kennametal.com

KENNAMETAL®

MASTER CATALOG 2018

VOLUME TWO | **ROTATING** TOOLS

HOLEMAKING | TAPPING | SOLID END MILLING | INDEXABLE MILLING

RIQ™ (Quattro Cut™) and RIR™
Padded Reamers

Primary Application

Master the highest precision reaming with standard inserts in almost all materials with two unique systems: RIR padded reamers for small-diameter applications and RIQ padded reamers for easy setup in large-diameters applications.

RIQ reamers are available starting at diameter 16mm (.630") with four cutting edges for lowest cost per hole. The proprietary pocket seat only requires setup of the diameter, which is a huge benefit in simplicity compared to systems that require the diameter and back taper to be adjusted simultaneously. RIR padded reamers are also proprietary and available starting at diameter 6mm (.236") with one cutting edge, and diameter 8mm (.315") with two edges.

Features and Benefits

Higher Productivity and Profitability

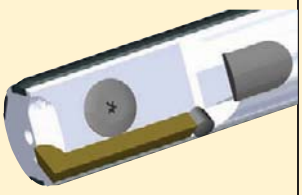
- Longer tool life with Kennametal grades.
- User friendly — RIQ padded reamers reduce setup time.
- Use four full edges even in PCD or PcBN styles of RIQ inserts.

Complete Insert Portfolio

- Large standard offering of lead geometries — E13, EDS, EDR, EGU, EGR, radius, and taper inserts.
- Large offering of grades — coated and uncoated carbide, cermet, PcBN, and PCD.

Customization

- All RIQ tooling engineered to specific needs in diameters 16–245mm (.630–9.645") with internal coolant.
- All RIR tooling engineered to specific needs in diameters 6–245mm (.236–9.645") with internal coolant.
- RIR taper reamers available upon request.
- Multiflute and step reaming applications and special blade shapes available upon request.
- Measuring and adjustment equipment available as standard.

Application recommendation	RIR	RIQ
	Bore tolerances less than 10 µm (can be greater). Geometric tolerances down to 2 µm. Skilled workforce experience required. 	Bore tolerances less than 10 µm. Geometric tolerances down to 2 µm. Lower skilled workforce, easier adjustment. Multidiameter bores. 
Pocket seat	Flat with clamping groove in blade.	Serrated. Greater insert stability.
Cutting edges	2 (1 with PCD or CBN and 1 within diameter range 6–8mm [.236–.315"])	4 (SC, cermet, PCD, CBN)
Special blade forms	yes	yes
Multiple inserts on diameter	no	yes
Blade adjustment	Diameter and back taper.	Diameter only (back taper defined by serration).
Blade adjusting screws	2	1
Chamfer or valve seat machining	Yes, but adjustment required on position and angle.	Yes, only adjustment of position. Angle adjustment not required due to precision of serrated pocket seat.
General comments	For small diameters with high setup effort.	For larger diameters with low setup effort.

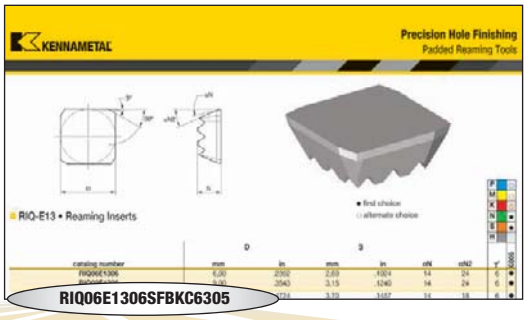

RIR™ Reamer


RIQ™ Reamer


RIQ™ Valve Seat Tool

How Do Catalog Numbers Work?

Each character in our catalog number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



RIQ	06	E13	06	S	FB	KC6305
Type	Size	Lead	Rake	Edge	Chipbreaker	Grade

RIR = Reamer Insert Rectangular

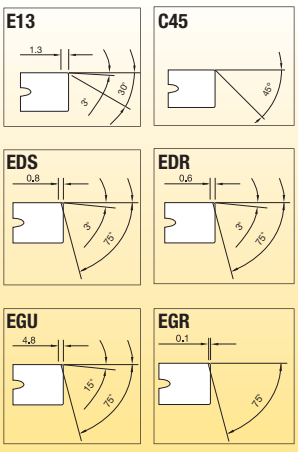
RIQ = Reamer Insert Quattro Cut™

Blade Size

Ø [mm]	RIQ	
16,0–24,99	**06**	6,0 x 6,0mm
Valve Seat	**B6**	6,0 x 6,0mm
Valve Seat	**B7**	6,5 x 6,5mm
Valve Seat	**07**	7,0 x 7,0mm
Valve Seat	**08**	8,0 x 8,0mm
>25	**09**	9,0 x 9,0mm
>25	**12**	12,0 x 12,0mm

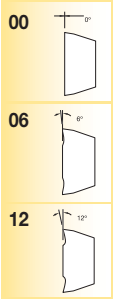
Ø [mm]	RIR	
6,0–7,99	**A0**	10,5 x 2,50mm
8,0–10,99	**01**	15,0 x 2,80mm
11,0–13,99	**02**	18,0 x 4,00mm
14,0–17,99	**03**	20,0 x 4,76mm
18,0–45,99	**04**	27,0 x 5,56mm
>46	**05**	27,0 x 6,75mm
Taper Reamer	**T4**	45,0 x 5,56mm

Cutting Lead



R = Radius Blade
R02
R04
R05

Rake Angle

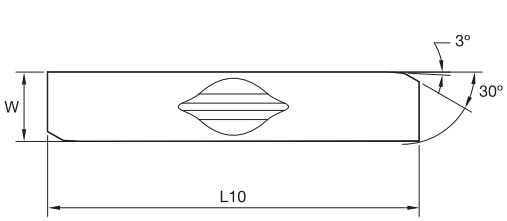


S  Chamfered and Rounded

FB = Finishing Blind Hole

FT = Finishing Through Hole

Grade	
Carbide	KC6005
Carbide	KC6105
Carbide	KC6305
Cermet	KT6225
Cermet	KT6315
PCD	KD1415
CBN	KB1610



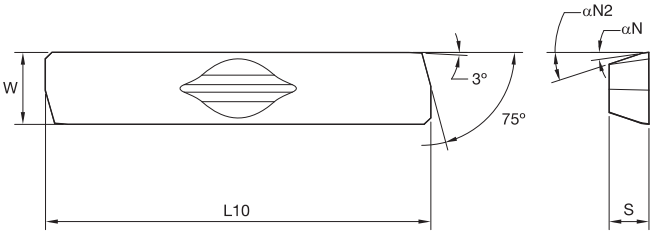
● first choice
○ alternate choice

P	●	●	○
M	○	○	●
K	●	●	●
N	○	○	○
S			
H			

RIR-E13 • Reaming Inserts

ISO catalog number	ANSI catalog number	L10 mm	L10 in	S mm	S in	W mm	W in	αN°	αN2°	γ°	KC6005	KC6105	KC6305
RIR01E1306 *	RIR01E1306 *	15,00	.5906	1,53	.0602	2,80	.1102	8	18	6	–	●	–
RIR01E1312 *	RIR01E1312 *	15,00	.5910	1,53	.0600	2,80	.1100	8	18	12	–	●	–
RIR02E1312 *	RIR02E1312 *	18,00	.7090	1,93	.0760	4,00	.1575	8	18	12	–	●	●
RIR03E1312 *	RIR03E1312 *	20,00	.7870	2,33	.0920	4,76	.1870	8	18	12	–	–	●
RIR04E1312	RIR04E1312	27,00	1.0630	3,13	.1230	5,56	.2190	8	18	12	●	–	–
RIR04E1312 *	RIR04E1312 *	27,00	1.0630	3,13	.1230	5,56	.2190	8	18	12	–	●	–

NOTE: *Made-to-order standard item. Standard pricing, manufacturing lead time, and minimum order quantity applies.



● first choice
○ alternate choice

P	
M	
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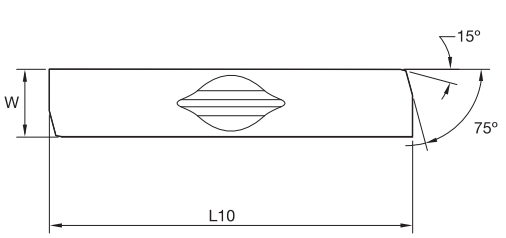
RIR-EDS • Reaming Inserts

ISO catalog number	ANSI catalog number	L10 mm	L10 in	S mm	S in	W mm	W in	αN°	αN2°	γ°	KD1415
RIR04EDS06 *	RIR04EDS06 *	27,00	1.0630	3,15	.1240	5,56	.2190	8	18	6	

NOTE: All KD1415™ inserts are single tipped except full face at size RIR01.
*Made-to-order standard item. Standard pricing, manufacturing lead time, and minimum order quantity applies.



● first choice
○ alternate choice

P	●
M	○
K	●
N	○
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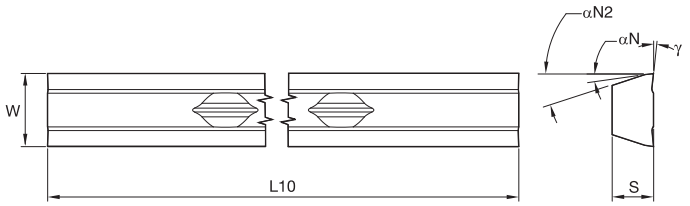
RIR-EGU • Reaming Inserts

ISO catalog number	ANSI catalog number	L10 mm	L10 in	S mm	S in	W mm	W in	αN°	αN2°	KC6105
RIR01EGU00	RIR01EGU00	14,48	.5699	1,55	.0610	2,80	.1100	8	18	
RIR05EGU00 *	RIR05EGU00 *	27,00	1.0630	3,15	.1240	6,75	.2660	8	18	

NOTE: *Made-to-order standard item. Standard pricing, manufacturing lead time, and minimum order quantity applies.



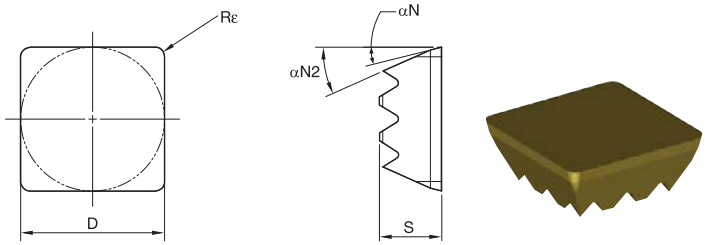
● first choice
○ alternate choice

P	●
M	○
K	●
N	○
S	
H	

RIR-C45 • Reaming Inserts

ISO catalog number	ANSI catalog number	L10 mm	L10 in	S mm	S in	W mm	W in	αN°	αN2°	γ°	KC6005
RIRT4C4512	**RIRT4C4512**	45,00	1.7720	3,15	.1240	5,56	.2190	8	18	12	●

NOTE: For use with taper reamer bodies.



● first choice
○ alternate choice

P	
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N	●
S	
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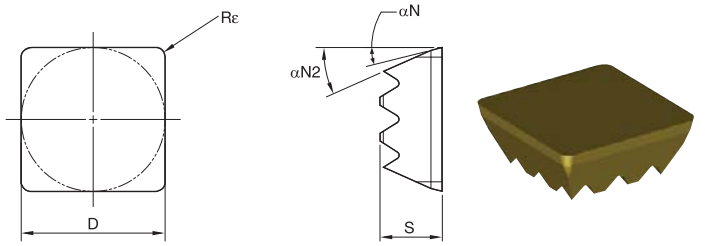
RIQ-R02 • Reaming Inserts

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	Rε mm	Rε in	αN°	αN2°	γ°	KD1415
RIQ06R0200 *	**RIQ06R0200 ***	6,00	.2362	2,60	.1024	0,20	.0079	8	18	0	●

NOTE: *Made-to-order standard item. Standard pricing, manufacturing lead time, and minimum order quantity applies.



● first choice
○ alternate choice

P	●
M	○
K	○
N	
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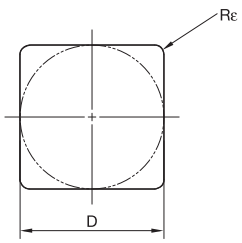
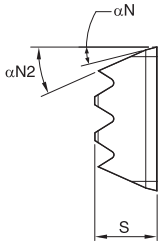
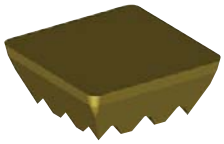
H	●

RIQ-R04 • Reaming Inserts

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	Rε mm	Rε in	αN°	αN2°	γ°	KB1610	KT6225
RIQ06R0400S	**RIQ06R0400S**	6,00	.2362	2,60	.1024	0,40	.0160	8	18	0	●	–
RIQ09R0400S	**RIQ09R0400S**	9,00	.3540	3,15	.1240	0,40	.0160	8	18	0	●	–





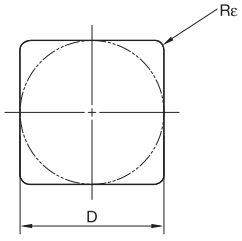


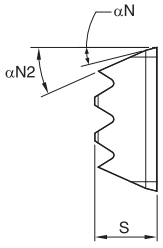
● first choice
○ alternate choice

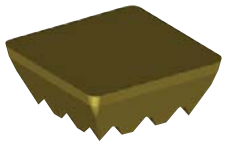
P		●
M		○
K	○	
N		
S		
H	●	

RIQ-R04-FB • Reaming Inserts • With Chipbreaker • For Blind Holes

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	Rε mm	Rε in	αN°	αN2°	γ°	KB1610	KT6225
RIQ06R0400FB	RIQ06R0400FB	6,00	.2362	2,60	.1024	0,40	.0169	3	18	12	–	●
RIQ09R0400FB	RIQ09R0400FB	9,00	.3543	3,15	.1240	0,40	.0156	3	18	12	–	●





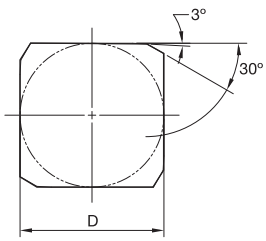


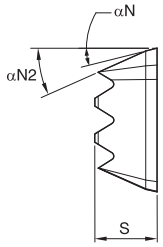
● first choice
○ alternate choice

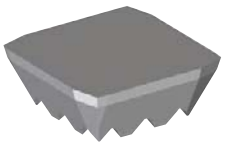
P		●
M		○
K		
N		
S		
H		

RIQ-R05 • Reaming Inserts • With Chipbreaker • For Through Holes

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	Rε mm	Rε in	αN°	αN2°	γ°	KT6315
RIQ06R0500FT	RIQ06R0500FT	6,00	.2362	2,60	.1024	0,50	.0197	8	18	0	●
RIQ09R0506FT	RIQ09R0506FT	9,00	.3543	3,15	.1240	0,50	.0197	14	24	6	●







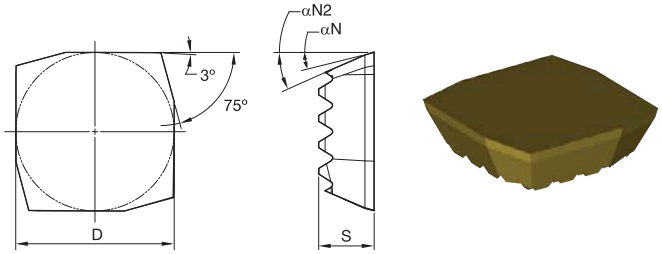
● first choice
○ alternate choice

P	●	●	○
M	○	○	●
K	●	●	●
N	○	○	○
S			
H			

RIQ-E13 • Reaming Inserts

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	αN°	αN2°	γ°	KC6005	KC6105	KC6305
RIQ06E1300 *	RIQ06E1300 *	6,00	.2362	2,60	.1024	8	18	0	●	●	●
RIQ06E1306 *	RIQ06E1306 *	6,00	.2362	2,60	.1024	14	24	6	●	●	●
RIQ06E1312 *	RIQ06E1312 *	6,00	.2362	2,60	.1024	20	30	12	●	●	●
RIQ09E1300 *	RIQ09E1300 *	9,00	.3543	3,15	.1240	8	18	0	●	●	●
RIQ09E1306 *	RIQ09E1306 *	9,00	.3543	3,15	.1240	14	24	6	●	●	●
RIQ09E1312 *	RIQ09E1312 *	9,00	.3543	3,15	.1240	20	30	12	●	●	●

NOTE: *Made-to-order standard item. Standard pricing, manufacturing lead time, and minimum order quantity applies.



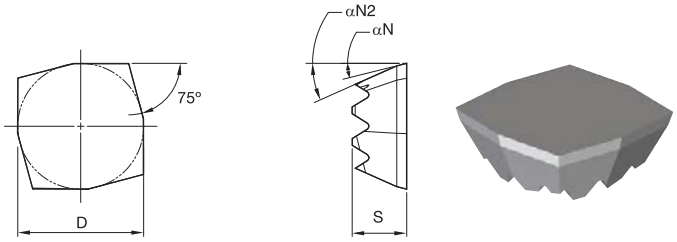
● first choice
○ alternate choice

P	●	●	○	
M	○	○	●	
K	●	●	●	
N	○	○	○	●
S				
H				

RIQ-EDR • Reaming Inserts

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	αN°	αN2°	γ°	KC6005	KC6105	KC6305	KD1415
RIQ06EDR00	RIQ06EDR00	6,00	.2362	2,60	.1024	8	18	0	●	–	●	–
RIQ06EDR00 *	RIQ06EDR00 *	6,00	.2362	2,60	.1024	8	18	0	–	●	–	–
RIQ06EDR06 *	RIQ06EDR06 *	6,00	.2362	2,60	.1024	14	24	6	●	–	–	–
RIQ06EDR06	RIQ06EDR06	6,00	.2362	2,60	.1024	14	24	6	–	●	●	●
RIQ06EDR12 *	RIQ06EDR12 *	6,00	.2362	2,60	.1024	20	30	12	●	●	●	–
RIQ09EDR00 *	RIQ09EDR00 *	9,00	.3543	3,15	.1240	8	18	0	●	●	●	–
RIQ09EDR06 *	RIQ09EDR06 *	9,00	.3543	3,15	.1240	14	24	6	●	●	●	●
RIQ09EDR12 *	RIQ09EDR12 *	9,00	.3543	3,15	.1240	20	30	12	●	●	●	–

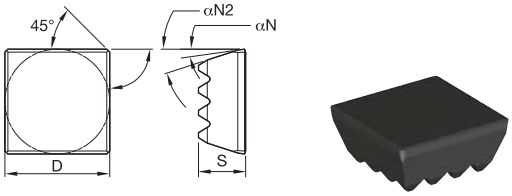
NOTE: *Made-to-order standard item. Standard pricing, manufacturing lead time, and minimum order quantity applies.



RIQ-EGR • Reaming Inserts

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	αN°	αN2°	γ°	KC6005	KC6105	KC6305	KD1415
RIQ06EGR00	RIQ06EGR00	6,00	.2362	2,60	.1020	8	18	0	●	–	–	–
RIQ06EGR00 *	RIQ06EGR00 *	6,00	.2362	2,60	.1020	8	18	0	–	●	●	–
RIQ06EGR06	RIQ06EGR06	6,00	.2362	2,60	.1020	14	24	6	●	–	–	●
RIQ06EGR06 *	RIQ06EGR06 *	6,00	.2362	2,60	.1020	14	24	6	–	●	●	–
RIQ06EGR12 *	RIQ06EGR12 *	6,00	.2362	2,60	.1020	20	30	12	●	●	●	–
RIQ09EGR00	RIQ09EGR00	9,00	.3543	3,15	.1240	8	18	0	●	–	–	–
RIQ09EGR00 *	RIQ09EGR00 *	9,00	.3543	3,15	.1240	8	18	0	–	●	●	–
RIQ09EGR06 *	RIQ09EGR06 *	9,00	.3543	3,15	.1240	14	24	6	●	●	–	–
RIQ09EGR06	RIQ09EGR06	9,00	.3543	3,15	.1240	14	24	6	–	–	●	●
RIQ09EGR12 *	RIQ09EGR12 *	9,00	.3543	3,15	.1240	20	30	12	●	●	●	–

NOTE: *Made-to-order standard item. Standard pricing, manufacturing lead time, and minimum order quantity applies.



● first choice
○ alternate choice

P		
M		
K	●	●
N		
S		
H	●	●

RIQ-C45 • Valve Seat Finishing

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	αN°	αN2°	KBHK10	KBHK15
RIQB6C4500S	RIQB6C4500S	6,00	.2362	2,60	.1024	8	18	●	●
RIQB7C4500S	RIQB7C4500S	6,50	.2559	2,60	.1024	8	18	●	●
RIQ07C4500S	RIQ07C4500S	7,00	.2756	3,15	.1240	8	18	●	●
RIQ08C4500S	RIQ08C4500S	8,00	.3150	3,15	.1240	8	18	●	●
RIQ09C4500S	RIQ09C4500S	9,00	.3540	3,15	.1240	8	18	●	●

RIR™/RIQ™ • Metric

Material Group		Grade	Cutting Speed — vc Range — m/min			Hole Types	1	2	3	4	5		
						Metric							
						Recommended Feed Rate per Tooth							
			min	Starting Value	max		E13	EDS	EDR	EGR	EGU	R0X	C45*
P	1	KC6005	30	**60**	100	mm/r	0,10–0,20	–	–	–	–	–	0,20–0,30
	2	KC6005	20	**50**	90	mm/r	0,10–0,20	–	–	–	–	–	0,20–0,30
	3	KC6005	20	**40**	80	mm/r	0,05–0,20	–	–	–	–	–	0,20–0,30
		KT6225	120	**180**	240	mm/r	–	–	–	–	–	0,15–0,20	–
		KT6315	120	**180**	240	mm/r	–	–	–	–	–	0,15–0,20	–
	4	KC6005	15	**30**	50	mm/r	0,05–0,20	–	–	–	–	–	0,20–0,30
		KC6105	15	**30**	50	mm/r	0,05–0,20	–	–	–	–	–	–
		KT6225	120	**180**	240	mm/r	–	–	–	–	–	0,15–0,20	–
		KT6315	120	**180**	240	mm/r	–	–	–	–	–	0,15–0,20	–
	5	KC6105	10	**25**	40	mm/r	0,05–0,20	–	–	–	–	–	–
	6	KC6105	10	**25**	40	mm/r	0,05–0,20	–	–	–	–	–	–
M	1	KC6305	10	**25**	40	mm/r	0,05–0,20	–	–	–	–	–	–
	2	KC6305	10	**25**	40	mm/r	0,05–0,20	–	–	–	–	–	–
	3	KC6305	10	**25**	40	mm/r	0,05–0,20	–	–	–	–	–	–
K	1	KC6005	20	**70**	100	mm/r	0,10–0,20	0,15–0,20	0,15–0,20	0,18–0,20	–	–	0,20–0,30
		K6105	20	**70**	100	mm/r	–	–	–	–	0,20	–	–
	2	KC6005	20	**60**	100	mm/r	0,10–0,20	0,15–0,20	0,15–0,20	0,18–0,20	–	–	0,20–0,30
		K6105	20	**60**	100	mm/r	–	–	–	–	0,20	–	–
	3	KC6005	20	**60**	100	mm/r	0,10–0,20	0,13–0,20	0,13–0,20	0,15–0,20	0,17–0,20	–	0,20–0,30
N	1	KD1415	100	**250**	600+	mm/r	–	0,10–0,20	0,10–0,20	0,10–0,20	–	–	–
	2	KD1415	100	**250**	600+	mm/r	–	0,10–0,20	0,10–0,20	0,10–0,20	–	–	–
	3	KD1415	100	**250**	600+	mm/r	–	0,10–0,20	0,10–0,20	0,10–0,20	–	–	–
	4	KD1415	100	**250**	600+	mm/r	–	0,10–0,20	0,10–0,20	0,10–0,20	–	–	–
S	1	–	–	**–**	–	mm/r	Recommendations available on request						
	2	–	–	**–**	–	mm/r							
	3	–	–	**–**	–	mm/r							
	4	–	–	**–**	–	mm/r							
H	1	KB1610	150	**180**	200	mm/r	–	–	–	–	–	0,05–0,10	–

*For taper reamers vc min 16 SFM (5 m/min), starting vc 33 SFM (10 m/min), max. vc 66 SFM (20 m/min).

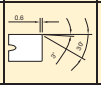
RIR™/RIQ™ • Inch

Material Group		Grade	Cutting Speed — vc Range — SFM min	Starting Value	max	Hole Types	1	2	3	4	5		
						Inch							
						Recommended Feed Rate per Tooth							
							E13	EDS	EDR	EGR	EGU	R0X	C45*
P	1	KC6005	98	**197**	328	IPR	0.004–0.008	–	–	–	–	–	0.008–0.012
	2	KC6005	66	**164**	295	IPR	0.004–0.008	–	–	–	–	–	0.008–0.012
	3	KC6005	66	**131**	262	IPR	0.002–0.008	–	–	–	–	–	0.008–0.012
		KT6225	394	**590**	787	IPR	–	–	–	–	–	0.006–0.008	–
		KT6315	394	**590**	787	IPR	–	–	–	–	–	0.006–0.008	–
	4	KC6005	49	**98**	164	IPR	0.002–0.008	–	–	–	–	–	0.008–0.012
		KC6105	49	**98**	164	IPR	0.002–0.008	–	–	–	–	–	–
		KT6225	394	**590**	787	IPR	–	–	–	–	–	0.006–0.008	–
		KT6315	394	**590**	787	IPR	–	–	–	–	–	0.006–0.008	–
	5	KC6105	33	**82**	131	IPR	0.002–0.008	–	–	–	–	–	–
	6	KC6105	33	**82**	131	IPR	0.002–0.008	–	–	–	–	–	–
M	1	KC6305	33	**82**	131	IPR	0.002–0.008	–	–	–	–	–	–
	2	KC6305	33	**82**	131	IPR	0.002–0.008	–	–	–	–	–	–
	3	KC6305	33	**82**	131	IPR	0.002–0.008	–	–	–	–	–	–
K	1	KC6005	66	**230**	328	IPR	0.004–0.008	0.006–0.008	0.006–0.008	0.007–0.008	–	–	0.008–0.012
		K6105	66	**230**	328	IPR	–	–	–	–	0.008	–	–
	2	KC6005	66	**197**	328	IPR	0.004–0.008	0.006–0.008	0.006–0.008	0.007–0.008	–	–	0.008–0.012
		K6105	66	**197**	328	IPR	–	–	–	–	0.008	–	–
	3	KC6005	66	**197**	328	IPR	0.004–0.008	0.005–0.008	0.005–0.008	0.006–0.008	0.007–0.008	–	0.008–0.012
N	1	KD1415	328	**820**	1968+	IPR	–	0.004–0.008	0.004–0.008	0.004–0.008	–	–	–
	2	KD1415	328	**820**	1968+	IPR	–	0.004–0.008	0.004–0.008	0.004–0.008	–	–	–
	3	KD1415	328	**820**	1968+	IPR	–	0.004–0.008	0.004–0.008	0.004–0.008	–	–	–
	4	KD1415	328	**820**	1968+	IPR	–	0.004–0.008	0.004–0.008	0.004–0.008	–	–	–
S	1	–	–	**–**	–	IPR	Recommendations available on request						
	2	–	–	**–**	–	IPR							
	3	–	–	**–**	–	IPR							
	4	–	–	**–**	–	IPR							
H	1	KB1610	492	**590**	656	IPR	–	–	–	–	–	0.002–0.004	–

*For taper reamers vc min 16 SFM (5 m/min), starting vc 33 SFM (10 m/min), max. vc 66 SFM (20 m/min).

Overview of RIR and RIQ insert leads

Alternative insert lead that can be used

Tool designed for below listed lead	E06	E13	EDS	EGS	EKS	EGU	EGR	EDR	EKR	ESR	EUR	R02	R04	R06	R08
															R
E06	●	–	–	–	–	–	–	–	–	–	–	●	–	–	–
E13	●	●	–	–	–	–	○	○	○	○	○	●	○	–	–
EDS	●	–	●	●	–	–	●	●	○	–	–	●	○	–	–
EGS	○	–	–	●	–	–	●	–	–	–	–	●	○	–	–
EKS	●	–	–	–	●	–	●	●	●	–	–	●	○	–	–
EGU	○	–	○	○	○	●	●	○	○	○	○	●	○	○	–
EGR	●	–	–	–	–	–	●	–	–	–	–	●	○	–	–
EDR	●	–	–	○	–	–	●	●	●	●	○	●	○	–	–
EKR	●	–	–	○	–	–	●	●	●	●	○	●	○	–	–
ESR	●	–	–	○	–	–	●	●	●	●	○	●	○	–	–
EUR	●	–	–	○	–	–	●	●	●	●	●	●	●	–	–
R02	–	–	–	–	–	–	○	–	–	–	–	●	–	–	–
R04	–	–	–	–	–	–	○	–	–	–	–	●	●	–	–
R06	●	–	–	–	–	–	●	●	●	●	●	●	●	●	–
R08	●	–	–	–	–	–	●	●	●	●	●	●	●	●	●

Insert Lead

Surface finish	●●●	●●●	●●	●	●●	●●	●	●●	●●	●●	●●	●●	●●	●●	●●
Postioning accuracy	–	–	●●	●●●	●●	●●	●●●	●●	●●	●●	●●	●	●	●	●

Legend

●	Alternative Inserts	Delivery condition of tool. Insert lead = tool lead.
●		90% compatible. Later support of guide pads at the bore entrance can happen, if leads are not identical.
○		Under certain circumstances compatible. Refer to a Kennametal expert for further support.
–		Do not use in this tool. Can lead to tool damage.

●●●	Surface/ Positioning	Excellent results
●●		Good results
●		Sufficient results
–		Not given

General advice: To mount an insert, where the lead is not identical to the tool lead, the rake angle and insert size have to be identical.

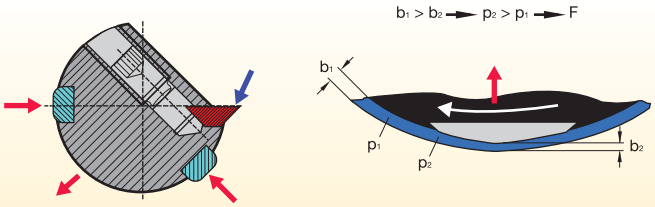
coolant selection		
	recommended	alternative
material type	mineral-oil-based emulsions	semi-synthetic
steel	6%	10%
nickel chrome steel	6%	12%
stainless steel	6%	12%
cast iron	6%	6%
aluminum	6%	12%
zinc alloys	6%	12%
copper	6%	12%
brass	6%	6%

pressure and flow rates					
cut diameter (mm)	cut diameter (in)	flow rate (L/min)	flow rate (gal/min)	pressure (bar)	pressure (psi)
6–12	.25–.468	15–20	55–75	>10	>150
12–16	.468–.625	20–40	75–150	>8	>120
16–20	.625–.781	30–50	115–190	>7	>100
20–32	.781–1.25	40–75	150–285	>5	>75
32–50	1.25–2.0	65–250	245–950	>4	>50
50–100	2.0–4.0	175–350	660–1325	>3	>40

Basic Principle

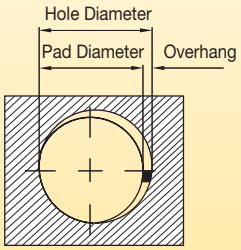
The Kennametal padded reaming tools follow two basic rules. The result, perfectly cylindrical bores with exceptional straightness and superior surface finishes combined with a bore diameter tolerance held to microns:

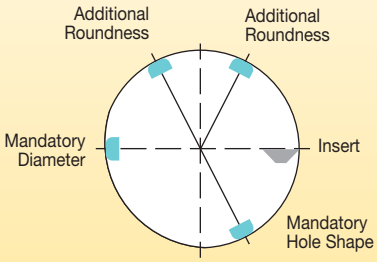
1. A SINGLE-POINT BORING TOOL SUPPORTED BY BEARING PADS, FLOATING ON A COOLANT FILM.
2. A TOOL MUST DEFLECT ONTO THE PADS, ON ENTERING THE HOLE, IN ORDER TO OBTAIN THE CORRECT SIZE.



Each padded reamer hosts a selection of guide pads that are positioned to resist the cutting forces created during machining. A minimum of two guide pads are necessary guiding the reamer in the predrilled hole.

The lubricant, in the form of coolant, gets between the pad and component surface, resulting in frictionless stability during cutting.





Guide pads are ground slightly smaller than the targeted diameter, this allows for blade/insert wear. Most common is a 10 µm overhang but can vary depending on the material to be cut.

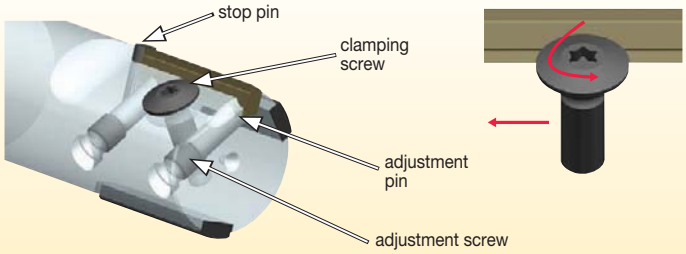
As padded reamers are specifically ground, relative to diameter and tolerance, guide pads are not flexible or adjustable. The pad below the insert ensures hole roundness while the pad opposite the insert defines the bore diameter. Each further pad improves the roundness, straightness, and bridges interruptions within the bore.

These carbide, cermet, PCD, and ceramic guide pads are selected and brazed or bonded to the body depending on coolant availability/type and abrasiveness of the material to be cut. Especially with high L/D ratio tooling (e.g., cam and crank boring bars), bonding of guide pads offers higher precision due to less thermal influence to the steel base body.

● first choice ○ alternate choice

material	P	M	K	N	S	H	MQL
carbide	●	○	●	●		○	○
cermet	●	○	●			○	●
PCD			○		●		●

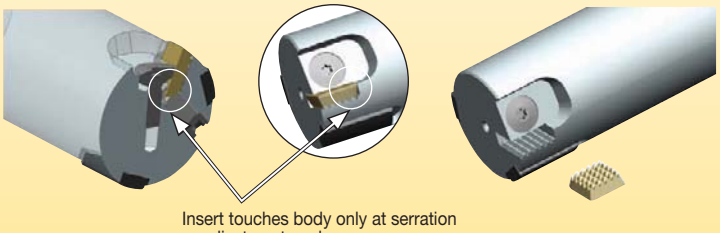
RIR Clamping



RIR reaming inserts are clamped by a single screw to avoid weakening of the pocket seat against common clamping wedges. This clamp screw has a left hand thread to move and securely hold the blade against the stop pin. The stop pin ensures correct advancement of cutting insert to guiding pad.

Like other types of padded reamers using rectangular reaming inserts, two adjustment screws and wedges are required to adjust diameter and back taper accurately. Therefore, RIR is the preferred solution for diameters below RIQ range.

RIQ Clamping



There is no need to adjust back taper as this is already predefined by the serrations. Only the overhang of the cutting edge, relative to the guide pads, needs to be adjusted.

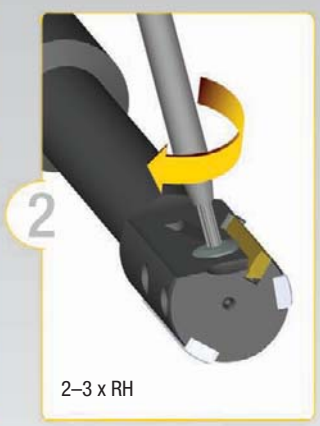
The right-hand clamp screw locks the insert securely onto the high-precision serration. The three cutting edges that are not in use are completely protected by the body while not touching them. All four cutting edges of full-face CBN and PCD inserts can be completely used without the danger of accidently damaging one of them.

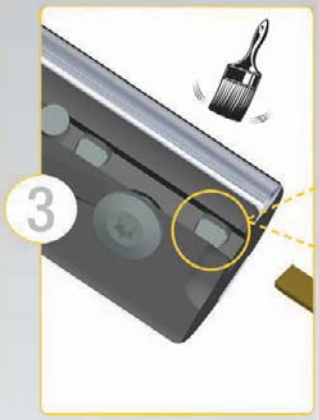
The special form of the clamp screw provides the highest clamping forces enabling less loss of diameter by bedding in effects than known on finger-clamp systems

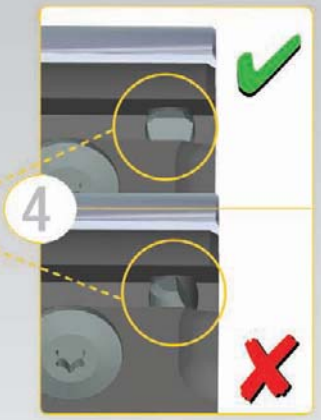
The proprietary adjustment wedge prevents any unpredictable rotation. This avoids errors during setup that cause tool damages.

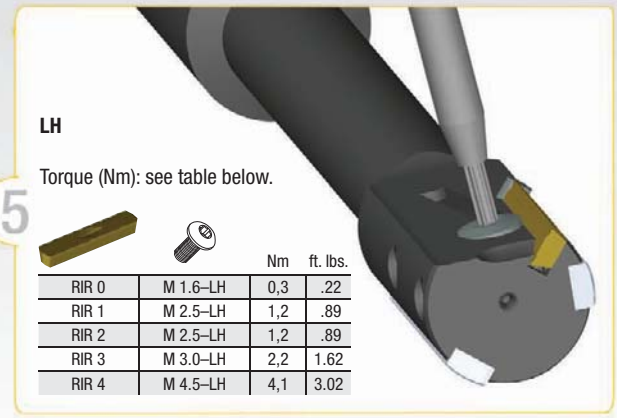
Adjustment Pin and Screw

RIR Tooling Setup

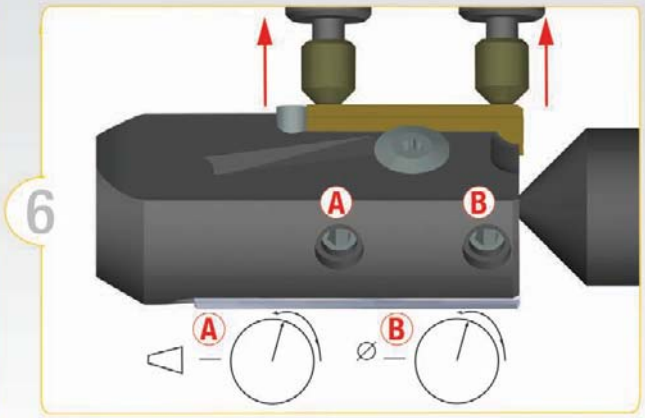




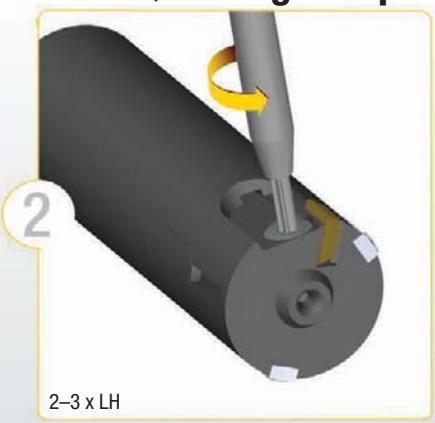


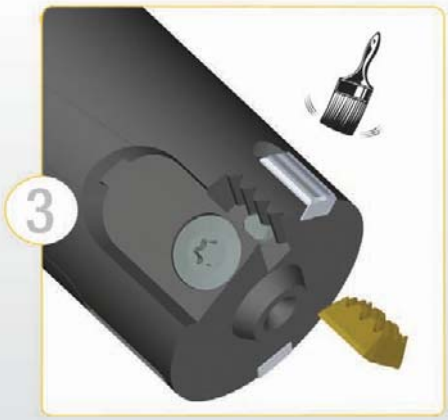


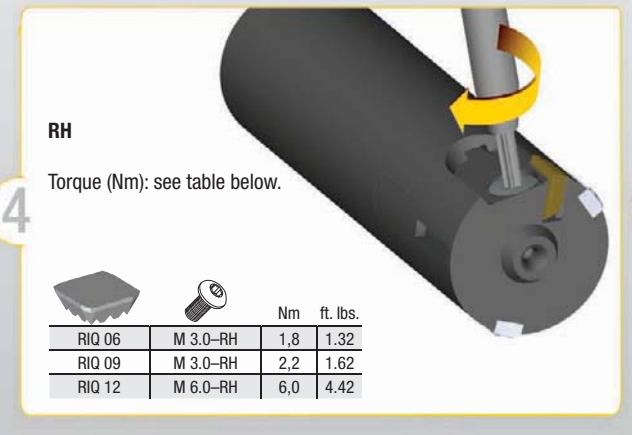
		Nm	ft. lbs.
RIR 0	M 1.6–LH	0,3	.22
RIR 1	M 2.5–LH	1,2	.89
RIR 2	M 2.5–LH	1,2	.89
RIR 3	M 3.0–LH	2,2	1.62
RIR 4	M 4.5–LH	4,1	3.02



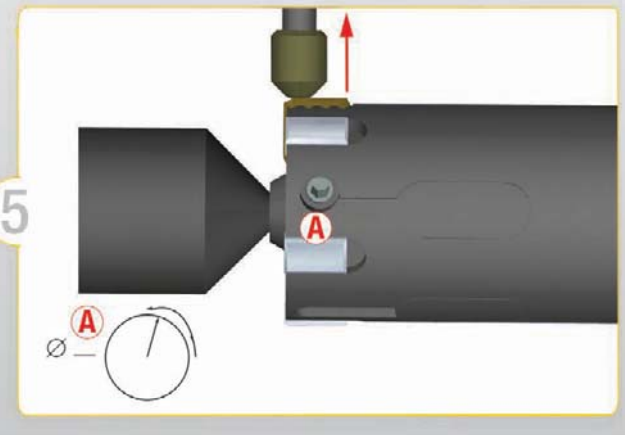
RIQ Tooling Setup





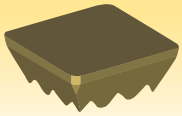


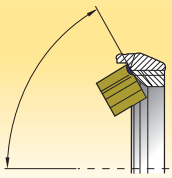
		Nm	ft. lbs.
RIQ 06	M 3.0–RH	1,8	1.32
RIQ 09	M 3.0–RH	2,2	1.62
RIQ 12	M 6.0–RH	6,0	4.42

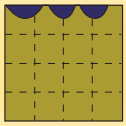


Valve Seat Tools • RIQ™ Quattro Cut™ Based Tooling

RIQ technology enables bypassing any angular adjustment of the insert and provides up to 12 cutting edges.







- Causing in three wear areas per edge.
- Resulting into 12 usable cutting edges per insert.

Valve Seat Tools • Machining Center Solutions

RIQ valve seat tooling with integrated hydraulic chuck to clamp multiflute RMS™ or RIR™ guide pad reamer.

Machining Center • Integrated Hydraulic Chuck

RMS Multiflute Reamer
for regular runout accuracy of valve seat to value guide demands

RIR Guide Pad Reamer
for highest requests regarding valve guide roundness and cylindricity

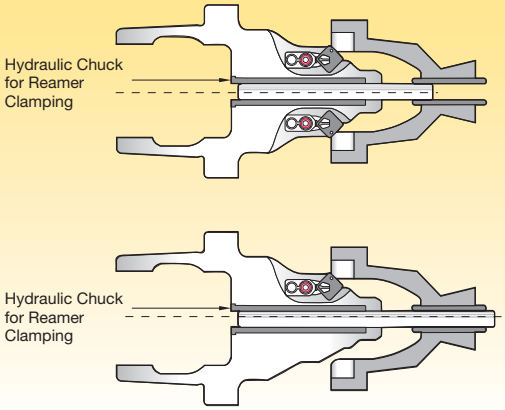
Machining Center Process • All Angles Formed to Finish Specifications in TWO Passes

Process A (Preferred)
Tool 1 • Semi-Finish:
- Finish of secondary angles.
- Semi-finish of primary angles.
- Create pilot bore (short version of RMS or RIR reamer).

Tool 2 • Finish:
- Finish of primary angles.
- Finish of guide bore (long version of RMS or RIR reamer).

Process B (Alternate)
Tool 1 • Finish Valve Seat:
- Finish of primary and secondary angles.
- Create pilot bore (short version of RMS or RIR reamer).

Tool 2 • Finish Valve Guide:
- Finish of guide bore (long version of RMS or RIR reamer).



Valve Seat Tools • Transfer Line Solutions

RIQ valve seat tooling with carbide bushing guiding RMS or RIR reamer machining the valve guide on transfer lines.

Transfer Line • Integrated Carbide Bushing

Multiflute Reamer RMS
for regular runout accuracy of valve seat to value guide demands

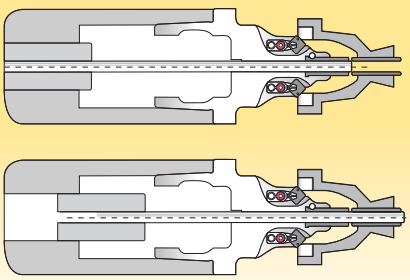
RIR Guide Pad Reamer
for highest requests regarding valve guide roundness and cylindricity

Transfer Line Process • All Angles Formed to Finish Specifications in TWO Passes/ONE Pass

Process A (Preferred)
Tool 1 • Semi-Finish:
- Semi-finish of secondary angles.
- Semi-finish of primary angles.

Tool 2 • Finish:
- Finish of primary angles.
- Finish of secondary angles.
- Finish of guide bore with feed out multiflute or guide pad reamer (squirt-through type).

Process B (Alternate)
Tool 1 • Semi-Finish and Finish Combined:
- Finish of primary and secondary seat angles.
- Finish of guide bore with feed out multiflute or guide pad reamer (squirt-through type).



Fine Boring Application Sheet

Feature tolerances, surface finishes, and geometric tolerances have to be content of the workpiece drawing

Q-Number:		**Date:**	
Customer:		**Sales eng.:**	
Location:		**Application eng.:**	
Contact person:		**Competitors:**	

General

Status:	❒ Launch	❒ Running progress	❒ Process change	
Volume:		Holes/Year	**Similar tool:**	

Workpiece

Operation name:						
Diameters/features to be machined	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**

Tolerance target:	❒ Upper third ❒ Middle third (e.g., if CpK is needed) ❒ Lower third (e.g., if Go/NoGo Gage)		**Interrupted cut:**	❒ Yes	❒ No
			Facing included:	❒ Yes	❒ No
			Max lead length:		
CpK-value:	❒ Yes	❒ No	**Hole type:**	❒ Blind	❒ Through
Workpiece material:			**Hardness/ strength:**		(N/mm², HRC,...)
Premachining: (detailed description including stock amounts)					

Machine/Fixture/Hole Gaging

Machine type:	❒ Machining center	❒ Transfer line	❒ Lathe	❒ Special purpose machine		
Machine name:						
Tool:	❒ Rotating	❒ Stationary	**Spindle connection:**			(HSK80A, DV50, BT40,...)
Spindle orientation:	❒ Horizontal	❒ Vertical	**Number of spindles:**			(for same operation on same machine)
Workpiece clamping:	❒ Rigid	❒ Weak	**M/C spindle adjustment:**	❒ Radial runout	❒ Axial runout	❒ No
Setting device available: (only for adjustable tools)	❒ Yes:		Description	❒ No		
Gauging method:	❒ Go/NoGo-gage	❒ Air or electronic gage	❒ Other			
Coolant type	❒ Soluble	❒ Semi-synthetic	❒ Synthetic	❒ MQL		
Coolant supply:	❒ Internal	❒ External	❒ None			

Coolant pressure:	bar	**Coolant concentration:**		%
		Coolant flow:		l/min

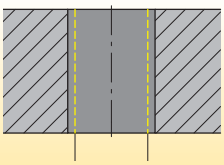
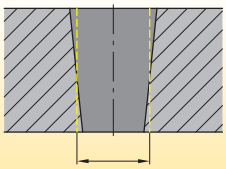
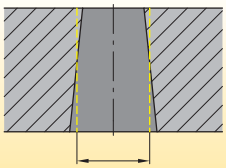
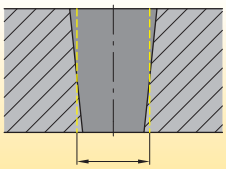
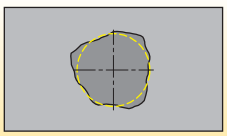
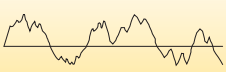
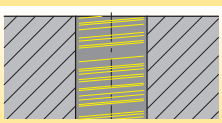
Additional Information: (e.g. interferences, weight or dimensional restrictions, customer reason for change, known issues,...)

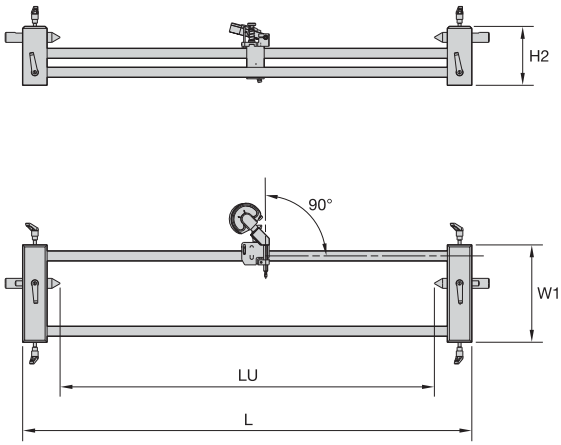
Quotation Processing Only with Workpiece Drawing and Filled Out Form

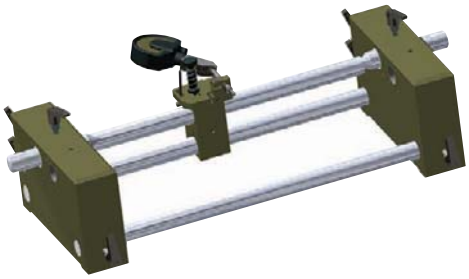
Reaming Allowances for Single Blade Reaming

		reaming allowance in diameter					
		mm			in		
mm	in	min	middle	max	min	middle	max
6,00–9,59	.189–.378	0,10	0,15	0,25	.004	.006	.010
9,60–15,00	.378–.591	0,15	0,20	0,30	.006	.008	.012
15,00–20,00	.591–.787	0,15	0,25	0,35	.006	.010	.014
20,00–50,00	.787–1.969	0,20	0,30	0,40	.008	.012	.016

Causes of and Remedies for Reaming Problems

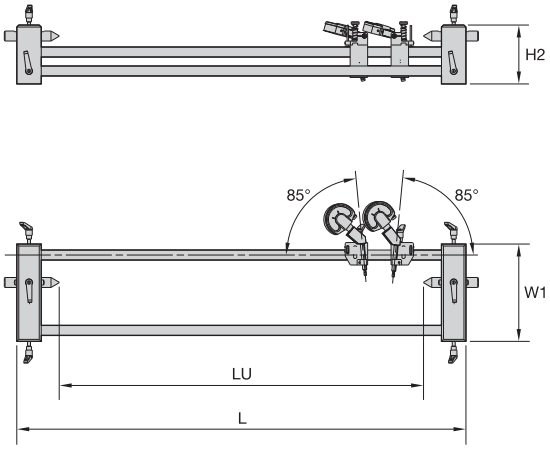
Problem		Cause	Possible Remedy
Drill diameter too large	 d_{Nom}	1. Reaming tool running out-of-center. 2. Concentricity of pilot hole and ream machining unsatisfactory. 3. Built-up edge. 4. Unsuitable cooling lubricant. 5. Reaming tool Ø too large.	• Use SIF™ equalizing adapter. • Re-align, use floating head. • Change cooling lubricant. • Change cutting speed. • Measure reamers and send for repairs.
Drill diameter too small	 d_{Nom}	1. Reamer worn. 2. Unsuitable cooling lubricant. 3. Reaming allowance too small.	• Replace and refit tool. • Change cooling lubricant. • Increase reaming allowance.
Conical drill profile wider towards drill runout	 d_{Nom}	1. Concentricity of pilot hole and reaming unsatisfactory. 2. Positioning accuracy of pilot hole to reaming.	• Re-align, use SIF equalizing adapter. • Correct positioning accuracy.
Conical drill profile wider at drill entry point	 d_{Nom}	1. Concentricity of pilot hole and reaming unsatisfactory. 2. Reaming tool skim cutting with ledger.	• Re-align, use floating head. • Securely clamp reaming tool axially.
Hole out-of-center and/or showing chatter marks		1. Reaming tool running out-of-center. 2. Slanted cutting surface/asymmetrical cutting. 3. Workpiece twisted.	• Use SIF equalizing adapter. • Flatten surface before drilling or reaming. • Take the direction of impact into account when clamping the workpiece.
Surface quality does not meet specification		1. Tool cutters worn. 2. Reaming tool running out-of-center. 3. Incorrect technology data (cutting parameters). 4. Inadequate chip evacuation.	• Replace and refit tool. • Use SIF equalizing adapter. • Change cutting parameters in machining range. • Optimize coolant supply; increase coolant pressure and volume.
Feed grooves		1. Built-up edge.	• Change cooling lubricant. • Change cutting speed.

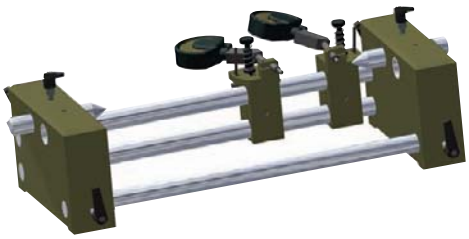




Setting Fixture • One Gage

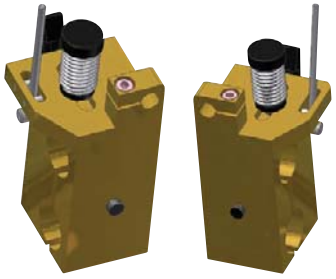
		H2		L		LU		W1	
order number	catalog number	mm	in	mm	in	mm	in	mm	in
5025599	SF300M1RS	118	4.646	450	17.717	300	11.811	195	7.677
5025670	SF750M1RS	118	4.646	900	35.443	750	29.527	195	7.677





Setting Fixture • Two Gage

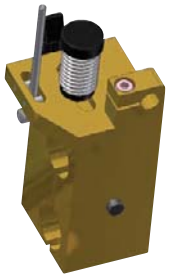
		H2		L		LU		W1	
order number	catalog number	mm	in	mm	in	mm	in	mm	in
5025597	SF300M1LA1RA	118	4.646	450	17.717	300	11.811	195	7.677
5025598	SF750M1LA1RA	118	4.646	900	35.443	750	29.527	195	7.677



Left Hand Right Hand

Axial Slide • 90° with Angle Fine Adjustment

order number	catalog number
5025672	SFSLLS
5025671	SFSLRS



SM Screw Sets for Slides

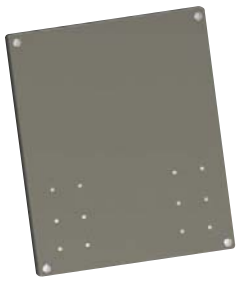
Axial Slides

order number	catalog number
5025683	SFSLSS

Left Hand Right Hand

Axial Slide • 85°

order number	catalog number
5025674	SFSLLA
5025673	SFSLRA



Base Plate for Vertical Setup

order number	catalog number
5025680	SFVB

SM Clamp Handle

Clamp Handle for End Blocks and Axial Slides

order number	catalog number
5025682	SFEBCH

SM End Block

End Block Including Screws

order number	catalog number
5025681	SFEBS

Contact Pins Set

order number	catalog number
5025686	SFCPS

Support Bars (450mm and 900mm)

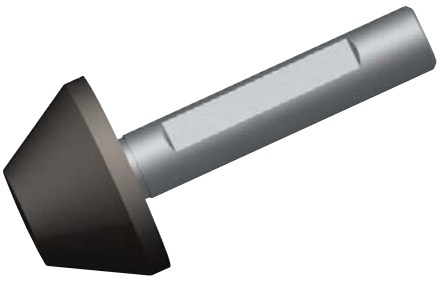
order number	catalog number
5025684	SFSB450
5025685	SFSB900

Gage Set

order number	catalog number
5025675	SFMGS

Spring-Loaded Center Ø 20mm

order number	catalog number
5025679	SFCR20S



HSK Center

order number	catalog number
5025677	SFCRHSK3263
5025678	SFCRHSK63100

Standard Center Ø 20mm

order number	catalog number
5025676	SFCR20