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SWISS QUALITY

URMA Reaming Technology Guide

Ø 7.600 – 13.600 mm

Ø 11.900 – 140.600 mm

Ø 5.800 – 33.100 mm

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URMA Reaming
RX small

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Order Example

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	Tolerancias ISO de agujero ISO Bore Tolerances	**Tolerancia del agujero µm** Bore Tolerance in µm	**Diámetro objetivo** Target Size (Q-Insert)	
Example	**Ejemplo de pedido** Order Example RXsG8**H7**-A01**U2** F0512R1	**Ejemplo de pedido** Order Example RXsG8**+20-10**-A01**U1** F0514R1	**Ejemplo de pedido** Order Example RXsG**8.020Q+3-3**-A01**U2** F0512R1	Example
	RXs **RX small** **sistema designación** RX small system designation	**RXs** **RX small** **sistema designación** RX small system designation	**RXs** **RX small** **sistema designación** RX small system designation	
	G **Hélice (G = recto** **L = helicodal)** Flute form (G = straight; L = left-hand helix)	**G** **Hélice (G = recto** **L = helicoidal)** Flute form (G = straight; L = left-hand helix)	**G** **Hélice (G = recto** **L = helicoidal)** Flute form (G = straight; L = left-hand helix)	
Diameter	**8** **Diámetro (mm)** Diameter (mm)	**8** **Diámetro (mm)** Diameter (mm)	**8.020** **Diámetro de placa (mm)** Insert diameter (mm) **Q** **Código para medida objetivo placa** Code for target size insert	Diameter
	H7 **Tolerancia ISO standard** Tolerance in ISO standard	**+20-10** **Tolerancia del agujero (µm)** Bore tolerance (µm)	**+3-3** **Tolerancia de fabricación (µm)** Manufacturing tolerance (µm)	
	A01 **Geometría de corte** Cutting geometry	**A01** **Geometría de corte** Cutting geometry	**A01** **Geometría de corte** Cutting geometry	
Option	**U2** **Preparación del filo** **Detalles, ver página 9** Edge preparation For details see page 9	**U1** **Preparación del filo** **Detalles, ver página 9** Edge preparation For details see page 9	**U2** **Preparación del filo** **Detalles, ver página 9** Edge preparation For details see page 9	Option
	F05 **Material de corte** **Detalles, ver página 11** Cutting material For details see page 11	**F05** **Material de corte** **Detalles, ver página 11** Cutting material For details see page 11	**F05** **Material de corte** **Detalles, ver página 11** Cutting material For details see page 11	
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	1 **1 = capa fina** **2 = capa gruesa** 1 = thin coating 2 = thick coating	**1** **1 = capa fina** **2 = capa gruesa** 1 = thin coating 2 = thick coating	**1** **1 = capa fina** **2 = capa gruesa** 1 = thin coating 2 = thick coating	

Detalles de ejemplo de pedido
Details Order Example

Tolerancias de agujero y posibles espesores de recubrimiento
Bore Tolerances and Applicable Coating Thickness

	Campo de tolerancia de agujero Bore Tolerance Range	**No recubierto** Uncoated	**Espesor de recubrimiento** Coating Thickness		**Recargo por tolerancias estrechas** Surcharge for Tight Tolerances
			1	2	
Bore Diameter	**≥ 14 µm**	x	x	x	-
	10 – 13 µm	x	x		-
				x	x
	6 – 9 µm	x			-
			x	-	x

Ejemplo: Diametro del agujero 20H7 = campo de tolerancia 21 µm = **≥ 14 µm**
Example: Bore diameter 20H7 = tolerance range 21 µm =

Diametro del agujero 12 $^{+0.006}_{-0.005}$ = campo de tolerancia 11 µm = **10 – 13 µm**
Bore diameter 12 $^{+0.006}_{-0.005}$ = tolerance range 11 µm =

Medida para sólidos (placas Q) y posibles espesores de recubrimiento
Target Size (Q-Inserts) and Applicable Coating Thickness

	Campo de tolerancia de agujero Insert Tolerance	**No recubierto** Uncoated	**Espesor de recubrimiento** Coating Thickness		**Recargo por tolerancias estrechas** Surcharge for Tight Tolerances
			1	2	
Insert Diameter	**± 4 µm**	N/A	N/A	x	-
	± 3 µm	N/A	x		-
				x	x
	± 2 µm	x			-
			x	N/A	x
	± 1 µm	x	N/A	N/A	x

N/A = No aplicable
N/A = Not applicable

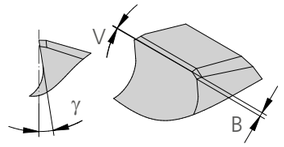
Preparación del filo (nano finishing)
Edge preparation (Nano Finishing)

U1 **Preparación de filo ligera**
Light
edge-preparation

U2 **Preparación de filo media**
Medium
edge-preparation

U__ **Otras preparaciones de filo bajo demanda**
Other edge-preparations
on request

Geometrías de corte
Cutting Geometries



vf →	Geo	RXG	RXL	Bore type		fz mm	Ra µm	Zyl.	Pos	FC	MD
	A0 __ (45°)	▲		▲ (K1-K8)*	▲	REFERENCE VALUE					
			▲	▲							
	B0 __ (25°)		▲	▲		↗	👍	👎	👎	↗	↗
		□			□						
	C0 __ (8° 45°)	▲		▲ (K1-K8)*	▲	↗	👍	👎	👎	↗	↗
			▲	▲							
	C1 __ (20° 45°)	▲		▲ (K1-K8)*	▲	↗	👍	👎	👎	↗	↗
			▲	▲							
	D0 __ (4° 30°)		▲	▲		↗	👍	👎	👎	↗	↗
		□			□						
	G0 __ (60°)	▲		▲ (K1-K8)*	▲	↘	👎	👍	👍	↘	↘
			□	▲							
	G1 __ (60°) with protection angle	▲		▲ (K1-K8)*		↘	=	👍	👍	↘	↘
			□	▲							

Geo	γ	B	V	W	ap mm	Ra µm	Zyl.	FC	MD	X
__ 1	STANDARD GEOMETRY (REFERENCE VALUE)									
__ 2	=	=	↘	=	=	=	=	↗	↗	=
__ 3	=	↘	=	=	↘	=	=	=	=	↘
__ 4	=	=	=	↘	=	👍	=	↘	↘	=
__ 5	=	=	=	↗	=	=	=	↗	↗	=
__ 6	=	=	↗	=	=	=	=	↘	↘	=
__ 7	↗	=	↗	=	=	=	=	↘	↘	=
__ 8	=	↗	=	=	↗	=	=	=	=	↗

Geometrías especiales bajo demanda
Special geometries on request

*** Consulte el grupo de materiales en la página 88**

* See page 88 for material group

Definiciones y formulas básicas mirar páginas 86

See page 86 for definitions and basic formulas

B = Longitud chaflan
V = Conicidad de la placa
W = Anchura de chaflán de rectificado cilíndrico
FC = Presión de corte
MD = Par
γ = Angulo de inclinación radial
vf = Dirección de avance

▲ = Recomendado
■ = Aplicable
□ = Posible
↗ = Valor mas alto
↘ = Valor mas bajo
👍 = Mejorado
👎 = Lo peor

B = Chamfer length
V = Back taper
W = Margin width
FC = Cutting force
MD = Torque
γ = Radial rake angle
vf = Feed direction

▲ = Recommended
■ = Applicable
□ = Possible
↗ = Higher value
↘ = Lower value
👍 = Improved
👎 = Worse

MATERIAL DETAILS PAGE 88

Descripción de los materiales de corte
Cutting Materials overview

		Materiales de corte / Cutting Materials			Recubrimiento / Coating											
ISO Material Code	URMA Material Code	URMA Code	F05	E10	00	01P_	05P_	07R_	08P_	12R_	14R_	17B_	18B_	10C	20C	21C
			HM/ Carbide ISO HW-K05	HM/ Carbide ISO HW-K35	Uncoated	TiN	AlTiN	TiAlN + AlCrN	AlCrN	AlCrN	AlCrN	AlCrN	TiSiN	DLC	DLC	DLC
						Coating Thickness: 1 = Thin / 2 = Thick										
						1 2	1	1 2	1 2	1	1 2	1	1			
P	P1		▲	■	□	□	□			▲	■	■	■			
	P2		▲	■	□	□	□			▲	■	■	■			
	P3		▲	■	□	□	□			▲	■	■	■			
	P4		▲	■	□	□	□			▲	■	■	■			
	P5		▲	■	□	□	□			▲	■	■	■			
	P6		▲	■	□	□	□			▲	■	■	■			
	P7		▲	■	□	□	□			▲	■	■	■			
M	M1		▲	■	□	□				▲	■	■	■			
	M2		▲	■	□	□				▲	■	■	■			
	M3		▲	■	□	□				▲	■	■	■			
	M4		▲	■	□	□				▲	■	■	■			
	M5		▲	■	□	□				▲	■	■	■			
	M6		▲	■	□	□				▲	■	■	■			
K	K1		▲	□	□		□	□	■	■		▲	■	■		
	K2		▲	□	□		□	□	■	■		▲	■	■		
	K3		▲	□	□		□	□	■	■		▲	■	■		
	K4		▲	□	□		□	□	■	■		▲	■	■		
	K5		▲	□	□	□	□	□	■	■	□	▲	■	■		
	K6		▲	□	□	□	□	□	■	■	□	▲	■	■		
	K7		▲	□	□	□	□	□	□	▲	■	□	■	■		
	K8		▲	□	□	□	□	□	□	▲	■	□	■	■		
N	N1		▲		□									▲		
	N2		▲		□									▲	□	■
	N3		▲		□										▲	■
	N4		▲		□										▲	■
	N5		▲		□									■	▲	■
	N6		▲		□										▲	■
S	S1		▲	■	□	□				▲	■		■			
	S2		▲	■	□	□				▲	■		■			
	S3		▲	■	□	□				▲	■		■			
	S4		▲	■	□	□				▲	■		■			
	S11		▲	■	□	□				▲	■		■			
	S12		▲	■	□	□				▲	■		■			
	S13		▲	■	□	□				▲	■		■			
	S14		▲	■	□	□				▲	■		■			
H	H1		▲	■	□	□		▲		■	□		■			
	H2		▲	■	□	□		▲		■	□		■			
	H3		▲	■	□	□		▲		□	□		□			
SM	SM1		▲	■	□	□				▲	■	■	■			
	SM2		▲	■	□	□				▲	■	■	■			
	SM3		▲	■	□	□				▲	■	■	■			
O	O1		▲		□									▲		
	O2		▲		□									▲		
	O3		▲		□										▲	■
	O4		▲		□										▲	■

Material / Workpiece Material

▲ = Recomendado
■ = Aplicable
□ = Posible
○ = Bajo demanda

▲ = Recommended
■ = Applicable
□ = Possible
○ = On request

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Datos de corte RX small

Cutting Data RX small

Agujero pasante

Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz Ø 7.600-9.600 mm	fz Ø 9.601-13.100 mm	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
P	P1	1	RXsL	B01	F0512R1	120-**160**-200	0.12-**0.16**-0.20	0.12-**0.18**-0.25	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsL	B01	F0512R1	120-**150**-180	0.12-**0.16**-0.20	0.12-**0.16**-0.22		
		3	RXsL	B01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	P2	1	RXsL	B01	F0512R1	120-**160**-200	0.12-**0.16**-0.20	0.12-**0.18**-0.25	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsL	B01	F0512R1	120-**150**-180	0.12-**0.16**-0.20	0.12-**0.16**-0.22		
		3	RXsL	B01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	P3	1	RXsL	B01	F0512R1	120-**160**-180	0.12-**0.16**-0.20	0.12-**0.18**-0.25	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsL	B01	F0512R1	120-**150**-160	0.12-**0.16**-0.20	0.12-**0.16**-0.22		
		3	RXsL	B01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	P4	1	RXsL	B01	F0512R1	120-**150**-180	0.12-**0.16**-0.20	0.12-**0.16**-0.20	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsL	B01	F0512R1	120-**140**-160	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
		3	RXsL	B01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	P5	1	RXsL	A07	F0512R1	100-**130**-160	0.10-**0.14**-0.18	0.10-**0.14**-0.18	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A07	F0512R1	100-**125**-150	0.10-**0.12**-0.15	0.10-**0.12**-0.15		
		3	RXsL	A07	F0512R1	80-**100**-120	0.10-**0.12**-0.15	0.10-**0.12**-0.15		
	P6	1	RXsL	A07	F0512R1	50-**80**-100	0.06-**0.08**-0.12	0.06-**0.08**-0.12	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A07	F0512R1	40-**70**-90	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
		3	RXsL	A07	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
	P7	1	RXsL	A06	F0512R1	15-**25**-40	0.04-**0.06**-0.10	0.04-**0.06**-0.10	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10		
		3	RXsL	A06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10		
M	M1	1	RXsL	A07	F0512R1	50-**80**-100	0.10-**0.14**-0.16	0.10-**0.14**-0.16	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsL	A07	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.14		
		3	RXsL	A07	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
	M2	1	RXsL	A07	F0512R1	50-**80**-100	0.10-**0.14**-0.16	0.10-**0.14**-0.16	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsL	A07	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.14		
		3	RXsL	A07	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
	M3	1	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.10-**0.14**-0.16	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
		3	RXsL	A07	F0512R1	25-**40**-70	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
	M4	1	RXsL	A07	F0512R1	25-**40**-60	0.08-**0.10**-0.14	0.08-**0.10**-0.14	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A07	F0512R1	20-**35**-55	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
		3	RXsL	A07	F0512R1	20-**30**-50	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
	M5	1	RXsL	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.12	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.12		
		3	RXsL	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12		
	M6	1	RXsL	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12		
		3	RXsL	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12		

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- Critical chip evacuation
- Internal coolant supply available

Agujero pasante con interrupción

Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut Ø 7.600-9.600 mm	fz Full Cut Ø 9.601-13.100 mm	fz Interrupted	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
4	RXsL	A01	F0512R1	120-**160**-200	0.12-**0.16**-0.20	0.12-**0.18**-0.25	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.050**-0.075	0.05-**0.075**-0.10
5	RXsL	A01	F0512R1	120-**150**-180	0.12-**0.16**-0.20	0.12-**0.16**-0.22			
6	RXsG	A01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20			
4	RXsL	A01	F0512R1	120-**160**-200	0.12-**0.16**-0.20	0.12-**0.18**-0.25		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsL	A01	F0512R1	120-**150**-180	0.12-**0.16**-0.20	0.12-**0.16**-0.22			
6	RXsG	A01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20			
4	RXsL	A01	F0512R1	120-**160**-180	0.12-**0.16**-0.20	0.12-**0.18**-0.25		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsL	A01	F0512R1	120-**150**-160	0.12-**0.16**-0.20	0.12-**0.16**-0.22			
6	RXsG	A01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20			
4	RXsL	A01	F0512R1	120-**150**-180	0.12-**0.16**-0.20	0.12-**0.16**-0.20		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	A01	F0512R1	120-**140**-160	0.12-**0.16**-0.20	0.12-**0.16**-0.20			
6	RXsG	A01	F0512R1	100-**120**-150	0.12-**0.16**-0.20	0.12-**0.16**-0.20			
4	RXsL	A07	F0512R1	100-**130**-160	0.10-**0.14**-0.18	0.10-**0.14**-0.18		**0.050**-0.075	**0.050**-0.075
5	RXsG	A07	F0512R1	100-**125**-150	0.10-**0.12**-0.15	0.10-**0.12**-0.15			
6	RXsG	A07	F0512R1	80-**100**-120	0.10-**0.12**-0.15	0.10-**0.12**-0.15			
4	RXsL	A07	F0512R1	50-**80**-100	0.06-**0.08**-0.12	0.06-**0.08**-0.12		**0.050**-0.075	**0.050**-0.075
5	RXsG	A07	F0512R1	40-**70**-90	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
6	RXsG	A07	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
4	RXsL	A06	F0512R1	15-**25**-40	0.04-**0.06**-0.10	0.04-**0.06**-0.10		**0.050**-0.075	**0.050**-0.075
5	RXsG	A06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10			
6	RXsG	A06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10			
4	RXsL	A07	F0512R1	50-**80**-100	0.10-**0.14**-0.16	0.10-**0.14**-0.16	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.050**-0.075	0.05-**0.075**-0.10
5	RXsL	A07	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.14			
6	RXsG	A06	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
4	RXsL	A07	F0512R1	50-**80**-100	0.10-**0.14**-0.16	0.10-**0.14**-0.16		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsL	A07	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.14			
6	RXsG	A06	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
4	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.10-**0.14**-0.16		**0.050**-0.075	**0.050**-0.075
5	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
6	RXsG	A06	F0512R1	25-**40**-70	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
4	RXsL	A07	F0512R1	25-**40**-60	0.08-**0.10**-0.14	0.08-**0.10**-0.14		**0.050**-0.075	**0.050**-0.075
5	RXsG	A06	F0512R1	20-**35**-55	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
6	RXsG	A06	F0512R1	20-**30**-50	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
4	RXsL	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.12		**0.050**-0.075	**0.050**-0.075
5	RXsG	A06	F0512R1	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.12			
6	RXsG	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12			
4	RXsL	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12		**0.050**-0.075	**0.050**-0.075
5	RXsG	A06	F0512R1	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12			
6	RXsG	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.12			

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

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Datos de corte RX small

Cutting Data RX small

Agujero ciego

Blind Hole

ISO	UMC	AC	Type	Grade	Sort	Vc	fz Ø 7.600-9.600 mm	fz Ø 9.601-13.100 mm	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
P	P1	1	RXsG	G01	F0512R1	120-**160**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G01	F0512R1	120-**150**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15		
		3	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15		
	P2	1	RXsG	G01	F0512R1	120-**160**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G01	F0512R1	120-**150**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15		
		3	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15		
	P3	1	RXsG	G01	F0512R1	120-**150**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G01	F0512R1	120-**140**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15		
		3	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15		
	P4	1	RXsG	G01	F0512R1	120-**150**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G01	F0512R1	120-**140**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15		
		3	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15		
	P5	1	RXsG	G01	F0512R1	100-**120**-140	0.08-**0.12**-0.15	0.10-**0.14**-0.18	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G01	F0512R1	90-**110**-130	0.08-**0.10**-0.15	0.10-**0.12**-0.15		
		3	RXsG	G01	F0512R1	80-**100**-120	0.06-**0.08**-0.12	0.10-**0.12**-0.15		
	P6	1	RXsG	G01	F0512R1	50-**80**-100	0.06-**0.08**-0.12	0.06-**0.08**-0.12	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G01	F0512R1	40-**70**-90	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
		3	RXsG	G01	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
	P7	1	RXsG	G06	F0512R1	15-**25**-40	0.04-**0.06**-0.10	0.04-**0.06**-0.10	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10		
		3	RXsG	G06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10		
M	M1	1	RXsG	G07	F0512R1	50-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.16	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G07	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.14		
		3	RXsG	G07	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
	M2	1	RXsG	G07	F0512R1	50-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.16	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G07	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.14		
		3	RXsG	G07	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
	M3	1	RXsG	G07	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.14**-0.16	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G07	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.14		
		3	RXsG	G07	F0512R1	25-**40**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12		
	M4	1	RXsG	G07	F0512R1	25-**40**-60	0.08-**0.10**-0.14	0.08-**0.12**-0.14	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G07	F0512R1	20-**35**-55	0.05-**0.08**-0.12	0.08-**0.10**-0.12		
		3	RXsG	G07	F0512R1	20-**30**-50	0.05-**0.08**-0.12	0.06-**0.08**-0.12		
	M5	1	RXsG	G07	F0512R1	15-**25**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.12	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G07	F0512R1	15-**25**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.12		
		3	RXsG	G07	F0512R1	15-**25**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.12		
	M6	1	RXsG	G07	F0512R1	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.12	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G07	F0512R1	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.12		
		3	RXsG	G07	F0512R1	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.12		

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- Critical chip evacuation
- Internal coolant supply available

Agujero ciego con interrupción

Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut Ø 7.600-9.600 mm	fz Full Cut Ø 9.601-13.100 mm	fz Interrupted	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
4	RXsG	G01	F0512R1	120-**160**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G01	F0512R1	120-**150**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15			
6	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15			
4	RXsG	G01	F0512R1	120-**160**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G01	F0512R1	120-**150**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15			
6	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15			
4	RXsG	G01	F0512R1	120-**150**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G01	F0512R1	120-**140**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15			
6	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15			
4	RXsG	G01	F0512R1	120-**150**-180	0.08-**0.12**-0.15	0.12-**0.15**-0.18		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G01	F0512R1	120-**140**-160	0.08-**0.10**-0.15	0.08-**0.12**-0.15			
6	RXsG	G01	F0512R1	100-**120**-150	0.06-**0.08**-0.12	0.08-**0.10**-0.15			
4	RXsG	G01	F0512R1	100-**120**-140	0.08-**0.12**-0.15	0.10-**0.14**-0.18		**0.050**-0.075	**0.050**-0.075
5	RXsG	G01	F0512R1	90-**110**-130	0.08-**0.10**-0.15	0.10-**0.12**-0.15			
6	RXsG	G01	F0512R1	80-**100**-120	0.06-**0.08**-0.12	0.10-**0.12**-0.15			
4	RXsG	G01	F0512R1	50-**80**-100	0.06-**0.08**-0.12	0.06-**0.08**-0.12		**0.050**-0.075	**0.050**-0.075
5	RXsG	G01	F0512R1	40-**70**-90	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
6	RXsG	G01	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
4	RXsG	G06	F0512R1	15-**25**-40	0.04-**0.06**-0.10	0.04-**0.06**-0.10		**0.050**-0.075	**0.050**-0.075
5	RXsG	G06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10			
6	RXsG	G06	F0512R1	15-**20**-30	0.04-**0.06**-0.10	0.04-**0.06**-0.10			
4	RXsG	G17	F0512R1	50-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.16	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G17	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.12			
6	RXsG	G16	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
4	RXsG	G17	F0512R1	50-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.16		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G17	F0512R1	40-**70**-90	0.08-**0.10**-0.12	0.08-**0.10**-0.12			
6	RXsG	G16	F0512R1	25-**50**-70	0.06-**0.08**-0.12	0.06-**0.08**-0.12			
4	RXsG	G17	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.08-**0.10**-0.14		**0.050**-0.075	**0.050**-0.075
5	RXsG	G17	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.14			
6	RXsG	G16	F0512R1	25-**40**-70	0.06-**0.08**-0.12	0.08-**0.10**-0.14			
4	RXsG	G16	F0512R1	25-**40**-60	0.08-**0.10**-0.14	0.08-**0.10**-0.14		**0.050**-0.075	**0.050**-0.075
5	RXsG	G16	F0512R1	20-**35**-55	0.05-**0.08**-0.12	0.08-**0.10**-0.14			
6	RXsG	G16	F0512R1	20-**30**-50	0.05-**0.08**-0.12	0.08-**0.10**-0.14			
4	RXsG	G16	F0512R1	15-**25**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.12		**0.050**-0.075	**0.050**-0.075
5	RXsG	G16	F0512R1	15-**25**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.12			
6	RXsG	G16	F0512R1	15-**25**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.12			
4	RXsG	G16	F0512R1	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.12		**0.050**-0.075	**0.050**-0.075
5	RXsG	G16	F0512R1	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.12			
6	RXsG	G16	F0512R1	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.12			

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

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Datos de corte RX small

Cutting Data RX small

Agujero pasante

Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz Ø 7.600-9.600 mm	fz Ø 9.601-13.100 mm	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
K	K1	1	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30	**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K2	1	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30	**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K3	1	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.20**-0.25	**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K4	1	RXsG	A01	F0514R2	90-**120**-140	0.12-**0.18**-0.25	0.16-**0.20**-0.25	0.075-**0.10**-0.15	**0.10**-0.15
		2	RXsG	A01	F0514R2	80-**100**-120	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	80-**100**-120	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K5	1	RXsG	A01	F0514R2	60-**80**-100	0.10-**0.16**-0.22	0.12-**0.18**-0.25	0.075-**0.10**-0.15	**0.10**-0.15
		2	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.10-**0.15**-0.20		
		3	RXsG	G01	F0514R2	50-**70**-90	0.08-**0.12**-0.16	0.10-**0.12**-0.18		
	K6	1	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.12-**0.16**-0.22	0.075-**0.10**-0.15	**0.10**-0.15
		2	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.18		
		3	RXsG	G01	F0514R2	50-**70**-90	0.08-**0.10**-0.12	0.10-**0.12**-0.18		
	K7	1	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14	**0.050**-0.075	0.050-**0.075**-0.10
		2	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12		
		3	RXsG	G01	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12		
	K8	1	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14	**0.050**-0.075	0.050-**0.075**-0.10
		2	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12		
		3	RXsG	G01	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12		
N	N1	1	RXsL	B07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.18-**0.25**-0.35	0.075-**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsL	B07	F0510C	160-**220**-280	0.16-**0.20**-0.28	0.16-**0.20**-0.28		
		3	RXsL	A07	F0510C	140-**180**-220	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	N2	1	RXsL	B07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.18-**0.25**-0.35	0.075-**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsL	B07	F0510C	160-**220**-280	0.16-**0.20**-0.28	0.16-**0.20**-0.28		
		3	RXsL	A07	F0510C	140-**180**-220	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	N3	1	RXsL	B07	F0520C	180-**250**-320	0.18-**0.25**-0.35	0.18-**0.25**-0.35	0.075-**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsL	B07	F0520C	160-**220**-280	0.16-**0.20**-0.28	0.16-**0.20**-0.28		
		3	RXsL	A07	F0520C	140-**180**-220	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	N4	1	RXsL	B07	F0520C	140-**180**-220	0.18-**0.22**-0.30	0.18-**0.22**-0.30	0.075-**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsL	B07	F0520C	140-**180**-220	0.12-**0.16**-0.22	0.12-**0.16**-0.22		
		3	RXsL	A07	F0520C	140-**160**-200	0.10-**0.14**-0.20	0.10-**0.14**-0.20		
	N5	1	RXsL	A07	F0520C	140-**180**-220	0.12-**0.18**-0.25	0.12-**0.18**-0.25	0.05-**0.075**-0.10	0.075-**0.10**-0.15
		2	RXsL	A07	F0520C	140-**160**-200	0.12-**0.16**-0.22	0.12-**0.16**-0.22		
		3	RXsL	A07	F0520C	120-**140**-180	0.10-**0.14**-0.20	0.10-**0.14**-0.20		
	N6	1	RXsL	A07	F0520C	50-**70**-100	0.12-**0.16**-0.20	0.12-**0.16**-0.20	0.05-**0.075**-0.10	0.075-**0.10**-0.15
		2	RXsL	A07	F0520C	50-**70**-100	0.10-**0.14**-0.18	0.10-**0.14**-0.18		
		3	RXsL	A07	F0520C	40-**60**-80	0.10-**0.12**-0.16	0.10-**0.12**-0.16		

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- Critical chip evacuation
- Internal coolant supply available

Agujero pasante con interrupción

Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut Ø 7.600-9.600 mm	fz Full Cut Ø 9.601-13.100 mm	fz Interrupted	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
4	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.10**-0.15	0.10-**0.15**-0.20
5	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30		**0.10**-0.15	0.10-**0.15**-0.20
5	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.20**-0.25		**0.10**-0.15	0.10-**0.15**-0.20
5	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	90-**120**-140	0.12-**0.18**-0.25	0.16-**0.20**-0.25		0.075-**0.10**-0.15	**0.10**-0.15
5	RXsG	A01	F0514R2	80-**100**-120	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	80-**100**-120	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	60-**80**-100	0.10-**0.16**-0.22	0.12-**0.18**-0.25		0.075-**0.10**-0.15	**0.10**-0.15
5	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.10-**0.15**-0.20			
6	RXsG	G11	F0514R2	50-**70**-90	0.08-**0.12**-0.16	0.10-**0.12**-0.18			
4	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.12-**0.16**-0.22		0.075-**0.10**-0.15	**0.10**-0.15
5	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.18			
6	RXsG	G11	F0514R2	50-**70**-90	0.08-**0.10**-0.12	0.10-**0.12**-0.18			
4	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14		**0.050**-0.075	0.050-**0.075**-0.10
5	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12			
6	RXsG	G11	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12			
4	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14		**0.050**-0.075	0.050-**0.075**-0.10
5	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12			
6	RXsG	G11	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12			
4	RXsL	B07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.18-**0.25**-0.35	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	0.075-**0.10**-0.15	0.10-**0.15**-0.20
5	RXsL	A07	F0510C	160-**220**-280	0.14-**0.18**-0.25	0.14-**0.18**-0.25			
6	RXsG	G17	F0510C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20			
4	RXsL	B07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.18-**0.25**-0.35		0.075-**0.10**-0.15	0.10-**0.15**-0.20
5	RXsL	A07	F0510C	160-**220**-280	0.14-**0.18**-0.25	0.14-**0.18**-0.25			
6	RXsG	G17	F0510C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20			
4	RXsL	B07	F0520C	180-**250**-320	0.18-**0.25**-0.35	0.18-**0.25**-0.35		0.075-**0.10**-0.15	0.10-**0.15**-0.20
5	RXsL	A07	F0520C	160-**220**-280	0.14-**0.18**-0.25	0.14-**0.18**-0.25			
6	RXsG	G17	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20			
4	RXsL	B07	F0520C	140-**180**-220	0.18-**0.22**-0.30	0.18-**0.22**-0.30		0.075-**0.10**-0.15	0.10-**0.15**-0.20
5	RXsL	A07	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20			
6	RXsG	G17	F0520C	140-**160**-200	0.10-**0.14**-0.18	0.10-**0.14**-0.18			
4	RXsL	A06	F0520C	140-**180**-220	0.12-**0.18**-0.25	0.12-**0.18**-0.25		0.05-**0.075**-0.10	0.075-**0.10**-0.15
5	RXsL	A06	F0520C	140-**160**-200	0.12-**0.16**-0.22	0.12-**0.16**-0.22			
6	RXsG	G06	F0520C	120-**140**-180	0.10-**0.12**-0.16	0.10-**0.12**-0.16			
4	RXsL	A06	F0520C	50-**70**-100	0.12-**0.16**-0.20	0.12-**0.16**-0.20		0.05-**0.075**-0.10	0.075-**0.10**-0.15
5	RXsL	A06	F0520C	50-**70**-100	0.10-**0.14**-0.18	0.10-**0.14**-0.18			
6	RXsG	G06	F0520C	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14			

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

MATERIAL DETAILS PAGE 89

Datos de corte RX small

Cutting Data RX small

Agujero ciego

Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz Ø 7.600-9.600 mm	fz Ø 9.601-13.100 mm	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
K	K1	1	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30	**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K2	1	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30	**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K3	1	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.20**-0.25	**0.10**-0.15	0.10-**0.15**-0.20
		2	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K4	1	RXsG	A01	F0514R2	90-**120**-140	0.12-**0.18**-0.25	0.16-**0.20**-0.25	0.075-**0.10**-0.15	**0.10**-0.15
		2	RXsG	A01	F0514R2	80-**100**-120	0.10-**0.15**-0.20	0.12-**0.18**-0.25		
		3	RXsG	G01	F0514R2	80-**100**-120	0.08-**0.12**-0.16	0.10-**0.15**-0.20		
	K5	1	RXsG	A01	F0514R2	60-**80**-100	0.10-**0.16**-0.22	0.12-**0.18**-0.25	0.075-**0.10**-0.15	**0.10**-0.15
		2	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.10-**0.15**-0.20		
		3	RXsG	G01	F0514R2	50-**70**-90	0.08-**0.12**-0.16	0.10-**0.12**-0.18		
	K6	1	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.12-**0.16**-0.22	0.075-**0.10**-0.15	**0.10**-0.15
		2	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.18		
		3	RXsG	G01	F0514R2	50-**70**-90	0.08-**0.10**-0.12	0.10-**0.12**-0.18		
	K7	1	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14	**0.050**-0.075	0.050-**0.075**-0.10
		2	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12		
		3	RXsG	G01	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12		
	K8	1	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14	**0.050**-0.075	0.050-**0.075**-0.10
		2	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12		
		3	RXsG	G01	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12		
N	N1	1	RXsG	G07	F0510C	180-**250**-320	0.10-**0.14**-0.20	0.12-**0.18**-0.25	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G07	F0510C	160-**220**-280	0.10-**0.14**-0.20	0.12-**0.16**-0.22		
		3	RXsG	G07	F0510C	140-**180**-220	0.10-**0.12**-0.16	0.10-**0.14**-0.20		
	N2	1	RXsG	G07	F0510C	180-**250**-320	0.10-**0.14**-0.20	0.12-**0.18**-0.25	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G07	F0510C	160-**220**-280	0.10-**0.14**-0.20	0.12-**0.16**-0.22		
		3	RXsG	G07	F0510C	140-**180**-220	0.10-**0.12**-0.16	0.10-**0.14**-0.20		
	N3	1	RXsG	G07	F0520C	180-**250**-320	0.10-**0.14**-0.20	0.12-**0.18**-0.25	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G07	F0520C	160-**220**-280	0.10-**0.14**-0.20	0.12-**0.16**-0.22		
		3	RXsG	G07	F0520C	140-**180**-220	0.10-**0.12**-0.16	0.10-**0.14**-0.20		
	N4	1	RXsG	G07	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20	**0.050**-0.075	0.05-**0.075**-0.10
		2	RXsG	G07	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20		
		3	RXsG	G07	F0520C	140-**160**-200	0.10-**0.12**-0.16	0.10-**0.12**-0.16		
	N5	1	RXsG	G07	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G07	F0520C	140-**160**-200	0.10-**0.14**-0.18	0.10-**0.14**-0.18		
		3	RXsG	G07	F0520C	120-**140**-180	0.10-**0.12**-0.16	0.10-**0.12**-0.16		
	N6	1	RXsG	G07	F0520C	50-**70**-100	0.10-**0.14**-0.20	0.10-**0.14**-0.20	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G07	F0520C	50-**70**-100	0.10-**0.14**-0.18	0.10-**0.14**-0.18		
		3	RXsG	G07	F0520C	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14		

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- Critical chip evacuation
- Internal coolant supply available

Agujero ciego con interrupción

Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut Ø 7.600-9.600 mm	fz Full Cut Ø 9.601-13.100 mm	fz Interrupted	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
4	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.10**-0.15	0.10-**0.15**-0.20
5	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.22**-0.30		**0.10**-0.15	0.10-**0.15**-0.20
5	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	100-**140**-180	0.12-**0.18**-0.25	0.16-**0.20**-0.25		**0.10**-0.15	0.10-**0.15**-0.20
5	RXsG	A01	F0514R2	80-**120**-160	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	70-**100**-140	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	90-**120**-140	0.12-**0.18**-0.25	0.16-**0.20**-0.25		0.075-**0.10**-0.15	**0.10**-0.15
5	RXsG	A01	F0514R2	80-**100**-120	0.10-**0.15**-0.20	0.12-**0.18**-0.25			
6	RXsG	G01	F0514R2	80-**100**-120	0.08-**0.12**-0.16	0.10-**0.15**-0.20			
4	RXsG	A01	F0514R2	60-**80**-100	0.10-**0.16**-0.22	0.12-**0.18**-0.25		0.075-**0.10**-0.15	**0.10**-0.15
5	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.10-**0.15**-0.20			
6	RXsG	G11	F0514R2	50-**70**-90	0.08-**0.12**-0.16	0.10-**0.12**-0.18			
4	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.14**-0.18	0.12-**0.16**-0.22		0.075-**0.10**-0.15	**0.10**-0.15
5	RXsG	A01	F0514R2	60-**80**-100	0.08-**0.12**-0.14	0.10-**0.14**-0.18			
6	RXsG	G11	F0514R2	50-**70**-90	0.08-**0.10**-0.12	0.10-**0.12**-0.18			
4	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14		**0.050**-0.075	0.050-**0.075**-0.10
5	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12			
6	RXsG	G11	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12			
4	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.12**-0.14	0.10-**0.12**-0.14		**0.050**-0.075	0.050-**0.075**-0.10
5	RXsG	A01	F0512R1	40-**60**-80	0.08-**0.10**-0.12	0.08-**0.10**-0.12			
6	RXsG	G11	F0512R1	25-**40**-70	0.06-**0.08**-0.10	0.08-**0.10**-0.12			
4	RXsG	G07	F0510C	180-**250**-320	0.10-**0.14**-0.20	0.12-**0.18**-0.25	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G07	F0510C	160-**220**-280	0.10-**0.14**-0.20	0.12-**0.16**-0.22			
6	RXsG	G07	F0510C	140-**180**-220	0.10-**0.12**-0.16	0.10-**0.14**-0.20			
4	RXsG	G07	F0510C	180-**250**-320	0.10-**0.14**-0.20	0.12-**0.18**-0.25		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G07	F0510C	160-**220**-280	0.10-**0.14**-0.20	0.12-**0.16**-0.22			
6	RXsG	G07	F0510C	140-**180**-220	0.10-**0.12**-0.16	0.10-**0.14**-0.20			
4	RXsG	G17	F0520C	180-**250**-320	0.10-**0.14**-0.20	0.12-**0.18**-0.25		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G17	F0520C	160-**220**-280	0.10-**0.14**-0.20	0.12-**0.16**-0.22			
6	RXsG	G17	F0520C	140-**180**-220	0.10-**0.12**-0.16	0.10-**0.14**-0.20			
4	RXsG	G16	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20		**0.050**-0.075	0.05-**0.075**-0.10
5	RXsG	G16	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20			
6	RXsG	G16	F0520C	140-**160**-200	0.10-**0.12**-0.16	0.10-**0.12**-0.16			
4	RXsG	G17	F0520C	140-**180**-220	0.10-**0.14**-0.20	0.10-**0.14**-0.20		**0.050**-0.075	**0.050**-0.075
5	RXsG	G16	F0520C	140-**160**-200	0.10-**0.14**-0.18	0.10-**0.14**-0.18			
6	RXsG	G16	F0520C	120-**140**-180	0.10-**0.12**-0.16	0.10-**0.12**-0.16			
4	RXsG	G17	F0520C	50-**70**-100	0.10-**0.14**-0.20	0.10-**0.14**-0.20		**0.050**-0.075	**0.050**-0.075
5	RXsG	G16	F0520C	50-**70**-100	0.10-**0.14**-0.18	0.10-**0.14**-0.18			
6	RXsG	G16	F0520C	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14			

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta ≤ 4xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta ≤ 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Longitud de proyección de la herramienta ≤ 8xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length ≤ 11xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Tool projection length ≤ 15xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

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Datos de corte RX small

Cutting Data RX small

Agujero pasante
Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz Ø 7.600-9.600 mm	fz Ø 9.601-13.100 mm	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
S	S1	1	RXsL	A07	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10		
		3	RXsL	A07	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S2	1	RXsL	A07	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10		
		3	RXsL	A07	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S3	1	RXsL	A07	F0512R1	15-**20**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.10	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsL	A07	F0512R1	8-**15**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S4	1	RXsL	A07	F0512R1	12-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsL	A07	F0512R1	5-**12**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S11	1	RXsL	A07	F0512R1	20-**40**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10		
		3	RXsL	A07	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S12	1	RXsL	A07	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10		
		3	RXsL	A07	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S13	1	RXsL	A07	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsL	A07	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S14	1	RXsL	A07	F0512R1	15-**20**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsL	A07	F0512R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsL	A07	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
H	H1	1	RXsL	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsL	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsL	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	H2	1	RXsL	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	**0.05**-0.08
		2	RXsL	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsL	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	H3	1	RXsL	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07	0.04-**0.05**-0.06	**0.05**-0.08
		2	RXsL	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07		
		3	RXsL	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07		
SM	SM1	1	RXsL	B07	F0512R1	140-**180**-220	0.18-**0.25**-0.35	0.18-**0.25**-0.35	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXsL	B07	F0512R1	110-**140**-170	0.18-**0.22**-0.30	0.18-**0.22**-0.30		
		3	RXsL	A07	F0512R1	80-**100**-120	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
	SM2	1	RXsL	B07	F0512R1	120-**140**-160	0.18-**0.22**-0.30	0.18-**0.22**-0.30	**0.08**-0.10	0.08-**0.10**-0.15
		2	RXsL	B07	F0512R1	100-**120**-150	0.15-**0.20**-0.25	0.15-**0.20**-0.25		
		3	RXsL	A07	F0512R1	80-**100**-120	0.12-**0.15**-0.20	0.12-**0.15**-0.20		
	SM3	1	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14	**0.050**-0.075	**0.050**-0.075
		2	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
		3	RXsL	A07	F0512R1	25-**40**-70	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
O	O1	1	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20		
		3	RXsL	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16		
	O2	1	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20		
		3	RXsL	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16		
	O3	1	RXsL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXsL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20		
		3	RXsL	A07	F0520C	40-**50**-60	0.10-**0.13**-0.16	0.10-**0.13**-0.16		
	O4	1	RXsL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXsL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10		
		3	RXsL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10		

Agujero pasante con interrupción
Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut Ø 7.600-9.600 mm	fz Full Cut Ø 9.601-13.100 mm	fz Interrupted	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
4	RXsL	A06	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10			
6	RXsG	A06	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10			
6	RXsG	A06	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0512R1	15-**20**-35	0.05-**0.08**-0.10	0.05-**0.08**-0.10		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	8-**15**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0512R1	12-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	5-**12**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0512R1	20-**40**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10			
6	RXsG	A06	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0512R1	20-**35**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10			
6	RXsG	A06	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0512R1	20-**30**-45	0.05-**0.08**-0.10	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0512R1	15-**20**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsL	A06	F0512R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.05**-0.08	0.05-**0.08**-0.10
5	RXsG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		**0.05**-0.08	**0.05**-0.08
5	RXsG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsL	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07		0.04-**0.05**-0.06	**0.05**-0.08
5	RXsG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07			
6	RXsG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07			
4	RXsL	A07	F0512R1	140-**180**-220	0.18-**0.22**-0.30	0.18-**0.22**-0.30	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXsL	A07	F0512R1	110-**140**-170	0.15-**0.20**-0.25	0.15-**0.20**-0.25			
6	RXsG	A06	F0512R1	80-**100**-120	0.12-**0.16**-0.20	0.12-**0.16**-0.20			
4	RXsL	A07	F0512R1	120-**140**-160	0.15-**0.20**-0.25	0.15-**0.20**-0.25		**0.08**-0.10	0.08-**0.10**-0.15
5	RXsL	A07	F0512R1	100-**120**-150	0.12-**0.18**-0.22	0.12-**0.18**-0.22			
6	RXsG	A06	F0512R1	80-**100**-120	0.12-**0.15**-0.20	0.12-**0.15**-0.20			
4	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14		**0.050**-0.075	**0.050**-0.075
5	RXsL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
6	RXsG	A06	F0512R1	25-**40**-70	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
4	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20			
6	RXsG	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16			
4	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXsL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20			
6	RXsG	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16			
4	RXsL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXsL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20			
6	RXsG	A07	F0520C	40-**50**-60	0.10-**0.13**-0.16	0.10-**0.13**-0.16			
4	RXsL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10		0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXsL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10			
6	RXsG	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10			

MATERIAL DETAILS PAGE 90/91

Datos de corte RX small

Cutting Data RX small

Agujero ciego
Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz Ø 7.600-9.600 mm	fz Ø 9.601-13.100 mm	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
S	S1	1	RXsG	A07	F0512R1	20-**35**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	20-**35**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S2	1	RXsG	A07	F0512R1	20-**30**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	20-**30**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S3	1	RXsG	A07	F0512R1	15-**20**-35	0.04-**0.06**-0.10	0.04-**0.06**-0.10	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	8-**15**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S4	1	RXsG	A07	F0512R1	12-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	5-**12**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S11	1	RXsG	A07	F0512R1	20-**40**-60	0.04-**0.06**-0.10	0.04-**0.06**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	20-**35**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S12	1	RXsG	A07	F0512R1	20-**35**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	20-**30**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S13	1	RXsG	A07	F0512R1	20-**30**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	S14	1	RXsG	A07	F0512R1	15-**20**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsG	A07	F0512R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	A07	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
H	H1	1	RXsG	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXsG	G06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	H2	1	RXsG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**0.05**-0.08	**0.05**-0.08
		2	RXsG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
		3	RXsG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08		
	H3	1	RXsG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07	0.04-**0.05**-0.06	**0.05**-0.08
		2	RXsG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07		
		3	RXsG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07		
SM	SM1	1	RXsG	G07	F0512R1	140-**180**-220	0.12-**0.16**-0.20	0.12-**0.18**-0.22	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXsG	G07	F0512R1	110-**140**-170	0.12-**0.16**-0.20	0.12-**0.16**-0.20		
		3	RXsG	G07	F0512R1	80-**100**-120	0.10-**0.14**-0.18	0.10-**0.14**-0.18		
	SM2	1	RXsG	G07	F0512R1	120-**140**-160	0.10-**0.14**-0.18	0.12-**0.16**-0.20	**0.08**-0.10	0.08-**0.10**-0.15
		2	RXsG	G07	F0512R1	100-**120**-150	0.10-**0.14**-0.18	0.10-**0.14**-0.18		
		3	RXsG	G07	F0512R1	80-**100**-120	0.08-**0.12**-0.16	0.08-**0.12**-0.16		
	SM3	1	RXsG	G07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14	**0.050**-0.075	**0.050**-0.075
		2	RXsG	G07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
		3	RXsG	G07	F0512R1	25-**40**-70	0.08-**0.10**-0.14	0.08-**0.10**-0.14		
O	O1	1	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20	**0.08**-0.10	0.08-**0.10**-0.15
		2	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20		
		3	RXsG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16		
	O2	1	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20	**0.08**-0.10	0.08-**0.10**-0.15
		2	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20		
		3	RXsG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16		
	O3	1	RXsG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20	**0.08**-0.10	0.08-**0.10**-0.15
		2	RXsG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20		
		3	RXsG	G07	F0520C	40-**50**-60	0.10-**0.13**-0.16	0.10-**0.13**-0.16		
	O4	1	RXsG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10	**0.08**-0.10	0.08-**0.10**-0.15
		2	RXsG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10		
		3	RXsG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10		

Agujero ciego con interrupción
Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut Ø 7.600-9.600 mm	fz Full Cut Ø 9.601-13.100 mm	fz Interrupted	Radial / Stock Removal ap Ø 7.600-9.600 mm	Radial / Stock Removal ap Ø 9.601-13.100 mm
4	RXsG	A06	F0512R1	20-**35**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	20-**35**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0512R1	20-**30**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	20-**30**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	15-**25**-35	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0512R1	15-**20**-35	0.04-**0.06**-0.10	0.04-**0.06**-0.10		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	8-**15**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0512R1	12-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	5-**12**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0512R1	20-**40**-60	0.04-**0.06**-0.10	0.04-**0.06**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	20-**35**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0512R1	20-**35**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	20-**30**-45	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0512R1	20-**30**-45	0.04-**0.06**-0.10	0.04-**0.06**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	10-**18**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0512R1	15-**20**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08		**0.05**-0.08	0.05-**0.08**-0.10
5	RXsG	A06	F0512R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	A06	F0512R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	0.04-**0.06**-0.08	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.05**-0.08	0.05-**0.08**-0.10
5	RXsG	G06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	0.04-**0.06**-0.08		**0.05**-0.08	**0.05**-0.08
5	RXsG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
6	RXsG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08	0.04-**0.06**-0.08			
4	RXsG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07		0.04-**0.05**-0.06	**0.05**-0.08
5	RXsG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07			
6	RXsG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.03-**0.05**-0.07			
4	RXsG	G07	F0512R1	140-**180**-220	0.12-**0.16**-0.20	0.12-**0.18**-0.22	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXsG	G06	F0512R1	110-**140**-170	0.12-**0.16**-0.20	0.12-**0.16**-0.20			
6	RXsG	G16	F0512R1	80-**100**-120	0.10-**0.14**-0.18	0.10-**0.14**-0.18			
4	RXsG	G07	F0512R1	120-**140**-160	0.10-**0.14**-0.18	0.12-**0.16**-0.20		**0.08**-0.10	0.08-**0.10**-0.15
5	RXsG	G06	F0512R1	100-**120**-150	0.10-**0.14**-0.18	0.10-**0.14**-0.18			
6	RXsG	G16	F0512R1	80-**100**-120	0.08-**0.12**-0.16	0.08-**0.12**-0.16			
4	RXsG	G07	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14		**0.050**-0.075	**0.050**-0.075
5	RXsG	G06	F0512R1	40-**60**-80	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
6	RXsG	G16	F0512R1	25-**40**-70	0.08-**0.10**-0.14	0.08-**0.10**-0.14			
4	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20	**Reducir corte completo fz en 30 % - 60 %** reduce fz full cut 30 - 60%	**0.08**-0.10	0.08-**0.10**-0.15
5	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20			
6	RXsG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16			
4	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20		**0.08**-0.10	0.08-**0.10**-0.15
5	RXsG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.10-**0.15**-0.20			
6	RXsG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16	0.10-**0.13**-0.16			
4	RXsG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20		**0.08**-0.10	0.08-**0.10**-0.15
5	RXsG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.10-**0.15**-0.20			
6	RXsG	G07	F0520C	40-**50**-60	0.10-**0.13**-0.16	0.10-**0.13**-0.16			
4	RXsG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10		**0.08**-0.10	0.08-**0.10**-0.15
5	RXsG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10			
6	RXsG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.05-**0.08**-0.10			

Ø 7.600 – 13.100 mm

Instrucciones de uso RX Small
Handling Instructions RX small

Cambio de placa
Insert Change

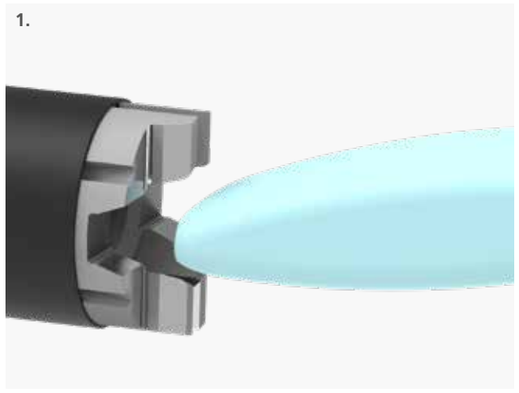
No saque el mango del portaherramientas. Saque el tornillo de amarre y la placa de escariado usada.

Para obtener la máxima repetitividad en cada cambio de placa, es imprescindible limpiar apropiadamente el porta placas y utilizar el par de apriete predefinido.

Do not take the shank out of the tool holder. Remove clamping screw and used reaming insert.

For highest repeatability on each insert change, proper cleaning of the interface as well as using the pre-defined tightening torque are imperative.

1.



2.

1. **Limpieza del porta placas**
   El porta placas puede limpiarse mediante la pasta de modelar que contiene el paquete de la placa.

2. **Cambio de placa**
   La placa se coloca en el portaplacas, que habrá sido limpiado previamente, y el tornillo de amarre se aprieta según el par de apriete predefinido.

1. **Cleaning of the Interface**
   The interface can be cleaned most effectively with the modelling clay included in the insert packaging.

2. **Insert Change**
   The insert is placed on the previously cleaned interface and tightened clamping screw with the pre-defined clamping torque.

Llave Torx® dinamométrica
Torx®-Torque Wrench

System Size	Clamping Torque	Torx® Size	Order Number
RXs 08	0.6 Nm	T6	**G00 40 15**
RXs 10	0.9 Nm	T7	**G00 40 14**
RXs 11	1.4 Nm	T9	**G00 40 16**
RXs 13	2.0 Nm	T10	**G00 40 17**

Utilice solo una llave dinamométrica para apretar los tornillos
Tighten screw with torque wrench only

Ø 7.600 – 13.100 mm

Instrucciones de uso RX Small
Handling Instructions RX small

Ajuste del salto
Run-Out Adjustment

Para conseguir un escariado óptimo, es fundamental utilizar una herramienta sin salto. Para compensar cualquier error de salto debido al portaherramientas o al husillo de la máquina, se recomienda un soporte de compensación o un mandril flotante. El salto de los escariadores RX small puede medirse con varios métodos distintos:

In order to achieve the best reaming results, a tool with zero run-out is absolutely essential. To compensate any run-out error of the tool holder and the machine spindle, we recommend using a compensation holder or floating chuck. The run-out of RX small reamers can be measured with different methods:

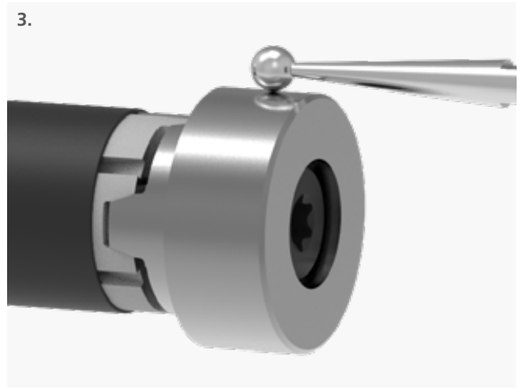
3. **Con la placa indicadora de salto**
   El salto puede ajustarse fácilmente y ser verificado con precisión usando una placa indicadora. No se incluye entre los componentes de la entrega. El número de referencia aparece indicado en el catálogo «URMA Reaming».

4. **En el diámetro externo de la placa**
   El salto también puede ajustarse con el testigo pequeño sobre la placa, aunque esto hace más difícil el manejo.

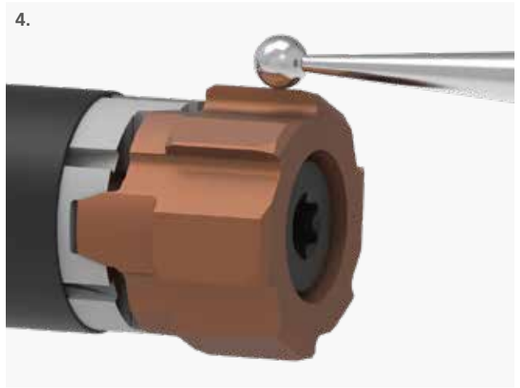
3. **Measurement Through Run-Out Indicating Insert**
   The run-out can be easily adjusted and precisely checked by using an indicating insert. It's not included in scope of delivery. Order number can be found in the "URMA Reaming" catalogue.

4. **Measurement on the External Diameter of the Insert**
   The run-out can also be set up via the small margin on the insert. Its handling is, however, more difficult.

3.



4.



Instrucciones de mandril de alineación

Instruction Compensation Chuck

Con el mandril de alineación de URMA puede ajustarse de forma óptima la concentricidad de herramientas de escariado y, con ello, compensar los errores de husillo y herramienta.

Procedimiento:

1. Antes del ajuste, asegurarse de que todos los tornillos de ajuste ② están completamente aflojados.

2. Cambiar la herramienta en el husillo de la máquina.

3. Ajuste el indicador (con una resolución de 1 µm/0,0001 pulgadas) sobre la placa indicadora de salto ① o sobre el testigo de la placa (consulte la página 25).

4. Con la ayuda de 4 tornillos de ajuste radiales ②, ajustar la concentricidad directamente en el husillo de la máquina a un máx. de 5 µm / 0,0002 pulgadas (ideal < 3 µm / 0,0001 pulgadas).

Los tornillos de ajuste no deben tensarse entre sí completamente tras el ajuste.

With the URMA compensation chuck, the run-out of reaming tools can be optimally adjusted and, thus, compensate for spindle and tool errors.

Procedure:

1. Before adjusting, make sure that all adjustment screws ② are completely loosened.

2. Load the tool in the machine spindle.

3. Set the indicator (with 1 µm / 0,0001 inch resolution) on the run-out indicating insert ① or on the margin of the insert (see page 25).

4. Set the run-out directly in the machine spindle to max. 5 µm / 0,0002 inch (ideal < 3 µm / 0,0001 inch) by using the four radial adjustment screws ②.

The adjustment screws do not have to be fully clamped against each other after adjustment.

Instrucciones de mandril flotante

Instruction Floating Chuck

Los trabajos de escariado en tornos se realizan principalmente con mandril flotante (en casos excepcionales, también en centros de mecanizado).

Los errores de posición pueden compensarse mediante el mecanismo de péndulo ajustable. La desviación solo debe ser posible planoparalela (sin compensación de errores angular).

Se recomiendan ángulos de corte ≤ 45°.

Procedimiento:

1. Ajustar el juego pendular mediante el tornillo de ajuste n ①.

Tornillo de ajuste	Mecanismo de péndulo	Influencia sobre el mecanizado
Giro en sentido horario	La fuerza elástica se fortalece / la resistencia a la desviación aumenta	La calidad de la superficie puede verse influida negativamente (marcas de retroceso)
Giro en sentido antihorario	La fuerza elástica se debilita / la resistencia a la desviación disminuye	Posible tendencia a las vibraciones

Reaming on lathes are mainly done with floating chucks (in exceptional cases also on machining centres).

Positioning errors can be compensated by the adjustable floating mechanism. The deflection should only take place in plane-parallel (No angular error compensation).

Cutting geometries with an angle of ≤ 45° are recommended.

Procedure:

1. Adjust the floating mechanism by using the adjustment screw ①.

Adjustment screw	Floating mechanism	Influence on machining
Clockwise rotation	Spring force increases / deflection resistance increases	The surface quality can be negatively influenced (retraction marks)
Counterclockwise rotation	Spring force becomes weaker / deflection resistance decreases	Potential vibration tendency

Ajuste:

Suave: La herramienta debe ajustarse con la mínima resistencia a la desviación posible. No obstante, teniendo en cuenta el peso de la herramienta, debe retornar elásticamente por sí misma al eje central.

Medio: El tornillo de ajuste se apretará completamente y se girará 1 ± ¼ de vuelta.

Duro: El tornillo de ajuste se apretará completamente y se girará ¼ - ½ de vuelta.

Adjustment:

Soft: The tool should be adjusted with the lowest possible deflection resistance. Nevertheless, taking into account the weight of the tool, it must jump back automatically into the central axis after deflection.

Medium: Fully tighten the adjusting screw and turn back by 1 ± ¼ rotation.

Hard: Fully tighten the adjusting screw and turn back by ¼ - ½ rotation.

Recomendación de posición inicial:

Recommendation for the basic setting:

Ø de herramienta Tool-Ø	Suave Soft	Medio Medium	Duro Hard
7.600 – 13.100	X		

2. Si hay un eje Y, recomendamos alinear la herramienta de forma adicional < 10 µm / 0,0004 pulgadas (idealmente < 5 µm / 0,0002 pulgadas) concéntricamente respecto al eje del husillo.

- Los ajustes del mecanismo de péndulo pueden variar en función de la aplicación y el tipo de mandril flotante.
- En general, se recomienda entrar en el agujero a velocidad reducida.
- Todos los datos son valores orientativos y se refieren al mandril flotante de URMA.

2. With an existing Y-axis, we recommend additionally aligning the tool < 10 µm / 0,0004 inch (ideally < 5 µm / 0,0002 inch) concentrically to the spindle axis.

- The setting of the floating mechanism can vary depending on the application and type of floating chuck.
- It is generally recommended to enter the bore with reduced rpm.
- All data are guide values and refer to URMA floating chucks.

URMA Reaming

RX medium

Ejemplo de pedido
Order Example

	Diámetro del agujero Bore diameter		**Diámetro de la placa** Insert diameter	
	Tolerancias ISO de agujero ISO bore tolerances	**Tolerancia del agujero µm** Bore tolerance in µm	**Diámetro objetivo** Target size (Q-Insert)	
Example	**Ejemplo de pedido** Order example RXG42.2**H7**-A01**U2** F0514R1	**Ejemplo de pedido** Order example RXG18.2**+20-10**-A01**U1** F0514R1**H**	**Ejemplo de pedido** Order example RXG**20.020Q+3-3**-A01**U1** F0512R1	Example
	RX **RX medium sistema designación** RX medium system designation	RX **RX medium sistema designación** RX medium system designation	RX **RX medium sistema designación** RX medium system designation	
	G **Hélice (G = recto L = helicodal)** Flute form (G = straight; L = left-hand helix)	G **Hélice (G = recto L = helicoidal)** Flute form (G = straight; L = left-hand helix)	G **Hélice (G = recto L = helicoidal)** Flute form (G = straight; L = left-hand helix)	
Diameter	42.2 **Diámetro (mm)** Diameter (mm)	18.2 **Diámetro (mm)** Diameter (mm)	20.020 **Diámetro de placa (mm)** Insert diameter (mm) Q **Código para medida objetivo placa** Code for target size insert	Diameter
	H7 **Tolerancia ISO standard** Tolerance in ISO standard	+20-10 **Tolerancia del agujero (µm)** Bore tolerance (µm)	+3-3 **Tolerancia de fabricación (µm)** Manufacturing tolerance (µm)	
	A01 **Geometría de corte** Cutting geometry	A01 **Geometría de corte** Cutting geometry	A01 **Geometría de corte** Cutting geometry	
Option	U2 **Preparación del filo** **Detalles, ver página 33** Edge preparation For details see page 33	U1 **Preparación del filo** **Detalles, ver página 33** Edge preparation For details see page 33	U1 **Preparación del filo** **Detalles, ver página 33** Edge preparation For details see page 33	Option
	F05 **Material de corte** **Detalles, ver página 35** Cutting material For details see page 35	F05 **Material de corte** **Detalles, ver página 35** Cutting material For details see page 35	F05 **Material de corte** **Detalles, ver página 35** Cutting material For details see page 35	
	14R **Recubrimiento** **Detalles, ver página 35** Coating For details see page 35	14R **Recubrimiento** **Detalles, ver página 35** Coating For details see page 35	12R **Recubrimiento** **Detalles, ver página 35** Coating For details see page 35	
	1 **1 = capa fina** **2 = capa gruesa** 1 = thin coating 2 = thick coating	1 **1 = capa fina** **2 = capa gruesa** 1 = thin coating 2 = thick coating	1 **1 = capa fina** **2 = capa gruesa** 1 = thin coating 2 = thick coating	
Option	H* **H = SD blank (sin H = pieza bruta normal)** H = SD blank (without H = regular blank)	H* **H = SD blank (sin H = pieza bruta normal)** H = SD blank (without H = regular blank)	H* **H = SD blank (sin H = pieza bruta normal)** H = SD blank (without H = regular blank)	Option

*** Consulte en el catálogo «URMA Reaming» pieza en bruto SD "H" solo para RX016 y RX019**
* SD blank "H" only for RX016 and RX019 see "URMA Reaming" catalogue

Detalles de ejemplo de pedido
Details Order Example

Tolerancias de agujero y posibles espesores de recubrimiento
Bore Tolerances and Applicable Coating Thickness

	Campo de tolerancia de agujero Bore Tolerance Range	**No recubierto** Uncoated	**Espesor de recubrimiento** Coating Thickness		**Recargo por tolerancias estrechas** Surcharge for Tight Tolerances
			1	2	
Bore Diameter	**≥ 14 µm**	x	x	x	-
	10 – 13 µm	x	x		-
				x	x
	6 – 9 µm	x			-
			x	-	x

Ejemplo: Diametro del agujero 20H7 = campo de tolerancia 21 µm = **≥ 14 µm**
Example: Bore diameter 20H7 = tolerance range 21 µm =

Diametro del agujero 12 $^{+0.006}_{-0.005}$ = campo de tolerancia 11 µm = **10 – 13 µm**
Bore diameter 12 $^{+0.006}_{-0.005}$ = tolerance range 11 µm =

Medida para sólidos (placas Q) y posibles espesores de recubrimiento
Target Size (Q-Insert) and Applicable Coating Thickness

	Campo de tolerancia de agujero Insert Tolerance	**No recubierto** Uncoated	**Espesor de recubrimiento** Coating Thickness		**Recargo por tolerancias estrechas** Surcharge for Tight Tolerances
			1	2	
Insert Diameter	**± 4 µm**	N/A	N/A	x	-
	± 3 µm	N/A	x		-
				x	x
	± 2 µm	x			-
			x	N/A	x
	± 1 µm	x	N/A	N/A	x

N/A = No aplicable
N/A = Not applicable

Preparación del filo (nano finishing)
Edge preparation (Nano Finishing)

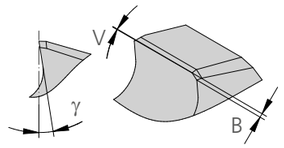
U1 **Preparación de filo ligera**
Light edge-preparation

U2 **Preparación de filo media**
Medium edge-preparation

U__ **Otras preparaciones de filo bajo demanda**
Other edge-preparations on request

Geometrías de corte

Cutting Geometries



vf → Geo	RXG	RXL	Bore type		fz mm	Ra µm	Zyl.	Pos	FC	MD
A0 __	▲		▲ (K1-K8)*	▲	REFERENCE VALUE					
		▲	▲							
B0 __		▲	▲		↗	👍	👎	👎	↗	↗
	□			□						
C0 __	▲		▲ (K1-K8)*	▲	↗	👍	👎	👎	↗	↗
		▲	▲							
C1 __	▲		▲ (K1-K8)*	▲	↗	👍	👎	👎	↗	↗
		▲	▲							
D0 __		▲	▲		↗	👍	👎	👎	↗	↗
	□			□						
G0 __	▲		▲ (K1-K8)*	▲	↘	👎	👍	👍	↘	↘
		□	▲							
G1 __ with protection angle	▲		▲ (K1-K8)*		↘	=	👍	👍	↘	↘
		□	▲							

Geo	γ	B	V	W	ap mm	Ra µm	Zyl.	FC	MD	X
__ 1	STANDARD GEOMETRY (REFERENCE VALUE)									
__ 2	=	=	↘	=	=	=	=	↗	↗	=
__ 3	=	↘	=	=	↘	=	=	=	=	↘
__ 4	=	=	=	↘	=	👍	=	↘	↘	=
__ 5	=	=	=	↗	=	=	=	↗	↗	=
__ 6	=	=	↗	=	=	=	=	↘	↘	=
__ 7	↗	=	↗	=	=	=	=	↘	↘	=
__ 8	=	↗	=	=	↗	=	=	=	=	↗

Geo	γ	B	V	RXG	RXL	Bore type		ap mm	fz mm	Ra µm	Zyl.	Pos.	FC	MD
Special cutting geometries (surcharge)	REFERENCE GEOMETRY A01													
S02	=	↗	=	■	□	▲	▲	↗	↘	=	👍	👍	↘	↘
S04	=	=	↗	■	■	▲	▲	=	↗	👍	👍	👎	↗	↗
S08	=	=	=	■	□	■	▲	↗	↘	👍	👍	👍	↘	↘
S10	=	↗	↗	■	■	▲	▲	↗	↘	=	👍	👍	↘	↘
S12	=	↗	↗	■	□	▲	▲	↗	↘	=	👍	👍	↘	↘
S13	=	↗	↗	■	■	▲	▲	↗	↘	=	👍	👍	↘	↘
S14	=	↘	↗	□	■	▲	□	↘	↗	👍	👎	👎	↗	↗
S15	=	=	↗	■	□	▲	▲	=	↘	↘	👍	👍	↘	↘
S16	↗	↗	↗	■	■	▲	▲	↗	↘	=	👍	👍	↘	↘

Definiciones y formulas básicas mirar páginas 86

See page 86 for definitions and basic formulas

B = Longitud chaflan
V = Conicidad de la placa
W = Anchura de chaflán de rectificado cilíndrico
FC = Presión de corte
MD = Par
γ = Angulo de inclinación radial
vf = Dirección de avance

▲ = Recomendado
■ = Aplicable
□ = Posible
↗ = Valor mas alto
↘ = Valor mas bajo
👍 = Mejorado
👎 = Lo peor

*** Consulte el grupo de materiales en la página 88**

* See page 88 for material group

B = Chamfer length
V = Back taper
W = Margin width
FC = Cutting force
MD = Torque
γ = Radial rake angle
vf = Feed direction

▲ = Recommended
■ = Applicable
□ = Possible
↗ = Higher value
↘ = Lower value
👍 = Improved
👎 = Worse

MATERIAL DETAILS PAGE 88

Descripción de los materiales de corte

Cutting Materials overview

Materiales de corte / Cutting Materials — **Recubrimiento** / Coating

ISO Material Code	URMA Material Code	URMA Code	F05	T15	BS10	BS20	BH15	DP30	00	01P_	05P_	07R_	08P_	12R_	14R_	17B_	18B_	10C	20C	21C
			HM / Carbide	Cermet	CBN	CBN	CBN	PKD / PCD	Uncoated	TiN	AlTiN	TiAlN + AlCrN	AlCrN	AlCrN	AlCrN	AlCrN	TiSiN	DLC	DLC	DLC
										Coating Thickness: 1 = Thin / 2 = Thick										
										1	2	1	1	2	1	2	1	1	2	1	1			
P	P1		■	▲					▲	□		□					■	■		■	■			
	P2		■	▲					▲	□		□					■	■		■	■			
	P3		■	▲					▲	□		□					■	■		■	■			
	P4		■	▲					▲	□		□					■	■		■	■			
	P5		■	▲					▲	□		□					■	■		■	■			
	P6		▲						□	□		□					▲	■		■	■			
	P7		▲						□	□		□					▲	■		■	■			
M	M1		▲	□					□	□							▲	■		■	■			
	M2		▲	□					□	□							▲	■		■	■			
	M3		▲						□	□							▲	■		■	■			
	M4		▲						□	□							▲	■		■	■			
	M5		▲						□	□							▲	■		■	■			
	M6		▲						□	□							▲	■		■	■			
K	K1		▲		○				□		□	□			■		■	▲		■	■			
	K2		▲		○				□		□	□			■		■	▲		■	■			
	K3		▲	□		○			□		□	□			■		■	▲		■	■			
	K4		▲	□		○			□		□	□			■		■	▲		■	■			
	K5		▲			○			□	□		□	□	□	□	□	■	■	□	▲	■	■		
	K6		▲			○			□	□		□	□	□	□	□	■	■	□	▲	■	■		
	K7		▲						□	□		□	□	□	□	□	▲	■	□	■	■			
	K8		▲						□	□		□	□	□	□	□	▲	■	□	■	■			
N	N1		▲					○	□										▲					
	N2		▲					○	□										▲	□	■			
	N3		▲					○	□											▲	■			
	N4		▲					○	□											▲	■			
	N5		▲	□				○	□										■	▲	■			
	N6		▲					○	□											▲	■			
S	S1		▲						□	□					▲	■		■	■					
	S2		▲						□	□					▲	■		■	■					
	S3		▲						□	□					▲	■		■	■					
	S4		▲						□	□					▲	■		■	■					
	S11		▲						□	□					▲	■		■	■					
	S12		▲						□	□					▲	■		■	■					
	S13		▲						□	□					▲	■		■	■					
	S14		▲						□	□					▲	■		■	■					
H	H1		▲				○		□	□			▲		■	■			■					
	H2		▲				○		□	□			▲		■	■			■					
	H3		▲				○		□	□			▲		□	□			□					
SM	SM1		■	▲					▲	□					■	■		■	■					
	SM2		▲	□					□	□					▲	■		■	■					
	SM3		▲						□	□					▲	■		■	■					
O	O1		▲	□					□										▲					
	O2		▲	□					□										▲					
	O3		▲					○	□											▲	■			
	O4		▲					○	□											▲	■			

Material — Workpiece Material

▲ = Recomendado
■ = Aplicable
□ = Posible
○ = Bajo demanda

▲ = Recommended
■ = Applicable
□ = Possible
○ = On request

MATERIAL DETAILS PAGE 88

Datos de corte RX medium

Cutting Data RX medium

Agujero pasante

Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
P	P1	1	RXL	B07	T1500	160-**200**-240	0.18-**0.25**-0.35	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	B01	T1500	120-**150**-180	0.18-**0.22**-0.30			
		3	RXL	A07	F0512R1	80-**110**-140	0.12-**0.16**-0.20			
	P2	1	RXL	B07	T1500	160-**200**-240	0.18-**0.25**-0.35	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	B01	T1500	120-**150**-180	0.18-**0.22**-0.30			
		3	RXL	A07	F0512R1	80-**110**-140	0.12-**0.16**-0.20			
	P3	1	RXL	B07	T1500	140-**180**-220	0.18-**0.25**-0.35	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	B01	T1500	110-**140**-170	0.18-**0.22**-0.30			
		3	RXL	A07	F0512R1	80-**100**-120	0.12-**0.16**-0.20			
	P4	1	RXL	B01	T1500	140-**180**-220	0.18-**0.22**-0.30	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXL	B07	F0512R1	110-**140**-170	0.16-**0.20**-0.28			
		3	RXL	A07	F0512R1	80-**100**-120	0.10-**0.14**-0.18			
	P5	1	RXL	B01	T1500	100-**130**-160	0.15-**0.20**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
		2	RXL	B07	F0512R1	100-**125**-150	0.15-**0.18**-0.22			
		3	RXL	A01	F0512R1	80-**100**-120	0.10-**0.14**-0.18			
	P6	1	RXL	B01	F0512R1	50-**80**-100	0.10-**0.14**-0.16	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A01	F0512R1	40-**70**-90	0.08-**0.10**-0.12			
		3	RXL	A01	F0512R1	25-**50**-70	0.06-**0.08**-0.12			
	P7	1	RXL	A06	F0512R1	15-**25**-40	0.08-**0.10**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A06	F0512R1	15-**20**-30	0.06-**0.08**-0.12			
		3	RXL	A06	F0512R1	15-**20**-30	0.06-**0.08**-0.10			
M	M1	1	RXL	B07	F0512R1	50-**80**-100	0.15-**0.20**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
		2	RXL	B07	F0512R1	40-**70**-90	0.15-**0.18**-0.22			
		3	RXL	A07	F0512R1	25-**50**-70	0.12-**0.14**-0.18			
	M2	1	RXL	B07	F0512R1	50-**80**-100	0.15-**0.20**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	B07	F0512R1	40-**70**-90	0.15-**0.18**-0.22			
		3	RXL	A07	F0512R1	25-**50**-70	0.12-**0.14**-0.18			
	M3	1	RXL	B07	F0512R1	40-**60**-80	0.10-**0.14**-0.16	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	B07	F0512R1	40-**60**-80	0.08-**0.10**-0.12			
		3	RXL	A07	F0512R1	25-**40**-70	0.06-**0.08**-0.12			
	M4	1	RXL	A07	F0512R1	25-**40**-60	0.08-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	20-**35**-55	0.08-**0.10**-0.14			
		3	RXL	A07	F0512R1	20-**30**-50	0.08-**0.10**-0.14			
	M5	1	RXL	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12			
		3	RXL	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.12			
	M6	1	RXL	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.12			
		3	RXL	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.12			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- Critical chip evacuation
- Internal coolant supply available

Agujero pasante con interrupción

Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
4	RXL	A06	T1500	160-**200**-240	0.16-**0.20**-0.25	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A06	F0512R1	120-**140**-180	0.12-**0.18**-0.22				
6	RXG	A01	F0512R1	80-**110**-140	0.10-**0.15**-0.20				
4	RXL	A06	T1500	160-**200**-240	0.16-**0.20**-0.25		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A06	F0512R1	120-**140**-180	0.12-**0.18**-0.22				
6	RXG	A01	F0512R1	80-**110**-140	0.10-**0.15**-0.20				
4	RXL	A06	T1500	140-**180**-220	0.16-**0.20**-0.25		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A06	F0512R1	110-**140**-170	0.12-**0.18**-0.22				
6	RXG	A01	F0512R1	80-**100**-120	0.10-**0.15**-0.20				
4	RXL	A01	F0512R1	110-**140**-170	0.15-**0.18**-0.22		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXL	A01	F0512R1	110-**140**-170	0.12-**0.16**-0.22				
6	RXG	A01	F0512R1	80-**100**-120	0.10-**0.12**-0.18				
4	RXL	A01	F0512R1	100-**120**-160	0.15-**0.18**-0.22		0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
5	RXL	A01	F0512R1	100-**120**-150	0.12-**0.16**-0.22				
6	RXG	A01	F0512R1	80-**100**-120	0.10-**0.12**-0.18				
4	RXL	A01	F0512R1	50-**80**-100	0.08-**0.10**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A01	F0512R1	40-**70**-90	0.06-**0.08**-0.12				
6	RXG	A01	F0512R1	25-**50**-70	0.04-**0.08**-0.10				
4	RXL	A06	F0512R1	15-**25**-40	0.06-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	15-**20**-30	0.06-**0.08**-0.12				
6	RXG	A06	F0512R1	15-**20**-30	0.04-**0.08**-0.10				
4	RXL	A07	F0512R1	50-**80**-100	0.14-**0.16**-0.22	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
5	RXL	A07	F0512R1	40-**70**-90	0.12-**0.15**-0.20				
6	RXG	A07	F0512R1	25-**50**-70	0.10-**0.14**-0.18				
4	RXL	A07	F0512R1	50-**80**-100	0.14-**0.16**-0.22		0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A07	F0512R1	40-**70**-90	0.12-**0.15**-0.20				
6	RXG	A07	F0512R1	25-**50**-70	0.10-**0.14**-0.18				
4	RXL	A07	F0512R1	40-**60**-80	0.10-**0.12**-0.16		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.12				
6	RXG	A07	F0512R1	25-**40**-70	0.06-**0.08**-0.12				
4	RXL	A07	F0512R1	25-**40**-60	0.08-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	20-**35**-55	0.08-**0.10**-0.14				
6	RXG	A06	F0512R1	20-**30**-50	0.08-**0.10**-0.14				
4	RXL	A06	F0512R1	15-**25**-35	0.08-**0.10**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	15-**25**-35	0.05-**0.08**-0.12				
6	RXG	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.12				
4	RXL	A06	F0512R1	15-**20**-30	0.08-**0.10**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	15-**20**-30	0.05-**0.08**-0.12				
6	RXG	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.12				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

MATERIAL DETAILS PAGE 88

Datos de corte RX medium

Cutting Data RX medium

Agujero ciego

Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
P	P1	1	RXG	A07	T1500	140-**180**-220	0.16-**0.20**-0.25	0.05-**0.08**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXG	A06	T1500	120-**140**-180	0.12-**0.18**-0.22			
		3	RXG	G01	F0512R1	80-**110**-140	0.08-**0.12**-0.18			
	P2	1	RXG	A07	T1500	140-**180**-220	0.16-**0.20**-0.25	0.05-**0.08**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXG	A06	T1500	120-**140**-180	0.12-**0.18**-0.22			
		3	RXG	G01	F0512R1	80-**110**-140	0.08-**0.12**-0.18			
	P3	1	RXG	A07	T1500	140-**160**-200	0.16-**0.20**-0.25	0.05-**0.08**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXG	A06	F0512R1	100-**130**-160	0.12-**0.18**-0.22			
		3	RXG	G01	F0512R1	80-**100**-120	0.08-**0.12**-0.18			
	P4	1	RXG	A01	T1500	140-**160**-200	0.15-**0.18**-0.22	0.05-**0.08**-0.12	0.05-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXG	A06	F0512R1	100-**130**-160	0.12-**0.16**-0.22			
		3	RXG	G01	F0512R1	80-**100**-120	0.08-**0.12**-0.18			
	P5	1	RXG	A01	F0512R1	100-**120**-140	0.14-**0.18**-0.20	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	G01	F0512R1	90-**110**-130	0.12-**0.16**-0.20			
		3	RXG	G01	F0512R1	80-**100**-120	0.08-**0.12**-0.18			
	P6	1	RXG	A01	F0512R1	50-**80**-100	0.10-**0.15**-0.18	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	G01	F0512R1	40-**70**-90	0.08-**0.12**-0.16			
		3	RXG	G01	F0512R1	25-**50**-70	0.06-**0.08**-0.12			
	P7	1	RXG	A06	F0512R1	15-**25**-40	0.08-**0.12**-0.16	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	G06	F0512R1	15-**20**-30	0.06-**0.08**-0.12			
		3	RXG	G06	F0512R1	15-**20**-30	0.06-**0.08**-0.12			
M	M1	1	RXG	A07	F0512R1	50-**80**-100	0.12-**0.15**-0.20	0.05-**0.08**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
		2	RXG	A07	F0512R1	40-**70**-90	0.12-**0.15**-0.20			
		3	RXG	G07	F0512R1	25-**50**-70	0.10-**0.14**-0.18			
	M2	1	RXG	A07	F0512R1	50-**80**-100	0.12-**0.15**-0.20	0.05-**0.08**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	40-**70**-90	0.12-**0.15**-0.20			
		3	RXG	G07	F0512R1	25-**50**-70	0.10-**0.14**-0.18			
	M3	1	RXG	A07	F0512R1	40-**60**-80	0.10-**0.12**-0.16	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.12			
		3	RXG	G07	F0512R1	25-**40**-70	0.06-**0.08**-0.12			
	M4	1	RXG	A07	F0512R1	25-**40**-60	0.08-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	20-**35**-55	0.08-**0.10**-0.14			
		3	RXG	G07	F0512R1	20-**30**-50	0.08-**0.10**-0.14			
	M5	1	RXG	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12			
		3	RXG	G07	F0512R1	15-**25**-35	0.05-**0.08**-0.12			
	M6	1	RXG	A06	F0512R1	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	A06	F0512R1	15-**20**-30	0.05-**0.08**-0.12			
		3	RXG	A06	F0512R1	15-**20**-30	0.05-**0.08**-0.12			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- Critical chip evacuation
- Internal coolant supply available

Agujero ciego con interrupción

Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
4	RXG	A06	T1500	140-**180**-220	0.16-**0.20**-0.25	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.08**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXG	A06	F0512R1	120-**140**-180	0.12-**0.18**-0.22				
6	RXG	G11	F0512R1	80-**110**-140	0.08-**0.12**-0.18				
4	RXG	A06	T1500	140-**180**-220	0.16-**0.20**-0.25		0.05-**0.08**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXG	A06	F0512R1	120-**140**-180	0.12-**0.18**-0.22				
6	RXG	G11	F0512R1	80-**110**-140	0.08-**0.12**-0.18				
4	RXG	A06	T1500	140-**160**-200	0.16-**0.20**-0.25		0.05-**0.08**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.15
5	RXG	A06	F0512R1	100-**130**-160	0.12-**0.18**-0.22				
6	RXG	G11	F0512R1	80-**100**-120	0.08-**0.12**-0.18				
4	RXG	A01	F0512R1	140-**160**-200	0.15-**0.18**-0.22		0.05-**0.08**-0.12	0.05-**0.10**-0.15	0.08-**0.10**-0.15
5	RXG	A06	F0512R1	100-**130**-160	0.12-**0.16**-0.22				
6	RXG	G11	F0512R1	80-**100**-120	0.08-**0.12**-0.18				
4	RXG	A01	F0512R1	100-**120**-140	0.14-**0.18**-0.20		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G11	F0512R1	90-**110**-130	0.12-**0.16**-0.20				
6	RXG	G11	F0512R1	80-**100**-120	0.08-**0.12**-0.18				
4	RXG	A01	F0512R1	50-**80**-100	0.10-**0.15**-0.18		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G11	F0512R1	40-**70**-90	0.08-**0.12**-0.16				
6	RXG	G11	F0512R1	25-**50**-70	0.06-**0.08**-0.12				
4	RXG	A06	F0512R1	15-**25**-40	0.08-**0.12**-0.16		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G16	F0512R1	15-**20**-30	0.06-**0.08**-0.12				
6	RXG	G16	F0512R1	15-**20**-30	0.06-**0.08**-0.12				
4	RXG	A07	F0512R1	50-**80**-100	0.12-**0.15**-0.20	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.08**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
5	RXG	G17	F0512R1	40-**70**-90	0.10-**0.14**-0.18				
6	RXG	G17	F0512R1	25-**50**-70	0.10-**0.14**-0.18				
4	RXG	A07	F0512R1	50-**80**-100	0.12-**0.15**-0.20		0.05-**0.08**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G17	F0512R1	40-**70**-90	0.10-**0.14**-0.18				
6	RXG	G17	F0512R1	25-**50**-70	0.10-**0.14**-0.18				
4	RXG	A07	F0512R1	40-**60**-80	0.10-**0.12**-0.16		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G17	F0512R1	40-**60**-80	0.06-**0.08**-0.12				
6	RXG	G17	F0512R1	25-**40**-70	0.06-**0.08**-0.12				
4	RXG	A07	F0512R1	25-**40**-60	0.08-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G16	F0512R1	20-**35**-55	0.08-**0.10**-0.14				
6	RXG	G16	F0512R1	20-**30**-50	0.08-**0.10**-0.14				
4	RXG	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G16	F0512R1	15-**25**-35	0.05-**0.08**-0.12				
6	RXG	G16	F0512R1	15-**25**-35	0.05-**0.08**-0.12				
4	RXG	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	G16	F0512R1	15-**20**-30	0.05-**0.08**-0.12				
6	RXG	G16	F0512R1	15-**20**-30	0.05-**0.08**-0.12				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

MATERIAL DETAILS PAGE 89

Datos de corte RX medium

Cutting Data RX medium

Agujero pasante

Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
K	K1	1	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
		2	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25			
		3	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20			
	K2	1	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
		2	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25			
		3	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20			
	K3	1	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
		2	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25			
		3	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20			
	K4	1	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30	0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
		2	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25			
		3	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20			
	K5	1	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25	0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
		2	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20			
		3	RXG	G01	F0514R2	50-**70**-90	0.10-**0.12**-0.18			
	K6	1	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25	0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
		2	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20			
		3	RXG	G01	F0514R2	50-**70**-90	0.10-**0.12**-0.18			
	K7	1	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16	0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14			
		3	RXG	G01	F0512R1	25-**40**-70	0.08-**0.10**-0.12			
	K8	1	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16	0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14			
		3	RXG	G01	F0512R1	25-**40**-70	0.08-**0.10**-0.12			
N	N1	1	RXL	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXL	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30			
		3	RXL	A07	F0510C	140-**180**-220	0.15-**0.18**-0.22			
	N2	1	RXL	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.08-**0.10**-0.15
		2	RXL	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30			
		3	RXL	A07	F0510C	140-**180**-220	0.15-**0.18**-0.22			
	N3	1	RXL	A07	F0520C	180-**250**-320	0.18-**0.25**-0.35	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXL	A07	F0520C	160-**220**-280	0.18-**0.22**-0.30			
		3	RXL	A07	F0520C	140-**180**-220	0.12-**0.16**-0.20			
	N4	1	RXL	A07	F0520C	140-**180**-220	0.18-**0.22**-0.30	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXL	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28			
		3	RXL	A07	F0520C	140-**160**-200	0.12-**0.16**-0.20			
	N5	1	RXL	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXL	A07	F0520C	140-**160**-200	0.16-**0.20**-0.28			
		3	RXL	A07	F0520C	120-**140**-180	0.12-**0.16**-0.20			
	N6	1	RXL	A07	F0520C	50-**70**-100	0.12-**0.18**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXL	A07	F0520C	50-**70**-100	0.12-**0.16**-0.22			
		3	RXL	A07	F0520C	40-**60**-80	0.12-**0.16**-0.22			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- Critical chip evacuation
- Internal coolant supply available

Agujero pasante con interrupción

Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
4	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
5	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25				
6	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20				
4	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30		0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
5	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25				
6	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20				
4	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30		0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
5	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25				
6	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20				
4	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30		0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
5	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25				
6	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20				
4	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25		0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
5	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20				
6	RXG	G11	F0514R2	50-**70**-90	0.10-**0.12**-0.18				
4	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25		0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
5	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20				
6	RXG	G11	F0514R2	50-**70**-90	0.10-**0.12**-0.18				
4	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16		0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14				
6	RXG	G11	F0512R1	25-**40**-70	0.08-**0.10**-0.12				
4	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16		0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14				
6	RXG	G11	F0512R1	25-**40**-70	0.08-**0.10**-0.12				
4	RXL	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.08-**0.10**-0.15
5	RXL	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30				
6	RXL	A07	F0510C	140-**180**-220	0.12-**0.16**-0.20				
4	RXL	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.08-**0.10**-0.15
5	RXL	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30				
6	RXL	A07	F0510C	140-**180**-220	0.12-**0.16**-0.20				
4	RXL	A07	F0520C	180-**250**-320	0.18-**0.25**-0.35		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXL	A07	F0520C	160-**220**-280	0.18-**0.22**-0.30				
6	RXL	A07	F0520C	140-**180**-220	0.12-**0.16**-0.20				
4	RXL	A07	F0520C	140-**180**-220	0.18-**0.22**-0.30		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXL	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28				
6	RXL	A07	F0520C	140-**160**-200	0.12-**0.16**-0.20				
4	RXL	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXL	A07	F0520C	140-**160**-200	0.16-**0.20**-0.28				
6	RXG	A07	F0520C	120-**140**-180	0.12-**0.16**-0.20				
4	RXL	A07	F0520C	50-**70**-100	0.12-**0.18**-0.25		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXL	A07	F0520C	50-**70**-100	0.12-**0.16**-0.22				
6	RXG	A07	F0520C	40-**60**-80	0.10-**0.14**-0.20				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

MATERIAL DETAILS PAGE 89

Datos de corte RX medium

Cutting Data RX medium

Agujero ciego

Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
K	K1	1	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
		2	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25			
		3	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20			
	K2	1	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
		2	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25			
		3	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20			
	K3	1	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
		2	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25			
		3	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20			
	K4	1	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30	0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
		2	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25			
		3	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20			
	K5	1	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25	0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
		2	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20			
		3	RXG	G01	F0514R2	50-**70**-90	0.10-**0.12**-0.18			
	K6	1	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25	0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
		2	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20			
		3	RXG	G01	F0514R2	50-**70**-90	0.10-**0.12**-0.18			
	K7	1	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16	0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14			
		3	RXG	G01	F0512R1	25-**40**-70	0.08-**0.10**-0.12			
	K8	1	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16	0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14			
		3	RXG	G01	F0512R1	25-**40**-70	0.08-**0.10**-0.12			
N	N1	1	RXG	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
		2	RXG	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30			
		3	RXG	G07	F0510C	140-**180**-220	0.12-**0.16**-0.20			
	N2	1	RXG	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
		2	RXG	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30			
		3	RXG	G07	F0510C	140-**180**-220	0.12-**0.16**-0.20			
	N3	1	RXG	A07	F0520C	180-**250**-320	0.18-**0.25**-0.35	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	RXG	A07	F0520C	160-**220**-280	0.18-**0.22**-0.30			
		3	RXG	G07	F0520C	140-**180**-220	0.12-**0.16**-0.20			
	N4	1	RXG	A07	F0520C	140-**180**-220	0.18-**0.22**-0.30	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	RXG	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28			
		3	RXG	G07	F0520C	140-**160**-200	0.12-**0.16**-0.20			
	N5	1	RXG	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	RXG	A07	F0520C	140-**160**-200	0.16-**0.20**-0.28			
		3	RXG	G07	F0520C	120-**140**-180	0.12-**0.16**-0.20			
	N6	1	RXG	A07	F0520C	50-**70**-100	0.12-**0.18**-0.25	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXG	A07	F0520C	50-**70**-100	0.12-**0.16**-0.22			
		3	RXG	G07	F0520C	40-**60**-80	0.10-**0.14**-0.20			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- Eliminación de virutas crítica
- Suministro de la refrigeración interior disponible

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- Critical chip evacuation
- Internal coolant supply available

Agujero ciego con interrupción

Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
4	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
5	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25				
6	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20				
4	RXG	A04	F0514R2	90-**120**-160	0.16-**0.22**-0.30		0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
5	RXG	A04	F0514R2	80-**110**-140	0.12-**0.18**-0.25				
6	RXG	G04	F0514R2	70-**90**-120	0.10-**0.15**-0.20				
4	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30		0.10-**0.15**-0.20	0.10-**0.15**-0.20	0.10-**0.15**-0.25
5	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25				
6	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20				
4	RXG	A01	F0514R2	120-**140**-180	0.16-**0.22**-0.30		0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
5	RXG	A01	F0514R2	100-**120**-140	0.12-**0.18**-0.25				
6	RXG	G01	F0514R2	80-**100**-120	0.10-**0.15**-0.20				
4	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25		0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
5	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20				
6	RXG	G11	F0514R2	50-**70**-90	0.10-**0.12**-0.18				
4	RXG	A01	F0514R2	60-**80**-100	0.12-**0.18**-0.25		0.08-**0.10**-0.15	0.10-**0.15**-0.20	0.10-**0.15**-0.20
5	RXG	A01	F0514R2	60-**80**-100	0.10-**0.15**-0.20				
6	RXG	G11	F0514R2	50-**70**-90	0.10-**0.12**-0.18				
4	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16		0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14				
6	RXG	G11	F0512R1	25-**40**-70	0.08-**0.10**-0.12				
4	RXG	A01	F0512R1	40-**60**-80	0.10-**0.14**-0.16		0.08-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXG	A01	F0512R1	40-**60**-80	0.10-**0.12**-0.14				
6	RXG	G11	F0512R1	25-**40**-70	0.08-**0.10**-0.12				
4	RXG	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
5	RXG	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30				
6	RXG	G07	F0510C	140-**180**-220	0.12-**0.16**-0.20				
4	RXG	A07	F0510C	180-**250**-320	0.18-**0.25**-0.35		0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.08-**0.10**-0.15
5	RXG	A07	F0510C	160-**220**-280	0.18-**0.22**-0.30				
6	RXG	G07	F0510C	140-**180**-220	0.12-**0.16**-0.20				
4	RXG	A07	F0520C	180-**250**-320	0.18-**0.25**-0.35		0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	RXG	A07	F0520C	160-**220**-280	0.18-**0.22**-0.30				
6	RXG	G07	F0520C	140-**180**-220	0.12-**0.16**-0.20				
4	RXG	A07	F0520C	140-**180**-220	0.18-**0.22**-0.30		0.05-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	RXG	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28				
6	RXG	G07	F0520C	140-**160**-200	0.12-**0.16**-0.20				
4	RXG	A07	F0520C	140-**180**-220	0.16-**0.20**-0.28		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	RXG	A07	F0520C	140-**160**-200	0.16-**0.20**-0.28				
6	RXG	G07	F0520C	120-**140**-180	0.12-**0.16**-0.20				
4	RXG	A07	F0520C	50-**70**-100	0.12-**0.18**-0.25		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXG	A07	F0520C	50-**70**-100	0.12-**0.16**-0.22				
6	RXG	G07	F0520C	40-**60**-80	0.10-**0.14**-0.20				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 6xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 5xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (< 10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 7xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones previas difíciles
- Fijación, máquina y/o pieza inestable
- Diámetro de placa < 35.600
  Longitud de proyección de la herramienta < 12xD
- Diámetro de placa > 35.601
  Longitud de proyección de la herramienta < 9xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 6xD
- Insert diameter > 35.601 Tool projection length < 5xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 7xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Difficult conditions
- Unstable fixture, machine and/or workpiece
- Insert diameter < 35.600 Tool projection length < 12xD
- Insert diameter > 35.601 Tool projection length < 9xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

MATERIAL DETAILS PAGE 90/91

Datos de corte RX medium

Cutting Data RX medium

Agujero pasante
Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
S	S1	1	RXL	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14			
		3	RXL	A07	F0512R1	15-**25**-35	0.06-**0.10**-0.14			
	S2	1	RXL	A07	F0512R1	20-**30**-45	0.06-**0.10**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	20-**30**-45	0.05-**0.08**-0.12			
		3	RXL	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12			
	S3	1	RXL	A07	F0512R1	15-**20**-35	0.06-**0.10**-0.12	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXL	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.10			
		3	RXL	A07	F0512R1	8-**15**-25	0.05-**0.08**-0.10			
	S4	1	RXL	A07	F0512R1	12-**18**-25	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXL	A07	F0512R1	8-**15**-20	0.05-**0.08**-0.10			
		3	RXL	A07	F0512R1	5-**12**-20	0.05-**0.08**-0.10			
	S11	1	RXL	A07	F0512R1	20-**40**-60	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14			
		3	RXL	A07	F0512R1	15-**25**-30	0.06-**0.10**-0.14			
	S12	1	RXL	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	20-**30**-45	0.06-**0.10**-0.14			
		3	RXL	A07	F0512R1	15-**25**-30	0.06-**0.10**-0.14			
	S13	1	RXL	A07	F0512R1	20-**30**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	RXL	A07	F0512R1	15-**25**-30	0.05-**0.08**-0.10			
		3	RXL	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.10			
	S14	1	RXL	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXL	A07	F0512R1	10-**18**-25	0.05-**0.08**-0.10			
		3	RXL	A07	F0512R1	8-**15**-20	0.05-**0.08**-0.10			
H	H1	1	RXG	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08			
		3	RXG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08			
	H2	1	RXG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	**0.05**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08			
		3	RXG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08			
	H3	1	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.04-**0.05**-0.06	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07			
		3	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07			
SM	SM1	1	RXL	B07	T1500	140-**180**-220	0.18-**0.25**-0.35	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	B07	T1500	110-**140**-170	0.18-**0.22**-0.30			
		3	RXL	A07	T1500	80-**100**-120	0.12-**0.16**-0.20			
	SM2	1	RXL	B07	F0512R1	120-**140**-160	0.18-**0.22**-0.30	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	B07	F0512R1	100-**120**-150	0.15-**0.20**-0.25			
		3	RXL	A07	F0512R1	80-**100**-120	0.12-**0.15**-0.20			
	SM3	1	RXL	A07	F0512R1	40-**60**-80	0.10-**0.12**-0.18	0.08-**0.10**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.16			
		3	RXL	A07	F0512R1	25-**40**-70	0.06-**0.08**-0.14			
O	O1	1	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20			
		3	RXL	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16			
	O2	1	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20			
		3	RXL	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16			
	O3	1	RXL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20			
		3	RXL	A07	F0520C	40-**50**-60	0.10-**0.13**-0.16			
	O4	1	RXL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10			
		3	RXL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10			

Agujero pasante con interrupción
Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
4	RXL	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14				
6	RXG	A06	F0512R1	15-**25**-35	0.06-**0.10**-0.14				
4	RXL	A06	F0512R1	20-**30**-45	0.06-**0.10**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	20-**30**-45	0.05-**0.08**-0.12				
6	RXG	A06	F0512R1	15-**25**-35	0.05-**0.08**-0.12				
4	RXL	A06	F0512R1	15-**20**-35	0.06-**0.10**-0.12		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXL	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	8-**15**-25	0.05-**0.08**-0.10				
4	RXL	A06	F0512R1	12-**18**-25	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXL	A06	F0512R1	8-**15**-20	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	5-**12**-20	0.05-**0.08**-0.10				
4	RXL	A06	F0512R1	20-**40**-60	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14				
6	RXG	A06	F0512R1	15-**25**-30	0.06-**0.10**-0.14				
4	RXL	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	20-**30**-45	0.06-**0.10**-0.14				
6	RXG	A06	F0512R1	15-**25**-30	0.06-**0.10**-0.14				
4	RXL	A06	F0512R1	20-**30**-45	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	RXL	A06	F0512R1	15-**25**-30	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.10				
4	RXL	A06	F0512R1	15-**20**-30	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXL	A06	F0512R1	10-**18**-25	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	8-**15**-20	0.05-0.08-0.10				
4	RXG	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08				
6	RXG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08				
4	RXG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08		**0.05**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
5	RXG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08				
6	RXG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08				
4	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07		0.04-**0.05**-0.06	**0.05**-0.08	0.05-**0.08**-0.10
5	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07				
6	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07				
4	RXL	A07	T1500	140-**180**-220	0.18-**0.22**-0.30	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A06	T1500	110-**140**-170	0.15-**0.20**-0.25				
6	RXG	A06	F0512R1	80-**100**-120	0.12-**0.16**-0.20				
4	RXL	A07	F0512R1	120-**140**-160	0.15-**0.20**-0.25		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A06	F0512R1	100-**120**-150	0.12-**0.18**-0.22				
6	RXG	A01	F0512R1	80-**100**-120	0.12-**0.15**-0.20				
4	RXL	A06	F0512R1	40-**60**-80	0.10-**0.12**-0.18		0.08-**0.10**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A06	F0512R1	40-**60**-80	0.08-**0.10**-0.16				
6	RXG	A01	F0512R1	25-**40**-70	0.06-**0.08**-0.14				
4	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20				
6	RXG	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16				
4	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A07	F0510C	40-**60**-80	0.10-**0.15**-0.20				
6	RXG	A07	F0510C	40-**60**-80	0.10-**0.13**-0.16				
4	RXL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A07	F0520C	40-**50**-60	0.10-**0.15**-0.20				
6	RXG	A07	F0520C	40-**50**-60	0.10-**0.13**-0.16				
4	RXL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXL	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10				
6	RXG	A07	F0520C	30-**50**-60	0.05-**0.08**-0.10				

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Datos de corte RX medium

Cutting Data RX medium

Agujero ciego
Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
S	S1	1	RXG	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14			
		3	RXG	A07	F0512R1	15-**25**-35	0.06-**0.10**-0.14			
	S2	1	RXG	A07	F0512R1	20-**30**-45	0.06-**0.10**-0.12	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	20-**30**-45	0.05-**0.08**-0.12			
		3	RXG	A07	F0512R1	15-**25**-35	0.05-**0.08**-0.12			
	S3	1	RXG	A07	F0512R1	15-**20**-35	0.06-**0.10**-0.12	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXG	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.10			
		3	RXG	A07	F0512R1	8-**15**-25	0.05-**0.08**-0.10			
	S4	1	RXG	A07	F0512R1	12-**18**-25	0.05-**0.08**-0.10	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXG	A07	F0512R1	8-**15**-20	0.05-**0.08**-0.10			
		3	RXG	A07	F0512R1	5-**12**-20	0.05-**0.08**-0.10			
	S11	1	RXG	A07	F0512R1	20-**40**-60	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14			
		3	RXG	A07	F0512R1	15-**25**-30	0.06-**0.10**-0.14			
	S12	1	RXG	A07	F0512R1	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	20-**30**-45	0.06-**0.10**-0.14			
		3	RXG	A07	F0512R1	15-**25**-30	0.06-**0.10**-0.14			
	S13	1	RXG	A07	F0512R1	20-**30**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
		2	RXG	A07	F0512R1	15-**25**-30	0.05-**0.08**-0.10			
		3	RXG	A07	F0512R1	10-**18**-30	0.05-**0.08**-0.10			
	S14	1	RXG	A07	F0512R1	15-**20**-30	0.05-**0.08**-0.10	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXG	A07	F0512R1	10-**18**-25	0.05-**0.08**-0.10			
		3	RXG	A07	F0512R1	8-**15**-20	0.05-**0.08**-0.10			
H	H1	1	RXG	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	RXG	G06	F0507R1	10-**18**-25	0.04-**0.06**-0.08			
		3	RXG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08			
	H2	1	RXG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08	**0.05**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08			
		3	RXG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08			
	H3	1	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07	0.04-**0.05**-0.06	**0.05**-0.08	0.05-**0.08**-0.10
		2	RXG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07			
		3	RXG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07			
SM	SM1	1	RXG	A07	T1500	140-**180**-220	0.18-**0.22**-0.30	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXG	A07	T1500	110-**140**-170	0.15-**0.20**-0.25			
		3	RXG	G07	T1500	80-**100**-120	0.10-**0.16**-0.20			
	SM2	1	RXG	A07	F0512R1	120-**140**-160	0.15-**0.20**-0.25	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXG	A07	F0512R1	100-**120**-150	0.12-**0.18**-0.22			
		3	RXG	G07	F0512R1	80-**100**-120	0.10-**0.15**-0.20			
	SM3	1	RXG	A07	F0512R1	40-**60**-80	0.10-**0.12**-0.18	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXG	A07	F0512R1	40-**60**-80	0.08-**0.10**-0.16			
		3	RXG	G07	F0512R1	25-**40**-70	0.06-**0.08**-0.14			
O	O1	1	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20			
		3	RXG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16			
	O2	1	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20			
		3	RXG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16			
	O3	1	RXG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20			
		3	RXG	G07	F0520C	40-**50**-60	0.10-**0.13**-0.16			
	O4	1	RXG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	RXG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10			
		3	RXG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10			

Agujero ciego con interrupción
Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
4	RXG	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
5	RXG	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14				
6	RXG	A06	F0512R1	15-**25**-35	0.06-**0.10**-0.14				
4	RXG	A06	F0512R1	20-**30**-45	0.06-**0.10**-0.12		**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.10**-0.12
5	RXG	A06	F0512R1	20-**30**-45	0.05-**0.08**-0.12				
6	RXG	A06	F0512R1	15-**25**-35	0.05-**0.08**-0.12				
4	RXG	A06	F0512R1	15-**20**-35	0.06-**0.10**-0.12		**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXG	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	8-**15**-25	0.05-**0.08**-0.10				
4	RXG	A06	F0512R1	12-**18**-25	0.05-**0.08**-0.10		**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXG	A06	F0512R1	8-**15**-20	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	5-**12**-20	0.05-**0.08**-0.10				
4	RXG	A06	F0512R1	20-**40**-60	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
5	RXG	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14				
6	RXG	A06	F0512R1	15-**25**-30	0.06-**0.10**-0.14				
4	RXG	A06	F0512R1	20-**35**-45	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
5	RXG	A06	F0512R1	20-**30**-45	0.06-**0.10**-0.14				
6	RXG	A06	F0512R1	15-**25**-30	0.06-**0.10**-0.14				
4	RXG	A06	F0512R1	20-**30**-45	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.10**-0.12
5	RXG	A06	F0512R1	15-**25**-30	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	10-**18**-30	0.05-**0.08**-0.10				
4	RXG	A06	F0512R1	15-**20**-30	0.05-**0.08**-0.10		**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXG	A06	F0512R1	10-**18**-25	0.05-**0.08**-0.10				
6	RXG	A06	F0512R1	8-**15**-20	0.05-**0.08**-0.10				
4	RXG	A06	F0507R1	15-**25**-30	0.04-**0.06**-0.08	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	RXG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08				
6	RXG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08				
4	RXG	A06	F0507R1	10-**18**-25	0.04-**0.06**-0.08		**0.05**-0.08	**0.05**-0.08	0.05-**0.08**-0.10
5	RXG	A06	F0507R1	8-**15**-20	0.04-**0.06**-0.08				
6	RXG	G06	F0507R1	8-**15**-20	0.04-**0.06**-0.08				
4	RXG	A06	F0507R1	8-**10**-15	0.03-**0.05**-0.07		0.04-**0.05**-0.06	**0.05**-0.08	0.05-**0.08**-0.10
5	RXG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07				
6	RXG	G06	F0507R1	8-**10**-15	0.03-**0.05**-0.07				
4	RXG	A07	T1500	140-**180**-220	0.18-**0.22**-0.30	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXG	A06	T1500	110-**140**-170	0.15-**0.20**-0.25				
6	RXG	G11	F0512R1	80-**100**-120	0.10-**0.16**-0.20				
4	RXG	A07	F0512R1	120-**140**-160	0.15-**0.20**-0.25		0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXG	A06	F0512R1	100-**120**-150	0.12-**0.18**-0.22				
6	RXG	G11	F0512R1	80-**100**-120	0.10-**0.15**-0.20				
4	RXG	A06	F0512R1	40-**60**-80	0.10-**0.12**-0.18		0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXG	A06	F0512R1	40-**60**-80	0.08-**0.10**-0.16				
6	RXG	G11	F0512R1	25-**40**-70	0.06-**0.08**-0.14				
4	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20	**Reducir corte completo fz en 30 % - 50%** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20				
6	RXG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16				
4	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXG	G07	F0510C	40-**60**-80	0.10-**0.15**-0.20				
6	RXG	G07	F0510C	40-**60**-80	0.10-**0.13**-0.16				
4	RXG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXG	G07	F0520C	40-**50**-60	0.10-**0.15**-0.20				
6	RXG	G07	F0520C	40-**50**-60	0.10-**0.13**-0.16				
4	RXG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	RXG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10				
6	RXG	G07	F0520C	30-**50**-60	0.05-**0.08**-0.10				

Ø 11.900 – 140.600 mm

Manual de manejo RX medium
Handling Manual RX medium

Cambio de placas

1. No agarrar el mango fuera del porta conos. Quitar los tornillos y las placas usadas.

2. Limpiar el mango del cono cuidadosamente y chequear los posibles daños.

3. Colocar la nueva placa en la posición (poner atencion en la claveta de posición) y apretar ligeramente los tornillos de amarre.

4. Si es posible, utilizar la llave dinamométrica para apretar los tornillos (ver cuadro de par de torsión).

Inserts Change

1. Do not take the shank out of the tool holder. Remove clamping screws and used reaming insert.

2. Clean short taper of the shank carefully and check for possible damages.

3. Set new insert in position (pay attention to the positioning pin) and slightly tighten the clamping screws.

4. Use the recommended Torx®-torque screw driver to tighten the screws crosswise. (See torque chart).

	Standard Insert Holder		SD Insert Holder	
RX medium Parameter	**Torx® Dimension**	**Torque**	**Torx® Dimension**	**Torque**
RX 016	6	0.9 Nm	15	4 Nm
RX 019	6	0.9 Nm	20	6 Nm
RX 024	8	1.5 Nm	30	16 Nm
RX 029	8	1.5 Nm	30	16 Nm
RX 036	8	1.5 Nm	30	18 Nm
RX 044	8	1.5 Nm		
RX 052	8	1.5 Nm		
RX 061	8	1.5 Nm		
RX 081	15	3.5 Nm		
RX 101	15	3.5 Nm		
RX 121	15	3.5 Nm		
RX 141	15	3.5 Nm		

Torx® registered trademark of Textron

Medida del diametro de la placa
Las placas RX medium tienen una inclinacion espaciada desigual. Para medir el diametro alinear los dos filos de corte marcados. Mide directamente sobre el angulo en el cono chaflanado por que las placas es tan afiladas.

Measuring of Insert Diameter
RX medium inserts are unequally spaced. To measure the diameter, line up the two marked cutting edges. Measure directly at the chamfer because the inserts are ground with taper.

Ø 11.900 – 140.600 mm

Manual de manejo RX medium
Handling Manual RX medium

Ø < 0.005

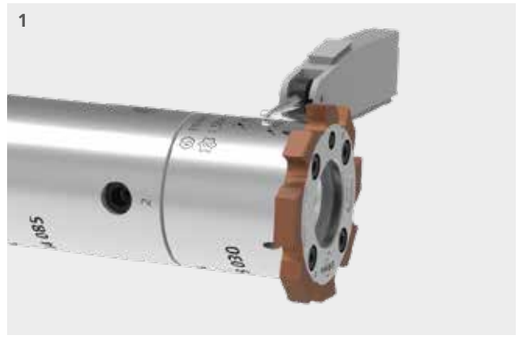
Concentricidad placa
Insert run-out

Ajuste del salto
Run-Out Adjustment

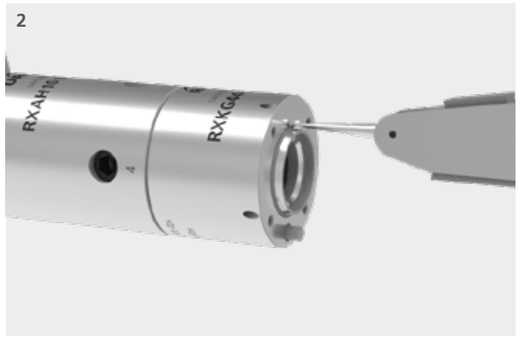
Para conseguir un escariado óptimo, es fundamental utilizar una herramienta con un salto perfecto. Para compensar cualquier error de salto debido al portaherramientas o al husillo de la máquina, se recomiendan los soportes de compensación siguientes: Portapinzas ajustables o mandriles hidráulicos. El salto puede medirse con varios métodos distintos:

To achieve the best reaming results, a tool with perfect run-out is absolutely essential. To compensate any run-out error of the tool holder and the machine spindle, the following compensation holders are recommended: Adjustable collet shrink fit or hydraulic chucks. The run-out can be measured with different methods:

1



2



1. Sobre el diametro exterior del porta placas
Los porta herramientas RX medium son fabricados con mucha precisión en todos los diametros. Un metodo fácil de manejar y ofrece resultados satisfactorios.

2. Sobre el cono del porta plaquitas
Con el escariador desmontado, medir directamente en el cono corto del porta placas. Este método de manejo ofrece excelentes resultados de medición.

1. On the External Diameter of the Insert Holder
RX medium tool holders are manufactured very accurately. This handling method is easy and offers reasonable measuring results.

2. Through Insert Holder Short Taper
With the reamer disassembled, measure directly on the insert holders short taper. This handling method offers high accuracy measuring results.

Instrucciones de mandril de alineación

Instruction Compensation Chuck

Para conseguir un escariado óptimo, es fundamental utilizar una herramienta sin salto. Para compensar cualquier error de salto debido al portaherramientas o al husillo de la máquina, se recomienda un soporte de compensación o un mandril flotante. El salto de los escariadores RX medium puede medirse con varios métodos distintos:

Procedimiento:

1. Antes del ajuste, asegurarse de que todos los tornillos de ajuste n ② están completamente aflojados.

2. Cambiar la herramienta en el husillo de la máquina.

3. Colocar el sensor de medición (con resolución 1 µm / 0,0001 pulgadas) en el punto marcado de control de concentricidad n ① del mango.

4. Con la ayuda de cuatro tornillos de ajuste radiales, ajustar la concentricidad directamente en el husillo de la máquina a un máx. de 5 µm / 0,0002 pulgadas (ideal < 3 µm / 0,0001 pulgadas).

Los tornillos de ajuste no deben tensarse entre sí completamente tras el ajuste.

In order to achieve the best reaming results, a tool with zero run-out is absolutely essential. To compensate any run-out error of the tool holder and the machine spindle, we recommend using a compensation holder or floating chuck. The run-out of RX medium reamers can be measured with different methods:

Procedure:

1. Before adjusting, make sure that all adjustment screws ② are completely loosened.

2. Load the tool in the machine spindle.

3. Set the indicator (with 1 µm / 0,0001 inch resolution) on the marked run-out area ① on the shank.

4. Set the run-out directly in the machine spindle to max. 5 µm / 0,0002 inch (ideal < 3 µm / 0,0001 inch) by using the four radial adjustment screws ②.

The adjustment screws do not have to be fully clamped against each other after adjustment.

Instrucciones de mandril flotante

Instruction Floating Chuck

Los trabajos de escariado en tornos se realizan principalmente con mandril flotante (en casos excepcionales, también en centros de mecanizado).

Los errores de posición pueden compensarse mediante el mecanismo de péndulo ajustable. La desviación solo debe ser posible planoparalela (sin compensación de errores angular).

Se recomiendan ángulos de corte ≤ 45°.

Procedimiento:

1. Ajustar el juego pendular mediante el tornillo de ajuste n ①.

Tornillo de ajuste	Mecanismo de péndulo	Influencia sobre el mecanizado
Giro en sentido horario	La fuerza elástica se fortalece / la resistencia a la desviación aumenta	La calidad de la superficie puede verse influida negativamente (marcas de retroceso)
Giro en sentido antihorario	La fuerza elástica se debilita / la resistencia a la desviación disminuye	Posible tendencia a las vibraciones

Reaming on lathes are mainly done with floating chucks (in exceptional cases also on machining centres).

Positioning errors can be compensated by the adjustable floating mechanism. The deflection should only take place in plane-parallel (No angular error compensation).

Cutting geometries with an angle of ≤ 45° are recommended.

Procedure:

1. Adjust the floating mechanism by using the adjustment screw ①.

Adjustment screw	Floating mechanism	Influence on machining
Clockwise rotation	Spring force increases / deflection resistance increases	The surface quality can be negatively influenced (retraction marks)
Counterclockwise rotation	Spring force becomes weaker / deflection resistance decreases	Potential vibration tendency

Ajuste:

Suave: La herramienta debe ajustarse con la mínima resistencia a la desviación posible. No obstante, teniendo en cuenta el peso de la herramienta, debe retornar elásticamente por sí misma al eje central.

Medio: El tornillo de ajuste se apretará completamente y se girará 1 ± ¼ de vuelta.

Duro: El tornillo de ajuste se apretará completamente y se girará ¼ - ½ de vuelta.

Adjustment:

Soft: The tool should be adjusted with the lowest possible deflection resistance. Nevertheless, taking into account the weight of the tool, it must jump back automatically into the central axis after deflection.

Medium: Fully tighten the adjusting screw and turn back by 1 ± ¼ rotation.

Hard: Fully tighten the adjusting screw and turn back by ¼ - ½ rotation.

Recomendación de posición inicial:

Recommendation for the basic setting:

Ø de herramienta Tool-Ø	**Suave** Soft	**Medio** Medium	**Duro** Hard
11.900 – 15.600	X		
15.601 – 23.600	X	X	
23.601 – 35.600		X	
35.601 – 60.600		X	
60.601 – 140.600		X	X

2. Si hay un eje Y, recomendamos alinear la herramienta de forma adicional < 10 µm / 0,0004 pulgadas (idealmente < 5 µm / 0,0002 pulgadas) concéntricamente respecto al eje del husillo.

2. With an existing Y-axis, we recommend additionally aligning the tool < 10 µm / 0,0004 inch (ideally < 5 µm / 0,0002 inch) concentrically to the spindle axis.

- Los ajustes del mecanismo de péndulo pueden variar en función de la aplicación y el tipo de mandril flotante.
- En general, se recomienda entrar en el agujero a velocidad reducida.
- Todos los datos son valores orientativos y se refieren al mandril flotante de URMA.

- The settings of the floating mechanism can vary depending on the application and type of floating chuck.
- It is generally recommended to enter the bore with reduced rpm.
- All data are guide values and refer to URMA floating chucks.

Como alternativa a un mandril flotante, también pueden utilizarse portaplacas de sección transversal reducida (ver el catálogo de escariado).

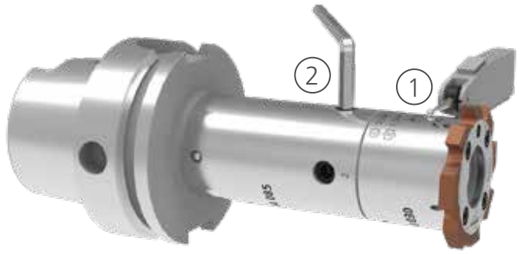
As an alternative to a floating chuck, diameter reduced insert holders can also be used (see reaming catalogue).

Instrucción para mangos con dispositivo de compensación integrado

Instruction for Shanks with Integrated Compensation Device

De serie en diámetros de escariado superiores a 35,601 mm

For Reaming Diameters bigger than 35,601 mm



Procedimiento:

1. Apretar tornillo de fijación central según el valor de tabla «A» (si no está disponible, valor «B»).

2. Cambiar la herramienta en el husillo de la máquina.

3. Colocar el sensor de medición (con resolución 1 µm / 0,0001 pulgadas) en el punto marcado de control de concentricidad ① del mango.

4. Mida el salto de los ejes de los dos tornillos de ajuste. Compense la mitad del valor del error de salto total usando los tornillos de ajuste. Compruebe el salto en los cuatro puntos axiales y repita el ajuste si fuera necesario. Apriete los tornillos que no estén bien apretados, teniendo en cuenta el salto < 0,005 mm en diámetro.

5. Fijar el tornillo de fijación central según el valor de tabla «B».

6. Comprobar de nuevo la concentricidad y, en caso necesario, reajustar.

Procedure:

1. Secure central clamping screw according to value "A" in the chart below (if not available, use value "B").

2. Load the tool into the machine spindle.

3. Set the indicator (with 1 µm / 0,0001 inch resolution) on the marked run-out area ① on the shank.

4. Measure run-out of the two adjustment screw ② axes. Compensate half value of the total run-out error by using the adjustment screws. Check run-out on all four axle points and repeat the adjustment if necessary. Tighten all screws that do not fit tightly, considering the run-out < 0,005 mm in diameter.

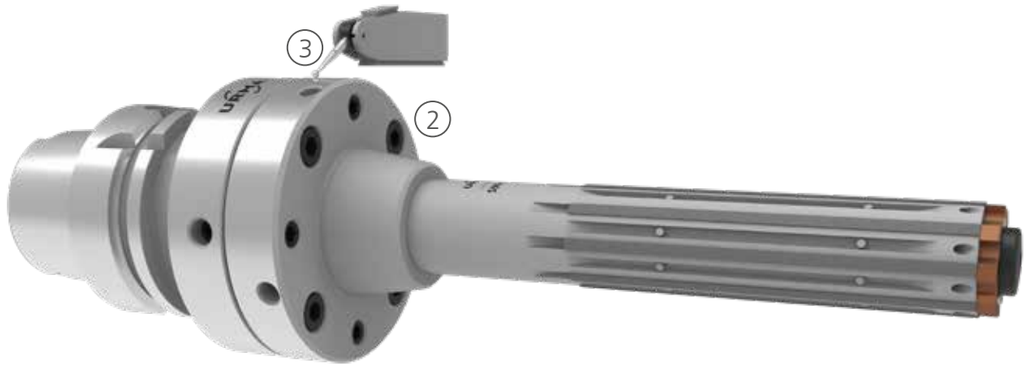
5. Tight the central clamping screw according to table value "B".

6. Check the run-out again and re-adjust if necessary.

RX Parameter	**A [Nm]**	**B [Nm]**
RX 044	-	35
RX 052	-	35
RX 061	-	55
RX 081	60	85
RX 101	70	120
RX 121	70	120
RX 141	70	120

Instrucción para el módulo de compensación con herramientas especiales

Instruction for Compensation Module with Special Tools



Con el módulo de alineación se ajusta la concentricidad de, por ejemplo, herramientas de carril de guía. Se pueden corregir tanto errores de eje como de ángulo.

Preparación de la herramienta:

1. Antes del montaje debe asegurarse de que no sobresalga ninguno de los discos de presión en la cara vista.

2. Montar la herramienta en el módulo de alineación pretensando suavemente los tornillos tensores ② (es decir, enroscar el tornillo hasta que quede plano y, a continuación, apretar ¼ de vuelta).

3. Cargar la herramienta en el husillo de la máquina.

4. Colocar el sensor de medición (con resolución 1 µm / 0,0001 pulgadas) sobre el diámetro ③ de la brida de la herramienta.

The compensation module is used, for example, to adjust the run-out of guide pad tools. Axis as well as angle errors can be adjusted.

Prepare the Tool:

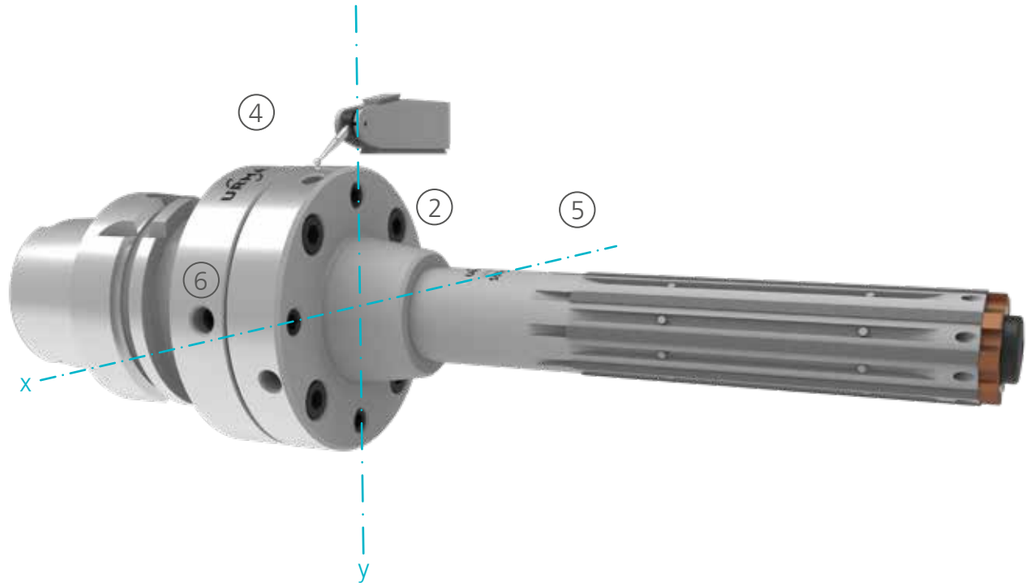
1. Before assembling, it must be ensured that none of the pressure pads discs on the face side stick out.

2. Assemble the tool on the compensation module, tightening the clamping screws ② slightly (i.e. tighten the screw until it has contact to the face, then tighten ¼ turn).

3. Load the tool into the machine spindle.

4. Set the indicator (with 1 µm / 0,0001 inch resolution) on the tool flange diameter ③.

Alineación radial de la herramienta - Paso 1:
Radial alignment of the tool - Step 1:



5. Con la ayuda de los tornillos de ajuste radiales ⑥, alinear el módulo de brida en 2 µm / 0,0001 pulgadas.
- a. Comprobar el error de concentricidad en dos tornillos radiales opuestos ⑥ (primer eje de ajuste ⑤)
- b. Corrija la diferencia de valor del eje a la mitad, utilizando el tornillo de ajuste correspondiente. A continuación, afloje los tornillos de ajuste.
- c. Poner el comparador a valor «0»
- d. Comprobar el valor «0» girando la herramienta 180° y corrigiendo en caso necesario (ver «b»).
- e. Aplicar el mismo procedimiento de alineación en el segundo eje de ajuste ④
- f. En caso necesario, volver a corregir el eje de ajuste ⑤

Al concluir el proceso de ajuste, hay que apretar todos los tornillos de ajuste n.º ⑥.

6. Apretar los tornillos tensores ②.

7. Volver a comprobar la concentricidad del módulo de brida
→ máx. 3 µm / 0,0001 pulgadas

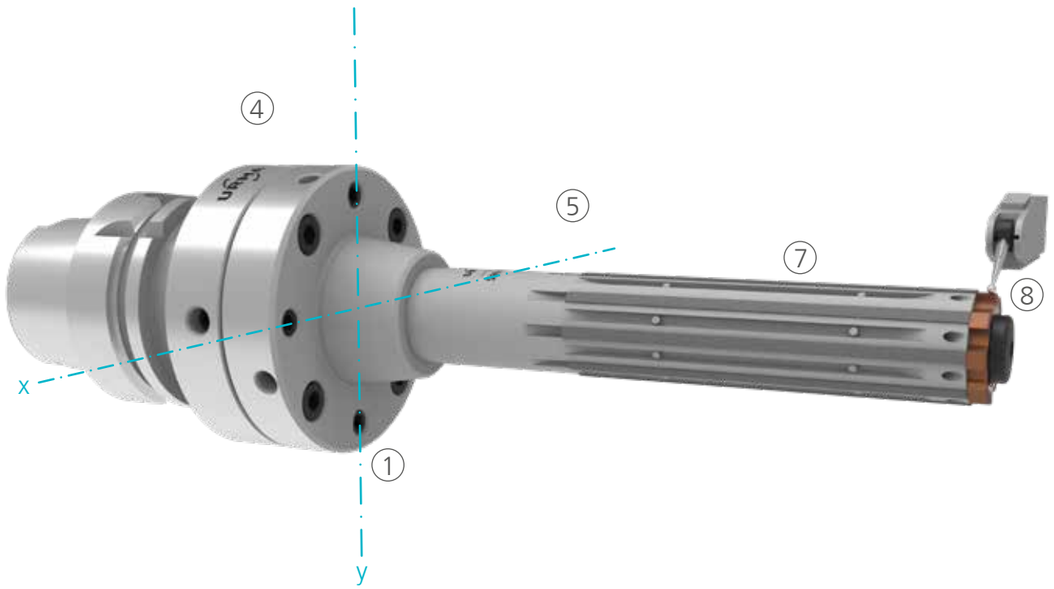
5. Align the flange module in 2 µm / 0,0001 inch by using the radial adjustment screws ⑥.
- a. Check run-out error with two opposing radial adjustment screws ⑥ (1st adjustment axis ⑤)
- b. Correct the value difference of the axis by half, using the corresponding adjusting screw. Loosen the adjusting screw afterwards.
- c. Set indicator to “0” value
- d. Check the “0” value by turning the tool to 180° and correct if necessary (see “b”).
- e. Use the same alignment procedure for the second adjustment axis ④
- f. If necessary readjust the first axis ⑤

All adjustment screws ⑥ must be tightened after completion of the adjustment process.

6. Tighten the clamping screws ②.

7. Check the run-out of the flange module again
→ max. 3 µm / 0,0001 inch

Alineación angular de la herramienta - Paso 2:
Aligning the tool angle - Step 2:



8. Colocar el sensor de medición en la posición frontal ⑧:
a. sobre el filo de corte o en la placa indicadora de salto (el número de referencia aparece indicado en el catálogo «URMA Reaming»)
b. en cono RX del mango (punto de corte)
c. en listones guía

9. Ajustar el error angular a 2 µm utilizando los tornillos de ajuste axiales ① (proceda según se describe en el «punto 5, de b a f»).

Se recomienda utilizar, máx. un tornillo de ajuste ① por eje (0 y 90°) para corregir el error de ángulo.

10. Volver a comprobar la concentricidad en los listones guía ⑦
→ máx. 3 µm / 0,0001 pulgadas

8. Set the indicator in front ⑧:
a. on cutting edge or run-out indicating insert (Order number can be found in the "URMA Reaming" catalogue)
b. on RX-taper of the shank (interface)
c. on guide pads

9. Set the angular error to 2 µm by using the axial adjusting screws ① (proceed as described in "point 5 b to f").

It is recommended to use max. one adjustment screw ① per axis (0 and 90°) to adjust the angular error.

10. Check the alignement on the guide pads ⑦
→ max. 3 µm / 0,0001 inch

Estrategias de mecanizado
Machining Strategies

Guiado
Piloting

Se recomienda el guiado en las siguientes situaciones de partida:
- Relación longitud / diámetro > 8xD
- Para cumplir tolerancias de posición y concentricidad estrechas
- Para evitar las vibraciones de entrada con una herramienta larga
- Uso de una herramienta de listones guía larga (exactitud de posicionamiento)
- En caso de entrada de agujero oblicua o discontinua

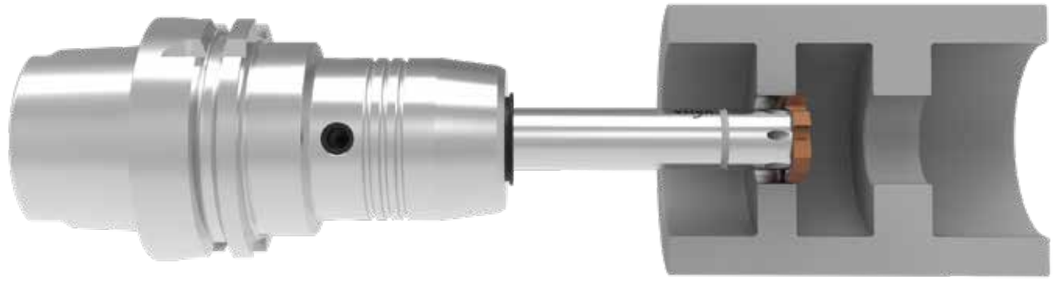
En función de la máquina y de la herramienta siguiente, pueden realizarse agujeros piloto del siguiente modo:
- Con una herramienta de escariado corta
- Tornear previamente en un torno
- Fresado o taladrado con precisión

Con una herramienta de escariado corta:
Con esta variante se utiliza una herramienta de escariado lo más corta posible para el agujero piloto. Con ello se obtiene un agujero piloto estable y con exactitud de repetición que puede utilizarse tanto en el torno como en centros de mecanizado. El filo de escariado para la herramienta piloto debe tener el mismo diámetro y tolerancia que la herramienta de acabado siguiente.

Piloting is recommended in the following situations:
- Diameter / length ratio > 8xD
- To hold narrow position and concentricity tolerances
- Avoidance of entry vibrations with a long tool.
- Use of a long guide pad tool (positioning accuracy)
- For inclined or interrupted bore entry

Depending on the machine and the following tool, pilot holes can be made as follows:
- With a short reamer
- Pre-turning on a lathe
- Milling or boring

With a short reamer:
For this variant, use the shortest possible reamer for the pilot bore. This method provides a very stable and repeatable pilot bore. Mainly used on machining centres. The reaming insert for the pilot tool should have the same diameter and tolerance as the following finishing tool.



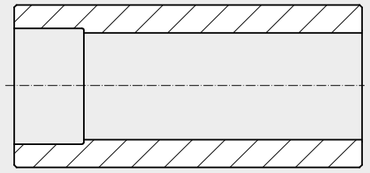
En caso de mecanizados de puntos de apoyo (ver figura 1), siempre guiar únicamente el primer punto de apoyo.

If machining spool or liner-bores (see figure), piloting only the first journal.

Guiado
Piloting

Procedimiento sobre torno:
El agujero piloto puede ser pretorneado en un torno. Este puede tener forma cónica o cilíndrica.

Procedure on a lathe:
The pilot bore can be pre-turned on a lathe. This can have a cylindrical or conical shape.



Tamaño de acabado Finish size	Tamaño pre-calibre Pre-bore size
+ 0,00 mm / - 0,03 mm	+ 0,10 mm / - 0,00 mm

Procedimiento en un centro de mecanizado:
El agujero piloto puede realizarse en un centro de mecanizado con diversos métodos:
- Insertar una herramienta de escariado corta (ver descripción en pág. 57
- Taladrado con precisión
- Fresado circular

Es imprescindible realizar un control regular del diámetro piloto.

Procedure on a Machining centre:
The pilot bore can be made on a machining centre using various methods:
- Short reaming tool (see page 57 for description)
- Boring tool
- Circular milling

A regular check of the pilot diameter is essential.

Acabado
Finish Machining

Procedimiento tras el guiado:
1. Al entrar en el agujero piloto con la herramienta de acabado, la velocidad debe reducirse (n = 50-500 min^{-1}) hasta que se utilice el filo de escariado completo o también partes de los listones guía. Por regla general, se aplica: «Entrada fz» = «Mecanizado fz».

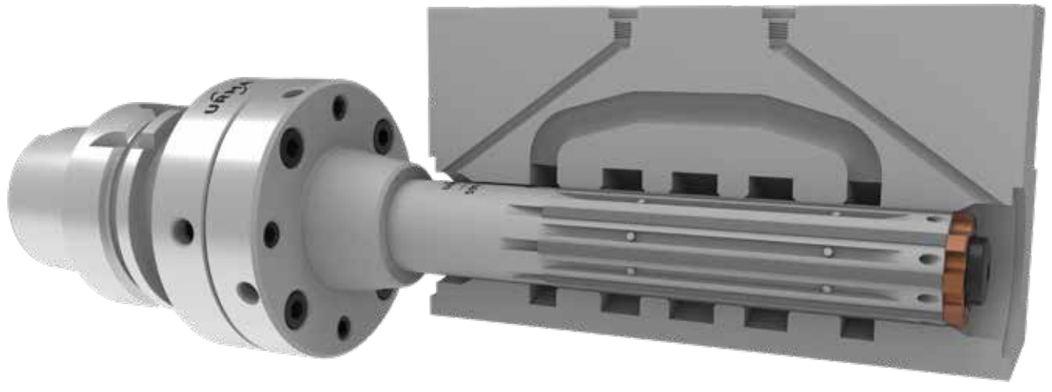
2. Aumente las rpm hasta la velocidad de mecanizado seleccionada y, si fuera posible, realice el acabado del agujero al completo sin interrumpir el movimiento de avance.

3. El retroceso de la herramienta se realiza normalmente a una velocidad reducida en 50 – 80% (n) y a aprox. 3 – 5 veces del avance de mecanizado (vf mm/min).

Procedure after piloting:
1. When entering into the pilot bore with the finishing tool, the speed must be reduced (n = 50-500 rpm) until the reaming insert is completely or also parts of the guide pads are engaged. As a rule: “fz entering” = “fz machining”.

2. Increase rpm to the selected machining speed and if possible, finish the whole bore without interrupting the feed movement.

3. Tool retraction usually takes place at 50 – 80% reduced speed (n) and approx. 3 – 5 times the machining feed rate (vf mm/min).



Con el fin de no dañar las regletas de guía, ¡debe garantizarse el suministro de refrigerante interno en todo momento!

In order to not damage the guide pads, the internal coolant supply must be guaranteed all the times!

URMA Reaming

RM vario

Ejemplo de pedido
Order Example

	Diámetro del agujero : Tolerancias ISO Bore Diameter: ISO Bore Tolerances	**Diámetro del agujero : Gama de tolerancia en µm** Bore Diameter: Bore Tolerance in µm	
Example	**Ejemplo de pedido** Order Example F25N-12.2H7-A W112R	**Ejemplo de pedido** Order Example F25N-12.2+20-10-A W112R	Example

F

Mango cilíndrico
A = solido, sin IKZ
B = solido, con IKZ para agujeros pasantes
C = solido, con IKZ para agujeros ciegos
D = expansible, sin IKZ
F = expansible, con IKZ para agujeros pasantes
G = expansible, con IKZ para agujeros ciegos
S = herramienta especial (apropiada para diseñarla)
Cylindrical shank
A = solid, without internal coolant supply
B = solid, with internal coolant supply for through bores
C = solid, with internal coolant supply for blind holes
D = expandable, without internal coolant supply
F = expandable, with internal coolant supply for through bores
G = expandable, with internal coolant supply for blind holes
S = special tool (bound to drawing)

2

2 = versión corta
4 = versión larga
2 = short version
4 = long version

5N

5N = corte recto
7N = corte diagonal de izquierdas
5N = flute form straight
7N = flute form left-hand helix

Diameter

12.2 **Diámetro en mm**
Diameter (mm)

H7 **Tolerancia ISO standard**
Tolerance in ISO standard

+20-10 **Tolerancia del agujero (µm)**
Bore tolerance (µm)

Diameter

A

Angulo de chaflán
A = 45° [1] B = 25° [2] C = 45/8° D = 30/4°
E = corte rizado 20°[3] F = corte al frente G = 0,5 x 45°
H = 30° I = 60° K = 75° L = corte rizado 30° [3]
Chamfer Angle
A = 45° [1] B = 25° [2] C = 45/8° D = 30/4°
E = Curling cut 20° [3] F = Face cutting G = 0,5 x 45°
H = 30° I = 60° K = 75° L = Curling cut 30° [3]

W1

Material de corte
Detalles, ver página 63
Cutting material
Details see page 63

12R

Recubrimiento
Detalles, ver página 63
Coating
Details see page 63

[1] **Estandar para cortes rectos**
[1] Standard for straight flute form

[2] **Estandar para herramientas con corte diagonal de izquierdas**
[2] Standard for tools with left-hand flute form

[3] **Solo para cortes rectos**
[3] Only for straight flute form

MATERIAL DETAILS PAGE 88

Descripción de los materiales de corte
Cutting Materials overview

			Materiales de corte Cutting Materials							**Recubrimiento** Coating						
ISO Material Code	URMA Material Code	**URMA Code**	W1	T1	B1	B2	D1		01P	05P	07R	08P	12R	14R	10C
			– –	– –	– –	– –	– –		– –	– –	– –	– –	– –	– –	– –
			HM/ Carbide	Cermet	CBN	CBN	PKD/PCD	Uncoatet	TiN	AlTiN	TiAlN + AlCrN	AlCrN	AlCrN	AlCrN	DLC
P	P1		■	▲				▲	□	□			■	■	
	P2		■	▲				▲	□	□			■	■	
	P3		■	▲				▲	□	□			■	■	
	P4		■	▲				▲	□	□			■	■	
	P5		■	▲				▲	□	□			■	■	
	P6		▲					□	□	□			▲	■	
	P7		▲					□	□	□			▲	■	
M	M1		▲	□				□	□				▲	■	
	M2		▲	□				□	□				▲	■	
	M3		▲					□	□				▲	■	
	M4		▲					□	□				▲	■	
	M5		▲					□	□				▲	■	
	M6		▲					□	□				▲	■	
K	K1		▲		□			□	□	□		□	■	▲	
	K2		▲		□			□	□	□		□	■	▲	
	K3		▲	□	□			□	□	□		□	■	▲	
	K4		▲	□	□			□	□	□		□	■	▲	
	K5		▲					□	□	□	□	□	■	▲	
	K6		▲					□	□	□	□	□	■	▲	
	K7		▲					□	□	□	□	□	▲	□	
	K8		▲					□	□	□	□	□	▲	□	
N	N1		▲				□	□							▲
	N2		▲				□	□							▲
	N3		▲				□	□							▲
	N4		□				▲	▲							□
	N5		▲	□			□	□							▲
	N6		▲				□	□							▲
S	S1		▲					□	□				▲	■	
	S2		▲					□	□				▲	■	
	S3		▲					□	□				▲	■	
	S4		▲					□	□				▲	■	
	S11		▲					□	□				▲	■	
	S12		▲					□	□				▲	■	
	S13		▲					□	□				▲	■	
	S14		▲					□	□				▲	■	
H	H1		▲			□		□	□		▲		■	■	
	H2		■			▲		▲	□		■		□	□	
	H3		■			▲		▲	□		■		□	□	
SM	SM1		■	▲				▲	□				■	■	
	SM2		▲	□				□	□				▲	■	
	SM3		▲					□	□				▲	■	
O	O1		▲	□				□							▲
	O2		▲	□				□							▲
	O3		□				▲	▲							
	O4		□				▲	▲							

Material Workpiece Material

▲ = **Recomendado** ▲ = Recommended
■ = **Aplicable** ■ = Applicable
□ = **Posible** □ = Possible
○ = **Bajo demanda** ○ = On request

MATERIAL DETAILS PAGE 88

Datos de corte RM vario

Cutting Data RM vario

Agujero pasante

Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
P	P1	1	L	B	T1	120-**150**-180	0.10-**0.18**-0.30	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	T1	100-**130**-160	0.10-**0.15**-0.25			
		3	L	B	W112R	60-**80**-100	0.10-**0.15**-0.25			
	P2	1	L	B	T1	120-**150**-180	0.10-**0.18**-0.30	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	T1	100-**130**-160	0.10-**0.15**-0.25			
		3	L	B	W112R	60-**80**-100	0.10-**0.15**-0.25			
	P3	1	L	B	T1	100-**130**-160	0.10-**0.18**-0.30	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	T1	90-**120**-140	0.10-**0.15**-0.25			
		3	L	B	W112R	50-**70**-90	0.10-**0.15**-0.25			
	P4	1	L	B	T1	80-**110**-130	0.10-**0.16**-0.25	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	W112R	80-**100**-120	0.10-**0.14**-0.20			
		3	L	B	W112R	40-**60**-80	0.10-**0.14**-0.20			
	P5	1	L	B	T1	80-**110**-130	0.10-**0.16**-0.25	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	W112R	80-**100**-120	0.10-**0.14**-0.20			
		3	L	B	W112R	40-**60**-80	0.10-**0.14**-0.20			
	P6	1	L	B	W112R	50-**70**-100	0.08-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	A	W112R	40-**70**-90	0.08-**0.10**-0.14			
		3	L	A	W112R	20-**35**-50	0.08-**0.10**-0.14			
	P7	1	L	A	W112R	15-**25**-40	0.04-**0.06**-0.08	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	A	W112R	15-**20**-30	0.04-**0.06**-0.08			
		3	L	A	W112R	10-**15**-20	0.04-**0.06**-0.08			
M	M1	1	L	B	W112R	30-**45**-60	0.08-**0.12**-0.18	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	L	B	W112R	15-**25**-35	0.08-**0.12**-0.15			
	M2	1	L	B	W112R	30-**45**-60	0.08-**0.12**-0.18	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	L	B	W112R	15-**25**-35	0.08-**0.12**-0.15			
	M3	1	L	B	W112R	30-**45**-60	0.08-**0.12**-0.16	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	B	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	L	B	W112R	15-**25**-35	0.08-**0.12**-0.15			
	M4	1	L	A	W112R	20-**35**-55	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	A	W112R	20-**35**-55	0.05-**0.08**-0.12			
		3	L	A	W112R	10-**15**-25	0.05-**0.08**-0.12			
	M5	1	L	A	W112R	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	A	W112R	15-**25**-35	0.05-**0.08**-0.12			
		3	L	A	W112R	7-**12**-15	0.05-**0.08**-0.12			
	M6	1	L	A	W112R	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	L	A	W112R	15-**20**-30	0.05-**0.08**-0.12			
		3	L	A	W112R	5-**10**-12	0.05-**0.08**-0.12			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones de mecanizado como 1 y 2
- No obstante, sin suministro de la refrigeración interior

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Machining conditions as 1 & 2
- But without internal coolant

Agujero pasante con interrupción

Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
4	L	A	T1	120-**150**-180	0.10-**0.18**-0.30	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	100-**130**-160	0.10-**0.15**-0.25				
6	L	A	W112R	60-**80**-100	0.10-**0.15**-0.25				
4	L	A	T1	120-**150**-180	0.10-**0.18**-0.30		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	100-**130**-160	0.10-**0.15**-0.25				
6	L	A	W112R	60-**80**-100	0.10-**0.15**-0.25				
4	L	A	T1	100-**130**-160	0.10-**0.18**-0.30		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	90-**120**-140	0.10-**0.15**-0.25				
6	L	A	W112R	50-**70**-90	0.10-**0.15**-0.25				
4	L	A	W112R	80-**110**-130	0.10-**0.16**-0.25		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	80-**100**-120	0.10-**0.14**-0.20				
6	L	A	W112R	40-**60**-80	0.10-**0.14**-0.20				
4	L	A	W112R	80-**110**-130	0.10-**0.16**-0.25		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	80-**100**-120	0.10-**0.14**-0.20				
6	L	A	W112R	40-**60**-80	0.10-**0.14**-0.20				
4	L	A	W112R	50-**70**-100	0.08-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	40-**70**-90	0.08-**0.10**-0.14				
6	L	A	W112R	20-**35**-50	0.08-**0.10**-0.14				
4	L	A	W112R	15-**25**-40	0.04-**0.06**-0.08		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	15-**20**-30	0.04-**0.06**-0.08				
6	L	A	W112R	10-**15**-20	0.04-**0.06**-0.08				
4	L	A	W112R	30-**45**-60	0.08-**0.12**-0.15	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	L	A	W112R	30-**45**-60	0.08-**0.12**-0.15		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	L	A	W112R	30-**45**-60	0.08-**0.12**-0.15		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	L	A	W112R	20-**35**-55	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	20-**35**-55	0.05-**0.08**-0.12				
6	G	A	W112R	10-**15**-25	0.05-**0.08**-0.12				
4	L	A	W112R	15-**25**-35	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	15-**25**-35	0.05-**0.08**-0.12				
6	G	A	W112R	7-**12**-15	0.05-**0.08**-0.12				
4	L	A	W112R	15-**20**-30	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	L	A	W112R	15-**20**-30	0.05-**0.08**-0.12				
6	G	A	W112R	5-**10**-12	0.05-**0.08**-0.12				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (<10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones de mecanizado como 4 y 5
- No obstante, sin suministro de la refrigeración interior
- Interrupciones medias simétricas (< 30 %)

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Machining conditions as 4 & 5
- But without internal coolant
- Medium symmetrical interruptions (< 30%)

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Datos de corte RM vario

Cutting Data RM vario

Agujero ciego

Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
P	P1	1	G	A	T1	120-**150**-180	0.10-**0.14**-0.20	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	T1	100-**130**-160	0.10-**0.14**-0.20			
		3	G	A	W112R	60-**80**-100	0.10-**0.12**-0.18			
	P2	1	G	A	T1	120-**150**-180	0.10-**0.14**-0.20	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	T1	100-**130**-160	0.10-**0.14**-0.20			
		3	G	A	W112R	60-**80**-100	0.10-**0.12**-0.18			
	P3	1	G	A	T1	100-**130**-160	0.10-**0.14**-0.20	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	90-**120**-140	0.10-**0.14**-0.20			
		3	G	A	W112R	50-**70**-90	0.10-**0.12**-0.18			
	P4	1	G	A	T1	80-**110**-130	0.10-**0.14**-0.20	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	80-**100**-120	0.10-**0.14**-0.20			
		3	G	A	W112R	40-**60**-80	0.10-**0.12**-0.18			
	P5	1	G	A	W112R	80-**110**-130	0.10-**0.14**-0.20	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	80-**100**-120	0.10-**0.12**-0.18			
		3	G	A	W112R	40-**60**-80	0.10-**0.12**-0.18			
	P6	1	G	A	W112R	50-**70**-100	0.08-**0.12**-0.16	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	40-**70**-90	0.06-**0.08**-0.12			
		3	G	A	W112R	20-**35**-50	0.06-**0.08**-0.12			
	P7	1	G	A	W112R	15-**25**-40	0.06-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	15-**20**-30	0.04-**0.06**-0.10			
		3	G	A	W112R	10-**15**-20	0.04-**0.06**-0.10			
M	M1	1	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15			
	M2	1	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15			
	M3	1	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15			
	M4	1	G	A	W112R	20-**35**-55	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	20-**35**-55	0.05-**0.08**-0.12			
		3	G	A	W112R	10-**15**-25	0.05-**0.08**-0.12			
	M5	1	G	A	W112R	15-**25**-35	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	15-**25**-35	0.05-**0.08**-0.12			
		3	G	A	W112R	7-**12**-15	0.05-**0.08**-0.12			
	M6	1	G	A	W112R	15-**20**-30	0.05-**0.08**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
		2	G	A	W112R	15-**20**-30	0.05-**0.08**-0.12			
		3	G	A	W112R	5-**10**-12	0.05-**0.08**-0.12			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones de mecanizado como 1 y 2
- No obstante, sin suministro de la refrigeración interior

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Machining conditions as 1 & 2
- But without internal coolant

Agujero ciego con interrupción

Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
4	G	A	T1	120-**150**-180	0.10-**0.14**-0.20	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	100-**130**-160	0.10-**0.14**-0.20				
6	G	A	W112R	60-**80**-100	0.10-**0.12**-0.18				
4	G	A	T1	120-**150**-180	0.10-**0.14**-0.20		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	100-**130**-160	0.10-**0.14**-0.20				
6	G	A	W112R	60-**80**-100	0.10-**0.12**-0.18				
4	G	A	T1	100-**130**-160	0.10-**0.14**-0.20		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	90-**120**-140	0.10-**0.14**-0.20				
6	G	A	W112R	50-**70**-90	0.10-**0.12**-0.18				
4	G	A	W112R	80-**110**-130	0.10-**0.14**-0.20		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	80-**100**-120	0.10-**0.14**-0.20				
6	G	A	W112R	40-**60**-80	0.10-**0.12**-0.18				
4	G	A	W112R	80-**110**-130	0.10-**0.14**-0.20		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	80-**100**-120	0.10-**0.12**-0.18				
6	G	A	W112R	40-**60**-80	0.10-**0.12**-0.18				
4	G	A	W112R	50-**70**-100	0.08-**0.12**-0.16		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	40-**70**-90	0.06-**0.08**-0.12				
6	G	A	W112R	20-**35**-50	0.06-**0.08**-0.12				
4	G	A	W112R	15-**25**-40	0.06-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	15-**20**-30	0.04-**0.06**-0.10				
6	G	A	W112R	10-**15**-20	0.04-**0.06**-0.10				
4	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	G	A	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	G	A	W112R	20-**35**-55	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	20-**35**-55	0.05-**0.08**-0.12				
6	G	A	W112R	10-**15**-25	0.05-**0.08**-0.12				
4	G	A	W112R	15-**25**-35	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	15-**25**-35	0.05-**0.08**-0.12				
6	G	A	W112R	7-**12**-15	0.05-**0.08**-0.12				
4	G	A	W112R	15-**20**-30	0.05-**0.08**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.15
5	G	A	W112R	15-**20**-30	0.05-**0.08**-0.12				
6	G	A	W112R	5-**10**-12	0.05-**0.08**-0.12				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (<10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones de mecanizado como 4 y 5
- No obstante, sin suministro de la refrigeración interior
- Interrupciones medias simétricas (< 30 %)

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Machining conditions as 4 & 5
- But without internal coolant
- Medium symmetrical interruptions (< 30%)

Datos de corte RM vario

Cutting Data RM vario

Agujero pasante

Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
K	K1	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18			
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K2	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18			
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K3	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18			
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K4	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18			
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K5	1	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15			
		2	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15			
	K6	1	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15			
		2	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15			
	K7	1	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12			
		2	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12			
	K8	1	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12			
		2	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12			
N	N1	1	L	B	W110C	100-**180**-250	0.12-**0.18**-0.25			
		2	L	B	W110C	80-**150**-220	0.12-**0.18**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	L	B	W110C	50-**90**-120	0.12-**0.18**-0.25			
	N2	1	L	B	W110C	100-**180**-250	0.12-**0.18**-0.25			
		2	L	B	W110C	80-**150**-220	0.12-**0.18**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	L	B	W110C	50-**90**-120	0.12-**0.18**-0.25			
	N3	1	L	B	W110C	100-**180**-250	0.12-**0.18**-0.25			
		2	L	B	W110C	80-**150**-220	0.12-**0.18**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	L	B	W110C	50-**90**-120	0.12-**0.18**-0.25			
	N4	1	L	B	D1	150-**250**-350	0.10-**0.15**-0.20			
		2	L	B	D1	150-**250**-350	0.10-**0.15**-0.20	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	L	B	D1	100-**220**-300	0.10-**0.15**-0.20			
	N5	1	L	B	W110C	100-**130**-160	0.12-**0.18**-0.25			
		2	L	B	W110C	80-**110**-140	0.12-**0.18**-0.25	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	L	B	W110C	50-**70**-80	0.12-**0.18**-0.25			
	N6	1	L	B	W110C	50-**70**-100	0.10-**0.15**-0.20			
		2	L	B	W110C	40-**60**-80	0.10-**0.15**-0.20	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		3	L	B	W110C	25-**35**-50	0.10-**0.15**-0.20			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones de mecanizado como 1 y 2
- No obstante, sin suministro de la refrigeración interior

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Machining conditions as 1 & 2
- But without internal coolant

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Agujero pasante con interrupción

Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%			
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18				
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18				
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18				
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15				
5	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15				
4	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15				
5	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15				
4	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12				
5	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12				
4	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12				
5	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12				
4	L	B	W110C	100-**180**-250	0.12-**0.18**-0.25	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%			
5	L	B	W110C	80-**150**-220	0.12-**0.18**-0.25		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	L	B	W110C	50-**90**-120	0.12-**0.18**-0.25				
4	L	B	W110C	100-**180**-250	0.12-**0.18**-0.25				
5	L	B	W110C	80-**150**-220	0.12-**0.18**-0.25		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	L	B	W110C	50-**90**-120	0.12-**0.18**-0.25				
4	L	B	W110C	100-**180**-250	0.12-**0.18**-0.25				
5	L	B	W110C	80-**150**-220	0.12-**0.18**-0.25		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	L	B	W110C	50-**90**-120	0.12-**0.18**-0.25				
4	L	B	D1	150-**250**-350	0.10-**0.15**-0.20				
5	L	B	D1	150-**250**-350	0.10-**0.15**-0.20		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	L	B	D1	100-**220**-300	0.10-**0.15**-0.20				
4	L	B	W110C	100-**130**-160	0.12-**0.18**-0.25				
5	L	B	W110C	80-**110**-140	0.12-**0.18**-0.25		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	L	B	W110C	50-**70**-80	0.12-**0.18**-0.25				
4	L	B	W110C	50-**70**-100	0.10-**0.15**-0.20				
5	L	B	W110C	40-**60**-80	0.10-**0.15**-0.20		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
6	L	B	W110C	25-**35**-50	0.10-**0.15**-0.20				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (<10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones de mecanizado como 4 y 5
- No obstante, sin suministro de la refrigeración interior
- Interrupciones medias simétricas (< 30 %)

AC Application Conditions

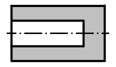
4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Machining conditions as 4 & 5
- But without internal coolant
- Medium symmetrical interruptions (< 30%)

Datos de corte RM vario

Cutting Data RM vario



Agujero ciego

Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
K	K1	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18			
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K2	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18			
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K3	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18			
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K4	1	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18			
		3	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18			
	K5	1	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15			
		3	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15			
	K6	1	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15			
		3	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15			
	K7	1	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12			
		3	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12			
	K8	1	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12			
		3	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12			
N	N1	1	G	A	W110C	100-**180**-250	0.10-**0.15**-0.22	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W110C	80-**150**-220	0.10-**0.15**-0.22			
		3	G	A	W110C	50-**90**-120	0.10-**0.15**-0.22			
	N2	1	G	A	W110C	100-**180**-250	0.10-**0.15**-0.22	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W110C	80-**150**-220	0.10-**0.15**-0.22			
		3	G	A	W110C	50-**90**-120	0.10-**0.15**-0.22			
	N3	1	G	A	W110C	100-**180**-250	0.10-**0.15**-0.22	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W110C	80-**150**-220	0.10-**0.15**-0.22			
		3	G	A	W110C	50-**90**-120	0.10-**0.15**-0.22			
	N4	1	G	A	D1	150-**250**-350	0.08-**0.12**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	D1	150-**250**-350	0.08-**0.12**-0.18			
		3	G	A	D1	100-**220**-300	0.08-**0.12**-0.18			
	N5	1	G	A	W110C	100-**130**-160	0.10-**0.15**-0.22	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W110C	80-**110**-140	0.10-**0.15**-0.22			
		3	G	A	W110C	50-**70**-80	0.10-**0.15**-0.22			
	N6	1	G	A	W110C	50-**70**-100	0.08-**0.12**-0.18	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
		2	G	A	W110C	40-**60**-80	0.08-**0.12**-0.18			
		3	G	A	W110C	25-**35**-50	0.08-**0.12**-0.18			

AC Condiciones de mecanizado

1 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Suministro de la refrigeración interior > 20 bar

2 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Suministro de la refrigeración interior disponible

3 Condiciones de mecanizado como 1 y 2
- No obstante, sin suministro de la refrigeración interior

AC Application Conditions

1 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Internal coolant supply > 20 bar

2 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Internal coolant supply available

3 Machining conditions as 1 & 2
- But without internal coolant

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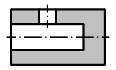

Agujero ciego con interrupción

Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18				
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18				
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18				
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	80-**140**-220	0.10-**0.14**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W114R	80-**120**-200	0.10-**0.14**-0.18				
6	G	A	W114R	40-**70**-100	0.10-**0.14**-0.18				
4	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15				
6	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15				
4	G	A	W114R	60-**80**-100	0.10-**0.12**-0.15		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W114R	50-**60**-80	0.10-**0.12**-0.15				
6	G	A	W114R	30-**40**-50	0.10-**0.12**-0.15				
4	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12				
6	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12				
4	G	A	W112R	40-**60**-80	0.08-**0.10**-0.12		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W112R	30-**50**-70	0.08-**0.10**-0.12				
6	G	A	W112R	20-**30**-40	0.08-**0.10**-0.12				
4	G	A	W110C	100-**180**-250	0.10-**0.15**-0.22	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W110C	80-**150**-220	0.10-**0.15**-0.22				
6	G	A	W110C	50-**90**-120	0.10-**0.15**-0.22				
4	G	A	W110C	100-**180**-250	0.10-**0.15**-0.22		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W110C	80-**150**-220	0.10-**0.15**-0.22				
6	G	A	W110C	50-**90**-120	0.10-**0.15**-0.22				
4	G	A	W110C	100-**180**-250	0.10-**0.15**-0.22		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W110C	80-**150**-220	0.10-0.15-0.22				
6	G	A	W110C	50-**90**-120	0.10-**0.15**-0.22				
4	G	A	D1	150-**250**-350	0.08-**0.12**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	D1	150-**250**-350	0.08-**0.12**-0.18				
6	G	A	D1	100-**220**-300	0.08-**0.12**-0.18				
4	G	A	W110C	100-**130**-160	0.10-**0.15**-0.22		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W110C	80-**110**-140	0.10-**0.15**-0.22				
6	G	A	W110C	50-**70**-80	0.10-**0.15**-0.22				
4	G	A	W110C	50-**70**-100	0.08-**0.12**-0.18		0.05-**0.10**-0.12	0.05-**0.10**-0.15	0.05-**0.10**-0.15
5	G	A	W110C	40-**60**-80	0.08-**0.12**-0.18				
6	G	A	W110C	25-**35**-50	0.08-**0.12**-0.18				

AC Condiciones de mecanizado

4 Condiciones previas óptimas
- Fijación, máquina y/o pieza estable
- Longitud de proyección de la herramienta < 3xD
- Eliminación de virutas garantizada sin impedimentos
- Interrupción ligeramente simétrica y asimétrica (<10 %)
- Suministro de la refrigeración interior > 20 bar

5 Condiciones previas insuficientes
- Fijación, máquina y/o pieza ligeramente inestable
- Longitud de proyección de la herramienta < 6xD
- No se garantiza eliminación de virutas óptima
- Interrupciones medias simétricas (< 30 %)
- Suministro de la refrigeración interior disponible

6 Condiciones de mecanizado como 4 y 5
- No obstante, sin suministro de la refrigeración interior
- Interrupciones medias simétricas (< 30 %)

AC Application Conditions

4 Optimal conditions
- Stable fixture, machine and/or workpiece
- Tool projection length < 3xD
- Optimal chip removal guaranteed
- Slightly symmetrical and asymmetrical interruption (< 10%)
- Internal coolant supply > 20 bar

5 Suboptimal conditions
- Slightly unstable fixture, machine and/or workpiece
- Tool projection length < 6xD
- No optimal chip removal guaranteed
- Medium symmetrical interruptions (< 30%)
- Internal coolant supply available

6 Machining conditions as 4 & 5
- But without internal coolant
- Medium symmetrical interruptions (< 30%)

MATERIAL DETAILS PAGE 90/91

Datos de corte RM vario

Cutting Data RM vario

Agujero pasante
Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
S	S1	1	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14			
		3	L	A	W112R	10-**15**-20	0.06-**0.10**-0.14			
	S2	1	L	A	W112R	20-**30**-45	0.06-**0.10**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	L	A	W112R	20-**30**-45	0.05-**0.08**-0.12			
		3	L	A	W112R	10-**15**-20	0.05-**0.08**-0.12			
	S3	1	L	A	W112R	15-**20**-35	0.06-**0.10**-0.12	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	L	A	W112R	10-**18**-30	0.05-**0.08**-0.10			
		3	L	A	W112R	6-**10**-15	0.05-**0.08**-0.10			
	S4	1	L	A	W112R	12-**18**-25	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	L	A	W112R	8-**15**-20	0.05-**0.08**-0.10			
		3	L	A	W112R	5-**10**-12	0.05-**0.08**-0.10			
	S11	1	L	A	W112R	20-**40**-60	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14			
		3	L	A	W112R	10-**20**-30	0.06-**0.10**-0.14			
	S12	1	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	L	A	W112R	20-**30**-45	0.06-**0.10**-0.14			
		3	L	A	W112R	10-**15**-20	0.06-**0.10**-0.14			
	S13	1	L	A	W112R	20-**30**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	L	A	W112R	15-**25**-30	0.05-**0.08**-0.10			
		3	L	A	W112R	10-**15**-20	0.05-**0.08**-0.10			
	S14	1	L	A	W112R	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	L	A	W112R	10-**18**-25	0.05-**0.08**-0.10			
		3	L	A	W112R	06-**10**-12	0.05-**0.08**-0.10			
H	H1	1	L	A	W107R	15-**25**-30	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	L	A	W107R	10-**18**-25	0.04-**0.06**-0.08			
		3	L	A	W107R	5-**10**-15	0.04-**0.06**-0.08			
	H2	1	L	A	W107R	10-**18**-25	0.04-**0.06**-0.08	**0.05**-0.08	**0.05**-0.08	**0.05**-0.08
		2	L	A	W107R	8-**15**-20	0.04-**0.06**-0.08			
		3	L	A	W107R	4-**8**-12	0.04-**0.06**-0.08			
	H3	1	L	A	W107R	8-**10**-15	0.03-**0.05**-0.07	0.04-**0.05**-0.06	**0.05**-0.08	**0.05**-0.08
		2	L	A	W107R	8-**10**-15	0.03-**0.05**-0.07			
		3	L	A	W107R	3-**5**-8	0.03-**0.05**-0.07			
SM	SM1	1	L	B	T1	120-**160**-200	0.18-**0.25**-0.35	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	L	B	T1	110-**140**-170	0.18-**0.22**-0.30			
		3	L	B	T1	60-**80**-100	0.12-**0.16**-0.20			
	SM2	1	L	B	W112R	110-**130**-160	0.16-**0.20**-0.25	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	L	B	W112R	100-**110**-140	0.12-**0.15**-0.20			
		3	L	B	W112R	50-**60**-80	0.12-**0.15**-0.20			
	SM3	1	L	B	W112R	30-**45**-60	0.08-**0.12**-0.16	0.08-**0.10**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	L	B	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	L	B	W112R	15-**25**-35	0.08-**0.12**-0.15			
O	O1	1	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20			
		3	L	A	W110C	40-**60**-80	0.10-**0.13**-0.16			
	O2	1	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20			
		3	L	A	W110C	40-**60**-80	0.10-**0.13**-0.16			
	O3	1	L	A	W110C	40-**50**-60	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	L	A	W110C	40-**50**-60	0.10-**0.15**-0.20			
		3	L	A	W110C	40-**50**-60	0.10-**0.13**-0.16			
	O4	1	L	A	W110C	30-**50**-60	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	L	A	W110C	30-**50**-60	0.05-**0.08**-0.10			
		3	L	A	W110C	30-**50**-60	0.05-**0.08**-0.10			

Agujero pasante con interrupción
Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
4	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14				
6	L	A	W112R	10-**15**-20	0.06-**0.10**-0.14				
4	L	A	W112R	20-**30**-45	0.06-**0.10**-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	L	A	W112R	20-**30**-45	0.05-**0.08**-0.12				
6	L	A	W112R	10-**15**-20	0.05-**0.08**-0.12				
4	L	A	W112R	15-**20**-35	0.06-**0.10**-0.12		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	L	A	W112R	10-**18**-30	0.05-**0.08**-0.10				
6	L	A	W112R	6-**10**-15	0.05-**0.08**-0.10				
4	L	A	W112R	12-**18**-25	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	L	A	W112R	8-**15**-20	0.05-**0.08**-0.10				
6	L	A	W112R	5-**10**-12	0.05-**0.08**-0.10				
4	L	A	W112R	20-**40**-60	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14				
6	L	A	W112R	10-**20**-30	0.06-**0.10**-0.14				
4	L	A	W112R	20-**35**-45	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	L	A	W112R	20-**30**-45	0.06-**0.10**-0.14				
6	L	A	W112R	10-**15**-20	0.06-**0.10**-0.14				
4	L	A	W112R	20-**30**-45	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	L	A	W112R	15-**25**-30	0.05-**0.08**-0.10				
6	L	A	W112R	10-**15**-20	0.05-**0.08**-0.10				
4	L	A	W112R	15-**20**-30	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	L	A	W112R	10-**18**-25	0.05-**0.08**-0.10				
6	L	A	W112R	06-**10**-12	0.05-**0.08**-0.10				
4	L	A	W107R	15-**25**-30	0.04-**0.06**-0.08	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	L	A	W107R	10-**18**-25	0.04-**0.06**-0.08				
6	L	A	W107R	5-**10**-15	0.04-**0.06**-0.08				
4	L	A	W107R	10-**18**-25	0.04-**0.06**-0.08		**0.05**-0.08	**0.05**-0.08	**0.05**-0.08
5	L	A	W107R	8-**15**-20	0.04-**0.06**-0.08				
6	L	A	W107R	4-**8**-12	0.04-**0.06**-0.08				
4	L	A	W107R	8-**10**-15	0.03-**0.05**-0.07		0.04-**0.05**-0.06	**0.05**-0.08	**0.05**-0.08
5	L	A	W107R	8-**10**-15	0.03-**0.05**-0.07				
6	L	A	W107R	3-**5**-8	0.03-**0.05**-0.07				
4	L	B	T1	120-**160**-200	0.18-**0.25**-0.35	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	L	B	T1	110-**140**-170	0.18-**0.22**-0.30				
6	L	B	W112R	60-**80**-100	0.12-**0.16**-0.20				
4	L	B	W112R	110-**130**-160	0.16-**0.20**-0.25		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	L	B	W112R	100-**110**-140	0.12-**0.15**-0.20				
6	L	B	W112R	50-**60**-80	0.12-**0.15**-0.20				
4	L	B	W112R	30-**45**-60	0.08-**0.12**-0.16		0.08-**0.10**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	L	B	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	L	B	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20				
6	L	A	W110C	40-**60**-80	0.10-**0.13**-0.16				
4	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	L	A	W110C	40-**60**-80	0.10-**0.15**-0.20				
6	L	A	W110C	40-**60**-80	0.10-**0.13**-0.16				
4	L	A	W110C	40-**50**-60	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	L	A	W110C	40-**50**-60	0.10-**0.15**-0.20				
6	L	A	W110C	40-**50**-60	0.10-**0.13**-0.16				
4	L	A	W110C	30-**50**-60	0.05-**0.08**-0.10		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	L	A	W110C	30-**50**-60	0.05-**0.08**-0.10				
6	L	A	W110C	30-**50**-60	0.05-**0.08**-0.10				

Datos de corte RM vario

Cutting Data RM vario

Agujero ciego

Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
S	S1	1	G	A	W112R	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	G	A	W112R	20-**35**-45	0.06-**0.10**-0.14			
		3	G	A	W112R	10-**15**-20	0.06-**0.10**-0.14			
	S2	1	G	A	W112R	20-**30**-45	0.06-**0.10**-0.12	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	G	A	W112R	20-**30**-45	0.05-**0.08**-0.12			
		3	G	A	W112R	10-**15**-20	0.05-**0.08**-0.12			
	S3	1	G	A	W112R	15-**20**-35	0.06-**0.10**-0.12	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	G	A	W112R	10-**18**-30	0.05-**0.08**-0.10			
		3	G	A	W112R	6-**10**-15	0.05-**0.08**-0.10			
	S4	1	G	A	W112R	12-**18**-25	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	G	A	W112R	8-**15**-20	0.05-**0.08**-0.10			
		3	G	A	W112R	5-**10**-12	0.05-**0.08**-0.10			
	S11	1	G	A	W112R	20-**40**-60	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	G	A	W112R	20-**35**-45	0.06-**0.10**-0.14			
		3	G	A	W112R	10-**20**-30	0.06-**0.10**-0.14			
	S12	1	G	A	W112R	20-**35**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	G	A	W112R	20-**30**-45	0.06-**0.10**-0.14			
		3	G	A	W112R	10-**15**-20	0.06-**0.10**-0.14			
	S13	1	G	A	W112R	20-**30**-45	0.06-**0.10**-0.14	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
		2	G	A	W112R	15-**25**-30	0.05-**0.08**-0.10			
		3	G	A	W112R	10-**15**-20	0.05-**0.08**-0.10			
	S14	1	G	A	W112R	15-**20**-30	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	G	A	W112R	10-**18**-25	0.05-**0.08**-0.10			
		3	G	A	W112R	06-**10**-12	0.05-**0.08**-0.10			
H	H1	1	G	A	W107R	15-**25**-30	0.04-**0.06**-0.08	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
		2	G	A	W107R	10-**18**-25	0.04-**0.06**-0.08			
		3	G	A	W107R	5-**10**-15	0.04-**0.06**-0.08			
	H2	1	G	A	W107R	10-**18**-25	0.04-**0.06**-0.08	**0.05**-0.08	**0.05**-0.08	**0.05**-0.08
		2	G	A	W107R	8-**15**-20	0.04-**0.06**-0.08			
		3	G	A	W107R	4-**8**-12	0.04-**0.06**-0.08			
	H3	1	G	A	W107R	8-**10**-15	0.03-**0.05**-0.07	0.04-**0.05**-0.06	**0.05**-0.08	**0.05**-0.08
		2	G	A	W107R	8-**10**-15	0.03-**0.05**-0.07			
		3	G	A	W107R	3-**5**-8	0.03-**0.05**-0.07			
SM	SM1	1	G	A	T1	120-**160**-200	0.18-**0.25**-0.35	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	G	A	T1	110-**140**-170	0.18-**0.22**-0.30			
		3	G	I	T1	60-**80**-100	0.12-**0.16**-0.20			
	SM2	1	G	A	W112R	110-**130**-160	0.16-**0.20**-0.25	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	G	A	W112R	100-**110**-140	0.12-**0.15**-0.20			
		3	G	I	W112R	50-**60**-80	0.12-**0.15**-0.20			
	SM3	1	G	A	W112R	30-**45**-60	0.08-**0.12**-0.16	0.08-**0.10**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15			
		3	G	I	W112R	15-**25**-35	0.08-**0.12**-0.15			
O	O1	1	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20			
		3	G	A	W110C	40-**60**-80	0.10-**0.13**-0.16			
	O2	1	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20			
		3	G	A	W110C	40-**60**-80	0.10-**0.13**-0.16			
	O3	1	G	A	W110C	40-**50**-60	0.10-**0.15**-0.20	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	G	A	W110C	40-**50**-60	0.10-**0.15**-0.20			
		3	G	A	W110C	40-**50**-60	0.10-**0.13**-0.16			
	O4	1	G	A	W110C	30-**50**-60	0.05-**0.08**-0.10	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
		2	G	A	W110C	30-**50**-60	0.05-**0.08**-0.10			
		3	G	A	W110C	30-**50**-60	0.05-**0.08**-0.10			

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Agujero ciego con interrupción

Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal ap Ø 5.800-10.609 mm	ap Ø 10.610-18.609 mm	ap Ø 18.610-33.100 mm
4	G	A	W112R	20-**35**-45	0.06-0.10-0.14	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	G	A	W112R	20-**35**-45	0.06-0.10-0.14				
6	G	A	W112R	10-**15**-20	0.06-0.10-0.14				
4	G	A	W112R	20-**30**-45	0.06-0.10-0.12		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	G	A	W112R	20-**30**-45	0.05-0.08-0.12				
6	G	A	W112R	10-**15**-20	0.05-0.08-0.12				
4	G	A	W112R	15-**20**-35	0.06-0.10-0.12		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	G	A	W112R	10-**18**-30	0.05-0.08-0.10				
6	G	A	W112R	6-**10**-15	0.05-0.08-0.10				
4	G	A	W112R	12-**18**-25	0.05-0.08-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	G	A	W112R	8-**15**-20	0.05-0.08-0.10				
6	G	A	W112R	5-**10**-12	0.05-0.08-0.10				
4	G	A	W112R	20-**40**-60	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	G	A	W112R	20-**35**-45	0.06-**0.10**-0.14				
6	G	A	W112R	10-**20**-30	0.06-**0.10**-0.14				
4	G	A	W112R	20-**35**-45	0.06-**0.10**-0.14		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	G	A	W112R	20-**30**-45	0.06-**0.10**-0.14				
6	G	A	W112R	10-**15**-20	0.06-**0.10**-0.14				
4	G	A	W112R	15-**25**-30	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.10**-0.12	0.05-**0.10**-0.12
5	G	A	W112R	15-**25**-30	0.05-**0.08**-0.10				
6	G	A	W112R	10-**15**-20	0.05-**0.08**-0.10				
4	G	A	W112R	15-**20**-30	0.05-**0.08**-0.10		0.05-**0.08**-0.10	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	G	A	W112R	10-**18**-25	0.05-**0.08**-0.10				
6	G	A	W112R	06-**10**-12	0.05-**0.08**-0.10				
4	G	A	W107R	15-**25**-30	0.04-**0.06**-0.08	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	**0.05**-0.08	0.05-**0.08**-0.10	0.05-**0.08**-0.10
5	G	A	W107R	10-**18**-25	0.04-**0.06**-0.08				
6	G	I	W107R	5-**10**-15	0.04-**0.06**-0.08				
4	G	A	W107R	10-**18**-25	0.04-**0.06**-0.08		**0.05**-0.08	**0.05**-0.08	**0.05**-0.08
5	G	A	W107R	8-**15**-20	0.04-**0.06**-0.08				
6	G	I	W107R	4-**8**-12	0.04-**0.06**-0.08				
4	G	A	W107R	8-**10**-15	0.03-**0.05**-0.07		0.04-**0.05**-0.06	**0.05**-0.08	**0.05**-0.08
5	G	I	W107R	8-**10**-15	0.03-**0.05**-0.07				
6	G	I	W107R	3-**5**-8	0.03-**0.05**-0.07				
4	G	A	T1	120-**160**-200	0.18-**0.25**-0.35	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	G	A	T1	110-**140**-170	0.18-**0.22**-0.30				
6	G	I	W112R	60-**80**-100	0.12-**0.16**-0.20				
4	G	A	W112R	110-**130**-160	0.16-**0.20**-0.25		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	G	A	W112R	100-**110**-140	0.12-**0.15**-0.20				
6	G	I	W112R	50-**60**-80	0.12-**0.15**-0.20				
4	G	A	W112R	30-**45**-60	0.08-**0.12**-0.16		0.08-**0.10**-0.12	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	G	A	W112R	30-**45**-60	0.08-**0.12**-0.15				
6	G	I	W112R	15-**25**-35	0.08-**0.12**-0.15				
4	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20	**Reducir corte completo fz en 30 % - 50 %** reduce fz full cut 30 - 50%	0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20				
6	G	A	W110C	40-**60**-80	0.10-**0.13**-0.16				
4	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	G	A	W110C	40-**60**-80	0.10-**0.15**-0.20				
6	G	A	W110C	40-**60**-80	0.10-**0.13**-0.16				
4	G	A	W110C	40-**50**-60	0.10-**0.15**-0.20		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	G	A	W110C	40-**50**-60	0.10-**0.15**-0.20				
6	G	A	W110C	40-**50**-60	0.10-**0.13**-0.16				
4	G	A	W110C	30-**50**-60	0.05-**0.08**-0.10		0.08-**0.10**-0.15	0.08-**0.10**-0.15	0.08-**0.10**-0.20
5	G	A	W110C	30-**50**-60	0.05-**0.08**-0.10				
6	G	A	W110C	30-**50**-60	0.05-**0.08**-0.10				

Instrucciones de uso de herramientas de escariado ajustable «RM vario»

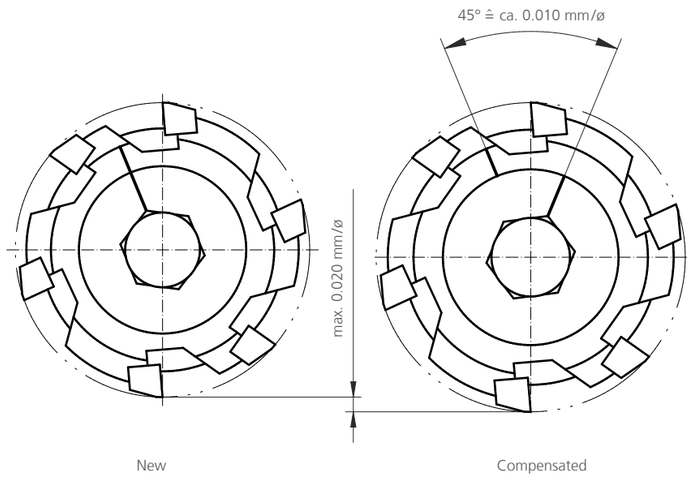
Handling Instructions for Adjustable Reaming Tools “RM vario”

Por qué ajustable?
- Reajuste del diámetro dentro del rango de tolerancia (en función del material que se va a mecanizar)
- Posible compensación del desgaste (siempre que la calidad de superficie siga siendo suficiente)

Tener en cuenta lo siguiente:
- Se puede avanzar máx. 0,020 mm en el diámetro (de lo contrario, el cabezal de escariado puede girarse en exceso)
- Avanzar con cuidado, ¡no corregir nunca posteriormente!
- Avance con la información de medida de ajuste (mm/°) según el dibujo.

Why adjustable?
- Readjustment of the diameter within the tolerance range (depending on the material to be machined)
- Possible compensation of wear (if the surface quality is still within the tolerance)

What has to be considered:
- Max. 0,020 mm in diameter may be added (otherwise the reaming head can be overstretched)
- Adjust carefully - never turn back!
- Infeed with adjustment dimension (mm/°) according to drawing



Instrucción del mandril de compensación

Instruction Compensation Chuck

Para conseguir un escariado óptimo, es fundamental utilizar una herramienta sin salto. Para compensar cualquier error de salto debido al portaherramientas o al husillo de la máquina, se recomienda un soporte de compensación o un mandril flotante. El salto de los escariadores RM vario puede medirse con varios métodos distintos:

Procedimiento:

1. Antes de ajustarlo, compruebe que todos los tornillos de ajuste n ① están totalmente sueltos.

2. Cambiar la herramienta en el husillo de la máquina.

3. Ajustar el indicador (con resolución de 1 µm / 0,0001 pulgadas) en el área de salto marcada en el mango.

4. Ajuste el salto directamente en el husillo de la máquina en un máximo de 5 µm / 0,0002 pulgadas (valor ideal < 3 µm / 0,0001 pulgadas) utilizando los cuatro tornillos de ajuste radiales n ①.

Los tornillos de ajuste no deben tensarse entre sí completamente tras el ajuste.

In order to achieve the best reaming results, a tool with zero run-out is absolutely essential. To compensate any run-out error of the tool holder and the machine spindle, we recommend using a compensation holder or floating chuck. The run-out of RM vario reamers can be measured with different methods:

Procedure:

1. Before adjusting, make sure that all adjustment screws ① are completely loosened.

2. Load the tool in the machine spindle.

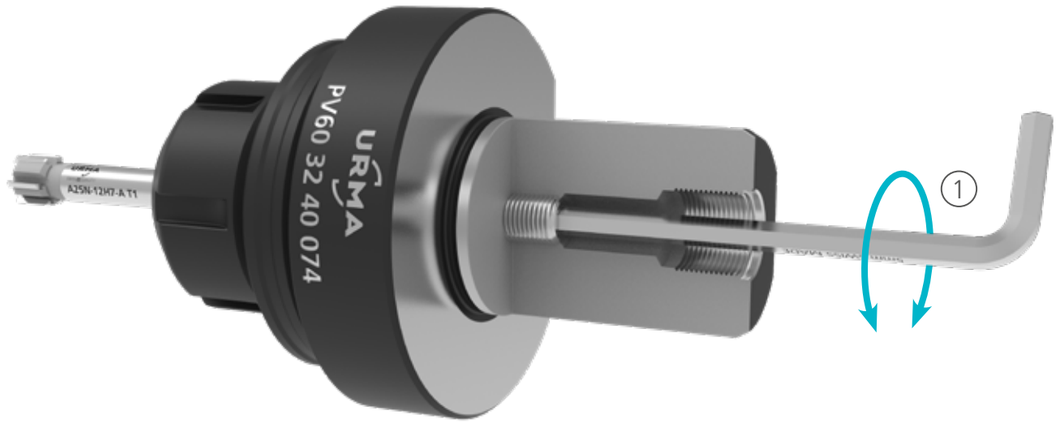
3. Set the indicator (with 1 µm / 0,0001 inch resolution) on the marked run-out area on the shank.

4. Set the run-out directly in the machine spindle to maximum 5 µm / 0,0002 inch (ideal < 3 µm / 0,0001 inch) by using the four radial adjustment screws ①.

The adjustment screws do not have to be fully clamped against each other after adjustment.

Instrucciones de mandril flotante

Instruction Floating Chuck



Los trabajos de escariado en tornos se realizan principalmente con mandril flotante (en casos excepcionales, también en centros de mecanizado).

Los errores de posición pueden compensarse mediante el mecanismo de péndulo ajustable. La desviación solo debe ser posible planoparalela (sin compensación de errores angular).

Se recomiendan ángulos de corte ≤ 45°

Procedimiento:

1. Ajustar el juego pendular mediante el tornillo de ajuste n ①.

Tornillo de ajuste	**Mecanismo de péndulo**	**Influencia sobre el mecanizado**
Giro en sentido horario	La fuerza elástica se fortalece / la resistencia a la desviación aumenta	La calidad de la superficie puede verse influida negativamente (marcas de retroceso)
Giro en sentido antihorario	La fuerza elástica se debilita / la resistencia a la desviación disminuye	Posible tendencia a las vibraciones

Reaming on lathes are mainly done with floating chucks (in exceptional cases also on machining centres).

Positioning errors can be compensated by the adjustable floating mechanism. The deflection should only take place in plane-parallel (No angular error compensation).

Cutting geometries with an angle of ≤ 45° are recommended.

Procedure:

1. Adjust the floating mechanism by using the adjustment screw ①.

Adjustment screw	**Floating mechanism**	**Influence on machining**
Clockwise rotation	Spring force increases / deflection resistance increases	The surface quality can be negatively influenced (retraction marks)
Counterclockwise rotation	Spring force becomes weaker / deflection resistance decreases	Potential vibration tendency

Ajuste:

Suave: La herramienta debe ajustarse con la mínima resistencia a la desviación posible. No obstante, teniendo en cuenta el peso de la herramienta, debe retornar elásticamente por sí misma al eje central.

Medio: El tornillo de ajuste se apretará completamente y se girará 1 ± ¼ de vuelta.

Duro: El tornillo de ajuste se apretará completamente y se girará ¼ - ½ de vuelta.

Adjustment:

Soft: The tool should be adjusted with the lowest possible deflection resistance. Nevertheless, taking into account the weight of the tool, it must jump back automatically into the central axis after deflection.

Medium: Fully tighten the adjusting screw and turn back by 1 ± ¼ rotation.

Hard: Fully tighten the adjusting screw and turn back by ¼ - ½ rotation.

Recomendación de posición inicial:

Recommendation for the basic setting:

Ø de herramienta Tool-Ø	**Suave** Soft	**Medio** Medium	**Duro** Hard
5.800 – 15.600	X		
15.601 – 23.600	X	X	
23.601 – 33.100		X	

2. Si hay un eje Y, recomendamos alinear la herramienta de forma adicional < 10 µm / 0,0004 pulgadas (idealmente < 5 µm / 0,0002 pulgadas) concéntricamente respecto al eje del husillo.

- Los ajustes del mecanismo de péndulo pueden variar en función de la aplicación y el tipo de mandril flotante.
- En general, se recomienda entrar en el agujero a velocidad reducida.
- Todos los datos son valores orientativos y se refieren al mandril flotante de URMA.

2. With an existing Y-axis, we recommend additionally aligning the tool < 10 µm / 0,0004 inch (ideally < 5 µm / 0,0002 inch) concentrically to the spindle axis.

- The settings of the floating mechanism can vary depending on the application and type of floating chuck.
- It is generally recommended to enter into the bore with reduced rpm.
- All data are guide values and refer to URMA floating chucks.

URMA Reaming
Technology

Soluciones practicas para problemas de escariado

Troubleshooting Machining Centres

	Agujero demasiado grande Hole too large				**Agujero cónico** Tapered hole				**Agujero con marcas de vibraciones** Hole shows chatter marks	
	Vibraciones Vibration	**Error de concentricidad** Run-out error	**Filo recrecido** Built-up edges	**Espesor de viruta (ap)** Radial depth of cut	**Pieza se arriostra** Deformation by clamping	**Grosor de material irregular** Uneven material thickness	**Máquina** Machine	**Flujo de virutas** Chip flow	**Vibraciones** Vibration	**Error de concentricidad** Run-out error
Datos de corte Cutting Data										
Avance (fz) Feed (fz)	↑		↓					↑/↓	↑	
Velocidad del husillo (min-1) Spindle speed (min-1)	↓		↑						↓	
Espesor de viruta ap Radial depth of cut	↑		↑	↓		⚠		↓	↑	
Herramienta Tool										
Ángulo de chaflán Chamfer angle	↑					↑			↑	
Concentricidad Run out	⚠	⚠								⚠
Controlar el punto de corte Check the connection	⚠	⚠								⚠
Controlar el desgaste / cambiar la placa Check the wear / change the insert			⚠						⚠	
Mandril flotante Floating chuck										•/⚠
Soporte de diámetro reducido Diameter reduced holder										•/⚠
Mandril de alineación Compensation chuck		•/⚠								•/⚠
Pieza Workpiece										
Fijación de la pieza Workpiece fixture	⚠				⚠/↓				⚠	
Presión de sujeción Clamping pressure	⚠				⚠/↓				⚠	
Máquina Machine										
Porcentaje de aceite en lubricante refrigerante Coolant mixture	↑		↑					⚠	↑	
Error de ángulo de los husillos Angle-error of spindle							⚠			
Error de ángulo de los ejes Angle-error of axis							⚠			
Vibraciones por cargador de barras Vibrations from bar-feeder										
Mecanizado Machining										
Flujo de virutas Chip flow				⚠				⚠		
Presión del refrigerante Coolant pressure	⚠/↓		⚠					↑	⚠/↓	
Presión radial por geometría Radial pressure from geometry	↓		⚠	⚠		↓			↓	
Velocidad en entrada Spindle speed on entry	↓		⚠				⚠		↓	
Retroceso igual que avance de mecanizado Feed in feed out										

	Calidad de superficie insuficiente (medible) Surface quality unsatisfactory (measurable)					**Calidad de superficie insuficiente (ópticamente)** Surface quality unsatisfactory (optically)				**Marcas de retroceso** Retraction marks			**Agujero demasiado pequeño o error de forma** Hole too small or shape defect			
	Vibraciones Vibration	**Filo recrecido** Built-up edges	**Error de concentricidad** Run-out error	**Geometría de corte** Cutting geometry	**Máquina** Machine	**Avance** Feed rate	**Error de concentricidad** Run-out error	**Geometría de corte** Cutting geometry	**Máquina** Machine	**Filo recrecido** Built-up edges	**Presión radial de material** Radial compression of material	**Presión radial por sujeción de pieza** Radial compression through clamping	**Desgaste** Tool wear	**Presión radial de material** Radial compression of material	**Presión radial por sujeción de pieza** Radial compression through clamping	**Espesor de viruta ap** Radial depth of cut
Datos de corte Cutting Data																
Avance (fz) Feed (fz)	↑	↓								↓						
Velocidad del husillo (min-1) Spindle speed (min-1)	↓	↑								↑						
Espesor de viruta ap Radial depth of cut											↓/↑			↑	↓	↑
Herramienta Tool																
Ángulo de chaflán Chamfer angle	↑			↓				↑			↑			↑	↑	
Concentricidad Run out			⚠				⚠			⚠						
Controlar el punto de corte Check the connection			⚠													
Controlar el desgaste / cambiar la placa Check the wear / change the insert	⚠	⚠		⚠						⚠	⚠		⚠	⚠		
Mandril flotante Floating chuck			•/⚠				•/⚠			•/⚠	•/⚠					
Soporte de diámetro reducido Diameter reduced holder			•/⚠				•/⚠			•/⚠	•/⚠					
Mandril de alineación Compensation chuck			•/⚠				•/⚠			•/⚠						
Pieza Workpiece																
Fijación de la pieza Workpiece fixture	⚠								⚠			⚠/↓		⚠/↓	⚠/↓	
Presión de sujeción Clamping pressure	⚠								⚠			⚠/↓		⚠/↓	⚠/↓	
Máquina Machine																
Porcentaje de aceite en lubricante refrigerante Coolant mixture	↑	↑							↑	↑	↓			↓		
Error de ángulo de los husillos Angle-error of spindle					⚠				⚠							
Error de ángulo de los ejes Angle-error of axis					⚠				⚠							
Vibraciones por cargador de barras Vibrations from bar-feeder																
Mecanizado Machining																
Flujo de virutas Chip flow				⚠										⚠		⚠
Presión del refrigerante Coolant pressure	⚠	⚠								⚠			⚠			
Presión radial por geometría Radial pressure from geometry	↓							⚠		⚠	↓			↓	↓	
Velocidad en entrada Spindle speed on entry	↓															
Retroceso igual que avance de mecanizado Feed in feed out						•					•			•		

Manipulación: Si es posible, utilizar únicamente una medida por paso.

Handling: If possible, apply only one modification at once.

↑ **Aumentar, mejorar** Increase, improve

↓ **Reducir, evitar** Reduce, decrease

⚠ **Controlar, optimizar** Check, optimize

• **Utilizar, aplicar** Apply

Solución de problemas del torno

Troubleshooting Lathes

	Agujero demasiado grande Hole too large				**Agujero cónico** Tapered hole				**Agujero con marcas de vibraciones** Hole shows chatter marks	
	Vibraciones Vibration	**Error de concentricidad** Run-out error	**Filo recrecido** Built-up edges	**Espesor de viruta (ap)** Radial depth of cut	**Pieza se arriostra** Deformation by clamping	**Grosor de material irregular** Uneven material thickness	**Máquina** Machine	**Flujo de virutas** Chip flow	**Vibraciones** Vibration	**Error de concentricidad** Run-out error
Datos de corte Cutting Data										
Avance (fz) Feed (fz)	↑		↓					↑/↓	↑	
Velocidad del husillo (min^{-1}) Spindle speed (min^{-1})	↓		↑						↓	
Espesor de viruta ap Radial depth of cut	↑			↓		⚠		↓	↑	
Herramienta Tool										
Ángulo de chaflán Chamfer angle	↑					↑			↑	
Concentricidad Run out		⚠								⚠
Controlar el punto de corte Check the connection	⚠		⚠							⚠
Controlar el desgaste / cambiar la placa Check the wear / change the insert	⚠	⚠	⚠						⚠	⚠
Mandril flotante Floating chuck	⚠	•/⚠					•/⚠			•/⚠
Soporte de diámetro reducido Diameter reduced holder	⚠	•/⚠					•/⚠			•/⚠
Mandril de alineación Compensation chuck										
Pieza Workpiece										
Fijación de la pieza Workpiece fixture	⚠				⚠/↓				⚠	⚠
Presión de sujeción Clamping pressure	⚠				⚠/↓				⚠	⚠
Máquina Machine										
Porcentaje de aceite en lubricante refrigerante Coolant mixture			↑					⚠		
Error de ángulo de los husillos Angle-error of spindle	⚠	⚠					⚠		⚠	⚠
Error de ángulo de los ejes Angle-error of axis	⚠	⚠					⚠		⚠	
Vibraciones por cargador de barras Vibrations from bar-feeder	⚠						⚠		⚠	
Mecanizado Machining										
Flujo de virutas Chip flow				⚠				⚠		
Presión del refrigerante Coolant pressure	⚠/↓		⚠					↑	⚠/↓	
Presión radial por geometría Radial pressure from geometry	↓		⚠	⚠		↓			↓	
Velocidad en entrada Spindle speed on entry	↓		⚠						↓	
Retroceso igual que avance de mecanizado Feed in feed out										

	Calidad de superficie insuficiente (medible) Surface quality unsatisfactory (measurable)					**Calidad de superficie insuficiente (ópticamente)** Surface quality unsatisfactory (optically)				**Marcas de retroceso** Retraction marks			**Agujero demasiado pequeño o error de forma** Hole too small or shape defect			
	Vibraciones Vibration	**Filo recrecido** Built-up edges	**Error de concentricidad** Run-out error	**Geometría de corte** Cutting geometry	**Máquina** Machine	**Avance** Feed rate	**Error de concentricidad** Run-out error	**Geometría de corte** Cutting geometry	**Máquina** Machine	**Filo recrecido** Built-up edges	**Presión radial de material** Radial compression of material	**Presión radial por sujeción de pieza** Radial compression through clamping	**Desgaste** Tool wear	**Presión radial de material** Radial compression of material	**Presión radial por sujeción de pieza** Radial compression through clamping	**Espesor de viruta ap** Radial depth of cut
Datos de corte Cutting Data																
Avance (fz) Feed (fz)	↑	↓								↓						
Velocidad del husillo (min^{-1}) Spindle speed (min^{-1})	↓	↑								↑						
Espesor de viruta ap Radial depth of cut	↑										↑/↓			↑	↓	↑
Herramienta Tool																
Ángulo de chaflán Chamfer angle	↑			↓				↓			↑			↑	↑	
Concentricidad Run out			⚠				⚠			⚠						
Controlar el punto de corte Check the connection			⚠				⚠									
Controlar el desgaste / cambiar la placa Check the wear / change the insert	⚠	⚠	⚠	⚠			⚠	⚠		⚠	⚠		⚠	⚠		
Mandril flotante Floating chuck	⚠		•/⚠				•/⚠			•/⚠	•/⚠		•/⚠	•/⚠		
Soporte de diámetro reducido Diameter reduced holder	⚠		•/⚠				•/⚠			•/⚠	•/⚠		•/⚠	•/⚠		
Mandril de alineación Compensation chuck																
Pieza Workpiece																
Fijación de la pieza Workpiece fixture	⚠											⚠/↓		⚠/↓	⚠/↓	
Presión de sujeción Clamping pressure	⚠											⚠/↓		⚠/↓	⚠/↓	
Máquina Machine																
Porcentaje de aceite en lubricante refrigerante Coolant mixture	↑	↑								↑	↓			↓		
Error de ángulo de los husillos Angle-error of spindle	⚠		⚠		⚠		⚠		⚠							
Error de ángulo de los ejes Angle-error of axis	⚠		⚠		⚠		⚠		⚠							
Vibraciones por cargador de barras Vibrations from bar-feeder	⚠				⚠				⚠							
Mecanizado Machining																
Flujo de virutas Chip flow														⚠		⚠
Presión del refrigerante Coolant pressure	⚠	⚠								⚠			⚠			
Presión radial por geometría Radial pressure from geometry	↓									⚠	↓			↓	↓	
Velocidad en entrada Spindle speed on entry	↓															
Retroceso igual que avance de mecanizado Feed in feed out						•					•			•		

Manipulación: Si es posible, utilizar únicamente una medida por paso.

Handling: If possible, apply only one modification at once.

↑ **Aumentar, mejorar** Increase, improve

↓ **Reducir, evitar** Reduce, decrease

⚠ **Controlar, optimizar** Check, optimize

• **Utilizar, aplicar** Apply

Definiciones y formulas básicas

Definitions and Basic Formulas

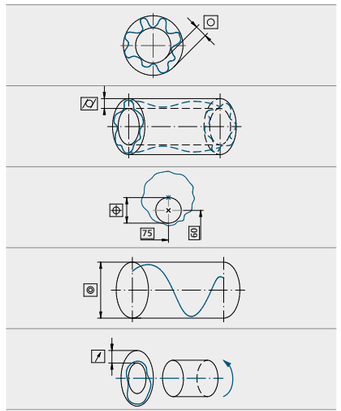
	Descripcion	Designation
a_p	Profundidad de corte	Depth of cut [mm]
n	Revoluciones	Speed [min^{-1}]
D/d	Diametro del agujero	Bore diameter [mm]
v_c	Velocidad de corte	Cutting speed [m/min]
v_f	Velocidad avance	Feed rate [mm/min]
f	Avance por revolucion	Feed per rotation [mm]
f_z	Avance por diente	Feed per tooth [mm]
z	Numero de dientes	Number of cutting edges
lf	Distancia de avance	Feed distance [mm]
R_a	Valor aritmetico de la rugosidad	Arithmetic centre line average value [µm]
R_t	Altura maxima de «pico a valle»	Peak-to-valley height [µm]
R_z	Media de la altura de «pico a valle»	Average peak-to-valley height [µm]
R_m	Resistencia a la traccion	Tensile strength [N/mm^2]
t_c	Tiempo de corte por pieza	Maschining time [min]
γ	Angulo de corte	Radial rake angle [Degrees]
ε	Angulo del vertice	Apex angle [Degrees]
h	Grosor de viruta	Chip thickness [mm]
mc	Constante de material	Material constant
kc1.1	Valor principal de la fuerza de corte	Main value cutting force [N/mm^2]
kc	Fuerza de corte específica	Specific cutting force [N/mm^2]
Fc	Fuerza de corte	Cutting force [N]
b	Ancho de viruta	Chip width [mm]
Pc	Potencia de accionamiento necesaria	Necessary drive power [kW]
η	Grado de eficacia	Degree of efficiency
Md	Par de torsión	Torque [Nm]

Spanungsbreite / Chip width

ap	h
0.05	0.07
0.08	0.11
0.10	0.14
0.15	0.21
0.20	0.28
0.25	0.35

	Ra	Rz
N8	1.6 - 3.2	8.4 - 15
N7	0.8 - 1.6	4.0 - 8.4
N6	0.4 - 0.8	2.2 - 4.0
N5	0.2 - 0.4	1.6 - 2.8
N4	0.1 - 0.2	1.0 - 2.8
N3	0.05 - 0.1	0.8 - 1.1

○	Circularidad	Circularity
⌭	Cilindricidad	Cylindricity
⌖	Posición	Position
◎	Concentricidad	Concentricity
↗	Descentramiento circular	Circular runout



Velocidad de corte Cutting speed	$v_c = \frac{\pi \cdot d \cdot n}{1000}$	m/min
Avance/min Feed rate	$v_f = f \cdot n$ $v_f = f_z \cdot z \cdot n$	mm/min
Fuerza de corte (por filo de corte) Cutting force (per cutting edge)	$F_c = b \cdot h \cdot k_c$	N

Velocidad Speed	$n = \frac{v_c \cdot 1000}{\pi \cdot d}$	min^{-1}
Tiempo de mecanizado Machining time	$t_c = \frac{l_f}{f \cdot n}$	min
Requisitos de alimentación eléctrica Power requirement	$P_c = \frac{b \cdot h \cdot k_c \cdot v_c \cdot z}{60 \cdot 10^3 \cdot \eta}$	kW

Fuerza de corte específica Specific cutting force	$k_c = \frac{k_c 1.1}{h^{m_c}}$	N
Par de torsión Torque	$M_d = \frac{(D^2 - d^2) \cdot f \cdot k_c}{8 \cdot 10^3}$	Nm

Estudio de mecanizado

Machining Study

Remitente *
Sender

Number

Compañía
Company

Distribuidor URMA
URMA distributor

Adresse
Address

Contacto
Contact

Máquina
Machine-Tool

Tipo de máquina
Machine type and manufacturer

Horizontal * ❑
Horizontal

Vertical * ❑
Vertical

Herramienta rotativa * ❑
Tool rotating

Agarre husillo *
Spindle holder

	Size		Execution
DIN 69893-HSK ❑	20 ❑	25 ❑	A ❑
DIN 69871 ❑	30 ❑	32 ❑	B ❑
MAS-BT ❑	40 ❑	50 ❑	C ❑
Cuerpo cilíndrico DIN 1835 ❑ Cylinder shank DIN 1835	63 ❑	80 ❑	D ❑
DIN 69880 VDI ❑	100 ❑	❑	E ❑
❑			

Lubricante
Lubricant

Aceite * ❑
Oil

MMS * [1] ❑
MLS [1]

Emulsión * ❑
Emulsion

Porcentaje de mezcla
Ratio of mixture

Suministro de la refrigeración interior * ❑
Internal coolant supply

Presión del refrigerante (bar) *
Coolant pressure (bar)

Pieza
Workpiece

Descripción
Designation

Material nº *
Material number

Tratamiento de la pieza *
Treatment condition (hardness)

Requisitos de la pieza
Machining requirements

Diámetro del agujero *
Bore ø

Longitud del agujero *
Bore length

Diámetro pre-mecanizado *
Pre-machined ø

Tolerancia *
Tolerance

Interfiriendo contornos **mm**
Interfering contours

Metodo de pre-mecanizado *
Method of pre-machining

Requisitos adicionales de tolerancia
Additional tolerance requirements

○ ◎ ⌭ ⌖

Agujero ciego * ❑
Blind Hole

Calidad superficie (µm) *
Surface quality (µm)

Ra ❑ Rz ❑ Rt ❑

Corte interrumpido * ❑
Cutting interruption

Fecha *
Date

Adjunto: Dibujo de la aplicación *
Attachement: your application sketch

* **Campos obligatorios**
Mandatory fields

[1] **Micro lubricación**
Minimal lubrication system (mist coolant)

Fax +41 62 889 20 28
customerservice@urma.ch

Tabla de materiales
Material Comparison Table

Acero
Steel

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
P	P1	Acero de fácil mecanización con contenido bajo en carbono	Free-cutting steels	< 600	< 180	1600	0.18	1.0715	11SMn30
	P2	Aceros ferríticos de baja aleación con C < 0,25%, aceros estructurales de baja aleación	Low-alloy ferrilic steels, C < 0.25%wt, low-alloy general structural steels	< 700	< 210	1700	0.18	1.0038	S235JRG2
	P3	Aceros ferríticos y ferríticos/perlíticos con C < 0,25%, aceros estructurales soldables	Ferritic and ferritic / pearlitic steels, C < 0.25%wt, weldable general structural steels, case-hardening steels	< 800	< 240	1800	0.21	1.7131	16MnCr5
	P4	Aceros endurecidos, aceros estructurales con C > 0,25%	Heat-treatable steels, construction stells C > 0.25%	< 1000	< 300	1800	0.23	1.1191 1.7225	C45E 42CrMo4
	P5	Aceros templables con C > 0,67 %, aceros para muelles y cojinetes	Through-hardening steels, C > 0.67%wt, spring and bearing steels	700 - 1100	210 - 325	1700	0.27	1.1274 1.2067	C100S 100Cr6
	P6	Aceros aleados para herramientas	Alloyed tool steels	700 - 1200	210 - 350	2200	0.25	1.2601	X165CrMoV12
	P7	Aceros altamente aleados para herramientas, aceros rápidos (HSS)	High alloyed tool steels, high speed steels (HSS)	> 900	> 260	2300	0.25	1.2083 1.2344	X42Cr13 X40CrMoV5-1

Acero austenítico inoxidable y dúplex
Stainless austenitic steel and duplex

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
M	M1	Aceros inoxidables ferríticos y martensíticos	Ferritic & martensitic stainless steels	500 - 900	150 - 260	1700	0.22	1.4005 1.4512 1.4021	X12CrS13 X5CrTi12 X20Cr13
	M2	Acero austenítico de fácil mecanización	Free-cutting austenitic stainless steels, less difficult machinable	500 - 900	150 - 260	1700	0.22	1.4305	X8CrNiS18 9
	M3	Aceros inoxidables austeníticos de baja aleación	Low-alloy austenitic stainless steels			2000	0.2	1.4301	X5CrNi18 10
	M4	Aceros inoxidables austeníticos aleados	Alloyed austenitic stainless steels			2100	0.2	1.4435	X2CrNiMo18 14 3
	M5	Aceros inoxidables de alta aleación (austenítico y dúplex)	High-alloy austenitic and duplex stainless steels			2300	0.2	1.4462 1.4548	X2CrNiMoN22 5 3 X5CrNiCuNb17 4 4
	M6	Austenítico, dúplex y súper dúplex, mecanizable por arranque de viruta muy difícil	Austenite, duplex and super duplex, very difficult to machine	700 - 1000	210 - 300	2300	0.2	1.4410	X2CrNiMoN25 7 4

Listas de materiales detalladas, páginas 92 – 100
See pages 92 – 100 for detailed material list

Tabla de materiales
Material Comparison Table

Fundición
Cast Irons

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
K	K1	Fundición gris	Grey cast irons	< 300	< 90	1100	0.25	0.6025	EN-GJL-250 (GG25)
	K2	Fundición gris	Grey cast irons	> 300	> 90	1300	0.27	0.6035	EN-GJL-350 (GG35)
	K3	Fundición esferoidal, fundición de grafito esferolítica, fundición maleable	Ductil cast irons, Malleable cast irons	< 500	< 150	900	0.25	0.7040	EN-GJS-400-15 (GGG40)
	K4	Fundición esferoidal, fundición de grafito esferolítica, fundición maleable	Ductil cast irons, Malleable cast irons	< 800	< 210	1400	0.28	0.7060	EN-GJS-600-3 (GGG60)
	K5	Fundición de grafito esferolítica con tratamiento térmico (ADI)	Austempered ductile irons	< 1100	< 325	1500	0.32		EN-GJS-1000-5
	K6	Fundición vermicular	Compactet graphite irons	300 - 500	90 - 150				EN-GJV-400
	K7	Fundición austenítica con grafito laminar	Austenitic lamellar cast irons	< 400				0.6655	GGL-NiCuCr 15 6 2
	K8	Fundición esferoidal austenítica, fundición de grafito esferolítica	Austenitic spheroidal graphite and ductil iron	300 - 600	90 - 180			0.7673	EN-GJSA-XNiMn23-4

Materiales no ferrosos
Non-Ferrous Metals

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
N	N1	Aleaciones de forja de aluminio con Si < 2 %	Aluminum wrought alloy with Si < 2%	< 300	< 150	600	0.23	3.3535	AlMg3
	N2	Aleaciones de aluminio con Si < 7 %	Aluminum alloys, Si < 7%	< 400	< 120	700	0.25	3.2152	AlSi6Cu4
	N3	Aleaciones de aluminio 8% < Si < 15% y aleaciones de magnesio	Aluminum alloys 8% < Si < 15% and alloys Magnesium	< 400	< 120	700	0.25	3.2163	AlSi9Cu3 AlSi12
	N4	Aleaciones de aluminio con Si > 15%	Aluminum alloys, Si > 15%	> 400	> 120	800	0.25		AlSi17Cu4Mg
	N5	Aleaciones de cobre buena mecanizabilidad por arranque de viruta	Copper alloys, good machinability	< 700	< 210	800	0.2	2.0401 2.1090	CuZn39Pb3 CuSn7Zn4Pb7-C
	N6	Aleaciones de cobre difícil mecanizabilidad por arranque de viruta	Copper alloys, more difficult machinability	> 500	> 150	1000	0.25	2.0966	CuAl10Ni5Fe4

Listas de materiales detalladas, páginas 92 – 100
See pages 92 – 100 for detailed material list

Tabla de materiales
Material Comparison Table

Superaleaciones
Superalloys

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
S	S1	Superaleaciones a base de Fe	Iron based superalloys	< 800	< 240	2400	0.23	2.4858	NiCr21Mo (Alloy 825)
	S2	Superaleaciones a base de Fe	Iron based superalloys	> 800	> 240	2600	0.23	1.4980	X6NiCrTi-MoVB25-15-2 (Alloy A-286)
	S3	Superaleaciones a base de Co	Cobalt based superalloys	600 - 1200		2800	0.23	2.4979	CoCr28MoNi (Stellite 21)
	S4	Superaleaciones a base de Ni	Nickel based superalloys	700 - 1500		3100	0.23	2.4668	NiCr19NbMo (Inconel 718)

Aleaciones de titanio
Titanium Alloys

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
S	S11	Titanio, baja aleación (α)	Titanium, low alloyed (α)	< 800	< 240	1300	0.22	3.7025 3.7035 3.7055	Ti1 (Grade 1) Ti2 (Grade 2) Ti3 (Grade 3)
	S12	Titanio, aleación media (cerca α + β)	Titanium, medium alloyed (close to α + β)	< 1100	< 325	1500	0.22		Ti6Al2Sn 4Zr2Mo0.1Si
	S13	Titanio, alta aleacón (α + β)	Titanium, high alloyed (α + β)	900 - 1200	265 - 355	1500	0.22	3.7165	TiAl6V4 (Grade 5)
	S14	Titanio, alta aleacón (β)	Titanium, high alloyed (β)	> 1200	> 355	1700	0.22		Ti10V2Fe3Al Ti5Al5Mo5V3Cr

Aceros templados
Hardened Steels

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
H	H1	Aceros cementados, aceros para bonificar, aceros para cojinetes, aceros para herramientas	Case hardening steels, heat-treatable steels, bearing steels, tool steels	1450 - 1800	< 520	3300	0.22		HRC 45 - 52
	H2	Aceros cementados, aceros para bonificar, aceros para cojinetes, aceros para herramientas	Case hardening steels, heat-treatable steels, bearing steels, tool steels	1800 - 2100	520 - 600	4100	0.22		HRC 53 - 57
	H3	Aceros cementados, aceros para bonificar, aceros para cojinetes, aceros para herramientas, aceros rápidos (HSS)	Case hardening steels, heat-treatable steels, bearing steels, tool steels, high-speed steels	> 2100	> 600	4700	0.22		HRC 58 - 62

Listas de materiales detalladas, páginas 92 – 100
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Tabla de materiales
Material Comparison Table

Materiales metalúrgicos en polvo
Powder Metallurgical Materials

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
SM	SM1	Materiales sinterizados de baja aleación	Low alloyed sintered materials	200 - 450	< 135				Sint-D11 / C11
	SM2	Materiales sinterizados de aleación media con Ni < 7 %	Medium alloyed sintered materials with Ni < 7%	400 - 600	120 - 180				Sint-D31 / C31
	SM3	Materiales sinterizados de alta aleación con Cr y Ni > 7 %	High alloyed sintered materials with Cr and Ni > 7%	400 - 600	120 - 180				Sint-D40 / C40 (AISI 316)

Materiales de plástico y compuestos
Composite Materials

ISO	UMC	Denominación	Description	Rm [N/mm²]	HB	Kc1.1	mc	DIN Nr.	Ejemplo Example
O	O1	Plásticos termoplásticos	Thermoplastic polymers			150	0.26		Polyamid 6 (PA 6) Polyoxymethylen (POM)
	O2	Plásticos duroplásticos	Thermosetting plastics			150	0.26		Epoxydharze (EP)
	O3	Plásticos con < 50 % vidrio	Reinforced plastics with < 50% glass fibers			300	0.26		Polyamid 6 mit 30% GF (PA 6 GF30)
	O4	Plásticos reforzados con fibra de vidrio, carbono y aramida	Glass fiber-, carbon fiber- and aramid reinforced plastics			300	0.26		GFK CFK

Listas de materiales detalladas, páginas 92 – 100
See pages 92 – 100 for detailed material list

Clasificación de grupos de materiales

Material Group Classification

Acero

Steel

UMC	W.-Nr	DIN	EN	AFNOR	BS	UNI	JIS	SS	UNS	AISI / ASTM
P1	1.0711	9 S 20	10 S 20	CF 9 S 22	220 M 07		SUM 21		G 11120	1112
	1.0715	9 SMn 28	11 SMn 30	S 250	230 M 07	CF 9 SMn 28	SUM 22	1912	G 12130	1213
	1.0718	9 SMnPb 28	11 SMnPb 30	S 250 Pb		CF 9 SMnPb 28	SUM 22 L	1914	G 12134	12 L 13
	1.0721	10 S 20	10 S 20	10 F 1	210 M 15	CF 10 S 20			G 11080	1108
	1.0722	10 SPb 20	10 SPb 20	10 PbF 2		CF 10 SPb 20	SUM 12		G 11084	11 L 08
	1.0723	15 S 20	15 SMn 13	S 300	210 A 15		SUM 32	1922		
	1.0726	35 S 20	35 S 20	35 MF 4	212 M 36		SUM 41	1957	G 11400	1140
	1.0727	46 S 20	46 S 20	45 MF 4	212 M 44		SUM 42	1973	G 11460	1146
	1.0736	9 SMn 36	11 SMn 37	S 300	240 M 07	CF 9 SMn 36	SUM 25		G 12150	1215
	1.0737	9 SMnPb 36	11 SMnPb 37	S 300 Pb		CF 9 SMnPb 36	SUM 24 L	1926	G 12144	12 L 14
P2	1.0037	St 37-2	S 235 JR	E 24-2	4360-40 C	Fe 360 B	STKM 12 C	1312		A 570
	1.0116	St 37-3	S 235 J2G3	E 24-3	4360-40 D	Fe 360 D FF		1313	K 01501	A 573
	1.0144	St 44-3	S 275 J2G3	E 28-4	4360-43 C	Fe 430 D FF	SM 41 C	1414		1020
	1.0301	C 10	C 10	AF 34 C 10, XC 10	045 M 10	C 10	S 10 C		G 10100	1010
	1.0302	C 10 Pb	C 10	AF 34 C 10, XC 10	045 M 10	C 10	S 10 C		G 10100	1010
	1.0401	C 15	C 15	AF3 7 C 12, XC 18	080 M 15	C 15, C 16	S 15 C	1350	G 10170	1015
	1.0402	C 22	1 C 22	C 20	050 A 20	C 20	S 22 C	1450	G 10200	1020
	1.0420	GS 38	GE 200	230-400M	A1		SC 42	1306		
	1.0425	P 265 GH	P 265 GH	A 42 CP	151-400	P 265 GH	SG 30	1430	K 02801	
	1.0446	GS 45	GE 240	E23-45M	A1		SC 450	1305	J 03001	
	1.0552	GS 52	GE 260		A2					
	1.0558	GS 60	GE 300	320-560M	A3	C 45		1606		
	1.0570	St 52-3	S 355 JR	E 36-3	4360-50 C	Fe 510 B	SM 50 YA	2132		
	1.0461	St E 255	S 255 N						K 01800	
	1.0486	St E 285	P 275 N	P 275 N	P 275 N	Fe E 285 KG	SM 41 A		K 01802	
	1.0505	St E 315	P 315 N			Fe E 315 KG	SM 50 A		K 11506	
	1.0562	St E 355	P 355 N	E 355 R/FP	P 355 N	Fe E 355 KG	SM 50 YB	2132	K 12000	
	1.0970	Q St E 260 N	S 260 MC	41 S 7		Fe E 275 TM				
	1.0974	Q St E 340 TM	S 340 MC	E 335 D	HR 40/30					
	1.0975	Q St E 340 N	S 340 NC			Fe E 355 TD				
	1.0978	Q St E 380 TM	S 380 MC	E 390 D						
	1.0979	Q St E 380 N	S 380 NC			Fe E 380 TD				
	1.0980	Q St E 420 TM	S 420 MC	E 430 D	HR 50 F 45	Fe E 420 TM				
	1.1121	Ck 10	C 10 E	XC 10	040 A 10		SS 10 C	1265		1010
	1.1141	Ck 15	C 15 E	XC 15, XC 18	080 M 15	C 15, C 16	S 15 C, S 15 CK	1370	G 10170	1015
	1.1158	Ck 25	2 C 25	XC 25	060 A 25	C 25	S 25 C		G 10250	1025
P3	1.0482	19 Mn 5	P 310 GH	A 52 CP	224-460	Fe 460-2 KW	SG 37		K 03102	
	1.0982	Q St E 460 TM	S 460 MC	E 445 D	50/45 HR					
	1.0984	Q St E 500 TM	S 500 MC	E 490 D		Fe E 490 TM		2662		
	1.0986	Q St E 550 TM	S 550 MC	E 560 D	60/55 HS	Fe E 560 TM				
	1.1120	G 20 Mn 5	GS 20 Mn 5							
	1.1131	G 17 Mn 5	GS 16 Mn 5 v	G 17 Mn 5		G 17 Mn 5				
	1.2162	21 MnCr 5	21 MnCr 5	20 NC 5			SCR 420 H			
	1.5415	15 Mo 3	16 Mo 3	15 D 3	1501-240	16 Mo 3		2912		A 204 Gr. A
	1.5423	16 Mo 5			1503-245-420	16 Mo 5	SBC 690		K 11522	4520
	1.5752	14 NiCr 14	14 NiCr 14	12 NC 15	655 M 13		SNC 815 (H)		G 33106	3310, 9314
	1.5919	15 CrNi 6	15 CrNi 6	16 NC 6	S 107	16 CrNi 4				4320
	1.5920	18 CrNi 8	18 CrNi 8	20 NC 6						
	1.6587	18 CrNiMo 7 6	18 NiCrMo 7 6	18 NCD 6	820 A 16	18 NiCrMo 7				
	1.7131	16 MnCr 5	16 MnCr 5	16 MC 5	527 M 17	16 MnCr 5	SCR 415	2511	G 51170	5115
	1.7139	16 MnCrS 5	16 MnCrS 5							
	1.7147	20 MnCr 5	20 MnCr 5	20 MC 5		20 MnCr 5	SMnC 420 (H)		G 51200	5120
	1.7149	20 MnCrS 5	20 MnCrS 5	20 MnCrS 5			SMnC 21 H			5120 H
	1.7321	20 MoCr 4	20 MoCr 4				SCM 21 H			
	1.7335	13 CrMo 4 4	13 CrMo 4 5	15 CD 3 5	1501-620 Gr. 27	14 CrMo 4 5		2216		A 182-F11, F12
	1.7337	16 CrMo 4 4		45 CDV 4	1501-620 Gr. 27	14 CrMo 4 5		2216		A 387 Gr. 12 Cl. 2
	1.7380	10 CrMo 9 10	10 CrMo 9 10	10 CD 9 10	1501-622 Gr. 31	12 CrMo 9 10		2218	J 21890	A 182-F22
	1.8900	St E 380	S 380 N			Fe E 390 KG	SM 50 B			
	1.8905	St E 460	P 460 N	E 460-I	P460 N	Fe E 460 KG	SM 53 B	2143	K 02900	A 633 Gr. E
	1.8907	St E 500	S 500 N				SM 58		K 02001	

UMC	W.-Nr	DIN	EN	AFNOR	BS	UNI	JIS	SS	UNS	AISI / ASTM
P4	1.0501	C 35	C35+N	AF 55 C 35	060 A 35	C 35		1550	G 10350	1035
	1.0503	C 45	E 335	AF 65 C 45	80 M 46	C 45	S 45 C	1650	G 10430	1045
	1.0511	C 40	C40+N	AF 60 C 40	080 M 40	C 40	S 40 C			1040
	1.0535	St 70-2	E 360	A 70-2		Fe 690		1655		1055
	1.0601	C 60	C60+N	CC 55	080 A 62	C 60			G 10600	1060
	1.0904	55 Si 7	55 SiCr7	55 S 7	250 A 53	55 Si 8		2085, 2090		9255
	1.1151	Ck 22	C 22E	XC 25	055 M 15					1023
	1.1157	40 Mn 4		35 M 5	150 M 36				G 10390	1039
	1.1165	30 Mn 5	G 28 Mn 6	35 M 5	120 M 36		SMn 1 H, SCMn 2		G 13300	1330
	1.1167	36 Mn 5	G 28 Mn 6	40 M 5	150 M 36		SMn 438 (H), SCMn 3	2120	G 13350	1335
	1.1181	Ck 35	C 35 E	XC 38 H1	080 M 36	C 35	S 35 C	1572	G 10340	1035
	1.1191	Ck 45	C 45 E	XC 42	080 M 46	C 45	S 45 C	1672	G 10420	1045
	1.1221	Ck 60	C 60 E	XC 60	080 A 62	C 60	S 58 C	1665, 1678	G 10640	1064
	1.1740	C 60 W		Y3 55			SK 7			1060
	1.2330	35 CrMo 4		34 CD 4	708 A 37	35 CrMo 4		2234	T 51620	4135
	1.2542	45 WCrV 7			BS 1	45 WCrV 8 KU		2710	T 41901	S1
	1.2714	56 NiCrMoV 7	56 NiCrMoV 7		BH 224-5	56 NiCrMoV7 KU	SKT 4		T 51605	P5
	1.5121	46 MnSi 4								5045
	1.5710	36 NiCr 6		35 NC 6	640 A 35		SNC 236			3135
	1.5736	36 NiCr 10		35 NC 11		35 NiCr 9	SNC 631 H			3435
	1.5864	35 NiCr 8	35 NiCr 8	40 NC 17						
	1.6511	36 CrNiMo 4	36 CrNiMo 4	40 NCD 3	816 M 40	38 NiCrMo 4 (KB)			G 98400	9840
	1.6580	30 CrNiMo 8	30 CrNiMo 8	30 CND 8	823 M 30					
	1.6582	34 CrNiMo 6	34 CrNiMo 6	35 NCD 6	817 M 40	35 NiCrMo 6 (KW)	SNCM 447	2541		4340
	1.7033	34 Cr 4	34 Cr 4	32 C 4	530 A 32	34 Cr 4 (KB)	SCr 430 (H)		G 51320	5132
	1.7035	41 Cr 4	41 Cr 4	42 C 4	530 M 40	41 Cr 4	SCr 440 (H)		G 51400	5140
	1.7218	25 CrMo 4	25 CrMo 4	25 CD 4 S	708 M 25	25 CrMo 4 (KB)	SCM 425	2225	G 41300	4130
	1.7220	34 CrMo 4	34 CrMo 4	35 CD 4	708 A 37					4137
	1.7225	42 CrMo 4	42 CrMo 4	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	2244	G 41400	4142, 4140
	1.7228	50 CrMo 4	50 CrMo 4		708 A 47					4150
	1.7361	32 CrMo 12	32 CrMo 12	30 CD 12	722 M 24			2240		
	1.8159	50 CrV 4	50 CrV 4	50 CV 4	735 A 50	51 CrV 4	SUP 10	2230	H 61500	6150
	1.8161	58 CrV 4	58 CrV 4		526 M 60					
	1.8509	41 CrAlMo 7	41 CrAlMo 7 10	40 CAD 6 12	905 M 39	41 CrAlMo 7	SACM 645	2940	K 24065	A 355 Cl. A
P5	1.1231	Ck 67	C 67 S	XC 68	060 A 67	C 70		1770	G 10700	1070
	1.1274	Ck 101	C 100 S		060 A 96		SUP 4	1870	G 10950	1095
	1.1545	C 105 W 1	C 105 U	Y1 105		C 100 KU		1880		W1
	1.1645	C 105 W 2		Y1 105		C 100 KU	SK 3			
	1.1663	C 125 W		Y2 120		C 120 KU	SK 2			W1
	1.2210	115 CrV 3	107 CrV 3	100 C 3		107 CrV 3 KU			T 61202	L2
	1.2510	100 MnCrW 4		90 MWCV 5	BO 1	95 MnWCr 5 KU	SKS 3	2140	T 31501	O1
	1.2842	90 MnCrV 8	90 MnCrV 8	90 MV 8	BO 2	90 MnVCr 8 KU			T 31502	O2
	1.3505	100 Cr 6	100 Cr 6	100 C 6	534 A 99	100 Cr 6	SUJ 2	2258	G 51986	52100
P6	1.2080	X 210 Cr 12	X 210 Cr 12	Z 200 C 12	BD 3	X 210 Cr 13 KU	SKD 1		T 30403	D3
	1.2311	40 CrMnMo 7	40 CrMnNiMo 8 6	40 CMD 8		35 CrMo 8 KU				P20
	1.2312	40 CrMnMoS 8 6 4	40 CrMnNiMoS 8 6 4	40 CMD 8 S						
	1.2316	X 36 CrMo 17	X 36 CrMo 17	Z 35 CD 17						
	1.2343	X 38 CrMoV 5 1		Z 38 CDV 5	BH 11	X 37 CrMoV 5 1 KU	SKD 6		T 20811	H11
	1.2344	X 40 CrMoV 5 1	X 40 CrMoV 5 1	Z 40 CDV 5	BH 13	X 40 CrMo 5 1 1 KU	SKD 61	2242	T 20813	H13
	1.2363	X 100 CrMoV 5 1	X 100 CrMoV 5	Z 100 CDV 5	BA 2	X 100 CrMoV 5 1 KU	SKD 12	2260	T 30102	A2
	1.2379	X 155 CrVMo 12 1	X 155 CrVMo 12 1	32 CDV 12 28	BD 2					D2
	1.2365	X 32 CrMoV 3 3		32 DCV 28	BH 10	30 CrMoV 12 27 KU	SKD 7		T 20810	H10
	1.2436	X 210 CrW 12				X 215 CrW 12 1 KU	SKD 2	2312		
	1.2567	X 30 WCrV 5 3	X 30 WCrV 5 3	X 32 WCRV 5						
	1.2601	X 165 CrMoV 12				X 165 CrMoW 12 KU		2310		
	1.2678	X 45 CoCrWV 5 5 5	X 45CoCrWV 5 5 5							
	1.2713	55 NiCrMoV 6	55 NiCrMoV 6	55 NCDV 7			SKT 4		T 61206	L6
	1.2714	55 NiCrMoV 7	56 NiCrMoV 7		BH 224-5	56 NiCrMoV7-KU	SKT 4		T 61206	6F3
	1.2743	60 NiCrMo 12 4	60 NiCrMo 12 4							
	1.2766	35 NiCrMo 16	35 NiCrMo 16	35 NCD 16	BP 30					
	1.2767	X 45 NiCrMo 4	X 45 NiCrMo 4	Y 35 NCD 16		42 NiCrMo 15 7 KU			T 30109	6F7
P7	1.3207	S 10-4-3-10	HS 10-4-3-10	Z130WKCDV	BT 42	HS 10-4-3-10	SKH 57		T 11334	M44
	1.3243	S 6-5-2-5	HS 6-5-2-5	Z 85 WDKCV 06-05-05-04-02	BM 35	HS 6-5-2-5	SKH 55	2723	T 11336	M35
	1.3247	S 2-10-1-8	HS 2-10-1-8	Z 110 DKCWV 09-08-04	BM 42	HS 2-9-1-8	SKH 51	2716	T 11342	M42
	1.3255	S 18-1-2-5	HS 18-1-2-5	Z 80 WKCV 18-05-04-01	BT 4	HS 18-1-1-5	SKH 3		T 12004	T4
	1.3343	S 6-5-2	HS 6-5-2	Z 85 WDCV 06-05-04-02	BM 2	HS 6-5-2	SKH 9, SKH 51	2722	T 11302	M2
	1.3348	S 2-9-2	HS 2-9-2	Z 100 DCWV 09-04-02-02		HS 2-9-2	SKH 58	2782	T 11307	M7
	1.3355	S 18-0-1	HS 18-0-1	Z 80 WCV 18-04-01	BT 1	HS 18-0-1	SKH 2		T 12001	T1

Clasificación de grupos de materiales
Material Group Classification

Acero austenítico inoxidable y dúplex
Stainless austenitic steel and duplex

UMC	W.-Nr	DIN	EN	AFNOR	BS	UNI	JIS	SS	UNS	AISI / ASTM	Div.	Condition	Structure
M1	1.4000	X 6 Cr 13	X 6 Cr 13	Z 6 C 12	403 S 17	X 6 Cr 13	SUS 403	2301	S41008	403		annealed	ferrite
	1.4006	X 10 Cr 13	X 12 Cr 13	Z 10 C 13	410 S 21	X 12 Cr 13	SUS 410	2302	S41000	410, CA-15		annealed	martensite
	1.4016	X 6 Cr 17	X 6 Cr 17	Z 8 C 17	430 S 15	X 8 Cr 17	SUS 430	2320	S43000	430		annealed	ferrite
	1.4021	X 20 Cr 13	X 20 Cr 13	Z 20 C 13	420 S 37	X 20 Cr 13	SUS 420 J 1	2303	S42000	420		annealed	martensite
	1.4031	X 40 Cr 13	X 39 Cr 13	Z 40 C 14	420 S 45	X 40 Cr 14	SUS 420	2304	S40280	420		annealed	martensite
	1.4109	X 65 CrMo 14	X 70 CrMo 15	Z 70 D 14			SUS 440 A		S44002	440 A		annealed	martensite
	1.4112	X 90 CrMoV 18	X 90 CrMoV 18	Z 2 CND 18 05	409 S 19	X CrTi 12	SUS 440 B	2327	S44003	440 B		annealed	martensite
	1.4125	X 105 CrMo 17	X 105 CrMo 17	Z 100 CD 17		X 105 CrMo 17	SUS 440 C		S44004	440 C		annealed	martensite
	1.4313	X 5 CrNi 13 4	X 3 CrNIMo 13 3	Z 5 CN 13.4	425 C 11	X 6 CrNi 13 04	SCS 5	2385	J91540		F6NM	annealed	martensite
	1.4749	X 18 CrN 28	X 18 CrN 28	Z 18 C 25				2322	S44600	446		annealed	ferrite
M2	1.4305	X 10 CrNiS 18 9	X 10 CrNiS 18 9	Z 10 CNF 18.09	303 S 31	X 10 CrNi 18 09	SUS 303	2346	S30300	303		annealed	austenite
M3	1.4300	X 12 CrNi 18 8	X 12 CrNi 18 8	Z 12 CN 18	302 S 25		SUS 302	2331	S30200	302		annealed	austenite
	1.4301	X 6 CrNi 18 10	X 5 CrNi 18 9	Z 6 CN 18.09	304 S 31	X 5 CrNi 18 11	SUS 304	2333	S30400	304		annealed	austenite
	1.4306	X 2 CrNi 19 11	X 2 CrNi 19 11	Z 2 CN 18.10	304 S 12	X 3 Cr Ni 18 11	SUS 304 L	2352	S30403	304 L		annealed	austenite
	1.4307	X 2 CrNi 18 9	X 2 CrNi 18 9	CLC 18 9 L	304 S 11		SUS 304 L		S30403	304 L		annealed	austenite
	1.4310	X 12 CrNi 17 7	X 9 CrNi 18 8	Z 12 CN 17.07	301 S 21	X 12 CrNi 17 07	SUS 301	2331	S30100	301		annealed	austenite
	1.4401	X 5 CrNiMo 17 12 2	X 5 CrNiMo 17 12 2	Z 3 CND 17 11 1	316 S 31	X 5 CrNiMo 17 12	SUS 316	2347	S31600	316		annealed	austenite
	1.4404	X 2 CrNiMo 17 13 2	X 2 CrNiMo 17 13 2	Z 3 CND 19 10 M	316 S 12	X 2CrNiMo 19 11	SUS 316 L	2348	S31603	316 L		annealed	austenite
	1.4550	X 6 CrNiNb 18 10	X 6 CrNiNb 18 10	Z 6 CNNb 18.10	347 S 31	X 6 CrNiNb 18 11	SUS 347	2338	S34700	347		annealed	austenite
M4	1.4311	X 2 CrNiN 19 11	X 2 CrNiN 18 10	Z 2 CN 18 10 Az	304 S 62	X 2 CrNiN 18 11	SUS 304 LN	2371	S30453	304 LN		annealed	austenite
	1.4335	X 12 CrNi 25 21	X 12 CrNi 25 21	Z 12 CN 25 20	310 S 24	X 6 CrNi 26 20	SUH 310, SUS 310 S	2361	S31008	310 S		annealed	austenite
	1.4429	X 2 CrNiMoN 17 13 3	X 2 CrNiMoN 17 13 3	Z 2 CND 17 13 Az	316 S 62	X 2 CrNiMoN 17 13 3	SUS 316 LN	2375	S31653	316 LN		annealed	austenite
	1.4435	X 2 CrNiMo 18 14 3	X 2 CrNiMo 18 14 3	Z 2 CND 17 13	316 S 12	X 2 CrNiMo 17 13 2	SCS 16, SUS 316 L	2353	S31603	316 L		annealed	austenite
	1.4441	X 2 CrNiMo 18 15 3	X 2 CrNiMo 18 15 3							316 LVM			
	1.4466	X 5 CrNi 18 15	X 3 CrNiMo 18 12 3		317 S 16	X 5 CrNi 18 15	SUS 317	2366	S31700	317		annealed	austenite
	1.4893	X 9 CrNiSiNCe 21 11 2	X 9 CrNiSiNCe 21 11 2		310 S 31			2368	S30815		253 MA	annealed	austenite
M5	1.4417	X 2 CrNiMoSi 19 5	X 2 CrNiMoSi 19 5	Z 2 CND 18.05.2003				2376	S31500		3RE60	annealed	duplex
	1.4460	X 4 CrNiMo 27 5 2	X 3 CrNiMo 27 5 2	Z 3 CND 25.7 Az		X 3 CrNiMo 27 5 2	SUS 329 J 1	2324	S32900	329		annealed	duplex
	1.4462	X 2 CrNiMoN 22 5	X 2 CrNiMoN 22 5 3	Z 2 CND 22.05 Az	332 S 15	X 2 CrNiMoN 22 5		2377	S31803	329 LN	SAF 2205	annealed	duplex
	1.4539	X 2 NiCrMoCu 25 20 5	X 2 NiCrMoCu 25 20 5	Z 2 NCDU 25 20	904 S 13			2562	N08904	904L		annealed	super austenite
M6	1.4410	X 2 CrNiMoN 25 7 4	X 2 CrNiMoN 25 7 4	Z 3 CND 25.07 Az		X 2 CrNiMoN 25 7 4		2328	S32750	F 53	SAF 2507	annealed	super duplex
	1.4529	X 1 CrNiMoN 20 18 7	X 1 CrNiMoN 20 18 7	Z 1 CNDU 20.18.05 Az		X 1 CrNiMoN 20 18 7		2778	S31254		254 SMO	annealed	super austenite
	1.4534	X 3 CrNiMoAl 13 8 2	X 6 NiCrTiMoV 25 15						S13800	XM-13	PH13-8Mo	solution heat treatment	austenite
	1.4540	X 4 CrNiCuNb 16 4		Z 4 CNUNb 16.4 M					S15500	XM-12	15-5-PH	solution heat treatment	martensite
	1.4568	X 7 CrNiAl 17 7	X 3 CrNiMoAl 13 8 2	Z 9 CAN 17.7	301 S 81	X 7 CrNiAl 17 7	SUS 631	2388	S17700	AMS 5528	17-7-PH	solution heat treatment	austenite / ferrite
	1.4652	X 2 CrNiMoN 25 22 7	X 1 CrNiMoN 25 22 8						S32654		654 SMO	annealed	super austenite
	1.4876	X 10 NiCrAlTi 32 20	X 10 NiCrAlTi 32 20	Z 10 NC 32.21			NCF 800		N08800		Alloy 800	annealed	austenite
	1.4943	X 4 NiCrTi 25 15	X 5 CrNiCuNb 16 4	Z 6 NCTDV 25.15	HR 51		SUH 660	2570	S66286	660	A286	solution heat treatment	austenite

Clasificación de grupos de materiales
Material Group Classification

Fundición
Cast Irons

UMC	W.-Nr	DIN	EN	AFNOR	BS	UNI	JIS	SS	UNS	AISI / ASTM
K1	0.6010	GG-10	EN-GJL-100	Ft 10 D	Grade 100	G10	FC 100	01 10-00		A48 20 B
	0.6015	GG-15	EN-GJL-150	Ft 15 D	Grade 150	G15	FC 150	01 15-00	F11601	A48 25 B
	0.6020	GG-20	EN-GJL-200	Ft 20 D	Grade 220	G20	FC 200	01 20-00	F12101	A48 30 B
	0.6025	GG-25	EN-GJL-250	Ft 25 D	Grade 260	G25	FC 250	01 25-00	F12401	A48 35 B
K2	0.6030	GG-30	EN-GJL-300	Ft 30 D	Grade 300	G30	FC 300	01 30-00	F13101	A48 45 B
	0.6035	GG-35	EN-GJL-350	Ft 35 D	Grade 350	G35	FC 350	01 35-00	F13502	A48 50 B
	0.6040	GG-40	EN-GJL-400	Ft 40 D	Grade 400	G40				
K3	0.7033	GGG-35.3	EN-GJS-350-22	FGS 370-17	Grade 350/22		FCD 350-22L	07 17-15		
	0.7040	GGG-40	EN-GJS-400-15	FGS 400-12	Grade 420/12	GS 400-12	FCD 400-18L	07 17-02	F32800	60-40-18
	0.7043	GGG-40.3	EN-GJS-400-18	FGS-370-17	Grade 370/17	GSO 42/17		07 17-12	F32800	60-40-18
	0.8035	GTW-35-04	EN-GJMW-350-4	MB 350-7	W 35-04	W 35-04	FCMW 300			
	0.8040	GTW-40-05	EN-GJMW-400-5	MB 400-5	W 40-05	GMB 40	FCMW 370			
	0.8135	GTS-35-10	EN-GJMB-350-10	MN 350-10	B 340/12					32-51-00
K4	0.7050	GGG-50	EN-GJS-500-7	FGS 500-7	Grade 500/7	GS 500-7	FCD 500-7	07 27-02	F33800	A536 80-55-6
	0.7060	GGG-60	EN-GJS-600-3	FGS 600-3	Grade 600/3	GS 600-3	FCD 600-3	07 32-03	F34100	A476 80-60-03
	0.7070	GGG-70	EN-GJS-700-2	FGS 700-2	Grade 700/2	GS 700-2	FCD 700-2	07 37-01	F34800	A536 100-70-03
	0.7080	GGG-80	EN-GJS-800-2	FGS 800-2	SNG 800/2	GS 800-2	FCD 800		F36200	120-90-2
	0.8045	GTW-45-07	EN-GJMW-450-7	MB 450-7	W 45-07	GMB 45	FCMWP 440			
	0.8055	GTW-55				GMB 55				
	0.8065	GTW-65				GMB 65				
	0.8145	GTS-45-06	EN-GJMB-450-6	MN 450-6	P 440/7	P 45-06				
	0.8155	GTS-55-04	EN-GJMB-550-4	MN 550-4	P 510/4	P 55-04				
	0.8165	GTS-65-02	EN-GJMB-650-2	MN 650-3	P 570/3	P 65-02				
K5		GJS-800-8	EN-GJS-800-8						ADI grade 1	850/550/10
		GJS-1000-5	EN-GJS-1000-5						ADI grade 2	1050/700/7
		GJS-1200-2	EN-GJS-1200-2						ADI grade 3	1200/850/4
		GJS-1400-1	EN-GJS-1400-1						ADI grade 4	1400/1100/1
K6		GJV-300	EN-GJV-300							Grade 350
		GJV-350	EN-GJV-350							Grade 400
		GJV-400	EN-GJV-400							Grade 400-15
		GJV-450	EN-GJV-450							Grade 450
		GJV-500	EN-GJV-500							Grade 500
K7	0.6652	GGL-NiMn-13-7	EN-GJLA-XNiMn-13-7	L-NM 13 7	L-NM 13 7		FCA NiMn 13 7		F43000	
	0.6655	GGL-NiCuCr-15-6-2	EN-GJLA-XNiCuCr-15-6-2	L-NUC 15 6 2	Grade F1		FCA NiCuCr 15 6 2		F41000	A436 Type 1
	0.6660	GGL-NiCr-20-2	EN-GJLA-XNiCr 20-2	L-NC 20 2	Grade F2		FCA NiCr 20 2	05 23-00	F41002	A436 Type 2
	0.6667	GGL-NiSiCr-20-5-3	EN-GJLA-XNiSiCr-20-5-3	L-NSC 20 5 3			FCA NiSiCr 20 5 3			
	0.6676	GGL-NiCr 30 3	EN-GJLA-XNiCr 30-3	FGL Ni30 Cr3	Grade F3				F41004	A436 Type 3
	0.6678	GGL-NiCr-35-2								
	0.6680	GGL-NiSiCr30-5-5								
K8	0.7659	GGG-NiCrNb-20-2	EN-GJSA-XNiCrNb-20-2							
	0.7683	GGG-Ni-35	EN-GJSA-XNi35	FGS Ni35					F43006	A439 Type D-5
	0.7660	GGG-NiCr-20-2	EN-GJSA-XNiCr20-2	FGS Ni20 Cr2	Grade S2		FCDA NiCr 20 2		F43000	A436 Type D-2
	0.7665	GGG-NiSiCr20-5-2	EN-GJSA-XNiSiCr-20-5-2	S-NSC 20 5 2			FCDA NiSiCr 20 5 2			
	0.7670	GGG-Ni-22	EN-GJSA-Xni-22	S-N 22	S-Ni 22		FCDA Ni 22		F43002	A439 Type D-2C
	0.7676	GGG-NiCr-30-3	EN-GJSA-XNiCr30-3	FGS Ni30 Cr3	Grade S3				F43003	A436 Type D-3
	0.7652	GGG-NiMn-13-7	EN-GJSA-XNiMn13-7	FGS Ni13 Mn7	Grade S6		FCDA 13 7	07 72-00		
	0.7673	GGG-NiMn-23-4	EN-GJSA-XNiMn23-4	FGS Ni23 Mn4	Grade S2M		FCDA NiMn 23 4		F43010	A439 Type D-2M
	0.7680	GGG-NiSiCr30-5-5								
	0.7688	GGG-NiSiCr35-5-2								

Clasificación de grupos de materiales

Material Group Classification

Materiales no ferrosos

Non-Ferrous Metals

UMC	W.-Nr	DIN	EN	AFNOR	BS	UNI	JIS	SS	UNS	AISI / ASTM
N1	3.0255	Al99.5	AW-1050A	A5	1B	4507		4007	AA1050A	
	3.0305	Al99.9	AW-1090							
	3.0515	AlMn1	AW-3103	A-M1	N3	3568		4054	AA3103	
	3.0517	AlMn1Cu	AW-3003	A-M1			A3003		AA3003	
	3.1255	AlCuSiMn	AW-2014	A-U4SG	H15			4338	AA2014	
	3.1655	AlCuBiPb	AW-2011	A-U5PbBi	FC1		A2011	4355	AA2011	
	3.2315	AlMgSi1	AW-6082	A-SGM0.7	H30			4212	AA6082	
	3.3206	AlMgSi0.5	AW-6060	A-GS	H9			4103	AA6060	
	3.3210	AlMgSi0.7	AW-6063	A-GSUC				4104	AA6005	
	3.3241	G-AlMg3Si	AW-6061		H20					
	3.3245	AlMg3Si								
	3.3261	G-AlMg5Si								
	3.3315	AlMg1	AW-5005	A-G0.6	N41			4106	AA5005	
	3.3523	AlMg2.5		5052	2L56				AA5052	
	3.3535	AlMg3	AW-5754	A-G3M	N5				AA5754	
	3.3541	G-AlMg3								
	3.3561	G-AlMg5								
	3.4335	AlZn4.5Mg1	AW-7020	A-Z5G	H17			4425	AA7020	
	3.4365	AlZnMgCu1.5	AW-7075	A-Z5GU	2L95/2L96	7075	A7075		AA7075	
	3.5103	G-MgSe3Zn2Zr1	MN65120	ZRE1	MAG6-TE				M12330	AMS 4442
	3.3527	AlMg2Mn0.8	AW-5049							
	3.5470	GD-MgAl4Si1		G-A4S1						
	3.5555	AlMg5								
	3.5612	G-MgAl6Zn	MG-P-63	G-A6Z1	MAG-E-121				M11600	AZ61A
	3.5632	G-MgAl6Zn3								
	3.5812	G-MgAl8Zn	MG-P-61	G-A7Z1	MAG1					AZ80A
N2	3.1263	GK-AlCu5Si3								
	3.2131	G-AlSi5Cu1								
	3.2134	G-AlSi5Cu1Mg	AC-AlCu4Ti							
	3.2151	GK-AlSi6Cu4	AC-45000							
	3.2152	GD-AlSi6Cu4	AC-AlSi6Cu4							
	3.2153	G-AlSi7Cu3								
	3.2245	SG-AlSi5								
	3.2341	G-AlSi5Mg	AC-42000	A-S7G	LM25	3599	AC 4C	4244		B26
	3.2371	G-AlSi7Mg	AC-42100							
N3	3.2161	G-AlSi8Cu3	AC-46200					4251	A13800	A380
	3.2162	GD-AlSi8Cu3								
	3.2163	GK-AlSi9Cu3	AC-46200							
	3.2211	GK-AlSi11								
	3.2373	G-AlSi9Mg	AC-AlSi9Mg							
	3.2381	G-AlSi10Mg	AC-43400	A-S10G	LM9			4253	A13600	B85
	3.2382	GD-AlSi12	AC-44200							A413.2
	3.2383	G-AlSi10MgCu	AC-43200							
	3.2581	G-AlSi12	AC-44200	A-S13	LM6	3051		4261		
	3.2582	GD-AlSi15	AC-44300					4247		
	3.2583	G-AlSi12Cu			LM20			4260		
	3.2982	GD-AlSi12Cu	AC-47100							
N4		G-AlSi17Cu4Mg					ADC14			B390.0
		G-AlSi18								
		GK-AlSi18CuNiMg								
		G-AlSi21CuNiMg								
		GKAlSi25CuNiMg								

Clasificación de grupos de materiales

Material Group Classification

UMC	W.-Nr	DIN	EN	AFNOR	BS	UNI	JIS	SS	UNS	AISI / ASTM
N5	2.0380	CuZn39Pb2	CW612N							
	2.0401	CuZn39Pb3	CW614N	CuZn39Pb3	CZ121			5170	C38500	
	2.0402	CuZn40Pb2	CW617N	CuZn39Pb2	CZ122			5168	C37800	
	2.0410	CuZn44Pb2	CW622N		CZ104			5272	C68700	
	2.0580	CuZn40Mn1Pb								
	2.0771	CuNi7Zn39Mn5Pb3								
	2.1061	G-CuSn11Pb2-C	CC482K	CuSn12Pb	PB4				C92500	
	2.1076	CuSn4Pb4Zn4	CW456K	CuSn4Pb4Zn4			C5441		C54400	
	2.1080	CuSn6Zn6								
	2.1086	G-CuSn10Zn								
	2.1090	G-CuSn7Zn4Pb7-C	CC493K	CuSn7Pb6Zn4					C93200	
	2.1096	G-CuSn5Zn5Pb5	CC491K	CuSn5Pb5Zn5	LG2		BC6		C83600	
	2.1176	CuPb10Sn	CW352H	CuSn10Pb10	LB2			5640	C93700	CA937
N6	2.0240	CuZn15	CW502L	CuZn15	CZ102		C2300	5112	C23000	
	2.0250	CuZn20								
	2.0265	CuZn30					C2600		C26000	
	2.0321	CuZn37	CW508L	CuZn37	CZ108	P-CuZn37	C2720	5150	C27200	
	2.0360	CuZn40	CW509L						C28000	
	2.0470	CuZn28Sn1	CW706R	CuZn29Sn1				5220	C44300	
	2.0530	CuZn38Sn1	CW717R						C46400	
	2.0561	CuZn40Al1								
	2.0790	CuNi18Zn19Pb		CuNi18Zn19Pb1					C76300	
	2.0872	CuNi10Fe1Mn	CW325H	CuNi10Fe1Mn	CN102	Pt-CuNi10Fe1Mn		5667	C70600	
	2.0932	CuAl8Fe3	CW303G	CuAl7Fe2	CA106	P-CuAl8Fe3			C61400	
	2.0940	CuAl10Fe	CC331G	CuAl10Fe	AB1			5710	C95200	CA952
	2.0966	CuAl10Ni5Fe4	CW307G	CuAl10Ni5Fe4	CA104				C63000	
	2.0975	CuAl10Ni5Fe5-C	CC333G	CuAl10Ni5Fe5	AB2	CuAl11Fe4Ni4		5716	C95500	CA955
	2.1020	CuSn6	CW452K	CuSn6	PB103	CuSn7	C5191	5428	C51900	
	2.1030	CuSn8	CW453K	CuSn8	PB104		C5210	5431	C52100	
	2.1050	CuSn10	CC480K	CuSn10	CT1			5443	C90700	
	2.1087	CuSn10Zn						5458	C90500	
	2.1247	CuBe2								
	2.1293	CuCrZr			CC102				C18200	
	2.1522	CuSi2Mn								
	2.1525	CuSi3Mn								

Clasificación de grupos de materiales
Material Group Classification

Superaleaciones
Superalloys

UMC	W.-Nr	DIN	UNS	AISI / ASTM	Div.
S1			S35000	633	AM350
			S42300	619	Lapelloy
	1.4958	X5NiCrAlTi 31 20	N08010		Incoloy 800
	1.4974	X12CrCoNi 21 20	R30155	661	N 155
S2	1.4545	X5CrNiCu 15 5	S15500	XM-12	15-5PH
	1.4548	X5CrNiCuNb 17 4 4	S17400	630	17-4PH
	1.4980	X6NiCrTiMoVB 25 15 2	S66286	660	Incoloy A 286
S3					Haynes 25
	2.4683	CoCr22NiW			Alloy 188
	2.4681	CoCr26Ni9Mo5W			ULTIMET
	2.4711	CoCr20Ni15Mo			ELGILOY
	2.4778	CoCr28			Alloy 150
	2.4967	CoCr20W15Ni			Alloy 25
					H531
					Stellite 6
					Stellite 12
	2.4979	CoCr28MoNi			Stellite 21
					Stellite 31
S4	2.4631	NiCr20TiAl	N07080		Nimonic 80A
	2.4654	NiCr20Co13Mo4Ti3Al	N07001		Waspaloy
	2.4668	NiCr19Fe19Nb5Mo3	N07718		Inconel 718
	2.4669	NiCr15Fe7TiAl	N07750		Inconel X-750
	2.4810	NiMo30	N10002		Hastelloy C
	2.4816	NiCr15Fe	N06600		Inconel 600
	2.4819	NiMo16Cr15W	N10276		Hastelloy C-276
	2.4856	NiCr22Mo9Nb	N06625		Inconel 625
	2.4983	NiCr18Co	N07500	684	Udimet 500

Aleaciones de titanio
Titanium Alloys

UMC	W.-Nr	DIN	UNS	AISI / ASTM	Div.
S11	3.7025	Ti1			Grade 1
	3.7035	Ti2			Grade 2
	3.7055	Ti3			Grade 3
	3.7065	Ti4			Grade 4
	3.7114	TiAl5Sn2	R54520		
S12	3.7144	TiAl6Sn2Zr4Mo2	R54620	AMS 4919	Ti 6-2-4-2 / Timetal 1100
	3.7154	TiAl6Zr5			Timetal 685
	3.7195	TiAl3V2.5	R56320	AMS 4943	Grade 9
S13	3.7165	TiAl6V4	R56400	AMS 4920, Grd 5	Ti 6Al-4V
		TiAl6Sn2Zr4Mo6	R56260		Ti 6-2-4-6
		TiAl5Sn2Zr2Mo4Cr4	R58650		Ti 17
	3.7174	TiAl6V6Sn2			
	3.7185	TiAl4Mo4Sn2			Hylite 50
S14		TiV10Fe2Al3		AMS 4986	Ti 10V-2Fe-3Al
		TiAl4.5V3Mo2Fe2			SP 700
		TiMo11Zr6Sn4.5			Beta III
		TiV10Fe2Al3			Ti 10-2-3
		TiV15Cr3Al3Sn3			Ti 15-3

Clasificación de grupos de materiales
Material Group Classification

Aceros templados
Hardened Steels

UMC	W.-Nr	DIN	EN	AFNOR	BS	UNI	JIS	SS	UNS	AISI / ASTM	Condition
H1	1.1201	42 CrMo 4	42 CrMo 4	42 CD 4	708 M40	42 CrMo 4	SCM 440 (H)	2244	G41400	4142, 4140	hardened and tempered
	1.2312	40 CrMnMoS 8 6 4	40 CrMnNiMoS 8 6 4	40 CMD 8 S							hardened and tempered
	1.2316	X 36 CrMo 17	X 36 CrMo 17	Z 35 CD 17							hardened and tempered
	1.2343	X 38 CrMoV 5 1		Z 38 CDV 5	BH 11	X 37 CrMoV 5 1 KU	SKD 6		T 20811	H11	hardened and tempered
	1.4534	X 3 CrNiMoAl 13 8 2	X 3 CrNiMoAl 13 8 2						S13800	XM-13	hardened and tempered
	1.6582	34 CrNiMo 6	34 CrNiMo 6	35 NCD 6	817 M 40	35 NiCrMo 6 (KW)	SNCM 447	2541		4340	hardened and tempered
	1.7131	16 MnCr 5	16 MnCr 5	16 MC 5	527 M 17	16 MnCr 5	SCR 415	2511	G51170	5115	hardened and tempered
H2	1.2344	X 40 CrMoV 5 1	X 40 CrMoV 5 1	Z 40 CDV 5	BH 13	X 40 CrMo 5 1 1 KU	SKD 61	2242	T 20813	H13	hardened and tempered
	1.2550	60 WCrV 7		55 WC 20		55 WCrV 8 KU				S1	hardened and tempered
	1.2767	X 45 NiCrMo 4	X 45 NiCrMo 4	Y 35 NCD 16		42 NiCrMo 15 7 KU			T 30109	6F7	hardened and tempered
	1.4109	X 65 CrMo 14	X 70 CrMo 15	Z 70 D 14			SUS 440 A		S44002	440 A	hardened and tempered
	1.4112	X 90 CrMoV 18	X 90 CrMoV 18	Z 2 CND 18 05	409 S 19	X CrTi 12	SUS 440 B	2327	S44003	440 B	hardened and tempered
	1.7225	42 CrMo 4	42 CrMo 4	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	2244	G 41400	4142, 4140	hardened and tempered
H3	1.1191	Ck 45	C 45 E	XC 42	080 M 46	C 45	S 45 C	1672	G 10420	1045	hardened and tempered
	1.1231	Ck 67	C 67S	XC 68	060 A 67	C 70		1770	G10700	1070	hardened and tempered
	1.1248	Ck 75	C 75S	XC 75	060 A 78	C 75		1774, 1778	G10780	1078, 1080	hardened and tempered
	1.1274	Ck 101	C 100S		060 A 96		SUP 4	1870	G10950	1095	hardened and tempered
	1.1545	C 105 W1	C 105U	Y1 105		C 100 KU		1880		W 1	hardened and tempered
	1.2162	21 MnCr 5	21 MnCr 5	20 NC 5			SCR 420 H				hardened and tempered
	1.2210	115 CrV 3	107 CrV 3	100 C 3		107 CrV 3 KU			T 61202	L2	hardened and tempered
	1.2363	X 100 CrMoV 5 1	X 100 CrMoV 5	Z 100 CDV 5	BA 2	X 100 CrMoV 5 1 KU	SKD 12	2260	T30102	A2	hardened and tempered
	1.2379	X 155 CrVMo 12 1	X 155 CrVMo 12 1	Z 160 CDV 12	BD 2	X 155 CrVMo 12 1 KU	SKD 11		T30402	D2	hardened and tempered
	1.2436	X 210 CrW 12				X 215 CrW 12 1 KU	SKD 2	2312			hardened and tempered
	1.2510	100 MnCrW 4		90 MWCV 5	BO 1	95 MnWCr 5 KU	SKS 3	2140	T 31501	O1	hardened and tempered
	1.2842	90 MnCrV 8	90 MnCrV 8	90 MV 8	BO 2	90 MnVCr 8 KU			T 31502	O2	hardened and tempered
	1.3243	S 6-5-2-5	HS 6-5-2-5	Z 85 WDKCV 06-05-05-04-02		HS 6-5-2-5	SKH 55	2723		M35	hardened and tempered
	1.3247	S 2-10-1-8	HS 2-10-1-8	Z 110 DKCWV 09-08-04	BM 42	HS 2-9-1-8	SKH 51		T11342	M42	hardened and tempered
	1.3343	S 6-5-2	HS 6-5-2	Z 85 WDCV 06-05-04-02	BM 2	HS 6-5-2	SKH 9, SKH 51	2722	T11302	M2	hardened and tempered
	1.3355	S 18-0-1	HS 18-0-1	Z 80 WCV 18-04-01	BT 1	HS 18-0-1	SKH 2		T12001	T1	hardened and tempered
	1.3505	100 Cr 6	100 Cr 6	100 C 6	534 A 99	100 Cr 6	SUJ 2	2258	G51986	52100	hardened and tempered
	1.4125	X 105 CrMo 17	X 105 CrMo 17	Z 100 CD 17		X 105 CrMo 17	SUS 440 C		S44004	440 C	hardened and tempered
	1.5752	14 NiCr 14	14 NiCr 14	12 NC 15	655 M 13		SNC 815 (H)		G 33106	3310, 9314	hardened and tempered
	1.6587	18 CrNiMo 7 6	18 NiCrMo 7 6	18 NCD 6	820 A 16	18 NiCrMo 7					hardened and tempered

Clasificación de grupos de materiales

Material Group Classification

Materiales metalúrgicos en polvo

Powder Metallurgical Materials

UMC	W.-Nr
SM1	Sint-C 00
	Sint-D 00
	Sint-E 00
	Sint-C 01
	Sint-D 01
	Sint-C 10
	Sint-D 10
	Sint-E 10
	Sint-C 11
	Sint-D 11
	Sint-C 21
SM2	Sint-C 31
	Sint-D 31
	Sint-E 31
	Sint-C 32
	Sint-D 32
	Sint-C 35
	Sint-D 35
	Sint-C 36
	Sint-D 36
	Sint-C 39
	Sint-D 39
SM3	Sint-C 40
	Sint-D 40
	Sint-C 42
	Sint-C 43

Materiales de plástico y compuestos

Composite Materials

UMC	Code	Chemical Description	Trade Names
O1	PC	Polycarbonate	Makrolon, Lexan
	PMMA	Polymethylmethacrylate	Acrylite, Plexiglas
	PS	Polystyrene	Luran, Styron
	PA	Polyamide	Ertalon, Ultramid
	POM	Polyoxymethylene	Delrin, Hostaform
	PP	Polypropylene	Hostalen, Vestolen
	PSU	Polysulfone	Mindel, Ultrason
O2	PF	Phenol formaldehyde resin	Bakelite, Supraplast
	MF	Melamine formaldehyde resin	Resopal, Hornit
	UF	Urea formaldehyde resin	Resamin, Urecoll
	EP	Epoxy resin	Epoxy, Araldit
O3	PA 6 GF 10	Polyamide 6 reinforced with 10% GF	
	PA 6 GF 30	Polyamide 6 reinforced with 30% GF	
	PC GF 20	Polycarbonate reinforced with 20% GF	
	POM GF 20	Polyoxymethylene reinforced with 20% GF	
	POM GF 30	Polyoxymethylene reinforced with 30% GF	
	PSU GF 30	Polysulfone reinforced with 30% GF	
O4	GFK	Glass fibre reinforced plastic	
	CFK	Carbon fiber reinforced plastic	

URMA AG WERKZEUGFABRIK
Obermatt 3
CH-5102 Rupperswil
Switzerland
T +41 62 889 20 20
F +41 62 889 20 28
info@urma.ch
www.urma.ch

SWISS QUALITY

Download on the App Store

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S.M.A.G.

Subsidiaries

URMA GmbH
Eisenbahnstraße 37
DE-77815 Bühl
+49 7223 911 170
info@urma-gmbh.de

URMA Trading (Shanghai) Co. Ltd.
Room 511, Hua Nan Mansion
1988 Dongfang Road
Pudong New District
CN-200125 Shanghai
+86 (21) 6109 6216
info@urmachina.com

Iraupen URMA
Polígono Belartza
ES-20018 Donostia-San Sebastian
Spain
+34 943 667 036
info@iraupen.es

License Manufacturer

Command Tooling Systems, LLC
13931 Sunfish Lake Blvd.
Ramsey MN, 55303 USA
+1 800 328 2197
support@commandtool.com

Paul Horn GmbH
Unter dem Holz 33-35
DE-72072 Tübingen
+49 (0) 7071 7004 0
info@phorn.de

Sumitomo Electric Ind., Ltd.
1-1-1, Koyakita,
Itami-shi, Hyogo 664-0016
Japan
+81 72 772 4535
info@sumitomotool.com