

**Gear grinding
with KREBS & RIEDEL**

Precision - tooth for tooth.



Grinding tools for gear production

Applications

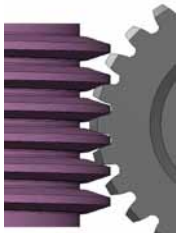


Grinding wheels for discontinuous generative grinding and profile grinding

Gears are among the most important machine elements in the construction of transmissions, vehicles and machinery. The requirements placed on these products in terms of power transmission or running smoothness continue to rise steadily. Grinding is therefore one of the most important methods for fulfilling these high quality demands.

The grinding wheel dimensions are specified by the grinding machine systems being used or by the particular task. Working speeds lie between 40–63 m/s, on the newest machines even as high as 70–80 m/s.

White high-grade aluminium oxide, special aluminium oxide mixtures or sintered aluminium oxide mixtures are preferably used as the grinding media.



Grinding wheels for continuous generative grinding

Depending on the process by which the tooth profile is generated, a differentiation is primarily made between discontinuous and continuous generative grinding or profile grinding:

Discontinuous generative or profile grinding is characterised by the fact that complete tooth spaces, or in the case of older machines just the flanks of the teeth, are ground by means of shaped wheels that are chamfered on both sides. The kinematics of the machine are less complicated; the machining method is intended for medium-sized batches, medium-sized and large modules, and varying ranges.

In continuous generative or profile grinding, a worm grinding wheel and workpiece rotate synchronously with one another while the workpiece is simultaneously moved past the worm grinding wheel at several traverses. The requirements on the kinematics of the machine are demanding. The method is economical for the bulk production of small- and medium-sized modules.



Grinding wheels for bevel gear grinding

The grinding of spiral and bevel gears is a special process and is undertaken primarily with grinding rings on grinding machines by Klingelnberg and Gleason specially designed for this purpose.

Grinding tools for gear production



KREBS – Grinding wheels

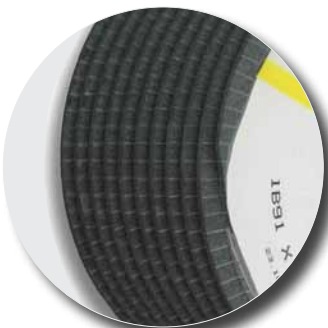
The manufacture of these grinding wheels is undertaken at KREBS & RIEDEL on modern machines using the latest CNC profiling technology. The process and organisation of production guarantees that our customers' most demanding quality requirements are met using grinding wheels with constant structural properties and the tightest tolerances on hardness.



The grinding wheel compounds are based on our innovative MULTO vitrified bond system and, in conjunction with the grinding media used (high-grade aluminium oxide, micro-crystalline sintered aluminium oxide and the new aluminium oxynitride), guarantee low thermal effects on the workpiece, good retention of profile, and cutting ability with high dressing cycle speeds and high efficiency.



We are certified in accordance with ISO 9001:2000 and produce the grinding tools in accordance with the internationally valid standards EN, ANSI and JIS. KREBS & RIEDEL is member of the GEAR RESEARCH CIRCLE of the Laboratory for Machine Tools and Production Engineering (WZL) at RWTH Aachen University (Germany).



The range held in stock includes grinding wheels in white high-grade aluminium oxide for general standard gear generation tasks and sintered aluminium oxide for higher removal rates on new gear grinding machines. Due to their selective porosity and grain compound, the grinding wheels guarantee a cool grind with high profile and abrasion resistance.

Most recently, the application of dressable vitrified CBN grinding wheels to gear grinding has also intensified. For this purpose, KREBS & RIEDEL can also offer you a product programme that we are continuously developing further and perfecting.

Grinding tools for gear production

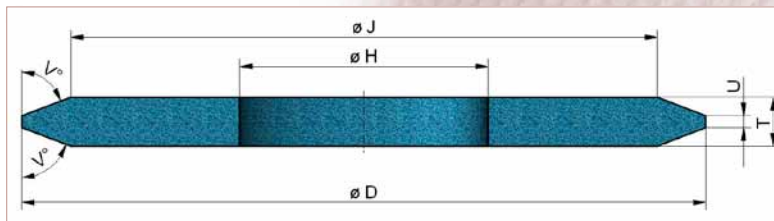
Grinding wheels for discontinuous generative grinding and profile grinding

Product group 219 - Single profile wheel

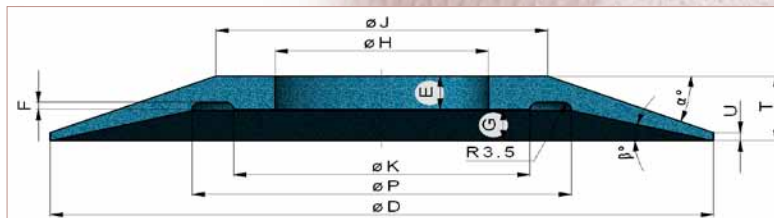
Product group 415 - MAAG grinding dish wheel



KREBS & RIEDEL offer you an extensive range of dressable single profile grinding wheels in a vitrified bond for machining your internal and external gears in different materials. For this purpose, high-grade aluminium oxide, micro-crystalline sintered aluminium oxide, special aluminium oxide as well as CBN are used as grinding media. Apart from the main product group 219 for all new gear profile grinding machines, we can also produce grinding wheels for older discontinuous generative grinding machines and grinding dish wheels (product group 415) for the MAAG process.



Single profile wheel – product group 219



Grinding dish wheel – product group 415

External diameter D (mm)	80 ... 500
Width T (mm)	15 ... 100
Bore H (mm)	20 ... 203,2

The production programme features the grinding wheel dimensions listed in the table for the following machine manufacturers:

Höfler; Gleason – Pfauter; Niles; Kapp-Niles; Samputensili; Oerlikon; Reform; Maag

Grinding tools for gear production

When placing your order, the following details are important:

Product group 219

Dimensions D x T x H (mm)
- if recesses are featured, also specify the dimensions P, F and G!
Cutting speed v_c (m/s)
Tip width U (mm)
Angle V (°)

KREBS & RIEDEL also keeps tried and tested standard compounds of the product group 219 as blanks for you in stock. When the order is placed, the grinding wheels are pre-profiled in accordance with your details. The grinding wheels can be completed within two working days. Smaller diameters and widths not found on the table can also be supplied at short notice from the goods in stock at no additional cost.

Goods in stock

Dimensions	Specifications	Spec. no.	Use
350x40x127	35A 46 I 5 V92 (white high-grade aluminium oxide)	119465	up to 63 m/s, large modules or rough grinding tasks
400x63x127	70A 46 I 8 V85-30 (sintered aluminium oxide)	247168	
	35A 80 I 10 V84 (white high-grade aluminium oxide)	645781	up to 63 m/s, medium-sized – smaller modules standard machining tasks
	70A 80 I 8 V85-30 (sintered aluminium oxide)	344268	
	35A 120 I 10 V84 (white high-grade aluminium oxide)	241570	up to 63 m/s, small modules, high-precision and fine grinding
	70A 120 I 10 V85-30 (sintered aluminium oxide)	234870	



Grinding tools for gear production

Grinding wheels for continuous generative grinding and profile grinding

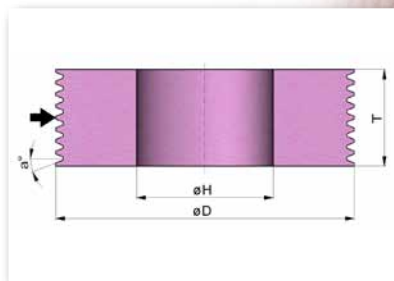
Product group 220 - Worm grinding wheels



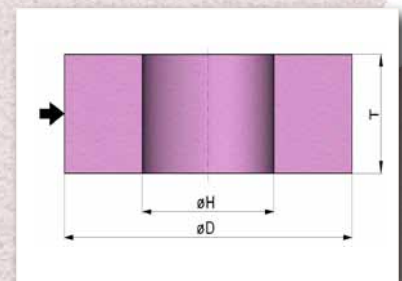
For your gear machining tasks, KREBS & RIEDEL produces a large range of dressable worm grinding wheels in a vitrified bond. Through innovative investment in design, technology and production, we have been able to offer you worm grinding wheels of the highest quality and performance since 2000. Our tried and tested specifications guarantee very good profile retention with minimal thermal loading of your workpieces. A lower level of dressing abrasion is achieved through the use of selected grinding media mixtures of high-grade aluminium oxide, micro-crystalline sintered aluminium oxide, special aluminium oxide as well as CBN. As a result, we can offer optimised grinding compounds for the machine system and machining task in question. For grinding speeds $v_c > 63$ m/s, we can supply worm grinding wheels with a strengthened bore area.

The following versions of worm grinding wheels are possible:

- Non-profiled
- Pre-profiled large module 0.8
- Max. of 7 gears
- Pressure angle EW according to customer's requirements



Pre-profiled



Non-profiled

External diameter D (mm)	Width T (mm)	Bore H (mm)	Machine type
350	84, 104	160	RZ301, RZ361, RZ362
400	84, 104	160	RZ701, RZ770, RZ801, RZ 820, ZB
275	125	160	RZ150
200	125	160	RZ400
300	145	160	RZ1000
320	125	115	KX300P
280	160	115	KX300P, KX1000P, ZX1000
220	180	76,2	245TWG
195	200	90	LCS200, LCS300

Grinding tools for gear production

When placing your order, the following details are important:

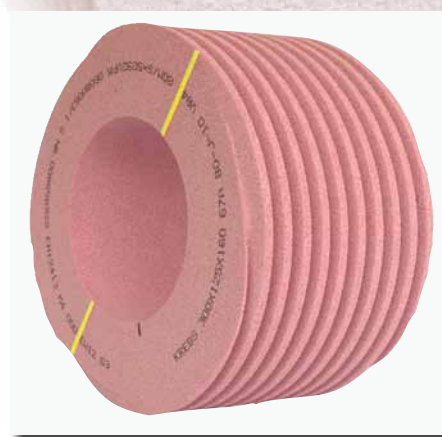
Product group 220

Dimensions D x T x H	(mm)
Cutting speed v_c	(m/s)
Pressure angle α	(°)
Module m	(-)
Gear number	(-)

Tried and tested standard compounds are held in store as blanks; according to the customer's requirements, these can be delivered profiled or non-profiled. For module 1–4, we can deliver the ordered grinding wheels within two working days. Smaller diameters and widths not in the table (e.g. 350x84x160, 350x64x160) can also be delivered at no additional cost.

Goods in stock

Dimensions	Specifications	Spec. no.	Use
300x125x160 (275x125x160)	70A 120 I 14 V85-30 (sintered aluminium oxide)	234874	RZ400, RZ150 module 1–4 63 m/s, (vc higher on request)
350x104x160	35A 120 H 14 V84 (white high-grade aluminium oxide) 70A 120 I 14 V85-30 (sintered aluminium oxide)	547274 234874	other RZ, RZA, amongst others module 1–4 up to 63 m/s
400x104x160	35A 120 H 14 V84 (white high-grade aluminium oxide) 70A 120 I 14 V85-30 (sintered aluminium oxide)	547274 234874	
350x104x160 400x104x160	35A 80 I 14 V84 (white high-grade aluminium oxide)	244774	



Grinding tools for gear production

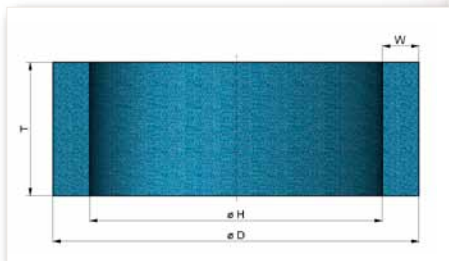
Grinding wheels for bevel gear grinding



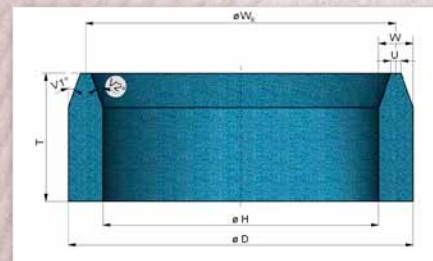
Product group 221 - Bevel gear grinding rings

For the manufacture of bevel gears and pinions for special gearboxes (car differentials, lift drives), KREBS & RIEDEL can offer various grinding rings for grinding machines of the type Klingelberg-Oerlikon and Gleason-Phönix.

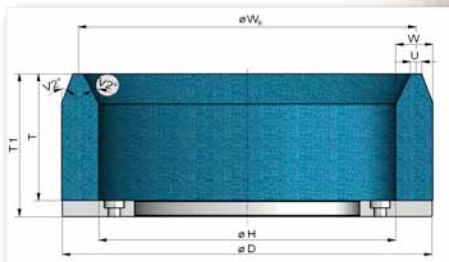
The grinding rings can be supplied with and without pre-profiling and can also be cemented to steel hubs.



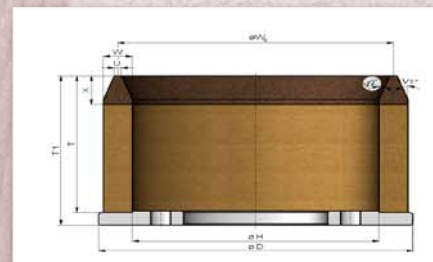
Straight, without hub



Pre-profiled, without hub



Pre-profiled, on steel hub



CBN design, pre-profiled, cemented to a steel hub

Common ranges of dimensions and machine systems:

Machines: Klingelberg-Oerlikon G27, G60, G80 WNC80
Gleason-Phönix II-245G, II600G, II800G

Dimensions (mostly in inches from 2" to 18"), e.g.:

100	x	70	x	70	126	x	92	x	90
140	x	100	x	104	167,4	x	100	x	125
213,3	x	88	x	160	254	x	100	x	104 (10")
279,4	x	100	x	220 (11")	304,8	x	100	x	255 (12")

also 13"-, 14"-, 15"-, 16"-, 17" – external diameters

Grinding tools for gear production

When placing your order, the following details are important:

Product group 221

Dimensions D x T x H (mm)
Cutting speed v_c (m/s)
Data for U, W and angles V1, V2
or as drawings in the case of special forms

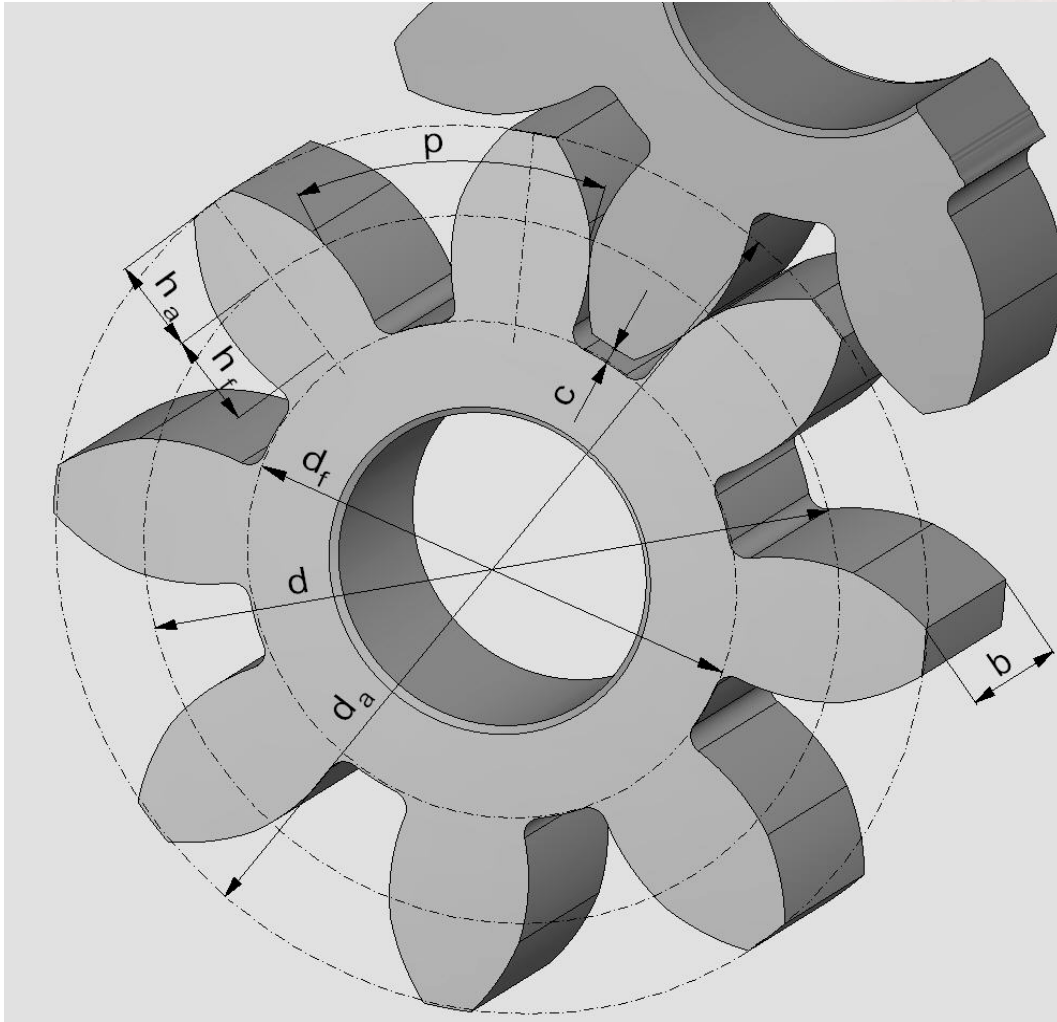
Here we can also offer you tried and tested compounds, especially ones based on micro-crystalline sintered aluminium oxide, to fulfil your grinding tasks.

Specifications	Spec. no.	Use
70A 60 E 10 V96-30	502770	car suppliers, case-hardened steels
70A 60 J 10 V85-30	267770	
70A 80 E 10 V96-30	607570	
70A 80 I 8 V85-30	244268	
70A 80 H 12 V85-30	858172	
70A 120 H 12 V85-30 (all sintered aluminium oxide)	732772	
70A 46 E 10 V96-30 (sintered aluminium oxide)	106570	machinery construction, car industry, especially for rough cogging
35A 80 H 12 V84	645972	aviation industry, nickel-based alloys
35A 120 H 12 V84 (white high-grade aluminium oxide)	672572	



Grinding tools for gear production

Selection of gear data and calculation formulae (straight gear):



d = pitch circle diameter
 d_a = tip circle diameter
 d_f = root circle diameter
 m = module
 p = pitch
 h_a = addendum
 h_f = dedendum
 z = number of teeth
 c = clearance
 b = tooth width

m = $p / \pi = d / z$
 p = $m * \pi$
 z = $d / m = d_a - (2m) / m$
 d = $m * z = z * p / \pi$
 d_a = $d + 2m = m * (z + 2)$
 d_f = $d - 2m * c$
 c $\approx 0,167m$
 h_f = $m + c$
 h_a $\approx m$



Always the right tool for each situation.

We pursue our unconditional quest for quality not only in our tools for gear grinding, but throughout our entire production programme.

- Aluminium oxide and silicon carbide wheels in a ceramic and resinoid bond with an outer diameter of up to 900 mm for circular grinding, flat grinding, tool grinding, centreless grinding, rough grinding, and more.
- Cut-off grinding wheels in a resinoid bond with and without fibre reinforcement with an outer diameter of up to 600 mm for wet and dry chop cutting, for oscillating and rotational cutting, and more.
- Snagging grinding wheels with and without fibre reinforcement for foundries and contract fettling and deburring, for swing frame grinding machines, floor stand grinders, grinding manipulators, and more.
- Diamond and CBN tools with working speeds of up to 160 m/s for internal grinding, flat grinding, circular grinding, tool grinding, for special grinding methods...



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