



www.urma.ch

A close-up photograph of several URMA reaming tools. The tools are made of polished metal and have distinctive orange-colored handles. The handles are shaped like gear wheels with multiple teeth. The tools are arranged in a row, with the one in the foreground being the most prominent. The background is slightly blurred, showing more tools and parts of a machine.

**Innovation Is
Our Tool**

SWISS  QUALITY

URMA Reaming Technology Guide

Ø 7.600 – 13.600 mm

Ø 11.900 – 140.600 mm

Ø 5.800 – 33.100 mm

Table des matières

Table of Contents

RX small		7
Exemple de commande	Order Example	8
Géométries de coupe	Cutting Geometries	10
Une d'ensemble des matières de coupe	Cutting Materials overview	11
Données de coupe	Cutting Data	12
Instructions d'utilisation	Handling Instructions	24
Manuel d'instruction	Instruction Manuals	27
Stratégies d'usinage	Machining Strategies	57
RX medium		31
Exemple de commande	Order Example	32
Géométries de coupe	Cutting Geometries	34
Une d'ensemble des matières de coupe	Cutting Materials overview	35
Données de coupe	Cutting Data	36
Instructions d'utilisation	Handling Instructions	48
Manuel d'instruction	Instruction Manuals	50
Stratégies d'usinage	Machining Strategies	57
RM vario		61
Exemple de commande	Order Example	62
Une d'ensemble des matières de coupe	Cutting Materials overview	63
Données de coupe	Cutting Data	64
Instructions d'utilisation	Handling Instructions	76
Manuel d'instruction	Instruction Manuals	77
Technology		81
Résolution des problèmes centre de fraisage	Troubleshooting Machining Centre	82
Résolution des problèmes centre de tournage	Troubleshooting Lathe	84
Définitions et formules de base	Definitions and Basic Formulas	86
Étude d'usinage	Machining Study	87
Tableau des matériaux	Material Comparison Table	88
Classification des groupes de matériaux	Material Group Classification	92

URMA Reaming
RX small

Exemple de commande

Order Example

Diamètre d'alésage Bore Diameter		Diamètre de l'insert Insert Diameter	
Tolérances d'alésage ISO ISO Bore Tolerances	Tolérances d'alésage en µm Bore Tolerance in µm	Dimension fixe (Insert Q) Target Size (Q-Insert)	
Exemple de commande Order Example RXsG8 H7 -A01 U2 F0512R1	Exemple de commande Order Example RXsG8 +20-10 -A01 U1 F0514R1	Exemple de commande Order Example RXsG 8.020Q+3-3 -A01 U2 F0512R1	
RXs Désignation du système RX small RX small system designation	RXs Désignation du système RX small RX small system designation	RXs Désignation du système RX small RX small system designation	
G Forme de l'insert (G = droit ; L = oblique gauche) Flute form (G = straight; L = left-hand helix)	G Forme de l'insert (G = droit ; L = oblique gauche) Flute form (G = straight; L = left-hand helix)	G Forme de l'insert (G = droit ; L = oblique gauche) Flute form (G = straight; L = left-hand helix)	
8 Diamètre (mm) Diameter (mm)	8 Diamètre (mm) Diameter (mm)	8.020 Diamètre de l'insert Insert diameter (mm)	Diameter
H7 Tolérances en standard ISO Tolerance in ISO standard	+20-10 Tolérances d'alésage (µm) Bore tolerance (µm)	Q Code pour inserts dim. fixe Code for target size insert	
A01 Géométrie de l'insert Cutting geometry	A01 Géométrie de l'insert Cutting geometry	+3-3 Tolérances de fabrication (µm) Manufacturing tolerance (µm)	
A01 Géométrie de l'insert Cutting geometry	A01 Géométrie de l'insert Cutting geometry	A01 Géométrie de l'insert Cutting geometry	
Option			Option
U2 Préparation des arêtes Pour les détails voir page 9 Edge preparation For details see page 9	U1 Préparation des arêtes Pour les détails voir page 9 Edge preparation For details see page 9	U2 Préparation des arêtes Pour les détails voir page 9 Edge preparation For details see page 9	
F05 Matériau de coupe Pour les détails voir page 11 Cutting material For details see page 11	F05 Matériau de coupe Pour les détails voir page 11 Cutting material For details see page 11	F05 Matériau de coupe Pour les détails voir page 11 Cutting material For details see page 11	
12R Revêtement Pour les détails voir page 11 Coating For details see page 11	14R Revêtement Pour les détails voir page 11 Coating For details see page 11	12R Revêtement Pour les détails voir page 11 Coating For details see page 11	
1 1 = revêtement fin 2 = revêtement épais 1 = thin coating 2 = thick coating	1 1 = revêtement fin 2 = revêtement épais 1 = thin coating 2 = thick coating	1 1 = revêtement fin 2 = revêtement épais 1 = thin coating 2 = thick coating	

Détails relatifs à l'exemple de commande

Details Order Example

Tolérances d'alésage et épaisseurs de revêtement applicables

Bore Tolerances and Applicable Coating Thickness

Plage de tolérance d'alésage Bore Tolerance Range	Sans revêtement Uncoated	Épaisseur de revêtement Coating Thickness		Supplément de prix pour tolérances serrées Surcharge for Tight Tolerances
		1	2	
≥ 14 µm	x	x	x	-
10 – 13 µm	x	x		-
			x	x
6 – 9 µm	x			-
		x	-	x

Exemple: Diamètre d'alésage 20H7 = plage de tolérance 21 µm = **≥ 14 µm** Diamètre d'alésage 12^{+0.006/0.005} = plage de tolérance 11 µm = **10 – 13 µm**
 Example: Bore diameter 20H7 = tolerance range 21 µm = **≥ 14 µm** Bore diameter 12^{+0.006/0.005} = tolerance range 11 µm = **10 – 13 µm**

Dimension fixe (Q insert) et épaisseurs de revêtement applicables

Target Size (Q-Inserts) and Applicable Coating Thickness

Tolérance de l'insert Insert Tolerance	Sans revêtement Uncoated	Épaisseur de revêtement Coating Thickness		Supplément de prix pour tolérances serrées Surcharge for Tight Tolerances
		1	2	
± 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 = Non applicable
N/A = Not applicable

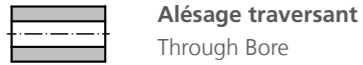
Préparation des arêtes (Finition Nano)

Edge preparation (Nano Finishing)

U1 Préparation simple des arêtes Light edge-preparation	U2 Préparation moyenne des arêtes Medium edge-preparation	U_ Autres préparations des arêtes sur demande Other edge-preparations on request
---	---	--

Données de coupe RX small

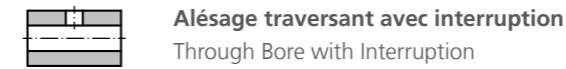
Cutting Data RX small



ISO	UMC	AC	Type	Geometry	Grade	Vc	fz		Radial / Stock Removal	
							Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	ap Ø 7.600-9.600 mm	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 Conditions d'utilisation**
- 1 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement 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



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

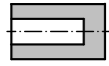
- AC Conditions d'utilisation**
- 4 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement 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 88

Données de coupe RX small

Cutting Data RX small

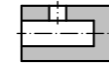


Trou borgne
Blind Hole

ISO	UMC	AC	Type	Grade	Sort	Vc	fz		Radial / Stock Removal	
							Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	ap Ø 7.600-9.600 mm	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 Conditions d'utilisation**
- 1 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement 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



Trou borgne avec interruption
Blind Hole with Interruption

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

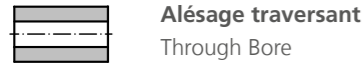
- AC Conditions d'utilisation**
- 4 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement 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 88

Données de coupe RX small

Cutting Data RX small



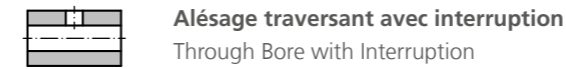
Alésage traversant
Through Bore

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz		Radial / Stock Removal	
							Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	ap Ø 7.600-9.600 mm	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 Conditions d'utilisation**
- 1 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement 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



Alésage traversant avec interruption
Through Bore with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut		fz Interrupted	Radial / Stock Removal			
					Ø 7.600-9.600 mm	Ø 9.601-13.100 mm		ap Ø 7.600-9.600 mm	ap Ø 9.601-13.100 mm		
K	4	RXsG	A01	F0514R2	100-140-180	0.12-0.18-0.25	0.16-0.22-0.30	fz coupe complète réduite de 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

N	4	RXsL	B07	F0510C	180-250-320	0.18-0.25-0.35	0.18-0.25-0.35	fz coupe complète réduite de 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

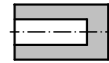
- AC Conditions d'utilisation**
- 4 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement 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

Données de coupe RX small

Cutting Data RX small



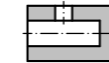
Trou borgne
Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz		Radial / Stock Removal	
							Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	ap Ø 7.600-9.600 mm	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		

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz		Radial / Stock Removal	
							Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	ap Ø 7.600-9.600 mm	ap Ø 9.601-13.100 mm
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 Conditions d'utilisation**
- 1 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement 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



Trou borgne avec interruption
Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut		fz Interrupted	Radial / Stock Removal		
					Ø 7.600-9.600 mm	Ø 9.601-13.100 mm		ap Ø 7.600-9.600 mm	ap Ø 9.601-13.100 mm	
K	4	RXsG	A01	F0514R2	100-140-180	0.12-0.18-0.25	0.16-0.22-0.30	fz coupe complète réduite de 30 - 60% reduce fz full cut 30 - 60%	0.10-0.15	0.10-0.15-0.20
		RXsG	A01	F0514R2	80-120-160	0.10-0.15-0.20	0.12-0.18-0.25			
		RXsG	G01	F0514R2	70-100-140	0.08-0.12-0.16	0.10-0.15-0.20			
	5	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
		RXsG	A01	F0514R2	80-120-160	0.10-0.15-0.20	0.12-0.18-0.25			
		RXsG	G01	F0514R2	70-100-140	0.08-0.12-0.16	0.10-0.15-0.20			
	6	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
		RXsG	A01	F0514R2	80-120-160	0.10-0.15-0.20	0.12-0.18-0.25			
		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		0.075-0.10-0.15	0.10-0.15
		RXsG	A01	F0514R2	80-100-120	0.10-0.15-0.20	0.12-0.18-0.25			
		RXsG	G01	F0514R2	80-100-120	0.08-0.12-0.16	0.10-0.15-0.20			
	5	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
		RXsG	A01	F0514R2	60-80-100	0.08-0.14-0.18	0.10-0.15-0.20			
		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
		RXsG	A01	F0514R2	60-80-100	0.08-0.12-0.14	0.10-0.14-0.18			
		RXsG	G11	F0514R2	50-70-90	0.08-0.10-0.12	0.10-0.12-0.18			
	5	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
		RXsG	A01	F0512R1	40-60-80	0.08-0.10-0.12	0.08-0.10-0.12			
		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
		RXsG	A01	F0512R1	40-60-80	0.08-0.10-0.12	0.08-0.10-0.12			
		RXsG	G11	F0512R1	25-40-70	0.06-0.08-0.10	0.08-0.10-0.12			

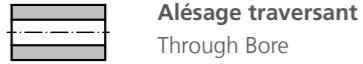
AC	Type	Geometry	Grade	Vc	fz Full Cut		fz Interrupted	Radial / Stock Removal		
					Ø 7.600-9.600 mm	Ø 9.601-13.100 mm		ap Ø 7.600-9.600 mm	ap Ø 9.601-13.100 mm	
N	4	RXsG	G07	F0510C	180-250-320	0.10-0.14-0.20	0.12-0.18-0.25	fz coupe complète réduite de 30 - 60% reduce fz full cut 30 - 60%	0.050-0.075	0.05-0.075-0.10
		RXsG	G07	F0510C	160-220-280	0.10-0.14-0.20	0.12-0.16-0.22			
		RXsG	G07	F0510C	140-180-220	0.10-0.12-0.16	0.10-0.14-0.20			
	5	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
		RXsG	G07	F0510C	160-220-280	0.10-0.14-0.20	0.12-0.16-0.22			
		RXsG	G07	F0510C	140-180-220	0.10-0.12-0.16	0.10-0.14-0.20			
	6	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
		RXsG	G17	F0520C	160-220-280	0.10-0.14-0.20	0.12-0.16-0.22			
		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
		RXsG	G16	F0520C	140-180-220	0.10-0.14-0.20	0.10-0.14-0.20			
		RXsG	G16	F0520C	140-160-200	0.10-0.12-0.16	0.10-0.12-0.16			
	5	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
		RXsG	G16	F0520C	140-160-200	0.10-0.14-0.18	0.10-0.14-0.18			
		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
		RXsG	G16	F0520C	50-70-100	0.10-0.14-0.18	0.10-0.14-0.18			
		RXsG	G16	F0520C	40-60-80	0.08-0.10-0.14	0.08-0.10-0.14			

- AC Conditions d'utilisation**
- 4 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil ≤ 11xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Longueur de l'outil ≤ 15xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible

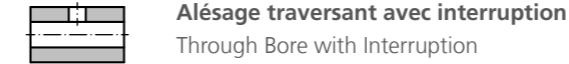
- AC Application Conditions**
- 4 Optimal conditions
 - Stable fixture, machine and/or workpiece
 - Tool projection length ≤ 11xD
 - Optimal chip removal guaranteed
 - Slightly symmetrical and asymmetrical interruption (< 10%)
 - Internal coolant supply > 20 bar
 - 5 Suboptimal conditions
 - Slightly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

Données de coupe RX small

Cutting Data RX small



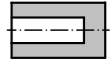
ISO	UMC	AC	Type	Geometry	Grade	Vc	fz		Radial / Stock Removal ap		
							Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	
S	S1	1	RXsL	A07	F0512R1	20-35-45	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
		2	RXsL	A07	F0512R1	20-35-45	0.05-0.08-0.10	0.05-0.08-0.10			
		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	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			



AC	Type	Geometry	Grade	Vc	fz Full Cut		fz Interrupted	Radial / Stock Removal ap						
					Ø 7.600-9.600 mm	Ø 9.601-13.100 mm		Ø 7.600-9.600 mm	Ø 9.601-13.100 mm					
S	S1	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	20-35-45	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						
		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						
	S2	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						
		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						
	S11	S11	4	RXsL	A06	F0512R1	20-40-60	0.05-0.08-0.10	0.05-0.08-0.10	fz coupe complète réduite de 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	15-25-30	0.04-0.06-0.08	0.04-0.06-0.08					
		S12	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					
		S13	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					
		S14	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					
H	H1	4	RXsL	A06	F0507R1	15-25-30	0.04-0.06-0.08	0.04-0.06-0.08	fz coupe complète réduite de 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						
	H2	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						
	H3	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						
SM	SM1	4	RXsL	A07	F0512R1	140-180-220	0.18-0.22-0.30	0.18-0.22-0.30	fz coupe complète réduite de 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						
	SM2	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						
	SM3	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						
O	O1	4	RXsL	A07	F0510C	40-60-80	0.10-0.15-0.20	0.10-0.15-0.20	fz coupe complète réduite de 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</							

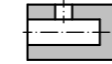
Données de coupe RX small

Cutting Data RX small



Trou borgne
Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz		Radial / Stock Removal ap		
							Ø 7.600-9.600 mm	Ø 9.601-13.100 mm	Ø 7.600-9.600 mm	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			
	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			



Trou borgne avec interruption
Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut		fz Interrupted	Radial / Stock Removal ap						
					Ø 7.600-9.600 mm	Ø 9.601-13.100 mm		Ø 7.600-9.600 mm	Ø 9.601-13.100 mm					
S	4	RXsG	A06	F0512R1	20-35-45	0.04-0.06-0.10	0.04-0.06-0.10	fz coupe complète réduite de 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							
	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							
	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							
	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							
	H	4	RXsG	A06	F0512R1	20-40-60	0.04-0.06-0.10	0.04-0.06-0.10	fz coupe complète réduite de 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	15-25-30	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						
		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						
		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						
		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						
SM	4	RXsG	A06	F0507R1	15-25-30	0.04-0.06-0.08	0.04-0.06-0.08	fz coupe complète réduite de 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							
	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							
	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							
	O	4	RXsG	G07	F0512R1	140-180-220	0.12-0.16-0.20				0.12-0.18-0.22	fz coupe complète réduite de 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							
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							
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							
O		4	RXsG	G07	F0510C	40-60-80	0.10-0.15-0.20	0.10-0.15-0.20	fz coupe complète réduite de 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							
	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							
	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							
	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							

MATERIAL DETAILS PAGE 90/91

Ø 7.600 – 13.100 mm

Instructions d'utilisation du RX small

Handling Instructions RX small

Changement d'insert

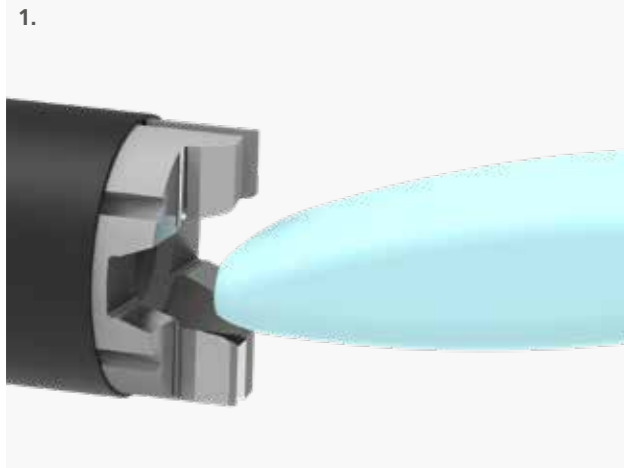
Insert Change

Ne pas retirer le corps de l'outil de son support. Enlevez la vis de serrage et retirez l'insert usé.

Pour une répétabilité maximale à chaque changement de plaque, il est impératif de bien nettoyer l'interface et d'utiliser le couple de serrage prédéfini.

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.

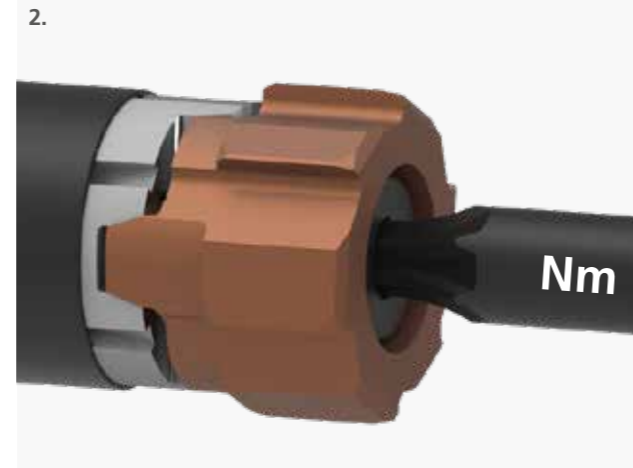


1. Nettoyage de l'interface

Pour une efficacité optimale, l'interface peut être nettoyée au moyen de la pâte à modeler fournie dans l'emballage des inserts.

2. Changement d'insert

L'insert est placé sur l'interface préalablement nettoyé et la vis de tension serré selon les normes de couple de serrage.



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.

Clé dynamométrique Torx®

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



Serrage de la vis uniquement clé dynamométrique
Tighten screw with torque wrench only

Ø 7.600 – 13.100 mm

Instructions d'utilisation du RX small

Handling Instructions RX small

Circularité

Run-Out Adjustment

Pour des résultats d'alésage optimaux, une parfaite concentricité de l'outil est indispensable. Pour compenser les erreurs de concentricité du logement et de la broche, des mandrins de compensation ou des mandrins flottants sont employés. La concentricité des outils d'alésage RX small peut être mesurée à l'aide de différentes méthodes.

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. Avec la rondelle d'ajustage de la concentricité

La concentricité peut également être ajustée au moyen de et contrôlé avec précision à l'aide d'un insert indicateur. Il n'est pas inclus dans la livraison. Vous trouverez le numéro de commande dans le catalogue « URMA Reaming ».

3. Measurement Through Run-Out Indicating Insert

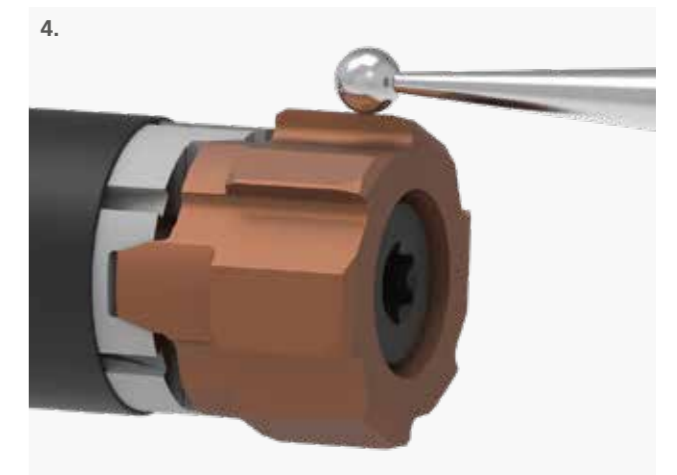
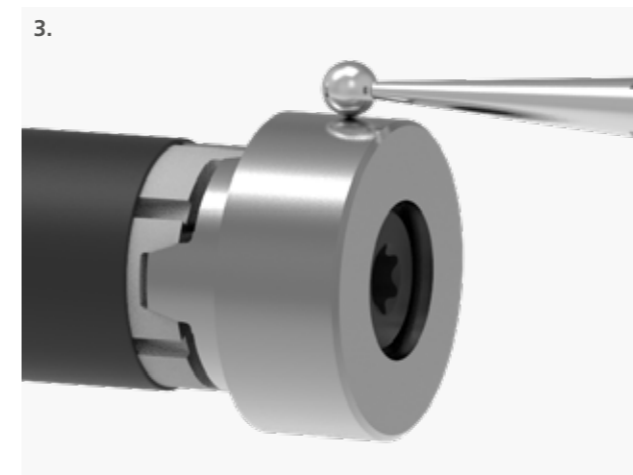
The run-out can be easily adjusted and precisely checked by using an indicating insert. It's not included in scope of delivery. Order number can be found in the "URMA Reaming" catalogue.

4. Avec le chanfrein de rectification cylindrique

Les outils RX small sont fabriqués avec des tolérances minimales. Réaliser des mesures à l'aide du chanfrein de rectification cylindrique permet d'obtenir une excellente précision.

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.



Instructions du mandrin de compensation

Instruction Compensation Chuck



Grâce au mandrin de compensation URMA, la circularité des outils d'alésage peut être ajustée de manière optimale afin de compenser toute erreur provenant de la broche ou de l'outillage.

Procédure:

1. Avant l'ajustement, assurez-vous que toutes les vis d'ajustement ② soient complètement desserrées.
2. Placez l'outil dans la broche de la machine.
3. Réglez l'indicateur (avec une résolution de $1\ \mu\text{m}$ / 0,0001 pouce) sur l'insert indicateur de battement ① ou sur le diamètre extérieur de l'insert (voir page 25).
4. Réglez la concentricité directement dans la broche de la machine sur max. $5\ \mu\text{m}$ / 0,0002 pouce (idéalement $< 3\ \mu\text{m}$ / 0,0001 pouce) à l'aide des 4 vis d'ajustement ②.

⚠ Les vis d'ajustement ne doivent pas être complètement serrées les unes contre les autres après l'ajustement.

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 $1\ \mu\text{m}$ / 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. $5\ \mu\text{m}$ / 0,0002 inch (ideal $< 3\ \mu\text{m}$ / 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.

Instructions du mandrin flottant

Instruction Floating Chuck



L'alésage sur tours s'effectue principalement à l'aide de mandrins flottants (en cas exceptionnels également possibles sur les centres d'usinage).

Les erreurs de position peuvent être compensées par le biais du mécanisme flottant ajustable. La flexion ne devrait être possible que de manière parallèle au plan (pas de compensation d'erreur angulaire).

Sont recommandées des géométries de coupe avec un angle de $\leq 45^\circ$.

Procédure:

1. Ajuster le mécanisme flottant à l'aide des vis d'ajustement ①.

Vis d'ajustement	Mécanisme flottant	Effet sur l'usinage
Rotation horaire	La force du ressort augmente / résistance à la flexion augmente	La qualité de la surface peut être impactée négativement (marques de rétraction)
Rotation antihoraire	La force du ressort diminue / résistance à la flexion diminue	Vibrations possibles

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 $\leq 45^\circ$ are recommended.

Procédure:

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

Ajustement:

Faible: L'outil devrait être ajusté avec la résistance de flexion la plus faible possible. Néanmoins, prenant en considération le poids de l'outil, ce dernier doit revenir automatiquement dans l'axe central suite à la flexion.

Moyen: Serrez complètement la vis d'ajustement et tournez à contre-sens de $1 \pm \frac{1}{4}$.

Fort: Serrez complètement la vis d'ajustement et tournez à contre-sens de $\frac{1}{4} - \frac{1}{2}$.

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 $1 \pm \frac{1}{4}$ rotation.

Hard: Fully tighten the adjusting screw and turn back by $\frac{1}{4} - \frac{1}{2}$ rotation.

Recommandation pour le réglage de base:

Outil-Ø Tool-Ø	Faible Soft	Moyen Medium	Fort Hard
7.600 – 13.100	X		

Recommendation for the basic setting:

2. Avec un axe Y existant, nous recommandons d'aligner l'outil $< 10 \mu\text{m} / 0,0004$ pouce (idéalement $< 5 \mu\text{m} / 0,0002$ pouce) de manière concentrique par rapport à l'axe de la broche.



- Le réglage du mécanisme flottant peut varier en fonction de l'application et du type de mandrin flottant.
- Il est généralement recommandé d'entamer l'alésage à vitesse réduite.
- Toutes les données sont des valeurs indicatives et se réfèrent aux mandrins flottants URMA.

2. With an existing Y-axis, we recommend additionally aligning the tool $< 10 \mu\text{m} / 0,0004$ inch (ideally $< 5 \mu\text{m} / 0,0002$ 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

Exemple de commande

Order Example

Diamètre d'alésage Bore diameter		Diamètre de l'insert Insert diameter	
Tolérances d'alésage ISO ISO bore tolerances	Tolérances d'alésage en µm Bore tolerance in µm	Dimension fixe (Insert Q) Target size (Q-Insert)	
Exemple de commande Order example RXG42.2 H7 -A01 U2 F0514R1	Exemple de commande Order example RXG18.2+ 20-10 -A01 U1 F0514R1 H	Exemple de commande Order example RXG 20.020Q + 3-3 -A01 U1 F0512R1	
RX Désignation du système RX medium RX medium system designation	RX Désignation du système RX medium RX medium system designation	RX Désignation du système RX medium RX medium system designation	
G Forme de l'insert (G = droit ; L = oblique gauche) Flute form (G = straight; L = left-hand helix)	G Forme de l'insert (G = droit ; L = oblique gauche) Flute form (G = straight; L = left-hand helix)	G Forme de l'insert (G = droit ; L = oblique gauche) Flute form (G = straight; L = left-hand helix)	
42.2 Diamètre (mm) Diameter (mm)	18.2 Diamètre (mm) Diameter (mm)	20.020 Diamètre de l'insert (mm) Insert diameter (mm)	
H7 Tolérances en standard ISO Tolerance in ISO standard	+20-10 Tolérances d'alésage (µm) Bore tolerance (µm)	Q Code pour inserts dimen. fixe Code for target size insert	
A01 Géométrie de l'insert Cutting geometry	A01 Géométrie de l'insert Cutting geometry	+3-3 Tolérances de fabrication (µm) Manufacturing tolerance (µm)	
A01 Géométrie de l'insert Cutting geometry	A01 Géométrie de l'insert Cutting geometry	A01 Géométrie de l'insert Cutting geometry	
U2 Préparation des arêtes Pour les détails voir page 33 Edge preparation For details see page 33	U1 Préparation des arêtes Pour les détails voir page 33 Edge preparation For details see page 33	U1 Préparation des arêtes Pour les détails voir page 33 Edge preparation For details see page 33	
F05 Matériau de coupe Pour les détails voir page 35 Cutting material For details see page 35	F05 Matériau de coupe Pour les détails voir page 35 Cutting material For details see page 35	F05 Matériau de coupe Pour les détails voir page 35 Cutting material For details see page 35	
14R Revêtement Pour les détails voir page 35 Coating For details see page 35	14R Revêtement Pour les détails voir page 35 Coating For details see page 35	12R Revêtement Pour les détails voir page 35 Coating For details see page 35	
1 1 = revêtement fin 2 = revêtement épais 1 = thin coating 2 = thick coating	1 1 = revêtement fin 2 = revêtement épais 1 = thin coating 2 = thick coating	1 1 = revêtement fin 2 = revêtement épais 1 = thin coating 2 = thick coating	
H* H=SD vide (sans H = blanc ordinaire) H = SD blank (without H = regular blank)	H* H=SD vide (sans H = blanc ordinaire) H = SD blank (without H = regular blank)	H* H=SD vide (sans H = blanc ordinaire) H = SD blank (without H = regular blank)	

* Insert SD « H » seulement RX016 et RX019 voir le catalogue « URMA Reaming »
* SD blank "H" only for RX016 and RX019 see "URMA Reaming" catalogue

Détails relatifs à l'exemple de commande

Details Order Example

Tolérances d'alésage et épaisseurs de revêtement applicables
Bore Tolerances and Applicable Coating Thickness

Bore Diameter	Plage de tolérance d'alésage Bore Tolerance Range	Sans revêtement Uncoated	Épaisseur de revêtement Coating Thickness		Supplément de prix pour tolérances serrées Surcharge for Tight Tolerances
			1	2	
			≥ 14 µm	x	
10 – 13 µm	x		x		-
				x	x
6 – 9 µm	x				-
			x	-	x

Exemple: Diamètre d'alésage 20H7 = plage de tolérance 21 µm = **≥ 14 µm** Diamètre d'alésage 12^{+0.006/0.005} = plage de tolérance 11 µm = **10 – 13 µm**
 Example: Bore diameter 20H7 = tolerance range 21 µm = **≥ 14 µm** Bore diameter 12^{+0.006/0.005} = tolerance range 11 µm = **10 – 13 µm**

Dimension fixe (Q insert) et épaisseurs de revêtement applicables
Target Size (Q-Insert) and Applicable Coating Thickness

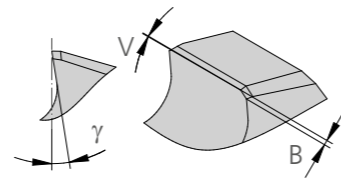
Insert Diameter	Tolérance de l'insert Insert Tolerance	Sans revêtement Uncoated	Épaisseur de revêtement Coating Thickness		Supplément de prix pour tolérances serrées Surcharge for Tight Tolerances
			1	2	
			± 4 µm	N/A	
± 3 µm	N/A		x		-
				x	x
± 2 µm	x				-
			x	N/A	x
± 1 µm	x		N/A	N/A	x

N/A = Non applicable
N/A = Not applicable

Préparation des arêtes (Finition Nano)
Edge preparation (Nano Finishing)

U1 Préparation simple des arêtes Light edge-preparation	U2 Préparation moyenne des arêtes Medium edge-preparation	U_ Autres préparations des arêtes sur demande Other edge-preparations on request
---	---	--

Géométries de coupe
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	▲	□	▲ (K1-K8)*	▲	↘	=	👍	👍	↘	↘					
	G1		□	▲												
	Geo	γ	B	V	W	ap mm	Ra μm	Zyl.	FC	MD						
	STANDARD GEOMETRY (REFERENCE VALUE)															
	1	=	=	↘	=	=	=	=	↗	↗	=					
	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	↗	↗	↗	■	■	▲	▲	↗	↘	=	👍	👍	↘	↘	

Terminologie et formules voir page 86
See page 86 for definitions and basic formulas

- B = Longueur du chanfrein
- V = Cônicité
- W = Largeur du chanfrein
- FC = Force de coupe
- MD = Couple
- γ = Angle de coupe radiale
- vf = Sens d'usinage
- ▲ = Recommandé
- = Approprié
- = Possible
- ↗ = Valeur plus élevée
- ↘ = Valeur inférieure
- 👍 = Meilleur
- 👎 = Moindre

* Tableau comparatif des matériaux voir page 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

Une d'ensemble des matières de coupe
Cutting Materials overview

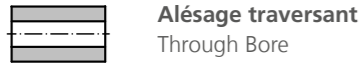
ISO Material Code	URMA Material Code	Matériaux de coupe Cutting Materials							Revêtement Coating												
		URMA Code	F05	T15	B510	B520	BH15	DP30	00	01P_	05P_	07R_	08P_	12R_	14R_	17B_	18B_	10C	20C	21C	
		HM / Carbide	Cermet	CBN	CBN	CBN	PKD / PCD	Uncoated	TiN	AlTiN	TiAlN + AlCrN	AlCrN	AlCrN	AlCrN	AlCrN	TiSiN	DLC	DLC	DLC		
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	▲						□	□												
	S14	▲						□	□												
H	H1	▲						○	□												
	H2	▲						○	□												
	H3	▲						○	□												
SM	SM1	■	▲					▲	□												
	SM2	▲	□					□	□												
	SM3	▲						□	□												
O	O1	▲	□					□													
	O2	▲	□					□													
	O3	▲						○	□												
	O4	▲						○	□												

- ▲ = Recommandé
- = Approprié
- = Possible
- = Sur demande
- ▲ = Recommended
- = Applicable
- = Possible
- = On request

MATERIAL DETAILS PAGE 88

Données de coupe RX medium

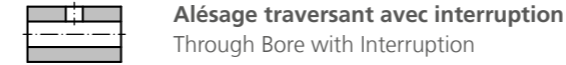
Cutting Data RX medium



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 Conditions d'utilisation**
- 1** Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2** Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 7xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3** Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement 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
 - No 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



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	
P	4	RXL	A06	T1500	160-200-240	0.16-0.20-0.25	fz coupe complète réduite de 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
		RXL	A06	F0512R1	120-140-180	0.12-0.18-0.22				
		RXL	A01	F0512R1	80-110-140	0.10-0.15-0.20				
	5	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
		RXL	A06	F0512R1	120-140-180	0.12-0.18-0.22				
		RXL	A01	F0512R1	80-110-140	0.10-0.15-0.20				
	6	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
		RXL	A06	F0512R1	110-140-170	0.12-0.18-0.22				
		RXL	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
		RXL	A01	F0512R1	110-140-170	0.12-0.16-0.22				
		RXL	A01	F0512R1	80-100-120	0.10-0.12-0.18				
	5	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
		RXL	A01	F0512R1	100-120-150	0.12-0.16-0.22				
		RXL	A01	F0512R1	80-100-120	0.10-0.12-0.18				
	6	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
		RXL	A01	F0512R1	40-70-90	0.06-0.08-0.12				
		RXL	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		
	RXL	A06	F0512R1	15-20-30	0.06-0.08-0.12					
	RXL	A06	F0512R1	15-20-30	0.04-0.08-0.10					
M	4	RXL	A07	F0512R1	50-80-100	0.14-0.16-0.22	fz coupe complète réduite de 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
		RXL	A07	F0512R1	40-70-90	0.12-0.15-0.20				
		RXL	A07	F0512R1	25-50-70	0.10-0.14-0.18				
	5	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
		RXL	A07	F0512R1	40-70-90	0.12-0.15-0.20				
		RXL	A07	F0512R1	25-50-70	0.10-0.14-0.18				
	6	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
		RXL	A07	F0512R1	40-60-80	0.08-0.10-0.12				
		RXL	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
		RXL	A06	F0512R1	20-35-55	0.08-0.10-0.14				
		RXL	A06	F0512R1	20-30-50	0.08-0.10-0.14				
	5	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
		RXL	A06	F0512R1	15-25-35	0.05-0.08-0.12				
		RXL	A06	F0512R1	10-18-30	0.05-0.08-0.12				
	6	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
		RXL	A06	F0512R1	15-20-30	0.05-0.08-0.12				
		RXL	A06	F0512R1	10-18-30	0.05-0.08-0.12				

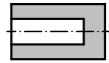
- AC Conditions d'utilisation**
- 4** Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5** Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 7xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6** Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement 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
 - No 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

Données de coupe RX medium

Cutting Data RX medium

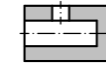


Trou borgne
Blind Hole

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 Conditions d'utilisation**
- 1 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 7xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement 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
 - No 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



Trou borgne avec interruption
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				
P	4	RXG	A06	T1500	140-180-220	0.16-0.20-0.25	fz coupe complète réduite de 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		
	M	4	RXG	A07	F0512R1	50-80-100		0.12-0.15-0.20	fz coupe complète réduite de 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		

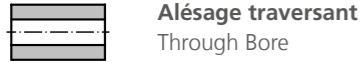
- AC Conditions d'utilisation**
- 4 Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5 Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 7xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6 Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement 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
 - No 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

Données de coupe RX medium

Cutting Data RX medium

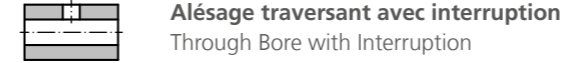


ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal		
								ap Ø 11.900-23.600 mm	ap Ø 23.601-35.600 mm	ap Ø 35.601-140.600 mm
K	K1	1	RXG	A04	F0514R2	90-120-160	0.16-0.22-0.30			
		2	RXG	A04	F0514R2	80-110-140	0.12-0.18-0.25	0.10-0.15-0.20	0.10-0.15-0.20	0.10-0.15-0.25
		3	RXG	G04	F0514R2	70-90-120	0.10-0.15-0.20			
	K2	1	RXG	A04	F0514R2	90-120-160	0.16-0.22-0.30			
		2	RXG	A04	F0514R2	80-110-140	0.12-0.18-0.25	0.10-0.15-0.20	0.10-0.15-0.20	0.10-0.15-0.25
		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			
		2	RXG	A01	F0514R2	100-120-140	0.12-0.18-0.25	0.10-0.15-0.20	0.10-0.15-0.20	0.10-0.15-0.25
		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			
		2	RXG	A01	F0514R2	100-120-140	0.12-0.18-0.25	0.08-0.10-0.15	0.10-0.15-0.20	0.10-0.15-0.20
		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			
		2	RXG	A01	F0514R2	60-80-100	0.10-0.15-0.20	0.08-0.10-0.15	0.10-0.15-0.20	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			
		2	RXG	A01	F0514R2	60-80-100	0.10-0.15-0.20	0.08-0.10-0.15	0.10-0.15-0.20	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			
		2	RXG	A01	F0512R1	40-60-80	0.10-0.12-0.14	0.08-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	RXG	A01	F0512R1	40-60-80	0.10-0.12-0.14	0.08-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	RXL	A07	F0510C	160-220-280	0.18-0.22-0.30	0.05-0.10-0.12	0.05-0.10-0.15	0.08-0.10-0.15
		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			
		2	RXL	A07	F0510C	160-220-280	0.18-0.22-0.30	0.05-0.10-0.12	0.05-0.10-0.15	0.08-0.10-0.15
		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			
		2	RXL	A07	F0520C	160-220-280	0.18-0.22-0.30	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	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
		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			
		2	RXL	A07	F0520C	140-160-200	0.16-0.20-0.28	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	RXL	A07	F0520C	50-70-100	0.12-0.16-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		3	RXL	A07	F0520C	40-60-80	0.12-0.16-0.22			

- AC Conditions d'utilisation**
- Conditions optimales**
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - Conditions d'utilisation sous-optimales**
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 7xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - Conditions d'utilisation difficiles**
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement disponible

- AC Application Conditions**
- 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
 - 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
 - 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



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		
K	4	RXG	A04	F0514R2	90-120-160	0.16-0.22-0.30	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
		5	RXG	A04	F0514R2	80-110-140		0.12-0.18-0.25	0.10-0.15-0.20	0.10-0.15-0.20	0.10-0.15-0.25
		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					
		5	RXG	A04	F0514R2	80-110-140		0.12-0.18-0.25	0.10-0.15-0.20	0.10-0.15-0.20	0.10-0.15-0.25
		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					
		5	RXG	A01	F0514R2	100-120-140		0.12-0.18-0.25	0.10-0.15-0.20	0.10-0.15-0.20	0.10-0.15-0.25
		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					
		5	RXG	A01	F0514R2	100-120-140		0.12-0.18-0.25	0.08-0.10-0.15	0.10-0.15-0.20	0.10-0.15-0.20
		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					
		5	RXG	A01	F0514R2	60-80-100		0.10-0.15-0.20	0.08-0.10-0.15	0.10-0.15-0.20	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					
		5	RXG	A01	F0514R2	60-80-100		0.10-0.15-0.20	0.08-0.10-0.15	0.10-0.15-0.20	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					
		5	RXG	A01	F0512R1	40-60-80		0.10-0.12-0.14	0.08-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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					
		5	RXG	A01	F0512R1	40-60-80		0.10-0.12-0.14	0.08-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		6	RXG	G11	F0512R1	25-40-70		0.08-0.10-0.12			

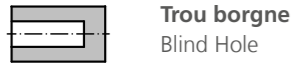
K	4	RXL	A07	F0510C	180-250-320	0.18-0.25-0.35	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
		5	RXL	A07	F0510C	160-220-280		0.18-0.22-0.30	0.05-0.10-0.12	0.05-0.10-0.15	0.08-0.10-0.15
		6	RXL	A07	F0510C	140-180-220		0.12-0.16-0.20			
	4	RXL	A07	F0510C	180-250-320	0.18-0.25-0.35					
		5	RXL	A07	F0510C	160-220-280		0.18-0.22-0.30	0.05-0.10-0.12	0.05-0.10-0.15	0.08-0.10-0.15
		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					
		5	RXL	A07	F0520C	160-220-280		0.18-0.22-0.30	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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					
		5	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
		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					
		5	RXL	A07	F0520C	140-160-200		0.16-0.20-0.28	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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					
		5	RXL	A07	F0520C	50-70-100		0.12-0.16-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		6	RXG	A07	F0520C	40-60-80		0.10-0.14-0.20			

- AC Conditions d'utilisation**
- Conditions optimales**
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - Conditions d'utilisation sous-optimales**
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 7xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - Conditions d'utilisation difficiles**
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible

- AC Application Conditions**
- 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
 - 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
 - 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

Données de coupe RX medium

Cutting Data RX medium



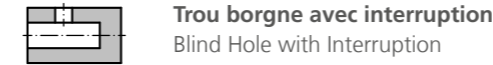
Trou borgne
Blind Hole

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			

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
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 Conditions d'utilisation**
- 1** Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2** Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3** Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation des copeaux critique
 - Alimentation interne en liquide de refroidissement 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



Trou borgne avec interruption
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																									
fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	4	RXG	A04	F0514R2	90-120-160	0.16-0.22-0.30	fz coupe complète réduite de 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					fz coupe complète réduite de 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	A01	F0514R2	120-140-180	0.16-0.22-0.30									fz coupe complète réduite de 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	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													fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	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																	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	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																					fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	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																									fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	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																												

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																					
fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	4	RXG	A07	F0510C	180-250-320	0.18-0.25-0.35	fz coupe complète réduite de 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					fz coupe complète réduite de 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	F0520C	180-250-320	0.18-0.25-0.35									fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	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													fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%	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																	fz coupe complète réduite de 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	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																					fz coupe complète réduite de 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	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 Conditions d'utilisation**
- 4** Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 6xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 5xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5** Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6** Conditions d'utilisation difficiles
 - Installation, machine et/ou pièce à usiner instables
 - Diamètre de l'insert < 35.600
 - Longueur de l'outil < 12xD
 - Diamètre de l'insert > 35.601
 - Longueur de l'outil < 9xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement 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

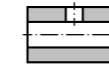
Données de coupe RX medium

Cutting Data RX medium



Alésage traversant
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				
		2	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	
		3	RXL	A07	F0512R1	15-25-35	0.06-0.10-0.14				
	S2	1	RXL	A07	F0512R1	20-30-45	0.05-0.08-0.12				
		2	RXL	A07	F0512R1	20-30-45	0.05-0.08-0.12	0.05-0.08-0.10	0.05-0.10-0.12	0.05-0.10-0.12	
		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				
		2	RXL	A07	F0512R1	10-18-30	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
		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				
		2	RXL	A07	F0512R1	8-15-20	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
		3	RXL	A07	F0512R1	5-12-20	0.05-0.08-0.10				
	S	S11	1	RXL	A07	F0512R1	20-40-60	0.06-0.10-0.14			
			2	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
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				
		2	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	
		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				
		2	RXL	A07	F0512R1	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	
		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				
		2	RXL	A07	F0512R1	10-18-25	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
		3	RXL	A07	F0512R1	8-15-20	0.05-0.08-0.10				
H	H1	1	RXL	A06	F0507R1	15-25-30	0.04-0.06-0.08				
		2	RXL	A06	F0507R1	10-18-25	0.04-0.06-0.08	0.05-0.08	0.05-0.08-0.10	0.05-0.08-0.10	
		3	RXL	A06	F0507R1	8-15-20	0.04-0.06-0.08				
	H2	1	RXL	A06	F0507R1	10-18-25	0.04-0.06-0.08				
		2	RXL	A06	F0507R1	8-15-20	0.04-0.06-0.08	0.05-0.08	0.05-0.08	0.05-0.08-0.10	
		3	RXL	A06	F0507R1	8-15-20	0.04-0.06-0.08				
	H3	1	RXL	A06	F0507R1	8-10-15	0.03-0.05-0.07				
		2	RXL	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	
		3	RXL	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				
		2	RXL	B07	T1500	110-140-170	0.18-0.22-0.30	0.08-0.10-0.15	0.08-0.10-0.15	0.08-0.10-0.20	
		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				
		2	RXL	B07	F0512R1	100-120-150	0.15-0.20-0.25	0.08-0.10-0.15	0.08-0.10-0.15	0.08-0.10-0.20	
		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				
		2	RXL	A07	F0512R1	40-60-80	0.08-0.10-0.16	0.08-0.10-0.12	0.08-0.10-0.15	0.08-0.10-0.20	
		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				
		2	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	
		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				
		2	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	
		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				
		2	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	
		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				
		2	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	
		3	RXL	A07	F0520C	30-50-60	0.05-0.08-0.10				

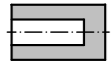


Alésage traversant avec interruption
Through Bore with Interruption

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	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
5	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	
6	RXL	A06	F0512R1	15-25-35	0.06-0.10-0.14					
4	RXL	A06	F0512R1	20-30-45	0.06-0.10-0.12					
5	RXL	A06	F0512R1	20-30-45	0.05-0.08-0.12		0.05-0.08-0.10	0.05-0.10-0.12	0.05-0.10-0.12	
6	RXL	A06	F0512R1	15-25-35	0.05-0.08-0.12					
4	RXL	A06	F0512R1	15-20-35	0.06-0.10-0.12					
5	RXL	A06	F0512R1	10-18-30	0.05-0.08-0.10		0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
6	RXL	A06	F0512R1	8-15-25	0.05-0.08-0.10					
4	RXL	A06	F0512R1	12-18-25	0.05-0.08-0.10					
5	RXL	A06	F0512R1	8-15-20	0.05-0.08-0.10		0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
6	RXL	A06	F0512R1	5-12-20	0.05-0.08-0.10					
4	RXL	A06	F0512R1	20-40-60	0.06-0.10-0.14					
5	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	
6	RXL	A06	F0512R1	15-25-30	0.06-0.10-0.14					
4	RXL	A06	F0512R1	20-35-45	0.06-0.10-0.14					
5	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	
6	RXL	A06	F0512R1	15-25-30	0.06-0.10-0.14					
4	RXL	A06	F0512R1	20-30-45	0.06-0.10-0.14					
5	RXL	A06	F0512R1	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		
6	RXL	A06	F0512R1	10-18-30	0.05-0.08-0.10					
4	RXL	A06	F0512R1	15-20-30	0.05-0.08-0.10					
5	RXL	A06	F0512R1	10-18-25	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10		
6	RXL	A06	F0512R1	8-15-20	0.05-0.08-0.10					
4	RXL	A06	F0507R1	15-25-30	0.04-0.06-0.08	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
5	RXL	A06	F0507R1	10-18-25	0.04-0.06-0.08		0.05-0.08	0.05-0.08-0.10	0.05-0.08-0.10	
6	RXL	A06	F0507R1	8-15-20	0.04-0.06-0.08					
4	RXL	A06	F0507R1	10-18-25	0.04-0.06-0.08					
5	RXL	A06	F0507R1	8-15-20	0.04-0.06-0.08		0.05-0.08	0.05-0.08	0.05-0.08-0.10	
6	RXL	A06	F0507R1	8-15-20	0.04-0.06-0.08					
4	RXL	A06	F0507R1	8-10-15	0.03-0.05-0.07					
5	RXL	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	
6	RXL	A06	F0507R1	8-10-15	0.03-0.05-0.07					
4	RXL	A07	T1500	140-180-220	0.18-0.22-0.30		fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%			
5	RXL	A06	T1500	110-140-170	0.15-0.20-0.25			0.08-0.10-0.15	0.08-0.10-0.15	0.08-0.10-0.20
6	RXL	A06	F0512R1	80-100-120	0.12-0.16-0.20					
4	RXL	A07	F0512R1	120-140-160	0.15-0.20-0.25					
5	RXL	A06	F0512R1	100-120-150	0.12-0.18-0.22			0.08-0.10-0.15	0.08-0.10-0.15	0.08-0.10-0.20
6	RXL	A01	F0512R1	80-100-120	0.12-0.15-0.20					
4	RXL	A06	F0512R1	40-60-80	0.10-0.12-0.18					
5	RXL	A06	F0512R1	40-60-80	0.08-0.10-0.16			0.08-0.10-0.12	0.08-0.10-0.15	0.08-0.10-0.20
6	RXL	A01	F0512R1	25-40-70	0.06-0.08-0.14					
4	RXL	A07	F0510C	40-60-80	0.10-0.15-0.20	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
5	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
6	RXL	A07	F0510C	40-60-80	0.10-0.13-0.16					
4	RXL	A07	F0510C	40-60-80	0.10-0.15-0.20					
5	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
6	RXL	A07	F0510C	40-60-80	0.10-0.13-0.16					
4	RXL	A07	F0520C	40-50-60	0.10-0.15-0.20					
5	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
6	RXL	A07	F0520C	40-50-60	0.10-0.13-0.16					
4	RXL	A								

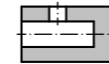
Données de coupe RX medium

Cutting Data RX medium



Trou borgne
Blind Hole

ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal			
								ap	ap	ap	
								Ø 11.900-23.600 mm	Ø 23.601-35.600 mm	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				
	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				



Trou borgne avec interruption
Blind Hole with Interruption

AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal					
							ap	ap	ap			
							Ø 11.900-23.600 mm	Ø 23.601-35.600 mm	Ø 35.601-140.600 mm			
S	4	RXG	A06	F0512R1	20-35-45	0.06-0.10-0.14	fz coupe complète réduite de 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						
	H	4	RXG	A06	F0512R1	20-40-60		0.06-0.10-0.14	fz coupe complète réduite de 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	15-25-30		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	10-18-30	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	15-20-30	0.05-0.08-0.10						
6		RXG	A06	F0512R1	8-15-20	0.05-0.08-0.10						
SM	4	RXG	A06	F0507R1	15-25-30	0.04-0.06-0.08	fz coupe complète réduite de 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						
	SM	4	RXG	A07	T1500	140-180-220		0.18-0.22-0.30	fz coupe complète réduite de 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						
O	4	RXG	G07	F0510C	40-60-80	0.10-0.15-0.20	fz coupe complète réduite de 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						

MATERIAL DETAILS PAGE 90/91

Ø 11.900 – 140.600 mm



Manuel d'utilisation RX medium

Handling Manual RX medium

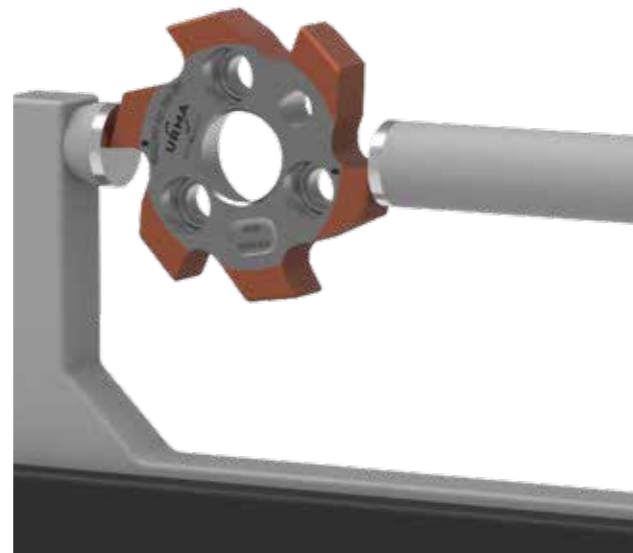
Changement d'inserts

1. Ne pas retirer le corps de l'outil de son support. Enlevez la vis de serrage et retirez l'insert usé.
2. Nettoyez le support du manche soigneusement et vérifiez qu'il n'y ait pas de dommage.
3. Positionnez le nouvel insert (tenir compte de la goupille de positionnement) et serrez doucement la vis.
4. Si disponible, serrez la vis de façon croisée avec l'outil dynamométrique. (Moment de serrage selon la liste suivante)

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).

RX medium Parameter	Standard Insert Holder		SD Insert Holder	
	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		



Mesurer le diamètre de l'insert

Les corps de l'outil RX medium, sont positionnées inégalement. Le diamètre ne peut être mesuré que sur les deux dents avec marquage. Les inserts sont rectifiés coniques.

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



Manuel d'utilisation RX medium

Handling Manual RX medium

↗ Ø < 0.005

Circularité des inserts
Insert run-out

Circularité

Run-Out Adjustment

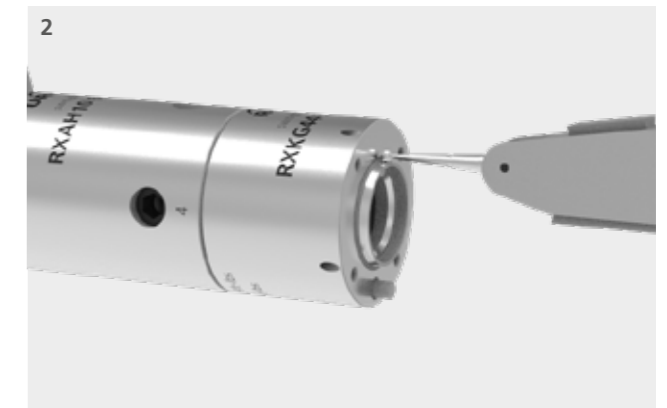
Pour atteindre un résultat d'alésage optimal, il est impératif d'avoir une circularité parfaite. Pour corriger le mal rond provenant de la broche et de l'outillage, des systèmes de compensation sont indispensables. Le mal rond peut être mesuré de différentes manières:

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. Sur le diamètre extérieur du porte-insert

Les outils RX medium sont usinés avec une grande précision. Cette méthode livre des mesures acceptables et une manipulation facile.



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. Sur le cône du porte-insert

Avec l'alésoir démonté, mesurez directement sur les porte-plaquettes à cône court. Cette méthode de manipulation offre des résultats de mesure élevés.

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.

Instructions mandrin de compensation

Instruction Compensation Chuck



Pour des résultats d'alésage optimaux, une parfaite concentricité de l'outil est indispensable. Pour compenser les erreurs de concentricité du logement et de la broche, des mandrins de compensation ou des mandrins flottants sont employés. La concentricité des outils d'alésage RX medium peut être mesurée à l'aide de différentes méthodes.

Procédure:

1. Avant l'ajustement, assurez-vous que toutes les vis d'ajustement ② soient complètement desserrées.
2. Placez l'outil dans la broche de la machine.
3. Réglez l'indicateur (avec une résolution de 1 μm / 0,0001 pouce) sur le point de contrôle de concentricité marqué ① sur le manche.
4. Réglez la concentricité directement dans la broche de la machine sur max. 5 μm / 0,0002 pouce (idéalement < 3 μm / 0,0001 pouce) à l'aide des 4 vis ② d'ajustement.



Les vis d'ajustement ne doivent pas être complètement serrées les unes contre les autres après l'ajustement.

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:

Procédure:

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.

Instructions mandrin flottant

Instruction Floating Chuck



L'alésage sur tours s'effectue principalement à l'aide de mandrins flottants (en cas exceptionnels également possibles sur les centres d'usinage).

Les erreurs de position peuvent être compensées par le biais du mécanisme flottant ajustable. La flexion ne devrait être possible que de manière parallèle au plan (pas de compensation d'erreur angulaire).

Sont recommandées des géométries de coupe avec un angle de $\leq 45^\circ$.

Procédure:

1. Ajuster le mécanisme flottant à l'aide des vis d'ajustement ①.

Vis d'ajustement	Mécanisme flottant	Effet sur l'usinage
Rotation horaire	La force du ressort augmente / résistance à la flexion augmente	La qualité de la surface peut être impactée négativement (marques de rétraction)
Rotation antihoraire	La force du ressort diminue / résistance à la flexion diminue	Vibrations possibles

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 $\leq 45^\circ$ are recommended.

Procédure:

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

Ajustement:

Faible: L'outil devrait être ajusté avec la résistance de flexion la plus faible possible. Néanmoins, prenant en considération le poids de l'outil, ce dernier doit revenir automatiquement dans l'axe central suite à la flexion.

Moyen: Serrez complètement la vis d'ajustement et tournez à contre-sens de $1 \pm \frac{1}{4}$.

Fort: Serrez complètement la vis d'ajustement et tournez à contre-sens de $\frac{1}{4} - \frac{1}{2}$.

Recommandation pour le réglage de base:

Outil-Ø Tool-Ø	Faible Soft	Moyen Medium	Fort Hard
11.900 – 15.600	X		
15.601 – 23.600	X		
23.601 – 35.600		X	
35.601 – 60.600		X	
60.601 – 140.600		X	X

2. Avec un axe Y existant, nous recommandons d'aligner l'outil $10 \mu\text{m} / 0,0004 \text{ pouce}$ (idéalement $5 \mu\text{m} / 0,0002 \text{ pouce}$) de manière concentrique par rapport à l'axe de la broche.



- Le réglage du mécanisme flottant peut varier en fonction de l'application et du type de mandrin flottant.
- Il est généralement recommandé d'entamer l'alésage à vitesse réduite.
- Toutes les données sont des valeurs indicatives et se réfèrent aux mandrins flottants URMA.



Alternativement au mandrin flottant, les porte-inserts à section transversale réduite peuvent également être utilisés (voir catalogue Reaming).

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 $1 \pm \frac{1}{4}$ rotation.

Hard: Fully tighten the adjusting screw and turn back by $\frac{1}{4} - \frac{1}{2}$ rotation.

Recommendation for the basic setting:

2. With an existing Y-axis, we recommend additionally aligning the tool $10 \mu\text{m} / 0,0004 \text{ inch}$ (ideally $5 \mu\text{m} / 0,0002 \text{ inch}$) 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 the bore with reduced rpm.
- All data are guide values and refer to URMA floating chucks.

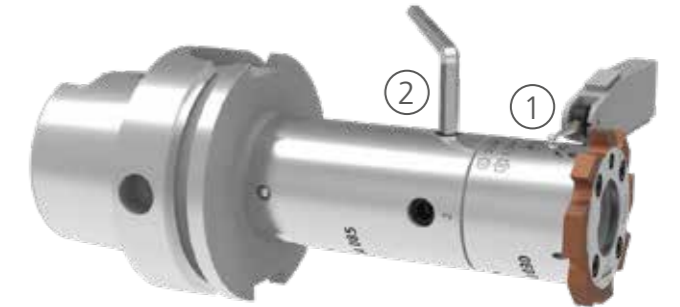
As an alternative to a floating chuck, diameter reduced insert holders can also be used (see reaming catalogue).

Instruction pour les jarrets avec dispositif de compensation intégré

Instruction for Shanks with Integrated Compensation Device

Pour les diamètres d'alésage plus grand que 35,601 mm

For Reaming Diameters bigger than 35,601 mm



Procédure:

1. Bloquez la vis de serrage centrale selon la valeur « A » du tableau ci-dessous (si non disponible, utilisez la valeur « B »).
2. Placez l'outil dans la broche de la machine.
3. Réglez l'indicateur (avec une résolution de $1 \mu\text{m} / 0,0001 \text{ pouce}$) sur le point de contrôle de concentricité marqué ① sur le corps.
4. Mesurer le battement des ② axes de la vis de réglage. Vérifier le faux-rond sur les quatre points d'essieu et répéter le réglage si nécessaire. Serrer toutes les vis qui ne sont pas bien serrées, en tenant compte du faux-rond $0,005 \text{ mm}$ de diamètre.
5. Serrez la vis de serrage centrale selon la valeur « B ».
6. Vérifiez la concentricité à nouveau et réajuster si nécessaire.

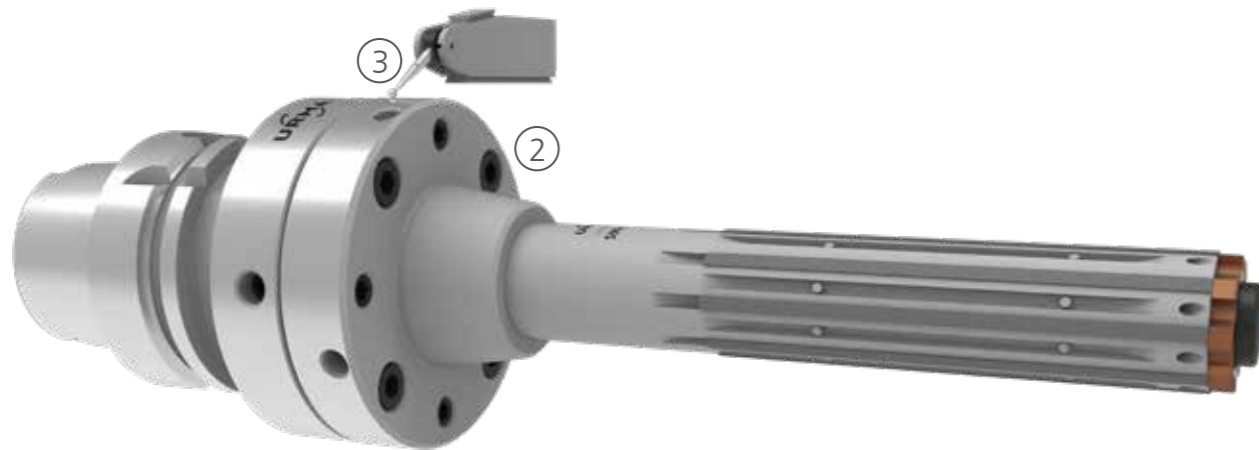
Procedure:

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 $1 \mu\text{m} / 0,0001 \text{ inch}$ 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 $0,005 \text{ mm}$ 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

Instructions de compensation pour outils spéciaux

Instruction for Compensation Module with Special Tools



Le Module de compensation est par exemple utilisé pour ajuster la concentricité d'outils avec guidage. Les erreurs d'axe et d'angle peuvent toutes deux être corrigées.

Préparez l'outil:

1. Avant l'assemblage, assurez-vous qu'aucun des disques d'empreinte sur le côté plat ne dépassent.
2. Assemblez l'outil sur la base du module de compensation en serrant légèrement les vis de serrage ② (c.-à-d., Serrez la vis jusqu'à ce qu'elle ait un contact avec le côté plat puis serrez d'un ¼ de tour).
3. Placez l'outil dans la broche de la machine.
4. Réglez l'indicateur (avec une résolution de $1 \mu\text{m} / 0,0001$ pouce) sur le diamètre de la bride de fixation de l'outil ③.

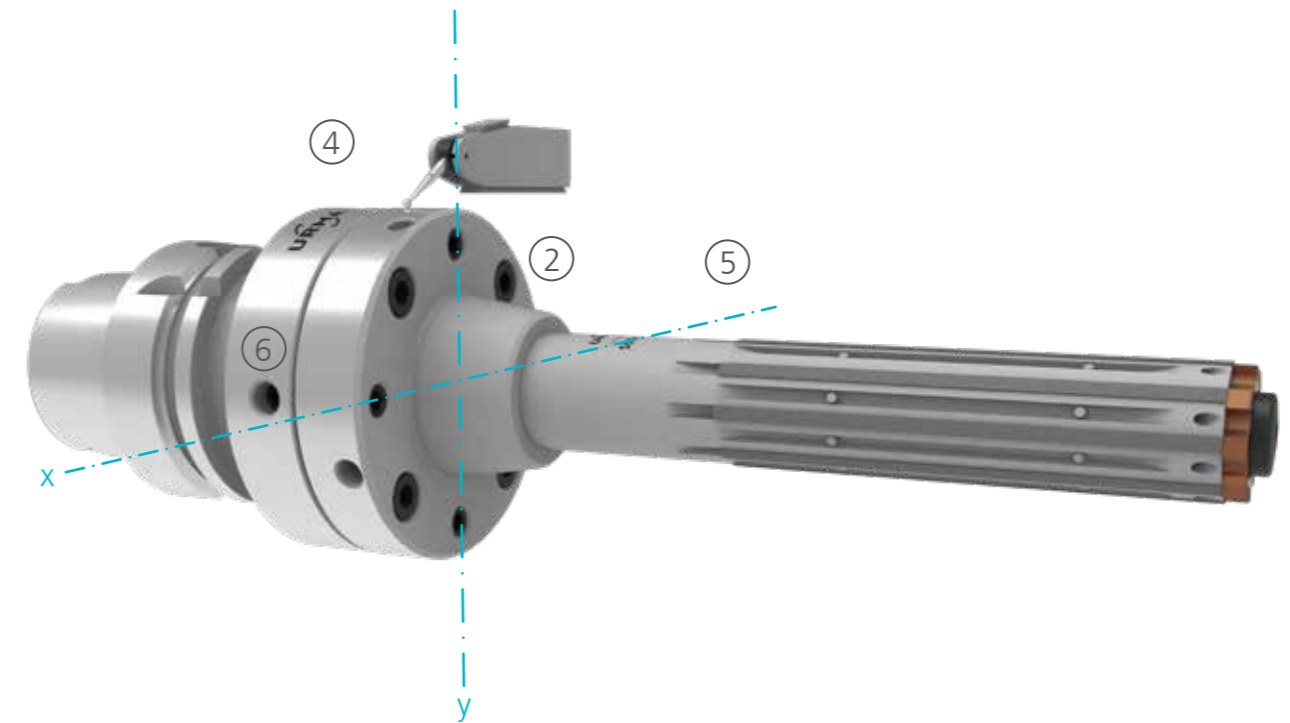
The compensation module is used, for example, to adjust the run-out of guide pad tools. Axis as well as angle errors can be adjusted.

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 $1 \mu\text{m} / 0,0001$ inch resolution) on the tool flange diameter ③.

Alignement radial de l'outil - Etape 1:

Radial alignment of the tool - Step 1:



5. Alignement du module à $2 \mu\text{m} / 0,0001$ pouce à l'aide des vis d'ajustement radial ⑥.
 - a. Vérifiez les éventuelles erreurs de concentricité à l'aide de deux vis d'ajustement radial opposées ⑥ (1er axe d'ajustement ⑤)
 - b. Corrigez la différence de masse de l'axe à la moitié de la valeur à l'aide des vis d'ajustement correspondantes. Des serrez ensuite les vis.
 - c. Placez l'indicateur sur la valeur « 0 ».
 - d. Ajustez la valeur « 0 » à 180° en tournant l'outil et recorrigez si nécessaire (voir « b »).
 - e. Utilisez la même procédure d'alignement pour le second ajustement de l'axe ④.
 - f. Si nécessaire, réajustez le premier axe ⑤.



Toutes les vis ⑥ d'ajustement doivent être serrées à la fin du processus d'ajustement.

6. Serrez les vis de serrage ②.

7. Contrôlez à nouveau la concentricité du module de bride
→ max. $3 \mu\text{m} / 0,0001$ pouce

5. Align the flange module in $2 \mu\text{m} / 0,0001$ 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

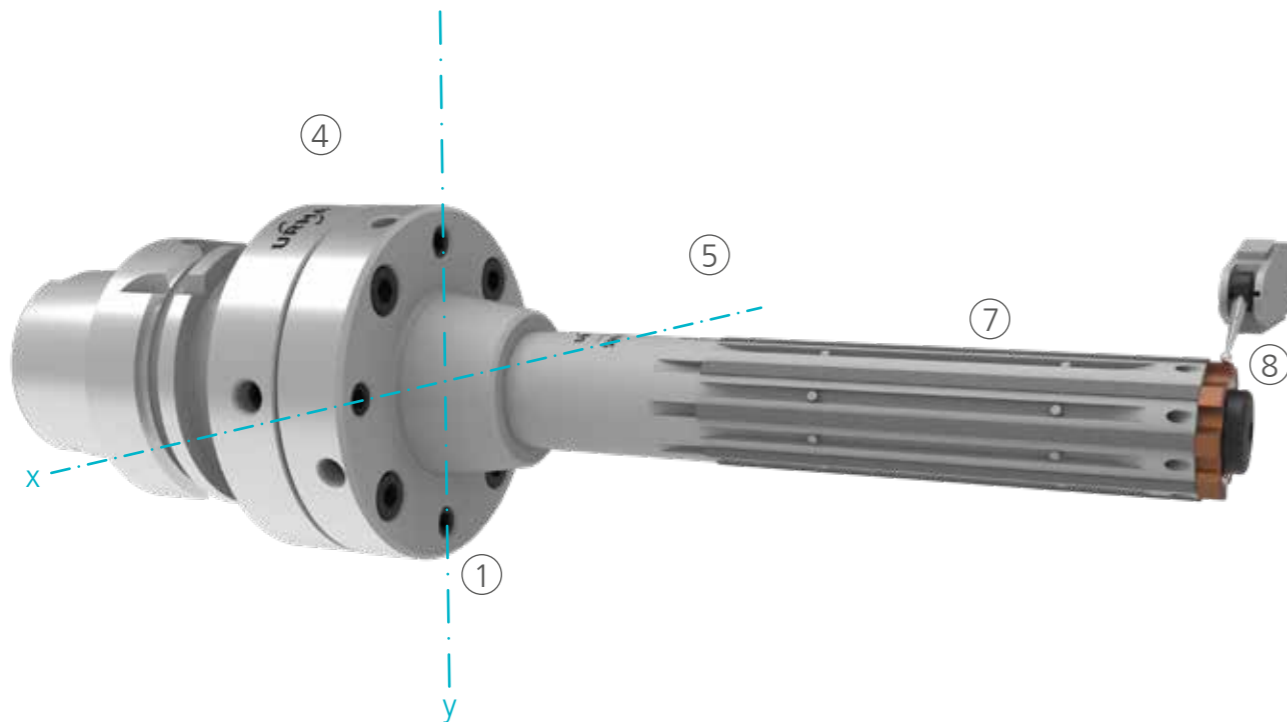


All adjustment screws ⑥ must be tightened after completion of the adjustment process.

6. Tighten the clamping screws ②.

7. Check the run-out of the flange module again
→ max. $3 \mu\text{m} / 0,0001$ inch

Alignement radial de l'outil - Etape 2: Aligning the tool angle - Step 2:



8. Placez l'indicateur à l'avant ⑧:

- sur le diamètre de coupe ou sur le diamètre du disque de réglage (Le numéro de commande se trouve dans le catalogue « URMA Reaming »)
- sur le cône se situant sur le corps (point de séparation RX)
- sur les patins de guidage

9. Régler l'erreur angulaire à 2 µm à l'aide des vis de réglage axial ① (processus selon instructions « point 5 b jusqu'à 5f »).



Il est recommandé d'utiliser au maximum une vis d'ajustement ① par axe (0 et 90°) pour ajuster l'erreur angulaire.

10. Vérifiez la concentricité sur les patins de guidage ⑦ → max. 3 µm / 0,0001 pouce.

8. Set the indicator in front ⑧:

- on cutting edge or run-out indicating insert (Order number can be found in the "URMA Reaming" catalogue)
- on RX-taper of the shank (interface)
- 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 alignment on the guide pads ⑦ → max. 3 µm / 0,0001 inch

Stratégies d'usinage

Machining Strategies

Pilotage

Piloting

Le pilotage est recommandé dans les situations suivantes :

- Rapport diamètre / longueur > 8xD
- Pour maintenir une position étroite et des tolérances de concentricité
- Éviter les vibrations d'entrée avec un outil long.
- Utilisation d'un outil de guidage long (précision de positionnement)
- Pour l'entrée d'alésage inclinée ou interrompue

En fonction de la machine et de l'outil suivant, l'alésage pilote peut se faire comme suit :

- A l'aide d'un alésoir court
- En Pré-tournant sur un tour
- Par fraisage ou alésage

Avec un alésoir court:

Pour cette variante, utiliser l'alésoir le plus court possible pour effectuer l'alésage pilote. Cette méthode permet d'obtenir un alésage pilote très stable et répétable. Elle peut être appliquée sur les tours ainsi que sur les centres d'usinage. L'insert d'alésage utilisé pour effectuer l'alésage pilote doit avoir le même diamètre et la même tolérance que l'outil de finition suivant.

Piloting is recommended in the following situations:

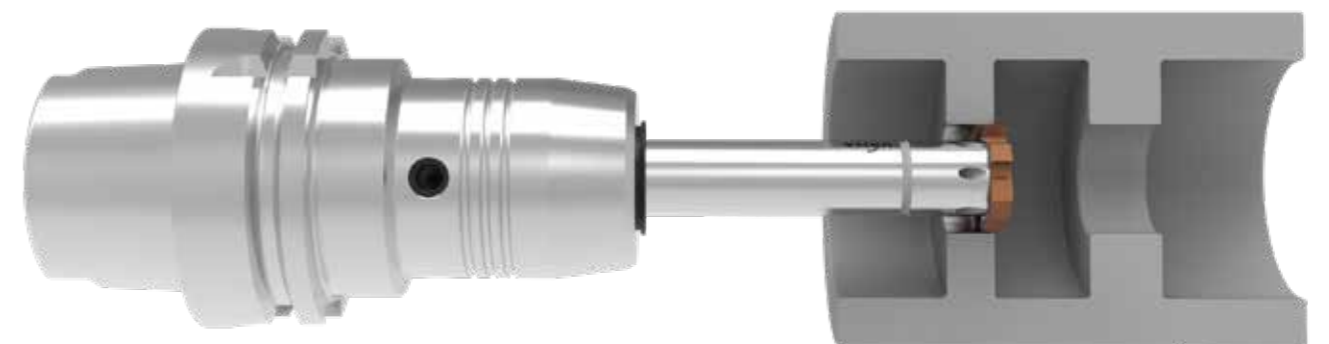
- Diameter / length ratio > 8xD
- To hold narrow position and concentricity tolerances
- Avoidance of entry vibrations with a long tool.
- Use of a long guide pad tool (positioning accuracy)
- For inclined or interrupted bore entry

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.



Lors de l'usinage des positions de roulements (voir figure.), alésez la lère position uniquement.



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

Pilotage

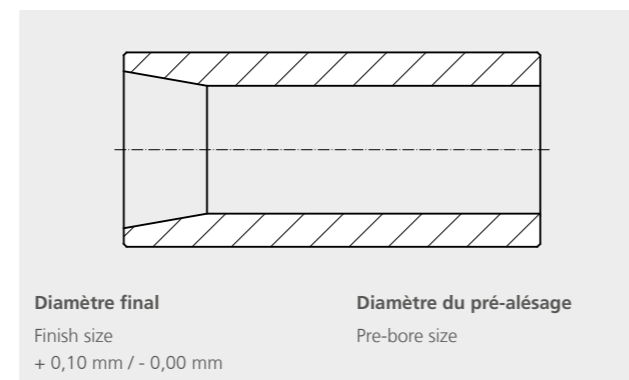
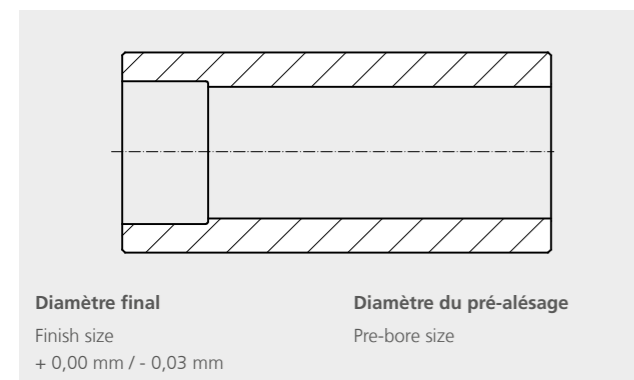
Piloting

Méthode sur un tour pré-tournage:

L'alésage pilote peut être pré-tourné sur un tour. L'alésage peut être cylindrique ou conique.

Procedure on a lathe:

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

**Méthode sur centre de tournage:**

L'alésage pilote peut être réalisé sur un centre d'usinage à l'aide de différentes méthodes :

- Outil d'alésage court (description voir page 57)
- Alésage
- Fraisage circulaire

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

⚠ Un contrôle régulier du diamètre pilote est essentiel.

⚠ A regular check of the pilot diameter is essential.

Usinage de finition

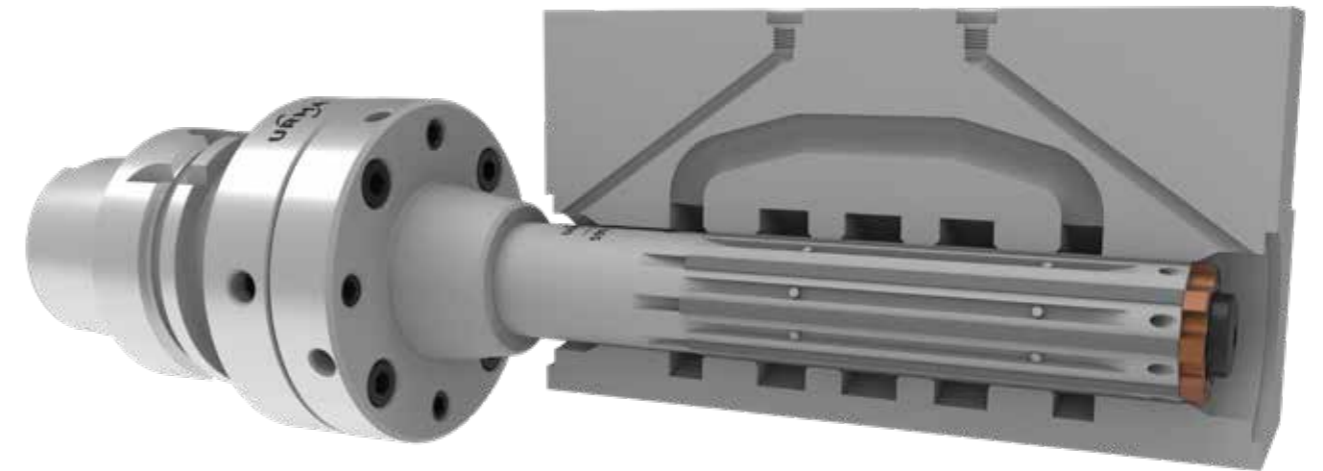
Finish Machining

Procédure après le pilotage:

1. En entrant dans l'alésage pilote avec l'outil de finition, la vitesse doit être réduite ($n = 50-500 \text{ min}^{-1}$) jusqu'à ce que l'insert d'alésage soit complètement sollicité ou qu'une partie des patins de guidage soient utilisés. En règle générale : « fz rétraction » = « fz usinage ».
2. Accélérez ensuite jusqu'à la vitesse choisie et, si possible, terminez l'alésage sans interrompre le mouvement d'avance.
3. La rétraction de l'outil s'effectue généralement à une vitesse réduite de 50 à 80 % (n) et à environ 3 à 5 fois la vitesse d'avance d'usinage ($v_f \text{ mm/min}$).

Procedure after piloting:

1. When entering into the pilot bore with the finishing tool, the speed must be reduced ($n = 50-500 \text{ rpm}$) 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 ($v_f \text{ mm/min}$).



⚠ Afin de ne pas endommager les patins de guidage, l'alimentation interne en liquide de refroidissement doit être garantie à tout moment !

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

URMA Reaming
RM vario

Exemple de commande

Order Example

Diamètre d'alésage: Tolérances d'alésage ISO
Bore Diameter: ISO Bore Tolerances

Diamètre d'alésage: Tolérances d'alésage en µm
Bore Diameter: Bore Tolerance in µm

Exemple	Exemple de commande Order Example F25N-12.2H7-A W112R	Exemple
Exemple	Exemple de commande Order Example F25N-12.2+20-10-A W112R	Exemple

F Corps cylindrique
A = fixe, sans refroidissement par le centre de l'outil
B = fixe, avec refr. par le centre de l'outil pour trou passant
C = fixe, avec refr. par le centre de l'outil pour trou borgne
D = expansible, sans refroidissement par le centre de l'outil
F = expansible, avec refr. par le centre de l'outil pour trou passant
G = expansible, avec refr. par le centre de l'outil pour trou borgne
S = Outils spéciaux (selon dessin)
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)

F Corps cylindrique
A = fixe, sans refroidissement par le centre de l'outil
B = fixe, avec refr. par le centre de l'outil pour trou passant
C = fixe, avec refr. par le centre de l'outil pour trou borgne
D = expansible, sans refroidissement par le centre de l'outil
F = expansible, avec refr. par le centre de l'outil pour trou passant
G = expansible, avec refr. par le centre de l'outil pour trou borgne
S = Outils spéciaux (selon dessin)
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 = version courte
4 = version longue
2 = short version
4 = long version

2
2 = version courte
4 = version longue
2 = short version
4 = long version

5N
5N = denture droite
7N = denture hélice gauche
5N = flute form straight
7N = flute form left-hand helix

5N
5N = denture droite
7N = denture hélice gauche
5N = flute form straight
7N = flute form left-hand helix

Diameter	12.2 Diamètre (mm) Diameter (mm)	Diameter
Diameter	H7 Tolérances en standard ISO Tolerance in ISO standard	Diameter
Diameter	+20-10 Tolérances d'alésage (µm) Bore tolerance (µm)	Diameter

A **Angle de chanfrein**
A = 45°¹ B = 25°² C = 45/8° D = 30/4° E = Coupe gun 20°³
F = Coupe frontale G = 0,5 x 45°
H = 30° I = 60° K = 75° L = Coupe gun 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

A **Angle de chanfrein**
A = 45°¹ B = 25°² C = 45/8° D = 30/4° E = Coupe gun 20°³
F = Coupe frontale G = 0,5 x 45°
H = 30° I = 60° K = 75° L = Coupe gun 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 **Matériau de coupe**
Pour les détails voir page 63
Cutting material
Details see page 63

W1 **Matériau de coupe**
Pour les détails voir page 63
Cutting material
Details see page 63

12R **Revêtement**
Pour les détails voir page 63
Coating
Details see page 63

12R **Revêtement**
Pour les détails voir page 63
Coating
Details see page 63

¹ Standard pour les outils à denture droite
¹ Standard for straight flute form

² Standard pour les outils denture hélice gauche
² Standard for tools with left-hand flute form

³ pour les outils à denture droite
³ Only for straight flute form

Une d'ensemble des matières de coupe

Cutting Materials overview

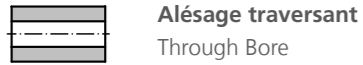
ISO Material Code	URMA Material Code	Matériaux de coupe Cutting Materials						Revêtement Coating						
		URMA Code	W1	T1	B1	B2	D1	01P	05P	07R	08P	12R	14R	10C
			HM/Carbide	Cermet	CBN	CBN	PKD/PCD	Uncoated	TiN	AlTiN	TiAlN + AlCrN	AlCrN	AlCrN	AlCrN
P	P1		■	▲			▲	□	□			■	■	
	P2		■	▲			▲	□	□			■	■	
	P3		■	▲			▲	□	□			■	■	
	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		▲				□	□				▲	■	
H	H1		▲			□	□	□		▲		■	■	
	H2		■			▲	▲	□		■		□	□	
	H3		■			▲	▲	□		■		□	□	
SM	SM1		■	▲			▲	□				■	■	
	SM2		▲	□			□	□				▲	■	
	SM3		▲				□	□				▲	■	
O	O1		▲	□			□							▲
	O2		▲	□			□							▲
	O3		□				▲	▲						
	O4		□				▲	▲						

▲ = Recommandé ▲ = Recommended
■ = Approprié ■ = Applicable
□ = Possible □ = Possible
○ = Sur demande ○ = On request

MATERIAL DETAILS PAGE 88

Données de coupe RM vario

Cutting Data RM vario



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			



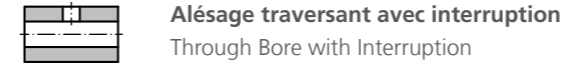
AC Conditions d'utilisation

- | | | |
|---|--|---|
| <p>1 Conditions optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner stables - Longueur de l'outil < 3xD - Evacuation optimale des copeaux garantie - Alimentation interne en liquide de refroidissement > 20 bar | <p>2 Conditions d'utilisation sous-optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner légèrement instables - Longueur de l'outil < 6xD - Evacuation optimale des copeaux non garantie - Alimentation interne en liquide de refroidissement disponible | <p>3 Conditions d'utilisation identiques à 1 & 2</p> <ul style="list-style-type: none"> - Cependant, absence d'alimentation interne en liquide de refroidissement |
|---|--|---|



AC Application Conditions

- | | | |
|--|---|--|
| <p>1 Optimal conditions</p> <ul style="list-style-type: none"> - Stable fixture, machine and/or workpiece - Tool projection length < 3xD - Optimal chip removal guaranteed - Internal coolant supply > 20 bar | <p>2 Suboptimal conditions</p> <ul style="list-style-type: none"> - Slightly unstable fixture, machine and/or workpiece - Tool projection length < 6xD - No optimal chip removal guaranteed - Internal coolant supply available | <p>3 Machining conditions as 1 & 2</p> <ul style="list-style-type: none"> - But without internal coolant |
|--|---|--|



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				
P	4	L	A	T1	120-150-180	0.10-0.18-0.30	fz coupe complète réduite de 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		
	M	4	L	A	W112R	30-45-60		0.08-0.12-0.15	fz coupe complète réduite de 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 Conditions d'utilisation

- | | | |
|---|---|--|
| <p>4 Conditions optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner stables - Longueur de l'outil < 3xD - Evacuation optimale des copeaux garantie - Interruptions symétriques et asymétriques légères (< 10%) - Alimentation interne en liquide de refroidissement > 20 bar | <p>5 Conditions d'utilisation sous-optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner légèrement instables - Longueur de l'outil < 6xD - Evacuation optimale des copeaux non garantie - Interruptions symétriques moyennes (< 30%) - Alimentation interne en liquide de refroidissement disponible | <p>6 Conditions d'utilisation identiques à 4 & 5</p> <ul style="list-style-type: none"> - Cependant, absence d'alimentation interne en liquide de refroidissement - Interruptions symétriques moyennes (< 30%) |
|---|---|--|



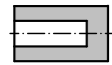
AC Application Conditions

- | | | |
|---|--|---|
| <p>4 Optimal conditions</p> <ul style="list-style-type: none"> - 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 | <p>5 Suboptimal conditions</p> <ul style="list-style-type: none"> - Slightly unstable fixture, machine and/or workpiece - Tool projection length < 6xD - No optimal chip removal guaranteed - Medium symmetrical interruptions (< 30%) - Internal coolant supply available | <p>6 Machining conditions as 4 & 5</p> <ul style="list-style-type: none"> - But without internal coolant - Medium symmetrical interruptions (< 30%) |
|---|--|---|

MATERIAL DETAILS PAGE 88

Données de coupe RM vario

Cutting Data RM vario



Trou borgne
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			



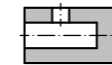
AC Conditions d'utilisation

- | | | |
|---|--|---|
| <p>1 Conditions optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner stables - Longueur de l'outil < 3xD - Evacuation optimale des copeaux garantie - Alimentation interne en liquide de refroidissement > 20 bar | <p>2 Conditions d'utilisation sous-optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner légèrement instables - Longueur de l'outil < 6xD - Evacuation optimale des copeaux non garantie - Alimentation interne en liquide de refroidissement disponible | <p>3 Conditions d'utilisation identiques à 1 & 2</p> <ul style="list-style-type: none"> - Cependant, absence d'alimentation interne en liquide de refroidissement |
|---|--|---|



AC Application Conditions

- | | | |
|--|---|--|
| <p>1 Optimal conditions</p> <ul style="list-style-type: none"> - Stable fixture, machine and/or workpiece - Tool projection length < 3xD - Optimal chip removal guaranteed - Internal coolant supply > 20 bar | <p>2 Suboptimal conditions</p> <ul style="list-style-type: none"> - Slightly unstable fixture, machine and/or workpiece - Tool projection length < 6xD - No optimal chip removal guaranteed - Internal coolant supply available | <p>3 Machining conditions as 1 & 2</p> <ul style="list-style-type: none"> - But without internal coolant |
|--|---|--|



Trou borgne avec interruption
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								
P	4	G	A	T1	120-150-180	0.10-0.14-0.20	fz coupe complète réduite de 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		0.10-0.14-0.20	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		0.10-0.14-0.20	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		0.10-0.14-0.20	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		0.10-0.14-0.20	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		0.08-0.12-0.16	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	0.06-0.08-0.12	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		
M	4	G	A	W112R	30-45-60	0.08-0.12-0.15	fz coupe complète réduite de 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		0.08-0.12-0.15	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		0.08-0.12-0.15	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		0.05-0.08-0.12	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		0.05-0.08-0.12	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		0.05-0.08-0.12	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 Conditions d'utilisation

- | | | |
|---|---|--|
| <p>4 Conditions optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner stables - Longueur de l'outil < 3xD - Evacuation optimale des copeaux garantie - Interruptions symétriques et asymétriques légères (< 10%) - Alimentation interne en liquide de refroidissement > 20 bar | <p>5 Conditions d'utilisation sous-optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner légèrement instables - Longueur de l'outil < 6xD - Evacuation optimale des copeaux non garantie - Interruptions symétriques moyennes (< 30%) - Alimentation interne en liquide de refroidissement disponible | <p>6 Conditions d'utilisation identiques à 4 & 5</p> <ul style="list-style-type: none"> - Cependant, absence d'alimentation interne en liquide de refroidissement - Interruptions symétriques moyennes (< 30%) |
|---|---|--|



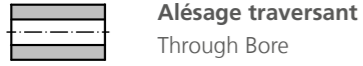
AC Application Conditions

- | | | |
|---|--|---|
| <p>4 Optimal conditions</p> <ul style="list-style-type: none"> - 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 | <p>5 Suboptimal conditions</p> <ul style="list-style-type: none"> - Slightly unstable fixture, machine and/or workpiece - Tool projection length < 6xD - No optimal chip removal guaranteed - Medium symmetrical interruptions (< 30%) - Internal coolant supply available | <p>6 Machining conditions as 4 & 5</p> <ul style="list-style-type: none"> - But without internal coolant - Medium symmetrical interruptions (< 30%) |
|---|--|---|

MATERIAL DETAILS PAGE 88

Données de coupe RM vario

Cutting Data RM vario



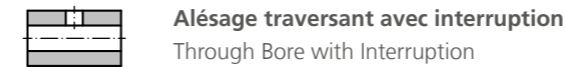
Alésage traversant
Through Bore

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 Conditions d'utilisation**
- 1** Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil < 3xD
 - Evacuation optimale des copeaux garantie
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 2** Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil < 6xD
 - Evacuation optimale des copeaux non garantie
 - Alimentation interne en liquide de refroidissement disponible
 - 3** Conditions d'utilisation identiques à 1 & 2
 - Cependant, absence d'alimentation interne en liquide de refroidissement

- 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



Alésage traversant avec interruption
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		
K	4	G	A	W114R	80-140-220	0.10-0.14-0.18	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
		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	
		G	A	W114R	40-70-100	0.10-0.14-0.18					
	5	G	A	W114R	80-140-220	0.10-0.14-0.18					
		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	
		G	A	W114R	40-70-100	0.10-0.14-0.18					
	6	G	A	W114R	80-140-220	0.10-0.14-0.18					
		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	
		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					
		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	
		G	A	W114R	30-40-50	0.10-0.12-0.15					
	5	G	A	W114R	60-80-100	0.10-0.12-0.15					
		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	
		G	A	W114R	30-40-50	0.10-0.12-0.15					
	6	G	A	W114R	60-80-100	0.10-0.12-0.15					
		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	
		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					
		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	
		G	A	W112R	20-30-40	0.08-0.10-0.12					
	5	G	A	W112R	40-60-80	0.08-0.10-0.12					
		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	
		G	A	W112R	20-30-40	0.08-0.10-0.12					
6	G	A	W112R	40-60-80	0.08-0.10-0.12						
	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			
	G	A	W112R	20-30-40	0.08-0.10-0.12						

N	4	L	B	W110C	100-180-250	0.12-0.18-0.25	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
		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	
		L	B	W110C	50-90-120	0.12-0.18-0.25					
	5	L	B	W110C	100-180-250	0.12-0.18-0.25					
		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	
		L	B	W110C	50-90-120	0.12-0.18-0.25					
	6	L	B	W110C	100-180-250	0.12-0.18-0.25					
		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	
		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					
		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	
		L	B	D1	100-220-300	0.10-0.15-0.20					
	5	L	B	W110C	100-130-160	0.12-0.18-0.25					
		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	
		L	B	W110C	50-70-80	0.12-0.18-0.25					
	6	L	B	W110C	50-70-100	0.10-0.15-0.20					
		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	
		L	B	W110C	25-35-50	0.10-0.15-0.20					

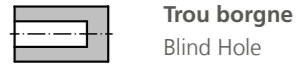
- AC Conditions d'utilisation**
- 4** Conditions optimales
 - Installation, machine et/ou pièce à usiner stables
 - Longueur de l'outil < 3xD
 - Evacuation optimale des copeaux garantie
 - Interruptions symétriques et asymétriques légères (< 10%)
 - Alimentation interne en liquide de refroidissement > 20 bar
 - 5** Conditions d'utilisation sous-optimales
 - Installation, machine et/ou pièce à usiner légèrement instables
 - Longueur de l'outil < 6xD
 - Evacuation optimale des copeaux non garantie
 - Interruptions symétriques moyennes (< 30%)
 - Alimentation interne en liquide de refroidissement disponible
 - 6** Conditions d'utilisation identiques à 4 & 5
 - Cependant, absence d'alimentation interne en liquide de refroidissement
 - Interruptions symétriques moyennes (< 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 89

Données de coupe RM vario

Cutting Data RM vario



ISO	UMC	AC	Type	Geometry	Grade	Vc	fz	Radial / Stock Removal		
								ap	ap	ap
								Ø 5.800-10.609 mm	Ø 10.610-18.609 mm	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	G	A	W110C	100-180-250	0.10-0.15-0.22			
		2	G	A	W110C	80-150-220	0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	G	A	W110C	80-150-220	0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	G	A	W110C	80-150-220	0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	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
		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			
		2	G	A	W110C	80-110-140	0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		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			
		2	G	A	W110C	40-60-80	0.08-0.12-0.18	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		3	G	A	W110C	25-35-50	0.08-0.12-0.18			



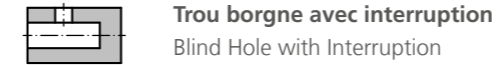
AC Conditions d'utilisation

- | | | |
|---|--|---|
| <p>1 Conditions optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner stables - Longueur de l'outil < 3xD - Evacuation optimale des copeaux garantie - Alimentation interne en liquide de refroidissement > 20 bar | <p>2 Conditions d'utilisation sous-optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner légèrement instables - Longueur de l'outil < 6xD - Evacuation optimale des copeaux non garantie - Alimentation interne en liquide de refroidissement disponible | <p>3 Conditions d'utilisation identiques à 1 & 2</p> <ul style="list-style-type: none"> - Cependant, absence d'alimentation interne en liquide de refroidissement |
|---|--|---|



AC Application Conditions

- | | | |
|--|---|--|
| <p>1 Optimal conditions</p> <ul style="list-style-type: none"> - Stable fixture, machine and/or workpiece - Tool projection length < 3xD - Optimal chip removal guaranteed - Internal coolant supply > 20 bar | <p>2 Suboptimal conditions</p> <ul style="list-style-type: none"> - Slightly unstable fixture, machine and/or workpiece - Tool projection length < 6xD - No optimal chip removal guaranteed - Internal coolant supply available | <p>3 Machining conditions as 1 & 2</p> <ul style="list-style-type: none"> - But without internal coolant |
|--|---|--|



AC	Type	Geometry	Grade	Vc	fz Full Cut	fz Interrupted	Radial / Stock Removal									
							ap	ap	ap							
							Ø 5.800-10.609 mm	Ø 10.610-18.609 mm	Ø 18.610-33.100 mm							
K	4	G	A	W114R	80-140-220	0.10-0.14-0.18	fz coupe complète réduite de 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		fz coupe complète réduite de 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			fz coupe complète réduite de 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	60-80-100	0.10-0.12-0.15				fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%						
		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					fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%					
		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						fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
		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			

K	4	G	A	W110C	100-180-250	0.10-0.15-0.22	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%									
		5	G	A	W110C	80-150-220		0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15					
		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		fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%								
		5	G	A	W110C	80-150-220			0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15				
		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			fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%							
		5	G	A	W110C	80-150-220				0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15			
		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				fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%						
		5	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		
		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					fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%					
		5	G	A	W110C	80-110-140						0.10-0.15-0.22	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15	
		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						fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
		5	G	A	W110C	40-60-80							0.08-0.12-0.18	0.05-0.10-0.12	0.05-0.10-0.15	0.05-0.10-0.15
		6	G	A	W110C	25-35-50							0.08-0.12-0.18			



AC Conditions d'utilisation

- | | | |
|---|---|--|
| <p>4 Conditions optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner stables - Longueur de l'outil < 3xD - Evacuation optimale des copeaux garantie - Interruptions symétriques et asymétriques légères (< 10%) - Alimentation interne en liquide de refroidissement > 20 bar | <p>5 Conditions d'utilisation sous-optimales</p> <ul style="list-style-type: none"> - Installation, machine et/ou pièce à usiner légèrement instables - Longueur de l'outil < 6xD - Evacuation optimale des copeaux non garantie - Interruptions symétriques moyennes (< 30%) - Alimentation interne en liquide de refroidissement disponible | <p>6 Conditions d'utilisation identiques à 4 & 5</p> <ul style="list-style-type: none"> - Cependant, absence d'alimentation interne en liquide de refroidissement - Interruptions symétriques moyennes (< 30%) |
|---|---|--|



AC Application Conditions

- | | | |
|---|--|---|
| <p>4 Optimal conditions</p> <ul style="list-style-type: none"> - 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 | <p>5 Suboptimal conditions</p> <ul style="list-style-type: none"> - Slightly unstable fixture, machine and/or workpiece - Tool projection length < 6xD - No optimal chip removal guaranteed - Medium symmetrical interruptions (< 30%) - Internal coolant supply available | <p>6 Machining conditions as 4 & 5</p> <ul style="list-style-type: none"> - But without internal coolant - Medium symmetrical interruptions (< 30%) |
|---|--|---|

MATERIAL DETAILS PAGE 89

Données de coupe RM vario

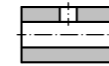
Cutting Data RM vario



Alésage traversant
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				
		2	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	
		3	L	A	W112R	10-15-20	0.06-0.10-0.14				
	S2	1	L	A	W112R	20-30-45	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	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	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				

MATERIAL DETAILS PAGE 90/91

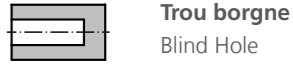


Alésage traversant avec interruption
Through Bore with Interruption

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	fz coupe complète réduite de 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				
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				
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				
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				
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				
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				
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				
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	fz coupe complète réduite de 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				
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				
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	fz coupe complète réduite de 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				
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				
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	fz coupe complète réduite de 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				
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				
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				
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				

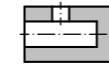
Données de coupe RM vario

Cutting Data RM vario



Trou borgne
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				
		2	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	
		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				
		2	G	A	W112R	20-30-45	0.05-0.08-0.12	0.05-0.08-0.10	0.05-0.10-0.12	0.05-0.10-0.12	
		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				
		2	G	A	W112R	10-18-30	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
		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				
		2	G	A	W112R	8-15-20	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
		3	G	A	W112R	5-10-12	0.05-0.08-0.10				
	S	S11	1	G	A	W112R	20-40-60	0.06-0.10-0.14			
			2	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
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				
		2	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	
		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				
		2	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	
		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				
		2	G	A	W112R	10-18-25	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
		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				
		2	G	A	W107R	10-18-25	0.04-0.06-0.08	0.05-0.08	0.05-0.08-0.10	0.05-0.08-0.10	
		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				
		2	G	A	W107R	8-15-20	0.04-0.06-0.08	0.05-0.08	0.05-0.08	0.05-0.08	
		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				
		2	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	
		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				
		2	G	A	T1	110-140-170	0.18-0.22-0.30	0.08-0.10-0.15	0.08-0.10-0.15	0.08-0.10-0.20	
		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				
		2	G	A	W112R	100-110-140	0.12-0.15-0.20	0.08-0.10-0.15	0.08-0.10-0.15	0.08-0.10-0.20	
		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				
		2	G	A	W112R	30-45-60	0.08-0.12-0.15	0.08-0.10-0.12	0.08-0.10-0.15	0.08-0.10-0.20	
		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				
		2	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	
		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				
		2	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	
		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				
		2	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	
		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				
		2	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	
		3	G	A	W110C	30-50-60	0.05-0.08-0.10				



Trou borgne avec interruption
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	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
5	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	
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					
5	G	A	W112R	20-30-45	0.05-0.08-0.12		0.05-0.08-0.10	0.05-0.10-0.12	0.05-0.10-0.12	
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					
5	G	A	W112R	10-18-30	0.05-0.08-0.10		0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
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					
5	G	A	W112R	8-15-20	0.05-0.08-0.10		0.05-0.08-0.10	0.05-0.08-0.10	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	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
5	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	
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					
5	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	
6	G	A	W112R	10-15-20	0.06-0.10-0.14					
4	G	A	W112R	20-30-45	0.06-0.10-0.14					
5	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	
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					
5	G	A	W112R	10-18-25	0.05-0.08-0.10		0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.10	
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	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
5	G	A	W107R	10-18-25	0.04-0.06-0.08		0.05-0.08	0.05-0.08-0.10	0.05-0.08-0.10	
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					
5	G	A	W107R	8-15-20	0.04-0.06-0.08		0.05-0.08	0.05-0.08	0.05-0.08	
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					
5	G	I	W107R	8-10-15	0.03-0.05-0.07		0.04-0.05-0.06	0.05-0.08	0.05-0.08	
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		fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%			
5	G	A	T1	110-140-170	0.18-0.22-0.30			0.08-0.10-0.15	0.08-0.10-0.15	0.08-0.10-0.20
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					
5	G	A	W112R	100-110-140	0.12-0.15-0.20	0.08-0.10-0.15		0.08-0.10-0.15	0.08-0.10-0.20	
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					
5	G	A	W112R	30-45-60	0.08-0.12-0.15	0.08-0.10-0.12		0.08-0.10-0.15	0.08-0.10-0.20	
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	fz coupe complète réduite de 30 - 50% reduce fz full cut 30 - 50%				
5	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
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					
5	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	
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					
5	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	
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					
5	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	
6	G	A	W110C	30-50-60	0.05-0.08-0.10					

MATERIAL DETAILS PAGE

Instructions de manipulation des outils d'alésage réglables « RM vario »

Handling Instructions for Adjustable Reaming Tools "RM vario"

Pourquoi ajustable ?

- Réajustement du diamètre dans la plage de tolérance (en fonction du matériau à usiner)
- Compensation possible de l'usure (dans le cas où la qualité de surface est encore suffisante)

Ce qui est à prendre en considération:

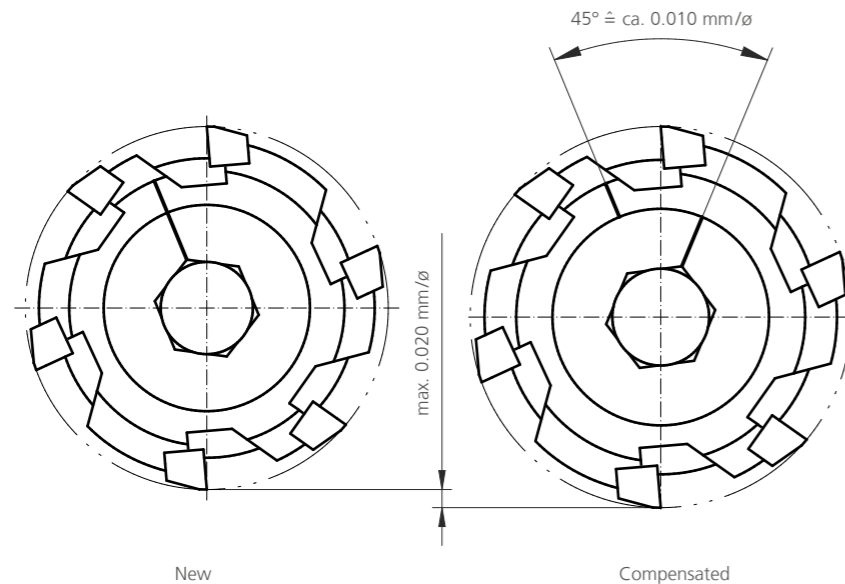
- Max. 0,020 mm de diamètre peuvent être ajoutés (sinon, la tête de friction peut être trop tendue)
- Ajuster saigneusement ne jamais revenir en arrière !
- Livraison avec dimension d'ajustement (mm/°) conformément au dessin.

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



Instructions du mandrin de compensation

Instruction Compensation Chuck



Pour des résultats d'alésage optimaux, une parfaite concentricité de l'outil est indispensable. Pour compenser les erreurs de concentricité du logement et de la broche, des mandrins de compensation ou des mandrins flottants sont employés. La concentricité des outils d'alésage RM vario peut être mesurée à l'aide de différentes méthodes.

Procédure:

1. Avant l'ajustement, assurez-vous que toutes les vis d'ajustement ① soient complètement desserrées.
2. Placez l'outil dans la broche de la machine.
3. Réglez l'indicateur (avec une résolution de 1 µm / 0,0001 pouce) sur la zone de battement marquée sur la tige.
4. Réglez la concentricité directement dans la broche de la machine sur max. 5µm / 0,0002 pouce (idéalement < 3µm / 0,0001 pouce) à l'aide des quatre vis d'ajustement ①.



Les vis d'ajustement ne doivent pas être complètement serrées les unes contre les autres après l'ajustement.

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.

Instructions mandrin flottant

Instruction Floating Chuck



L'alésage sur tours s'effectue principalement à l'aide de mandrins flottants (en cas exceptionnels également possibles sur les centres d'usinage).

Les erreurs de position peuvent être compensées par le biais du mécanisme flottant ajustable. La flexion ne devrait être possible que de manière parallèle au plan (pas de compensation d'erreur angulaire).

Sont recommandées des géométries de coupe avec un angle de $\leq 45^\circ$.

Procédure:

1. Ajuster le mécanisme flottant à l'aide des vis d'ajustement ①.

Vis d'ajustement	Mécanisme flottant	Effet sur l'usinage
Rotation horaire	La force du ressort augmente / résistance à la flexion augmente	La qualité de la surface peut être impactée négativement (marques de rétraction)
Rotation antihoraire	La force du ressort diminue / résistance à la flexion diminue	Vibrations possibles

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 $\leq 45^\circ$ are recommended.

Procédure:

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

Ajustement:

Faible: L'outil devrait être ajusté avec la résistance de flexion la plus faible possible. Néanmoins, prenant en considération le poids de l'outil, ce dernier doit revenir automatiquement dans l'axe central suite à la flexion.

Moyen: Serrez complètement la vis d'ajustement et tournez à contre-sens de $1 \pm \frac{1}{4}$.

Fort: Serrez complètement la vis d'ajustement et tournez à contre-sens de $\frac{1}{4} - \frac{1}{2}$.

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 $1 \pm \frac{1}{4}$ rotation.

Hard: Fully tighten the adjusting screw and turn back by $\frac{1}{4} - \frac{1}{2}$ rotation.

Recommandation pour le réglage de base:

Outil-Ø Tool-Ø	Faible Soft	Moyen Medium	Fort Hard
5.800 – 15.600	X		
15.601 – 23.600	X	X	
23.601 – 33.100		X	

Recommendation for the basic setting:

2. Avec un axe Y existant, nous recommandons d'aligner l'outil $< 10 \mu\text{m} / 0,0004$ pouce (idéalement $< 5 \mu\text{m} / 0,0002$ pouce) concentriquement à l'axe de la broche.



- Le réglage du mécanisme flottant peut varier en fonction de l'application et du type de mandrin flottant.
- Il est généralement recommandé d'entamer l'alésage à vitesse réduite.
- Toutes les données sont des valeurs indicatives et se réfèrent aux mandrins flottants URMA.

2. With an existing Y-axis, we recommend additionally aligning the tool $< 10 \mu\text{m} / 0,0004$ inch (ideally $< 5 \mu\text{m} / 0,0002$ 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

Résolution des problèmes sur centre de fraisage

Troubleshooting Machining Centres



	L'alésage est trop grand Hole too large				L'alésage est conique Tapered hole				L'alésage montre des marques de broutage Hole shows chatter marks	
	Vibrations Vibration	Erreur de circularité Run-out error	bords relevés Built-up edges	Profondeur de coupe radiale Radial depth of cut	Déformation par serrage Deformation by clamping	Épaisseur des matériaux inégale Uneven material thickness	Machine	Flux de copeaux Chip flow	Vibrations Vibration	Erreur de circularité Run-out error
Données de coupe Cutting Data										
Avance (fz) Feed (fz)	↑		↓				↑/↓	↑		
Vitesse de la broche (min-1) Spindle speed (min ⁻¹)	↓		↑					↓		
Profondeur de coupe radiale Radial depth of cut	↑		↑	↓		⚠	↓	↑		
Outil Tool										
Angle de chanfrein Chamfer angle	↑					↑		↑		
Mal-rond Run out	⚠	⚠							⚠	
Vérifier la connexion Check the connection	⚠	⚠							⚠	
Vérifier l'usure / changer l'insert Check the wear / change the insert			⚠					⚠		
Mandrin flottant Floating chuck									•/⚠	
Corps du porte-outil réduit à diamètre Diameter reduced holder									•/⚠	
Mandrin de compensation Compensation chuck		•/⚠							•/⚠	
Pièce à usiner Workpiece										
Fixation de la pièce à usiner Workpiece fixture	⚠				⚠/↓			⚠		
Pression de serrage Clamping pressure	⚠				⚠/↓			⚠		
Machine Machine										
Mélange de liquide de refroidissement Coolant mixture	↑		↑				⚠	↑		
Erreur angulaire de la broche Angle-error of spindle						⚠				
Erreur angulaire des axes Angle-error of axis						⚠				
Vibrations du ravitailleur de barres Vibrations from bar-feeder										
Usinage Machining										
Flux de copeaux Chip flow				⚠			⚠			
Pression du liquide de refroidissement Coolant pressure	⚠/↓		⚠				↑	⚠/↓		
Pression radiale provenant de la géométrie Radial pressure from geometry	↓		⚠	⚠		↓		↓		
Vitesse de broche à l'entrée Spindle speed on entry	↓		⚠			⚠		↓		
Retrait égal à l'avance de l'usinage Feed in feed out										

Manipulation: Si possible, n'effectuez qu'une seule modification à la fois.

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

↑ Augmenter, améliorer
Increase, improve

↓ Réduire
Reduce, decrease

⚠ Contrôler, optimiser
Check, optimize

• Appliquer
Apply

Qualité de surface insatisfaisante (mesurable) Surface quality unsatisfactory (measurable)				Qualité de surface insatisfaisante (visuellement) Surface quality unsatisfactory (optically)				Marques de rétraction Retraction marks		Alésage trop petit ou déformation Hole too small or shape defect					
Vibrations Vibration	bords relevés Built-up edges	Erreur de circularité Run-out error	Géométrie de l'insert Cutting geometry	Machine	Vitesse d'avance Feed rate	Erreur de circularité Run-out error	Géométrie de l'insert Cutting geometry	Machine	bords relevés Built-up edges	Compression radiale du matériau Radial compression of material	Compression radiale par serrage Radial compression through clamping	Usure de l'outil Tool wear	Compression radiale du matériau Radial compression of material	Compression radiale par serrage Radial compression through clamping	Profondeur de coupe radiale Radial depth of cut
↑	↓														
↓	↑														
										↓/↑			↑	↓	↑
↑			↓				↑			↑			↑	↑	
		⚠				⚠			⚠						
		⚠													
⚠	⚠		⚠						⚠	⚠		⚠	⚠		
		•/⚠				•/⚠			•/⚠	•/⚠					
		•/⚠				•/⚠			•/⚠	•/⚠					
		•/⚠				•/⚠			•/⚠						
⚠								⚠			⚠/↓		⚠/↓	⚠/↓	
⚠								⚠			⚠/↓		⚠/↓	⚠/↓	
↑	↑							↑	↑	↓			↓		
						⚠		⚠							
						⚠		⚠							
			⚠										⚠		⚠
⚠	⚠								⚠			⚠			
↓							⚠		⚠	↓			↓	↓	
↓															
									•				•		•

Résolution des problèmes sur centre de tournage

Troubleshooting Lathes



	L'alésage est trop grand Hole too large				L'alésage est conique Tapered hole				L'alésage montre des marques de broutage Hole shows chatter marks	
	Vibrations Vibration	Erreur de circularité Run-out error	bords relevés Built-up edges	Profondeur de coupe radiale Radial depth of cut	Déformation par serrage Deformation by clamping	Épaisseur des matériaux inégale Uneven material thickness	Machine Machine	Flux de copeaux Chip flow	Vibrations Vibration	Erreur de circularité Run-out error
Données de coupe Cutting Data										
Avance (fz) Feed (fz)	↑		↓				↑/↓	↑		
Vitesse de la broche (min-1) Spindle speed (min ⁻¹)	↓		↑					↓		
Profondeur de coupe radiale Radial depth of cut	↑			↓	⚠		↓	↑		
Outil Tool										
Angle de chanfrein Chamfer angle	↑				↑			↑		
Mal-rond Run out		⚠							⚠	
Vérifier la connexion Check the connection	⚠		⚠						⚠	
Vérifier l'usure / changer l'insert Check the wear / change the insert	⚠	⚠	⚠					⚠	⚠	
Mandrin flottant Floating chuck	⚠	•/⚠				•/⚠			•/⚠	
Corps du porte-outil réduit à diamètre Diameter reduced holder	⚠	•/⚠				•/⚠			•/⚠	
Mandrin de compensation Compensation chuck										
Pièce à usiner Workpiece										
Fixation de la pièce à usiner Workpiece fixture	⚠				⚠/↓			⚠	⚠	
Pression de serrage Clamping pressure	⚠				⚠/↓			⚠	⚠	
Machine Machine										
Mélange de liquide de refroidissement Coolant mixture			↑				⚠			
Erreur angulaire de la broche Angle-error of spindle	⚠	⚠				⚠		⚠	⚠	
Erreur angulaire des axes Angle-error of axis	⚠	⚠				⚠		⚠		
Vibrations du ravitailleur de barres Vibrations from bar-feeder	⚠					⚠		⚠		
Usinage Machining										
Flux de copeaux Chip flow				⚠			⚠			
Pression du liquide de refroidissement Coolant pressure	⚠/↓		⚠				↑	⚠/↓		
Pression radiale provenant de la géométrie Radial pressure from geometry	↓		⚠	⚠		↓		↓		
Vitesse de broche à l'entrée Spindle speed on entry	↓		⚠					↓		
Retrait égal à l'avance de l'usinage Feed in feed out										

Manipulation: Si possible, n'effectuez qu'une seule modification à la fois.

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

↑ Augmenter, améliorer
Increase, improve

↓ Réduire
Reduce, decrease

⚠ Contrôler, optimiser
Check, optimize






• Appliquer
Apply

Qualité de surface insatisfaisante (mesurable) Surface quality unsatisfactory (measurable)				Qualité de surface insatisfaisante (visuellement) Surface quality unsatisfactory (optically)				Marques de rétraction Retraction marks		Alésage trop petit ou déformation Hole too small or shape defect					
Vibrations Vibration	bords relevés Built-up edges	Erreur de circularité Run-out error	Géométrie de l'insert Cutting geometry	Machine Machine	Vitesse d'avance Feed rate	Erreur de circularité Run-out error	Géométrie de l'insert Cutting geometry	Machine Machine	bords relevés Built-up edges	Compression radiale du matériau Radial compression of material	Compression radiale par serrage Radial compression through clamping	Usure de l'outil Tool wear	Compression radiale du matériau Radial compression of material	Compression radiale par serrage Radial compression through clamping	Profondeur de coupe radiale Radial depth of cut
↑	↓														
↓	↑														
↑										↑/↓			↑	↓	↑
↑			↓				↓			↑			↑	↑	
		⚠				⚠			⚠						
		⚠				⚠									
⚠	⚠	⚠	⚠			⚠	⚠		⚠	⚠		⚠	⚠		
⚠		•/⚠				•/⚠			•/⚠	•/⚠		•/⚠	•/⚠		
⚠		•/⚠				•/⚠			•/⚠	•/⚠		•/⚠	•/⚠		
⚠											⚠/↓		⚠/↓	⚠/↓	
⚠											⚠/↓		⚠/↓	⚠/↓	
↑	↑								↑	↓			↓		
⚠		⚠		⚠		⚠		⚠							
⚠		⚠		⚠		⚠		⚠							
⚠				⚠				⚠							
														⚠	⚠
⚠	⚠								⚠			⚠			
↓									⚠	↓			↓	↓	
↓															
									•				•		•

Terminologie et formules de base

Definitions and Basic Formulas

Désignation	Designation
a_p Profondeur de coupe	Depth of cut [mm]
n Vitesse de rotation	Speed [min^{-1}]
D/d Diamètre d'alésage	Bore diameter [mm]
v_c Vitesse de coupe	Cutting speed [m/min]
v_f Vitesse d'avance	Feed rate [mm/min]
f Avance par tour	Feed per rotation [mm]
f_z Avance par dent	Feed per tooth [mm]
z Nombre de copeaux	Number of cutting edges
l_f Distance de ravitaillement	Feed distance [mm]
R_a Moyenne arithmétique de rugosité	Arithmetic centre line average value [μm]
R_t Profondeur max. de rugosité	Peak-to-valley height [μm]
R_z Profondeur moyenne max. de rugosité	Average peak-to-valley height [μm]
R_m Résistance à la traction	Tensile strength [N/mm^2]
t_c Temps de découpe par pièce à usiner	Machining time [min]
γ Angle de coupe radiale	Radial rake angle [Degrees]
ε Angle d'arête	Apex angle [Degrees]
h Epaisseur du copeau	Chip thickness [mm]
mc Constance du matériel	Material constant
$kc1.1$ Valeur principale de la force de coupe	Main value cutting force [N/mm^2]
kc Force de coupe spécifique	Specific cutting force [N/mm^2]
F_c Force de coupe	Cutting force [N]
b Largeur du copeau	Chip width [mm]
P_c Puissance d'entraînement nécessaire	Necessary drive power [kW]
η Efficacité	Degree of efficiency
M_d Torque	Torque [Nm]

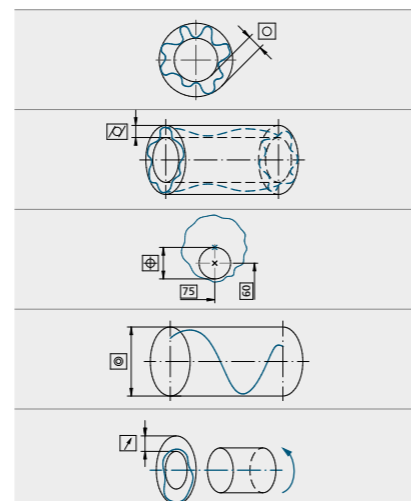
 Circularité	Circularity
 Cylindricité	Cylindricity
 Positionnement	Position
 Concentricité	Concentricity
 Mal rond	Circular runout

Vitesse de coupe 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
Force de coupe (par dent) Cutting force (per cutting edge)	$F_c = b \cdot h \cdot k_c$	N

Vitesse de rotation Speed	$n = \frac{v_c \cdot 1000}{\pi \cdot d}$	min^{-1}
Durée d'usinage Machining time	$t_c = \frac{l_f}{f \cdot n}$	min
Puissance requise Power requirement	$P_c = \frac{b \cdot h \cdot k_c \cdot v_c \cdot z}{60 \cdot 10^3 \cdot \eta}$	kW

Spanungsbreite / Chip width	
a_p	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

	R_a	R_z
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



Force de coupe spécifique Specific cutting force	$k_c = \frac{k_c1.1}{h^{m_c}}$	N
Torque Torque	$M_d = \frac{(D^2 - d^2) \cdot f \cdot k_c}{8 \cdot 10^3}$	Nm

Etude d'usinage

Machining Study

Expéditeur * Sender		Number	
Société Company		Représentant URMA URMA distributor	
Adresse Address		Conseiller Contact	
Machine-Outil Machine-Tool			
Type de machine Machine type and manufacturer			
Horizontal * Horizontal <input type="checkbox"/>	Vertical * Vertical <input type="checkbox"/>	Outil rotatif * Tool rotating <input type="checkbox"/>	
Porte-broche * Spindle holder	Taille * Size	Exécution * Execution	
DIN 69893-HSK <input type="checkbox"/>	20 <input type="checkbox"/> 25 <input type="checkbox"/>	A <input type="checkbox"/>	
DIN 69871 <input type="checkbox"/>	30 <input type="checkbox"/> 32 <input type="checkbox"/>	B <input type="checkbox"/>	
MAS-BT <input type="checkbox"/>	40 <input type="checkbox"/> 50 <input type="checkbox"/>	C <input type="checkbox"/>	
Embout cylindrique DIN 1835 Cylinder shank DIN 1835 <input type="checkbox"/>	63 <input type="checkbox"/> 80 <input type="checkbox"/>	D <input type="checkbox"/>	
DIN 69880 VDI <input type="checkbox"/>	100 <input type="checkbox"/>	E <input type="checkbox"/>	
Refroidissement Lubricant			
Huile * Oil <input type="checkbox"/>	SLM * 1) MLS 1) <input type="checkbox"/>	Emulsion * Emulsion <input type="checkbox"/>	Rapport du mélange Ratio of mixture
Alimentation interne en liquide de refroidissement * Internal coolant supply <input type="checkbox"/>			Pression du liquide de refroidissement (bar) * Coolant pressure (bar)
Pièce à usiner Workpiece			
Désignation Designation	Numéro de matériau * Material number	État du traitement (dureté) * Treatment condition (hardness)	
Exigences d'usinage Machining requirements			
Diamètre d'alésage * Bore \varnothing	Longueur d'alésage Bore length	\varnothing pré-usiné * Pre-machined \varnothing	
Tolérance * Tolerance	Interférence des contours Interfering contours	Méthode de prétraitement * Method of pre-machining	
Exigences de tolérance additionnelles Additional tolerance requirements	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Trou borgne * Blind Hole <input type="checkbox"/>	
Qualité de la surface (μm) * Surface quality (μm)	R_a <input type="checkbox"/> R_z <input type="checkbox"/> R_t <input type="checkbox"/>	Interruption de la coupe * Cutting interruption <input type="checkbox"/>	
Date * Date			
Annexe: Votre croquis d'usinage * Attachement: your application sketch			

* Champs obligatoires
Mandatory fields

1) Système de lubrification minimale
Minimal lubrication system (mist coolant)

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

Tableau comparatif des matériaux

Material Comparison Table

Acier
Steel

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
P	P1	Aciers de décolletage avec faible teneur en carbone	Free-cutting steels	< 600	< 180	1600	0.18	1.0715	11SMn30
	P2	Aciers ferritiques faiblement alliés, C < 0,25 %, aciers de construction légèrem. alliés	Low-alloy ferritic steels, C < 0.25%wt, low-alloy general structural steels	< 700	< 210	1700	0.18	1.0038	S235JR2
	P3	Aciers ferritiques et ferritiques/perlitiques, C < 0,25%, aciers de construction, aciers de cémentation	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	Aciers traités thermiquement, aciers de construction, C > 0,25%	Heat-treatable steels, construction steels C > 0.25%	< 1000	< 300	1800	0.23	1.1191 1.7225	C45E 42CrMo4
	P5	Aciers durcissables, C > 0,67%, aciers à ressort, aciers de roulement	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	Aciers à outils alliés	Alloyed tool steels	700 - 1200	210 - 350	2200	0.25	1.2601	X165CrMoV12
	P7	Aciers à outils fortement alliés, aciers rapides (HSS)	High alloyed tool steels, high speed steels (HSS)	> 900	> 260	2300	0.25	1.2083 1.2344	X42Cr13 X40CrMoV5-1

Acier inoxydable et double face

Stainless austenitic steel and duplex

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
M	M1	Aciers inoxydables ferritiques et martensitiques	Ferritic & martensitic stainless steels	500 - 900	150 - 260	1700	0.22	1.4005 1.4512 1.4021	X12CrS13 X5CrTi12 X20Cr13
	M2	Aciers inoxydables à coupe libre, moins difficiles à usiner	Free-cutting austenitic stainless steels, less difficult machinable	500 - 900	150 - 260	1700	0.22	1.4305	X8CrNiS18 9
	M3	Aciers inoxydables austénitiques faiblement alliés	Low-alloy austenitic stainless steels			2000	0.2	1.4301	X5CrNi18 10
	M4	Aciers inoxydables austénitiques moyennement alliés	Alloyed austenitic stainless steels			2100	0.2	1.4435	X2CrNiMo18 14 3
	M5	Aciers inoxydables austénitiques fortement alliés	High-alloy austenitic and duplex stainless steels			2300	0.2	1.4462 1.4548	X2CrNiMoN22 5 3 X5CrNiCuNb17 4 4
	M6	Austénite, duplex et super duplex, très difficile à usiner	Austenite, duplex and super duplex, very difficult to machine	700 - 1000	210 - 300	2300	0.2	1.4410	X2CrNiMoN25 7 4

Listes détaillées des matériaux page 92 – 100

See pages 92 – 100 for detailed material list

Tableau comparatif des matériaux

Material Comparison Table

Fers à couler
Cast Irons

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
K	K1	Fers gris	Grey cast irons	< 300	< 90	1100	0.25	0.6025	EN-GJL-250 (GG25)
	K2	Fers gris	Grey cast irons	> 300	> 90	1300	0.27	0.6035	EN-GJL-350 (GG35)
	K3	Fers de fonte nodulaires, Fers de fonte malléables	Ductil cast irons, Malleable cast irons	< 500	< 150	900	0.25	0.7040	EN-GJS-400-15 (GGG40)
	K4	Fers de fonte nodulaires, Fers de fonte malléables	Ductil cast irons, Malleable cast irons	< 800	< 210	1400	0.28	0.7060	EN-GJS-600-3 (GGG60)
	K5	Fers traités thermiquement	Austempered ductile irons	< 1100	< 325	1500	0.32		EN-GJS-1000-5
	K6	Fers à graphite compact	Compactet graphite irons	300 - 500	90 - 150				EN-GJV-400
	K7	Fers de fonte lamellaires austénitiques	Austenitic lamellar cast irons	< 400				0.6655	GGL-NiCuCr 15 6 2
	K8	Fer de fonte sphéroïdal, austénitique, graphite et ductile	Austenitic spheroidal graphite and ductil iron	300 - 600	90 - 180			0.7673	EN-GJSA-XNiMn23-4

Métal non ferreux

Non-Ferrous Metals

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
N	N1	Alliages d'aluminium avec Si < 2 %	Aluminum wrought alloy with Si < 2%	< 300	< 150	600	0.23	3.3535	AlMg3
	N2	Alliages d'aluminium, Si < 7 %	Aluminum alloys, Si < 7%	< 400	< 120	700	0.25	3.2152	AlSi6Cu4
	N3	Alliages d'aluminium 8% < Si < 15% et alliages Magnésium	Aluminum alloys 8% < Si < 15% and alloys Magnesium	< 400	< 120	700	0.25	3.2163	AlSi9Cu3 AlSi12
	N4	Alliages d'aluminium, Si > 15%	Aluminum alloys, Si > 15%	> 400	> 120	800	0.25		AlSi17Cu4Mg
	N5	Alliages de cuivre, bonne usinabilité	Copper alloys, good machinability	< 700	< 210	800	0.2	2.0401 2.1090	CuZn39Pb3 CuSn7Zn4Pb7-C
	N6	Alliages de cuivre, plus difficile à usiner	Copper alloys, more difficult machinability	> 500	> 150	1000	0.25	2.0966	CuAl10Ni5Fe4

Listes détaillées des matériaux page 92 – 100

See pages 92 – 100 for detailed material list

Tableau comparatif des matériaux

Material Comparison Table

Superalloys

Superalloys

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

Alliages de titane

Titanium Alloys

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
S	S11	Titane, faiblement allié (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	Titane, alliage moyen (près de α + β)	Titanium, medium alloyed (close to α + β)	< 1100	< 325	1500	0.22		Ti6Al2Sn 4Zr2Mo0.1Si
	S13	Titane fortement allié (α + β)	Titanium, high alloyed (α + β)	900 - 1200	265 - 355	1500	0.22	3.7165	TiAl6V4 (Grade 5)
	S14	Titane fortement allié (β)	Titanium, high alloyed (β)	> 1200	> 355	1700	0.22		Ti10V2Fe3Al Ti5Al5Mo5V3Cr

Aciers trempés

Hardened Steels

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
H	H1	Aciers de cémentation, aciers traités therm., aciers pour roulements, aciers à outils	Case hardening steels, heat-treatable steels, bearing steels, tool steels	1450 - 1800	< 520	3300	0.22		HRC 45 - 52
	H2	Aciers de cémentation, aciers traités therm., Aciers pour roulements, aciers à outils	Case hardening steels, heat-treatable steels, bearing steels, tool steels	1800 - 2100	520 - 600	4100	0.22		HRC 53 - 57
	H3	Aciers de cémentation, aciers traités therm., aciers pour roulements, aciers à outils, aciers rapides (HSS)	Case hardening steels, heat-treatable steels, bearing steels, tool steels, high-speed steels	> 2100	> 600	4700	0.22		HRC 58 - 62

Listes détaillées des matériaux page 92 – 100

See pages 92 – 100 for detailed material list

Tableau comparatif des matériaux

Material Comparison Table

Matériaux métallurgiques en poudre

Powder Metallurgical Materials

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
SM	SM1	Matériaux faiblement alliés frittés	Low alloyed sintered materials	200 - 450	< 135				Sint-D11 / C11
	SM2	Matériaux moyennement alliés frittés avec Ni < 7 %	Medium alloyed sintered materials with Ni < 7%	400 - 600	120 - 180				Sint-D31 / C31
	SM3	Matériaux fortement alliés frittés avec Cr et Ni > 7 %	High alloyed sintered materials with Cr and Ni > 7%	400 - 600	120 - 180				Sint-D40 / C40 (AISI 316)

Plastiques et composites

Composite Materials

ISO	UMC	Description	Description	Rm [N/mm ²]	HB	Kc1.1	mc	DIN Nr.	Exemple Example
O	O1	Polymères thermoplastiques	Thermoplastic polymers			150	0.26		Polyamid 6 (PA 6) Polyoxyméthylène (POM)
	O2	Matières plastiques thermodurcissables	Thermosetting plastics			150	0.26		Epoxydharze (EP)
	O3	Plastiques renforcés de < 50% de fibres de verre	Reinforced plastics with < 50% glass fibers			300	0.26		Polyamid 6 mit 30% GF (PA 6 GF30)
	O4	Plastiques renforcés de fibres de verre, de carbone et d'aramide	Glass fiber-, carbon fiber- and aramid reinforced plastics			300	0.26		GFK CFK

Listes détaillées des matériaux page 92 – 100

See pages 92 – 100 for detailed material list

Classification des groupes de matériaux

Material Group Classification

Acier
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			SUM 32	1922			
	1.0726	35 S 20	35 S 20	35 MF 4			SUM 41	1957	G 11400	1140	
	1.0727	46 S 20	46 S 20	45 MF 4			SUM 42	1973	G 11460	1146	
	1.0736	9 SMn 36	11 SMn 37	S 300			SUM 25		G 12150	1215	
	1.0737	9 SMnPb 36	11 SMnPb 37	S 300 Pb			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				1606		
	1.0570	St E 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	Z 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 5	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 CrMoV 12 KU		2310			
1.2678		X 45 CoCrWV 5 5 5									
1.2713		55 NiCrMoV 6	55 NiCrMoV 6	55 NCDV 7							
1.2714		55 NiCrMoV 7	56 NiCrMoV 7		BH 224-5	56 NiCrMoV7-KU	SKT 4			T 61206	L6
1.2743	60 NiCrMo 12 4	60 NiCrMo 12 4								6F3	
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							

Classification des groupes de matériaux

Material Group Classification

Acier inoxydable et double face

Stainless austenitic steel and duplex

UMC	W-Nr	DIN	EN	AFNOR	B5	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 CrNi 28	X 18 CrNi 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 CrNi 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 2 CrNiMo 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
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 CrNiSiN 21 11 2	X 9 CrNiSiN 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
	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

Classification des groupes de matériaux

Material Group Classification

Fonte

Cast Irons

UMC	W-Nr	DIN	EN	AFNOR	B5	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					
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								

Classification des groupes de matériaux

Material Group Classification

Métaux non ferreux

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-A451							
	3.5555	AlMg5									
	3.5612	G-MgAl6Zn	MG-P-63	G-A621		MAG-E-121			M11600	AZ61A	
	3.5632	G-MgAl6Zn3									
	3.5812	G-MgAl8Zn	MG-P-61	G-A721		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-57G		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-510G		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-513		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										

Classification des groupes de matériaux

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									

Classification des groupes de matériaux

Material Group Classification

Superaliages

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	2.4683	CoCr22NiW			Haynes 25
	2.4681	CoCr26Ni9Mo5W			Alloy 188
	2.4711	CoCr20Ni15Mo			ULTIMET
	2.4778	CoCr28			ELGILOY
	2.4967	CoCr20W15Ni			Alloy 150
					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

Alliages de titane

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
					Ti 15-3

Classification des groupes de matériaux

Material Group Classification

Aciers trempés

Hardened Steels

UMC	W.-Nr	DIN	EN	AFNOR	B5	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
H2	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
	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
	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
H3	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 DKCWW 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

Classification des groupes de matériaux

Material Group Classification

Matériaux métallurgiques en poudre

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

Plastiques et composites

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
O2	PSU	Polysulfone	Mindel, Ultrason
	PF	Phenol formaldehyde resin	Bakelite, Supraplast
	MF	Melamine formaldehyde resin	Resopal, Hornit
	UF	Urea formaldehyde resin	Resamin, Urecoll
O3	EP	Epoxy resin	Epoxy, Araldit
	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	
O4	PSU GF 30	Polysulfone reinforced with 30% GF	
	GFK	Glass fibre reinforced plastic	
	CFK	Carbon fiber reinforced plastic	



URMA AG WERKZEUGFABRIK

Obermatt 3
CH-5102 Ruppertswil
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**



ANDROID APP ON
 **Google play**



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