

MILLIM



# WORKING FOR YOUR SUCCESS

Since 1952



HELION TOOLS S.L. is owned by Molins family with more than 70 years of experience in the machining industry. *HELION TOOLS S.L. es una empresa propiedad de la Familia Molins con más de 70 años de experiencia en el sector del mecanizado.*

**They offer solutions and collaborate back-to-back with their partners.**

Since its foundation in 1952, it has grown continuously with the attitude and business philosophy of: "We work for your success". The success of its customers is Helion's number one priority.

**Specialist in the manufacturing of cutting tools**

within its main market segment: endmills, drills and taps in the production facility in Manresa – Spain, a wholly-owned cutting tools production site at full capacity to serve both nationally and to another 23 countries.

**Cutting tools in stock and its flexibility in producing**

translates into immediate deliveries of purchase orders.

Thanks to its means of production, Helion Tools can ensure an optimal and agile service level to meet supply needs. Helion Tools brand guarantees products are developed, tested and commercialized with its factory.

**Helion Tools is a relationship-driven company.**

In its opinion, the most important resource is people. This is remarked and identifies its business culture while guaranteeing a solid foundation for its future.

Upright behavior is a deep-rooted value among Helion Tools. It is the commitment from both the company and its partners to carry out a fair competition within the market under the premise of respect, equity and forging their own future.

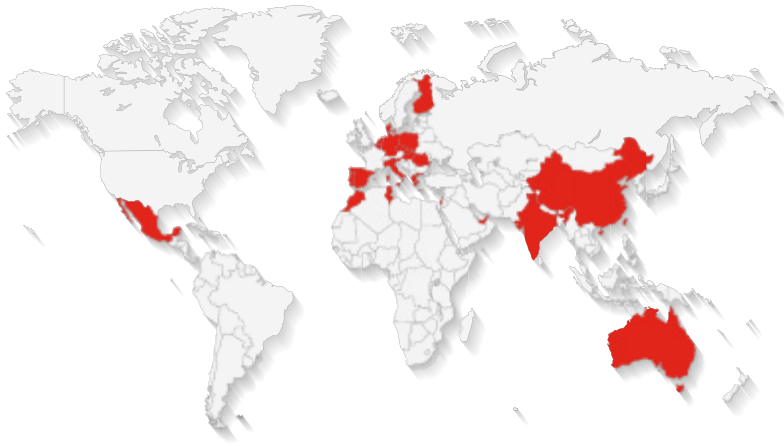
**Nowadays, there must be a sense of great responsibility**

towards society and the environment. They are convinced that the only way to be successful in the long term is to take always this factor into account. For this reason, Helion Tools uses natural resources in an efficient way, avoids contaminating and disposes of waste in an adequate manner.

**"Each obstacle is a new challenge that encourages us to keep growing as we remain in the vanguard of state-of-the-art technologies, changing automation processes and the passion that keeps as all together for the mechanization sector...let's move forward together!"** Josep Ma. Molins Pujol - President



AUSTRALIA / BELGIUM / CHINA / CZECH REPUBLIC / DENMARK / FINLAND / FRANCE / GREECE / HUNGARY  
/ INDIA / ISRAEL / ITALY / MEXICO / MOROCCO / NETHERLANDS / POLAND / PORTUGAL / ROMANIA /  
SLOVAKIA / SLOVENIA / SPAIN / TUNISIA / UNITED ARAB EMIRATES



Production facility located in Manresa – Spain, a wholly-owned cutting tools production site at full capacity to serve both nationally and to another 23 countries. *Planta de producción en Manresa – España, una producción propia de herramientas a pleno rendimiento en diferentes sectores industriales del país y una red de distribuidores con presencia en 23 países.*

**Ofrece soluciones y acompaña a sus colaboradores en el proceso.** Desde su fundación en el año 1952, ha crecido continuamente con la actitud de su filosofía de negocio: “Trabajamos para su éxito”. El triunfo de sus clientes es lo mejor que les puede pasar.

**Especialistas en la fabricación de herramientas de corte** en su segmento principal de fresas, brocas y herramientas de rosca en la planta de producción en Manresa – España, una producción propia de herramientas a pleno rendimiento en diferentes sectores industriales del país y una red de distribuidores con presencia en 23 países.

**Herramientas en stock y flexibilidad en la producción** que se traduce en la entrega inmediata de las órdenes de pedido. Disponen de medios de producción propios que aseguran un óptimo nivel de servicio y agilidad en el suministro. La marca Helion Tools, es 100% garante de productos desarrollados, probados y comercializados en su fábrica.

**Helion Tools es una empresa cercana** y convencida que el recurso más importante son las personas,

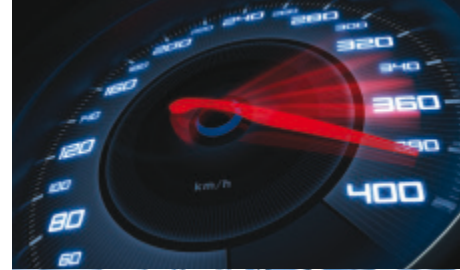
hecho que identifica a su cultura empresarial y les garantiza una sólida base de futuro.

**La conducta íntegra tiene para Helion Tools un gran valor,** es su compromiso y el de sus colaboradores llevar a cabo una competencia leal en el mercado bajo la premisa de respeto, equidad y proyección de futuro.

**Conscientes que hoy más que nunca tienen una gran responsabilidad** frente a la sociedad y el medio ambiente al estar convencidos de que el éxito a largo plazo dependerá de ello, de esta manera, disponen de los recursos naturales de forma eficiente, previniendo la contaminación y gestionando los residuos de forma adecuada.












**“Cada dificultad es un nuevo reto que nos proyecta a continuar creciendo al mantenernos a la vanguardia de las nuevas tecnologías, crecientes procesos de automatización y la pasión que nos une por el sector del mecanizado... avancemos juntos!”**

**Josep Ma. Molins Pujol** - Presidente









# MILL LINE INDEX

Índice de fresado

Code.	Picture	Description	Page	Ø Range (mm)	Helix angle	Coat.	600	HRC	HRC		
							1200 N/mm <sup>2</sup>	45	62	70	75
90.6221		BALL NOSE Z2	26	0,5 - 12	35°	RACER	●	●	○		
90.6226		BALL NOSE EXTRA LONG Z2	27	2 - 16	30°	RACER	●	●	●		
82.7220		BALL NOSE EXTRA LONG Z2	27	6 - 12	30°	RACER	●	●	●		
90.6702		SQUARE Z2	28	1 - 12	30°	RACER	●	●			
90.6202		SQUARE Z2	29	0,1 - 20	35°	RACER	●	●	○		
90.6204		SQUARE LONG Z2	31	3 - 16	35°	RACER	●	●	○		
90.6704		SQUARE Z4	32	3 - 12	30°	RACER	●	●	○		
90.6402		SQUARE Z4	33	1 - 20	35°	RACER	●	●	○		
90.6404		SQUARE LONG Z4	35	4 - 20	35°	RACER	●	●	○		
90.6811		CORNER RADIUS LONG NECK Z2	36	0,5 - 6	30°	RACER	●	●	●		
90.6815		CORNER RADIUS LONG NECK Z4	38	1 - 6	30°	RACER	●	●	●		
90.6412		CORNER RADIUS Z4	40	2 - 16	30°	RACER PLUS	●	●	●		
90.6413		CORNER RADIUS LONG Z4	41	6 - 16	30°	RACER PLUS	●	●	●		
90.5572		TROCHOIDAL Z5	42	6 - 20	40°	RACER PLUS	●	●			
90.6572		SUPER FINISHING Z5 -Z6	43	3 - 20	40° - 42°	RACER PLUS	●	●	●		
91.6424		BALL NOSE Z4	46	6 - 12	42°	VOLCANO	●	●			
91.6302		SQUARE END MILL Z3	47	1 - 12	42°	VOLCANO	●	●			
91.1479		SQUARE END MILL Z4	48	3 - 20	35° - 38°	VOLCANO	●	●			
91.5479		SQUARE END MILL Z4	49	3 - 20	40°	VOLCANO PLUS	●	●			

● First choice ○ Suitable

	Stainless M	Cast Iron K	Non Ferrous N	Graphite G	Super Alloy S	Pulvemetallurgic PM	HSC High Speed Cutting	HHC High Hard Cutting	HPC High Performance Cutting	Full Slot 	Side Milling 	Copy 	Interpolation 	Ramping 	Trochoidal 
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# MILL LINE INDEX

Índice de fresado



















	Code.	Picture	Description	Page	Ø Range (mm)	Helix angle	Coat.	600	HRC	HRC		
								1200	45	62	70	75
							N/mm <sup>2</sup>					
HELITOP	91.4472		SQUARE END MILL Z4	50	6 - 20	45°	VOLCANO GOLD	●	●			
	91.6410		CORNER RADIUS Z4	51	4 - 12	42°	VOLCANO	●	●			
	91.6614		ROUGHING END MILL Z4 - Z5	52	5 - 20	42°	VOLCANO	●	●			
	91.6505		MULTIFLUTES EXTRA LONG Z4 - Z6	53	3 - 32	45°	VOLCANO PLUS	●	●	●		
HELI-MOTION	92.6228		BALL NOSE TAPER NECK Z2	56	1 - 12	30°	DEEP BLUE	●	●	●	●	
	92.6220		BALL NOSE Z2	57	0,5 - 12	30°	DEEP BLUE	○	●	●	●	
	92.6224		BALL NOSE LONG Z2	58	1 - 12	30°	DEEP BLUE	○	●	●	●	
	82.6228		BALL NOSE TAPER NECK Z2	59	1,5 - 12	30°	RACER PLUS	○	●	●		
	82.6227		BALL NOSE TAPER NECK Z2	60	1 - 4	30°	RACER PLUS	○	●	●		
	82.6229		BALL NOSE TAPER NECK Z2	61	2 - 4	30°	RACER PLUS	○	●	●		
	92.6823		BALL NOSE LONG NECK Z2	62	0,1 - 5	30°	DEEP BLUE	○	●	●	●	
	92.7534		BARREL CONICAL MILL Z6	65	4 - 8	30°	DEEP BLUE	●	●	●		
	92.6403		SQUARE END MILL Z4	66	1 - 16	45°	DEEP BLUE	○	●	●	●	
	82.6217		CORNER RADIUS TAPER NECK Z2	67	1 - 12	30°	RACER PLUS	○	●	●		
	92.6813		CORNER RADIUS LONG NECK Z2	68	0,2 - 6	30°	DEEP BLUE	○	●	●	●	
	92.6415		CORNER RADIUS Z4	70	3 - 12	30°	DEEP BLUE	○	●	●	●	
	92.6783		HIGH FEED END MILL Z4 - Z6	72	3 - 16	30°	DEEP BLUE	●	●	●	●	
	92.6505		FINISHING END MILL Z6 - Z8	73	3 - 25	45°	DEEP BLUE	○	●	●	●	
	HELIHARD	93.1824		CBN BALL NOSE Z2	76	1 - 6	30°	CBN SOLID			●	●
93.1810			CBN CORNER RADIUS Z2	77	1 - 6	30°	CBN SOLID			●	●	●

● First choice ○ Suitable









# MILL LINE INDEX

Índice de fresado

Code.	Picture	Description	Page	Ø Range (mm)	Helix angle	Coat.	600	HRC	HRC			
							1200	45	62	70	75	
							N/mm <sup>2</sup>					
HELIALU	94.3223	 <b>NEW</b>	BALL NOSE END MILL Z2	80	1 - 12	45°	SPEED					
	94.0100	 <b>NEW</b>	SQUARE END MILL Z1	81	3 - 12	30°	BRIGHT					
	94.0201	 <b>NEW</b>	SQUARE END MILL Z2	82	3 - 20	45°	BRIGHT					
	94.3203	 <b>NEW</b>	SQUARE END MILL Z2	83	3 - 20	45°	SPEED ZR					
	94.3302	 <b>NEW</b>	SQUARE END MILL Z3	84	3 - 25	43° - 47°	SPEED ZR					
	94.3409	 <b>NEW</b>	SQUARE END MILL Z4	85	3 - 20	43° - 47°	SPEED ZR					
	94.3213	 <b>NEW</b>	CORNER RADIUS Z2	86	1 - 12	45°	SPEED					
	94.3535	 <b>NEW</b>	END MILL FINISHING Z6	87	6 - 20	45°	SPEED ZR					
	HELIDIAMOND	96.8822	 <b>NEW</b>	BALL NOSE END MILL DIAMOND Z2	90	0,2 - 12	30°	DIAMOND				
96.8814		 <b>NEW</b>	CORNER RADIUS END MILL DIAMOND Z2	92	0,2 - 6	30°	DIAMOND					
96.8415		 <b>NEW</b>	CORNER RADIUS END MILL DIAMOND Z4	96	2 - 12	30°	DIAMOND					
MULTILINE	70.6480	 <b>NEW</b>	SC QUADRANT ROUND MILL Z4	100	R 0,2 - 10	-	RACER	●	●	○		
	70.6045	 <b>NEW</b>	TWIN DEBURRING TOOL 90° Z4	101	2 - 16	-	RACER	●	●	○		
	70.6160	 <b>NEW</b>	END MILL GRAVER 60° Z1	102	3 - 6	30°	RACER	●	●	○		
	90.6460	 <b>NEW</b>	DEBURRING TOOL 60° Z4- Z6	103	4 - 20	-	RACER PLUS	●	●	○		
	90.6490	 <b>NEW</b>	DEBURRING TOOL 90° Z3-Z6	104	1 - 20	-	RACER PLUS	●	●	○		
	85.0050	 <b>NEW</b>	SLITTING SAW FINE PITCH DIN 1837 A	106	15 - 200	-	BRIGHT	●	●	○		
85.0051	 <b>NEW</b>	SLITTING SAW COARSE PITCH DIN 1838 B	110	15 - 200	-	BRIGHT	●	●	○			











● First choice ○ Suitable









	Stainless M	Cast Iron K	Non Ferrous N	Graphite	Super Alloy S	Pulvmetallurgic PM	HSC High Speed Cutting	HHC High Hard Cutting	HPC High Performance Cutting	Full Slot 	Side Milling 	Copy 	Interpolation 	Ramping 	Trochoidal 
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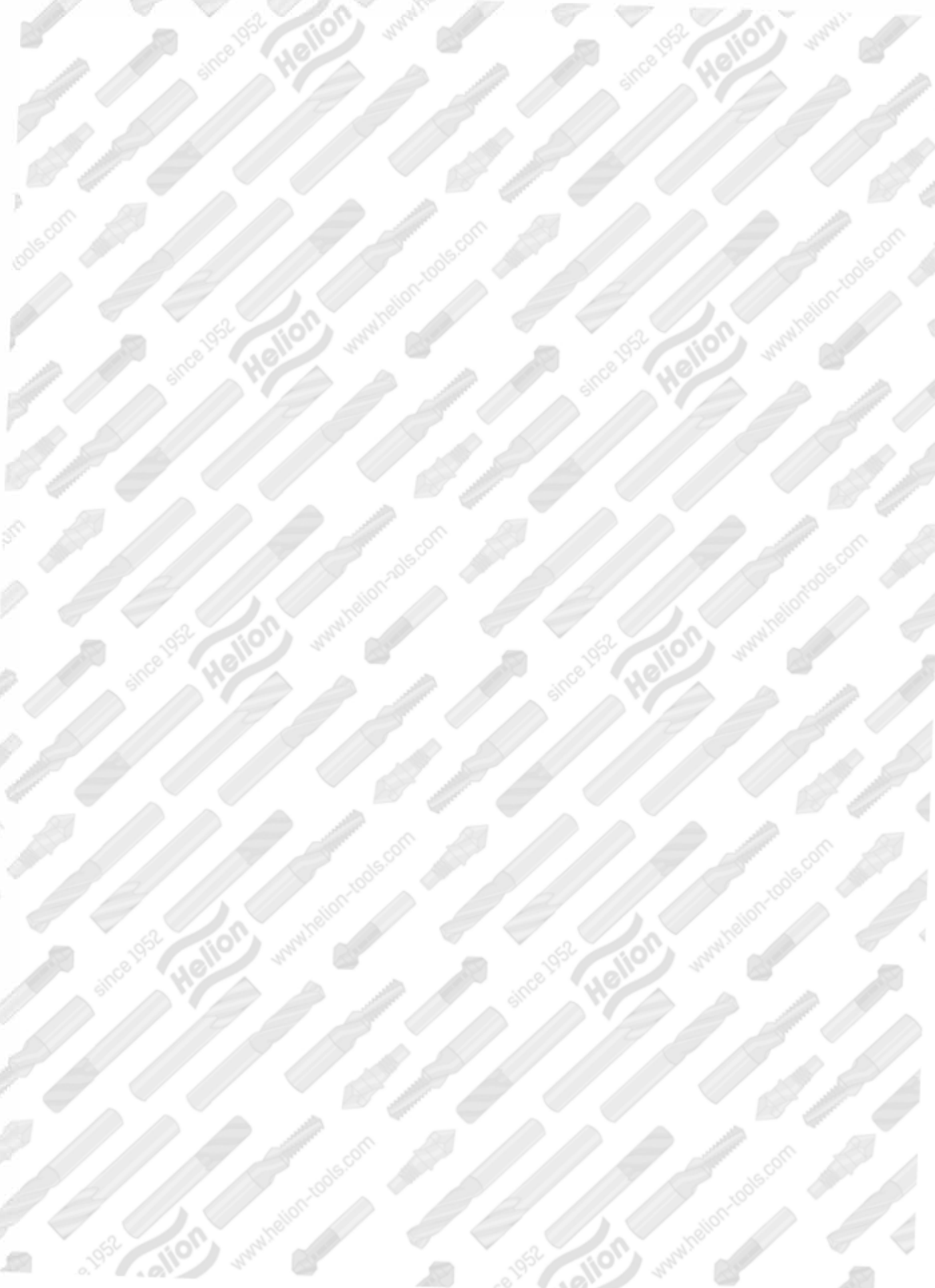
# MILL LINE INDEX

Índice de fresado

Code.	Picture	Description	Page	Ø Range (mm)	Helix angle	Coat.	600	HRC	HRC			
							1200 N/mm <sup>2</sup>	45	62	70	75	
INCHLINE	80.7421F	 <b>NEW</b>	BALL NOSE END MILL Z2	116	1/16 - 5/8	35°	RACER PLUS	●	●	○		
	80.7202F	 <b>NEW</b>	SQUARE END MILL Z2	117	1/16 - 5/8	35°	RACER PLUS	●	●	○		
	84.0303F	 <b>NEW</b>	SQUARE END MILL ALU Z3	118	1/8 - 5/8	45°	BRIGHT					
	84.3202F	 <b>NEW</b>	SQUARE END MILL HIGH FEED HELIX ALU Z2	119	1/4 - 5/8	45°	SPEED ZR					
	91.7414F	 <b>NEW</b>	SQUARE CORNER RADIO Z4	120	1/4 - 5/8	30°	RACER PLUS	●	●			
	80.7402F	 <b>NEW</b>	SQUARE END MILL Z4	121	1/16 - 5/8	35°	RACER PLUS	●	●	○		
	91.7404F	 <b>NEW</b>	VARIABLE HELIX END MILL Z4	122	1/4 - 5/8	35° - 38°	RACER PLUS	●	●			
	HELHSS	89.0602		ROUGHING END MILL HSS NR Z4	126	6 - 24	30°	BRIGHT	●			
89.0604			ROUGHING END MILL HSS NR Z4	126	10 - 20	30°	BRIGHT	●				
89.0402			SQUARE END MILL HSS N Z4 - Z6	127	2 - 32	30°	BRIGHT	●				
89.0404			SQUARE END MILL HSS N Z4 - Z6 LONG	129	3 - 40	30°	BRIGHT	●				
89.0202			SQUARE END MILL HSS N Z2	130	3 - 20	30°	BRIGHT	●				
89.0204			SQUARE END MILL HSS N Z2 LONG	131	3 - 20	30°	BRIGHT	●				
89.0302			SQUARE END MILL HSS N Z3	132	2,8 - 20	30°	BRIGHT	●				
89.0221			BALL NOSE END MILL HSS N Z2	133	2 - 20	30°	BRIGHT	●				
89.0223			BALL NOSE END MILL HSS N Z2 LONG	134	3 - 20	30°	BRIGHT	●				

● First choice ○ Suitable

	Stainless M	Cast Iron K	Non Ferrous N	Graphite	Super Alloy S	Pulvmetallurgic PM	HSC High Speed Cutting	HHC High Hard Cutting	HPC High Performance Cutting	Full Slot 	Side Milling 	Copy 	Interpolation 	Ramping 	Trochoidal 
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# 90

# HELIRUN

## **UNIVERSAL APPLICATION**

**Higher productivity**  
*Alta productividad*

**Steels up to 62 HRC**  
*Aceros hasta 62 HRC*

**TOP performance**  
*Rendimiento superior*

**High edge tolerance**  
*Alta tolerancia en el filo de corte*

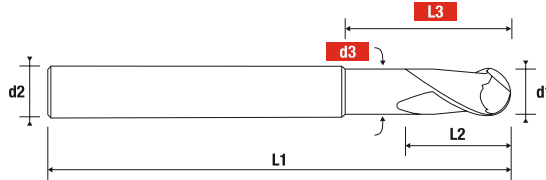


## BALL NOSE END MILL EXTRA LONG Z2 · 30°

Fresa esférica de metal duro extra larga Z2 · 30°

90.6226  
82.7220

**NEW PRODUCT**



Cod.	d1	d2	d3	R	L1	L2	L3	Z
9062260200	2	6	1,9	1	80	2,4	40	2
9062260301	3	6	2,9	1,5	100	3,6	50	2
9062260302	3	3	-	1,5	60	8	-	2
9062260401	4	6	3,9	2	100	4,8	60	2
9062260402	4	4	-	2	80	8	-	2
9062260403	4	6	-	2	120	8	-	2
9062260500	5	5	-	2,5	80	8	-	2
9062260601	6	6	-	3	80	12	-	2
9062260602	6	6	-	3	120	12	-	2
9062260801	8	8	-	4	90	14	-	2
9062260802	8	8	-	4	150	14	-	2
9062261001	10	10	-	5	120	18	-	2
9062261002	10	10	-	5	180	18	-	2
9062261201	12	12	-	6	150	22	-	2
9062261202	12	12	-	6	200	22	-	2
9062261602	16	16	-	8	200	30	-	2

Cod.	d1	d2	d3	R	L1	L2	L3	Z
8272200600	6	6	-	3	100	12	-	2
8272200800	8	8	-	4	100	14	-	2
8272201000	10	10	-	5	100	18	-	2
8272201200	12	12	-	6	100	22	-	2

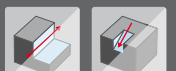
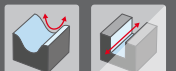
**SC**

HELIX 30° RACER

600 1200 N/mm² 62 HRC

INOX GG(G)

ALU NE UNI



HSC HHC

HPC

AIR



C. CONDITIONS



2023 The BIG JUMP Helion 27

## 90.6702

### SQUARE END MILL Z2 · 30°

Fresa plana de metal duro Z2 · 30°

**SC**

HELIX  
**30°**

RACER

600  
1200  
N/mm<sup>2</sup>

**55**  
HRC

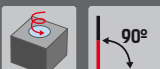
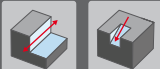
GG(G)

INOX

ALU  
NE

NI  
ALLOYS

UNI



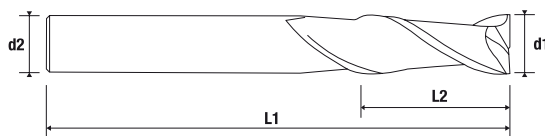
HA

HSC

HHC



AIR



Cod.	d1	d2	L1	L2	Z
9067020100	1	3	50	3	2
9067020200	2	3	50	6	2
9067020300	3	3	50	8	2
9067020400	4	4	50	11	2
9067020500	5	6	50	13	2
9067020600	6	6	50	16	2
9067020800	8	8	60	20	2
9067021000	10	10	75	25	2
9067021200	12	12	75	32	2



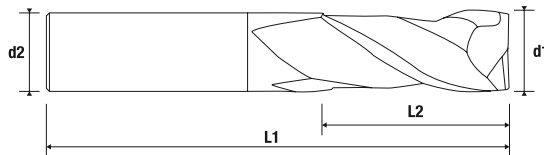
C. CONDITIONS



## SQUARE END MILL Z2 · 35°

Fresa plana de metal duro Z2 · 35°

# 90.6202



Cod.	d1	d2	L1	L2	Z
9062020010	0,1	4	38	0,2	2
9062020020	0,2	4	38	0,4	2
9062020030	0,3	4	38	0,6	2
9062020040	0,4	4	38	0,8	2
9062020050	0,5	4	38	1	2
9062020060	0,6	4	38	1,2	2
9062020070	0,7	4	38	1,4	2
9062020080	0,8	4	38	1,6	2
9062020090	0,9	4	38	2	2
9062020100	1	4	40	2,5	2
9062020150	1,5	4	40	4	2
9062020200	2	4	40	6	2
9062020250	2,5	4	45	8	2
9062020300	3	4	45	8	2
9062020350	3,5	6	45	10	2
9062020400	4	4	45	10	2
9062020450	4,5	6	45	11	2
9062020500	5	6	50	13	2
9062020550	5,5	6	50	13	2
9062020600	6	6	60	15	2



**SC**

**HELIX 35°** **RACER**

**600 1200** N/mm<sup>2</sup> **45** HRC

**65** HRC **GG(G)**

**INOX** **ALU NE**

**NI ALLOYS** **UNI**

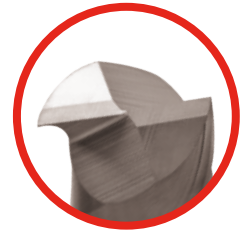


**HA** **HSC**

**HHC**

**AIR** **μ** **MICROTOOLS**

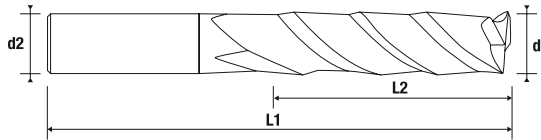
Cod.	d1	d2	L1	L2	Z
9062020650	6,5	8	60	16	2
9062020700	7	8	60	16	2
9062020750	7,5	8	60	16	2
9062020800	8	8	70	20	2
9062020850	8,5	10	70	19	2
9062020900	9	10	70	19	2
9062020950	9,5	10	70	19	2
9062021000	10	10	75	25	2
9062021100	11	12	75	22	2
9062021200	12	12	75	26	2
9062021400	14	14	80	26	2
9062021600	16	16	100	40	2
9062022000	20	20	100	40	2



## SQUARE END MILL Z2 LONG · 35°

Fresa plana de metal duro larga Z2 · 35°

# 90.6204



Cod.	d1	d2	L1	L2	Z
9062040300	3	6	70	20	2
9062040400	4	6	70	20	2
9062040500	5	6	75	25	2
9062040600	6	6	80	30	2
9062040800	8	8	90	40	2
9062041000	10	10	100	50	2
9062041200	12	12	100	50	2
9062041600	16	16	160	80	2



**SC**

**HELIX 35°** **RACER**

**600 1200 N/mm²** **45 HRC**

**62 HRC** **GG(G)**

**INOX** **ALU NE**

**NI ALLOYS** **UNI**



**HA** **HSC**

**HHC**

**AIR**



C. CONDITIONS

## 90.6704

### SQUARE END MILL Z4 · 30°

Fresa plana de metal duro Z4 · 30°

**SC**

HELIX  
**30°** RACER

600  
1200  
N/mm<sup>2</sup> 55  
HRC

INOX GG(G)

ALU  
NE TITAN  
INCONEL

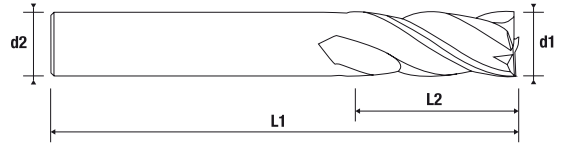
UNI

90°

3D HA

HSC HHC

AIR



Cod.	d1	d2	L1	L2	Z
9067040300	3	4	50	8	4
9067040400	4	4	50	11	4
9067040500	5	6	50	13	4
9067040600	6	6	50	16	4
9067040800	8	8	60	20	4
9067041000	10	10	75	30	4
9067041200	12	12	75	32	4

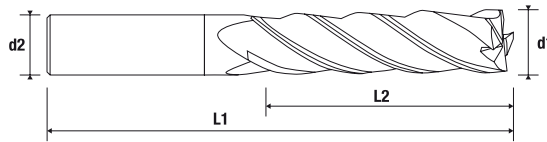


C. CONDITIONS

## SQUARE END MILL Z4 · 35°

Fresa plana de metal duro Z4 · 35°

# 90.6402



Cod.	d1	d2	L1	L2	Z
9064020100	1	4	40	2,5	4
9064020150	1,50	4	40	4	4
9064020200	2	4	40	6	4
9064020303	3	3	45	8	4
9064020304	3	4	45	8	4
9064020404	4	4	45	11	4
9064020406	4	6	45	11	4
9064020500	5	6	50	13	4
9064020600	6	6	60	15	4
9064020700	7	8	60	16	4
9064020800	8	8	70	20	4
9064020900	9	10	70	19	4
9064021000	10	10	75	25	4
9064021100	11	12	75	22	4
9064021200	12	12	80	30	4
9064021400	14	14	80	26	4
9064021600	16	16	100	40	4
9064021800	18	18	100	35	4
9064022000	20	20	100	40	4



C. CONDITIONS

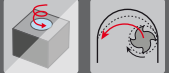
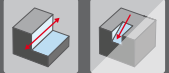
**SC**

**HELIX 35°** **RACER**

**600 1200** **62**  
N/mm<sup>2</sup> HRC

**GG(G)** **ALU NE**

**NI ALLOYS** **UNI**



**HA** **HSC**

**HFC**

**AIR**



# Trochoidal Spin

A close-up, high-speed photograph of a trochoidal milling operation. The central focus is a circular hole in a metal workpiece, through which a multi-fluted end mill is cutting. The cutting process is captured with a motion blur effect, creating a rainbow-colored ring around the hole and a blurred, overlapping pattern of the mill's flutes. The background is a dark, gradient of blue and green, suggesting a high-tech industrial environment.

## The 5<sup>th</sup> Force

DISCOVER THE POWER OF TROCHOIDAL MILLING

Page 42

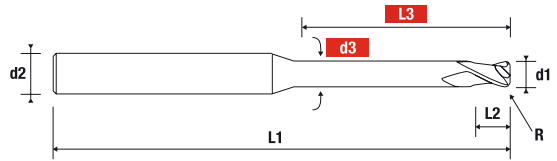


## 90.6811

### CORNER RADIUS END MILL LONG NECK Z2 · 30°

Fresa tórica de metal duro de cuello largo Z2 · 30°

**NEW PRODUCT**



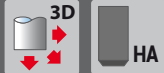
**SC**

**HELIX 30°** **RACER**

**600 1200 N/mm²** **62 HRC**

**GG(G)** **INOX**

**TITAN INCONELL**



**HSC** **HHC**

**HPC**

**AIR**



Cod.	d1	d2	d3	R	L1	L2	L3	Z
9068110051	0,5	4	0,45	0,05	45	0,06	1,5	2
9068110052	0,5	4	0,45	0,05	45	0,06	2	2
9068110061	0,6	4	0,55	0,05	45	0,07	3	2
9068110062	0,6	4	0,55	0,05	45	0,07	6	2
9068110081	0,8	4	0,75	0,1	45	0,9	4	2
9068110082	0,8	4	0,75	0,1	45	0,9	8	2
9068110101	1	4	0,95	0,1	45	1,2	4	2
9068110102	1	4	0,95	0,1	45	1,2	8	2
9068110103	1	4	0,95	0,1	50	1,2	10	2
9068110104	1	4	0,95	0,1	50	1,2	12	2
9068110105	1	4	0,95	0,1	50	1,2	16	2
9068110106	1	4	0,95	0,1	50	1,2	20	2
9068110121	1,2	4	1,15	0,1	45	1,4	6	2
9068110122	1,2	4	1,15	0,1	50	1,4	10	2
9068110123	1,2	4	1,15	0,1	50	1,4	16	2
9068110151	1,5	4	1,45	0,1	45	1,8	8	2
9068110152	1,5	4	1,45	0,1	50	1,8	12	2





Cod.	d1	d2	d3	R	L1	L2	L3	Z
9068110153	1,5	4	1,45	0,1	50	1,8	20	2
9068110201	2	4	1,9	0,2	45	2,4	6	2
9068110202	2	4	1,9	0,2	50	2,4	10	2
9068110203	2	4	1,9	0,2	50	2,4	16	2
9068110204	2	4	1,9	0,2	60	2,4	25	2
9068110301	3	6	2,9	0,3	50	3,6	10	2
9068110302	3	6	2,9	0,3	55	3,6	16	2
9068110303	3	6	2,9	0,3	65	3,6	25	2
9068110304	3	6	2,9	0,3	75	3,6	35	2
9068110305	3	6	2,9	0,3	80	3,6	40	2
9068110401	4	6	3,9	0,5	50	4,8	12	2
9068110402	4	6	3,9	0,5	60	4,8	20	2
9068110403	4	6	3,9	0,5	70	4,8	30	2
9068110404	4	6	3,9	0,5	80	4,8	40	2
9068110501	5	6	4,9	0,5	70	6	25	2
9068110502	5	6	4,9	0,5	80	6	40	2
9068110601	6	6	5,9	0,5	60	7	20	2
9068110602	6	6	5,9	0,5	90	7	40	2



C. CONDITIONS

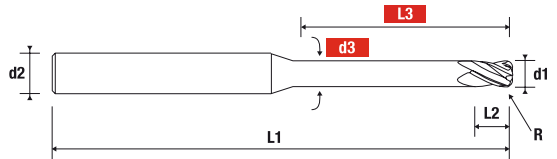


## 90.6815

### CORNER RADIUS END MILL LONG NECK Z4 · 30°

Fresa tórica de metal duro de cuello largo Z4 · 30°

**NEW PRODUCT**



**SC**

**HELIX 30°** **RACER**

**600 1200 N/mm²** **62 HRC**

**GG(G)** **INOX**

**TITAN INCONELL**



**HSC** **HHC**

**HPC**



**AIR**



Cod.	d1	d2	d3	R	L1	L2	L3	Z
9068150101	1	4	0,95	0,1	45	1,2	4	4
9068150102	1	4	0,95	0,1	45	1,2	8	4
9068150103	1	4	0,95	0,1	50	1,2	10	4
9068150104	1	4	0,95	0,1	50	1,2	12	4
9068150105	1	4	0,95	0,1	50	1,2	16	4
9068150106	1	4	0,95	0,1	50	1,2	20	4
9068150121	1,2	4	1,15	0,1	45	1,4	6	4
9068150122	1,2	4	1,15	0,1	50	1,4	10	4
9068150123	1,2	4	1,15	0,1	50	1,4	16	4
9068150151	1,5	4	1,45	0,1	45	1,8	8	4
9068150152	1,5	4	1,45	0,1	50	1,8	12	4
9068150153	1,5	4	1,45	0,1	50	1,8	20	4
9068150201	2	4	1,9	0,2	50	2,4	10	4
9068150202	2	4	1,9	0,2	50	2,4	16	4
9068150203	2	4	1,9	0,2	60	2,4	25	4
9068150301	3	6	2,9	0,3	50	3,6	10	4
9068150302	3	6	2,9	0,3	55	3,6	16	4
9068150303	3	6	2,9	0,3	65	3,6	25	4



Cod.	d1	d2	d3	R	L1	L2	L3	Z
9068150304	3	6	2,9	0,3	75	3,6	35	4
9068150401	4	6	3,9	0,5	50	4,8	12	4
9068150402	4	6	3,9	0,5	60	4,8	20	4
9068150403	4	6	3,9	0,5	70	4,8	30	4
9068150404	4	6	3,9	0,5	80	4,8	40	4
9068150501	5	6	4,9	0,5	70	6	30	4
9068150502	5	6	4,9	0,5	100	6	50	4
9068150601	6	6	5,9	0,5	60	7	20	4
9068150602	6	6	5,9	0,5	80	7	40	4



C. CONDITIONS

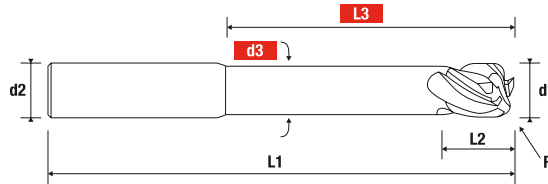




## CORNER RADIUS END MILL LONG Z4 · 30°

Fresa tórica de metal duro larga Z4 · 30°

# 90.6413



Cod.	d1	R	d2	d3	L1	L2	L3	Z
9064130605	6	0,50	6	5,50	80	7	44	4
9064130610	6	1,00	6	5,50	80	7	44	4
9064130615	6	1,50	6	5,50	80	7	44	4
9064130620	6	2,00	6	5,50	80	7	44	4
9064130805	8	0,50	8	7,40	100	9	54	4
9064130810	8	1,00	8	7,40	100	9	54	4
9064130815	8	1,50	8	7,40	100	9	54	4
9064130820	8	2,00	8	7,40	100	9	54	4
9064131010	10	1,00	10	9,20	100	11	60	4
9064131015	10	1,50	10	9,20	100	11	60	4
9064131020	10	2,00	10	9,20	100	11	60	4
9064131205	12	0,50	12	11,00	120	12	75	4
9064131210	12	1,00	12	11,00	120	12	75	4
9064131215	12	1,50	12	11,00	120	12	75	4
9064131220	12	2,00	12	11,00	120	12	75	4
9064131620	16	2,00	16	15,00	150	16	92	4



C. CONDITIONS



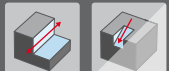
**SC**

**HELIX 30°** **RACER PLUS**

**600 1200** N/mm<sup>2</sup> **62** HRC

**GG(G)** **INOX**

**TITAN INCONELL**



**HSC** **HHC**

**HPC**

**AIR**



## 90.5572

### TROCHOIDAL END MILL Z5 · 40°

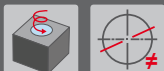
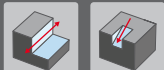
Fresa de metal duro para trocoidal Z5 · 40°

**SC**

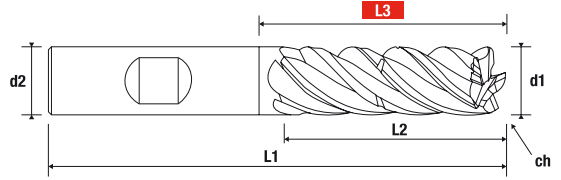
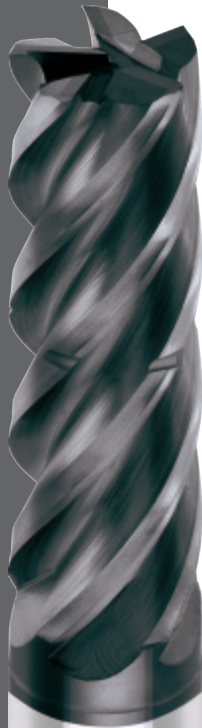
**HELIX 40°** **RACER PLUS**

**55 HRC** **INOX**

**GG(G)** **TITAN INCONELL**



**HSC** **HPC**



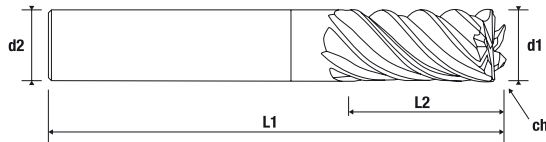
Cod.	d1	d2	L1	L2	L3	Ch	Z
9055720600	6	6	62	18	25	0,10	5
9055720800	8	8	68	24	30	0,15	5
9055721000	10	10	80	30	35	0,20	5
9055721200	12	12	93	36	45	0,20	5
9055721600	16	16	108	48	55	0,30	5
9055722000	20	20	126	60	70	0,40	5



## SUPERFINISHING ENDMILL Z5-Z6 · 40°/42°

Fresa de metal duro para super acabado Z5 - Z6 · 40°/42°

# 90.6572



Cod.	d1	d2	L1	L2	Ch	Z
9065720300	3	6	57	8	0,05	5
9065720400	4	6	57	8	0,10	6
9065720500	5	6	57	10	0,10	6
9065720600	6	6	57	13	0,10	6
9065720800	8	8	63	19	0,10	6
9065721000	10	10	72	22	0,10	6
9065721200	12	12	83	26	0,10	6
9065721600	16	16	92	32	0,20	6
9065722000	20	20	104	42	0,20	6



### SC

HELIX  
40/42°

RACER  
PLUS

600  
1200  
N/mm²

55  
HRC

GG(G)

ALU  
NE

TITAN  
INCONEL

UNI



HSC

HPC

HHC



AIR



C. CONDITIONS









# 91

# HELITOP

**EXOTIC MATERIALS  
HIGH ALLOYED STEELS**

Latest coating technology  
*Última tecnología en recubrimiento*

Improved geometry  
*Geometría mejorada*

Heat resistance configuration  
*Configuración de resistencia al calor*





## 91.1479

### SQUARE END MILL Z4 · 35°/38°

Fresa plana de metal duro Z4 · 35°/38°

**SC**

**HELIX**  
35/38°

**VOLCANO**



600  
1200  
N/mm<sup>2</sup>

**55**  
HRC

**INOX**

**GG(G)**

**NI**  
ALLOYS

**TITAN**  
INCONELL

**UNI**



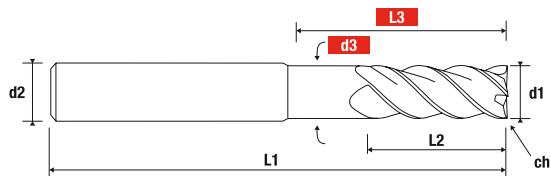
**HPC**

**HSC**

**MULTI**  
**TASK**  
Cutter



**AIR**



Cod.	d1	d2	d3	L1	L2	L3	Ch	Z
9114790300	3	6	2,80	60	8	18	0,13	4
9114790400	4	6	3,60	60	11	21	0,18	4
9114790500	5	6	4,60	60	13	21	0,20	4
9114790600	6	6	5,50	60	13	21	0,20	4
9114790800	8	8	7,50	60	19	27	0,20	4
9114791000	10	10	9,50	70	22	32	0,20	4
9114791200	12	12	11,50	80	26	38	0,30	4
9114791600	16	16	15,50	90	32	44	0,40	4
9114792000	20	20	19,50	105	38	54	0,50	4



23  
THE **BIG**  
JUMP  
**Helion**



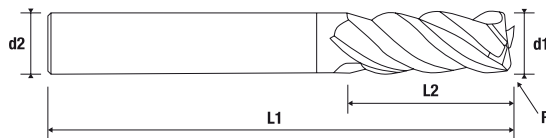




## CORNER RADIUS END MILL Z4 · 42°

Fresa tórica de metal duro Z4 · 42°

# 91.6410



Cod.	d1	R	d2	L1	L2	Z
9164100405	4	0,5	6	60	12	4
9164100505	5	0,5	6	60	15	4
9164100605	6	0,5	6	60	15	4
9164100610	6	1,0	6	60	15	4
9164100805	8	0,5	8	80	20	4
9164100810	8	1,0	8	80	20	4
9164101005	10	0,5	10	80	25	4
9164101010	10	1,0	10	80	25	4
9164101205	12	0,5	12	80	24	4
9164101210	12	1,0	12	80	24	4



**SC**

**HELIX  
42°**

**VOLCANO**

**600  
1200  
N/mm²**

**45  
HRC**

**INOX**

**GG(G)**

**TITAN  
INCONEL**



**HA  
HPC**

**HSC**

**MULTI  
TASK  
Cutter**



**MQL**

**AIR**



C. CONDITIONS



**23  
24  
The  
BIG  
JUMP**  
**Helion**

## 91.6614

### ROUGHING END MILL Z4-Z5 · 42°

Fresa de metal duro para desbaste Z4-Z5 · 42°

**SC**

**HELIX 42°** VOLCANO

600  
1200  
N/mm<sup>2</sup> **45**  
HRC

**INOX** TITAN  
INCONEL

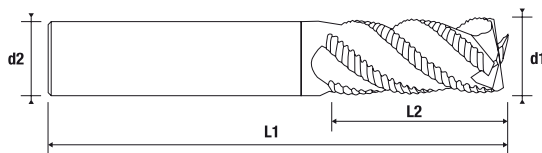
**GG(G)** ALU  
NE



**HA** HPC

**MULTI TASK** Cutter

**MQL** AIR



Cod.	d1	R	d2	L1	L2	Z
9166140500	5	0,2	6	50	13	4
9166140600	6	0,2	6	60	13	4
9166140800	8	0,2	8	70	19	4
9166141000	10	0,3	10	75	22	4
9166141200	12	0,3	12	80	26	4
9166141600	16	0,5	16	100	32	5
9166142000	20	0,5	20	100	38	5



C. CONDITIONS



APPLICATION

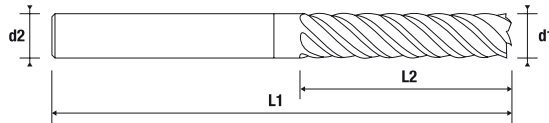


## MULTIFLUTES END MILL EXTRA LONG Z4-Z6 · 45°

Fresa de metal duro multilabio extralarga Z4-Z6 · 45°

# 91.6505

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	Z
9165050300	3	3	60	15	4
9165050400	4	4	80	20	4
9165050500	5	5	80	25	4
9165050600	6	6	80	25	6
9165050800	8	8	90	35	6
9165051000	10	10	100	45	6
9165051201	12	12	100	50	6
9165051202	12	12	125	70	6
9165051601	16	16	150	65	6
9165051602	16	16	165	100	6
9165052002	20	20	165	100	6
9165052003	20	20	200	135	6
9165052502	25	25	165	100	6
9165052503	25	25	200	140	6
9165053201	32	32	165	100	6
9165053202	32	32	210	150	6

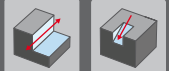


**SC**

**HELIX 45°** VOLCANO PLUS

**600 1200** N/mm<sup>2</sup> **65** HRC

**INOX** GG(G)



**HSC** **HHC**

**HPC**

**AIR**



23  
24  
The **BIG**  
JUMP  
**Helion** 53





**H 92**  
**HELMOTION**

**STEELS UP TO 70 HRC**

High alloyed steels and  
hardened materials

*Aceros aleados y materiales templados*

High speed cutting

*Alta velocidad de corte*

Super micro substrate

*Super micro sustrato*

Higher accurate dimensional tolerance

*Tolerancia dimensional de mayor precisión*

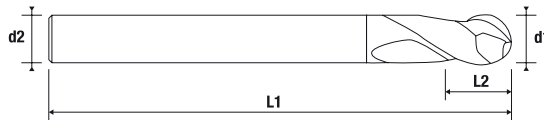


## BALL NOSE END MILL Z2 · 30°

Fresa esférica de metal duro Z2 · 30°

# 92.6220

**NEW PRODUCT**



Cod.	d1	d2	R	L1	L2	Z
9262200051	0,5	4	0,25	40	0,5	2
9262200052	0,5	4	0,25	40	0,75	2
9262200101	1	6	0,5	40	1	2
9262200102	1	4	0,5	40	1,5	2
9262200151	1,5	6	0,75	40	1,5	2
9262200152	1,5	6	0,75	40	2,3	2
9262200201	2	6	1	45	2	2
9262200202	2	6	1	45	3	2
9262200301	3	6	1,5	45	3	2
9262200302	3	6	1,5	45	4,5	2
9262200401	4	6	2	45	4	2
9262200501	5	6	2,5	50	5	2
9262200601	6	6	3	50	6	2
9262200602	6	6	3	55	8	2
9262200801	8	8	4	50	8	2
9262200802	8	8	4	60	11	2
9262201000	10	10	5	70	13	2
9262201200	12	12	6	70	15	2



**SC**

HELIX **30°** DEEP BLUE

**45** HRC **62** HRC

**70** HRC GG(G)

INOX

HA

HSC HHC

HPC

MQL AIR



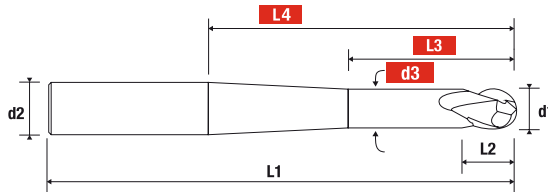


## BALL NOSE END MILL TAPER NECK Z2 · 30°

Fresa esférica metal duro cónica Z2 · 30°

# 82.6228

**NEW PRODUCT**



Cod.	d1	d2	d3	L1	L2	L3	L4	Z
8262280150	1,5	6	1,45	120	2,3	5	75	2
8262280201	2	6	1,85	100	3	8	40	2
8262280202	2	6	1,85	120	3	8	60	2
8262280301	3	6	2,9	100	4	12	40	2
8262280302	3	6	2,9	120	4	12	60	2
8262280401	4	6	3,85	100	5	16	40	2
8262280402	4	6	3,85	120	5	16	60	2
8262280601	6	8	5,85	100	6	25	45	2
8262280602	6	8	5,85	120	6	25	45	2
8262280603	6	10	-	150	8	-	60	2
8262280801	8	10	7,85	120	10	30	60	2
8262280802	8	10	7,85	150	10	30	60	2
8262281001	10	12	9,8	160	12	40	80	2
8262281201	12	16	11,8	160	14	50	100	2
8262281202	12	16	11,8	200	14	50	100	2



C. CONDITIONS

**SC**

**HELIX 30°** **RACER PLUS**

**45 HRC** **62 HRC**

**GG(G)**

**HA**

**HSC** **HHC**

**HPC**

**MQL**





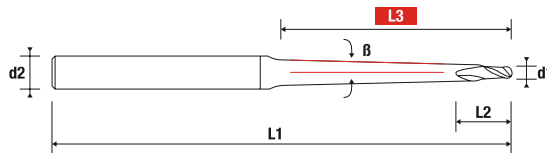


## BALL NOSE END MILL TAPER NECK Z2 · 30°

Fresa esférica metal duro cónica Z2 · 30°

# 82.6229

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	L3	β	Z
8262290200	2	6	100	3	60	0,5°	2
8262290201	2	6	100	3	60	1°	2
8262290202	2	6	100	3	60	1,5°	2
8262290203	2	6	100	3	57	2°	2
8262290300	3	6	100	4	60	0,5°	2
8262290301	3	6	100	4	60	1°	2
8262290302	3	6	100	4	57	1,5°	2
8262290303	3	6	100	4	43	2°	2
8262290400	4	6	100	5	60	0,5°	2
8262290401	4	6	100	5	57	1°	2
8262290402	4	6	100	5	38	1,5°	2
8262290403	4	6	100	5	29	2°	2



**SC**

**HELIX 30°** **RACER PLUS**

**45 HRC** **62 HRC**

**GG(G)**

**HA**

**HSC** **HHC**

**HPC**

**MQL**



C. CONDITIONS



## 92.6823

### BALL NOSE END MILL LONG NECK Z2 · 30°

Fresa esférica de metal duro cuello largo Z2 · 30°

SC

HELIX  
30°

DEEP  
BLUE

45  
HRC

62  
HRC

70  
HRC

GG(G)



HHC

HPC

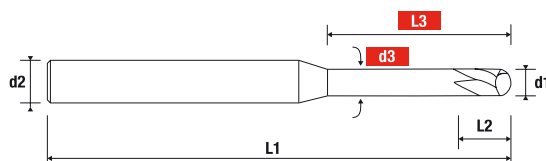
HSC



MQL



μ  
MICROTOOLS



Cod.	d1	d2	d3	L1	L2	L3	Z
9268230010	0,1	4	0,05	40	0,3	-	2
9268230205	0,2	4	0,15	40	0,2	0,5	2
9268230215	0,2	4	0,15	40	0,2	1,5	2
9268230301	0,3	4	0,25	40	0,3	1	2
9268230303	0,3	4	0,25	40	0,3	3	2
9268230402	0,4	4	0,35	40	0,4	2	2
9268230404	0,4	4	0,35	40	0,4	4	2
9268230501	0,5	4	0,45	45	0,5	1	2
9268230502	0,5	4	0,45	45	0,5	2	2
9268230503	0,5	4	0,45	45	0,5	3	2
9268230505	0,5	4	0,45	45	0,5	5	2
9268230508	0,5	4	0,45	45	0,5	8	2
9268230602	0,6	4	0,55	45	0,6	2	2
9268230604	0,6	4	0,55	45	0,6	4	2
9268230608	0,6	4	0,55	45	0,6	8	2
9268230804	0,8	4	0,75	45	0,8	4	2
9268230806	0,8	4	0,75	45	0,8	6	2
9268230810	0,8	4	0,75	45	0,8	10	2
9268231004	1	4	0,95	45	1	4	2



Cod.	d1	d2	d3	L1	L2	L3	Z
9268231006	1	4	0,95	45	1	6	2
9268231008	1	4	0,95	45	1	8	2
9268231010	1	4	0,95	50	1	10	2
9268231012	1	4	0,95	50	1	12	2
9268231016	1	4	0,95	50	1	16	2
9268231025	1	4	0,95	60	1	25	2
9268231204	1,2	4	1,15	45	1,2	4	2
9268231206	1,2	4	1,15	45	1,2	6	2
9268231208	1,2	4	1,15	45	1,2	8	2
9268231212	1,2	4	1,15	50	1,2	12	2
9268231220	1,2	4	1,15	50	1,2	20	2
9268231508	1,5	4	1,45	45	1,5	8	2
9268231510	1,5	4	1,45	50	1,5	10	2
9268231512	1,5	4	1,45	50	1,5	12	2
9268231516	1,5	4	1,45	50	1,5	16	2
9268231520	1,5	4	1,45	50	1,5	20	2
9268232004	2	4	1,90	45	2	4	2
9268232006	2	4	1,90	45	2	6	2
9268232008	2	4	1,90	45	2	8	2
9268232010	2	4	1,90	50	2	10	2
9268232012	2	4	1,90	50	2	12	2
9268232014	2	4	1,90	50	2	14	2
9268232016	2	4	1,90	50	2	16	2
9268232020	2	4	1,90	50	2	20	2
9268232508	2,5	4	2,40	45	2,5	8	2
9268232516	2,5	4	2,40	50	2,5	16	2
9268233008	3	6	2,90	50	3	8	2
9268233012	3	6	2,90	50	3	12	2
9268233020	3	6	2,90	60	3	20	2
9268233025	3	6	2,90	65	3	25	2

Cod.	d1	d2	d3	L1	L2	L3	Z
9268233030	3	6	2,90	70	3	30	2
9268234010	4	6	3,90	50	4	10	2
9268234020	4	6	3,90	60	4	20	2
9268234025	4	6	3,90	65	4	25	2
9268234030	4	6	3,90	70	4	30	2
9268235016	5	6	4,90	60	6	16	2



C. CONDITIONS



# 92.7534 ROUGHING AND FINISHING WITH ONE TOOL

DeepBlue coating

Suitable for 3 and 5 axes like operations

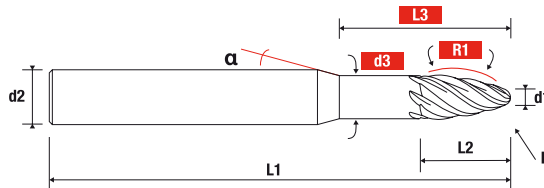
Turbine impellers blades and tires profiles

## BARREL CONICAL MILL Z6 · 30°

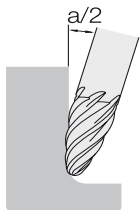
Fresa cónica de barril de metal duro Z6 · 30°

# 92.7534

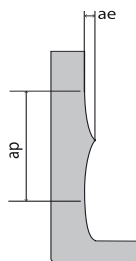
**NEW PRODUCT**



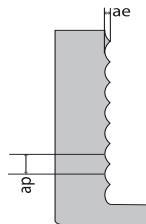
Cod.	d1	d2	d3	R	R1	L1	L2	L3	α	Z
9275340401	4	12	9,5	2	50	100	18,7	40	10°	6
9275340402	4	16	-	2	750	110	12,4	-	30°	6
9275340601	6	12	-	3	75	100	20	-	10°	6
9275340602	6	16	-	3	1000	110	16,7	-	20°	6
9275340801	8	16	-	4	1000	110	26,7	-	10°	6
9275340802	8	12	-	4	100	110	26,8	-	5°	6



Ap : Axial Depth (mm)  
Ae : Radial Depth (mm)



Conical Type - Tipo cónica



Ball type - Tipo bola

**SC**

HELIX  
**30°**

DEEP  
BLUE

600  
1200  
N/mm²

**45**  
HRC

**62**  
HRC

GG(G)

INOX

TITAN  
INCONEL

GRAPHITE



HA

HSC

HPC

HHC

MULTI  
TASK  
Cutter



MQL

AIR



C. CONDITIONS



## 92.6403

### SQUARE END MILL Z4 · 45°

Fresa plana de metal duro Z4 · 45°

SC

HELIX  
45°

DEEP  
BLUE

45  
HRC

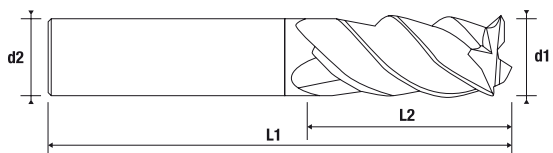
62  
HRC

70  
HRC

GG(6)



THE BIG  
JUMP  
Helion



Cod.	d1	d2	L1	L2	Z
9264030100	1	6	40	1,5	4
9264030200	2	6	40	5	4
9264030300	3	6	45	8	4
9264030400	4	6	45	11	4
9264030500	5	6	50	13	4
9264030600	6	6	55	15	4
9264030800	8	8	60	20	4
9264031000	10	10	70	22	4
9264031200	12	12	75	26	4
9264031600	16	16	90	35	4



C. CONDITIONS



## 92.6813

### CORNER RADIUS END MILL LONG NECK Z2 · 30°

Fresa tórica de metal duro cuello largo Z2 · 30°

**SC**

HELIX  
30°

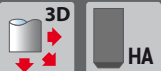
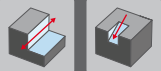
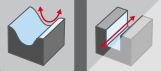
DEEP  
BLUE

45  
HRC

62  
HRC

70  
HRC

GG(G)



HSC HHC

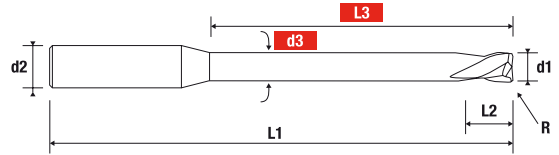
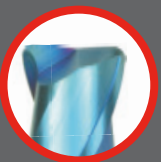
HPC



MQL



μ  
MICROTOOLS



Cod.	d1	R	d2	d3	L1	L2	L3	Z
9268130205	0,2	0,05	4	0,15	40	0,2	0,5	2
9268130215	0,2	0,05	4	0,15	40	0,2	1,5	2
9268130301	0,3	0,05	4	0,25	40	0,3	1	2
9268130303	0,3	0,05	4	0,25	40	0,3	3	2
9268130402	0,4	0,05	4	0,35	40	0,4	2	2
9268130404	0,4	0,05	4	0,35	40	0,4	4	2
9268130502	0,5	0,05	4	0,45	45	0,5	2	2
9268130504	0,5	0,05	4	0,45	45	0,5	4	2
9268130506	0,5	0,05	4	0,45	45	0,5	6	2
9268130603	0,6	0,05	4	0,55	45	0,6	3	2
9268130606	0,6	0,05	4	0,55	45	0,6	6	2
9268130804	0,8	0,05	4	0,75	45	0,8	4	2
9268130808	0,8	0,05	4	0,75	45	0,8	8	2
9268131004	1	0,1	4	0,95	45	1	4	2
9268131008	1	0,1	4	0,95	45	1	8	2
9268131010	1	0,1	4	0,95	50	1	10	2
9268131012	1	0,1	4	0,95	50	1	12	2
9268131016	1	0,1	4	0,95	50	1	16	2
9268131020	1	0,1	4	0,95	50	1	20	2
9268131206	1,2	0,1	4	1,15	45	1,2	6	2





Cod.	d1	R	d2	d3	L1	L2	L3	Z
9268131210	1,2	0,1	4	1,15	50	1,2	10	2
9268131216	1,2	0,1	4	1,15	50	1,2	16	2
9268131508	1,5	0,1	4	1,45	45	1,5	8	2
9268131512	1,5	0,1	4	1,45	50	1,5	12	2
9268131520	1,5	0,1	4	1,45	50	1,5	20	2
9268132006	2	0,2	4	1,90	45	2	6	2
9268132010	2	0,2	4	1,90	50	2	10	2
9268132016	2	0,2	4	1,90	50	2	16	2
9268132025	2	0,2	4	1,90	60	2	25	2
9268133010	3	0,3	6	2,90	50	3	10	2
9268133016	3	0,3	6	2,90	55	3	16	2
9268133025	3	0,3	6	2,90	65	3	25	2
9268133035	3	0,3	6	2,90	75	3	35	2
9268134012	4	0,5	6	3,90	50	4	12	2
9268134020	4	0,5	6	3,90	60	4	20	2
9268134030	4	0,5	6	3,90	70	4	30	2
9268134040	4	0,5	6	3,90	80	4	40	2
9268135025	5	0,5	6	4,90	70	6	25	2
9268135040	5	0,5	6	4,90	80	6	40	2
9268136020	6	0,5	6	5,90	60	7	20	2
9268136040	6	0,5	6	5,90	80	7	40	2



C. CONDITIONS



92.6415

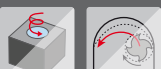
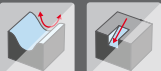
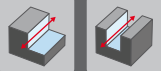
## CORNER RADIUS END MILL Z4 · 30°

Fresa tórica de metal duro Z4 · 30°

SC

HELIX  
30°DEEP  
BLUE45  
HRC62  
HRC70  
HRC

GG(6)



HSC HHC

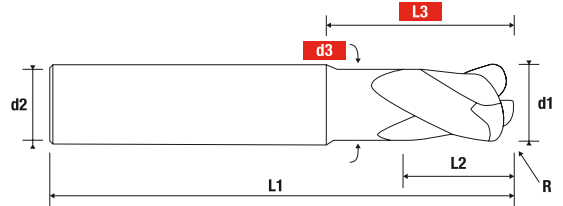
HPC 3D

MULTI  
TASK  
Cutter

MQL AIR



Helion



Cod.	d1	R	d2	d3	L1	L2	L3	Z
9264150303	3	0,3	6	2,90	60	3	20	4
9264150305	3	0,5	6	2,90	60	3	20	4
9264150310	3	0,5	6	2,90	50	3	10	4
9264150403	4	0,3	6	3,90	60	4	20	4
9264150405	4	0,5	6	3,90	60	4	20	4
9264150410	4	1,0	6	3,90	60	4	20	4
9264150550	5	0,5	6	4,95	60	5	16	4
9264150650	6	0,5	6	5,90	60	7	20	4
9264150651	6	0,5	6	5,90	80	7	40	4
9264150610	6	1,0	6	5,90	60	7	20	4
9264150611	6	1,0	6	5,90	80	7	40	4
9264150850	8	0,5	8	7,80	65	9	22	4
9264150851	8	0,5	8	7,80	100	9	40	4
9264150810	8	1,0	8	7,80	65	9	22	4
9264150811	8	1,0	8	7,80	100	9	40	4
9264151050	10	0,5	10	9,85	70	11	24	4
9264151051	10	0,5	10	9,85	100	11	40	4
9264151010	10	1,0	10	9,85	70	11	24	4

&gt;&gt;&gt;

Cod.	d1	R	d2	d3	L1	L2	L3	Z
9264151011	10	1,0	10	9,85	100	11	40	4
9264151015	10	1,5	10	9,85	100	11	40	4
9264151020	10	2,0	10	9,85	70	11	24	4
9264151025	10	2,5	10	9,85	70	11	24	4
9264151250	12	0,5	12	11,80	80	13	26	4
9264151251	12	0,5	12	11,80	110	13	40	4
9264151210	12	1,0	12	11,80	80	13	26	4
9264151211	12	1,0	12	11,80	110	13	40	4
9264151220	12	2,0	12	11,80	80	13	26	4
9264151230 <b>NEW</b>	12	3	12	11,80	80	13	26	4



C. CONDITIONS



APPLICATION











**93**  
**HELIHARD**

**SUPER HARD WITH CBN**

**Materials up to 75 HRC**

*Materiales hasta 75 HRC*

**High speed cutting in HHC**

*Alta velocidad de corte en materiales templados (HHC)*

**Sharp dimensional tolerance**

*Tolerancia dimensional muy precisa*

**Very good surface quality**

*Óptima calidad superficial*

## 93.1824

### CBN BALL NOSE END MILL Z2 · 30°

Fresa esférica de metal duro CBN · Z2 · 30°

**CBN  
SOLID**

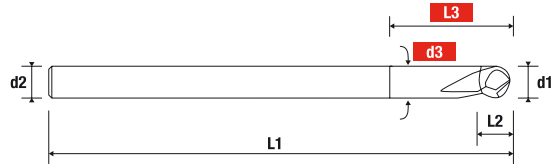
**HELIX  
30°**

**62  
HRC**

**70  
HRC**

**75  
HRC**

**PM**



Cod.	d1	d2	d3	L1	L2	L3	Z
9318240108	1	4	0,90	48	0,7	8	2
9318240212	2	4	1,90	50	1,2	12	2
9318241510	3	6	2,90	66	1,8	10	2
9318240220	4	6	3,90	66	2,4	20	2
9318240320	6	6	5,90	83	3,5	20	2





## CBN CORNER RADIUS END MILL Z2 · 30°

Fresa tórica de metal duro CBN · Z2 · 30°

# 93.1810



Cod.	d1	R	d2	d3	L1	L2	L3	Z
9318100106	1	0,1	4	0,90	48	0,7	6	2
9318100208	2	0,2	4	1,90	50	0,9	8	2
9318100310	3	0,3	6	2,90	66	1,2	10	2
9318100416	4	0,5	6	3,90	66	1,5	16	2
9318100615	6	0,5	6	5,90	83	3,0	15	2



CBN  
SOLID

HELIX  
30°

62  
HRC

70  
HRC

75  
HRC

PM



HSC

HHC

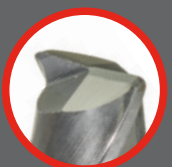
HPC

MQL

AIR



C. CONDITIONS







# 94 HELI**ALU**

## **ALLUMINIUM AND NON FERROUS IN HSC**

**High speed cutting**  
*Corte de alta velocidad*

**Improved chip removal rate**  
*Mejora en la capacidad de arranque de viruta*

**Coating with lower friction coefficient**  
*Recubrimiento con menor coeficiente de fricción*

**Agressive cutting edge**  
*Filo de corte agresivo*

## 94.3223

### BALL NOSE END MILL ALU Z2 · 45°

Fresa esférica de metal duro ALU · Z2 · 45°

SC

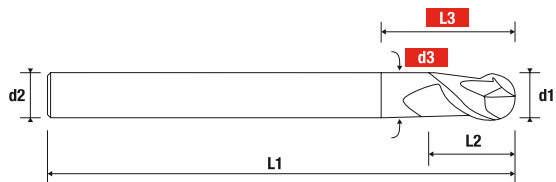
HELIX  
45° SPEED

ALU  
NE PLASTIC

GFK  
CFK

HA

HSC HPC



Cod.	d1	d2	d3	L1	L2	L3	Z
9432230105	1	4	0,95	50	1,5	5	2
9432230110	1	4	0,95	50	1,5	10	2
9432230210	2	6	1,90	50	3	10	2
9432230220	2	6	1,90	60	3	20	2
9432230312	3	6	2,90	60	4,5	12	2
9432230325	3	6	2,90	70	4,5	25	2
9432230416	4	6	3,90	60	6	16	2
9432230430	4	6	3,90	70	6	30	2
9432230516	5	6	4,90	80	8	16	2
9432230525	5	6	4,90	80	8	25	2
9432230615	6	6	5,80	90	9	15	2
9432230640	6	6	5,80	90	9	40	2
9432230820	8	8	7,80	100	12	20	2
9432231025	10	10	9,80	100	15	25	2
9432231230	12	12	11,80	110	18	30	2



C. CONDITIONS



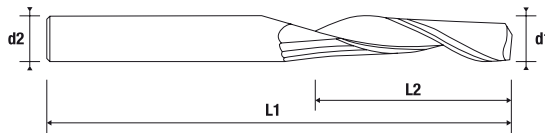
APPLICATION

## SQUARE END MILL ALU Z1 · 30°

Fresa plana de metal duro ALU · Z1 · 30°

# 94.0100

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	Z
9401000300	3	6	50	8	1
9401000400	4	6	50	10	1
9401000500	5	6	60	13	1
9401000600	6	6	60	15	1
9401000800	8	8	70	19	1
9401001000	10	10	75	22	1
9401001200	12	12	75	26	1



**SC**

HELIX **30°** BRIGHT

ALU NE PLASTIC

BRONZE

90° HA

POLISHED HSC

HPC



C. CONDITIONS

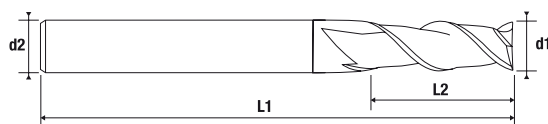
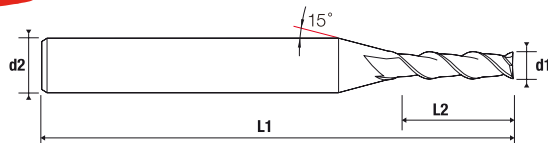


## 94.0201

### SQUARE END MILL ALU Z2 · 45°

Fresa plana de metal duro ALU Z2 · 45°

**NEW PRODUCT**

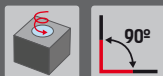
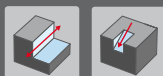


**SC**

HELIX  
45° BRIGHT

ALU  
NE PLASTIC

BRONZE

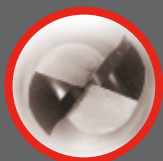


POLISHED HSC

MULTI  
TASK  
Cutter



Cod.	d1	d2	L1	L2	Z
9402010300	3	6	45	10	2
9402010400	4	6	50	12	2
9402010500	5	6	50	15	2
9402010600	6	6	60	20	2
9402010800	8	8	65	25	2
9402011000	10	10	75	30	2
9402011200	12	12	80	35	2
9402011400	14	14	90	50	2
9402011600	16	16	110	55	2
9402012000	20	20	120	65	2





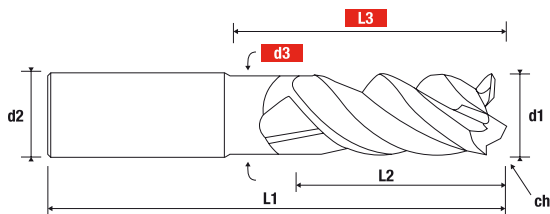




## SQUARE END MILL Z4 · 43°/47°

Fresa plana de metal duro Z4 · 43°/47°

# 94.3409



Cod.	d1	d2	d3	L1	L2	L3	Ch	Z
9434090300	3	6	2,8	57	8	12	0,1	4
9434090400	4	6	3,8	57	11	18	0,1	4
9434090500	5	6	4,8	57	13	18	0,1	4
9434090600	6	6	5,8	57	13	18	0,2	4
9434090601	6	6	5,8	80	13	42	0,2	4
9434090800	8	8	7,8	63	21	25	0,2	4
9434090801	8	8	7,8	100	21	62	0,2	4
9434091000	10	10	9,7	72	22	30	0,2	4
9434091001	10	10	9,7	100	22	58	0,2	4
9434091200	12	12	11,7	83	26	36	0,2	4
9434091201	12	12	11,7	120	26	73	0,2	4
9434091600	16	16	15,7	92	36	42	0,2	4
9434091601	16	16	15,7	150	36	100	0,2	4
9434092000	20	20	19,5	104	41	52	0,2	4



C. CONDITIONS



### SC

HELIX  
43/47°

SPEED  
ZR

ALU  
NE

PLASTIC

45°

3D

HA

POLISHED

HSC

HPC

23  
24  
The  
BIG  
JUMP

Helion

85

94.3213

**CORNER RADIUS END MILL ALU Z2 · 45°**

Fresa tórica de metal duro ALU · Z2 · 45°

SC

HELIX  
45°

SPEED

ALU  
NE

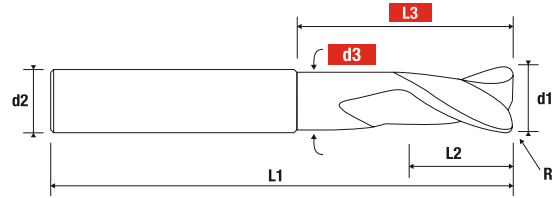
PLASTIC

BRONZE



HSC

HPC



Cod.	d1	R	d2	d3	L1	L2	L3	Z
9432130101	1	0,1	4	0,95	50	1,5	8	2
9432130111	1	0,1	4	0,95	50	1,5	16	2
9432130202	2	0,2	4	1,90	50	3	10	2
9432130222	2	0,2	4	1,90	50	3	20	2
9432130303	3	0,3	6	2,90	55	4	16	2
9432130333	3	0,3	6	2,90	70	4	30	2
9432130405	4	0,5	6	3,90	60	5	20	2
9432130455	4	0,5	6	3,90	80	5	40	2
9432130603	6	0,3	6	5,85	60	7	20	2
9432130610	6	1	6	5,85	60	7	20	2
9432130805	8	0,5	8	7,88	65	9	25	2
9432130810	8	1	8	7,88	65	9	25	2
9432131005	10	0,5	10	9,80	70	11	32	2
9432131015	10	1,5	10	9,80	70	11	32	2
9432131205	12	0,5	12	11,80	80	12	38	2
9432131215	12	1,5	12	11,80	80	12	38	2



C. CONDITIONS



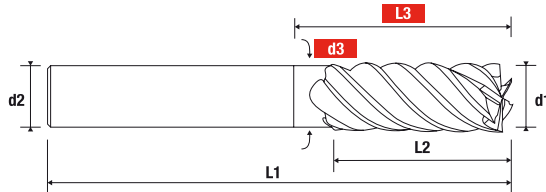
APPLICATION



## END MILL FINISHING Z6 · 45°

Fresa de metal duro para acabado Z6 · 45°

# 94.3535



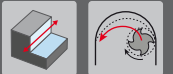
Cod.	d1	d2	d3	L1	L2	L3	Z
9435350600	6	6	5,7	57	15	20	6
9435350601	6	6	5,7	80	15	43	6
9435350800	8	8	7,4	63	20	26	6
9435350801	8	8	7,4	100	20	62	6
9435351000	10	10	9,2	73	25	32	6
9435351001	10	10	9,2	100	25	58	6
9435351200	12	12	11	83	30	37	6
9435351201	12	12	11	120	30	73	6
9435351600	16	16	15	93	40	45	6
9435351601	16	16	15	150	40	100	6
9435352000	20	20	19	104	50	53	6



### SC

HELIX  
**45°** SPEED  
ZR

ALU  
NE PLASTIC



HA POLISHED

HSC HPC



C. CONDITIONS







**H96**

**HELIDIAMOND**

**ABRASSIVE  
MATERIALS**

**Diamond coating (CVD)**

*Recubrimiento con diamante (CVD)*

**High resistance and performance  
against abrasive materials**

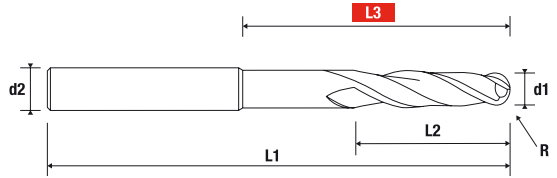
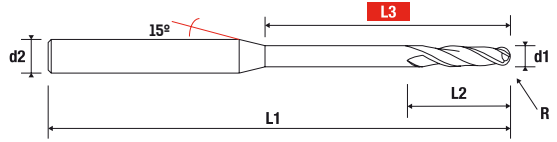
*Alta resistencia y rendimiento  
frente a materiales abrasivos*

# 96.8822

## BALL NOSE END MILL DIAMOND Z2 · 30°

Fresa esférica de metal duro DIAMOND Z2 · 30°

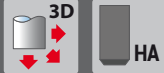
**NEW PRODUCT**



**SC**

**HELIX 30°** **DIAMOND**

GRAPHITE



**HSC** **HPC**



COATING THICKNESS  
10 +2µm



Helion

Cod.	d1	R	d2	L1	L2	L3	Z
9688220020	0,2	0,1	4	45	1	-	2
9688220030	0,3	0,15	4	45	1,2	-	2
9688220031	0,3	0,15	4	45	1,2	2	2
9688220040	0,4	0,2	4	45	1,5	-	2
9688220041	0,4	0,2	4	45	1,5	2	2
9688220042	0,4	0,2	4	45	1,5	3	2
9688220043	0,4	0,2	4	45	1,5	4	2
9688220044	0,4	0,2	4	45	1,5	5	2
9688220045	0,4	0,2	4	45	1,5	8	2
9688220046	0,4	0,2	4	45	1,5	10	2
9688220050	0,5	0,25	4	45	2	-	2
9688220051	0,5	0,25	4	45	2	3	2
9688220052	0,5	0,25	4	45	2	4	2
9688220053	0,5	0,25	4	45	2	5	2
9688220054	0,5	0,25	4	45	2	6	2
9688220055	0,5	0,25	4	45	2	8	2
9688220056	0,5	0,25	4	45	2	10	2
9688220057	0,5	0,25	4	45	2	12	2
9688226001	0,6	0,3	4	45	2	-	2
9688226003	0,6	0,3	4	45	2	3	2
9688226005	0,6	0,3	4	45	2	4	2
9688226007	0,6	0,3	4	45	2	5	2
9688226009	0,6	0,3	4	45	2	6	2
9688226011	0,6	0,3	4	45	2	8	2
9688226013	0,6	0,3	4	45	2	10	2
9688226015	0,6	0,3	4	45	2	12	2
9688226017	0,6	0,3	4	45	2	15	2
9688226019	0,6	0,3	4	45	2	20	2
9688228001	0,8	0,4	4	45	3	-	2
9688228003	0,8	0,4	4	45	3	4	2
9688228005	0,8	0,4	4	45	3	5	2



Cod.	d1	R	d2	L1	L2	L3	Z
9688228007	0,8	0,4	4	45	3	6	2
9688228009	0,8	0,4	4	45	3	8	2
9688228011	0,8	0,4	4	45	3	10	2
9688228013	0,8	0,4	4	45	3	15	2
9688228015	0,8	0,4	4	45	3	20	2
9688220100	1	0,5	4	60	3	-	2
9688220101	1	0,5	4	60	3	4	2
9688220102	1	0,5	4	60	3	5	2
9688220103	1	0,5	4	60	3	6	2
9688220104	1	0,5	4	60	3	8	2
9688220115	1	0,5	4	60	3	10	2
9688220116	1	0,5	4	60	3	12	2
9688220117	1	0,5	4	60	3	15	2
9688220118	1	0,5	4	60	3	20	2
9688220119	1	0,5	4	80	3	25	2
9688220120	1	0,5	4	80	3	30	2
9688220121	1	0,5	4	80	3	35	2
9688220122	1	0,5	4	80	3	40	2
9688220123	1	0,5	4	80	3	45	2
9688220124	1	0,5	4	80	3	50	2
9688220150	1,5	0,75	4	60	4,5	-	2
9688220151	1,5	0,75	4	60	4,5	2	2
9688220152	1,5	0,75	4	80	4,5	8	2
9688220153	1,5	0,75	4	80	4,5	10	2
9688220154	1,5	0,75	4	80	4,5	12	2
9688220155	1,5	0,75	4	80	4,5	15	2
9688220156	1,5	0,75	4	80	4,5	18	2
9688220157	1,5	0,75	4	80	4,5	20	2
9688220158	1,5	0,75	4	80	4,5	25	2
9688220159	1,5	0,75	4	80	4,5	30	2
9688220160	1,5	0,75	4	80	4,5	35	2
9688220161	1,5	0,75	4	80	4,5	40	2
9688220200	2	1	4	60	6	-	2
9688220201	2	1	4	80	6	10	2
9688220202	2	1	4	80	6	15	2
9688220203	2	1	4	80	6	20	2
9688220204	2	1	4	80	6	25	2
9688220205	2	1	4	80	6	30	2
9688220206	2	1	4	80	6	35	2
9688220207	2	1	4	100	6	40	2
9688220208	2	1	4	100	6	45	2
9688220209	2	1	4	100	6	50	2
9688220210	2	1	4	100	6	60	2
9688220211	2	1	4	100	6	70	2
9688220300	3	1,5	4	60	8	-	2
9688220301	3	1,5	6	60	3	8	2

Cod.	d1	R	d2	L1	L2	L3	Z
9688220302	3	1,5	3	100	8	15	2
9688220303	3	1,5	4	100	8	15	2
9688220304	3	1,5	4	100	8	20	2
9688220305	3	1,5	4	100	8	25	2
9688220306	3	1,5	4	100	8	30	2
9688220307	3	1,5	4	100	8	35	2
9688220308	3	1,5	4	100	8	40	2
9688220309	3	1,5	4	100	8	50	2
9688220310	3	1,5	4	100	8	60	2
9688220311	3	1,5	4	100	8	70	2
9688220400	4	2	4	60	4	-	2
9688220401	4	2	4	60	16	-	2
9688220402	4	2	4	80	16	-	2
9688220403	4	2	4	100	16	-	2
9688220404	4	2	4	130	16	-	2
9688220405	4	2	4	150	16	-	2
9688220406	4	2	4	80	16	30	2
9688220407	4	2	4	100	16	40	2
9688220408	4	2	4	130	16	40	2
9688220409	4	2	4	150	16	50	2
9688220500	5	2,5	5	110	16	-	2
9688220501	5	2,5	6	110	16	20	2
9688220502	5	2,5	5	110	16	40	2
9688220503	5	2,5	6	110	16	40	2
9688220504	5	2,5	6	110	16	60	2
9688220600	6	3	6	80	16	25	2
9688220601	6	3	6	110	16	25	2
9688220602	6	3	6	150	16	30	2
9688220603	6	3	6	110	16	40	2
9688220604	6	3	6	150	16	50	2
9688220800	8	4	8	80	20	30	2
9688220801	8	4	8	110	20	30	2
9688220802	8	4	8	110	20	40	2
9688220803	8	4	8	200	20	40	2
9688220804	8	4	8	150	20	50	2
9688221000	10	5	10	80	22	40	2
9688221001	10	5	10	110	22	40	2
9688221002	10	5	10	110	22	50	2
9688221003	10	5	10	200	22	50	2
9688221004	10	5	10	160	22	60	2
9688221200	12	6	12	110	25	50	2
9688221201	12	6	12	160	25	50	2
9688221202	12	6	12	200	25	60	2

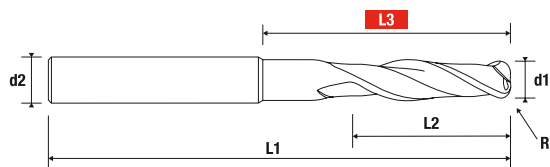
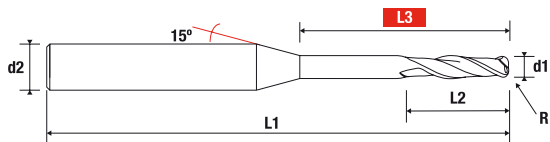


## 96.8814

### CORNER RADIUS END MILL DIAMOND Z2 · 30°

Fresa tórica de metal duro DIAMOND Z2 · 30°

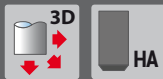
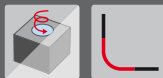
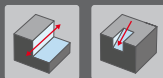
**NEW PRODUCT**



**SC**

**HELIX 30°** **DIAMOND**

GRAPHITE



**HSC** **HPC**



COATING THICKNESS 10 +2µm



Cod.	d1	R	d2	L1	L2	L3	Z
9688140021	0,2	0,02	4	60	0,5	1,5	2
9688140031	0,3	0,02	4	60	0,6	1,5	2
9688140033	0,3	0,02	4	60	0,6	4,5	2
9688140034	0,3	0,02	4	60	0,6	6	2
9688140041	0,4	0,02	4	60	0,8	2	2
9688140042	0,4	0,02	4	60	0,8	4	2
9688140043	0,4	0,02	4	60	0,8	6	2
9688140044	0,4	0,02	4	60	0,8	8	2
9688140050	0,5	0,05	4	60	1	-	2
9688140051	0,5	0,05	4	60	1	2,5	2
9688140052	0,5	0,05	4	60	1	3,5	2
9688140053	0,5	0,05	4	60	1	5	2
9688140054	0,5	0,05	4	60	1	7,5	2
9688140055	0,5	0,05	4	60	1	10	2
9688140061	0,6	0,05	4	60	1,2	-	2
9688140062	0,6	0,05	4	60	1,2	3	2
9688140063	0,6	0,05	4	60	1,2	6	2
9688140064	0,6	0,05	4	60	1,2	9	2
9688140065	0,6	0,05	4	60	1,2	12	2
9688140081	0,8	0,05	4	60	1,6	-	2
9688140082	0,8	0,05	4	60	1,6	4	2
9688140083	0,8	0,05	4	60	1,6	8	2
9688140084	0,8	0,05	4	60	1,6	10	2





Cod.	d1	R	d2	L1	L2	L3	Z
9688140085	0,8	0,05	4	60	1,6	16	2
9688140101	1	0,05	4	60	2	-	2
9688140102	1	0,05	4	60	2	5	2
9688140103	1	0,05	4	60	2	10	2
9688140104	1	0,05	4	60	2	15	2
9688140105	1	0,05	4	60	2	20	2
9688140106	1	0,1	4	60	2	-	2
9688140107	1	0,1	4	60	2	5	2
9688140108	1	0,1	4	60	2	10	2
9688140109	1	0,1	4	60	2	15	2
9688140110	1	0,1	4	60	2	20	2
9688140111	1	0,2	4	60	2	-	2
9688140112	1	0,2	4	60	2	5	2
9688140113	1	0,2	4	60	2	10	2
9688140114	1	0,2	4	60	2	15	2
9688140115	1	0,2	4	60	2	20	2
9688140151	1,5	0,05	4	60	3	-	2
9688140152	1,5	0,05	4	60	3	5	2
9688140153	1,5	0,05	4	60	3	10	2
9688140154	1,5	0,05	4	60	3	15	2
9688140155	1,5	0,05	4	60	3	20	2
9688140156	1,5	0,1	4	60	3	-	2
9688140157	1,5	0,1	4	60	3	5	2
9688140158	1,5	0,1	4	60	3	10	2
9688140159	1,5	0,1	4	60	3	15	2
9688140160	1,5	0,1	4	60	3	20	2
9688140161	1,5	0,15	4	60	3	-	2
9688140162	1,5	0,15	4	60	3	5	2
9688140163	1,5	0,15	4	60	3	10	2
9688140164	1,5	0,15	4	60	3	15	2
9688140165	1,5	0,15	4	60	3	20	2
9688140166	1,5	0,2	4	60	3	-	2
9688140167	1,5	0,2	4	60	3	5	2
9688140168	1,5	0,2	4	60	3	10	2

Cod.	d1	R	d2	L1	L2	L3	Z
9688140169	1,5	0,2	4	60	3	15	2
9688140170	1,5	0,2	4	60	3	20	2
9688140171	1,5	0,3	4	60	3	-	2
9688140172	1,5	0,3	4	60	3	5	2
9688140173	1,5	0,3	4	60	3	10	2
9688140174	1,5	0,3	4	60	3	15	2
9688140175	1,5	0,3	4	60	3	20	2
9688140201	2	0,05	4	60	3,5	-	2
9688140202	2	0,05	4	60	3,5	6	2
9688140203	2	0,05	4	60	3,5	12	2
9688140204	2	0,05	4	60	3,5	18	2
9688140205	2	0,05	4	60	3,5	25	2
9688140206	2	0,05	4	60	3,5	30	2
9688140207	2	0,2	4	60	3,5	-	2
9688140208	2	0,2	4	60	3,5	6	2
9688140209	2	0,2	4	60	3,5	12	2
9688140210	2	0,2	4	60	3,5	18	2
9688140211	2	0,2	4	60	3,5	25	2
9688140212	2	0,2	4	60	3,5	30	2
9688140213	2	0,3	4	60	3,5	-	2
9688140214	2	0,3	4	60	3,5	6	2
9688140215	2	0,3	4	60	3,5	12	2
9688140216	2	0,3	4	60	3,5	18	2
9688140217	2	0,3	4	60	3,5	25	2
9688140218	2	0,3	4	60	3,5	30	2
9688140219	2	0,5	4	60	3,5	-	2
9688140220	2	0,5	4	60	3,5	6	2
9688140221	2	0,5	4	60	3,5	12	2
9688140222	2	0,5	4	60	3,5	18	2
9688140223	2	0,5	4	60	3,5	25	2
9688140224	2	0,5	4	60	3,5	30	2
9688140301	3	0,05	4	80	4	-	2
9688140302	3	0,05	4	80	4	10	2
9688140303	3	0,05	4	80	4	20	2



Cod.	d1	R	d2	L1	L2	L3	Z
9688140303	3	0,05	4	80	4	20	2
9688140304	3	0,05	4	80	4	30	2
9688140305	3	0,05	4	80	4	40	2
9688140306	3	0,2	4	80	4	-	2
9688140307	3	0,2	4	80	4	10	2
9688140308	3	0,2	4	80	4	20	2
9688140309	3	0,2	4	80	4	30	2
9688140310	3	0,2	4	80	4	40	2
9688140311	3	0,3	4	80	4	-	2
9688140312	3	0,3	4	80	4	10	2
9688140313	3	0,3	4	80	4	20	2
9688140314	3	0,3	4	80	4	30	2
9688140315	3	0,3	4	80	4	40	2
9688140321	3	0,5	4	80	4	-	2
9688140322	3	0,5	4	80	4	10	2
9688140323	3	0,5	4	80	4	20	2
9688140324	3	0,5	4	80	4	30	2
9688140325	3	0,5	4	80	4	40	2
9688140331	3	1	4	80	4	-	2
9688140332	3	1	4	80	4	10	2
9688140333	3	1	4	80	4	20	2
9688140334	3	1	4	80	4	30	2
9688140335	3	1	4	80	4	40	2
9688140401	4	0,05	4	80	5	-	2
9688140402	4	0,05	4	80	5	15	2
9688140403	4	0,05	4	80	5	25	2
9688140404	4	0,05	4	80	5	40	2
9688140411	4	0,2	4	80	5	-	2
9688140412	4	0,2	4	80	5	15	2
9688140413	4	0,2	4	80	5	25	2
9688140414	4	0,2	4	80	5	40	2
9688140421	4	0,5	4	80	5	-	2
9688140422	4	0,5	4	80	5	15	2

Cod.	d1	R	d2	L1	L2	L3	Z
9688140423	4	0,5	4	80	5	25	2
9688140424	4	0,5	4	80	5	40	2
9688140431	4	1	4	80	5	-	2
9688140432	4	1	4	80	5	15	2
9688140433	4	1	4	80	5	25	2
9688140434	4	1	4	80	5	40	2
9688140501	5	0,05	6	110	6	-	2
9688140502	5	0,05	6	110	6	15	2
9688140503	5	0,05	6	110	6	30	2
9688140504	5	0,05	6	110	6	50	2
9688140511	5	0,2	6	110	6	-	2
9688140512	5	0,2	6	110	6	15	2
9688140513	5	0,2	6	110	6	30	2
9688140514	5	0,2	6	110	6	50	2
9688140521	5	0,5	6	110	6	-	2
9688140522	5	0,5	6	110	6	15	2
9688140523	5	0,5	6	110	6	30	2
9688140524	5	0,5	6	110	6	50	2
9688140601	6	0,05	6	110	7	-	2
9688140602	6	0,05	6	110	7	20	2
9688140603	6	0,05	6	110	7	30	2
9688140604	6	0,05	6	110	7	50	2
9688140611	6	0,2	6	110	7	-	2
9688140612	6	0,2	6	110	7	20	2
9688140613	6	0,2	6	110	7	30	2
9688140614	6	0,2	6	110	7	50	2
9688140621	6	0,5	6	110	7	-	2
9688140622	6	0,5	6	110	7	20	2
9688140623	6	0,5	6	110	7	30	2
9688140624	6	0,5	6	110	7	50	2
9688140631	6	1	6	110	7	-	2
9688140632	6	1	6	110	7	20	2
9688140633	6	1	6	110	7	30	2
9688140634	6	1	6	110	7	50	2



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The stated cutting data are recommended values under optimal machine, cooling, tool and workholding conditions. The actual cutting data must be calculated and adjusted to the working capacity of each machine.



Cod.	d1	R	d2	L1	L2	L3	Z
9684150246	2	0,5	4	60	3,5	30	4
9684150300	3	0,05	4	80	4	-	4
9684150302	3	0,05	4	80	4	10	4
9684150304	3	0,05	4	80	4	20	4
9684150306	3	0,05	4	80	4	30	4
9684150308	3	0,05	4	80	4	40	4
9684150310	3	0,2	4	80	4	-	4
9684150312	3	0,2	4	80	4	10	4
9684150314	3	0,2	4	80	4	20	4
9684150316	3	0,2	4	80	4	30	4
9684150318	3	0,2	4	80	4	40	4
9684150320	3	0,3	4	80	4	-	4
9684150322	3	0,3	4	80	4	10	4
9684150324	3	0,3	4	80	4	20	4
9684150326	3	0,3	4	80	4	30	4
9684150328	3	0,3	4	80	4	40	4
9684150330	3	0,5	4	80	4	-	4
9684150332	3	0,5	4	80	4	10	4
9684150334	3	0,5	4	80	4	20	4
9684150336	3	0,5	4	80	4	30	4
9684150338	3	0,5	4	80	4	40	4
9684150340	3	1	4	80	4	-	4
9684150342	3	1	4	80	4	10	4
9684150344	3	1	4	80	4	20	4
9684150346	3	1	4	80	4	30	4
9684150348	3	1	4	80	4	40	4
9684150400	4	0,3	4	100	6	20	4
9684150402	4	0,5	4	100	6	20	4
9684150404	4	1	4	100	6	20	4
9684150600	6	0,3	6	110	9	25	4
9684150602	6	0,5	6	110	9	25	4
9684150604	6	0,5	6	150	9	30	4
9684150606	6	1	6	110	9	25	4
9684150608	6	1	6	150	9	30	4
9684150800	8	0,3	8	110	12	30	4
9684150802	8	0,5	8	110	12	30	4

Cod.	d1	R	d2	L1	L2	L3	Z
9684150804	8	0,5	8	150	12	40	4
9684150806	8	1	8	110	12	30	4
9684150808	8	1	8	150	12	40	4
9684151000	10	0,5	10	110	15	35	4
9684151002	10	0,5	10	160	15	45	4
9684151004	10	1	10	110	15	35	4
9684151006	10	1	10	160	15	45	4
9684151200	12	0,5	12	110	18	40	4
9684151202	12	0,5	12	160	18	45	4
9684151204	12	1	12	110	18	40	4
9684151206	12	1	12	160	18	45	4







**MULTI  
LINE**

**SELECTION OF TOOLS FOR  
WIDE RANGE SOLUTIONS**

*SELECCIÓN DE HERRAMIENTAS PARA  
UNA AMPLIA GAMA DE SOLUCIONES*



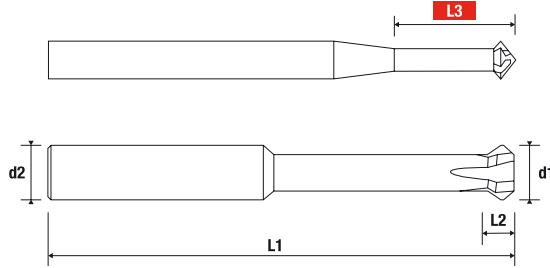


**TWIN DEBURRING END MILL 90° · Z4**

Fresa de metal duro para chaflanar a la entrada y a la salida 90° · Z4

**70.6045**

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	L3	Z
7060450200	2	6	100	1,4	10	4
7060450300	3	6	100	2	10	4
7060450400	4	6	100	3,0	13	4
7060450600	6	6	100	4,0	19	4
7060450800	8	6	100	3,2	-	4
7060451000	10	6	100	4,3	-	4
7060451200	12	6	100	5	-	4
7060451600	16	10	100	8,0	-	4



**SC**

**RACER** 600 1200 N/mm<sup>2</sup>

**55 HRC** **INOX**

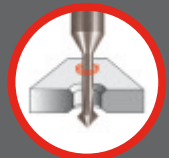
**GG(G)** **ALU NE**

**PLASTIC** **GFK CFK**

**UNI**

45°

**HA**

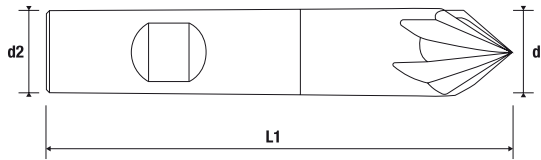




**DEBURRING TOOL 60°**

Fresa de metal duro para chaflanar 60°

90.6460



Cod	d1	d2	L1	Z
9064600400	4	4	54	4
9064600600	6	6	57	4
9064600800	8	8	63	5
9064601000	10	10	72	6
9064601200	12	12	83	6
9064601600	16	16	92	6
9064602000	20	20	104	6



SC



## 90.6490

### DEBURRING TOOL 90°

Fresa de metal duro para chaflanar 90°

**SC**



600  
1200  
N/mm<sup>2</sup> **45**  
HRC

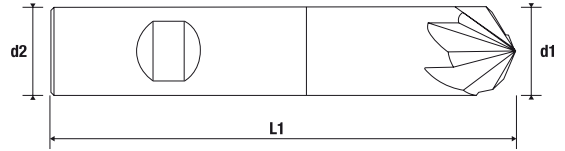
**62**  
HRC **GG(G)**

**ALU**  
**NE** **PLASTIC**

**GFK**  
**CFK** **TITAN**  
INCONEL



**HSC** **HHC**



Cod	d1	d2	L1	Z
9064900100	1	3	38	3
9064900200	2	3	38	3
9064900300	3	3	38	4
9064900400	4	4	54	4
9064900600	6	6	57	4
9064900800	8	8	63	5
9064901000	10	10	72	6
9064901200	12	12	83	6
9064901600	16	16	92	6
9064902000	20	20	104	6



C. CONDITIONS



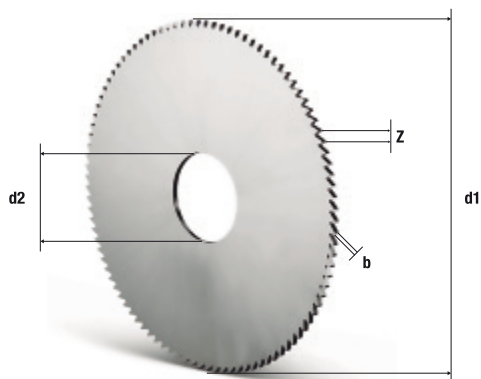
**Best**  
own coating, better  
**PERFORMANCE**

85.0050

## SLITTING SAW FINE PITCH DIN 1837 A

Fresa de disco de metal duro paso fino DIN 1837 A

NEW PRODUCT

DIN  
1837A

SC

BRIGHT  
600  
1200  
N/mm<sup>2</sup>45  
HRC  
62  
HRCGG(G)  
ALU  
NEBRONZE  
TITAN  
INCONEL

Helion

Cod.	d1	d2	b	Z
85005015060	15	5	0,60	48
85005015070	15	5	0,70	48
85005015080	15	5	0,80	40
85005015100	15	5	1,00	40
85005015110	15	5	1,10	40
85005015150	15	5	1,50	40
85005015160	15	5	1,60	40
85005015350	15	5	3,50	40
85005015400	15	5	4,00	40
85005015450	15	5	4,50	40
85005015500	15	5	5,00	40
85005015550	15	5	5,50	40
85005015600	15	5	6,00	40
85005020010	20	5	0,10	80
85005020015	20	5	0,15	80
85005020020	20	5	0,20	80
85005020025	20	5	0,25	64
85005020030	20	5	0,30	64
85005020035	20	5	0,35	64
85005020040	20	5	0,40	64

Cod.	d1	d2	b	Z
85005020050	20	5	0,50	48
85005020060	20	5	0,60	48
85005020070	20	5	0,70	48
85005020080	20	5	0,80	48
85005020090	20	5	0,90	40
85005020100	20	5	1,00	40
85005020110	20	5	1,10	40
85005020120	20	5	1,20	40
85005020130	20	5	1,30	40
85005020140	20	5	1,40	40
85005020150	20	5	1,50	40
85005020160	20	5	1,60	40
85005020170	20	5	1,70	40
85005020180	20	5	1,80	32
85005020190	20	5	1,90	32
85005020200	20	5	2,00	32
85005020250	20	5	2,50	32
85005020300	20	5	3,00	32
85005020350	20	5	3,50	24
85005020400	20	5	4,00	24



Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z
85005020450	20	5	4,50	24	85005025500	25	8	5,00	32	85005030550	30	8	5,50	32
85005020500	20	5	5,00	24	85005025550	25	8	5,50	24	85005030600	30	8	6,00	32
85005020550	20	5	5,50	24	85005025600	25	8	6,00	24	85005040010	40	10	0,10	128
85005020600	20	5	6,00	24	85005030010	30	8	0,10	100	85005040015	40	10	0,15	128
85005025010	25	8	0,10	80	85005030015	30	8	0,15	100	85005040020	40	10	0,20	128
85005025015	25	8	0,15	80	85005030020	30	8	0,20	100	85005040025	40	10	0,25	100
85005025020	25	8	0,20	80	85005030025	30	8	0,25	100	85005040030	40	10	0,30	100
85005025025	25	8	0,25	80	85005030030	30	8	0,30	80	85005040035	40	10	0,35	100
85005025030	25	8	0,30	80	85005030035	30	8	0,35	80	85005040040	40	10	0,40	100
85005025035	25	8	0,35	64	85005030040	30	8	0,40	80	85005040050	40	10	0,50	80
85005025040	25	8	0,40	64	85005030050	30	8	0,50	80	85005040060	40	10	0,60	80
85005025050	25	8	0,50	64	85005030060	30	8	0,60	64	85005040070	40	10	0,70	80
85005025060	25	8	0,60	64	85005030070	30	8	0,70	64	85005040080	40	10	0,80	80
85005025070	25	8	0,70	48	85005030080	30	8	0,80	64	85005040090	40	10	0,90	64
85005025080	25	8	0,80	48	85005030090	30	8	0,90	64	85005040100	40	10	1,00	64
85005025090	25	8	0,90	48	85005030100	30	8	1,00	64	85005040110	40	10	1,10	64
85005025100	25	8	1,00	48	85005030110	30	8	1,10	64	85005040120	40	10	1,20	64
85005025110	25	8	1,10	48	85005030120	30	8	1,20	48	85005040130	40	10	1,30	64
85005025120	25	8	1,20	48	85005030130	30	8	1,30	48	85005040140	40	10	1,40	64
85005025130	25	8	1,30	40	85005030140	30	8	1,40	48	85005040150	40	10	1,50	64
85005025140	25	8	1,40	40	85005030150	30	8	1,50	48	85005040160	40	10	1,60	64
85005025150	25	8	1,50	40	85005030160	30	8	1,60	48	85005040170	40	10	1,70	48
85005025160	25	8	1,60	40	85005030170	30	8	1,70	48	85005040180	40	10	1,80	48
85005025170	25	8	1,70	40	85005030180	30	8	1,80	48	85005040190	40	10	1,90	48
85005025180	25	8	1,80	40	85005030190	30	8	1,90	48	85005040200	40	10	2,00	48
85005025190	25	8	1,90	40	85005030200	30	8	2,00	48	85005040250	40	10	2,50	48
85005025200	25	8	2,00	40	85005030250	30	8	2,50	40	85005040300	40	10	3,00	48
85005025250	25	8	2,50	40	85005030300	30	8	3,00	40	85005040350	40	10	3,50	48
85005025300	25	8	3,00	32	85005030350	30	8	3,50	40	85005040400	40	10	4,00	40
85005025350	25	8	3,50	32	85005030400	30	8	4,00	40	85005040450	40	10	4,50	40
85005025400	25	8	4,00	32	85005030450	30	8	4,50	32	85005040500	40	10	5,00	40
85005025450	25	8	4,50	32	85005030500	30	8	5,00	32	85005040550	40	10	5,50	40



# MILL LINE MULTI LINE

Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z
85005040600	40	10	6,00	40	85005063020	63	16	0,20	160	85005080050	80	22	0,50	128
85005050010	50	13	0,10	128	85005063025	63	16	0,25	160	85005080060	80	22	0,60	128
85005050015	50	13	0,15	128	85005063030	63	16	0,30	128	85005080070	80	22	0,70	128
85005050020	50	13	0,20	128	85005063035	63	16	0,35	128	85005080080	80	22	0,80	128
85005050025	50	13	0,25	128	85005063040	63	16	0,40	128	85005080090	80	22	0,90	100
85005050030	50	13	0,30	128	85005063050	63	16	0,50	128	85005080100	80	22	1,00	100
85005050035	50	13	0,35	100	85005063060	63	16	0,60	100	85005080110	80	22	1,10	100
85005050040	50	13	0,40	100	85005063070	63	16	0,70	100	85005080120	80	22	1,20	100
85005050050	50	13	0,50	100	85005063080	63	16	0,80	100	85005080130	80	22	1,30	100
85005050060	50	13	0,60	100	85005063090	63	16	0,90	100	85005080140	80	22	1,40	100
85005050070	50	13	0,70	80	85005063100	63	16	1,00	100	85005080150	80	22	1,50	100
85005050080	50	13	0,80	80	85005063110	63	16	1,10	80	85005080160	80	22	1,60	100
85005050090	50	13	0,90	80	85005063120	63	16	1,20	80	85005080170	80	22	1,70	80
85005050100	50	13	1,00	80	85005063130	63	16	1,30	80	85005080180	80	22	1,80	80
85005050110	50	13	1,10	80	85005063140	63	16	1,40	80	85005080190	80	22	1,90	80
85005050120	50	13	1,20	80	85005063150	63	16	1,50	80	85005080200	80	22	2,00	80
85005050130	50	13	1,30	64	85005063160	63	16	1,60	80	85005080250	80	22	2,50	80
85005050140	50	13	1,40	64	85005063170	63	16	1,70	80	85005080300	80	22	3,00	80
85005050150	50	13	1,50	64	85005063180	63	16	1,80	80	85005080350	80	22	3,50	64
85005050160	50	13	1,60	64	85005063190	63	16	1,90	80	85005080400	80	22	4,00	64
85005050170	50	13	1,70	64	85005063200	63	16	2,00	80	85005080450	80	22	4,50	64
85005050180	50	13	1,80	64	85005063250	63	16	2,50	64	85005080500	80	22	5,00	64
85005050190	50	13	1,90	64	85005063300	63	16	3,00	64	85005080550	80	22	5,50	64
85005050200	50	13	2,00	64	85005063350	63	16	3,50	64	85005080600	80	22	6,00	64
85005050250	50	13	2,50	64	85005063400	63	16	4,00	64	850050040410	40	10	0,70	80
85005050300	50	13	3,00	48	85005063450	63	16	4,50	64	850050100050	100	22	0,50	160
85005050350	50	13	3,50	48	85005063500	63	16	5,00	48	850050100060	100	22	0,60	160
85005050400	50	13	4,00	48	85005063550	63	16	5,50	48	850050100070	100	22	0,70	128
85005050450	50	13	4,50	48	85005063600	63	16	6,00	48	850050100080	100	22	0,80	128
85005050500	50	13	5,00	48	85005080030	80	22	0,30	160	850050100090	100	22	0,90	128
85005050550	50	13	5,50	40	85005080035	80	22	0,35	160	850050100100	100	22	1,00	128
85005050600	50	13	6,00	40	85005080040	80	22	0,40	160	850050100110	100	22	1,10	128





Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z
850050100120	100	22	1,20	128	850050125250	125	22	2,50	100
850050100130	100	22	1,30	100	850050125300	125	22	3,00	100
850050100140	100	22	1,40	100	850050125350	125	22	3,50	100
850050100150	100	22	1,50	100	850050125400	125	22	4,00	100
850050100160	100	22	1,60	100	850050125450	125	22	4,50	100
850050100170	100	22	1,70	100	850050125500	125	22	5,00	80
850050100180	100	22	1,80	100	850050125550	125	22	5,50	80
850050100190	100	22	1,90	100	850050125600	125	22	6,00	80
850050100200	100	22	2,00	100	850050150100	150	32	1,00	150
850050100250	100	22	2,50	100	850050150120	150	32	1,20	150
850050100300	100	22	3,00	80	850050150150	150	32	1,50	150
850050100350	100	22	3,50	80	850050150160	150	32	1,60	150
850050100400	100	22	4,00	80	850050150200	150	32	2,00	128
850050100450	100	22	4,50	80	850050150250	150	32	2,50	128
850050100500	100	22	5,00	80	850050150300	150	32	3,00	128
850050100550	100	22	5,50	64	850050150400	150	32	4,00	128
850050100600	100	22	6,00	64	850050160100	160	32	1,00	160
850050125060	125	22	0,60	160	850050160120	160	32	1,20	160
850050125070	125	22	0,70	160	850050160150	160	32	1,50	160
850050125080	125	22	0,80	160	850050160160	160	32	1,60	160
850050125090	125	22	0,90	160	850050160200	160	32	2,00	128
850050125100	125	22	1,00	160	850050160250	160	32	2,50	128
850050125110	125	22	1,10	128	850050160300	160	32	3,00	128
850050125120	125	22	1,20	128	850050160400	160	32	4,00	128
850050125130	125	22	1,30	128	850050200150	200	32	1,50	160
850050125140	125	22	1,40	128	850050200160	200	32	1,60	160
850050125150	125	22	1,50	128	850050200200	200	32	2,00	160
850050125160	125	22	1,60	128	850050200250	200	32	2,50	160
850050125170	125	22	1,70	128	850050200300	200	32	3,00	128
850050125180	125	22	1,80	128	850050200400	200	32	4,00	128
850050125190	125	22	1,90	128					
850050125200	125	22	2,00	128					

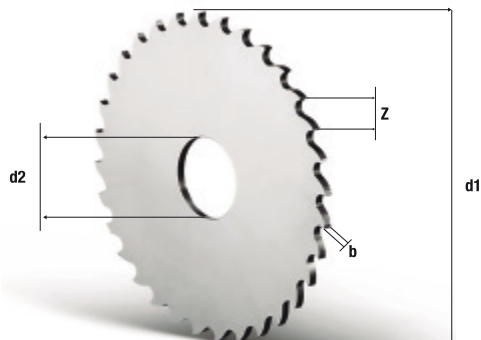


85.0051

## SLITTING SAW COARSE PITCH DIN 1838 B

Fresa de disco de metal duro paso grueso DIN 1838 B

NEW PRODUCT

DIN  
1838B

SC

BRIGHT  
600  
1200  
N/mm<sup>2</sup>45  
HRC  
62  
HRCGG(G)  
ALU  
NEBRONZE  
TITAN  
INCONEL

Helion

Cod.	d1	d2	b	Z
85005115010	15	5	0,10	20
85005115015	15	5	0,15	20
85005115020	15	5	0,20	20
85005115025	15	5	0,25	20
85005115030	15	5	0,30	20
85005115035	15	5	0,35	20
85005115040	15	5	0,40	20
85005115050	15	5	0,50	20
85005115060	15	5	0,60	20
85005115070	15	5	0,70	20
85005115080	15	5	0,80	20
85005115090	15	5	0,90	20
85005115100	15	5	1,00	20
85005115110	15	5	1,10	20
85005115120	15	5	1,20	20
85005115130	15	5	1,30	20
85005115140	15	5	1,40	20
85005115150	15	5	1,50	20
85005115160	15	5	1,60	20
85005115170	15	5	1,70	20
85005115180	15	5	1,80	20
85005115190	15	5	1,90	20

Cod.	d1	d2	b	Z
85005115200	15	5	2,00	20
85005115250	15	5	2,50	20
85005115300	15	5	3,00	20
85005115350	15	5	3,50	20
85005115400	15	5	4,00	20
85005115450	15	5	4,50	20
85005115500	15	5	5,00	20
85005115550	15	5	5,50	20
85005115600	15	5	6,00	20
85005120020	20	5	0,20	20
85005120025	20	5	0,25	20
85005120030	20	5	0,30	20
85005120035	20	5	0,35	20
85005120040	20	5	0,40	20
85005120050	20	5	0,50	20
85005120060	20	5	0,60	20
85005120070	20	5	0,70	20
85005120080	20	5	0,80	20
85005120090	20	5	0,90	20
85005120100	20	5	1,00	20
85005120110	20	5	1,10	20
85005120120	20	5	1,20	20



Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z
85005120130	20	5	1,30	20	85005125200	25	8	2,00	20	85005130550	30	8	5,50	24
85005120140	20	5	1,40	20	85005125250	25	8	2,50	20	85005130600	30	8	6,00	24
85005120150	20	5	1,50	20	85005125300	25	8	3,00	20	85005140020	40	10	0,20	40
85005120160	20	5	1,60	20	85005125350	25	8	3,50	20	85005140025	40	10	0,25	40
85005120170	20	5	1,70	20	85005125400	25	8	4,00	20	85005140030	40	10	0,30	40
85005120180	20	5	1,80	20	85005125450	25	8	4,50	20	85005140035	40	10	0,35	40
85005120190	20	5	1,90	20	85005125500	25	8	5,00	20	85005140040	40	10	0,40	40
85005120200	20	5	2,00	20	85005125550	25	8	5,50	20	85005140050	40	10	0,50	40
85005120250	20	5	2,50	20	85005125600	25	8	6,00	20	85005140060	40	10	0,60	40
85005120300	20	5	3,00	20	85005130020	30	8	0,20	30	85005140070	40	10	0,70	40
85005120350	20	5	3,50	20	85005130025	30	8	0,25	30	85005140080	40	10	0,80	32
85005120400	20	5	4,00	20	85005130030	30	8	0,30	30	85005140090	40	10	0,90	32
85005120450	20	5	4,50	20	85005130035	30	8	0,35	30	85005140100	40	10	1,00	32
85005120500	20	5	5,00	20	85005130040	30	8	0,40	30	85005140110	40	10	1,10	32
85005120550	20	5	5,50	20	85005130050	30	8	0,50	30	85005140120	40	10	1,20	32
85005120600	20	5	6,00	20	85005130060	30	8	0,60	30	85005140130	40	10	1,30	32
85005125020	25	8	0,20	20	85005130070	30	8	0,70	30	85005140140	40	10	1,40	32
85005125025	25	8	0,25	20	85005130080	30	8	0,80	24	85005140150	40	10	1,50	32
85005125030	25	8	0,30	20	85005130090	30	8	0,90	24	85005140160	40	10	1,60	32
85005125035	25	8	0,35	20	85005130100	30	8	1,00	24	85005140170	40	10	1,70	32
85005125040	25	8	0,40	20	85005130110	30	8	1,10	24	85005140180	40	10	1,80	32
85005125050	25	8	0,50	20	85005130120	30	8	1,20	24	85005140190	40	10	1,90	32
85005125060	25	8	0,60	20	85005130130	30	8	1,30	24	85005140200	40	10	2,00	32
85005125070	25	8	0,70	20	85005130140	30	8	1,40	24	85005140250	40	10	2,50	32
85005125080	25	8	0,80	20	85005130150	30	8	1,50	24	85005140300	40	10	3,00	32
85005125090	25	8	0,90	20	85005130160	30	8	1,60	24	85005140350	40	10	3,50	32
85005125100	25	8	1,00	20	85005130170	30	8	1,70	24	85005140400	40	10	4,00	32
85005125110	25	8	1,10	20	85005130180	30	8	1,80	24	85005140450	40	10	4,50	32
85005125120	25	8	1,20	20	85005130190	30	8	1,90	24	85005140500	40	10	5,00	32
85005125130	25	8	1,30	20	85005130200	30	8	2,00	24	85005140550	40	10	5,50	32
85005125140	25	8	1,40	20	85005130250	30	8	2,50	24	85005140600	40	10	6,00	32
85005125150	25	8	1,50	20	85005130300	30	8	3,00	24	85005150020	50	13	0,20	48
85005125160	25	8	1,60	20	85005130350	30	8	3,50	24	85005150025	50	13	0,25	48
85005125170	25	8	1,70	20	85005130400	30	8	4,00	24	85005150030	50	13	0,30	48
85005125180	25	8	1,80	20	85005130450	30	8	4,50	24	85005150035	50	13	0,35	48
85005125190	25	8	1,90	20	85005130500	30	8	5,00	24	85005150040	50	13	0,40	48



Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z
85005150050	50	13	0,50	48	85005163140	63	16	1,40	40	85005180350	80	22	3,50	32
85005150060	50	13	0,60	48	85005163150	63	16	1,50	40	85005180400	80	22	4,00	32
85005150070	50	13	0,70	40	85005163160	63	16	1,60	40	85005180450	80	22	4,50	32
85005150080	50	13	0,80	40	85005163170	63	16	1,70	40	85005180500	80	22	5,00	32
85005150090	50	13	0,90	40	85005163180	63	16	1,80	40	85005180550	80	22	5,50	32
85005150100	50	13	1,00	40	85005163190	63	16	1,90	40	85005180600	80	22	6,00	32
85005150110	50	13	1,10	40	85005163200	63	16	2,00	40	850051100050	100	22	0,50	80
85005150120	50	13	1,20	40	85005163250	63	16	2,50	32	850051100060	100	22	0,60	80
85005150130	50	13	1,30	32	85005163300	63	16	3,00	32	850051100070	100	22	0,70	80
85005150140	50	13	1,40	32	85005163350	63	16	3,50	32	850051100080	100	22	0,80	64
85005150150	50	13	1,50	32	85005163400	63	16	4,00	32	850051100090	100	22	0,90	64
85005150160	50	13	1,60	32	85005163450	63	16	4,50	32	850051100100	100	22	1,00	64
85005150170	50	13	1,70	32	85005163500	63	16	5,00	24	850051100110	100	22	1,10	64
85005150180	50	13	1,80	32	85005163550	63	16	5,50	24	850051100120	100	22	1,20	64
85005150190	50	13	1,90	32	85005163600	63	16	6,00	24	850051100130	100	22	1,30	48
85005150200	50	13	2,00	32	85005180030	80	22	0,30	64	850051100140	100	22	1,40	48
85005150250	50	13	2,50	32	85005180035	80	22	0,35	64	850051100150	100	22	1,50	48
85005150300	50	13	3,00	24	85005180040	80	22	0,40	64	850051100160	100	22	1,60	48
85005150350	50	13	3,50	24	85005180050	80	22	0,50	64	850051100170	100	22	1,70	48
85005150400	50	13	4,00	24	85005180060	80	22	0,60	64	850051100180	100	22	1,80	48
85005150450	50	13	4,50	24	85005180070	80	22	0,70	64	850051100190	100	22	1,90	48
85005150500	50	13	5,00	24	85005180080	80	22	0,80	64	850051100200	100	22	2,00	48
85005150550	50	13	5,50	20	85005180090	80	22	0,90	48	850051100250	100	22	2,50	48
85005150600	50	13	6,00	20	85005180100	80	22	1,00	48	850051100300	100	22	3,00	40
85005163030	63	16	0,30	64	85005180110	80	22	1,10	48	850051100350	100	22	3,50	40
85005163035	63	16	0,35	64	85005180120	80	22	1,20	48	850051100400	100	22	4,00	40
85005163040	63	16	0,40	64	85005180130	80	22	1,30	48	850051100450	100	22	4,50	40
85005163050	63	16	0,50	64	85005180140	80	22	1,40	48	850051100500	100	22	5,00	40
85005163060	63	16	0,60	48	85005180150	80	22	1,50	48	850051100550	100	22	5,50	32
85005163070	63	16	0,70	48	85005180160	80	22	1,60	48	850051100600	100	22	6,00	32
85005163080	63	16	0,80	48	85005180170	80	22	1,70	40	850051125060	125	22	0,60	80
85005163090	63	16	0,90	48	85005180180	80	22	1,80	40	850051125070	125	22	0,70	80
85005163100	63	16	1,00	48	85005180190	80	22	1,90	40	850051125080	125	22	0,80	80
85005163110	63	16	1,10	40	85005180200	80	22	2,00	40	850051125090	125	22	0,90	80
85005163120	63	16	1,20	40	85005180250	80	22	2,50	40	850051125100	125	22	1,00	80
85005163130	63	16	1,30	40	85005180300	80	22	3,00	40	850051125110	125	22	1,10	64



Cod.	d1	d2	b	Z	Cod.	d1	d2	b	Z
850051125120	125	22	1,20	64	850051200160	200	32	1,60	80
850051125130	125	22	1,30	64	850051200200	200	32	2,00	80
850051125140	125	22	1,40	64	850051200250	200	32	2,50	80
850051125150	125	22	1,50	64	850051200300	200	32	3,00	64
850051125160	125	22	1,60	64	850051200400	200	32	4,00	64
850051125170	125	22	1,70	64					
850051125180	125	22	1,80	64					
850051125190	125	22	1,90	64					
850051125200	125	22	2,00	64					
850051125250	125	22	2,50	48					
850051125300	125	22	3,00	48					
850051125350	125	22	3,50	48					
850051125400	125	22	4,00	48					
850051125450	125	22	4,50	40					
850051125500	125	22	5,00	40					
850051125550	125	22	5,50	40					
850051125600	125	22	6,00	40					
850051150100	150	32	1,00	80					
850051150120	150	32	1,20	80					
850051150150	150	32	1,50	80					
850051150160	150	32	1,60	80					
850051150200	150	32	2,00	64					
850051150250	150	32	2,50	64					
850051150300	150	32	3,00	64					
850051150400	150	32	4,00	48					
850051160100	160	32	1,00	80					
850051160120	160	32	1,20	80					
850051160150	160	32	1,50	80					
850051160160	160	32	1,60	80					
850051160200	160	32	2,00	64					
850051160250	160	32	2,50	64					
850051160300	160	32	3,00	64					
850051160400	160	32	4,00	48					
850051200150	200	32	1,50	80					







**INCH  
LINE**



**SOLID CARBIDE END  
MILL INCH SIZES**

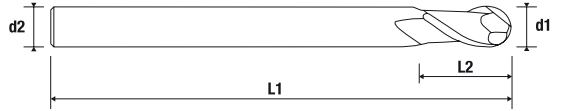
*FRESAS DE METAL DURO CON  
MEDIDAS EN PULGADAS*

## 80.7421F

### BALL NOSE END MILL Z2 · 35°

Fresa esférica de metal duro Z2 · 35°

**NEW PRODUCT**



**SC**

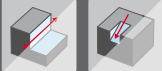
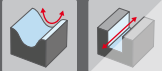
**HELIX 35°** **RACER PLUS**

**600 1200**  
N/mm<sup>2</sup> **45**  
HRC

**62**  
HRC **INOX**

**GG(G)** **ALU NE**

**TITAN INCONELL** **UNI**



**HSC** **HHC**



**Helion**

Cod.	d1	d2	L1	L2	Z
807421F116	1/16	1/8	1-1/2	3/16	2
807421F564	5/64	1/8	1-1/2	3/16	2
807421F332	3/32	1/8	1-1/2	9/32	2
807421F764	7/64	1/8	1-1/2	3/8	2
807421F18	1/8	1/8	1-1/2	3/8	2
807421F316	3/16	3/16	2	5/8	2
807421F14	1/4	1/4	2-1/2	3/4	2
807421F516	5/16	5/16	2-1/2	13/16	2
807421F38	3/8	3/8	2-1/2	1	2
807421F12	1/2	1/2	3	1	2
807421F58	5/8	5/8	3-1/2	1-1/4	2

Unit: Inch / Unidad: Pulgadas



C. CONDITIONS

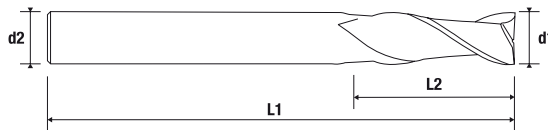


## SQUARE END MILL Z2 · 35°

Fresa plana de metal duro Z2 · 35°

# 80.7202F

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	Z
807202F116	1/16	1/8	1-1/2	3/16	2
807202F564	5/64	1/8	1-1/2	3/16	2
807202F332	3/32	1/8	1-1/2	9/32	2
807202F764	7/64	1/8	1-1/2	3/8	2
807202F18	1/8	1/8	1-1/2	3/8	2
807202F316	3/16	3/16	2	5/8	2
807202F14	1/4	1/4	2-1/2	3/4	2
807202F516	5/16	5/16	2-1/2	13/16	2
807202F38	3/8	3/8	2-1/2	1	2
807202F12	1/2	1/2	3	1	2
807202F58	5/8	5/8	3-1/2	1-1/4	2

Unit: Inch / Unidad: Pulgadas



**SC**

**HELIX 35°** **RACER PLUS**

**600 1200 N/mm²** **45 HRC**

**65 HRC** **GG(G)**

**INOX** **ALU NE**

**NI ALLOYS** **UNI**



**HA** **HSC**

**HHC**

**AIR**



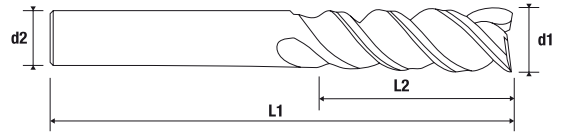
C. CONDITIONS

84.0303F

**SQUARE END MILL ALU Z3 · 45°**

Fresa plana de metal duro ALU Z3 · 45°

**NEW PRODUCT**

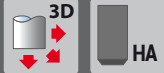
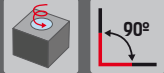
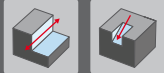


**SC**

HELIX 45° BRIGHT

ALU NE PLASTIC

BRONZE



POLISHED HSC

MULTI TASK Cutter



Cod.	d1	d2	L1	L2	Z
840303F18	1/8	1/8	1-1/2	3/8	3
840303F316	3/16	3/16	2	9/16	3
840303F14	1/4	1/4	2	3/4	3
840303F516	5/16	5/16	2-1/2	5/8	3
840303F38	3/8	3/8	2-1/2	1-1/4	3
840303F12	1/2	1/2	3	1-1/4	3
840303F58	5/8	5/8	3-1/2	1-5/8	3

Unit: Inch / Unidad: Pulgadas



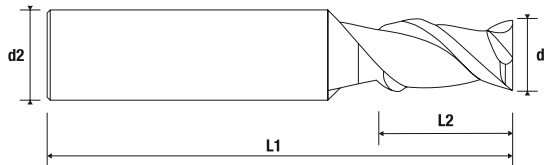
i

C. CONDITIONS      APPLICATION

## SQUARE END MILL HIGH FEED HELIX ALU Z2 · 45°

Fresa plana de metal duro de alto avance ALU Z2 · 45°

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	Z
843302F14	1/4	1/4	2	3/4	2
843302F516	5/16	5/16	2-1/2	5/8	2
843302F38	3/8	3/8	2-1/2	1-1/4	2
843302F12	1/2	1/2	3	1-1/4	2
843302F58	5/8	5/8	3-1/2	1-5/8	2

Unit: Inch / Unidad: Pulgadas



**SC**

**HELIX  
45°**

**SPEED  
ZR**

**ALU  
NE**

**PLASTIC**

**BRONZE**



**POLISHED**

**HSC**

**HPC**



**MULTI  
TASK  
Cutter**



C. CONDITIONS

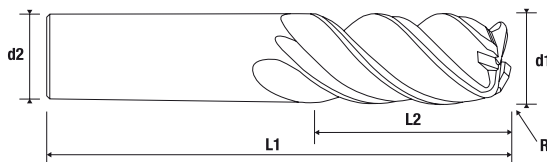


## 91.7414F

### SQUARE END MILL CORNER RADIUS Z4 · 30°

Fresa plana de metal duro tórica Z4 · 30°

**NEW PRODUCT**



**SC**

**HELIX 42°**

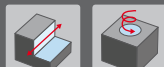
**RACER PLUS**

**600 1200 N/mm²**

**45 HRC**

**INOX GG(G)**

**TITAN INCONEL**



**HPC HSC**

**MULTI TASK Cutter**

**MQL AIR**



Cod.	d1	R	d2	L1	L2	Z
917414F141	1/4	0,015	1/4	2-1/2	9/16	4
917414F142	1/4	0,030	1/4	2-1/2	9/16	4
917414F143	1/4	0,060	1/4	2-1/2	9/16	4
917414F5161	5/16	0,015	5/16	2-1/2	11/16	4
917414F5162	5/16	0,030	5/16	2-1/2	11/16	4
917414F5163	5/16	0,060	5/16	2-1/2	11/16	4
917414F381	3/8	0,020	3/8	2-1/2	13/16	4
917414F382	3/8	0,030	3/8	2-1/2	13/16	4
917414F383	3/8	0,060	3/8	2-1/2	13/16	4
917414F384	3/8	0,090	3/8	2-1/2	13/16	4
917414F121	1/2	0,020	1/2	3	1	4
917414F122	1/2	0,030	1/2	3	1	4
917414F123	1/2	0,060	1/2	3	1	4
917414F124	1/2	0,090	1/2	3	1	4
917414F125	1/2	0,125	1/2	3	1	4
917414F581	5/8	0,030	5/8	3-1/2	1-1/4	4
917414F582	5/8	0,060	5/8	3-1/2	1-1/4	4
917414F583	5/8	0,090	5/8	3-1/2	1-1/4	4
917414F584	5/8	0,125	5/8	3-1/2	1-1/4	4

Unit: Inch / Unidad: Pulgadas



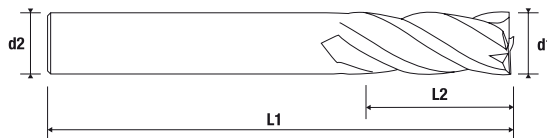
C. CONDITIONS

**SQUARE END MILL Z4 · 35°**

Fresa plana de metal duro Z4 · 35°

**80.7402F**

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	Z
807402F116	1/16	1/8	1-1/2	3/16	4
807402F564	5/64	1/8	1-1/2	3/16	4
807402F332	3/32	1/8	1-1/2	9/32	4
807402F764	7/64	1/8	1-1/2	3/8	4
807402F18	1/8	1/8	1-1/2	3/8	4
807402F316	3/16	3/16	2	5/8	4
807402F14	1/4	1/4	2-1/2	3/4	4
807402F516	5/16	5/16	2-1/2	13/16	4
807402F38	3/8	3/8	2-1/2	1	4
807402F12	1/2	1/2	3	1	4
807402F58	5/8	5/8	3-1/2	1-1/4	4

Unit: Inch / Unidad: Pulgadas



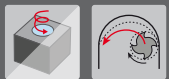
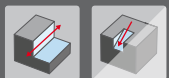
**SC**

**HELIX 35°** **RACER PLUS**

**600 1200 N/mm²** **62 HRC**

**GG(G)** **ALU NE**

**NI ALLOYS** **UNI**



**HA** **HSC**

**HHC**

**AIR**

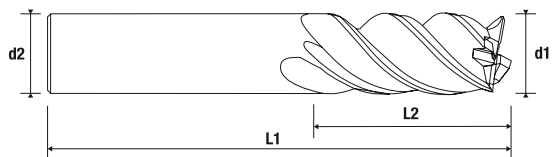


# 91.7404F

## VARIABLE HELIX SC END MILL Z4 · 35°/38°

Fresa plana de metal duro con hélice variable Z4 · 35°/38°

**NEW PRODUCT**



Cod.	d1	d2	L1	L2	Z
917404F14	1/4	1/4	2-1/2	1/2	4
917404F516	5/16	5/16	2-1/2	13/16	4
917404F38	3/8	3/8	2-1/2	7/8	4
917404F12	1/2	1/2	3	1	4
917404F58	5/8	5/8	3-1/2	1-1/4	4

Unit: Inch / Unidad: Pulgadas



**SC**

**HELIX 35/38°** **RACER PLUS**

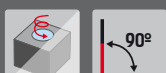
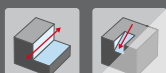


**600 1200 N/mm²** **55 HRC**

**INOX GG(G)**

**NI ALLOYS TITAN INCONEL**

**UNI**



**HPC HSC**

**MULTI TASK Cutter**



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# LIFT



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# 89

# HELIHSS

## HIGHT PERFORMANCE HSS CUTTING TOOLS

Universal cutter for  
efficient machining with HSS

*Cortador universal para  
mecanizado eficiente con HSS*

Special geometry for longer tool life

*Geometría especial para  
la larga vida de la herramienta*

High removal rate with soft cutting

*Alta capacidad de arranque de viruta con corte suave*

## 89.0602 89.0604

**M42**

HELIX  
**30°** BRIGHT

600  
1200  
N/mm<sup>2</sup> GG(G)

ALU  
NE INOX

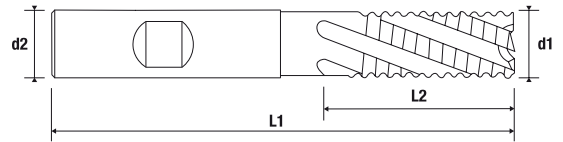
TITAN  
INCONEL UNI



## ROUGHING END MILL HSS NR · Z4

Fresa frontal de HSS para desbaste NR · Z4

DIN  
844K



Cod.	d1	d2	L1	L2	Z
8906020600	6	6	57	13	4
8906020700	7	10	66	16	4
8906020800	8	10	69	19	4
8906020900	9	10	69	19	4
8906021000	10	10	72	22	4
8906021100	11	12	79	22	4
8906021200	12	12	83	26	4
8906021400	14	12	83	26	4
8906021500	15	12	83	26	4
8906021600	16	16	92	32	4
8906021800	18	16	92	32	4
8906022000	20	20	104	38	4
8906022200	22	20	104	38	4
8906022400	24	25	121	45	4

Cod.	d1	d2	L1	L2	Z
8906041000	10	10	95	45	4
8906041200	12	12	110	53	4
8906041400	14	12	110	53	4
8906041600	16	16	123	63	4
8906041800	18	18	123	63	4
8906042000	20	20	141	75	4



C. CONDITIONS  
89.0602



C. CONDITIONS  
89.0604

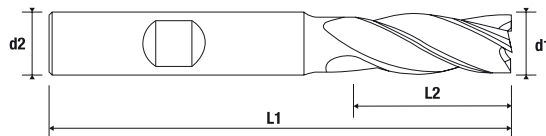


## SQUARE END MILL HSS N · Z4 - Z6

Fresa frontal de HSS N · Z4-Z6

# 89.0402

DIN  
844K



Cod.	d1	d2	L1	L2	Z
8904020200	2	6	51	7	4
8904020250	2,5	6	52	8	4
8904020300	3	6	52	8	4
8904020350	3,5	6	54	10	4
8904020400	4	6	55	11	4
8904020450	4,5	6	55	11	4
8904020500	5	6	57	13	4
8904020550	5,5	6	57	13	4
8904020600	6	6	57	13	4
8904020650	6,5	10	66	16	4
8904020700	7	10	66	16	4
8904020750	7,5	10	66	16	4
8904020800	8	10	69	19	4
8904020850	8,5	10	69	19	4
8904020900	9	10	69	19	4
8904020950	9,5	10	69	19	4



### M42



Cod.	d1	d2	L1	L2	Z
8904021000	10	10	72	22	4
8904021100	11	12	79	22	4
8904021200	12	12	83	26	4
8904021300	13	12	83	26	4
8904021400	14	12	83	26	4
8904021500	15	12	83	26	4
8904021600	16	16	92	32	4
8904021800	18	16	92	32	4
8904022000	20	20	104	38	4
8904022200	22	20	104	38	4
8904022400	24	25	121	45	6
8904022500	25	25	121	45	6
8904022600	26	25	121	45	6
8904022800	28	25	121	45	6
8904023000	30	25	121	45	6
8904023200	32	32	133	53	6

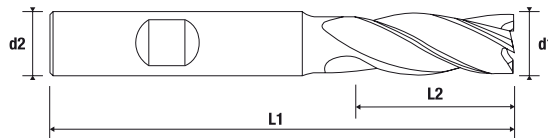


## SQUARE END MILL HSS LONG N · Z4-Z6

Fresa frontal de HSS larga N · Z4-Z6

# 89.0404

DIN  
844L



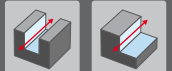
M42

HELIX  
30° BRIGHT

600  
1200  
N/mm<sup>2</sup> GG(G)

INOX ALU  
NE

TITAN  
INCONEL UNI



Cod.	d1	d2	L1	L2	Z
8904040300	3	6	56	12	4
8904040400	4	6	63	19	4
8904040500	5	6	68	24	4
8904040600	6	6	68	24	4
8904040700	7	10	80	30	4
8904040800	8	10	88	38	4
8904040900	9	10	88	38	4
8904041000	10	10	95	45	4
8904041100	11	12	102	45	4
8904041200	12	12	110	53	4
8904041400	14	12	110	53	4
8904041500	15	12	110	53	4
8904041600	16	16	123	63	4
8904041800	18	16	123	63	4
8904042000	20	20	141	75	4
8904042500	25	25	166	90	6
8904042800	28	25	166	90	6
8904043000	30	25	166	90	6
8904043200	32	32	186	106	6
8904043600	36	32	186	106	6
8904044000	40	40	217	125	6



C. CONDITIONS



## 89.0202

### SQUARE END MILL HSS N · Z2

Fresa frontal de HSS N · Z2

### M42

HELIX  
30° BRIGHT

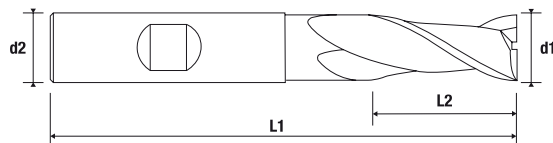
600  
1200  
N/mm<sup>2</sup> GG(G)

INOX ALU  
NE

TITAN  
INCONEL UNI



DIN  
844K



Cod.	d1	d2	L1	L2	Z
8902020300	3	6	52	8	2
8902020350	3,5	6	54	10	2
8902020400	4	6	55	11	2
8902020450	4,5	6	55	11	2
8902020500	5	6	57	13	2
8902020550	5,5	6	57	13	2
8902020600	6	6	57	13	2
8902020700	7	10	66	16	2
8902020800	8	10	69	19	2
8902021000	10	10	72	22	2
8902021100	11	12	79	22	2
8902021200	12	12	83	26	2
8902021300	13	12	83	26	2
8902021400	14	12	83	26	2
8902021500	15	12	83	26	2
8902021600	16	16	92	32	2
8902021800	18	16	92	32	2
8902022000	20	20	104	38	2



C. CONDITIONS

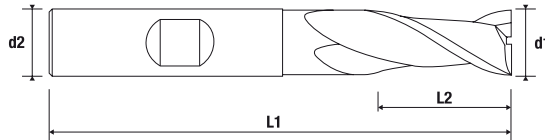


## SQUARE END MILL HSS LONG N · Z2

Fresa frontal de HSS larga N · Z2

# 89.0204

**DIN  
844L**



Cod.	d1	d2	L1	L2	Z
8902040300	3	6	56	12	2
8902040400	4	6	63	19	2
8902040500	5	6	68	24	2
8902040600	6	6	68	24	2
8902040800	8	10	88	38	2
8902041000	10	10	95	45	2
8902041200	12	12	110	53	2
8902041400	14	12	110	53	2
8902041600	16	16	123	63	2
8902041800	18	16	123	63	2
8902042000	20	20	141	75	2



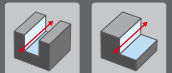
**M42**

**HELIX  
30°** **BRIGHT**

**600  
1200  
N/mm²** **GG(G)**

**INOX** **ALU  
NE**

**TITAN  
INCONEL** **UNI**



C. CONDITIONS



## 89.0302

### SQUARE END MILL HSS N · Z3

Fresa frontal de HSS N · Z3

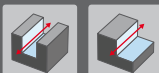
### M42

HELIX  
30° BRIGHT

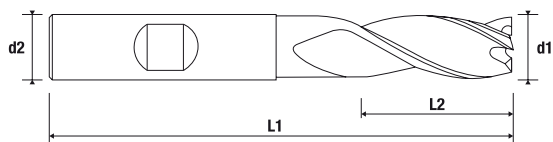
600  
1200  
N/mm<sup>2</sup> GG(G)

INOX ALU  
NE

TITAN  
INCONEL UNI



DIN  
844K



Cod.	d1	Tol. d1	d2	L1	L2	Z
8903020280	2,80	h10	6	52	8	3
8903020300	3,00	e8	6	52	8	3
8903020380	3,80	h10	6	55	11	3
8903020400	4,00	e8	6	55	11	3
8903020480	4,80	h10	6	57	13	3
8903020500	5,00	e8	6	57	13	3
8903020575	5,75	h10	6	57	13	3
8903020600	6,00	e8	6	57	13	3
8903020675	6,75	h10	10	66	16	3
8903020700	7,00	e8	10	66	16	3
8903020775	7,75	h10	10	69	19	3
8903020800	8,00	e8	10	69	19	3
8903020900	9,00	h10	10	69	19	3
8903020970	9,70	h10	10	72	22	3
8903021000	10,00	e8	10	72	22	3
8903021100	11,00	h10	12	79	22	3
8903021170	11,70	h10	12	79	22	3
8903021200	12,00	e8	12	83	26	3
8903021370	13,70	h10	12	83	26	3
8903021400	14,00	e8	12	83	26	3
8903021500	15,00	h10	12	83	26	3
8903021570	15,70	h10	16	92	32	3
8903021600	16,00	e8	16	92	32	3
8903021800	18,00	e8	16	92	32	3
8903022000	20,00	e8	20	104	38	3



C. CONDITIONS

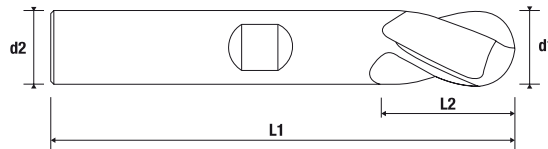




## BALL NOSE END MILL HSS N Z2

Fresa esférica de HSS N · Z2

# 89.0221



Cod.	d1	d2	L1	L2	Z
8902210200	2	6	48	4	2
8902210300	3	6	49	5	2
8902210400	4	6	51	7	2
8902210500	5	6	52	8	2
8902210600	6	6	52	8	2
8902210700	7	10	60	10	2
8902210800	8	10	61	11	2
8902210900	9	10	61	11	2
8902211000	10	10	63	13	2
8902211200	12	12	73	16	2
8902211300	13	12	73	16	2
8902211400	14	12	73	16	2
8902211500	15	12	73	16	2
8902211600	16	16	79	19	2
8902211800	18	16	79	19	2
8902211900	19	16	79	19	2
8902212000	20	20	88	22	2

### M42

- HELIX 30° BRIGHT
- 600 1200 N/mm² GG(G)
- INOX ALU NE
- TITAN INCONEL UNI
- HB



G. CONDITIONS

## 89.0223

### BALL NOSE END MILL HSS N · Z2 LONG

Fresa esférica de HSS larga N · Z2

### M42

HELIX  
30° BRIGHT

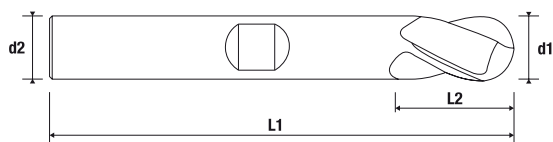
600  
1200  
N/mm<sup>2</sup> GG(G)

INOX ALU  
NE

TITAN  
INCONEL UNI



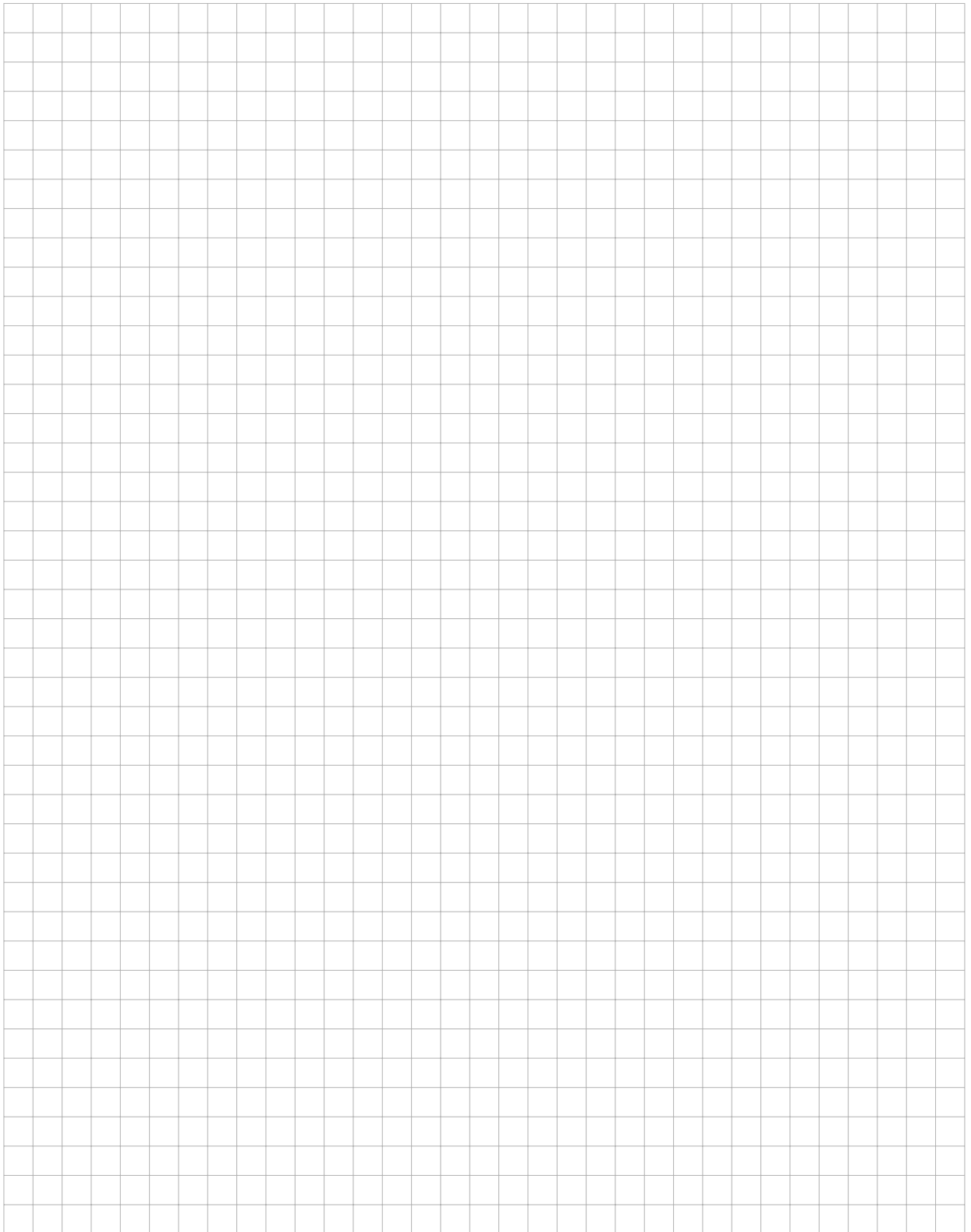
DIN  
844K

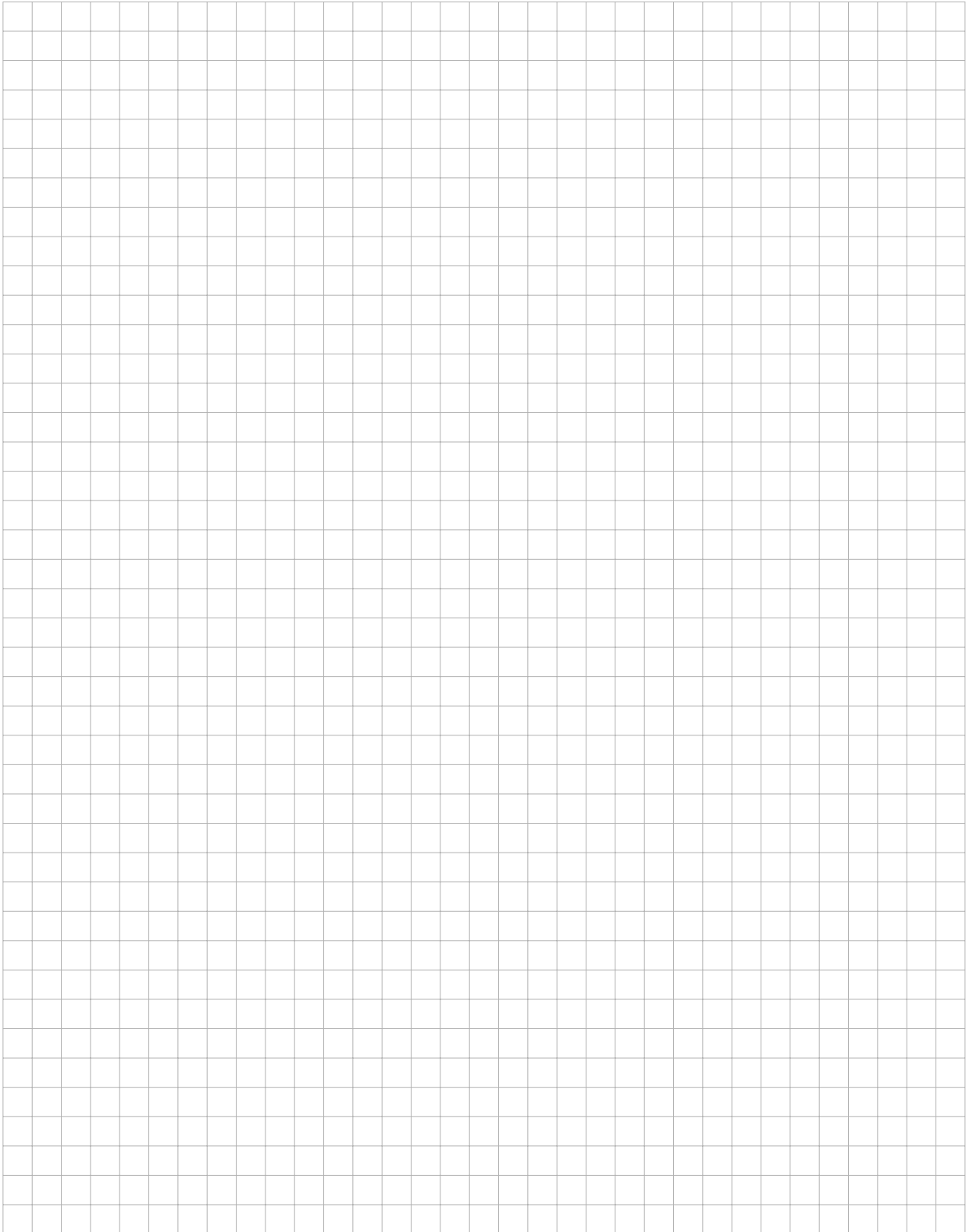


Cod.	d1	d2	L1	L2	Z
8902230300	3	6	56	8	2
8902230400	4	6	63	11	2
8902230500	5	6	68	13	2
8902230600	6	6	68	13	2
8902230700	7	10	80	16	2
8902230800	8	10	88	19	2
8902231000	10	10	95	22	2
8902231200	12	12	110	26	2
8902231400	14	12	110	26	2
8902231500	15	12	110	26	2
8902231600	16	16	123	32	2
8902231800	18	16	123	32	2
8902232000	20	20	141	38	2



C. CONDITIONS









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