	355	450	0.156	280	320	0.078	100
30	4	900	0.182	655	750	0.182	550	475	0.182	345	375	0.169	250	270	0.091	100
40	6	975	0.182	730	560	0.169	570	360	0.169	365	280	0.169	280	200	0.091	110

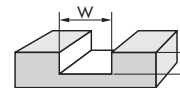


ESM - QS = 100%

DIN1835B = (N + V_f) -20%

W=D x d=D

V _c	50 ~ 80 m/min			30 ~ 50 m/min			25 ~ 45 m/min			20 ~ 40 m/min			15 ~ 25 m/min			
	DØ	Z	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z
6	4	3,450	0.024	330	2,100	0.024	200	1,850	0.024	180	1,580	0.016	100	1,060	0.008	35
8	4	2,580	0.036	370	1,590	0.036	230	1,400	0.036	200	1,200	0.024	115	800	0.012	40
10	4	2,070	0.061	500	1,270	0.048	245	1,150	0.048	220	950	0.036	135	640	0.024	60
12	4	1,725	0.072	500	1,060	0.061	255	930	0.061	225	790	0.048	150	535	0.036	80
16	4	1,300	0.096	500	790	0.096	300	700	0.084	235	590	0.061	140	400	0.048	75
20	4	1,035	0.132	550	635	0.121	305	560	0.108	240	475	0.084	165	320	0.048	60
25	4	830	0.121	400	510	0.121	245	450	0.121	215	380	0.096	145	255	0.072	75
30	4	690	0.121	330	420	0.121	200	375	0.121	180	315	0.096	120	210	0.072	60
40	6	520	0.121	375	320	0.121	230	280	0.121	200	235	0.096	135	160	0.072	70

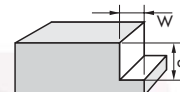


ESM - QL = 100%

DIN1835B = (N + V_f) -20%

W=0.1D x d=3D

V _c	45 ~ 60 m/min			35 ~ 45 m/min			30 ~ 40 m/min			15 ~ 25 m/min			10 ~ 15 m/min			
	DØ	Z	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z
10	4	1,650	0.048	315	1,240	0.048	240	1,050	0.036	150	640	0.036	90	420	0.024	40
12	4	1,375	0.061	330	1,030	0.061	250	875	0.048	170	530	0.048	100	350	0.031	40
16	4	1,030	0.072	300	775	0.072	225	655	0.061	160	400	0.061	95	260	0.036	40
20	4	825	0.096	315	620	0.096	240	525	0.072	150	320	0.072	90	210	0.048	40
25	4	660	0.121	315	500	0.121	240	420	0.096	160	255	0.096	95	170	0.061	40
30	4	550	0.144	315	415	0.144	240	350	0.108	150	215	0.108	90	140	0.072	40

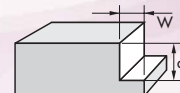


ESM - HKR = 100%

DIN1835B = (N + V_f) -20%

W=0.1D x d=1.5W

V _c	70 m/min			53 m/min			42 m/min			25 m/min			
	DØ	Z	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z
12	4	1,850	0.104	770	1,400	0.104	580	1,100	0.091	400	670	0.091	245
16	4	1,400	0.131	730	1,050	0.131	550	840	0.104	350	500	0.104	210
20	4	1,100	0.156	680	845	0.143	480	670	0.131	350	400	0.117	190
25	4	890	0.169	600	680	0.156	425	530	0.156	330	320	0.131	170
30	4	740	0.208	615	560	0.143	320	440	0.143	250	270	0.131	140

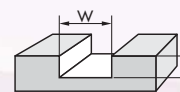


ESM - HKR = 100%

DIN1835B = (N + V_f) -20%

W=D x d=D

V _c	36 m/min			29 m/min			21 m/min			15 m/min			
	DØ	Z	N	f _z	V _f	N	f _z	V _f	N	f _z	V _f	N	f _z
12	4	960	0.048	185	770	0.048	150	560	0.048	110	400	0.048	75
16	4	720	0.072	210	580	0.072	165	420	0.072	120	300	0.072	85
20	4	580	0.084	195	460	0.084	155	335	0.084	110	240	0.084	80
25	4	460	0.084	155	370	0.084	125	270	0.084	90	190	0.084	65
30	4	380	0.084	130	310	0.084	105	225	0.084	75	160	0.084	55



ESM - HKM (N + V_f) -50%

ESM - HKL (N + V_f) -70%

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