MAKRA
ALPINE METAL TECH

KEG

Edge deburring devices

en

The MAKRA edge deburring devices achieve optimum milling results on longitudinal edges, inner and outer contours, undercuts and in weld seam preparation.

KEG

Edge deburring devices

The edge deburring devices developed by MAKRA are used for deburring radii, bores, inner contours, outer and visible edges as well as for weld seam preparation and linear undercuts on large and small workpieces. They are designed for machining of different materials such as plastic, aluminum, brass, steel and stainless steel. Depending on the intended use, various handheld and worktop devices as well as universal devices are available. In addition, we offer an extensive range of accessories and numerous solid carbide cutters.

Your advantages

» Maintenance-free and robust construction
» Excellent milling results (without secondary burr)
» Intuitive and easy use

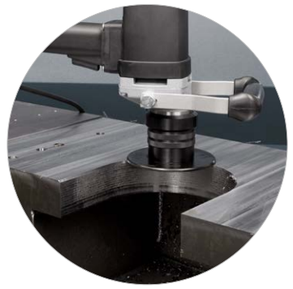
Examples of use

Removal of peaks in welded joints in thin metal sheets

KEG 152V – preparing welding bevels and machining straight edges of large workpieces

Stationary use at workbench vice for rectangular workpieces

KEG 251 T – can be converted into a stationary unit using a screw-on clamping shaft



KEG 253 – deburring inner contours

KEG 250 – deburring of outer and inner contours

WORKTOP DEVICES

Portable edge deburring devices

The series of edge deburring machines KEG 150, KEG 300 and KEG 400 was developed for direct use beside metalworking machines. The portable design and the standard power connection facilitate the placement of the devices near production machines. For example, next to the machining centre, beside the surface grinding machine or directly after the material saw. The milling cutter is clamped by means of a collet and the chamfer size is individually adjusted via the scale. Cutting in the longitudinal direction of the edges the milling cutters prevent secondary burr formation and are ideally suited for the metal edge deburring work. With the applied “roll milling” process a smooth chamfer surface is achieved.

Worktop device KEG 150/300/400/500

The edge deburring units are perfectly suitable for the machining of smaller (KEG 150), medium (KEG 300), larger (KEG 400, KEG 500) workpieces. For optimal handling it is important that at least half of the workpiece length is situated in the prism. For example, for a workpiece with a length of 300 mm, the best milling results are achieved with the KEG 300 or KEG 400 devices. We would be pleased to advise you on the choice of the appropriate device.

Two hardened guide plates set at a 90° angle facilitate the handling of the workpiece.

The edge deburring units KEG 150, KEG 300 and KEG 400 are optionally equipped with two different motors:

» 1050 W motor for easy deburring tasks (soft metals, low material-dependent milling depth)
» 1600 W motor for difficult deburring tasks (harder metals, certain material-dependent milling depth)

The KEG 500 is equipped with a 1500 W motor (standard shank diameter 60 mm) for difficult deburring tasks. The powerful 1500 W drive motor ensures optimum milling results with maximum smooth running.

KEG 150 with 1050 W motor: part no. 111000066
KEG 150 with 1600 W motor: part no. 111000071
KEG 300 with 1050 W motor: part no. 111000068
KEG 300 with 1600 W motor: part no. 111000073
KEG 400 with 1050 W motor: part no. 111000069
KEG 400 with 1600 W motor: part no. 111000074
KEG 500 with 1500 W motor: part no. 111000057

Undercut milling device FFG 200 E

The device is ideally suited for machining small to medium-sized workpieces. With the stationary FFG 200 E, the workpiece is moved manually along the guide prism. The device is characterized by high stability. A chip extractor can be connected to the FFG 200 E. The extraction of the chips increases the service life of the milling tools considerably.

FFG 200 E with 500 W motor: part no. 106002002
FFG 200 E with 1050 W motor: part no. 106002003
FFG 200 E with 1600 W motor: part no. 106002013

FEATURES

Clamping lever and knurled screw

Variable settings are possible with the use of the clamping lever for quick adjustments of the milling depth or the knurled screw for further fine adjustments.

Roll milling

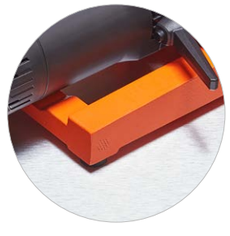
Roll milling guarantees exact deburring at extremely low tool costs.

Chip tray

In order to ensure a clean workplace, a chip collection tray is included in the MAKRA worktop devices.

Vibration reduction elements

The vibration reducing elements made out of rubber ensure high stability and smoothness.



ACCESSORIES

Guide plate

High-quality plastic for the processing of sensitive surfaces

Guide plate for KEG 150: part no. 106015004
Guide plate for KEG 300: part no. 106015009
Guide plate for KEG 400: part no. 106015011

TECHNICAL DATA

Worktop device		KEG 150	KEG 300	KEG 400	KEG 500	FFG 200 E
Guide plates	material	hardened steel plastic for sensitive workpieces (option)	hardened steel plastic for sensitive workpieces (option)	hardened steel plastic for sensitive workpieces (option)	hardened steel	hardened steel
	dimensions	152 x 40 mm (L x W)	302 x 40 mm (L x W)	405 x 50/70 mm (L x W)	500 x 70 mm (L x W)	220 x 27 x 27 mm (L x W x H)
	angle	90°	90°	90°	90°	90°
Cutter	cutting depth	max. 3.5 mm	max. 3,5 mm	max. 5 mm	max. 8 mm	max. 0,9 mm
	thickness of material	position 1: min. 5.5 mm position 2: min. 2.5 mm	position 1: min. 5.5 mm position 2: min. 2.5 mm	position 1: min. 5.5 mm position 2: min. 2.5 mm	position 1: min. 6.0 mm position 2: min. 1.5 mm	min. 2 mm
	cutter retention	collet	collet	collet	collet	collet
	cutter Ø	8 mm	8 mm	8 mm	12 mm	1 – 4 mm
	length of cutter	45 – 62 mm	45 – 62 mm	45 – 62 mm	max. 85 mm	31 – 40 mm
	collet Ø	8 mm	8 mm	8 mm	12 mm DIN 6499 type ER 20 (3 – 14 mm)	6 mm
	cutter angle	45°	45°	45°	45°	45°
Drive motor	shank standard Ø	43 mm	43 mm	43 mm	60 mm	43 mm
	performance	1050 W / 1600 W	1050 W / 1600 W	1050 W / 1600 W	1500 W	500W / 1050W / 1600W
	voltage	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz
	revolutions per minute	3500 – 30 000 rpm	3500 – 30 000 rpm	3500 – 30 000 rpm	2500 – 14 000 rpm	3500 – 30 000 rpm
	electronic control	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable
Weight		5.6 kg	6.8 kg	9.0 kg	20.1 kg	10.6 – 11.6 kg

HANDHELD DEVICES

For chamfers and visible edges on large workpieces

The handheld units are used for simple edge machining of large rectangular workpieces, which can no longer be processed with a stationary device. The device is placed on the edge of the workpiece and moved along the same under light contact pressure. The optimal weight distribution of the device ensures safe handling.

Handheld device KEG 151

The KEG 151 is suitable for easier milling tasks on larger workpieces. The good guidance and safe handling guarantee a neat chamfer of 45°. With the applied “roll milling” process a smooth chamfer surface without secondary burr is achieved.

KEG 151 with 1050 W motor: part no. 111000067

KEG 151 with 1600 W motor: part no. 111000072

Handheld device KEG 152 V

The handy KEG 152 V was developed specially for machining large bevels on large and heavy workpieces with easy effort. The applied “rooll milling” process achieves a smooth chamfer surface without secondary burr. For welding bevels the milling angle is adjustable from 45° to max. 60° in both directions.

Part no. 111000022

Undercut milling machine FFG 201 E

This device is ideally suited for processing large workpieces. The FFG 201 E is placed on the workpiece and guided along it. A chip blow-off hose is permanently connected to the FFG 201 E. Blowing off the chips increases the service life of the milling tools considerably.

FFG 201 E with 500 W motor: part no. 106002005

FFG 201 E with 1060 W motor: part no. 106002008

FFG 201 E with 1600 W motor: part no. 106002012

Handheld device KEG 253

The KEG 253 is used especially for milling bevels on large workpieces. It is suitable for deburring radii and bores from a diameter of 22 mm and all accessible edges.

KEG 253 with 45° milling cutter: part no. 111000065

KEG 253 with 60° milling cutter: part no. 111000065V

Universal handheld device KEG 251

The MAKRA deburring unit KEG 251 has been specially developed for universal use in the assembly sector. The KEG 251 is an indispensable aid at workplaces that require different deburring tasks. The device can be converted by means of a retaining shaft for stationary use of rectangular workpieces or contour edges on small workpieces within a few simple steps. The KEG 251 is available in several versions: as a set with three different attachments or as unit with one attachment.

KEG 251 Basic drive unit (base plate with 500 W motor): part no. 111000032

KEG 251 Complete set (basic drive unit with 3 milling attachments KEG 251 T / KEG 251 P / KEG 251 K; see page 12): part no. 111000035

Clamping shaft (see page 12): part no. 180014000

KEG 251 Basic drive unit

KEG 251 Complete set

FEATURES

KEG 151 and KEG 152 V clamping lever

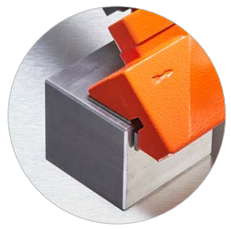
The clamping lever together with the knurled screw allow quick and stepless adjustment to the milling depth.

KEG 151 Knob

The round knob ensures that the device is guided safely along the workpiece.

KEG 151 Guide plates

A set of hardened steel guide plates is included in the scope of delivery. They are optionally available in high-quality plastic for the machining of sensitive workpieces.



KEG 253 Variable milling angles

The KEG 253 is optionally equipped with an exchangeable 45° or 60° millling cutter.

KEG 152 V Milling angle adjustments

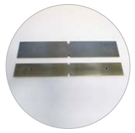
In the standard setting the milling angle is 45° and can be infinitely adjusted to 60° on both sides.

ACCESSORIES

Set of guide plates

For KEG 151; set consisting of 2 guide plates: 1 pc. narrow 15 x 152 mm, 1 pc. wide 40 x 152 mm, high-quality plastic for the processing of sensitive surfaces

Part no. 106015006



Indexable insert

For KEG 253; HM-P25, HT-coated

Part no. 520074002

Table milling attachment KEG 251 T

Quick-change worktop milling attachment for large workpieces; larger surface support area

Part no. 111000038

Prism milling attachment KEG 251 P

Quick-change prism shaped milling attachment for machining edges on large right-angled workpieces

Part no. 111000040

Contour milling attachment KEG 251 K

Quick-change contour milling attachment for machining various workpieces

Part no. 111000036

Weld seam milling attachment KEG 251 S

Quick-change weld seam milling attachment for seam leveling on angled welded sheets

Part no. 111000042

Clamping shaft

For KEG 251 T / KEG 251 P; shaft for vice retention to convert handheld to stationary workbench unit

Part no. 180014000

TECHNICAL DATA

Handheld device		KEG 151	KEG 152 V	FFG 201 E	KEG 253
Guide plates	material	hardened steel / plastic (option)	hardened steel	hardened steel	hardened steel
	dimensions	152 x 15/40 mm (L x W)	250 x 70 mm (L x W)	120 x 25 x 25 mm (L x W x H)	Ø 120 mm
	smallest deburrable Ø	–	–	–	Ø 22 mm
	angle	90°	90°	90°	90°
Milling cutter	milling depth (depends on material)	max. 4 mm	max. 8 mm	max. 0.9 mm	45° cutter: max. 8 mm 60° cutter: max. 7 mm
	material thickness	position 1: min. 5.5 mm position 2: min. 2.5 mm	min. 4 mm	min. 2 mm	min. 4 mm
	pilot Ø	–	–	–	45° cutter: 19 mm 60° cutter: 20 mm
	insert	–	–	–	HM-P25, HT-coated
	cutter retention	collet	collet	collet	thread M12 x 1.5
	cutter Ø	8 mm	12 mm	1 – 4 mm	32 mm
	cutter length	45 – 62 mm	max. 83 mm	31 – 40 mm	max. 40 mm
	collet Ø	8 mm	12 mm DIN 6499 type ER 20 (3 – 14 mm)	6 mm	–
	cutter angle	45°	45°, both directions. adjustable to 60°	45°	45°/60°
Drive motor	shank standard Ø	43 mm	60 mm	43 mm	–
	performance	1050 W / 1600 W	1500 W	500W / 1050W / 1600W	1500 W
	voltage	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/0 Hz	230 V, 50/60 Hz
	rotations per minute	3500 – 30 000 rpm	2500 – 14 000 rpm	3500 – 30 000 rpm	6000 – 10 000 rpm
	electronic control	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable
Weight		3.0 kg	12 kg	4.2 – 4.6 kg	5 kg

Universal handheld device		KEG 251 T	KEG 251 P	KEG 251 K	KEG 251 S
Guide plates	material	hardened steel / plastic	hardened steel / plastic	hardened steel / plastic	hardened steel
	dimensions	Ø 150 mm	152 x 40 mm (L x W)	75 x 70 mm (L x W)	152 x 40 mm (L x W)
	smallest deburrable Ø	Ø 4 mm	–	Ø 4 mm	–
	angle	90°	90°	90°	90°
Milling cutter	milling depth	max. 4 mm	max. 4 mm	max. 4 mm	max. 4 mm
	material thickness	min. 2 mm	position 1: min. 5.5 mm position 2: min 2.5 mm	min. 2 mm	min. 8 mm
	pilot Ø	min. 4 mm, max. 5 mm	–	min. 4 mm, max. 5 mm	–
	cutter retention	collet	collet	collet	collet
	cutter Ø	10 mm	8 mm	10 mm	8 mm
	cutter length	30 – 36 mm	45 – 60 mm	30 – 36 mm	45 – 60 mm
	collet Ø	6 mm	8 mm	6 mm	8 mm
	cutter angle	45°	45°	45°	45°
Drive motor	shank standard Ø	43 mm	43 mm	43 mm	43 mm
	performance	500 W	500 W	500 W	500 W
	voltage	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz
	revolutions per minute	3500 – 30 000 rpm	3500 – 30 000 rpm	3500 – 30 000 rpm	3500 – 30 000 rpm
	electronic control	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable
Weight		basic drive unit: 2 kg basic drive unit + attachment: 3.4 kg	basic drive unit: 2 kg basic drive unit + attachment: 4.1 kg	basic drive unit: 2 kg basic drive unit + attachment: 2.6 kg	basic drive unit: 2 kg basic drive unit + attachment: 3.6 kg

UNIVERSAL DEVICE

Deburring inner/outer contours and longitudinal edges

The MAKRA KEG 250 edge deburring device was developed as a universal unit for inside and outside contours as well as for deburring longitudinal edges (chamfering). The portable device can be used for the entire range of machining operations – both in individual and (small) series production. The overall height is adapted for workbenches and mobile workshop trolleys.

Universal device KEG 250

The KEG 250 equipped with worktable allows a wide range of applications with different contours. The table device can be extended with various accessories (see page 17).

KEG 250 with 500 W motor: part no. 111000026
KEG 250 with 1050 W motor: part no. 111000070
KEG 250 with 1600 W motor: part no. 111000075

FEATURES

Chip collection tray

Quick tool change with best accessibility due to the hinged table top with locking device. The chip tray also serves as protection against contact with the milling spindle from underneath and can be removed and emptied by hand.

Chip suction tray (option)

The chip suction tray is equipped with a connection for all common small industrial vacuum cleaners and also serves as protection against contact with the milling spindle. It can be removed and emptied by hand.

Part no. 119042001

Milling depth adjustment

Milling depth adjustment via regulating knob, with slide clamping retention.

Vibration reduction elements

The vibration reducing elements made out of rubber ensure high stability and smoothness.

TECHNICAL DATA

Universal device		KEG 250
Table top	material	hardened steel
	dimensions	250 x 250 mm (L x W)
	device height	300 mm
	max. table load	15 kg
	smallest deburrable bore	2.5 mm
	angle	90°
Milling cutter	cutter depth	4 mm
	material thickness	min. 2 mm
	pilot Ø	2.5 mm
	ball bearing Ø	3.0 / 4.0 / 5.0 mm
	cutter retention	collet
	cutting edge Ø	6.0 / 10.0 mm
	cutter length	max. 36 mm
	collet Ø	6 mm
	cutter angle	45°
Drive motor	shank standard Ø	43 mm
	performance/ voltage	500 W / 1050 W / 1600 W; 230 V, 50/60 Hz
	rotations per minute	3500 – 30 000 rpm
	electronic control	full wave control electronic, infinitely variable
Weight		13.4 – 15.2 kg

ACCESSORIES

Edge milling carriage KFW 280

For sensitive workpiece surfaces together with good handling. The workpiece is guided past the milling cutter together with the carriage so no scraping marks on the contact surfaces occur

Part no. 111018001

Pip cut-off carriage AFW 80

Clean removal of pips because the workpiece is moved together with the carriage; sealed ball guides guarantee low-friction movement

Part no. 104025001

Edge milling attachment KFA 290

Rapid upgrade to a full-fledged chamfering device for right-angled workpieces

Part no. 106018003

Guide rail attachment FS 250

Enables deburring of 90° longitudinal edges

Part no. 106022001

Flexion wave BW 250

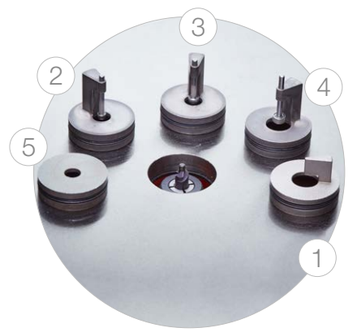
For edge deburring in places with difficult access

Part no. 525006010

Guide finger

For reliable deburring of complex edges

① Guide finger with hardened leading edge for outer contours with up to 30° corners: part no. 106016001
② Guide finger with ball bearing Ø 3 mm: part no. 1060160022
③ Guide finger with ball bearing Ø 4 mm: part no. 1060160033
④ Guide finger with ball bearing Ø 5 mm: part no. 1060160044
⑤ Ring insert Ø 30 x 7 mm: part no. 1050250035
⑥ Ring insert Ø 30 x 11.5 mm: part no. 1050250026



DRIVE MOTORS

The drive motors developed by MAKRA are used in a wide range of applications in the metalworking industry; in MAKRA deburring machines as well as in milling and grinding machines. Due to their triple custom bearings (front mounted double-bearing milling spindle) and high-speed grease lubrication, the motors are especially suitable for continuous operation. All motors comply with protection class II (reinforced insulation), standard EN 60745 and protection class IP X0 (open design).

Drive motor 500 W

The 500 W drive motor is used for easy deburring tasks (soft metals or plastics, low material-dependent milling depth).

Part no. 513009040; carbon brushes: part no. 511027003

Drive motor 1050 W

The 1050 W drive motor is used for medium difficult deburring tasks (solid metals, medium material-dependent milling depth).

Part no. 513009127; carbon brushes: part no. 511027001

Drive motor 1600 W

The 1600 W drive motor is used for difficult deburring tasks (harder metals, certain material-dependent milling depths).

Part no. 513009108; carbon brushes: part no. 511027006

Drive motor 1500 W

The drive motor with standard shank diameter 60 mm is used for difficult deburring tasks (harder metals, certain material-dependent milling depths). The powerful drive motor with 1500 W ensures optimum milling results with maximum smooth running.

Part no. 513009016; carbon brushes: part no. 511027002

TECHNICAL DATA

Drive motor		500 W Motor	1050 W Motor	1600 W Motor	1500 W Motor
Spindle bearing arrangement		milling spindle with three bearing array – shank end with double bearing	milling spindle with three bearing array – shank end with double bearing	milling spindle with three bearing array – shank end with double bearing	milling spindle with three bearing array – shank end with double bearing
Motor shank	material	steel	steel	steel	steel
	standard Ø	43 mm	43 mm	43 mm	60 mm
	clamp length	22 mm	22 mm	22 mm	45 mm
Performance / Voltage	performance	500 W	1050 W	1600 W	1500 W
	voltage	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz
	revolutions	3 500 – 30 000 rpm	3 500 – 30 000 rpm	3 500 – 30 000 rpm	2 500 – 14 000 rpm
	speed control	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable	full wave electronic control, infinitely variable
Collet Ø		6 mm	8 mm	8 mm	12 mm

VHM MILLS

As one of the leading manufacturers of deburring machines, MAKRA has developed and tested cutting edge geometry for the most common types of materials. MAKRA deburring cutters are the result of careful development and many years of experience. In use, they have proven to be extremely durable with a long service life. Thanks to the variety of types, you will always find an optimal solution for your deburring task. All milling cutters are available in solid carbide and fine grain design with various coatings (ZrCN/AlTiN).

The tables on the following pages are intended as a guide to help you select the right type of milling cutter. They are the result of MAKRA's years of experience. If there are similar types of milling cutters to choose from in the table, characteristics such as cutting speed, chamfer size, feed rate and material machinability should be considered.

Should you need advice on the selection of the optimal milling cutter, please do not hesitate to contact us.

MILLING CUTTERS

For KEG 150 / 151 / 300 / 400 / 500 / 152 V

		Standard shank cutters						Radius shank cutters			Standard shank cutters				Radius shank cutters		
KEG		KEG 150/151/300/400						KEG 150/151/300/400			KEG 500, KEG152 V				KEG 500, KEG152 V		
TYPE		FZ 810	FZ 820	FZ 830	FZ 840	FZ 850	FZ 860	RZ 8015	RZ 8020	RZ 8025	FZ 1210	FZ 1220	FZ 1230	FZ 1240	RZ 1203	RZ 1204	RZ 1205
PART NO.		508000006	508000007	508000008	508000009	508000010	508000012	518020010	518020011	518020012	508000013	508000014	508000015	508000016	518020014	518020015	518020016
MATERIAL	STEEL: hardened steel					●	○										
	STEEL: tool steel				●	○	○	●	●	●					●	●	●
	STEEL: case-hardened/tempered steel, cast steel			●	●	●	●	○	○	○			●	●	○	○	○
	STEEL: free cutting steel (short chipping)			●	●	○	●	●	●	●		●	●	●	●	●	●
	CAST IRON / COPPER ALLOYS: soft copper, soft brass		●	●	●		●	●	●	●	●	●	●	●	●	●	●
	CAST IRON / COPPER ALLOYS: nickel silver, hard brass, bronze		●	●	●	●	●	●	●	●		○	●	○	●	●	●
	CAST IRON / COPPER ALLOYS: cast iron		●	●	●	●	○						●		○	○	○
	STAINLES STEEL: soft grades				●	●	●	●	●	●				●	●	●	●
	STAINLES STEEL: high-strength grades				●	●	○							○			
	STAINLES STEEL: free cutting steel (short chipping)				●	●	●	○	○	○					○	○	○
	ALU-MINUM: soft (long chipping)	●					○	●	●	●	●	●	●	○	○	○	○
	ALU-MINUM: free cutting steel alloy (short chipping)	●		●			●	●	●	●	●	●	●	●	●	●	●
	PLASTIC: soft (long chipping)	●	●				●	●	●	●	●	●	●	●	●	●	●
	PLASTIC: hard (short chipping)	●	●				●	●	●	●	●	●	●	●	●	●	●
Total length (mm)		60	60	60	60	60	60	60	60	60	85	85	85	85	89	89	89
Cutting edge (mm)		19	19	19	19	19	19	–	–	–	25	25	25	25	–	–	–
Shank diameter (mm)		8	8	8	8	8	8	8	8	8	12	12	12	12	12	12	12
Cut diameter/radius (mm)		8	8	8	8	8	8	R1.5	R2	R2.5	12	12	12	12	R3	R4	R5
No. of cutting edges		6	14	18	4	30	6	5	5	5	3	4	6	4	5	5	5
short- / middle- / long chipping		l	s	s	m	m	m	s/m/l	s/m/l	k/m/l	l	s	m	s	s/m/l	s/m/l	s/m/l
Coating		ZrCN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	ZrCN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN

● Optimum implementation

○ Possible implementation (test necessary)

CONTOUR-DEBURRING CUTTERS

For KEG 250, KEG 251 K/T/P/S, KEG 253, FFG 200 E, FFG 201 E

	Standard contour-deburring cutters																			
KEG	KEG 250 KEG 251 K/T																			
TYPE	1	2	2	1	2	2	1	1	2	2	2	2	3	3	3	3	3	3	3	3
PART NO.	524026018	524026030	524026043	524026016	524026028	524026041	524026065	524026070	524026067	524026071	524026069	524026072	524026008	524026010	524026012	524026020	524026022	524026024	524026033	524026035
MATERIAL – STEEL: hardened steel	●	●	●																	
STEEL: tool steel	●	●	●																	
STEEL: case-hardened/tempered steel, cast steel				●	●	●	●		●		●			○			○			○
STEEL: free cutting steel (short chipping)	●	●	●	●	●	●	●	●	●	●	●	●								
CAST IRON / COPPER ALLOYS: soft copper, soft brass								○		○		○	●		●	●		●	●	
CAST IRON / COPPER ALLOYS: nickel silver, hard brass, bronze	●	●	●	●	●	●	●	●	●	●	●	●								
CAST IRON / COPPER ALLOYS: cast iron	●	●	●																	
STAINLESS STEEL: soft grades							●		●		●		○	●		○	●		○	●
STAINLESS STEEL: high-strength grades				●	●	●	●		●		●									
STAINLESS STEEL: free cutting steel (short chipping)				●	●	●	○		○		○									
ALU-MINUM: soft (long chipping)								○		○		○	●		●	●		●	●	
ALU-MINUM: free cutting steel alloy (short chipping)								●		●		●	●		●	●		●	●	
PLASTIC: soft (long chipping)								○		○		○	●		●	●		●	●	
PLASTIC: hard (short chipping)								●		●		●	●		●	●		●	●	
Total length (mm)	35.5	36	36	35.5	36	36	35.5	35.5	36	36	36	36	36	36	36	36	36	36	36	36
Cutting length (mm)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Shank diameter (mm)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Cutting diameter/radius (mm)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Ball bearing diameter (mm)	—	3	4	—	3	4	—	—	3	3	4	4	—	—	—	3	3	3	4	4
Piolt diameter (mm)	2.5	—	—	2.5	—	—	2.5	2.5	—	—	—	—	2.5	2.5	2.5	—	—	—	—	—
No. of cutting edges	6	6	6	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
Cutting edges on one side / both sides	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
Rake angle	0°	0°	0°	6°	6°	6°	12°	12°	12°	12°	12°	12°	30°	30°	30°	30°	30°	30°	30°	30°
Short / medium / long chip	s	s	s	s	s	s	m	m	m	m	m	m	l	l	l	l	l	l	l	l
Coating	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	ZrCN	AlTiN	ZrCN	AlTiN	ZrCN		AlTiN	ZrCN	—	AlTiN	ZrCN	—	AlTiN

												Radius milling cutters						Pointed milling cutters		
KEG												KEG 250 KEG 251 K/T						KEG 250 (with FS 250)		
TYPE	3	4	4	4	4	5	5	5	5	5	5	6	6	6	7	7	7	8	8	8
PART NO.	524026037	524026052	524026059	524026048	524026055	524026047	524026049	524026050	524026054	524026056	524026057	518020027	518020028	518020029	518020030	518020031	518020032	524026073	524026074	524026075
MATERIAL – STEEL: hardened steel		●	●									○	○						●	●
STEEL: tool steel		○	○									●	●	○	○	○		○	●	●
STEEL: case-hardened/tempered steel, cast steel				●	●		●			●		●	●	●	●	○	○	○	●	●
STEEL: free cutting steel (short chipping)		●	●	●	●		○			○		●	●	●	●	●	●	●	●	●
CAST IRON / COPPER ALLOYS: soft copper, soft brass	●					●		●	●		●	●	●	●	●	●	●	●	●	○
CAST IRON / COPPER ALLOYS: nickel silver, hard brass, bronze		●	●	●	●							●	●	●	●	●	●	●	●	●
CAST IRON / COPPER ALLOYS: cast iron		●	●									●	●	●	●	●	●	●	●	●
STAINLESS STEEL: soft grades				●	●	○	●		○	●		○	○	○	○	○	○	○	○	○
STAINLESS STEEL: high-strength grades												●	●	●	●	●	○	○	●	●
STAINLESS STEEL: free cutting steel (short chipping)				●	●		●			●		●	●	●	●	●	●	○	●	●
ALU-MINUM: soft (long chipping)	●					●		●	●		●	●	●	●	●	○	○	○		
ALU-MINUM: free cutting steel alloy (short chipping)	●					●		●	●		●	●	●	●	●	●	●	●	●	●
PLASTIC: soft (long chipping)	●					●		●	●		●	●	●	●	●	●	●	○		
PLASTIC: hard (short chipping)	●					●		●	●		●	●	●	●	●	●	●	●	●	●
Total length (mm)	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	40	40	40
Cutting length (mm)	2	3	3	3	3	3	3	3	3	3	3	—	—	—	—	—	—	3	3	3
Shank diameter (mm)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Cutting diameter/radius (mm)	6	10	10	10	10	10	10	10	10	10	10	R0.5	R1	R1.5	R2	R2.5	R3	6	6	6
Ball bearing diameter (mm)	4	4	5	4	5	4	4	4	5	5	5	3	3	3	4	4	4	—	—	—
Piolt diameter (mm)	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
No. of cutting edges	3	6	6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4
Cutting edges on one side / both sides	b	o	o	o	o	o	o	o	o	o	o	b	b	b	o	o	o	b	b	b
Rake angle	30°	0°	0°	6°	6°	30°	30°	30°	30°	30°	30°	0°	0°	0°	0°	0°	0°	0°	5°	10°
Short / medium / long chip	l	s	s	s/m	s/m	l	l	l	l	l	l	s/m/l	s/m/l	s/m/l	s/m/l	s/m/l	s/m/l	—	—	—
Coating	ZrCN	AlTiN	AlTiN	AlTiN	AlTiN	—	AlTiN	ZrCN	—	AlTiN	ZrCN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN

			Shank milling cutters			Shank milling cutters							Radius milling cutters				Insert-cutters exchangeable	
KEG			KEG 251 P/S KEG 250 (with KFW 280 / KFA 290)			KEG 250 (with AFW), FFG 200 E FFG 201 E							FFG 200 E FFG 201 E				KEG 253	
TYPE	8	8	S 4	S 6	S 12	FFG-Z	FFG-Z	FFG-Z	FFG-Z	FFG-Z	FFG-Z	FFG-Z	FFG-R	FFG-R	FFG-R	FFG-R	45°	60°
PART NO.	524026044	524026045	506006079	506006081	506006082	506006090	506006089	506006088	506006068	506006074	506006076	506006078	506006092	506006093	506006094	506006067	106034001	106034002
MATERIAL – STEEL: hardened steel	●	●			○												○	○
STEEL: tool steel	●	●	○	●	●												●	●
STEEL: case-hardened/tempered steel, cast steel	●	●	○	●	●												○	○
STEEL: free cutting steel (short chipping)	●	●		●	●	○	○	○	○	○	○	○	○	○	○	○	●	●
CAST IRON / COPPER ALLOYS: soft copper, soft brass	○	○	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●
CAST IRON / COPPER ALLOYS: nickel silver, hard brass, bronze	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
CAST IRON / COPPER ALLOYS: cast iron	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
STAINLESS STEEL: soft grades	○	○		●	○								●	●	●	●	●	●
STAINLESS STEEL: high-strength grades	●	●		○	●													
STAINLESS STEEL: free cutting steel (short chipping)	●	●		●	●												○	○
ALU-MINUM: soft (long chipping)	○	○	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
ALU-MINUM: free cutting steel alloy (short chipping)	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	●	●
PLASTIC: soft (long chipping)	○	○	●			●	●	●	●	●	●	●	●	●	●	●	●	●
PLASTIC: hard (short chipping)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Total length (mm)	40	40	57	57	57	35	35	35	35	36	45	45	35	35	35	35	55	55
Cutting length (mm)	4	4	11	11	11	3	3	3	3	3	3	3	—	—	—	—	9	9
Shank diameter (mm)	8	8	8	8	8	6	6	6	6	6	6	6	6	6	6	6	M 12x1.5	M 12x1.5
Cutting diameter/radius (mm)	8	8	8	8	8	1	1.5	2	2.5	3	3.5	4	R1	R1.5	R2	R2.5	20-25	20-25
Ball bearing diameter (mm)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19	20
Piolt diameter (mm)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of cutting edges	4	4	4	6	12	3	3	3	3	3	3	3	—	—	—	—	3	3
Cutting edges on one side / both sides	b	b	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Rake angle	5°	10°	0°	5°	10°	30°	30°	30°	30°	30°	30°	30°	60°	60°	60°	60°	45°	60°
Short / medium / long chip	—	—	—	—	—	s/l	s/l	s/l	s/l	s/l	s/l	s/l	s/m/l	s/m/l	s/m/l	s/m/l	s/m/l	s/m/l
Coating	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN	AlTiN

● Optimum implementation

○ Possible implementation (test necessary)

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