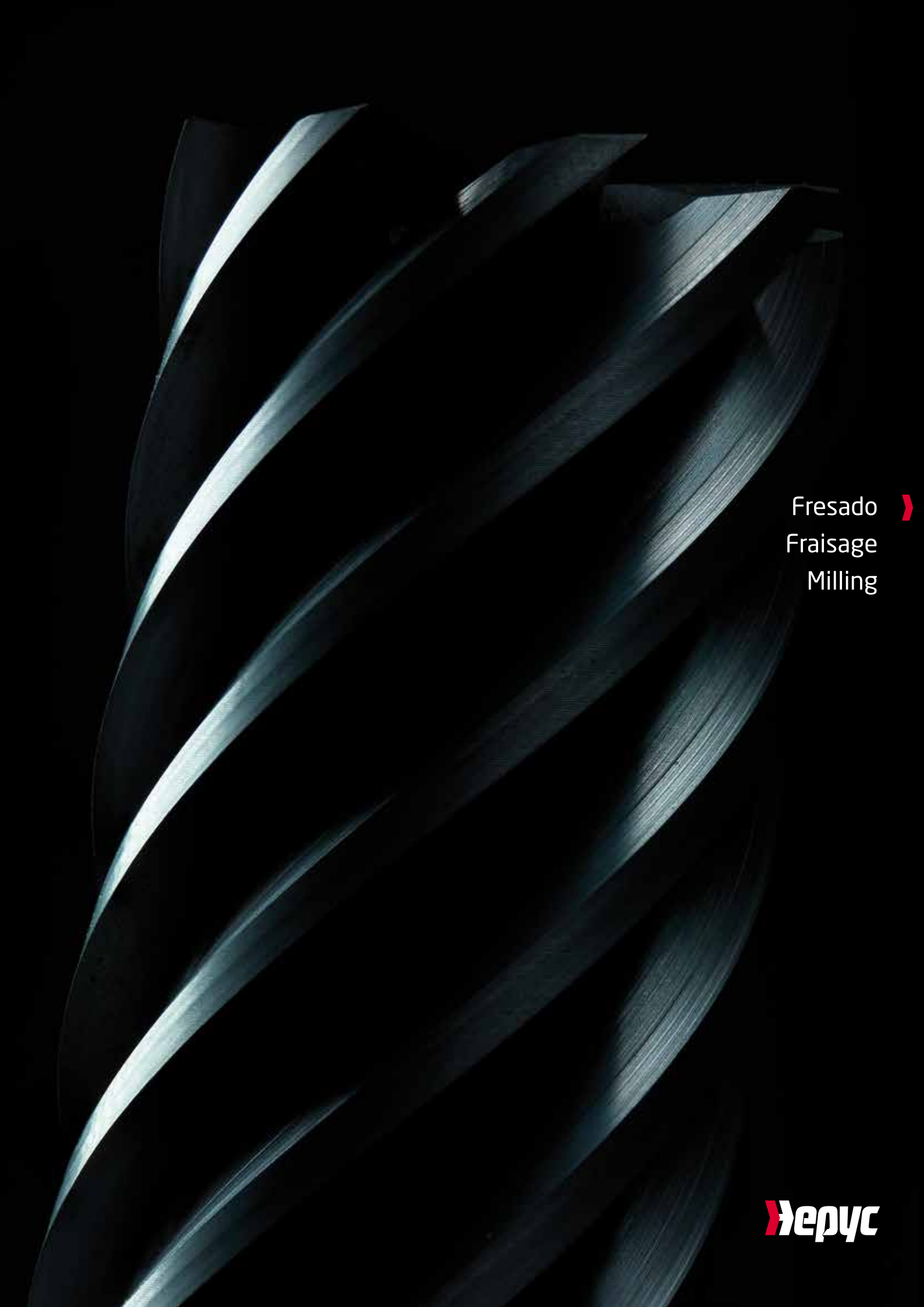

Fresado
Fraisage
Milling

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SOMMAIRE / INDEX

Hepyc CUTTING TOOL EXPERTS

Pág.

Fresas Metal duro / Fraises carbure / Hard metal mills

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

ÍNDICE
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P	Aceros Aciers Steels	M	Aceros Inox Aciers Inox Stainless Steels	K	Fundicion Fonte Cast Iron	N	Metales no ferrosos Métal non Ferraux Non Ferrous metals	S	Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys	H	Materiales Duros Materiels Durs Hard materials

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Pág.

Fresas HSSE mango cilíndrico cortas / Fraises HSSE queue cylindrique courtes / HSSE Straight short shank mills

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

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M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
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Pág.

Fresas mango cónico / Fraises queue conique / Tapered shank mills

Fresas con agujero / Fraises à trou / Mills with holes

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

ÍNDICE
SOMMAIRE / INDEX

Hepyc CUTTING TOOL EXPERTS

Pág.

Fresas HSSE especiales / Fraises HSSE spéciales / HSSE Special mills

Fresas rotativas metal duro / Fraises rotatives métal dur / Hard metal rotary mills

P Aceros / Aciers / Steels

M Aceros Inox / Aciers Inox / Stainless Steels

K Fundicion / Fonte / Cast Iron

N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals

S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys

H Materiales Duros / Materiels Durs / Hard materials

ÍNDICE
SOMMAIRE / INDEX

Fresas huecas máquinas electromagnéticas / Fraises à trou électromagnétiques / Electromagnetics core bits

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

FORMULARIO FRESAS ESPECIALES
FICHE TECHIQUE FRAISES SPECIAUX / TECHNICAL ENQUIRY FOR SPECIAL MILLS

Fecha / Date: .....

Empresa / Entreprise / Company: ..... **Contacto /** Contact: .....

Dirección / Adresse / Adress: ..... **Población /** Ville / Town: .....

Tel / Fax: ..... **E-mail:** .....

.....

TRABAJO A REALIZAR / TRAVAIL DEMANDE / REQUESTED WORK

Material / Matière / Material ..... **Norma /** Norme / Norm: .....

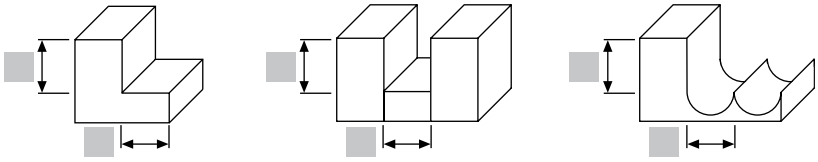
Dureza / Dureté / Hardness ..... **HB** ..... **HRc** **Resistencia /** Résistance / Resistance .....N/mm²

Tipo viruta: Type copeau Shaving ☐ **Corta** Courte Short ☐ **Larga** Longue Long ☐ **Polvo** Poussière Powder

Máquina / Machine ..... **Refrigerante /** Réfrigérant / Coolant .....

Posición / Position: ☐ **Horizontal** ☐ **Vertical** ☐ **V. Corte** V. Coupe Cutting Speed ☐ **V. avance** Avance Feed

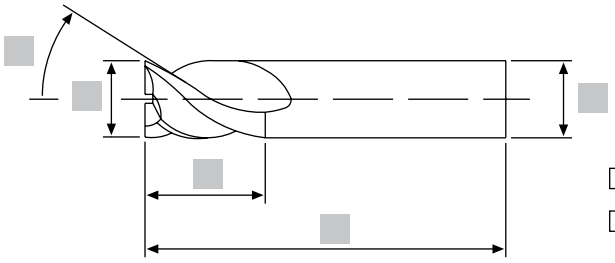
Forma / Forme / Form:



HERRAMIENTA / OUTIL / TOOL

Descripción / Description .....

Cantidad / Quantité / Quantity..... **Número ranuras /** Rainures / Grooves .....



☐ **Corte al centro /** Coupe au centre / Cut to the center

☐ **Sin corte al centro /** Sans coupe au centre / Without cut to the center

Mango: Queue: Shank: ☐ **Cilíndrico** Cylindrique Straight ☐ **Weldon** Weldon Weldon ☐ **Cónico** Conique Taper ☐ **Rebajado** Réduite Reduced

Tipos de punta: Types de pointe: Types of tips: ☐ **Recta** Droite Straight ☐ **Chaflán** Chanfrein Chamfered ☐ **Radial** Radiale Radial

Labios: Lèvres: Lips: ☐ **Desbaste** Dégrossissage Grinding ☐ **Desbaste fino** Dégrossissage fin Fine grinding ☐ **Acabado** Finition Finishing

Material / Matière / Material: ☐ **HSS** ☐ **HSSE** ☐ **HM** ☐ **HSS-HM**

Superficie / Surface: ☐ **Brillante** Brillant Brilliant ☐ **Recubrimiento** Revêtement Coating

COMENTARIOS / COMMENTAIRES/ COMMENTS: .....

.....

.....

.....

Servicio de Herramienta Especial - Service Outils Spéciaux - Special Tools Service
Tel. (+34) 93 387 32 99 - Fax.(+ 34) 93 383 33 08 - especiales@hepycrf.com

TABLA DE APLICACIONES
GUIDE D'APPLICATION / APPLICATION GUIDE

$$r.p.m.= \frac{Vc \times 1.000}{\pi \times Ø}$$

Ref./ Réf. / Ref.		3141	3189	3190	3167	3168	3169	3170	3191	3171	3172	3173	3174	3175
Z		1Z	2Z	3Z	2Z	2Z	2Z	2Z	2Z	3Z	3Z	3Z	3Z	4Z
Ejec./Exéc./Exec.		N	W	W	N	N	N	N	N	N	N	W	W	N
Hel./Hel./Spiral		30°	45°	45°	30°	30°	30°	30°	30°	30°	30°	45°	45°	30°
Mat.		HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM
Rec./Rev./Coat.					TIALN	TIALN	TIALN	TIALN	AICRN	TIALN	TIALN	TIALN	TIALN	TIALN
DIN					6527S	6527L	6527S	6527L	6527EL	6527S	6527L	6527S	6527L	6527S
Arista/Arête/Edge		45°					R	R	R					
Gama/Gamme/Range		3-10	3-20	3-20	3-20	3-20	3-20	3-20	2-20	3-20	3-20	3-20	3-20	3-20
Pag.		349	349	350	351	351	352	352	353	354	354	355	355	356
Mat.		Vc (m/min)												
P.1	<600				● 140-250	● 120-220	● 140-250	● 140-250	● 180-240	● 140-250	● 120-220	● 140-250	● 120-220	● 140-250
P.2	<800				● 110-220	● 100-200	● 110-220	● 110-220	● 160-220	● 110-220	● 100-200	● 110-220	● 100-200	● 110-220
P.3	<1000				● 90-200	● 80-180	● 90-200	● 90-200	● 140-210	● 90-200	● 80-180	● 90-200	● 80-180	● 90-200
P.4	<1200				● 75-180	● 70-150	● 75-180	● 75-180	● 150-200	● 75-180	● 70-150	● 75-180	● 70-150	● 75-180
P.5	<1400				● 60-120	● 60-90	● 60-120	● 60-120	● 100-140	● 60-120	● 60-90	● 60-120	● 60-90	● 60-120
M.1	<950				● 80-140	● 70-110	● 70-110	● 70-110		● 80-140	● 70-110	● 80-140	● 70-110	● 80-140
M.2					● 80-140	● 70-110	● 70-110	● 70-110		● 80-140	● 70-110	● 80-140	● 70-110	● 80-140
M.3	<1200				● 60-120	● 60-100	● 60-100	● 60-100		● 60-120	● 60-100	● 60-120	● 60-100	● 60-120
M.4					● 60-120	● 60-100	● 60-100	● 60-100		● 60-120	● 60-100	● 60-120	● 60-100	● 60-120
K.1	<500				● 120-180	● 100-160	● 120-180	● 120-180	● 120-180	● 120-180	● 100-160	● 120-180	● 100-160	● 120-180
K.2					● 120-180	● 100-160	● 120-180	● 120-180	● 120-180	● 120-180	● 100-160	● 120-180	● 100-160	● 120-180
K.3	<800				● 100-140	● 80-120	● 100-140	● 100-140	● 90-130	● 100-140	● 80-120	● 100-140	● 80-120	● 100-140
K.4.1					● 100-140	● 80-120	● 100-140	● 100-140	● 90-130	● 100-140	● 80-120	● 100-140	● 80-120	● 100-140
K.4.2	<1400				○ 60-120	○ 60-90	○ 60-120	○ 60-120	○ 100-140	○ 60-120	○ 60-90	○ 60-120	○ 60-90	○ 60-120
N.1.1	Al	● 150-300	● 150-300	● 150-300			○ 150 - 450	○ 150 - 450				○ 150-300	○ 110-240	
N.1.2		● 150-300	● 150-300	● 150-300			○ 150 - 450	○ 150 - 450				○ 150-300	○ 110-240	
N.1.3		● 150-300	● 150-300	● 150-300			○ 150 - 450	○ 150 - 450				○ 150-300	○ 110-240	
N.2.1	Cu	● 120-350	● 120-350	● 120-350			● 120-350	● 120-350				○ 120-350	○ 110-250	
N.2.2		● 120-350	● 120-350	● 120-350			● 120-350	● 120-350				○ 120-350	○ 110-250	
N.2.3					○ 110-220	○ 100-200	● 110-220	● 110-220		○ 110-220	○ 100-200	○ 110-220	○ 100-200	○ 110-220
N.2.4							● 60-120	● 60-120						
N.3.1	Mg/Zn	● 120-350	● 120-350	● 120-350			● 150 - 450	● 150 - 450				○ 120-350	○ 90-250	
N.4.1	Plastic	● 150-300	● 150-300	● 150-300			● 150 - 450	● 150 - 450				○ 150-300	○ 110-240	
N.4.2														
N.4.3														
S.1.1	Ni				● 60-90	● 50-80			● 50-80	● 60-90	● 60-90	● 60-90	● 60-90	● 60-90
S.1.2					● 40-75	● 40-60			● 40-60	● 40-75	● 40-75	● 40-75	● 40-75	● 40-75
S.2.1	Ti				● 80-140	● 70-110				● 80-140	● 70-110	● 80-140	● 70-110	● 80-140
S.2.2					● 75-100	● 70-90			● 70-90	● 75-100	● 75-100	● 75-100	● 75-100	● 75-100
S.2.3					● 60-90	● 60-80			● 60-80	● 60-90	● 60-90	● 60-90	● 60-90	● 60-90
H.1	50 HRC						● 40-80	● 40-80	● 90-150			● 40-80		
H.2	55 HRC						○ 30-50	○ 30-50	● 70-130			○ 30-50		
H.3	60 HRC								○ 60-110					

● Optima / Optimun ○ Alternativo / Alternative

P Aceros / Aciers / Steels

M Aceros Inox / Aciers Inox / Stainless Steels

K Fundicion / Fonte / Cast Iron

N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals

S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys

H Materiales Duros / Materiels Durs / Hard materials

3176	3177	3192	3193	3178	3179	3180	3181	3183	3184	3185	3194	3195	3101	3105	3107
4Z	4Z	4Z	5Z	4Z	6,8Z	6,8Z	3,4,5,6Z	4Z	4Z	4Z	4Z	5Z	2Z	3Z	4Z
N	N-V	N-V	N-V	N-V	W	W	WR	60º	90º	r	N-V	N-V	N	N	N
30º	35º-38º	35º-38º	37º-38º	35º-38º	45º	45º	45º	0º	0º	0º	40º-42º	40º-42º	30º	30º	30º
HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM	HM
TIALN	TIALN	AICRN	AICRN	AICRN	TIALN	TIALN	TIALN	TIALN	TIALN	TIALN	ALCR	ALCR			
6527L	6527L	6527L	6527EL	6527L	6527S	6527EL	6527L				6527L	6527EL			
	45º	45º	45º	r	45º	45º	45º	30º	45º	r	45º	45º			
3-20	3-20	3-20	6-25	6-16	6-20	6-20	4-20	1,20-2,40	1,20-2,40	0,50-5	3-20	6-25	3-20	3-20	3-20
356	357	358	358	359	360	360	361	361	362	362	363	363	364	364	365
Vc (m/min)															
● 120-220	● 120-220	● 180-240	● 220-380	● 180-240	● 120-220	● 120-220	● 120-220	● 120-220	● 120-220	● 120-220			● 85-155	● 85-155	● 85-155
● 100-200	● 100-200	● 170-220	● 210-350	● 170-220	● 100-200	● 100-200	● 100-200	● 100-200	● 100-200	● 100-200			● 70-130	● 70-130	● 70-130
● 80-180	● 80-180	● 160-210	● 200-320	● 160-210	● 80-180	● 80-180	● 80-180	● 80-180	● 80-180	● 80-180			● 60-110	● 60-110	● 60-110
● 70-150	● 70-150	● 150-200	● 200-300	● 150-200	● 70-150	● 70-150	● 70-150	● 70-150	● 70-150	● 70-150			● 50-105	● 50-105	● 50-105
● 60-90	● 60-90	● 100-140	● 180-250	● 100-140	● 60-90	● 60-90	● 60-90	● 60-90	● 60-90	● 60-90			○ 45-65	○ 45-65	○ 45-65
● 70-110	● 70-110	● 80-140		● 80-140	● 70-110	● 70-110	● 70-110	● 70-110	● 70-110	● 70-110	● 90-150	● 150-230	● 50-80	● 50-80	● 50-80
● 70-110	● 70-110	● 80-140		● 80-140	● 70-110	● 70-110	● 70-110	● 70-110	● 70-110	● 70-110	● 90-150	● 150-230	● 50-80	● 50-80	● 50-80
● 60-100	● 60-100	● 60-120		● 60-120	● 60-100	● 60-100	● 60-100	● 60-100	● 60-100	● 60-100	● 70-130	● 130-200	● 45-70	● 45-70	● 45-70
● 60-100	● 60-100	● 60-120		● 60-120	● 60-100	● 60-100	● 60-100	● 60-100	● 60-100	● 60-100	● 70-130	● 130-200	● 45-70	● 45-70	● 45-70
● 100-160	● 100-160	● 120-180		● 120-180	● 100-160	● 100-160	● 100-160	● 100-160	● 100-160	● 100-160			● 70-115	● 70-115	● 70-115
● 100-160	● 100-160	● 120-180		● 120-180	● 100-160	● 100-160	● 100-160	● 100-160	● 100-160	● 100-160			● 70-115	● 70-115	● 70-115
● 80-120	● 80-120	● 90-130		● 90-130	● 80-120	● 80-120	● 80-120	● 80-120	● 80-120	● 80-120			● 60-85	● 60-85	● 60-85
● 80-120	● 80-120	● 90-130		● 90-130	● 80-120	● 80-120	● 80-120	● 80-120	● 80-120	● 80-120			● 60-85	● 60-85	● 60-85
○ 60-90	○ 60-90	○ 100-140		○ 100-140	○ 60-90	○ 60-90	○ 60-90	○ 60-90	○ 60-90	○ 60-90					
○ 100-200	○ 100-200	○ 170-220	○ 200-250	○ 170-220	○ 100-200	○ 100-200	○ 100-200	○ 100-200	○ 100-200	○ 100-200			○ 70-130	○ 70-130	○ 70-130
● 60-90		● 50-80		● 50-80	● 50-80	● 50-80	● 50-80	● 50-80	● 50-80	● 50-80	● 60-80	● 50-100	● 40-60	● 40-60	● 40-60
● 40-75	● 40-60	● 40-60		● 40-60	● 40-60	● 40-60	● 40-60	● 40-60	● 40-60	● 40-60	● 50-70	● 40-80	● 30-45	● 30-45	● 30-45
● 70-110		● 80-140		● 80-140	● 70-110	● 70-110	● 70-110	● 70-110	● 70-110	● 70-110	● 90-150	● 150-230	● 50-80	● 50-80	● 50-80
● 75-100		● 70-90		● 70-90	● 70-90	● 70-90	● 70-90	● 70-90	● 70-90	● 70-90	● 80-100	● 80-170	● 50-80	● 50-80	● 50-80
● 60-90	● 60-80	● 60-80		● 60-80	● 60-80	● 60-80	● 60-80	● 60-80	● 60-80	● 60-80	● 60-80	● 60-120	● 45-60	● 45-60	● 45-60
	● 40-80	● 90-150	● 70-130	● 90-150	● 60-100	● 60-100		● 40-80							
	○ 30-50	● 70-130	● 50-120	● 70-130	○ 50-80	○ 50-80		○ 30-50							
		○ 60-110	○ 40-80	○ 60-110											

● Optima / Optimun ○ Alternativo / Alternative

P	Aceros Aciers Steels	M	Aceros Inox Aciers Inox Stainless Steels	K	Fundicion Fonte Cast Iron	N	Metales no ferrosos Métal non Ferraux Non Ferrous metals	S	Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys	H	Materiales Duros Materiels Durs Hard materials

TABLA DE APLICACIONES
GUIDE D'APPLICATION / APPLICATION GUIDE

$$r.p.m.= \frac{Vc \times 1.000}{\pi \times Ø}$$

		Ref./ Réf. / Ref.	3120	3121	3122	3186	3110	3110/1	3112	3112/1	3187	3187/1	3114	3114/1	3115	3115/1	3117	3117/1	3119	3119/1
		Z	1Z	1Z	1Z	2Z	2Z	2Z	2Z	2Z	3Z	3Z	3Z	3Z	Z>4	Z>4	Z>4	Z>4	Z>4	Z>4
		Ejec./Exéc./Exec.	W	W	W	W	N	N	N	N	N	N	W	W	N	N	NR	NR	NRF	NRF
		Hel./Hel./Spiral				40°	30°	30°	30°	30°	30°	30°	45°	45°	30°	30°	30°	30°	30°	30°
		Mat.	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE
		Rec./Rev./Coat.						TIALN		TIALN		TIALN		TIALN		TIALN		TIALN		TIALN
		DIN					327	327	327	327	327	327	844	844	844	844	844	844	844	844
		Gama/Gamme/Range	3-10	4-8	5	2-20	2,40	2-40	3-25	3-25	2-32	2-32	2-30	6-20	2-32	3-32	6-40	6-32	6-30	6-30
		Pag.	366	366	367	367	368	369	370	370	371	371	372	372	373	373	374	374	375	375
Mat.			Vc (m/min)																	
P.1	<600					● 45-50	● 45-50	o 70-80	● 45-50	o 70-80	● 45-50	o 70-80	● 45-50	● 70-80	● 45-50	o 70-80	● 45-50	● 70-80	o 45-50	o 70-80
P.2	<800					o 30-36	● 30-36	● 48-65	● 30-36	● 48-65	● 30-36	● 48-65	● 30-36	o 48-65	● 30-36	● 48-65	● 35-45	● 55-65	● 30-36	● 48-65
P.3	<1000						o 25-30	● 40-45	o 25-30	● 40-45	o 25-30	● 40-45			o 25-30	● 40-45	o 25-30	● 45-55	● 25-30	● 40-45
P.4	<1200							o 30-35		o 30-35		o 30-35				o 30-35		o 35-40		
P.5	<1400																			
M.1	<950						o 15-20	o 25-35	o 15-20	o 25-35	o 15-20	o 25-35			o 15-20	o 25-35	o 15-20	o 25-35	o 15-20	o 25-35
M.2							o 15-20	o 25-35	o 15-20	o 25-35	o 15-20	o 25-35			o 15-20	o 25-35	o 15-20	o 25-35	o 15-20	o 25-35
M.3	<1200																			
M.4																				
K.1	<500						o 34-38	● 55-60	o 34-38	● 55-60	o 34-38	● 55-60			o 34-38	● 55-60	o 34-38	● 55-60	o 34-38	● 55-60
K.2																				
K.3	<800							o 30-35		o 30-35		o 30-35				o 30-35			● 20-25	● 30-40
K.4.1							o 20-24	● 30-40	o 20-24	● 30-40	o 20-24	● 30-40			o 20-24	● 30-40			o 34-38	o 55-60
K.4.2	<1400							o 30-35		o 30-35		o 30-35				o 30-35				
N.1.1	Al		● 160-200	● 160-200	● 160-200	● 160-200							● 100-150	● 130-200						
N.1.2			● 160-200	● 160-200	● 160-200	● 160-200							● 100-150	● 130-200						
N.1.3			o 60-100	o 60-100	o 60-100	o 60-100							o 60-100	o 100-160						
N.2.1	Cu						o 70-90	o 90-120	o 70-90	o 90-120	o 70-90	o 90-120			o 70-90	o 90-120	o 70-90	o 90-120	o 70-90	o 90-120
N.2.2							o 70-90	o 90-120	o 70-90	o 90-120	o 70-90	o 90-120			o 70-90	o 90-120	o 70-90	o 90-120	o 70-90	o 90-120
N.2.3							o 45-50	o 70-80	o 45-50	o 70-80	o 45-50	o 70-80			o 45-50	o 70-80	o 45-50	o 60-75	o 45-50	o 60-75
N.2.4																				
N.3.1	Mg/Zn		● 60-100	● 60-100	● 60-100	● 60-100							● 60-100	● 80-120						
N.4.1	Plastic		● 50-80	● 50-80	● 50-80	● 50-80							● 50-80	● 65-100						
N.4.2																				
N.4.3																				
S.1.1	Ni								o 2-4	● 4-6					o 15-20	● 25-35			o 15-20	o 25-35
S.1.2																				
S.2.1	Ti										o 15-20	o 25-35			o 15-20	● 25-35				
S.2.2												o 30-35				o 30-35				
S.2.3																				
H.1	50 HRC																			
H.2	55 HRC																			
H.3	60 HRC																			

● Optima / Optimun ○ Alternativo / Alternative

P	Aceros Aciers Steels	M	Aceros Inox Aciers Inox Stainless Steels	K	Fundicion Fonte Cast Iron	N	Metales no ferrosos Métal non Ferraux Non Ferrous metals	S	Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys	H	Materiales Duros Materiels Durs Hard materials

3162	3157	3159	3111	3111/1	3113	3113/1	3188	3188/1	3182	3182/1	3116	3116/1	3118	3118/1	3163	3158	3160
Z>4	Z>4	Z>4	2Z	2Z	2Z	2Z	3Z	3Z	3Z	3Z	Z>4	Z>4	Z>4	Z>4	Z>4	Z>4	Z>4
N	NR	NRF	N	N	N	N	N	N	W	W	N	N	NR	NR	N	NR	NRF
30°	30°	30°	30°	30°	30°	30°	30°	30°	40°	40°	30°	30°	30°	30°	30°	30°	30°
HSSE-PM	HSSE-PM	HSSE-PM	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE-PM	HSSE-PM	HSSE-PM
TIALN	TIALN	TIALN		TIALN		TIALN		TIALN		TIALN		TIALN		TIALN	TIALN	TIALN	TIALN
844	844	844	844-L	844-L	327-L	327-L	327-L	327-L	844-L	844-L	844-L	844-L	844-L	844-L	844-L	844-L	844-L
6-20	6-32	6-20	4-25	4-25	4-25	4-25	3-25	3-25	6-20	6-20	3-25	6-25	6-32	6-32	6-20	6-32	6-20
376	376	377	378	378	379	379	380	380	381	381	382	382	383	383	384	384	385
Vc (m/min)																	
o 80-85	o 85-90	o 80-85	● 45-50	o 70-80	● 45-50	o 70-80	● 45-50	o 70-80	● 45-50	● 70-80	● 45-50	o 70-80	● 45-50	● 70-80	o 80-85	o 85-90	o 80-85
● 55-65	● 60-70	● 55-65	● 30-36	● 48-65	● 30-36	● 48-65	● 30-36	● 48-65	o 30-36	o 48-65	● 35-45	● 48-65	● 35-45	● 55-65	● 55-65	● 60-70	● 55-65
● 50-60	● 50-60	● 40-50	25-30	● 40-45	o 25-30	● 40-45	o 25-30	● 40-45			o 25-30	● 40-45	o 25-30	● 45-55	● 50-60	● 50-60	● 40-50
o 35-40	o 45-50	o 35-40		o 30-35		o 30-35		o 30-35				o 30-35		o 35-40	o 35-40	o 45-50	o 35-40
● 35-40	● 35-40	● 30-35	o 15-20	o 25-35	o 15-20	o 25-35	o 15-20	o 25-35			o 15-20	o 25-35	o 15-20	o 25-35	● 35-40	● 35-40	● 30-35
● 35-40	● 35-40	● 30-35	o 15-20	o 25-35	o 15-20	o 25-35	o 15-20	o 25-35			o 15-20	o 25-35	o 15-20	o 25-35	● 35-40	● 35-40	● 30-35
o 28-35	o 28-35	o 25-30													o 28-35	o 28-35	o 25-30
o 28-35	o 28-35	o 25-30													o 28-35	o 28-35	o 25-30
● 55-60	● 60-65	● 55-60	o 34-38	● 55-60	o 34-38	● 55-60	o 34-38	● 55-60			o 34-38	● 55-60	o 34-38	● 55-60	● 55-60	● 60-65	● 55-60
o 30-35				o 30-35		o 30-35		o 30-35				o 30-35			o 30-35		
● 30-40			o 20-24	● 30-40	o 20-24	● 30-40	o 20-24	● 30-40			o 20-24	● 30-40			● 30-40		
o 30-35				o 30-35		o 30-35		o 30-35				o 30-35			o 30-35		
o 130-200									● 100-150	● 130-200					o 130-200		
o 130-200									● 100-150	● 130-200					o 130-200		
o 90-130									o 60-100	o 100-160					o 90-130		
o 90-120	o 120-140	o 120-140	o 60-80	o 80-110	o 70-90	o 90-120	o 55-75	o 90-120			o 70-90	o 90-120	o 70-90	o 90-120	o 90-120	o 120-140	o 120-140
o 90-120	o 120-140	o 120-140	o 60-80	o 80-110	o 70-90	o 90-120	o 55-75	o 90-120			o 70-90	o 90-120	o 70-90	o 90-120	o 90-120	o 120-140	o 120-140
o 80-85	o 85-90	o 80-85	o 45-50	o 70-80	o 45-50	o 70-80	o 45-50	o 70-80			o 45-50	o 70-80	o 45-50	o 60-75	o 80-85	o 85-90	o 80-85
o 90-130									o 60-100	o 80-120					o 90-130		
o 75-190									o 50-150	o 65-100					o 75-190		
● 35-40		● 35-40			o 2-4	● 4-6					o 15-20	● 25-35			● 35-40		● 35-40
15-20		15-20													15-20		15-20
● 35-40		● 35-40					o 15-20	o 25-35			o 15-20	o 25-35			● 35-40		● 35-40
o 30-35		o 30-35						o 30-35				o 30-35			o 30-35		o 30-35

● Optima / Optimun ○ Alternativo / Alternative

P	Aceros Aciers Steels	M	Aceros Inox Aciers Inox Stainless Steels	K	Fundicion Fonte Cast Iron	N	Metales no ferrosos Métal non Ferraux Non Ferrous metals	S	Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys	H	Materiales Duros Materiels Durs Hard materials

TABLA DE APLICACIONES
GUIDE D'APPLICATION / APPLICATION GUIDE

r.p.m.= $\frac{Vc \times 1.000}{\pi x \varnothing}$

		3144	3144/1	3145	3145/1	3146	3146/1	3147	3147/1	3148	3148/1
Ref./ Réf. / Ref.		3144	3144/1	3145	3145/1	3146	3146/1	3147	3147/1	3148	3148/1
Z		2Z	2Z	Z>4	Z>4	Z>4	Z>4	Z>4	Z>4	Z>4	Z>4
Ejec./Exéc./Exec.		N	N	N	N	NR	NR	N	N	NR	NR
Hel./Hel./Spiral		30°	30°	30°	30°	30°	30°	30°	30°	30°	30°
Mat.		HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE
Rec./Rev./Coat.			TIALN		TIALN		TIALN		TIALN		TIALN
DIN		326	326	845	845	845	845	845-L	845-L	845-L	845-L
Gama/Gamme/Range		12-40	12-40	12-50	12-50	12-50	12-50	12-50	12-50	16-50	20-50
Pag.		386	386	387	387	388	388	389	389	390	390
Mat.		Vc (m/min)									
P.1	<600	● 45-50	● 70-80	● 45-50	● 70-80	● 50-55	● 70-80	● 45-50	● 70-80	● 50-55	● 70-80
P.2	<800	● 30-36	● 48-65	● 30-36	● 48-65	● 35-45	● 55-65	● 30-36	● 48-65	● 35-45	● 55-65
P.3	<1000	○ 25-30	● 40-45	○ 25-30	● 40-45	○ 25-30	● 45-55	○ 25-30	● 40-45	○ 25-30	● 45-55
P.4	<1200		○ 30-35		○ 30-35		○ 35-40		○ 30-35		○ 35-40
P.5	<1400										
M.1	<950	○ 15-20	○ 25-35	○ 15-20	○ 25-35	○ 15-20	○ 25-35	○ 15-20	○ 25-35	○ 15-20	○ 25-35
M.2	<950	○ 15-20	○ 25-35	○ 15-20	○ 25-35	○ 15-20	○ 25-35	○ 15-20	○ 25-35	○ 15-20	○ 25-35
M.3	<1200										
M.4	<1200										
K.1	<500	○ 34-38	● 55-60	○ 34-38	● 55-60	○ 38-42	● 55-60	○ 34-38	● 55-60	○ 38-42	● 55-60
K.2	<500										
K.3	<800		○ 30-35		○ 30-35				○ 30-35		
K.4.1	<800	○ 20-24	● 30-40	○ 20-24	● 30-40	○ 20-24	● 30-35	○ 20-24	● 30-40	○ 20-24	● 30-35
K.4.2	<1400		○ 30-35		○ 30-35				○ 30-35		
N.1.1	Al	○ 100-150	○ 130-200	○ 100-150	○ 130-200			○ 100-150	○ 130-200		
N.1.2	Al	○ 100-150	○ 130-200	○ 100-150	○ 130-200			○ 100-150	○ 130-200		
N.1.3	Al	○ 60-100	○ 90-130	○ 60-100	○ 90-130			○ 60-100	○ 90-130		
N.2.1	Cu	● 55-75	● 90-120	● 55-75	● 90-120	● 55-75	● 90-120	● 55-75	● 90-120	● 55-75	● 90-120
N.2.2	Cu	● 55-75	● 90-120	● 55-75	● 90-120	● 55-75	● 90-120	● 55-75	● 90-120	● 55-75	● 90-120
N.2.3	Cu	● 75-95	● 120-140	● 75-95	● 120-140	● 75-95	● 120-140	● 75-95	● 120-140	● 75-95	● 120-140
N.2.4	Cu										
N.3.1	Mg/Zn	○ 60-100	○ 90-130	○ 60-100	○ 90-130			○ 60-100	○ 90-130		
N.4.1	Plastic	○ 50-150	○ 75-190	○ 50-150	○ 75-190			○ 50-150	○ 75-190		
N.4.2	Plastic										
N.4.3	Plastic										
S.1.1	Ni			○ 15-20	● 25-35			○ 15-20	● 25-35		
S.1.2	Ni										
S.2.1	Ti			○ 15-20	○ 25-35			○ 15-20	○ 25-35		
S.2.2	Ti				○ 30-35				○ 30-35		
S.2.3	Ti										
H.1	50 HRC										
H.2	55 HRC										
H.3	60 HRC										

● Optima / Optimun ○ Alternativo / Alternative

P Aceros Aciers Steels	M Aceros Inox Aciers Inox Stainless Steels	K Fundicion Fonte Cast Iron	N Metales no ferrosos Métal non Ferraux Non Ferrous metals	S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys	H Materiales Duros Materiels Durs Hard materials

TABLA DE APLICACIONES
GUIDE D'APPLICATION / APPLICATION GUIDE

r.p.m.= $\frac{Vc \times 1.000}{\pi x \varnothing}$












Ref./ Réf. / Ref.		3149	3150	3165	3151	3161	3166	3152	3153	3154	3155	3156	3164
Z		6-10	6-10	8-10	18-24	18-24	16-40	6-12	4-10	8-10	8-12	10-12	4
Ejec./Exéc./Exec.		N	NR	NRF	H	H	H		N	N			
Hel./Hel./Spiral		30°	30°	30°	0°	10°	10°	10°	10°	10°	0°	0°	0°
Mat.		HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE	HSSE
Rec./Rev./Coat.													
DIN		1880	1880	1880	885-B	885-A	1834-A	850	851	851	1833-A	1833-B	6518
Gama/Gamme/Range		40-80	40-80	40-80	63-125	63-125	50-125	4,5-45,50	11-40	18-72	16-32	16-32	8-56
Pag.		391	391	392	392	393	393	394	394	395	395	396	396
Mat.		Vc (m/min)						Vc (m/min)					
P.1	<600	● 35-40	● 40-50	● 35-40	● 35-40	● 35-40	● 35-40	● 35-40	● 35-40	● 35-40	● 35-40	● 35-40	● 40-50
P.2	<800	● 30-35	● 35-45	● 30-35	● 30-35	● 30-35	● 30-35	● 30-35	● 30-35	● 30-35	● 30-35	● 30-35	● 35-45
P.3	<1000	● 15-25	● 25-35	● 15-25	● 15-25	● 15-25	● 15-25	● 15-25	● 15-25	● 15-25	● 15-25	● 15-25	● 25-35
P.4	<1200			● 15-20	● 15-20	● 15-20	● 15-20						
P.5	<1400												
M.1	<950	● 10-15	● 15-20	● 10-15		● 10-15							
M.2		● 10-15	● 15-20	● 10-15		● 10-15							
M.3	<1200												
M.4													
K.1	<500			o 30-35	● 30-35	● 30-35	● 30-35						
K.2				o 30-35	● 30-35	● 30-35	● 30-35						
K.3	<800	● 20-24	● 25-30	● 15-25	● 15-25	● 15-25	● 15-25						
K.4.1		● 20-24	● 25-30	● 15-25	● 15-25	● 15-25	● 15-25	o 20-24	o 20-24	o 20-24	o 20-24	o 20-24	o 25-30
K.4.2	<1400												
N.1.1	Al						o 60-100	o 100-150	o 100-150	o 100-150	o 100-150	o 100-150	
N.1.2							● 160-260	o 100-150	o 100-150	o 100-150	o 100-150	o 100-150	
N.1.3							o 60-100	o 60-100	o 60-100	o 60-100	o 60-100	o 60-100	
N.2.1	Cu							● 55-75	● 55-75	● 55-75	● 55-75	● 55-75	
N.2.2					● 60-100	● 60-100	● 60-100	● 55-75	● 55-75	● 55-75	● 55-75	● 55-75	
N.2.3		● 30-35	● 30-35	● 30-35	● 30-35	● 30-35	● 30-35	● 75-95	● 75-95	● 75-95	● 75-95	● 75-95	
N.2.4													
N.3.1	Mg/Zn				● 50-90	● 50-90	● 50-90	o 60-100	o 60-100	o 60-100	o 60-100	o 60-100	
N.4.1	Plastic												
N.4.2													
N.4.3													
S.1.1	Ni			o 10-15									
S.1.2				● 5-10									
S.2.1	Ti	● 10-15	● 15-20	● 10-15		● 10-15							
S.2.2													
S.2.3													
H.1	50 HRC												
H.2	55 HRC												
H.3	60 HRC												

● Optima / Optimun ○ Alternativo / Alternative

P	Aceros Aciers Steels	M	Aceros Inox Aciers Inox Stainless Steels	K	Fundicion Fonte Cast Iron	N	Metales no ferrosos Métal non Ferraux Non Ferrous metals	S	Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys	H	Materiales Duros Materiels Durs Hard materials

TABLA DE APLICACIONES
GUIDE D'APPLICATION / APPLICATION GUIDE

$$r.p.m.= \frac{Vc \times 1.000}{\pi x \varnothing}$$

		 CRUZ	 DIAM	 ALU				
Ref./ Réf. / Ref.					7172	7137	7138	7139
Z								
Ejec./Exéc./Exec.		CRUZ	DIAM	ALU				
Hel./Hel./Spiral								
Mat.		HM	HM	HM	HSS	HSSE	HSSE	HSS - WIDIA
Rec./Rev./Coat.							TIALN	
DIN								
Gama/Gamme/Range					12-60	12-60	12-50	18-50
Pag.					406	408	410	412
Mat.		Vc (m/min)			Vc (m/min)			
P.1	<600	● 400-800	o 400-800		● 20-25	● 35-45	o 45-55	o 55-65
P.2	<800	● 400-800	o 400-800		● 15-20	● 25-35	● 40-50	● 40-50
P.3	<1000	● 400-800	● 400-800			● 20-25	● 30-40	● 30-40
P.4	<1200	o 300-700	● 300-700			o 15-20	● 20-25	● 20-25
P.5	<1400		● 300-700				o 15-20	● 15-20
M.1	<950	● 600-1000	o 600-1000			o 15-20	● 20-25	● 20-30
M.2		● 600-1000	o 600-1000			o 15-20	● 20-25	● 20-30
M.3	<1200	o 400-800	● 400-800				o 15-20	o 15-20
M.4		o 400-800	● 400-800				o 15-20	o 15-20
K.1	<500	● 500-800	● 500-800		o 20-30	● 30-35	● 45-55	● 50-60
K.2		● 500-800	● 500-800		o 20-30	● 30-35	● 45-55	● 50-60
K.3	<800	● 400-800	● 400-800		o 15-20	o 25-30	o 40-50	● 45-55
K.4.1		● 400-800	● 400-800		o 15-20	o 25-30	o 40-50	● 45-55
K.4.2	<1400		● 300-700				o 15-20	o 15-20
N.1.1	Al			● 400-1000	● 40-50	● 50-60	● 60-70	● 70-90
N.1.2				● 400-1000	o 40-50	o 50-60	o 60-70	o 70-90
N.1.3				● 300-700	o 40-50	o 50-60	o 60-70	o 70-90
N.2.1	Cu	o 400-800		● 300-700	o 40-50	● 50-60	● 60-70	● 70-90
N.2.2		o 400-800	o 400-800	● 300-700	o 40-50	● 50-60	● 60-70	● 70-90
N.2.3		● 400-800			o 15-20	● 25-35	● 40-50	● 40-50
N.2.4			o 300-700			o 15-20	● 20-25	● 20-25
N.3.1	Mg/Zn	● 400-800		o 400-1000	o 20-25	● 30-35	● 45-55	● 50-60
N.4.1	Plastic			● 400-1000	o 40-50	o 50-60	o 60-70	o 70-90
N.4.2				● 400-1000	o 40-50	o 50-60	o 60-70	o 70-90
N.4.3			o 300-700					
S.1.1	Ni	o 400-800	● 400-800				o 10-15	● 15-20
S.1.2			o 300-700					o 15-20
S.2.1	Ti	● 600-1000	● 600-1000				● 20-25	● 20-30
S.2.2			● 400-800				o 15-20	● 20-25
S.2.3			o 300-700					o 15-20
H.1	50 HRC		● 200-600					● 20-25
H.2	55 HRC		● 200-600					o 15-20
H.3	60 HRC							

● Optima / Optimun ○ Alternativo / Alternative

P Aceros Aciers Steels

M Aceros Inox Aciers Inox Stainless Steels

K Fundicion Fonte Cast Iron

N Metales no ferrosos Métal non Ferraux Non Ferrous metals

S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys

H Materiales Duros Materiels Durs Hard materials

Avance / Feed
vf (mm/min) = rpm x Z x fz x K
rpm = (Vc x 1000) / (D x P)
Z = número de dientes / nombre de dents / teeth number
fz = avance por diente / avance per dent / feed per tooth

Fresado / Fresage / Milling			
1	2	3	4
			

K = Coef. x material (rest = 1)															
P.4	P.5	M.3	M.4	K.4.2	N.1.1	N.1.2	N.1.3	N.4.1	N.4.2	N.4.3	S.1.2	S.2.3	H.1	H.2	H.3
0,7	0,7	0,7	0,7	0,7	1,3	1,3	1,3	1,3	1,3	1,3	0,7	0,7	0,7	0,7	0,7

FRESAS METAL DURO / FRAISES CARBURE / HARD METAL MILLS

AVANCE / FEED (Fz = mm / Z)															
Ref.	Fres./ Mill	Ap	Ae	D (mm)											
				1	2	3	4	5	6	8	10	12	14	16	18	20
3189	2	1xD	1xD	-	-	0,010	0,013	0,017	0,020	0,027	0,033	0,040	0,047	0,053	0,060	0,067
3190	2	1xD	1xD	-	-	0,010	0,013	0,017	0,020	0,027	0,033	0,040	0,047	0,053	0,060	0,067
3167	2	0,5xD	1xD	-	-	0,010	0,013	0,017	0,020	0,027	0,033	0,040	0,047	0,053	0,060	0,067
3168	2	0,75xD	1xD	-	-	0,010	0,013	0,017	0,020	0,027	0,033	0,040	0,047	0,053	0,060	0,067
3169	4	0,025xD	0,05xD	-	-	0,050	0,067	0,083	0,100	0,133	0,167	0,200	0,233	0,267	0,300	0,333
3170	4	0,025xD	0,05xD	-	-	0,045	0,060	0,075	0,090	0,120	0,150	0,180	0,210	0,240	0,270	0,300
3191	4	0,1xD	0,05xD	-	-	0,030	0,040	0,050	0,060	0,080	0,100	0,120	0,140	0,160	0,180	0,200
3171	2	0,25xD	1xD	-	-	0,010	0,013	0,017	0,020	0,027	0,033	0,040	0,047	0,053	0,062	0,067
3171	3	0,75xD	0,2xD	-	-	0,020	0,025	0,033	0,040	0,050	0,065	0,080	0,090	0,100	0,110	0,130
3172	2	0,5xD	1xD	-	-	0,010	0,013	0,017	0,020	0,027	0,033	0,040	0,047	0,053	0,062	0,067
3172	3	1,5xD	0,2xD	-	-	0,015	0,020	0,025	0,030	0,040	0,050	0,060	0,070	0,080	0,090	0,100
3173	2	0,25xD	1xD	-	-	0,015	0,020	0,025	0,030	0,040	0,050	0,060	0,070	0,080	0,090	0,100
3173	3	0,75xD	0,2xD	-	-	0,030	0,040	0,050	0,060	0,080	0,100	0,120	0,135	0,160	0,180	0,200
3174	2	0,5xD	1xD	-	-	0,010	0,013	0,017	0,020	0,027	0,033	0,040	0,047	0,053	0,060	0,067
3174	3	1,5xD	0,2xD	-	-	0,025	0,035	0,040	0,050	0,065	0,080	0,100	0,115	0,130	0,150	0,170
3175	3	1xD	0,2xD	-	-	0,020	0,025	0,033	0,040	0,050	0,065	0,080	0,090	0,100	0,110	0,130
3176	3	1,75xD	0,2xD	-	-	0,012	0,017	0,022	0,025	0,035	0,040	0,050	0,060	0,070	0,080	0,090
3177	3	1,5xD	0,3xD	-	-	0,018	0,025	0,031	0,039	0,050	0,060	0,075	0,085	0,100	0,115	0,120
3177	2	1xD	1xD	-	-	0,012	0,016	0,020	0,024	0,032	0,040	0,048	0,056	0,064	0,072	0,080
3192	3	1,5xD	0,3xD	-	-	0,020	0,025	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,120
3193	2	3xD	0,2xD	-	-	0,015	0,023	0,043	0,062	0,083	0,104	0,125	0,146	0,166	0,187	0,208
3178	3	1,5xD	0,3xD	-	-	0,010	0,015	0,015	0,020	0,020	0,025	0,025	0,030	0,030	0,035	0,035
3178	2	1xD	1xD	-	-	0,010	0,015	0,015	0,020	0,025	0,025	0,030	0,030	0,030	0,035	0,035
3179	3	1,75xD	0,05xD	-	-	0,020	0,025	0,030	0,035	0,045	0,055	0,070	0,080	0,090	0,100	0,115
3180	3	2,75xD	0,05xD	-	-	0,010	0,015	0,018	0,022	0,032	0,038	0,045	0,052	0,060	0,067	0,075
3181	3	1,5xD	0,4xD	-	-	0,015	0,018	0,022	0,027	0,035	0,040	0,050	0,060	0,070	0,080	0,090
3181	2	1xD	1xD	-	-	0,012	0,015	0,019	0,023	0,030	0,038	0,045	0,053	0,060	0,068	0,075
3183	3	30°	-	0,030	0,070	0,110	-	-	-	-	-	-	-	-	-	-
3184	3	45°	-	0,040	0,100	0,140	-	-	-	-	-	-	-	-	-	-
3185	3	r	-	-	-	0,030	0,040	0,050	0,070	0,120	0,150	-	-	-	-	-
3194	3	1,5xD	0,3xD	-	-	0,020	0,025	0,030	0,038	0,050	0,060	0,072	0,085	0,095	0,110	0,125
3194	2	1xD	1xD	-	-	0,020	0,025	0,030	0,035	0,050	0,060	0,070	0,085	0,095	0,105	0,120
3195	2	3xD	0,12xD	-	-	0,010	0,015	0,020	0,030	0,040	0,050	0,060	0,070	0,080	0,090	0,100
3101	2	0,75xD	1xD	-	-	0,007	0,009	0,012	0,014	0,019	0,023	0,028	0,033	0,037	0,042	0,047
3105	3	1,5xD	0,2xD	-	-	0,010	0,015	0,020	0,025	0,030	0,035	0,040	0,045	0,050	0,055	0,060
3105	2	0,5xD	1xD	-	-	0,007	0,009	0,012	0,014	0,019	0,023	0,028	0,032	0,037	0,042	0,047
3107	3	1,75xD	0,2xD	-	-	0,010	0,015	0,020	0,024	0,028	0,035	0,040	0,047	0,055	0,065	0,075

Fresado / Fresage / Milling			
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		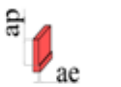	

FRESAS HSSE MANGO CILÍNDRICO / FRAISES HSSE QUEUE CYLINDRIQUE / HSSE STRAIGHT SHANK MILLS

AVANCE / FEED (Fz = mm / Z)															
Ref.	Fres./ Mill	Ap	Ae	D (mm)											
				3	4	5	6	8	10	12	14	16	18	20	25	32
3120	1	-	-	0,015	0,020	0,025	0,030	0,050	0,050	0,055	0,055	0,060	0,060	0,065	0,065	0,070
3121	1	-	-	0,015	0,020	0,025	0,030	0,050	0,050	0,055	0,055	0,060	0,060	0,065	0,065	0,070
3122	1	-	-	0,015	0,020	0,025	0,030	0,050	0,050	0,055	0,055	0,060	0,060	0,065	0,065	0,070
3186	2	0,5xD	1xD	0,009	0,013	0,016	0,022	0,029	0,036	0,044	0,051	0,058	0,065	0,073	0,091	0,116
3110	2	0,5xD	1xD	0,009	0,013	0,016	0,022	0,029	0,036	0,044	0,051	0,058	0,065	0,073	0,091	0,116
3110/1	2	0,5xD	1xD	0,012	0,017	0,021	0,029	0,038	0,047	0,057	0,066	0,075	0,085	0,095	0,118	0,151
3112	4	0,05xD	0,05xD	0,020	0,022	0,025	0,029	0,036	0,044	0,058	0,062	0,065	0,073	0,080	0,100	0,130
3112/1	4	0,05xD	0,05xD	0,026	0,029	0,033	0,038	0,047	0,057	0,075	0,081	0,085	0,095	0,104	0,130	0,169
3114	2	1xD	0,1xD	0,006	0,008	0,011	0,015	0,021	0,028	0,034	0,040	0,044	0,051	0,057	0,071	0,091
3114/1	2	1xD	0,1xD	0,008	0,010	0,014	0,020	0,027	0,036	0,044	0,052	0,057	0,066	0,074	0,092	0,118
3187	2	0,5xD	1xD	0,009	0,013	0,016	0,022	0,029	0,036	0,044	0,051	0,058	0,065	0,073	0,091	0,116
3187/1	2	0,5xD	1xD	0,012	0,017	0,021	0,029	0,038	0,047	0,057	0,066	0,075	0,085	0,095	0,118	0,151
3115	3	1xD	0,1xD	0,011	0,015	0,018	0,020	0,025	0,035	0,040	0,060	0,070	0,080	0,090	0,100	0,120
3115/1	3	1xD	0,1xD	0,014	0,020	0,023	0,026	0,033	0,046	0,052	0,078	0,091	0,104	0,117	0,130	0,156
3162	3	1xD	0,1xD	0,016	0,021	0,026	0,029	0,036	0,050	0,057	0,086	0,100	0,114	0,129	0,143	0,172
3157	3	1,5xD	0,5xD	0,018	0,025	0,030	0,033	0,041	0,058	0,066	0,099	0,115	0,132	0,148	0,164	0,197
3159	3	1,5xD	0,5xD	0,018	0,025	0,030	0,033	0,041	0,058	0,066	0,099	0,115	0,132	0,148	0,164	0,197
3117	3	1,5xD	0,5xD	0,012	0,015	0,018	0,020	0,025	0,035	0,040	0,060	0,070	0,080	0,090	0,100	0,120
3117/1	3	1,5xD	0,5xD	0,016	0,020	0,023	0,026	0,033	0,046	0,052	0,078	0,091	0,104	0,117	0,130	0,156
3119	3	1,5xD	0,5xD	0,012	0,015	0,018	0,020	0,025	0,035	0,040	0,060	0,070	0,080	0,090	0,100	0,120
3119/1	3	1,5xD	0,5xD	0,016	0,020	0,023	0,026	0,033	0,046	0,052	0,078	0,091	0,104	0,117	0,130	0,156
3111	2	1,2xD	1xD	0,009	0,013	0,016	0,022	0,029	0,036	0,044	0,051	0,058	0,065	0,073	0,091	0,116
3111/1	2	1,2xD	1xD	0,012	0,017	0,021	0,029	0,038	0,047	0,057	0,066	0,075	0,085	0,095	0,118	0,151
3113	4	0,05xD	0,05xD	0,020	0,022	0,025	0,029	0,036	0,044	0,058	0,062	0,065	0,073	0,080	0,100	0,130
3113/1	4	0,05xD	0,05xD	0,026	0,029	0,033	0,038	0,047	0,057	0,075	0,081	0,085	0,095	0,104	0,130	0,169
3188	2	0,5xD	1xD	0,009	0,013	0,016	0,022	0,029	0,036	0,044	0,051	0,058	0,065	0,073	0,091	0,116
3188/1	2	0,5xD	1xD	0,012	0,017	0,021	0,029	0,038	0,047	0,057	0,066	0,075	0,085	0,095	0,118	0,151
3182	3	2,5xD	0,3xD	0,006	0,008	0,011	0,015	0,021	0,028	0,034	0,040	0,044	0,051	0,057	0,071	0,091
3182/1	3	2,5xD	0,3xD	0,008	0,010	0,014	0,020	0,027	0,036	0,044	0,052	0,057	0,066	0,074	0,092	0,118
3116	3	2,5xD	0,3xD	0,011	0,015	0,018	0,020	0,025	0,035	0,040	0,060	0,070	0,080	0,090	0,100	0,120
3116/1	3	2,5xD	0,3xD	0,014	0,020	0,023	0,026	0,033	0,046	0,052	0,078	0,091	0,104	0,117	0,130	0,156
3118	3	2,5xD	0,5xD	0,011	0,015	0,018	0,020	0,025	0,035	0,040	0,060	0,070	0,080	0,090	0,100	0,120
3118/1	3	2,5xD	0,5xD	0,014	0,020	0,023	0,026	0,033	0,046	0,052	0,078	0,091	0,104	0,117	0,130	0,156
3163	3	2,5xD	0,3xD	0,016	0,021	0,026	0,029	0,036	0,050	0,057	0,086	0,100	0,114	0,129	0,143	0,172
3158	3	2,5xD	0,5xD	0,018	0,025	0,030	0,033	0,041	0,058	0,066	0,099	0,115	0,132	0,148	0,164	0,197
3160	3	2,5xD	0,5xD	0,018	0,025	0,030	0,033	0,041	0,058	0,066	0,099	0,115	0,132	0,148	0,164	0,197

Fresado / Fresage / Milling			
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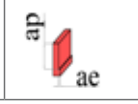
			

TABLA DE AVANCES
GUIDE D'AVANCES / FEED GUIDE

FRESAS MANGO CÓNICO / FRAISES QUEUE CONIQUE / TAPERED SHANK MILLS

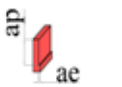
AVANCE / FEED (Fz = mm / Z)									
Ref.	Fres./Mill	Ap	Ae	D (mm)					
				12	16	20	25	32	40
3144	2	0,5xD	1xD	0,050	0,060	0,075	0,090	0,100	0,110
3144/1	2	0,5xD	1xD	0,065	0,078	0,098	0,117	0,130	0,143
3145	3	1xD	0,1xD	0,035	0,045	0,060	0,070	0,080	0,090
3145/1	3	1xD	0,1xD	0,046	0,059	0,078	0,091	0,104	0,117
3146	3	1,5xD	0,5xD	0,040	0,070	0,090	0,110	0,120	0,130
3146/1	3	1,5xD	0,5xD	0,052	0,091	0,117	0,143	0,156	0,169
3147	3	1xD	0,1xD	0,035	0,045	0,060	0,070	0,080	0,090
3147/1	3	1xD	0,1xD	0,046	0,059	0,078	0,091	0,104	0,117
3148	3	1,5xD	0,5xD	0,040	0,070	0,090	0,110	0,120	0,130
3148/1	3	1,5xD	0,5xD	0,052	0,091	0,117	0,143	0,156	0,169

FRESAS CON AGUJERO / FRAISES À TROU / MILLS WITH HOLES

AVANCE / FEED (Fz = mm / Z)									
Ref.	Fres./Mill	Ap	Ae	D (mm)					
				40	50	80	100	160	200
3149	3	0,05xD	0,75xD	0,080	0,085	0,110	0,110		
3150	3	0,05xD	0,75xD	0,080	0,085	0,110	0,110		
3165	3	0,05xD	0,75xD	0,080	0,085	0,110	0,110		
3151	2	0,1xD	1xe		0,050	0,070	0,080	0,090	0,090
3161	2	0,1xD	1xe		0,050	0,070	0,080	0,090	0,090
3166	2	0,1xD	1xe		0,050	0,070	0,080	0,090	0,090

FRESAS HSSE ESPECIALES / FRAISES HSSE SPECIALES / HSSE SPECIAL MILLS

AVANCE / FEED (Fz = mm / Z)										
Ref.	Fres./Mill	Ap	Ae	D (mm)						
				8	12	16	20	25	32	45
3152	1	-	-	0,040	0,055	0,070	0,075	0,090	0,090	0,100
3153	1	-	-	0,040	0,055	0,070	0,075	0,080	0,080	0,100
3154	1	0,1xD	1xl	0,040	0,055	0,070	0,075	0,080	0,080	0,100
3155	2	-	-	0,040	0,055	0,070	0,075	0,080	0,080	0,100
3156	2	-	1xl	0,040	0,055	0,070	0,075	0,080	0,080	0,100
3164	3	-	-	0,040	0,060	0,065	0,070	0,075	0,080	0,100

Fresado / Fresage / Milling			
1	2	3	4
			

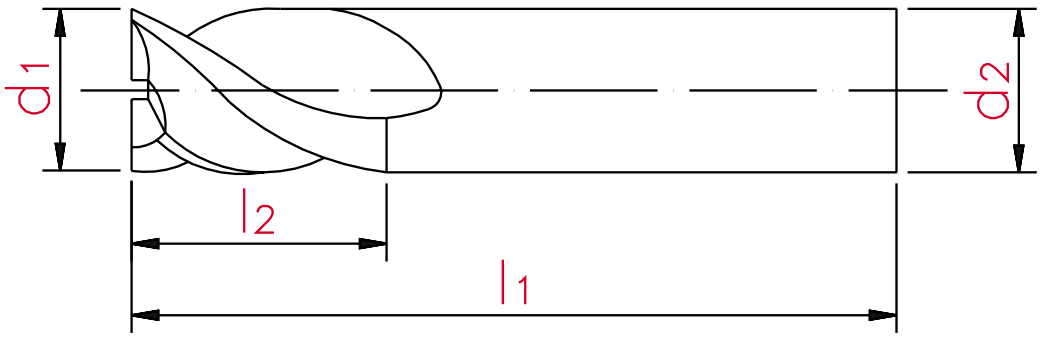
FRESAS ROTATIVAS / FRAISES ROTATIVES / ROTARY MILLS

RPM		Vc (m/min)									
		100	200	300	400	500	600	700	800	900	1000
D (mm)	3	10.610	21.221	31.831	42.441	53.052	63.662	74.272	84.882	95.493	106.103
	4	7.958	15.915	23.873	31.831	39.789	47.746	55.704	63.662	71.620	79.577
	5	6.366	12.732	19.099	25.465	31.831	38.197	44.563	50.929	57.296	63.662
	6	5.305	10.610	15.915	21.221	26.526	31.831	37.136	42.441	47.746	53.052
	7	4.547	9.095	13.642	18.189	22.736	27.284	31.831	36.378	40.925	45.473
	8	3.979	7.958	11.937	15.915	19.894	23.873	27.852	31.831	35.810	39.789
	9	3.537	7.074	10.610	14.147	17.684	21.221	24.757	28.294	31.831	35.368
	10	3.183	6.366	9.549	12.732	15.915	19.099	22.282	25.465	28.648	31.831
	11	2.894	5.787	8.681	11.575	14.469	17.362	20.256	23.150	26.043	28.937
	12	2.653	5.305	7.958	10.610	13.263	15.915	18.568	21.221	23.873	26.526
	13	2.449	4.897	7.346	9.794	12.243	14.691	17.140	19.588	22.037	24.485
	14	2.274	4.547	6.821	9.095	11.368	13.642	15.915	18.189	20.463	22.736
	15	2.122	4.244	6.366	8.488	10.610	12.732	14.854	16.976	19.099	21.221
	16	1.989	3.979	5.968	7.958	9.947	11.937	13.926	15.915	17.905	19.894

TABLA DE VELOCIDADES
GUIDE DE VITESSE / SPEED GUIDE

FRESAS HUECAS / FRAISES À TROU / CORE BITS

RPM		Vc (m/min)									
		100	200	300	400	500	600	700	800	900	1000
D (mm)	12	265	531	796	1.061	1.326	1.592	1.857	2.122	2.387	2.653
	13	245	490	735	979	1.224	1.469	1.714	1.959	2.204	2.449
	14	227	455	682	909	1.137	1.364	1.592	1.819	2.046	2.274
	15	212	424	637	849	1.061	1.273	1.485	1.698	1.910	2.122
	16	199	398	597	796	995	1.194	1.393	1.592	1.790	1.989
	17	187	374	562	749	936	1.123	1.311	1.498	1.685	1.872
	18	177	354	531	707	884	1.061	1.238	1.415	1.592	1.768
	19	168	335	503	670	838	1.005	1.173	1.340	1.508	1.675
	20	159	318	477	637	796	955	1.114	1.273	1.432	1.592
	21	152	303	455	606	758	909	1.061	1.213	1.364	1.516
	22	145	289	434	579	723	868	1.013	1.157	1.302	1.447
	23	138	277	415	554	692	830	969	1.107	1.246	1.384
	24	133	265	398	531	663	796	928	1.061	1.194	1.326
	25	127	255	382	509	637	764	891	1.019	1.146	1.273
	26	122	245	367	490	612	735	857	979	1.102	1.224
	27	118	236	354	472	589	707	825	943	1.061	1.179
	28	114	227	341	455	568	682	796	909	1.023	1.137
	29	110	220	329	439	549	659	768	878	988	1.098
	30	106	212	318	424	531	637	743	849	955	1.061
	31	103	205	308	411	513	616	719	821	924	1.027
	32	99	199	298	398	497	597	696	796	895	995
	33	96	193	289	386	482	579	675	772	868	965
	34	94	187	281	374	468	562	655	749	843	936
	35	91	182	273	364	455	546	637	728	819	909
	36	88	177	265	354	442	531	619	707	796	884
	37	86	172	258	344	430	516	602	688	774	860
	38	84	168	251	335	419	503	586	670	754	838
	39	82	163	245	326	408	490	571	653	735	816
	40	80	159	239	318	398	477	557	637	716	796
	41	78	155	233	311	388	466	543	621	699	776
	42	76	152	227	303	379	455	531	606	682	758
	43	74	148	222	296	370	444	518	592	666	740
	44	72	145	217	289	362	434	506	579	651	723
	45	71	141	212	283	354	424	495	566	637	707
	46	69	138	208	277	346	415	484	554	623	692
	47	68	135	203	271	339	406	474	542	610	677
	48	66	133	199	265	332	398	464	531	597	663
	49	65	130	195	260	325	390	455	520	585	650
	50	64	127	191	255	318	382	446	509	573	637
	51	62	125	187	250	312	374	437	499	562	624
	52	61	122	184	245	306	367	428	490	551	612
	53	60	120	180	240	300	360	420	480	541	601
	54	59	118	177	236	295	354	413	472	531	589
	55	58	116	174	231	289	347	405	463	521	579
	56	57	114	171	227	284	341	398	455	512	568
	57	56	112	168	223	279	335	391	447	503	558
	58	55	110	165	220	274	329	384	439	494	549
	59	54	108	162	216	270	324	378	432	486	540
	60	53	106	159	212	265	318	371	424	477	531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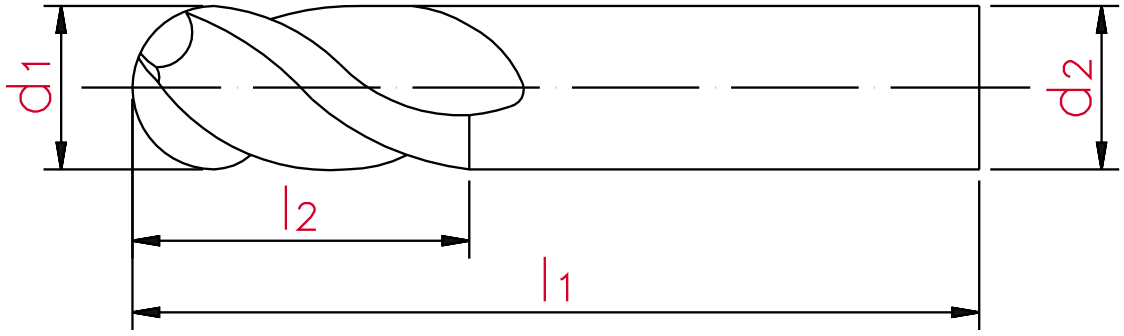
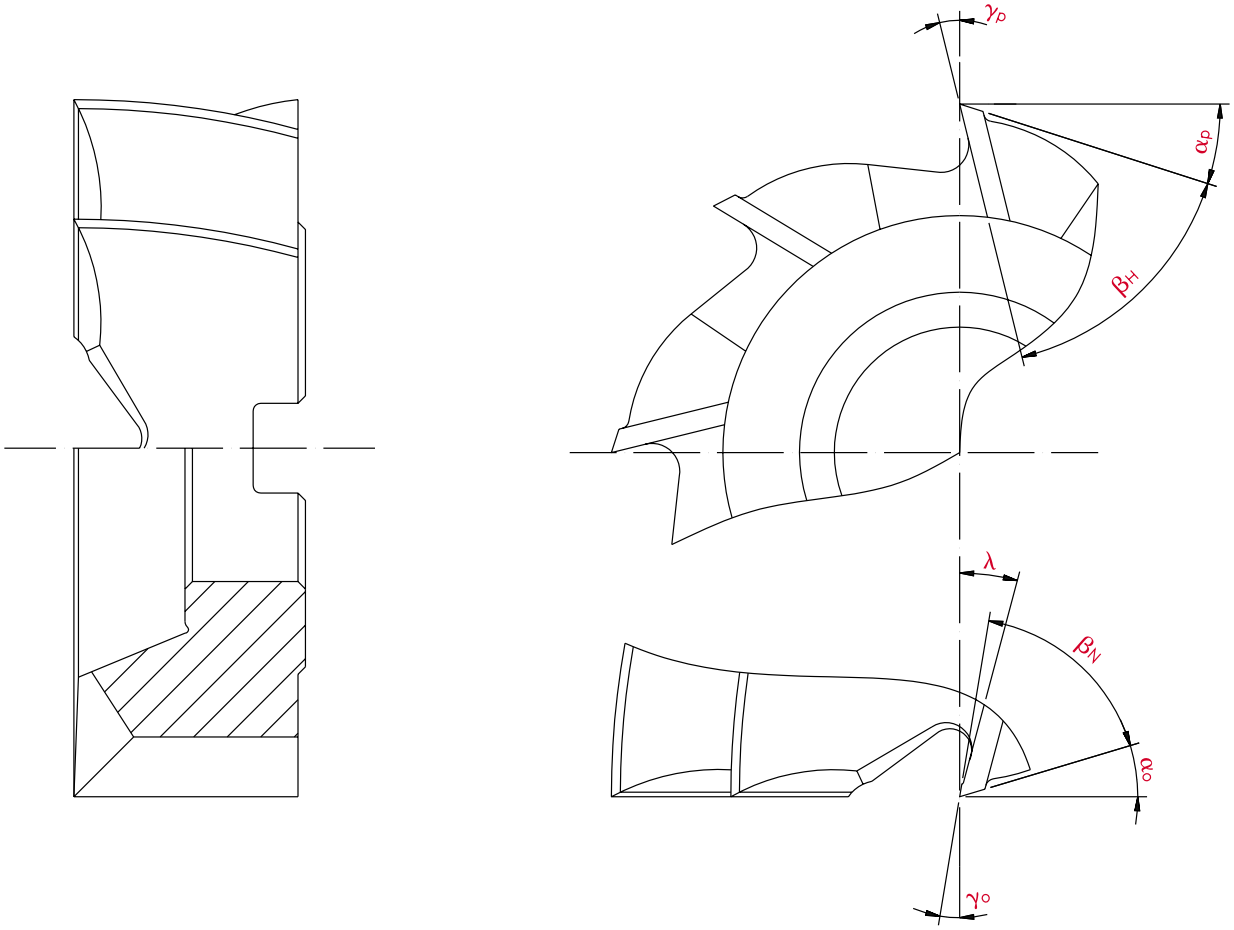

d1
d2
l2
l1



l1	**Longitud total** / Longueur totale / Total length
l2	**Longitud de corte** / Longueur de coupe / Length of cut
d1	**Diámetro de fresa** / Diamètre de fraise / Diametre of mill
d2	**Longitud mango** / Longueur queue / Shank length
λ	**Ángulo de espiral** / Angle de spirale / Spiral angle
απ	**Ángulo de destalonado del corte principal** / Angle de détalonnage de la coupe principale / Main cutting relief angle
α()	**Ángulo de destalonado del corte secundario** / Angle de détalonnage de la coupe secondaire / Secondary cutting relief angle
βH	**Ángulo de cuña del corte principal** / Angle de coin de la coupe principale / Main cutting wedge angle
βN	**Ángulo de cuña del corte secundario** / Angle de coin de la coupe secondaire / Secondary cutting wedge angle
γp	**Ángulo de desprendimiento del corte principal** / Angle de dégagement de la coupe principale / Main cutting rake angle
γ0	**Ángulo de desprendimiento del corte secundario** / Angle de dégagement de la coupe secondaire / Secondary cutting rake angle

3141 HM-MD

1z

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
									● 150-300	● 120-350	● 120-350	● 150-300					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	
3,00	6	*27,27*	50	8	1
4,00	6	*27,27*	54	11	1
5,00	6	*27,27*	54	13	1

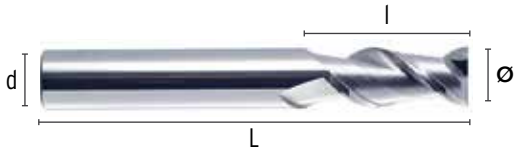
Ø mm	d mm	€	L mm	l mm	
6,00	6	*27,27*	54	13	1
8,00	8	*38,48*	58	19	1
10,00	10	*54,69*	66	22	1

3189 HM-MD

45° 2z DIN 6535 HA

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
									● 150-300	● 120-350	● 120-350	● 150-300					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*29,93*	57	8	2	1
3,50	6	*29,93*	57	10	2	1
4,00	6	*29,93*	57	11	2	1
4,50	6	*29,93*	57	11	2	1
5,00	6	*29,93*	57	13	2	1
6,00	6	*29,93*	57	13	2	1
7,00	8	*37,65*	63	16	2	1
8,00	8	*37,65*	63	19	2	1

Ø mm	d mm	€	L mm	l mm	Z	
9,00	10	*55,11*	72	19	2	1
10,00	10	*55,11*	72	22	2	1
12,00	12	*79,63*	83	26	2	1
14,00	14	*119,53*	83	26	2	1
16,00	16	*147,14*	92	32	2	1
18,00	18	*193,26*	92	32	2	1
20,00	20	*233,42*	104	38	2	1

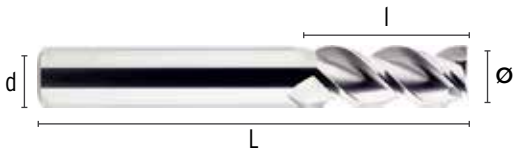
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3190 HM-MD

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
									● 150-300	● 120-350	● 120-350	● 150-300					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

NEW



Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*29,93*	57	8	3	1
3,50	6	*29,93*	57	9	3	1
4,00	6	*29,93*	57	11	3	1
4,50	6	*29,93*	57	11	3	1
5,00	6	*29,93*	57	13	3	1
6,00	6	*29,93*	57	13	3	1
8,00	8	*37,65*	63	19	3	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*55,11*	72	22	3	1
12,00	12	*79,63*	83	26	3	1
14,00	14	*119,53*	83	26	3	1
16,00	16	*147,14*	92	32	3	1
18,00	18	*193,26*	92	32	3	1
20,00	20	*233,42*	104	38	3	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3167 HM-MD DIN 6527 S

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 110-250	● 90-200	● 75-180	● 60-120	● 80-140	● 60-120	● 120-180	● 100-140	○ 60-120		○ 110-220			● 40-90	● 60-140			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*24,51*	50	4	2	1
3,50	6	*24,51*	50	4	2	1
4,00	6	*25,05*	54	5	2	1
4,50	6	*25,05*	54	5	2	1
5,00	6	*25,05*	54	6	2	1
6,00	6	*25,05*	54	7	2	1
7,00	8	*33,12*	58	8	2	1
8,00	8	*33,12*	58	9	2	1

Ø mm	d mm	€	L mm	l mm	Z	
9,00	10	*45,51*	66	10	2	1
10,00	10	*45,51*	66	11	2	1
12,00	12	*65,46*	73	12	2	1
14,00	14	*93,66*	75	14	2	1
16,00	16	*110,25*	82	16	2	1
18,00	18	*152,46*	84	18	2	1
20,00	20	*171,84*	92	20	2	1

3168 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 100-220	● 80-180	● 70-150	● 60-90	● 70-110	● 60-100	● 100-160	● 80-120	○ 60-90		○ 100-200			● 40-80	● 60-110			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*21,75*	57	7	2	1
3,50	6	*21,75*	57	7	2	1
4,00	6	*21,75*	57	8	2	1
4,50	6	*21,75*	57	8	2	1
5,00	6	*21,75*	57	10	2	1
6,00	6	*21,75*	57	10	2	1
7,00	8	*32,01*	63	13	2	1
8,00	8	*32,01*	63	16	2	1

Ø mm	d mm	€	L mm	l mm	Z	
9,00	10	*46,28*	72	16	2	1
10,00	10	*46,28*	72	19	2	1
12,00	12	*66,03*	83	22	2	1
14,00	14	*102,77*	83	22	2	1
16,00	16	*125,68*	92	26	2	1
18,00	18	*159,57*	92	26	2	1
20,00	20	*196,29*	104	32	2	1

3169 HM-MD DIN 6527 S

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	○	
110-250	90-200	75-180	60-120	70-110	60-100	120-180	100-140	60-120	150-450	60-350	150-450	150-450	40-80	60-110	40-80	30-50	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*32,55*	50	4	2	1
4,00	6	*33,12*	54	5	2	1
5,00	6	*33,12*	54	6	2	1
6,00	6	*33,12*	54	7	2	1
8,00	8	*44,67*	58	9	2	1
10,00	10	*60,90*	66	11	2	1

Ø mm	d mm	€	L mm	l mm	Z	
12,00	12	*85,26*	73	12	2	1
14,00	14	*113,25*	75	14	2	1
16,00	16	*137,76*	82	16	2	1
18,00	18	*168,57*	84	18	2	1
20,00	20	*207,75*	92	20	2	1

3170 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	○	
110-250	90-200	75-180	60-120	70-110	60-100	120-180	100-140	60-120	150-450	60-350	150-450	150-450	40-80	60-110	40-80	30-50	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*21,75*	57	7	2	1
4,00	6	*21,75*	57	8	2	1
5,00	6	*21,75*	57	10	2	1
6,00	6	*21,75*	57	10	2	1
8,00	8	*32,01*	63	16	2	1
10,00	10	*46,28*	72	19	2	1

Ø mm	d mm	€	L mm	l mm	Z	
12,00	12	*66,03*	83	22	2	1
14,00	14	*102,77*	83	22	2	1
16,00	16	*137,74*	92	26	2	1
18,00	18	*178,75*	92	26	2	1
20,00	20	*250,43*	104	32	2	1

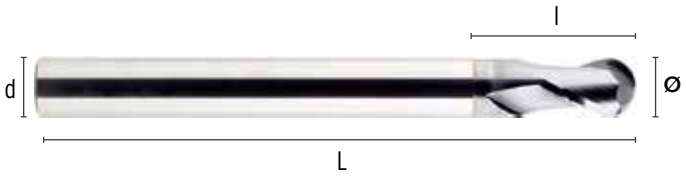
P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3191 HM-MD DIN 6527 EL

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●			●	●	○		○			●	●	●	●	○
160-240	140-210	150-200	100-140			120-180	90-130	100-140		100-200			40-80	60-90	90-150	70-130	60-110

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

NEW



Ø mm	d mm	€	L mm	l mm	r	Z	
2,00	6	*43,77*	62	3	1,0	2	1
3,00	6	*43,77*	62	4	1,5	2	1
4,00	6	*43,77*	62	5	2,0	2	1
5,00	6	*50,55*	80	6	2,5	2	1
6,00	6	*50,55*	80	7	3,0	2	1
8,00	8	*72,00*	90	9	4,0	2	1

Ø mm	d mm	€	L mm	l mm	r	Z	
10,00	10	*105,11*	100	11	5,0	2	1
12,00	12	*152,81*	120	13	6,0	2	1
14,00	14	*180,77*	120	15	7,0	2	1
16,00	16	*247,81*	140	17	8,0	2	1
18,00	18	*298,03*	140	19	9,0	2	1
20,00	20	*391,54*	160	21	10,0	2	1

3171 HM-MD DIN 6527 S

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 110-250	● 90-200	● 75-180	● 60-120	● 80-140	● 60-120	● 120-180	● 100-140	○ 60-120		○ 110-220			● 40-90	● 60-140			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

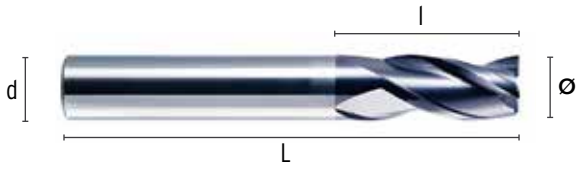
Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*24,51*	50	4	2	1
3,50	6	*24,51*	50	4	2	1
4,00	6	*25,05*	54	5	2	1
4,50	6	*25,05*	54	5	2	1
5,00	6	*25,05*	54	6	2	1
6,00	6	*25,05*	54	7	2	1
8,00	8	*33,12*	58	9	2	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*45,51*	66	11	3	1
12,00	12	*65,46*	73	12	3	1
14,00	14	*93,66*	75	14	3	1
16,00	16	*110,25*	82	16	3	1
18,00	18	*152,46*	84	18	3	1
20,00	20	*171,84*	92	20	3	1

3172 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 100-220	● 80-180	● 70-150	● 60-90	● 70-110	● 60-100	● 100-160	● 80-120	○ 60-90		○ 100-200			● 40-80	● 60-110			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*21,75*	57	7	3	1
3,50	6	*21,75*	57	7	3	1
4,00	6	*21,75*	57	8	3	1
4,50	6	*21,75*	57	8	3	1
5,00	6	*21,75*	57	10	3	1
6,00	6	*21,75*	57	10	3	1
8,00	8	*32,01*	63	16	3	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*46,28*	72	19	3	1
12,00	12	*66,03*	83	22	3	1
14,00	14	*102,77*	83	22	3	1
16,00	16	*125,68*	92	26	3	1
18,00	18	*159,57*	92	26	3	1
20,00	20	*196,29*	104	32	3	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3173 HM-MD DIN 6527 S

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○	○	○	○	○	●	●	●	○	
110-250	90-200	75-180	60-120	80-140	60-120	120-180	100-140	60-120	150-300	110-350	120-350	150-300	40-90	60-140	40-80	30-50	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

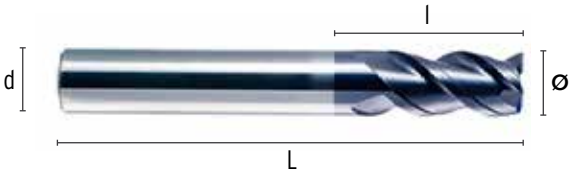
Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*25,05*	50	4	2	1
3,50	6	*25,05*	50	4	2	1
4,00	6	*25,56*	54	5	2	1
4,50	6	*25,56*	54	5	2	1
5,00	6	*25,56*	54	6	2	1
6,00	6	*25,56*	54	7	2	1
8,00	8	*33,24*	58	9	2	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*45,72*	66	11	3	1
12,00	12	*65,46*	73	12	3	1
14,00	14	*93,66*	75	14	3	1
16,00	16	*110,25*	82	16	3	1
18,00	18	*152,46*	84	18	3	1
20,00	20	*171,72*	92	20	3	1

3174 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○	○	○		○	●	●			
100-220	80-180	70-150	60-90	70-110	60-100	100-160	80-120	60-90	110-240	100-250		110-240	40-80	60-110			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*28,71*	57	7	3	1
3,50	6	*28,71*	57	7	3	1
4,00	6	*28,71*	57	8	3	1
4,50	6	*28,71*	57	8	3	1
5,00	6	*28,71*	57	10	3	1
6,00	6	*28,71*	57	10	3	1
8,00	8	*36,60*	63	16	3	1

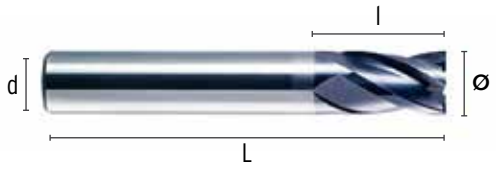
Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*50,40*	72	19	3	1
12,00	12	*74,91*	83	22	3	1
14,00	14	*103,80*	83	22	3	1
16,00	16	*126,21*	92	26	3	1
18,00	18	*165,75*	92	26	3	1
20,00	20	*196,35*	104	32	3	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3175 HM-MD DIN 6527 S

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○		○			●	●			
110-250	90-200	75-180	60-120	80-140	60-120	120-180	100-140	60-120		110-220			40-90	60-140			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



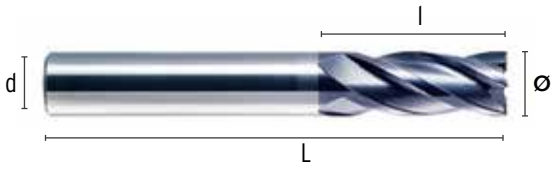
Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*24,51*	50	5	4	1
3,50	6	*24,51*	50	6	4	1
4,00	6	*25,05*	54	8	4	1
4,50	6	*25,05*	54	8	4	1
5,00	6	*25,05*	54	9	4	1
6,00	6	*25,05*	54	10	4	1
8,00	8	*33,12*	58	12	4	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*45,51*	66	14	4	1
12,00	12	*65,46*	73	16	4	1
14,00	14	*93,66*	75	18	4	1
16,00	16	*110,25*	82	22	4	1
18,00	18	*152,46*	84	24	4	1
20,00	20	*171,84*	92	26	4	1

3176 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○		○			●	●			
100-220	80-180	70-150	60-90	70-110	60-100	100-160	80-120	60-90		100-200			40-80	60-110			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*21,75*	57	8	4	1
3,50	6	*21,75*	57	10	4	1
4,00	6	*21,75*	57	11	4	1
4,50	6	*21,75*	57	11	4	1
5,00	6	*21,75*	57	13	4	1
6,00	6	*21,75*	57	13	4	1
8,00	8	*32,01*	63	19	4	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*46,28*	72	22	4	1
12,00	12	*66,03*	83	26	4	1
14,00	14	*102,77*	83	26	4	1
16,00	16	*125,68*	92	32	4	1
18,00	18	*159,57*	92	32	4	1
20,00	20	*196,29*	104	38	4	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3177 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○		○			●	●	●	○	
100-220	80-180	70-150	60-90	70-110	60-100	100-160	80-120	60-90		100-200			40-60	60-80	40-80	30-50	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*31,35*	57	8	4	1
3,50	6	*31,35*	57	10	4	1
4,00	6	*31,35*	57	11	4	1
4,50	6	*31,35*	57	11	4	1
5,00	6	*31,35*	57	13	4	1
6,00	6	*31,35*	57	13	4	1
8,00	8	*41,85*	63	19	4	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*65,46*	72	22	4	1
12,00	12	*86,46*	83	26	4	1
14,00	14	*119,70*	83	26	4	1
16,00	16	*141,60*	92	32	4	1
18,00	18	*195,99*	92	32	4	1
20,00	20	*227,70*	104	38	4	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3192 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 170-240	● 160-210	● 150-200	● 100-140	● 80-140	● 60-120	● 120-180	● 90-130	○ 100-140		○ 170-220			● 40-80	● 60-140	● 90-150	● 70-130	○ 60-110

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

NEW

Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*41,46*	57	8	4	1
3,50	6	*41,46*	57	9	4	1
4,00	6	*41,46*	57	11	4	1
4,50	6	*41,46*	57	11	4	1
5,00	6	*41,46*	57	13	4	1
6,00	6	*41,46*	57	13	4	1
8,00	8	*52,18*	63	19	4	1

Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*81,43*	72	22	4	1
12,00	12	*101,58*	83	26	4	1
14,00	14	*140,60*	83	26	4	1
16,00	16	*166,32*	92	32	4	1
18,00	18	*218,09*	92	32	4	1
20,00	20	*253,38*	104	38	4	1

3193 HM-MD DIN 6527 EL

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 210-380	● 200-320	● 200-300	● 180-250							○ 200-250					● 70-130	● 50-120	○ 40-80

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

NEW

Ø mm	d mm	€	L mm	l mm	z	
6,00	6	*45,53*	62	18	5	1
8,00	8	*58,29*	68	24	5	1
10,00	10	*86,25*	80	30	5	1
12,00	12	*115,02*	93	36	5	1
14,00	14	*156,28*	100	42	5	1

Ø mm	d mm	€	L mm	l mm	z	
16,00	16	*214,16*	108	48	5	1
18,00	18	*273,46*	115	54	5	1
20,00	20	*331,69*	126	60	5	1
25,00	25	*585,34*	150	75	5	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3178 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○		○			●	●	●	●	○
170-240	160-210	150-200	100-140	80-140	60-120	120-180	90-130	100-140		170-220			40-80	60-140	90-150	70-130	60-110

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	r	
6,00	6	*45,00*	57	13	0,5	1
6,00	6	*45,00*	57	13	1,0	1
8,00	8	*58,11*	63	19	0,5	1
8,00	8	*58,11*	63	19	1,0	1
10,00	10	*87,51*	72	22	0,5	1
10,00	10	*87,51*	72	22	1,0	1
10,00	10	*87,51*	72	22	2,0	1

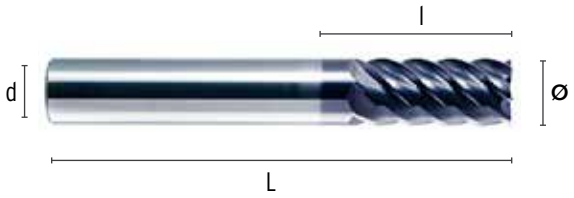
Ø mm	d mm	€	L mm	l mm	r	
12,00	12	*113,04*	83	26	0,5	1
12,00	12	*113,04*	83	26	1,0	1
12,00	12	*122,49*	83	26	2,0	1
16,00	16	*179,76*	92	32	0,5	1
16,00	16	*179,76*	92	32	1,0	1
16,00	16	*184,32*	92	32	2,0	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3179 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 100-220	● 80-180	● 70-150	● 60-90	● 70-110	● 60-100	● 100-160	● 80-120	○ 60-90		○ 100-200			● 40-80	● 60-110	● 60-100	○ 50-80	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	Z	
6,00	6	*33,96*	57	13	6	1
8,00	8	*46,89*	63	19	6	1
10,00	10	*63,21*	72	22	6	1
12,00	12	*89,82*	83	26	6	1

Ø mm	d mm	€	L mm	l mm	Z	
14,00	14	*112,20*	83	26	6	1
16,00	16	*151,05*	92	32	6	1
18,00	18	*189,36*	92	32	6	1
20,00	20	*225,96*	104	38	8	1

3180 HM-MD DIN 6527 EL

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 100-220	● 80-180	● 70-150	● 60-90	● 70-110	● 60-100	● 100-160	● 80-120	○ 60-90		○ 100-200			● 40-90	● 60-110	● 60-100	○ 50-80	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	Z	
6,00	6	*36,96*	62	18	6	1
8,00	8	*50,40*	68	24	6	1
10,00	10	*70,71*	80	30	6	1
12,00	12	*101,49*	93	36	6	1

Ø mm	d mm	€	L mm	l mm	Z	
14,00	14	*140,55*	100	45	6	1
16,00	16	*189,21*	108	48	6	1
18,00	18	*255,00*	115	55	6	1
20,00	20	*326,07*	126	60	8	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3181 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 100-220	● 80-180	● 70-150	● 60-90	● 70-110	● 60-100	● 100-160	● 80-120	○ 60-90		○ 100-200			● 40-90	● 60-110			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	Z	
4,00	6	*34,86*	57	11	3	1
5,00	6	*34,86*	57	13	4	1
6,00	6	*34,86*	57	13	4	1
8,00	8	*49,56*	63	19	4	1
10,00	10	*67,41*	72	22	4	1
12,00	12	*94,35*	83	26	4	1

Ø mm	d mm	€	L mm	l mm	Z	
14,00	14	*126,90*	83	26	4	1
16,00	16	*163,80*	92	32	4	1
16,00	16	*163,80*	92	32	5	1
18,00	18	*200,13*	92	32	5	1
20,00	20	*224,55*	104	38	5	1
20,00	20	*224,55*	104	38	6	1

3183 HM-MD

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 100-220	● 80-180	● 70-150	● 60-90	● 70-110	● 60-100	● 100-160	● 80-120	○ 60-90		○ 100-200			● 40-90	● 60-110	● 40-80	○ 30-50	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	Z	
1,20	6	*28,93*	57	4	1
1,60	8	*40,15*	63	4	1

Ø mm	d mm	€	L mm	Z	
2,00	10	*59,85*	72	4	1
2,40	12	*86,45*	83	4	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3184 HM-MD

90° | 4z | DIN 6535 HA | TIALN

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○		○			●	●			
100-220	80-180	70-150	60-90	70-110	60-100	100-160	80-120	60-90		100-200			40-90	60-110			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	Z	
1,20	6	*28,93*	57	4	1
1,60	8	*40,15*	63	4	1

Ø mm	d mm	€	L mm	Z	
2,00	10	*59,85*	72	4	1
2,40	12	*86,45*	83	4	1

3185 HM-MD

r | 4z | DIN 6535 HA | TIALN

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	●	●	●	○		○			●	●			
100-220	80-180	70-150	60-90	70-110	60-100	100-160	80-120	60-90		100-200			40-90	60-110			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	r	d mm	€	L mm	Z	
5,00	0,50	6	*30,18*	57	4	1
4,00	1,00	6	*30,18*	57	4	1
5,00	1,50	8	*40,15*	63	4	1
4,00	2,00	8	*40,15*	63	4	1
5,00	2,50	10	*59,85*	72	4	1

Ø mm	r	d mm	€	L mm	Z	
4,00	3,00	10	*59,85*	72	4	1
5,00	3,50	12	*86,45*	83	4	1
4,00	4,00	12	*86,45*	83	4	1
4,00	5,00	14	*115,79*	83	4	1

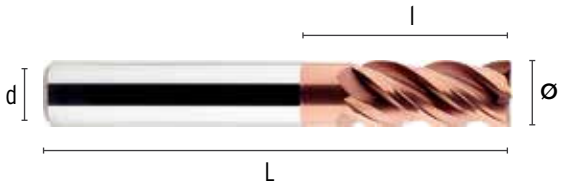
P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3194 HM-MD DIN 6527 L

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
				● 90-150	● 70-130								● 50-80	● 60-150			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

NEW



Ø mm	d mm	€	L mm	l mm	Z	
3,00	6	*44,72*	57	8	4	1
3,50	6	*44,72*	57	10	4	1
4,00	6	*44,72*	57	11	4	1
4,50	6	*44,72*	57	11	4	1
5,00	6	*44,72*	57	13	4	1
6,00	6	*44,72*	57	13	4	1
8,00	8	*56,73*	63	19	4	1

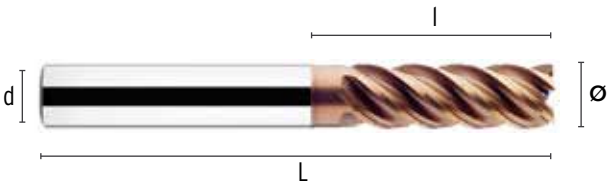
Ø mm	d mm	€	L mm	l mm	Z	
10,00	10	*87,26*	72	22	4	1
12,00	12	*107,49*	83	26	4	1
14,00	14	*144,54*	83	26	4	1
16,00	16	*193,66*	92	32	4	1
18,00	18	*239,67*	92	32	4	1
20,00	20	*289,82*	104	38	4	1

3195 HM-MD DIN 6527 EL

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
				● 150-230	● 130-200								● 40-100	● 60-230			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

NEW

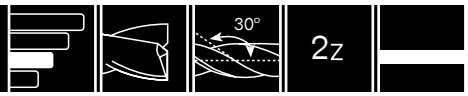


Ø mm	d mm	€	L mm	l mm	Z	
6,00	6	*49,20*	62	18	5	1
8,00	8	*60,60*	68	24	5	1
10,00	10	*89,98*	80	30	5	1
12,00	12	*119,90*	93	36	5	1
14,00	14	*169,51*	100	42	5	1

Ø mm	d mm	€	L mm	l mm	Z	
16,00	16	*230,04*	108	48	5	1
18,00	18	*291,11*	115	54	5	1
20,00	20	*351,98*	126	60	5	1
25,00	25	*615,67*	150	75	5	1

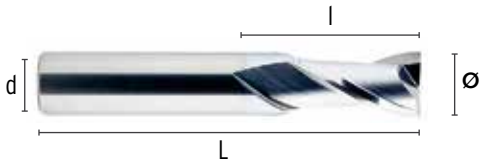
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3101 HM-MD



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 70-155	● 60-110	● 50-105	○ 45-65	● 50-80	● 45-70	● 70-115	● 60-85			○ 70-130			● 30-60	● 45-80			

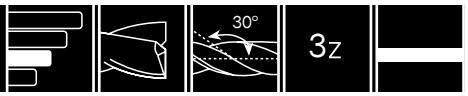
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	
3,00	3	*17,84*	40	12	1
4,00	4	*20,14*	40	12	1
5,00	5	*20,98*	50	14	1
6,00	6	*25,88*	50	16	1
8,00	8	*37,21*	60	20	1

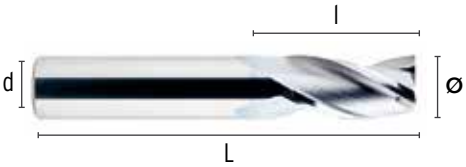
Ø mm	d mm	€	L mm	l mm	
10,00	10	*50,91*	70	22	1
12,00	12	*71,59*	70	22	1
16,00	16	*120,81*	75	25	1
20,00	20	*183,37*	100	32	1

3105 HM-MD



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 70-155	● 60-110	● 50-105	○ 45-65	● 50-80	● 45-70	● 70-115	● 60-85			○ 70-130			● 30-60	● 45-80			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

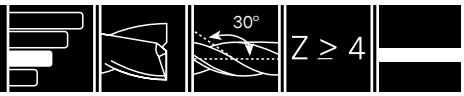


Ø mm	d mm	€	L mm	l mm	
3,00	3	*17,84*	40	12	1
4,00	4	*20,14*	40	14	1
5,00	5	*20,98*	50	16	1
6,00	6	*25,88*	50	19	1
8,00	8	*37,21*	60	20	1

Ø mm	d mm	€	L mm	l mm	
10,00	10	*50,91*	70	22	1
12,00	12	*71,59*	70	22	1
16,00	16	*120,81*	75	25	1
20,00	20	*183,37*	100	32	1

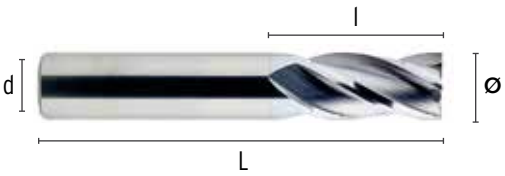
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3107 HM-MD



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 70-155	● 60-110	● 50-105	○ 45-65	● 50-80	● 45-70	● 70-115	● 60-85			○ 70-130			● 30-60	● 45-80			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	
3,00	3	*17,84*	40	12	1
4,00	4	*20,14*	40	12	1
5,00	5	*20,98*	50	14	1
6,00	6	*25,88*	50	16	1
8,00	8	*37,21*	60	20	1

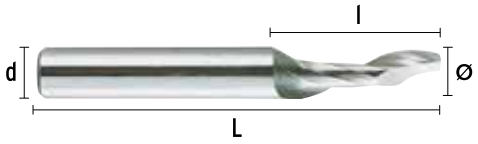
Ø mm	d mm	€	L mm	l mm	
10,00	10	*50,91*	75	22	1
12,00	12	*71,59*	70	22	1
16,00	16	*120,81*	75	25	1
20,00	20	*183,37*	100	32	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3120 HSSE W — 1z

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
									● 60-200		● 60-100	● 50-80					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	
3,00	8	*15,38*	60	12	1
4,00*	6	*15,38*	60	12	1
4,00	8	*15,38*	60	12	1
5,00*	6	*15,38*	60	12	1
5,00	8	*15,38*	60	14	1

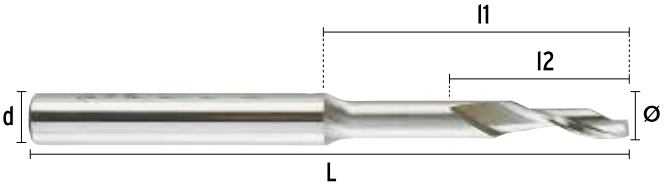
Ø mm	d mm	€	L mm	l mm	
6,00	6	*15,38*	60	14	1
6,00	8	*15,38*	60	14	1
7,00	8	*18,68*	60	14	1
8,00	8	*18,68*	80	14	1
10,00	8	*23,61*	80	14	1

***(Hasta fin de existencias /** Jusqu'à épuisement des stocks / While supplies last)

3121 HSSE W — 1z

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
									● 60-200		● 60-100	● 50-80					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l1 mm	l2 mm	
4,00	8	*21,78*	80	45	16	1
5,00*	6	*21,78*	80	45	14	1
5,00	8	*21,78*	80	45	16	1

Ø mm	d mm	€	L mm	l1 mm	l2 mm	
6,00	8	*21,78*	90	45	16	1
8,00	8	*24,15*	100	70	30	1

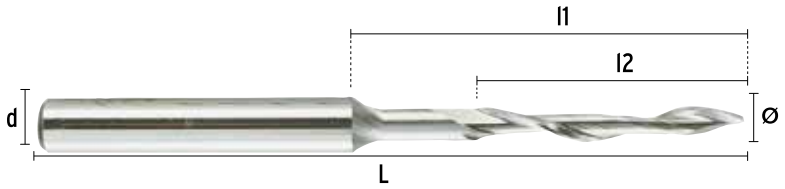
***(Hasta fin de existencias /** Jusqu'à épuisement des stocks / While supplies last)

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3122 HSSE W — 1z

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
									● 60-200		● 60-100	● 50-80					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l1 mm	l2 mm	
5,00	8	*21,78*	100	55	35	1

3186 HSSE W — 2z

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50									● 60-150		● 60-100	● 50-80					

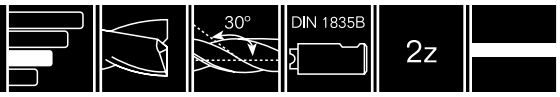
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	L mm	l mm	
2	2	6	*15,24*	51	7	1
3	2	6	*15,24*	52	8	1
4	2	6	*15,24*	55	11	1
5	2	6	*15,24*	57	13	1
6	2	6	*15,24*	57	13	1
8	2	10	*20,75*	69	19	1

Ø mm	Z	d mm	€	L mm	l mm	
10	2	10	*21,70*	72	22	1
12	2	12	*28,16*	83	26	1
14	2	12	*31,12*	83	26	1
16	2	16	*37,96*	92	32	1
18	2	16	*47,10*	92	32	1
20	2	20	*57,32*	104	38	1

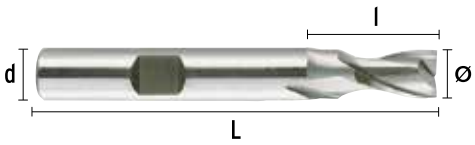
P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3110 HSSE DIN 327 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			○ 45-90							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

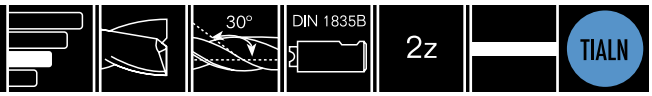


Ø mm	d mm	€	L mm	l mm	
2,00	6	*13,84*	48	4	1
2,50	6	*13,84*	49	5	1
3,00	6	*13,84*	49	5	1
3,50	6	*15,06*	50	6	1
4,00	6	*13,84*	51	7	1
4,50	6	*16,54*	51	7	1
5,00	6	*13,84*	52	8	1
5,50	6	*17,56*	52	8	1
6,00	6	*13,84*	52	8	1
6,50	10	*22,95*	60	10	1
7,00	10	*22,26*	60	10	1
7,50	10	*22,06*	60	10	1
8,00	10	*19,83*	61	11	1
8,50	10	*24,76*	61	11	1
9,00	10	*22,79*	61	11	1
9,50	10	*24,16*	61	11	1
10,00	10	*19,62*	63	13	1
11,00	12	*26,76*	70	13	1

Ø mm	d mm	€	L mm	l mm	
12,00	12	*25,36*	73	16	1
13,00	12	*33,46*	73	16	1
14,00	12	*33,46*	73	16	1
15,00	12	*37,49*	73	16	1
16,00	16	*36,60*	79	19	1
17,00	16	*44,58*	79	19	1
18,00	16	*44,58*	79	19	1
19,00	16	*56,29*	79	19	1
20,00	20	*53,28*	88	22	1
22,00	20	*69,68*	88	22	1
24,00	25	*88,26*	102	26	1
25,00	25	*96,12*	102	26	1
28,00	25	*111,67*	102	26	1
30,00	25	*129,90*	102	26	1
32,00	32	*130,74*	112	32	1
36,00	32	*174,87*	112	32	1
40,00	32	*214,70*	130	38	1

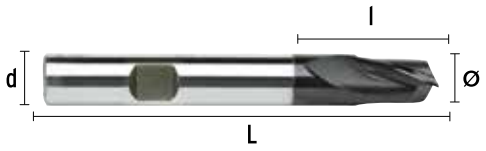
P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3110/1 HSSE DIN 327 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35		○ 70-120							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

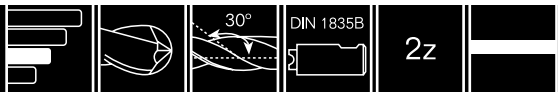


Ø mm	d mm	€	L mm	l mm	
2,00	6	*19,37*	48	4	1
2,50	6	*19,37*	49	5	1
3,00	6	*19,37*	49	5	1
3,50	6	*21,08*	50	6	1
4,00	6	*19,37*	51	7	1
4,50	6	*23,15*	51	7	1
5,00	6	*19,37*	52	8	1
5,50	6	*24,58*	52	8	1
6,00	6	*19,37*	52	8	1
6,50	10	*32,13*	60	10	1
7,00	10	*31,16*	60	10	1
7,50	10	*30,88*	60	10	1
8,00	10	*27,77*	61	11	1
8,50	10	*34,66*	61	11	1
9,00	10	*31,90*	61	11	1
9,50	10	*33,82*	61	11	1
10,00	10	*27,47*	63	13	1
11,00	12	*37,47*	70	13	1

Ø mm	d mm	€	L mm	l mm	
12,00	12	*35,50*	73	16	1
13,00	12	*46,85*	73	16	1
14,00	12	*46,85*	73	16	1
15,00	12	*52,48*	73	16	1
16,00	16	*51,24*	79	19	1
17,00	16	*62,42*	79	19	1
18,00	16	*62,42*	79	19	1
19,00	16	*78,81*	79	19	1
20,00	20	*74,59*	88	22	1
22,00	20	*97,55*	88	22	1
24,00	25	*123,57*	102	26	1
25,00	25	*134,56*	102	26	1
28,00	25	*156,33*	102	26	1
30,00	25	*181,85*	102	26	1
32,00	32	*183,03*	112	32	1
36,00	32	*244,81*	112	32	1
40,00	40	*300,59*	118	38	1

Bajo demanda / Sur commande / Upon request

3112 HSSE DIN 327 N



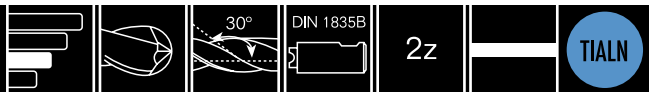
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			○ 45-90			○ 2-4				

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	
3,00	6	*27,32*	49	5	1
4,00	6	*27,32*	51	7	1
5,00	6	*27,32*	52	8	1
6,00	6	*27,32*	52	8	1
7,00	10	*32,94*	60	10	1
8,00	10	*29,33*	61	11	1
9,00	10	*33,72*	61	11	1
10,00	10	*29,12*	63	13	1
12,00	12	*37,53*	73	16	1

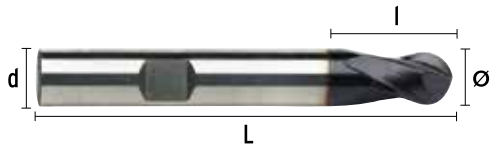
Ø mm	d mm	€	L mm	l mm	
13,00	12	*49,59*	73	16	1
14,00	12	*49,59*	73	16	1
15,00	12	*49,67*	73	16	1
16,00	16	*54,19*	79	19	1
18,00	16	*65,98*	79	19	1
20,00	20	*78,80*	88	22	1
22,00	20	*103,13*	88	22	1
24,00	25	*123,24*	102	26	1
25,00	25	*113,26*	102	26	1

3112/1 HSSE DIN 327 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35		○ 70-120			● 4-6				

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



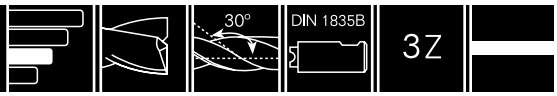
Ø mm	d mm	€	L mm	l mm	
3,00	6	*38,25*	49	5	1
4,00	6	*38,25*	51	7	1
5,00	6	*38,25*	52	8	1
6,00	6	*38,25*	52	8	1
7,00	10	*46,11*	60	10	1
8,00	10	*41,06*	61	11	1
9,00	10	*47,20*	61	11	1
10,00	10	*40,76*	63	13	1
12,00	12	*52,54*	73	16	1

Ø mm	d mm	€	L mm	l mm	
13,00	12	*69,43*	73	16	1
14,00	12	*69,43*	73	16	1
15,00	12	*69,53*	73	16	1
16,00	16	*75,87*	79	19	1
18,00	16	*92,37*	79	19	1
20,00	20	*110,32*	88	22	1
22,00	20	*144,38*	88	22	1
24,00	25	*172,53*	102	26	1
25,00	25	*158,57*	102	26	1

Bajo demanda / Sur commade / upon request

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3187 HSSE DIN 327 N



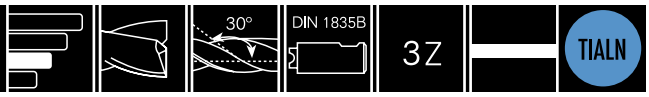
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			○ 45-90				○ 15-20			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	L mm	l mm	
2,00	3	6	*13,89*	48	4	1
3,00	3	6	*12,62*	49	5	1
4,00	3	6	*12,62*	51	7	1
5,00	3	6	*12,62*	52	8	1
6,00	3	6	*12,62*	52	8	1
7,00	3	10	*15,79*	60	10	1
8,00	3	10	*15,79*	61	11	1
9,00	3	10	*18,50*	91	11	1
10,00	3	10	*18,49*	63	13	1
11,00	3	12	*21,53*	70	13	1
12,00	3	12	*21,51*	73	16	1

Ø mm	Z	d mm	€	L mm	l mm	
13,00	3	12	*26,68*	73	16	1
14,00	3	12	*26,68*	73	16	1
15,00	3	12	*30,94*	73	16	1
16,00	3	16	*30,94*	79	19	1
18,00	3	16	*38,06*	79	19	1
20,00	3	20	*47,61*	88	22	1
22,00	3	20	*70,91*	88	22	1
25,00	3	25	*93,73*	102	26	1
28,00	3	25	*105,35*	102	26	1
30,00	3	25	*131,62*	102	26	1
32,00	3	32	*174,39*	112	32	1

3187/1 HSSE DIN 327 N



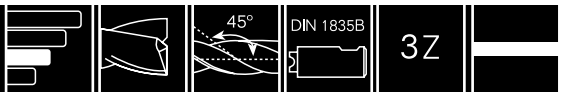
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35		○ 70-120				○ 25-35			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	L mm	l mm	
2,00	3	6	*19,45*	48	4	1
3,00	3	6	*17,67*	49	5	1
4,00	3	6	*17,67*	51	7	1
5,00	3	6	*17,67*	52	8	1
6,00	3	6	*17,67*	52	8	1
7,00	3	10	*22,11*	60	10	1
8,00	3	10	*22,11*	61	11	1
9,00	3	10	*25,90*	91	11	1
10,00	3	10	*25,89*	63	13	1
11,00	3	12	*30,14*	70	13	1
12,00	3	12	*30,12*	73	16	1

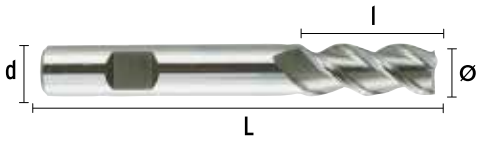
Ø mm	Z	d mm	€	L mm	l mm	
13,00	3	12	*37,35*	73	16	1
14,00	3	12	*37,35*	73	16	1
15,00	3	12	*43,32*	73	16	1
16,00	3	16	*43,32*	79	19	1
18,00	3	16	*53,29*	79	19	1
20,00	3	20	*66,65*	88	22	1
22,00	3	20	*99,27*	88	22	1
25,00	3	25	*131,23*	102	26	1
28,00	3	25	*147,49*	102	26	1
30,00	3	25	*184,26*	102	26	1
32,00	3	32	*244,15*	112	32	1

3114 HSSE DIN 844 W



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50									● 60-150		● 60-100	● 50-80					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

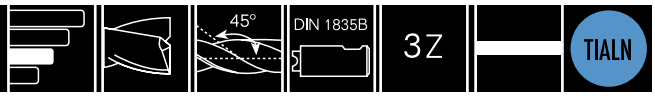


Ø mm	d mm	€	L mm	l mm	Z	
2,00	6	*16,26*	51	7	3	1
3,00	6	*16,26*	52	8	3	1
4,00	6	*16,26*	55	11	3	1
5,00	6	*16,26*	57	13	3	1
6,00	6	*20,23*	57	13	3	1
7,00	10	*22,40*	69	16	3	1
8,00	10	*24,66*	69	19	3	1
9,00	10	*27,17*	69	19	3	1
10,00	10	*25,43*	72	22	3	1

Ø mm	d mm	€	L mm	l mm	Z	
12,00	12	*30,88*	83	26	3	1
14,00	12	*40,57*	83	26	3	1
15,00	12	*40,28*	83	26	3	1
16,00	16	*46,26*	92	32	3	1
18,00	16	*54,83*	92	32	3	1
20,00	20	*66,38*	104	38	3	1
25,00*	25	*109,60*	121	45	4	1
30,00*	25	*156,69*	121	45	4	1

* Hasta fin de existencias / Jusqu'à epuisement des stocks / Until end of stock

3114/1 HSSE DIN 844 W



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80									● 100-200		● 80-120	● 65-100					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

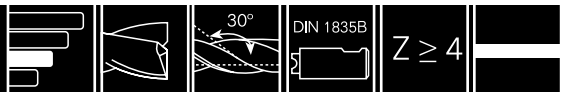
Ø mm	d mm	€	L mm	l mm	Z	
6,00	6	*28,33*	57	13	3	1
7,00	10	*31,36*	66	16	3	1
8,00	10	*34,53*	69	19	3	1
9,00	10	*38,04*	69	19	3	1
10,00	10	*35,60*	72	22	3	1
12,00	12	*43,23*	83	26	3	1

Ø mm	d mm	€	L mm	l mm	Z	
14,00	12	*56,80*	83	26	3	1
15,00	12	*56,39*	83	26	3	1
16,00	16	*64,77*	92	32	3	1
18,00	16	*76,76*	92	32	3	1
20,00	20	*92,93*	104	38	3	1

Bajo demanda / Sur commade / upon request

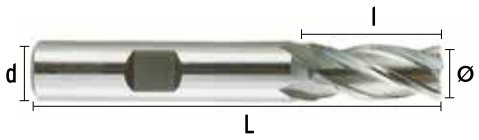
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3115 HSSE DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			○ 45-90			○ 15-20	● 15-20			

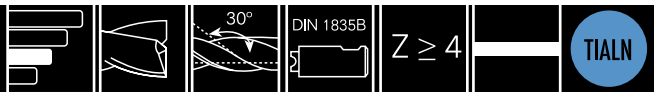
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	Z	d mm	€	L mm	l mm	
2,00	3	6	*15,23*	51	7	1
2,50	3	6	*15,23*	52	8	1
3,00	4	6	*15,23*	52	8	1
4,00	4	6	*15,34*	55	11	1
5,00	4	6	*15,34*	57	13	1
6,00	4	6	*15,34*	57	13	1
7,00	4	10	*23,15*	69	16	1
8,00	4	10	*19,13*	69	19	1
9,00	4	10	*24,15*	69	19	1
10,00	4	10	*21,35*	72	22	1
11,00	4	12	*29,12*	79	22	1
12,00	4	12	*27,03*	83	26	1

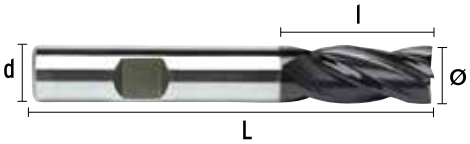
Ø mm	Z	d mm	€	L mm	l mm	
13,00	4	12	*36,40*	83	26	1
14,00	4	12	*34,35*	83	26	1
15,00	4	12	*39,21*	83	26	1
16,00	4	16	*38,26*	92	32	1
18,00	4	16	*47,16*	92	32	1
20,00	4	20	*55,19*	104	38	1
22,00	5	20	*76,64*	104	38	1
25,00	5	25	*95,24*	121	45	1
28,00	5	25	*119,07*	121	45	1
30,00	5	25	*141,90*	121	45	1
32,00	6	32	*141,90*	133	53	1

3115/1 HSSE DIN 327 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35	○ 90-200	○ 70-120			● 25-35	● 25-35			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



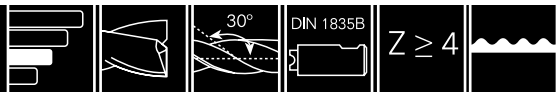
Ø mm	Z	d mm	€	L mm	l mm	
3,00	4	6	*21,32*	52	8	1
4,00	4	6	*21,32*	55	11	1
5,00	4	6	*21,32*	57	13	1
6,00	4	6	*21,48*	57	13	1
7,00	4	10	*21,48*	66	16	1
8,00	4	10	*21,48*	69	19	1
9,00	4	10	*32,41*	69	19	1
10,00	4	10	*26,78*	72	22	1
11,00	4	12	*33,81*	79	22	1
12,00	4	12	*29,89*	83	26	1
13,00	4	12	*40,76*	83	26	1

Ø mm	Z	d mm	€	L mm	l mm	
14,00	4	12	*37,84*	83	26	1
15,00	4	12	*50,96*	83	26	1
16,00	4	16	*48,08*	92	32	1
18,00	4	16	*54,89*	92	32	1
20,00	4	20	*53,57*	104	38	1
22,00	5	20	*66,02*	104	38	1
25,00	5	25	*77,26*	121	45	1
28,00	5	25	*107,30*	121	45	1
30,00	5	25	*133,33*	121	45	1
32,00	6	32	*166,70*	133	53	1

Bajo demanda / Sur commade / upon request

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3117 HSSE DIN 844 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 35-50	○ 25-30			○ 15-20		○ 34-38				○ 45-90							

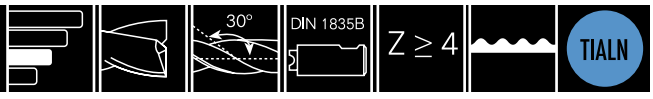
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	L mm	l mm	
6,00	4	6	*39,22*	57	13	1
7,00	4	10	*47,26*	66	16	1
8,00	4	10	*44,13*	69	19	1
9,00	4	10	*49,02*	69	19	1
10,00	4	10	*38,70*	72	22	1
11,00	4	12	*57,74*	79	22	1
12,00	4	12	*50,90*	83	26	1
13,00	4	12	*69,06*	83	26	1
14,00	4	12	*55,19*	83	26	1
15,00	4	12	*72,59*	83	26	1
16,00	4	16	*67,61*	92	32	1
17,00	4	16	*89,45*	92	32	1

Ø mm	Z	d mm	€	L mm	l mm	
18,00	4	16	*71,43*	92	32	1
20,00	4	20	*89,51*	98	38	1
22,00	5	20	*102,85*	104	38	1
24,00	5	25	*129,49*	121	45	1
25,00	5	25	*128,55*	121	45	1
26,00	5	25	*153,53*	121	45	1
28,00	5	25	*148,58*	121	45	1
30,00	5	25	*165,01*	121	45	1
32,00	6	32	*180,95*	133	53	1
36,00*	6	32	*214,25*	133	53	1
40,00*	6	32	*240,92*	155	63	1

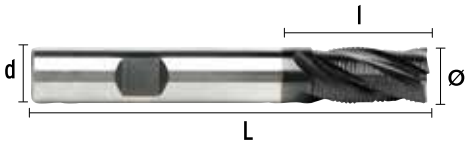
* Hasta fin de existencias / Jusqu'à epuisement des stocks / Until end of stock

3117/1 HSSE DIN 844 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-80	● 45-55	○ 35-40		○ 25-35		● 55-60				○ 60-120							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



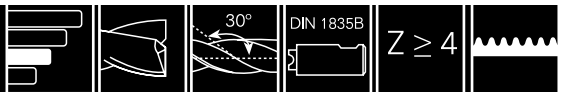
Ø mm	Z	d mm	€	L mm	l mm	
6,00	4	6	*54,90*	57	13	1
7,00	4	10	*66,16*	66	16	1
8,00	4	10	*61,78*	69	19	1
9,00	4	10	*68,63*	69	19	1
10,00	4	10	*54,18*	72	22	1
11,00	4	12	*80,84*	79	22	1
12,00	4	12	*71,27*	83	26	1
13,00	4	12	*96,68*	83	26	1
14,00	4	12	*77,26*	83	26	1
15,00	4	12	*101,62*	83	26	1
16,00	4	16	*94,65*	92	32	1

Ø mm	Z	d mm	€	L mm	l mm	
17,00	4	16	*125,23*	92	32	1
18,00	4	16	*100,00*	92	32	1
20,00	4	20	*125,32*	98	38	1
22,00	5	20	*143,99*	104	38	1
24,00	5	25	*181,28*	121	45	1
25,00	5	25	*179,97*	121	45	1
26,00	5	25	*214,94*	121	45	1
28,00	5	25	*208,01*	121	45	1
30,00	5	25	*231,01*	121	45	1
32,00	6	32	*253,33*	133	53	1

Bajo demanda / Sur commade / upon request

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3119 HSSE DIN 844 NRF



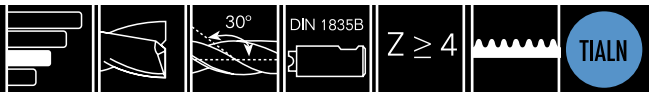
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	● 20-38			○ 50-90			○ 15-20				

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	L mm	l mm	
6,00	4	6	*43,68*	57	13	1
8,00	4	10	*49,14*	69	19	1
10,00	4	10	*43,12*	72	22	1
12,00	4	12	*56,69*	83	26	1
14,00	4	12	*61,46*	83	26	1

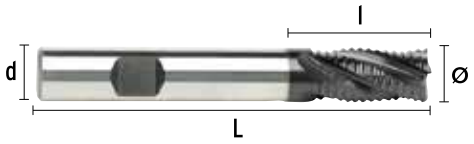
Ø mm	Z	d mm	€	L mm	l mm	
16,00	4	16	*75,22*	9	32	1
18,00	4	16	*79,46*	92	32	1
20,00	4	20	*99,61*	104	38	1
25,00	5	25	*143,03*	121	45	1
30,00	5	25	*183,58*	121	45	1

3119/1 HSSE DIN 844 NRF



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 40-45			○ 25-35		● 55-60	● 20-38			○ 60-120			○ 25-35				

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



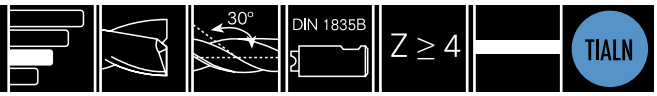
Ø mm	Z	d mm	€	L mm	l mm	
6,00	4	6	*61,15*	57	13	1
8,00	4	10	*68,80*	69	19	1
10,00	4	10	*60,37*	72	22	1
12,00	4	12	*79,37*	83	26	1
14,00	4	12	*86,04*	83	26	1

Ø mm	Z	d mm	€	L mm	l mm	
16,00	4	16	*105,31*	92	32	1
18,00	4	16	*111,25*	92	32	1
20,00	4	20	*139,46*	104	38	1
25,00	5	25	*200,24*	121	45	1
30,00	6	25	*257,01*	121	45	1

Bajo demanda / Sur commade / upon request

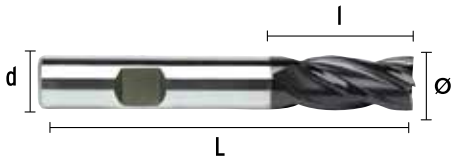
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3162 HSSE-PM DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-85	● 50-60	○ 35-40		● 35-40	○ 28-35	● 55-60	● 30-40	○ 30-35	○ 90-200	○ 80-120	○ 90-130	○ 75-190	● 15-40	● 30-40			

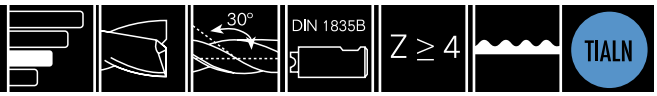
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	L mm	l mm	€	Z	
6,00	6	57	13	42,23	4	1
8,00	10	69	19	52,73	4	1
10,00	10	72	22	62,46	4	1
12,00	12	83	26	74,69	4	1

Ø mm	d mm	L mm	l mm	€	Z	
14,00	12	83	26	87,24	4	1
16,00	16	92	32	103,43	4	1
18,00	16	92	32	126,39	4	1
20,00	20	104	38	155,81	4	1

3157 HSSE-PM DIN 844 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 60-90	● 50-60	○ 45-50		● 35-40	○ 28-35	● 60-65				○ 85-140							

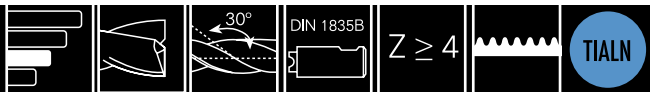
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	l mm	€	Z	
6,00	6	57	13	72,42	4	1
8,00	10	69	19	79,50	4	1
10,00	10	72	22	77,12	4	1
12,00	12	83	26	98,82	4	1
14,00	12	83	26	118,04	4	1
16,00	16	92	32	145,11	4	1
18,00	16	92	32	158,55	4	1

Ø mm	d mm	L mm	l mm	€	Z	
20,00	20	104	38	196,94	4	1
22,00	20	104	38	243,81	5	1
25,00	25	121	45	289,35	5	1
28,00	25	121	45	371,04	5	1
30,00	25	121	45	387,83	5	1
32,00	32	133	53	421,10	6	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3159 HSSE-PM DIN 844 NRF



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-85	● 40-50	○ 35-40		● 30-35	○ 25-30	● 55-60				○ 80-140			● 15-40	● 30-40			

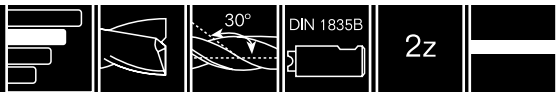
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	l mm	€	Z	
6,00	6	57	13	*79,67*	4	1
8,00	10	69	19	*87,11*	4	1
10,00	10	72	22	*84,69*	4	1
12,00	12	83	26	*108,77*	4	1

Ø mm	d mm	L mm	l mm	€	Z	
14,00	12	83	26	*129,59*	4	1
16,00	16	92	32	*159,08*	4	1
18,00	16	92	32	*173,96*	4	1
20,00	20	104	38	*215,51*	4	1

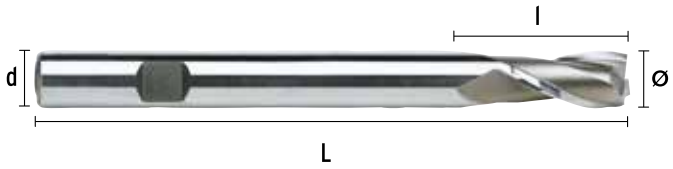
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3111 HSSE DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			○ 45-80							

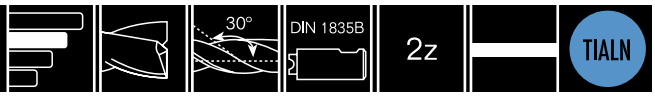
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	
4,00	6	*21,15*	63	11	1
5,00	6	*21,15*	68	13	1
6,00	6	*21,15*	68	13	1
7,00	10	*35,18*	80	16	1
8,00	10	*30,75*	88	19	1
9,00	10	*41,67*	88	19	1
10,00	10	*35,18*	95	22	1

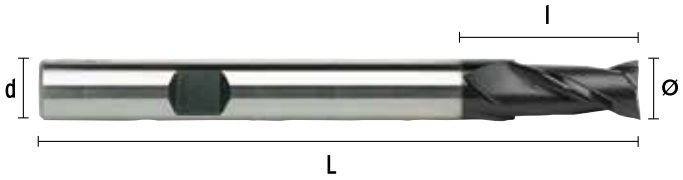
Ø mm	d mm	€	L mm	l mm	
12,00	12	*48,06*	110	26	1
14,00	12	*62,48*	110	26	1
16,00	16	*73,49*	123	32	1
18,00	16	*87,57*	123	32	1
20,00	20	*95,64*	141	38	1
22,00	20	*129,83*	141	38	1
25,00	25	*186,21*	166	45	1

3111/1 HSSE DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35		○ 70-110							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



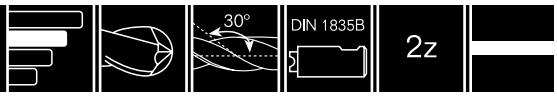
Ø mm	d mm	€	L mm	l mm	
4,00	6	*29,61*	63	11	1
5,00	6	*29,61*	68	13	1
6,00	6	*29,61*	68	13	1
7,00	10	*49,25*	80	16	1
8,00	10	*43,05*	88	19	1
9,00	10	*58,34*	88	19	1
10,00	10	*49,25*	95	22	1

Ø mm	d mm	€	L mm	l mm	
12,00	12	*67,28*	110	26	1
14,00	12	*87,47*	110	26	1
16,00	16	*102,88*	123	32	1
18,00	16	*122,60*	123	32	1
20,00	20	*133,90*	141	38	1
22,00	20	*181,76*	141	38	1
25,00	25	*260,69*	166	45	1

Bajo demanda / Sur commade / upon request

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3113 HSSE DIN 844 N



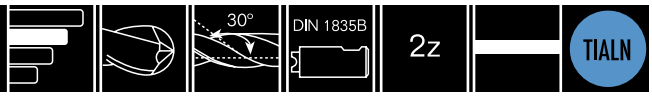
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			○ 45-90			○ 2-4				

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	
4,00	6	*30,83*	63	11	1
5,00	6	*32,63*	68	13	1
6,00	6	*29,46*	68	13	1
8,00	10	*36,13*	88	19	1
10,00	12	*39,64*	95	22	1
12,00	12	*50,85*	110	26	1

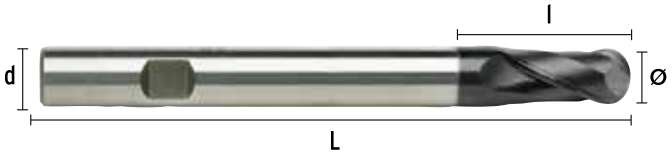
Ø mm	d mm	€	L mm	l mm	
14,00	12	*59,81*	110	26	1
16,00	16	*76,02*	123	32	1
18,00	16	*91,41*	123	32	1
20,00	20	*99,09*	141	38	1
22,00	20	*122,83*	141	38	1
25,00	25	*182,37*	166	45	1

3113/1 HSSE DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35		○ 70-120			● 4-6				

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



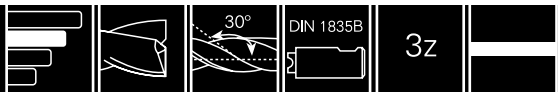
Ø mm	d mm	€	L mm	l mm	
4,00	6	*43,16*	63	11	1
5,00	6	*45,69*	68	13	1
6,00	6	*41,25*	68	13	1
8,00	10	*50,58*	88	19	1
10,00	10	*55,49*	95	22	1
12,00	12	*71,19*	110	26	1

Ø mm	d mm	€	L mm	l mm	
14,00	12	*83,73*	110	26	1
16,00	16	*106,43*	123	32	1
18,00	16	*127,98*	123	32	1
20,00	20	*138,72*	141	38	1
22,00	20	*171,96*	141	38	1
25,00	25	*255,32*	166	45	1

Bajo demanda / Sur commade / upon request

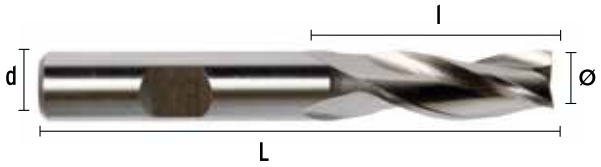
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3188 HSSE DIN 327 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			○ 55-75				○ 15-20			

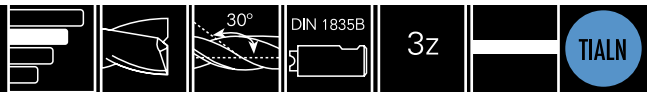
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	Z	d mm	€	L mm	l mm	
3	3	6	*16,33*	52	8	1
4	3	6	*16,33*	55	11	1
5	3	6	*16,33*	57	13	1
6	3	6	*16,33*	57	13	1
7	3	10	*20,48*	66	16	1
8	3	10	*20,48*	69	19	1
9	3	10	*22,10*	69	22	1
10	3	10	*24,11*	72	22	1
11	3	12	*25,80*	79	22	1

Ø mm	Z	d mm	€	L mm	l mm	
12	3	12	*27,94*	83	26	1
13	3	12	*30,22*	83	26	1
14	3	12	*34,80*	83	26	1
15	3	12	*38,08*	83	26	1
16	3	16	*40,30*	92	32	1
18	3	16	*49,64*	92	32	1
20	3	20	*61,94*	104	38	1
22	3	20	*72,17*	104	38	1
25	3	25	*80,12*	121	45	1

3188/1 HSSE DIN 327 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35		○ 70-120				○ 25-35			

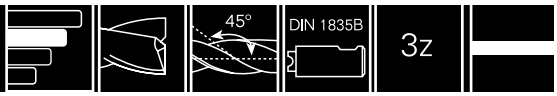
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	L mm	l mm	
3	3	6	*22,86*	52	8	1
4	3	6	*22,86*	55	11	1
5	3	6	*22,86*	57	13	1
6	3	6	*22,86*	57	13	1
7	3	10	*28,67*	66	16	1
8	3	10	*28,67*	69	19	1
9	3	10	*30,94*	69	22	1
10	3	10	*33,75*	72	22	1
11	3	12	*36,12*	79	22	1

Ø mm	Z	d mm	€	L mm	l mm	
12	3	12	*39,12*	83	26	1
13	3	12	*42,31*	83	26	1
14	3	12	*48,72*	83	26	1
15	3	12	*53,32*	83	26	1
16	3	16	*56,42*	92	32	1
18	3	16	*69,50*	92	32	1
20	3	20	*86,72*	104	38	1
22	3	20	*101,03*	104	38	1
25	3	25	*112,16*	121	45	1

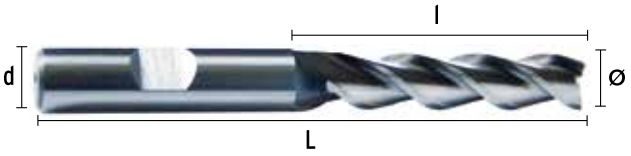
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3182 HSSE DIN 844 W



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50									● 60-150		○ 60-100	○ 50-150					

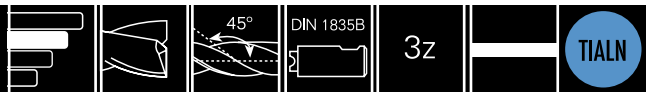
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	€	L mm	l mm	z	
6,00	6	*21,72*	68	24	3	1
8,00	10	*27,69*	88	38	3	1
10,00	10	*32,55*	95	45	3	1
12,00	12	*39,05*	110	53	3	1

Ø mm	d mm	€	L mm	l mm	z	
14,00	12	*45,56*	110	53	3	1
16,00	16	*54,31*	123	63	3	1
18,00	16	*61,77*	123	63	3	1
20,00	20	*77,04*	141	75	3	1

3182/1 HSSE DIN 844 W



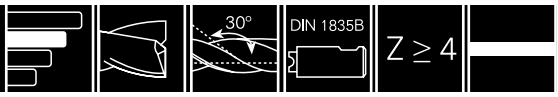
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50									● 60-150		● 60-100	● 50-150					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	€	L mm	l mm	z	
6,00	6	*30,41*	68	24	3	1
8,00	10	*38,76*	88	38	3	1
10,00	10	*45,57*	95	45	3	1
12,00	12	*54,67*	110	53	3	1

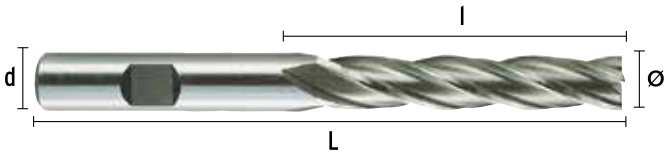
Ø mm	d mm	€	L mm	l mm	z	
14,00	12	*63,78*	110	53	3	1
16,00	16	*76,03*	123	63	3	1
18,00	16	*86,48*	123	63	3	1
20,00	20	*107,85*	141	75	3	1

3116 HSSE DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24			● 55-75			○ 15-20	○ 15-20			

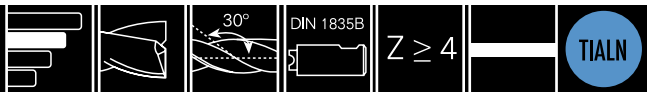
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	Z	d mm	€	L mm	l mm	
3,00	4	6	*18,22*	56	12	1
4,00	4	6	*18,22*	63	19	1
5,00	4	6	*18,22*	68	24	1
6,00	4	6	*18,22*	68	24	1
7,00	4	10	*27,63*	80	30	1
8,00	4	10	*25,38*	88	38	1
9,00	4	10	*28,57*	88	38	1
10,00	4	10	*25,15*	95	45	1

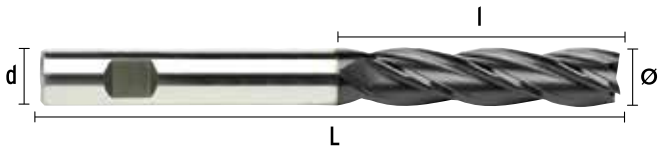
Ø mm	Z	d mm	€	L mm	l mm	
12,00	4	12	*31,88*	110	53	1
14,00	4	12	*41,70*	110	53	1
16,00	4	16	*45,61*	123	63	1
18,00	4	16	*55,70*	123	63	1
20,00	4	20	*65,23*	141	75	1
22,00	5	20	*90,46*	141	75	1
25,00	5	25	*119,99*	166	90	1

3116/1 HSSE DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35		● 70-120			● 25-35	○ 25-35			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



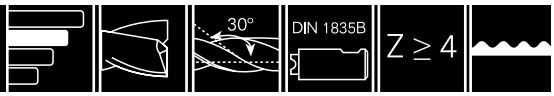
Ø mm	Z	d mm	€	L mm	l mm	
6,00	4	6	*25,50*	68	24	1
7,00	4	10	*38,68*	80	30	1
8,00	4	10	*35,53*	88	38	1
9,00	4	10	*40,00*	88	38	1
10,00	4	10	*35,21*	95	45	1
12,00	4	12	*44,63*	110	53	1

Ø mm	Z	d mm	€	L mm	l mm	
14,00	4	12	*58,37*	110	53	1
16,00	4	16	*63,86*	123	63	1
18,00	4	16	*77,98*	123	63	1
20,00	4	20	*91,32*	141	75	1
22,00	5	20	*126,64*	141	75	1
25,00	5	25	*167,99*	166	90	1

Bajo demanda / Sur commade / upon request

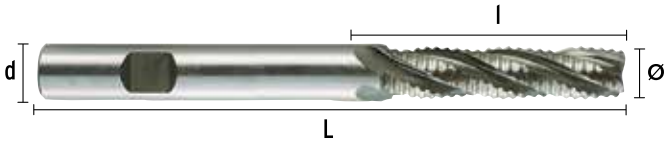
P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3118 HSSE DIN 844 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 35-50	○ 25-30			○ 15-20		○ 34-38				○ 45-90							

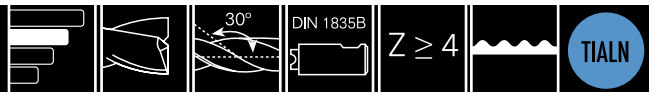
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	Z	d mm	€	L mm	l mm	
6,00	4	6	*54,03*	68	24	1
8,00	4	10	*71,43*	88	38	1
10,00	4	10	*49,02*	95	45	1
12,00	4	12	*58,08*	110	53	1
14,00	4	12	*67,12*	110	53	1
16,00	4	16	*78,54*	123	63	1
18,00	4	16	*88,58*	123	63	1

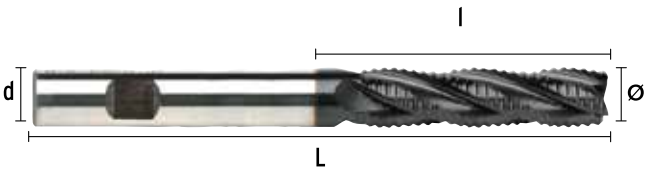
Ø mm	Z	d mm	€	L mm	l mm	
20,00	4	20	*111,39*	141	75	1
22,00	5	20	*135,72*	141	75	1
25,00	5	25	*171,39*	166	90	1
28,00	5	25	*194,27*	166	90	1
30,00	5	25	*260,28*	166	90	1
32,00	6	32	*246,68*	186	106	1

3118/1 HSSE DIN 844 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-80	● 45-55	○ 35-40		○ 25-35		● 55-60				○ 60-120							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



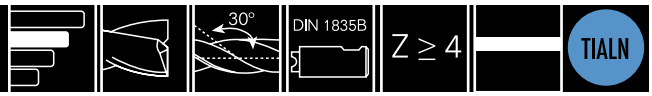
Ø mm	Z	d mm	€	L mm	l mm	
6,00	4	6	*75,65*	68	24	1
8,00	4	10	*100,00*	88	38	1
10,00	4	10	*68,63*	95	45	1
12,00	4	12	*81,31*	110	53	1
14,00	4	12	*93,96*	110	53	1
16,00	4	16	*109,96*	123	63	1
18,00	4	16	*124,01*	123	63	1

Ø mm	Z	d mm	€	L mm	l mm	
20,00	4	20	*155,95*	141	75	1
22,00	5	20	*190,01*	141	75	1
25,00	5	25	*239,95*	166	90	1
28,00	5	25	*271,98*	166	90	1
30,00	5	25	*364,40*	166	90	1
32,00	6	32	*345,35*	186	106	1

Bajo demanda / Sur commade / upon request

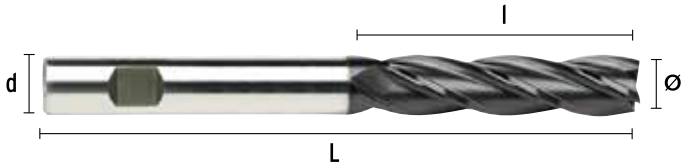
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3163 HSSE-PM DIN 844 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-85	● 50-60	○ 35-40		● 35-40	○ 28-35	● 55-60	● 30-40	○ 30-35	○ 90-200	○ 80-120	○ 90-130	○ 75-190	● 15-40	● 30-40			

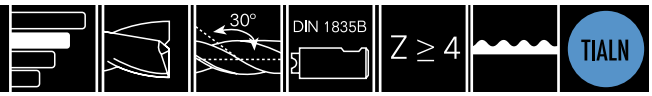
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	L mm	l mm	€	Z	
6,00	6	68	24	*35,32*	4	1
8,00	10	88	38	*44,11*	4	1
10,00	10	95	45	*52,25*	4	1
12,00	12	110	53	*62,46*	4	1

Ø mm	d mm	L mm	l mm	€	Z	
14,00	12	110	53	*72,67*	4	1
16,00	16	123	63	*86,15*	4	1
18,00	16	123	63	*104,83*	4	1
20,00	20	141	75	*129,23*	4	1

3158 HSSE-PM DIN 844 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 60-90	● 50-60	○ 45-50		● 35-40	○ 28-35	● 60-65				○ 85-140							

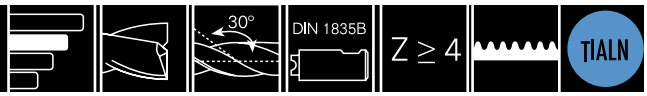
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	l mm	€	Z	
6,00	6	68	24	*76,66*	4	1
8,00	10	88	38	*80,08*	4	1
10,00	10	95	45	*72,93*	4	1
12,00	12	110	53	*91,41*	4	1
14,00	12	110	53	*104,29*	4	1

Ø mm	d mm	L mm	l mm	€	Z	
16,00	16	123	63	*128,86*	4	1
18,00	16	123	63	*145,18*	4	1
20,00	20	141	75	*185,83*	4	1
25,00	25	166	90	*285,54*	5	1
32,00	32	186	106	*406,16*	6	1

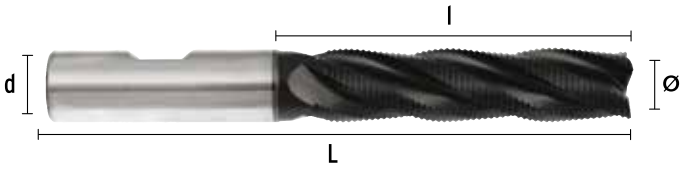
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3160 HSSE-PM DIN 844 NRF



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-85	● 40-50	○ 35-40		● 30-35	○ 25-30	● 55-60				○ 80-140			● 15-40	● 30-40			

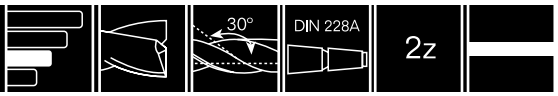
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	L mm	l mm	€	Z	
6,00	6	68	24	*84,40*	4	1
8,00	10	88	38	*88,06*	4	1
10,00	10	95	45	*79,95*	4	1
12,00	12	110	53	*100,42*	4	1

Ø mm	d mm	L mm	l mm	€	Z	
14,00	12	110	53	*114,69*	4	1
16,00	16	123	63	*141,49*	4	1
18,00	16	123	63	*159,42*	4	1
20,00	20	141	75	*204,40*	4	1

3144 HSSE DIN 326 N



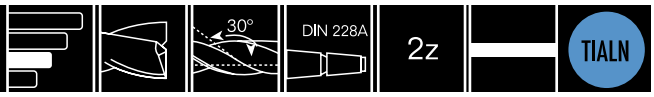
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24		○ 60-150	● 55-95	○ 60-100	○ 50-150					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	2	*80,36*	85	14	1
2	14,00	2	*82,72*	100	16	1
2	16,00	2	*88,07*	105	18	1
2	18,00	2	*98,19*	110	20	1
2	20,00	2	*107,39*	115	20	1
2	22,00	2	*129,14*	120	22	1
3	24,00	2	*144,87*	140	25	1

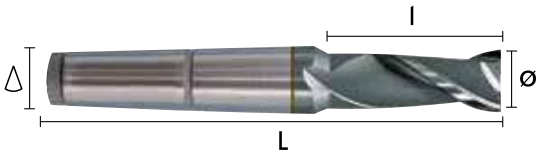
Δ	Ø mm	Z	€	L mm	l mm	
3	25,00	2	*154,74*	140	25	1
3	28,00	2	*183,91*	145	28	1
3	30,00	2	*196,10*	150	30	1
4	32,00	2	*221,97*	175	32	1
4	36,00	2	*280,57*	175	35	1
4	40,00	2	*341,28*	180	38	1

3144/1 HSSE DIN 326 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35	○ 90-200	● 90-140	○ 90-130	○ 75-190					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



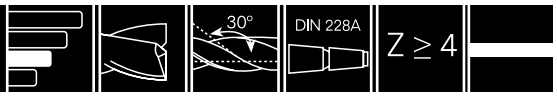
Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	2	*112,50*	85	14	1
2	14,00	2	*115,81*	100	16	1
2	16,00	2	*123,30*	105	18	1
2	18,00	2	*137,46*	110	20	1
2	20,00	2	*150,35*	115	20	1
2	22,00	2	*180,80*	120	22	1
3	24,00	2	*202,82*	140	25	1

Δ	Ø mm	Z	€	L mm	l mm	
3	25,00	2	*216,63*	140	25	1
3	28,00	2	*257,47*	145	28	1
3	30,00	2	*274,54*	150	30	1
4	32,00	2	*310,76*	175	32	1
4	36,00	2	*392,80*	175	35	1
4	40,00	2	*477,79*	180	38	1

Bajo demanda / Sur commade / upon request

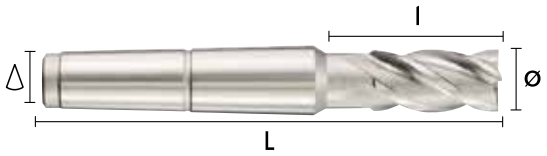
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3145 HSSE DIN 845 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24		○ 60-150	● 55-95	○ 60-100	○ 50-150	○ 15-20	○ 15-20			

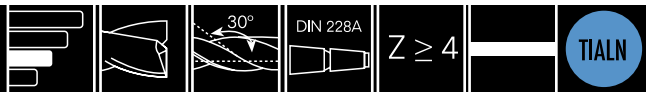
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	4	*79,45*	96	26	1
2	14,00	4	*87,76*	111	26	1
2	16,00	4	*87,76*	117	32	1
2	18,00	4	*94,87*	117	32	1
2	20,00	4	*104,63*	123	38	1
2	22,00	5	*119,76*	123	38	1
3	24,00	5	*169,58*	147	45	1
3	25,00	5	*158,89*	147	45	1

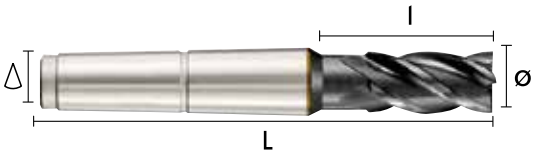
Δ	Ø mm	Z	€	L mm	l mm	
3	26,00	5	*179,92*	147	45	1
3	28,00	5	*181,09*	147	45	1
3	30,00	6	*197,72*	147	45	1
3	32,00	6	*260,55*	178	53	1
4	36,00	6	*298,18*	178	53	1
4	40,00	6	*359,54*	188	63	1
5	50,00	6	*541,50*	233	75	1

3145/1 HSSE DIN 845 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35	○ 90-200	● 90-140	○ 90-130	○ 75-190	● 25-35	○ 25-35			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



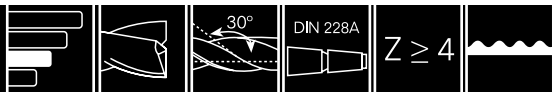
Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	4	*111,23*	96	26	1
2	14,00	4	*122,86*	111	26	1
2	16,00	4	*122,86*	117	32	1
2	18,00	4	*132,81*	117	32	1
2	20,00	4	*146,49*	123	38	1
2	22,00	5	*167,67*	123	38	1
3	24,00	5	*237,41*	147	45	1
3	25,00	5	*222,44*	147	45	1

Δ	Ø mm	Z	€	L mm	l mm	
3	26,00	5	*251,88*	147	45	1
3	28,00	5	*253,53*	147	45	1
3	30,00	6	*276,80*	147	45	1
3	32,00	6	*364,77*	178	53	1
4	36,00	6	*417,45*	178	53	1
4	40,00	6	*503,36*	188	63	1
5	50,00	6	*758,09*	233	75	1

Bajo demanda / Sur commade / upon request

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3146 HSSE DIN 845 NR



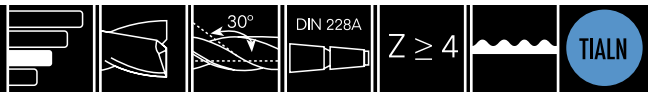
P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 35-55	○ 25-30			○ 15-20		○ 38-42	○ 20-24			● 55-95							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	4	*103,55*	96	26	1
2	14,00	4	*104,54*	111	26	1
2	16,00	4	*113,24*	117	32	1
2	18,00	4	*119,09*	117	32	1
2	20,00	4	*131,69*	123	38	1
2	22,00	5	*167,92*	123	38	1
3	25,00	5	*195,43*	147	45	1

Δ	Ø mm	Z	€	L mm	l mm	
3	28,00	5	*220,00*	147	45	1
3	30,00	5	*238,44*	147	45	1
4	32,00	6	*266,28*	201	53	1
4	36,00	6	*299,25*	201	53	1
4	40,00	6	*342,31*	211	63	1
5	50,00	8	*489,50*	261	75	1

3146/1 HSSE DIN 845 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-80	● 45-55	○ 35-40		○ 25-35		● 55-60	● 30-35			● 90-140							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

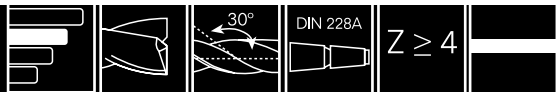
Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	4	*144,97*	96	26	1
2	14,00	4	*146,35*	111	26	1
2	16,00	4	*158,54*	117	32	1
2	18,00	4	*166,73*	117	32	1
2	20,00	4	*184,37*	123	38	1
2	22,00	5	*235,08*	123	38	1
3	25,00	5	*273,60*	147	45	1

Δ	Ø mm	Z	€	L mm	l mm	
3	28,00	5	*307,99*	147	45	1
3	30,00	5	*333,82*	147	45	1
4	32,00	6	*372,79*	178	53	1
4	36,00	6	*418,95*	178	53	1
4	40,00	6	*479,23*	188	63	1
4	50,00	8	*685,30*	233	75	1

Bajo demanda / Sur commade / upon request

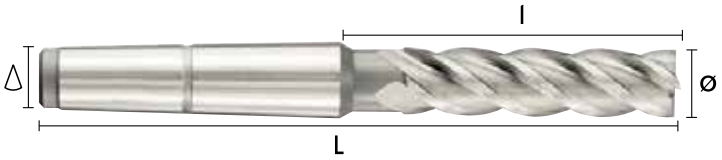
P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3147 HSSE DIN 845 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-50	○ 25-30			○ 15-20		○ 34-38	○ 20-24		○ 60-150	● 55-95	○ 60-100	○ 50-150	○ 15-20	○ 15-20			

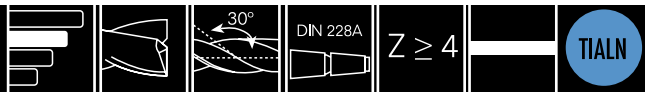
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	4	*91,29*	138	53	1
2	14,00	4	*96,06*	138	53	1
2	16,00	4	*104,63*	148	63	1
2	18,00	4	*118,55*	148	63	1
2	20,00	4	*169,58*	160	75	1
3	22,00	5	*181,09*	160	75	1
3	25,00	5	*199,19*	192	90	1

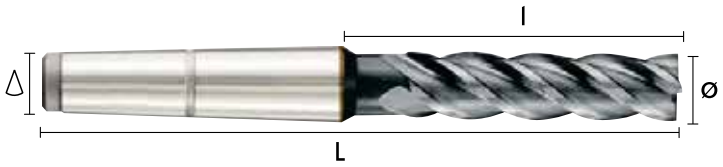
Δ	Ø mm	Z	€	L mm	l mm	
3	28,00	5	*221,41*	192	90	1
3	30,00	6	*283,65*	192	90	1
4	32,00	6	*303,81*	210	106	1
4	36,00	6	*364,86*	231	106	1
4	40,00	6	*417,90*	250	125	1
4	50,00	6	*643,47*	308	150	1

3147/1 HSSE DIN 845 N



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 48-80	● 40-45	○ 30-35		○ 25-35		● 55-60	● 30-40	○ 30-35	○ 90-200	● 90-140	○ 90-130	○ 75-190	● 25-35	○ 25-35			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



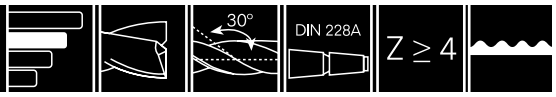
Δ	Ø mm	Z	€	L mm	l mm	
1	12,00	4	*127,80*	123	53	1
2	14,00	4	*134,49*	138	53	1
2	16,00	4	*146,49*	148	63	1
2	18,00	4	*165,96*	148	63	1
2	20,00	4	*237,41*	160	75	1
3	22,00	5	*253,53*	160	75	1
3	25,00	5	*278,86*	192	90	1

Δ	Ø mm	Z	€	L mm	l mm	
3	28,00	5	*309,98*	192	90	1
3	30,00	5	*397,11*	192	90	1
4	32,00	6	*425,33*	231	106	1
4	36,00	6	*510,81*	231	106	1
4	40,00	6	*585,06*	250	125	1
4	50,00	6	*900,86*	308	150	1

Bajo demanda / Sur commade / upon request

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3148 HSSE DIN 845 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 35-55	○ 25-30			○ 15-20		○ 38-42	○ 20-24			● 55-95							

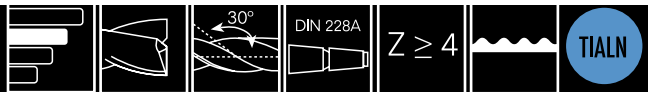
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Δ	Ø mm	Z	€	L mm	l mm	
2	16,00*	4	*151,74*	148	63	1
2	18,00*	4	*161,47*	148	63	1
2	20,00	4	*168,90*	160	75	1
2	22,00	5	*229,38*	160	75	1
3	25,00	5	*265,62*	192	90	1
3	28,00	5	*297,64*	192	90	1

Δ	Ø mm	Z	€	L mm	l mm	
3	30,00	5	*335,83*	192	90	1
4	32,00	6	*363,30*	254	106	1
4	36,00	6	*398,27*	254	106	1
4	40,00	6	*508,88*	273	125	1
5	50,00	8	*768,34*	336	150	1

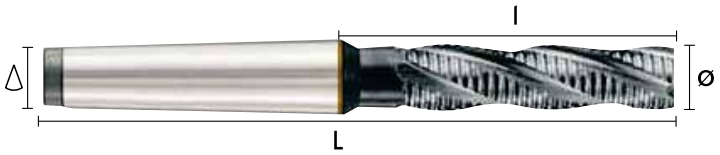
* Hasta fin de existencias / Jusqu'à epuisement des stocks / Until end of stock

3148/1 HSSE DIN 845 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 55-80	● 45-55	○ 35-40		○ 25-35		● 55-60	● 30-35			● 90-140							

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Δ	Ø mm	Z	€	L mm	l mm	
2	20,00	4	*212,43*	160	75	1
2	22,00	5	*226,06*	160	75	1
3	25,00	5	*236,46*	192	90	1
3	28,00	5	*321,14*	192	90	1
3	30,00	5	*371,87*	192	90	1

Δ	Ø mm	Z	€	L mm	l mm	
4	32,00	6	*416,70*	254	106	1
4	36,00	6	*470,16*	254	106	1
4	40,00	6	*508,62*	273	125	1
5	50,00	8	*557,57*	336	150	1

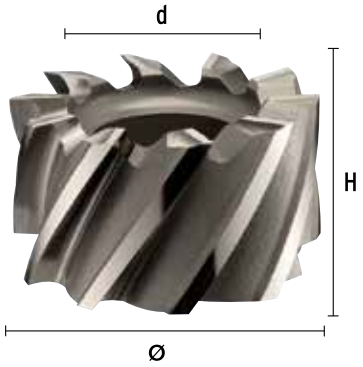
Bajo demanda / Sur commade / upon request

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3149 HSSE DIN 1880 N

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-40	● 15-25			● 10-15			● 20-24			● 30-35				● 10-15			

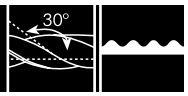
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	Z	d mm	€	H mm	
40,00	6	16	*136,65*	32	1
50,00	8	22	*173,87*	36	1

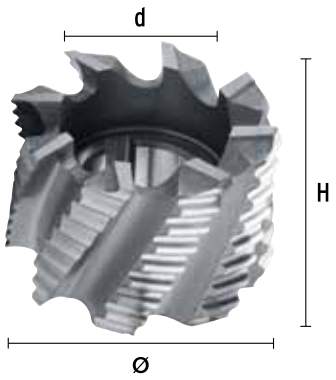
Ø mm	Z	d mm	€	H mm	
63,00	8	27	*236,28*	40	1
80,00	10	27	*346,69*	45	1

3150 HSSE DIN 1880 NR



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 35-50	● 25-35			● 15-20			● 25-30			● 30-35				● 15-20			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

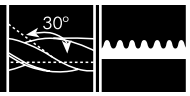


Ø mm	Z	d mm	€	H mm	
40,00	6	16	*205,70*	32	1
50,00	6	22	*255,63*	36	1

Ø mm	Z	d mm	€	H mm	
63,00	8	27	*324,31*	40	1
80,00	8	27	*450,95*	45	1

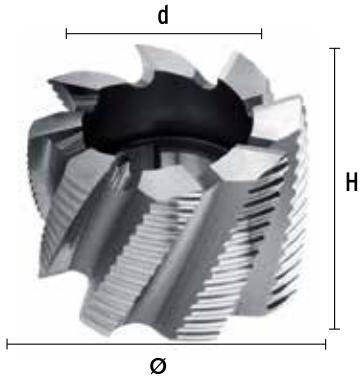
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3165 HSSE DIN 1880 NRF



P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-40	● 15-25	● 15-20		● 10-15		○ 30-35	● 15-25			● 30-100			● 5-15	● 10-15			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	Z	d mm	€	H mm	
40,00	8	16	*250,40*	32	1
50,00	8	22	*311,17*	36	1

Ø mm	Z	d mm	€	H mm	
63,00	10	27	*402,43*	40	1
80,00	10	27	*604,60*	45	1

3151 HSSE DIN 885 B

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-40	● 15-25	● 15-20				● 30-35	● 15-25			● 30-100	● 50-90						

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	e mm	
63,00	18	22	*154,53*	4	1
63,00	18	22	*145,90*	5	1
63,00	18	22	*138,39*	6	1
63,00	18	22	*147,61*	8	1
63,00	18	22	*155,67*	10	1
80,00	20	27	*137,75*	4	1
80,00	20	27	*174,12*	5	1
80,00	20	27	*177,65*	6	1
80,00	20	27	*182,21*	8	1
80,00	20	27	*199,52*	10	1
80,00	20	27	*219,11*	12	1

Ø mm	Z	d mm	€	e mm	
100,00	24	32	*212,19*	6	1
100,00	24	32	*232,94*	8	1
100,00	24	32	*257,17*	10	1
100,00	24	32	*284,85*	12	1
100,00	24	32	*329,83*	14	1
125,00	24	32	*332,13*	6	1
125,00	24	32	*342,50*	8	1
125,00	24	32	*359,80*	10	1
125,00	24	32	*418,60*	12	1
125,00	24	32	*443,99*	14	1
125,00	24	32	*387,72*	16	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3161 HSSE DIN 885 A

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-40	● 15-25	● 15-20		● 10-15		● 30-35	● 15-25			● 30-100	● 50-90			● 10-15			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	e mm	
63,00	18	22	*118,22*	4	1
63,00	18	22	*121,83*	5	1
63,00	18	22	*126,98*	6	1
63,00	18	22	*136,67*	8	1
63,00	18	22	*152,58*	10	1
80,00	20	27	*147,00*	4	1
80,00	20	27	*153,23*	5	1
80,00	20	27	*161,72*	6	1
80,00	20	27	*171,64*	8	1
80,00	18	27	*175,97*	10	1
80,00	18	27	*198,19*	12	1

Ø mm	Z	d mm	€	e mm	
100,00	20	32	*191,91*	6	1
100,00	20	32	*213,16*	8	1
100,00	20	32	*247,12*	10	1
100,00	20	32	*266,46*	12	1
100,00	20	32	*297,27*	14	1
125,00	24	32	*226,64*	6	1
125,00	24	32	*269,86*	8	1
125,00	24	32	*295,77*	10	1
125,00	24	32	*352,77*	12	1
125,00	24	32	*397,51*	14	1
125,00	24	32	*412,09*	16	1

3166 HSSE DIN 1834 A

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-40	● 15-25	● 15-20				● 30-35	● 15-25		● 60-260	● 30-100	● 50-90						

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Z	d mm	€	e mm	
50,00	24	16	*143,10*	1,6	1
50,00	24	16	*139,15*	2	1
50,00	24	16	*141,52*	2,5	1
50,00	24	16	*143,90*	3	1
63,00	28	22	*151,63*	4	1
63,00	28	22	*159,81*	5	1
63,00	28	22	*175,43*	6	1
80,00	32	27	*160,01*	1,6	1
80,00	32	27	*155,43*	2	1
80,00	32	27	*158,03*	2,5	1
80,00	32	27	*162,38*	3	1
80,00	32	27	*174,01*	4	1
80,00	32	27	*194,95*	5	1
80,00	32	27	*206,83*	6	1
100,00	36	32	*191,42*	1,6	1
100,00	36	32	*190,37*	2	1

Ø mm	Z	d mm	€	e mm	
100,00	36	32	*190,22*	2,5	1
100,00	36	32	*193,63*	3	1
100,00	36	32	*208,77*	4	1
100,00	36	32	*221,30*	5	1
100,00	36	32	*248,64*	6	1
100,00	28	32	*274,83*	8	1
125,00	40	32	*242,09*	1,6	1
125,00	40	32	*232,84*	2	1
125,00	40	32	*238,64*	2,5	1
125,00	40	32	*244,43*	3	1
125,00	40	32	*261,87*	4	1
125,00	40	32	*280,31*	5	1
125,00	40	32	*301,18*	6	1
125,00	40	32	*352,10*	8	1
125,00	40	32	*390,25*	10	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3152 HSSE DIN 850 D

DIN 1835B

Tol D (h11) d (h8) l (e8)

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-04	● 15-25						○ 20-24		○ 60-150	● 55-95	○ 60-100						

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	l mm	€	Z	
4,50	6	50	1,00	*55,41*	6	1
7,50	6	50	1,50	*57,68*	6	1
7,50	6	50	2,00	*57,68*	6	1
10,50	6	50	2,00	*62,08*	6	1
10,50	6	50	2,50	*62,08*	6	1
10,50	6	50	3,00	*62,08*	6	1
13,50	10	56	3,00	*63,06*	6	1
13,50	10	56	4,00	*63,06*	6	1
16,50	10	56	3,00	*63,64*	6	1
16,50	10	56	4,00	*63,64*	6	1
16,50	10	56	5,00	*63,64*	6	1
19,50	10	63	4,00	*72,45*	8	1
19,50	10	63	5,00	*72,45*	8	1

Ø mm	d mm	L mm	l mm	€	Z	
19,50	10	63	6,00	*72,45*	8	1
22,50	10	63	5,00	*79,64*	8	1
22,50	10	63	6,00	*79,64*	8	1
22,50	10	63	8,00	*79,64*	8	1
25,50	10	63	6,00	*92,90*	10	1
28,50	10	63	6,00	*94,54*	10	1
28,50	10	63	8,00	*94,54*	10	1
28,50	12	71	10,00	*94,54*	10	1
32,50	12	71	7,00	*117,13*	10	1
32,50	12	71	8,00	*117,13*	10	1
32,50	12	71	10,00	*117,13*	10	1
45,50	12	71	10,00	*185,44*	12	1

3153 HSSE DIN 851 N

DIN 1835B

ISO 3337

Tol D (d11) d (h8) l (d11)

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-04	● 15-25						○ 20-24		○ 60-150	● 55-95	○ 60-100						

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	l mm	€	Z	
11,00	10	53,50	4	*101,84*	6	1
12,50	10	57	6	*105,87*	6	1
16,00	10	62	8	*116,43*	6	1
18,00	12	70	8	*122,60*	8	1

Ø mm	d mm	L mm	l mm	€	Z	
21,00	12	74	9	*135,08*	6	1
25,00	16	82	11	*152,43*	8	1
32,00	16	90	14	*191,75*	8	1
40,00	25	108	18	*266,12*	10	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3154 HSSE DIN 851 N

DIN 228A | ISO 1641 | Tol D (d11) l (d11)

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-04	● 15-25						○ 20-24		○ 60-150	● 55-95	○ 60-100						

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Δ	Ø mm	L mm	l mm	€	Z	
1	18,00	82	8	*136,13*	8	1
2	21,00	102	9	*150,08*	8	1
2	25,00	104	11	*155,57*	8	1
2	32,00	111	14	*231,07*	8	1

Δ	Ø mm	L mm	l mm	€	Z	
3	40,00	138	18	*304,52*	8	1
4	50,00	173	22	*369,80*	8	1
4	60,00	188	28	*534,29*	10	1
5	72,00	229	35	*695,97*	10	1

3155 HSSE DIN 1833 A

DIN 1835B | ISO 3859 | Tol D (js16) d (h8)

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-04	● 15-25						○ 20-24		○ 60-150	● 55-95	○ 60-100						

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	Ang º	L mm	l mm	€	Z	
16,00	12	45	60	4,00	*103,36*	8	1
20,00	12	45	63	5,00	*109,97*	8	1
25,00	12	45	67	6,30	*134,07*	10	1
32,00	16	45	71	8,00	*149,59*	12	1

Ø mm	d mm	Ang º	L mm	l mm	€	Z	
16,00	12	60	60	6,30	*103,36*	8	1
20,00	12	60	63	8,00	*109,97*	8	1
25,00	12	60	67	10,00	*134,07*	10	1
32,00	16	60	71	12,50	*149,59*	12	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3156 HSSE DIN 1833 B

DIN 1835B | ISO 3859 | Tol D (js16) d (h8)

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-04	● 15-25						○ 20-24		○ 60-150	● 55-95	○ 60-100						

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	Ang º	L mm	l mm	€	Z	
16,00	12	45	60	4,00	*83,21*	10	1
20,00	12	45	63	5,00	*93,61*	10	1
25,00	12	45	67	6,30	*105,25*	10	1
32,00	16	45	71	8,00	*119,68*	12	1

Ø mm	d mm	Ang º	L mm	l mm	€	Z	
16,00	12	60	60	6,30	*83,21*	10	1
20,00	12	60	63	8,00	*93,61*	10	1
25,00	12	60	67	10,00	*105,25*	10	1
32,00	16	60	71	12,50	*119,68*	12	1

3164 HSSE DIN 6518 N

DIN 1835B | Tol R (H11) d2 (h6)

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 30-04	● 15-25						○ 20-24										

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	Radio mm	d mm	L mm	€	Z	
8,00	1,00	10	60	*70,17*	4	1
9,20	1,60	10	60	*76,61*	4	1
10,00	2,00	10	60	*76,61*	4	1
11,00	2,50	10	60	*76,61*	4	1
12,00	3,00	12	60	*79,65*	4	1
14,00	4,00	12	60	*86,19*	4	1
16,00	5,00	12	60	*92,40*	4	1
20,00	6,00	16	67	*97,40*	4	1
22,00	7,00	16	71	*119,61*	4	1
24,00	8,00	16	71	*119,61*	4	1

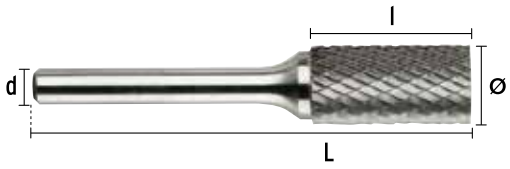
Ø mm	Radio mm	d mm	L mm	€	Z	
26,00	9,00	25	85	*143,99*	4	1
28,00	10,00	25	85	*143,99*	4	1
32,00	11,00	25	90	*159,00*	4	1
34,00	12,00	25	90	*159,00*	4	1
42,00	13,00	25	100	*222,64*	6	1
44,00	14,00	25	100	*222,64*	6	1
46,00	15,00	25	100	*254,61*	6	1
48,00	16,00	25	100	*254,61*	6	1
52,00	18,00	32	112	*287,25*	6	1
56,00	20,00	32	112	*319,05*	6	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3201 Cilíndrica / Cylindrique / Straight

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



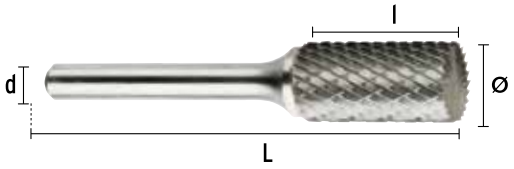
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	12,36	13,59		38	13	1
4,00	4	20,60	22,66		50	13	1
6,00	6	24,18	26,60		50	19	1
8,00	6	30,36	33,40		65	19	1

Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	33,94	37,34	37,53	65	19	1
12,00	6	48,63	53,49	52,84	70	25	1
16,00	6	61,19	67,31	76,58	70	25	1

3202 Cilíndrica con corte / Cylindrique taillée / Straight with cut

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	13,43	14,77		38	13	1
4,00	4	24,64	27,10		50	13	1
6,00	6	26,78	29,46		50	19	1
8,00	6	33,94	37,34		65	19	1

Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	37,35	41,08	44,69	65	19	1
12,00	6	53,65	59,01	66,18	70	25	1
16,00	6	71,56	78,72	87,32	70	25	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3203 Cilíndrica radio / Cylindrique à rayon / Straight radius

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

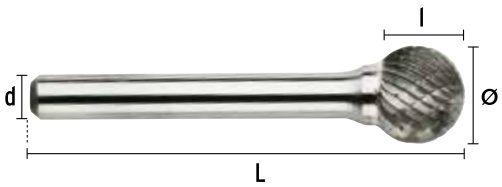
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*13,80*	*15,17*		38	13	1
6,00	3	*22,39*	*24,63*		50	13	1
6,00	6	*27,31*	*30,04*		50	19	1
8,00	6	*32,25*	*35,47*		65	19	1

Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	*35,82*	*39,40*	*43,35*	65	19	1
12,00	6	*54,62*	*60,09*	*68,11*	70	25	1
16,00	6	*67,98*	*74,78*	*92,23*	70	25	1

3204 Esférica / Sphérique / Spherical

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*14,07*	*15,48*		38	2,50	1
6,00	3	*21,19*	*23,31*		44	5,00	1
6,00	6	*25,00*	*27,50*		50	5,00	1
8,00	6	*27,76*	*30,54*		51	6,40	1

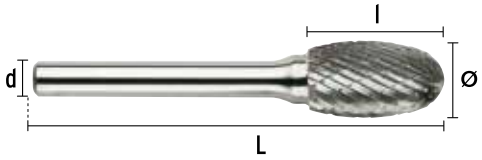
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	*28,46*	*31,30*	*38,96*	53	8,00	1
12,00	6	*38,36*	*42,20*	*50,07*	56	11,00	1
16,00	6	*51,87*	*57,06*	*62,61*	59	14,00	1
19,00	6	*68,96*	*75,85*		61	16,00	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

3205 Oval / Ovale

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



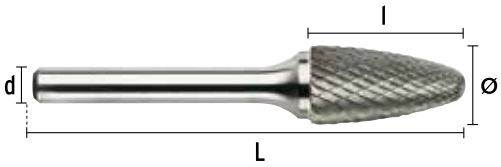
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*15,22*	*16,75*		38	6	1
6,00	3	*21,95*	*29,40*		47	10	1
8,00	6	*30,36*	*33,40*		58	13	1

Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	*34,60*	*38,06*		60	16	1
12,00	6	*46,48*	*51,14*		67	22	1
16,00	6	*69,77*	*76,74*		70	25	1

3206 Árbol con radio / Arbre à rayon / Arc with radius

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*16,99*	*18,69*		38	13	1
6,00	3	*22,39*	*24,63*		50	13	1
10,00	6	*39,80*	*43,78*	*44,69*	65	19	1

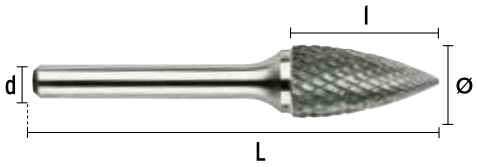
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
12,00	6	*52,83*	*58,11*	*64,22*	70	25	1
16,00	6	*69,24*	*76,16*	*89,48*	70	25	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3207 Árbol / Arbre / Arc

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



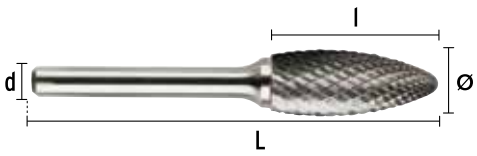
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*16,04*	*17,64*		38	13	1
6,00	3	*23,21*	*25,53*		50	13	1
6,00	6	*28,57*	*31,43*		50	16	1

Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	*38,49*	*42,34*		65	19	1
12,00	6	*49,26*	*54,18*		70	25	1
16,00	6	*68,46*	*75,30*		70	25	1

3208 Llama / Flamme / Flame

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*17,39*	*19,13*		38	6	1
6,00	6	*29,56*	*32,51*		50	13	1

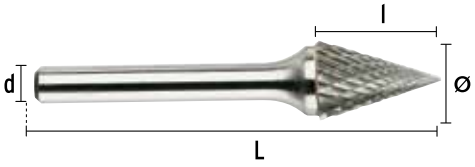
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
8,00	6	*33,91*	*37,30*		65	19	1
12,00	6	*68,69*	*75,56*		77	32	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3209 Cónica / Conique / Tapered

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*15,57*	*17,13*		38	11	1
6,00	6	*25,22*	*27,74*		50	19	1
10,00	6	*33,91*	*37,30*		61	16	1
12,00	6	*47,81*	*52,59*		67	25	1

3210 Cónica 90º / Conique 90º / Tapered 90º

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	*30,04*	*33,05*		50	5	1
16,00	6	*48,61*	*53,47*		53	8	1

3211 Cónica radio / Conique à rayon / Tapered radius

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

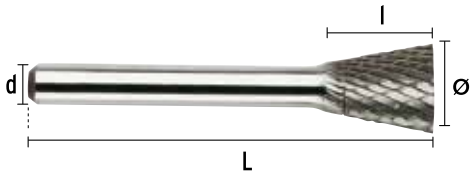
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*17,05*	*18,75*		38	10	1
6,00	6	*29,21*	*32,13*		50	16	1
10,00	6	*43,39*	*47,73*	*52,62*	72	27	1

Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
12,00	6	*51,37*	*56,51*	*62,17*	73	28	1
16,00	6	*81,65*	*89,81*	*124,96*	78	33	1

3212 Cono invertido / Cône inversé / Inverted taper

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



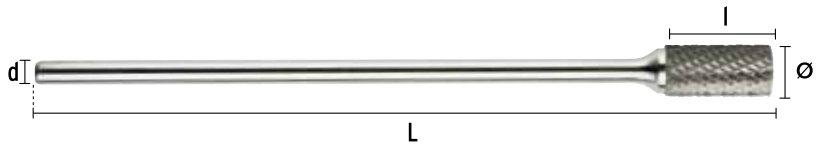
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
3,00	3	*18,24*	*20,07*		38	4	1
6,00	6	*26,42*	*29,07*		50	8	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3214 Cilíndrica L / Cylindrique L / Straight L

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

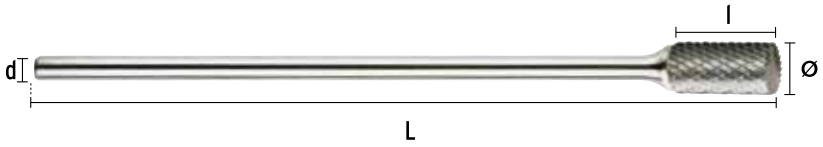


Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	*43,39*	*47,73*		169	19	1

3215 Cilíndrica con corte L / Cylindrique taillée L / Straight with L cut

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

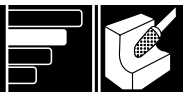
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
6,00	6	*37,40*	*41,14*		162	16	1

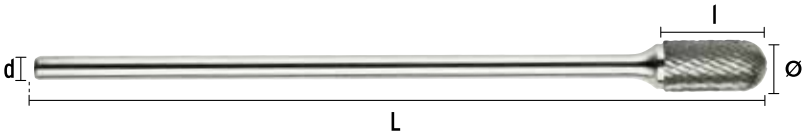
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3216 Cilíndrica radio L / Cylindrique à rayon L / Straight L radius



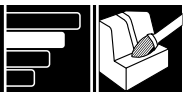
	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



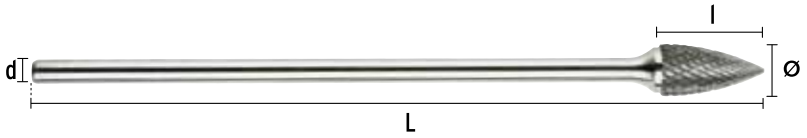
Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
10,00	6	*51,30*	*56,43*		169	19	1
12,00	6	*68,15*	*74,96*		175	25	1

3217 Árbol L / Arbre L / L Arc



	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

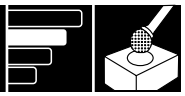
Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
12,00	6	*67,73*	*74,50*		175	25	1

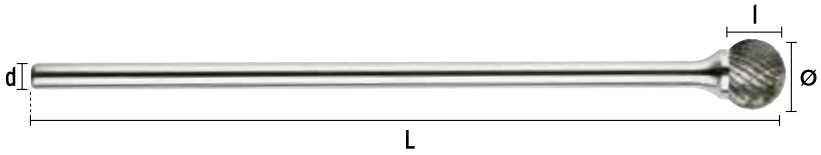
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

3218 Esférica L / Sphérique L / L Spherical



	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

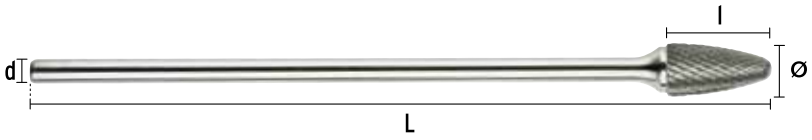


Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
12,00	6	*53,48*	*58,82*		161	11	1

3219 Árbol radio L / Arbre à rayon L / L Radius arc

	P				M		K			N				S		H		
	<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
CRUZ	● 400-800	● 400-800	○ 300-700		● 600-1000	○ 400-800	● 500-800	● 400-800			● 400-800	● 400-800		○ 400-800	● 600-1000			
DIAM	○ 400-800	● 400-800	● 300-700	● 300-700	○ 600-1000	● 400-800	● 500-800	● 400-800	● 300-700		○ 300-800		○ 300-700	● 300-800	● 300-1000	● 200-600	● 200-600	
ALU										● 300-1000	● 300-700	○ 400-1000	● 400-1000					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	CRUZ €	DIAM €	ALU €	L mm	l mm	
12,00	6	*74,49*	*74,13*		175	25	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

7172 HSS

L=30

WELDON 19

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 15-25						○ 20-30	○ 15-20		● 40-50	○ 15-50	○ 20-25	○ 40-50					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
12,00	19	30	*33,08*	1
13,00	19	30	*33,08*	1
14,00	19	30	*33,93*	1
15,00	19	30	*35,31*	1
16,00	19	30	*36,55*	1
17,00	19	30	*37,94*	1
18,00	19	30	*42,66*	1
19,00	19	30	*43,51*	1
20,00	19	30	*45,29*	1
21,00	19	30	*48,50*	1
22,00	19	30	*50,60*	1
23,00	19	30	*52,37*	1
24,00	19	30	*54,34*	1
25,00	19	30	*56,18*	1
26,00	19	30	*57,75*	1
27,00	19	30	*62,28*	1
28,00	19	30	*62,35*	1
29,00	19	30	*64,64*	1
30,00	19	30	*66,29*	1
31,00	19	30	*72,32*	1
32,00	19	30	*81,38*	1
33,00	19	30	*82,49*	1
34,00	19	30	*96,14*	1
35,00	19	30	*105,99*	1
36,00	19	30	*108,61*	1

Ø mm	d mm	L mm	€	
37,00	19	30	*114,85*	1
38,00	19	30	*116,49*	1
39,00	19	30	*120,89*	1
40,00	19	30	*123,84*	1
41,00	19	30	*128,89*	1
42,00	19	30	*135,85*	1
43,00	19	30	*138,80*	1
44,00	19	30	*148,64*	1
45,00	19	30	*153,50*	1
46,00	19	30	*156,65*	1
47,00	19	30	*161,90*	1
48,00	19	30	*169,58*	1
49,00	19	30	*172,14*	1
50,00	19	30	*176,40*	1
51,00	19	30	*177,45*	1
52,00	19	30	*178,64*	1
53,00	19	30	*179,81*	1
54,00	19	30	*182,90*	1
55,00	19	30	*186,64*	1
56,00	19	30	*190,71*	1
57,00	19	30	*194,65*	1
58,00	19	30	*198,85*	1
59,00	19	30	*203,11*	1
60,00	19	30	*206,85*	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

7172 HSS

L=50

WELDON 19

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 15-25						○ 20-30	○ 15-20		● 40-50	○ 15-50	○ 20-25	○ 40-50					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
12,00	19	50	*51,25*	1
13,00	19	50	*52,30*	1
14,00	19	50	*54,66*	1
15,00	19	50	*55,00*	1
16,00	19	50	*55,19*	1
17,00	19	50	*56,76*	1
18,00	19	50	*62,94*	1
19,00	19	50	*64,90*	1
20,00	19	50	*67,99*	1
21,00	19	50	*72,85*	1
22,00	19	50	*75,27*	1
23,00	19	50	*80,26*	1
24,00	19	50	*82,82*	1
25,00	19	50	*83,09*	1
26,00	19	50	*85,25*	1
27,00	19	50	*89,19*	1
28,00	19	50	*93,06*	1
29,00	19	50	*96,93*	1
30,00	19	50	*101,20*	1
31,00	19	50	*106,11*	1
32,00	19	50	*110,97*	1
33,00	19	50	*116,49*	1
34,00	19	50	*120,89*	1
35,00	19	50	*125,87*	1
36,00	19	50	*131,65*	1

Ø mm	d mm	L mm	€	
37,00	19	50	*133,75*	1
38,00	19	50	*138,80*	1
39,00	19	50	*148,64*	1
40,00	19	50	*159,54*	1
41,00	19	50	*161,24*	1
42,00	19	50	*170,10*	1
43,00	19	50	*175,29*	1
44,00	19	50	*180,08*	1
45,00	19	50	*207,77*	1
46,00	19	50	*223,00*	1
47,00	19	50	*237,96*	1
48,00	19	50	*245,64*	1
49,00	19	50	*248,06*	1
50,00	19	50	*249,31*	1
51,00	19	50	*249,84*	1
52,00	19	50	*251,09*	1
53,00	19	50	*252,53*	1
54,00	19	50	*257,25*	1
55,00	19	50	*260,80*	1
56,00	19	50	*262,37*	1
57,00	19	50	*268,54*	1
58,00	19	50	*269,91*	1
59,00	19	50	*274,45*	1
60,00	19	50	*277,07*	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

7137 HSSE

L=30

WELDON 19

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 25-45	● 20-25	○ 15-20		○ 15-20		● 30-35	● 25-30		● 50-60	● 25-60	● 30-35	○ 50-60					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
12,00	19	30	*45,45*	1
13,00	19	30	*45,45*	1
14,00	19	30	*45,45*	1
15,00	19	30	*52,43*	1
16,00	19	30	*55,78*	1
17,00	19	30	*57,33*	1
18,00	19	30	*60,56*	1
19,00	19	30	*64,04*	1
20,00	19	30	*67,27*	1
21,00	19	30	*70,78*	1
22,00	19	30	*74,01*	1
23,00	19	30	*76,35*	1
24,00	19	30	*79,59*	1
25,00	19	30	*83,07*	1
26,00	19	30	*84,90*	1
27,00	19	30	*86,40*	1
28,00	19	30	*89,47*	1
29,00	19	30	*92,81*	1
30,00	19	30	*95,88*	1
31,00	19	30	*108,20*	1
32,00	19	30	*111,55*	1
33,00	19	30	*126,70*	1
34,00	19	30	*130,38*	1
35,00	19	30	*134,36*	1
36,00	19	30	*138,04*	1

Ø mm	d mm	L mm	€	
37,00	19	30	*142,04*	1
38,00	19	30	*145,72*	1
39,00	19	30	*149,71*	1
40,00	19	30	*153,39*	1
41,00	19	30	*157,38*	1
42,00	19	30	*161,06*	1
43,00	19	30	*165,05*	1
44,00	19	30	*168,72*	1
45,00	19	30	*172,71*	1
46,00	19	30	*176,40*	1
47,00	19	30	*180,38*	1
48,00	19	30	*184,07*	1
49,00	19	30	*188,06*	1
50,00	19	30	*191,74*	1
55,00	19	30	*211,06*	1
60,00	19	30	*230,08*	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

7137 HSSE

L=50

WELDON 19

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 25-45	● 20-25	○ 15-20		○ 15-20		● 30-35	● 25-30		● 50-60	● 25-60	● 30-35	○ 50-60					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
12,00	19	50	*55,22*	1
13,00	19	50	*59,82*	1
14,00	19	50	*64,42*	1
15,00	19	50	*69,03*	1
16,00	19	50	*73,63*	1
17,00	19	50	*78,24*	1
18,00	19	50	*82,83*	1
19,00	19	50	*87,44*	1
20,00	19	50	*92,03*	1
21,00	19	50	*96,63*	1
22,00	19	50	*101,23*	1
23,00	19	50	*105,84*	1
24,00	19	50	*110,44*	1
25,00	19	50	*115,05*	1
26,00	19	50	*119,65*	1
27,00	19	50	*124,26*	1
28,00	19	50	*128,85*	1
29,00	19	50	*133,44*	1
30,00	19	50	*138,04*	1
31,00	19	50	*142,65*	1
32,00	19	50	*147,25*	1
33,00	19	50	*151,86*	1
34,00	19	50	*156,46*	1
35,00	19	50	*161,06*	1
36,00	19	50	*165,66*	1

Ø mm	d mm	L mm	€	
37,00	19	50	*170,26*	1
38,00	19	50	*174,86*	1
39,00	19	50	*179,47*	1
40,00	19	50	*184,07*	1
41,00	19	50	*188,67*	1
42,00	19	50	*193,27*	1
43,00	19	50	*197,87*	1
44,00	19	50	*202,47*	1
45,00	19	50	*207,07*	1
46,00	19	50	*211,67*	1
47,00	19	50	*216,28*	1
48,00	19	50	*220,88*	1
49,00	19	50	*225,49*	1
50,00	19	50	*230,08*	1
51,00	19	50	*234,69*	1
52,00	19	50	*239,28*	1
53,00	19	50	*243,88*	1
54,00	19	50	*248,48*	1
55,00	19	50	*253,09*	1
56,00	19	50	*257,69*	1
57,00	19	50	*262,30*	1
58,00	19	50	*266,89*	1
59,00	19	50	*271,50*	1
60,00	19	50	*276,10*	1

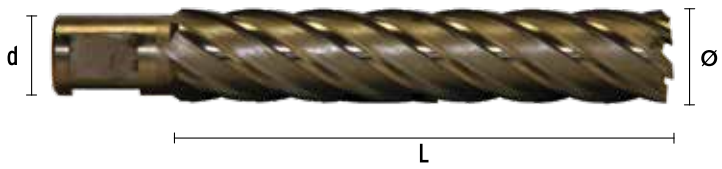
P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

7137 HSSE

L=110 | WELDON 19

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 25-45	● 20-25	○ 15-20		○ 15-20		● 30-35	● 25-30		● 50-60	● 25-60	● 30-35	○ 50-60					

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative



Ø mm	d mm	L mm	€	
20,00	19	110	*146,09*	1
22,00	19	110	*152,34*	1
24,00	19	110	*160,84*	1
25,00	19	110	*166,94*	1
26,00	19	110	*181,76*	1
28,00	19	110	*196,33*	1

Ø mm	d mm	L mm	€	
30,00	19	110	*208,66*	1
32,00	19	110	*224,87*	1
35,00	19	110	*239,03*	1
40,00	19	110	*322,11*	1
45,00	19	110	*405,18*	1
50,00	19	110	*474,05*	1

7138 HSSE

L=30 | WELDON 19 | TIALN

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 40-55	● 30-40	● 20-25	○ 15-20	● 20-25	○ 15-20	● 45-55	● 40-50	○ 15-20	● 60-70	● 20-70	● 45-55	○ 60-70	○ 10-15	● 15-25			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
12,00	19	30	*83,39*	1
13,00	19	30	*83,39*	1
14,00	19	30	*83,39*	1
15,00	19	30	*86,87*	1
16,00	19	30	*86,87*	1
17,00	19	30	*93,61*	1
18,00	19	30	*97,08*	1
19,00	19	30	*99,04*	1
20,00	19	30	*102,95*	1
21,00	19	30	*110,32*	1
22,00	19	30	*115,10*	1
23,00	19	30	*119,24*	1
24,00	19	30	*123,57*	1
25,00	19	30	*128,35*	1
26,00	19	30	*133,14*	1
27,00	19	30	*137,71*	1
28,00	19	30	*142,04*	1
29,00	19	30	*146,60*	1
30,00	19	30	*150,74*	1
31,00	19	30	*164,63*	1

Ø mm	d mm	L mm	€	
32,00	19	30	*176,37*	1
33,00	19	30	*187,66*	1
34,00	19	30	*199,15*	1
35,00	19	30	*205,89*	1
36,00	19	30	*216,75*	1
37,00	19	30	*234,56*	1
38,00	19	30	*245,42*	1
39,00	19	30	*256,27*	1
40,00	19	30	*264,97*	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

7138 HSSE

L=50 | WELDON 19 | TIALN

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
● 40-55	● 30-40	● 20-25	○ 15-20	● 20-25	○ 15-20	● 45-55	● 40-50	○ 15-20	● 60-70	● 20-70	● 45-55	○ 60-70	○ 10-15	● 15-25			

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
12,00	19	50	*111,41*	1
13,00	19	50	*111,41*	1
14,00	19	50	*111,41*	1
15,00	19	50	*120,98*	1
16,00	19	50	*129,44*	1
17,00	19	50	*134,23*	1
18,00	19	50	*144,21*	1
19,00	19	50	*147,90*	1
20,00	19	50	*155,51*	1
21,00	19	50	*167,01*	1
22,00	19	50	*172,44*	1
23,00	19	50	*178,31*	1
24,00	19	50	*183,96*	1
25,00	19	50	*189,83*	1
26,00	19	50	*195,24*	1
27,00	19	50	*204,15*	1
28,00	19	50	*213,05*	1
29,00	19	50	*223,70*	1
30,00	19	50	*232,39*	1
31,00	19	50	*243,24*	1

Ø mm	d mm	L mm	€	
32,00	19	50	*247,59*	1
33,00	19	50	*258,45*	1
34,00	19	50	*267,15*	1
35,00	19	50	*278,01*	1
36,00	19	50	*286,68*	1
37,00	19	50	*299,72*	1
38,00	19	50	*308,41*	1
39,00	19	50	*317,10*	1
40,00	19	50	*334,47*	1
45,00	19	50	*397,47*	1
50,00	19	50	*503,86*	1

P Aceros Aciers Steels
M Aceros Inox Aciers Inox Stainless Steels
K Fundicion Fonte Cast Iron
N Metales no ferrosos Métal non Ferraux Non Ferrous metals
S Titanio y Superaleaciones Titanium et Supealliages Titanium and Superalloys
H Materiales Duros Materiels Durs Hard materials

7139 TCT — L=35 — WELDON 19

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	○	●	●	●	○	●	○	○	●	●	●	○	
40-65	30-40	20-25	15-20	20-30	15-20	50-60	45-55	15-20	70-90	40-90	50-60	70-90	15-20	15-30	20-25	15-20	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
18,00	19	35	*168,28*	1
19,00	19	35	*168,28*	1
20,00	19	35	*168,28*	1
21,00	19	35	*168,28*	1
22,00	19	35	*171,28*	1
23,00	19	35	*171,28*	1
24,00	19	35	*172,75*	1
25,00	19	35	*172,75*	1
26,00	19	35	*174,55*	1

Ø mm	d mm	L mm	€	
27,00	19	35	*174,55*	1
28,00	19	35	*174,55*	1
29,00	19	35	*174,55*	1
30,00	19	35	*179,01*	1
31,00	19	35	*179,01*	1
32,00	19	35	*179,01*	1
33,00	19	35	*179,01*	1
34,00	19	35	*179,01*	1
35,00	19	35	*193,01*	1

7139 TCT — L=50 — WELDON 19

P				M		K			N				S		H		
<800	<1.000	<1.200	<1.400	<950	<1.200	<500	<800	<1.400	Al	Cu	Mg/Zn	Plastic	Ni	Ti	50 HRC	55 HRC	60 HRC
●	●	●	●	●	○	●	●	●	○	●	○	○	●	●	●	○	
40-65	30-40	20-25	15-20	20-30	15-20	50-60	45-55	15-20	70-90	40-90	50-60	70-90	15-20	15-30	20-25	15-20	

Vc (m/min). ● Optima / Optimun ○ Alternativo / Alternative

Ø mm	d mm	L mm	€	
18,00	19	50	*180,51*	1
19,00	19	50	*180,51*	1
20,00	19	50	*180,51*	1
21,00	19	50	*180,51*	1
22,00	19	50	*183,77*	1
23,00	19	50	*183,77*	1
24,00	19	50	*185,26*	1
25,00	19	50	*185,26*	1
26,00	19	50	*186,76*	1
27,00	19	50	*186,76*	1
28,00	19	50	*186,76*	1
29,00	19	50	*186,76*	1
30,00	19	50	*191,52*	1
31,00	19	50	*191,52*	1
32,00	19	50	*191,52*	1
33,00	19	50	*191,52*	1
34,00	19	50	*191,52*	1

Ø mm	d mm	L mm	€	
35,00	19	50	*205,22*	1
36,00	19	50	*205,22*	1
37,00	19	50	*205,22*	1
38,00	19	50	*205,22*	1
39,00	19	50	*205,22*	1
40,00	19	50	*231,74*	1
41,00	19	50	*231,74*	1
42,00	19	50	*231,74*	1
43,00	19	50	*231,74*	1
44,00	19	50	*231,74*	1
45,00	19	50	*231,74*	1
46,00	19	50	*306,79*	1
47,00	19	50	*306,79*	1
48,00	19	50	*306,79*	1
49,00	19	50	*306,79*	1
50,00	19	50	*306,79*	1

P Aceros / Aciers / Steels
M Aceros Inox / Aciers Inox / Stainless Steels
K Fundicion / Fonte / Cast Iron
N Metales no ferrosos / Métal non Ferraux / Non Ferrous metals
S Titanio y Superaleaciones / Titanium et Supealliages / Titanium and Superalloys
H Materiales Duros / Materiels Durs / Hard materials

Accesorios / Accessoires / Accessories

7140 Cono Morse / Cône Morse / Morse taper

△	€	L mm
Nº 2	*320,89*	180
Nº 3	*320,89*	185

7141 Punzón / Poinçon / Puncher

Ref.	€	Ø mm	L mm	L Fresa L Fraise Cutting L
7137-7138-7172	*19,19*	6,35	77	30
	19,19	6,35	87	35
	19,19	6,35	102	50
	24,22	8,00	160	110
7139	*19,19*	8,00	87	35
	19,19	8,00	102	50

7158 Adaptador para Taladros Fein / Adaptateur pour perceuses Fein / Adaptor for Fein drills

€	*105,92*

3138 Ø 4 a 12 mm

Ø mm 4-5-6 8-10-12 | 2z

REF	€
HSS E	*128,54*
HSS E TIALN	*179,96*

3139 Ø 4 a 12 mm

Ø mm 6-8 10-12 | 3z

REF	€
HSS E	*156,03*
HSS E TIALN	*218,44*

3140 Ø 4 a 12 mm

Ø mm 4-5-6 8-10-12 | 4z

REF	€
HSS E	*135,75*
HSS E TIALN	*190,06*

3220 10 PCS

10 CRUZ

Ref.	Ø mm	d mm	L mm	l mm
3201	10,00	6	65	19
3201	12,00	6	70	25
3203	10,00	6	65	19
3203	12,00	6	70	25
3204	10,00	6	53	9
3205	10,00	6	60	16
3206	12,00	6	70	25
3207	10,00	6	65	19
3207	12,00	6	70	25
3211	12,00	6	75	30
			€	*429,57*

3221 5 PCS

5 CRUZ

Ref.	Ø mm	d mm	L mm	l mm
3201	12,00	6	70	25
3203	12,00	6	70	25
3207	12,00	6	70	25
3211	12,00	6	75	30
3206	12,00	6	75	30
			€	*258,26*

7168 7 PCS L = 25 — 7

Ref.	Ø mm	d mm	L mm	Pcs.
7137	12	19	25	1
7137	14	19	25	1
7137	16	19	25	1
7137	18	19	25	1
7137	20	19	25	1
7137	22	19	25	1
7141	6,35		77	1
			€	415,96

7169 7 PCS L = 50 — 7

Ref.	Ø mm	d mm	L mm	Pcs.
7137	12	19	50	1
7137	14	19	50	1
7137	16	19	50	1
7137	18	19	50	1
7137	20	19	50	1
7137	22	19	50	1
7141	6,35		102	1
			€	536,79