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A Review of Factory Swaty Development

Grinding wheels factory Swaty was established by chemist Franz Swaty in 1879 so that it is one of the oldest European producers of grinding tools.

At the beginning the production was based on a patented procedure for production of grinding wheels in mineral bond. This production was abandoned in 1958 when it was substituted by up to dated production programmes.

To meet the increasing demand of industry the production of grinding wheels in vitrified bond was introduced at the end of 1929.

The production of grinding wheels in resinoid bond, at present the strongest production line, was started in 1946.

In 1963 various of resinoid bonded grinding wheels with integrated glass reinforcements were developed. The products were especially suitable for cutting and grinding at higher peripheral speeds of 80 to 100 m/s. In the same year the flexible cleaning disc Swaty Fibre war launched.

During seventies various new special products suitable for applications at higher peripheral speeds were developed:
- hot pressed resinoid bonded wheels made of alumina zirconias for usage on automatic machines in ironworks,
- cold pressed resinoid bonded snagging wheels for peripheral speed 63 m/s,
- grinding wheels in vitrified bond for peripheral speeds 50 and 60 m/s, designed for special grinding applications.

In 1978 the production of diamond tools in metal bond (diamond saws and cores) was started.

Year 1984 marks the beginning of production of CBN grinding tools in resinoid bond (DIABON programme). Further development in this field led to the production of diamond tools in metal bond for glass industry as well as to the production of CBN grinding tools in vitrified bond.

It is understood that the development of new types of grinding tools continues.

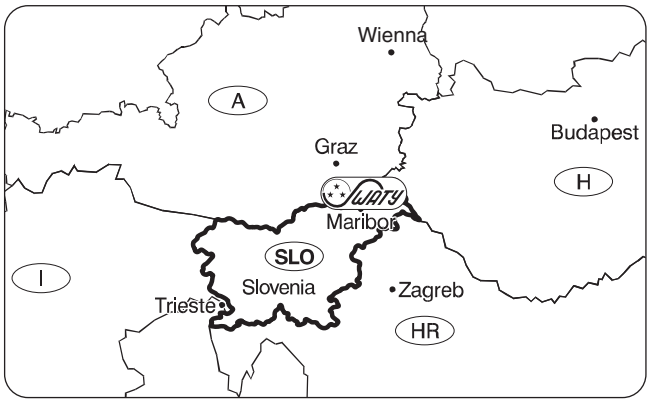
At present factory Swaty manufactures about fifty thousand different grinding tools and sells them to more than forty countries on all continents.

In 1992 Swaty was transformed into a shareholding company.

In 1997 factory Swaty was awarded ISO 9001 Standard Certificate of Approval for having the quality system in development, production and marketing organized in accordance with the ISO requirements.

In year 2000 factory Swaty was awarded ISO 14001 Standard Certificate of Approval for having Environmental management systems organized in accordance with the ISO requirements.

In year 2002 Swaty became a member of OSA-Organization for the Safety of Abrasives.



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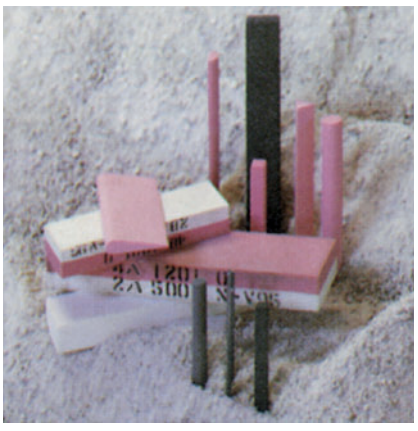
3STARS
3STARS FLEX
3STARS FLEX


SWATY DIAMANT
SWATY CBN
SWATY DIAMANT



PRODUCTION PROGRAMME REVIEW

Due to many years of experience and research in the field of quality and effective grinding we are able to offer our customers high quality grinding tools for usage in all fields of industry which includes ironworks and foundries, machine building, tool making, shipbuilding, car industry, metal construction industry, processing equipment, maintenance of railway tracks, glass industry, building industry, stonecutting, agriculture, leather industry, food industry, craft shops, hobby usage, and many other applications.

Production programme includes:

Grinding wheels made of aluminas and silicon carbides

for standard and increased peripheral speeds in types and dimensions standardised per ISO and DIN Standards as well as for non-standard types and dimensions if so required;

- grinding wheels in diameters from 3 mm to 1250 mm, in thickness from 1,5 mm to 300* mm for vitrified bonded and from 0,8 mm to 300* mm for resinoid bonded wheels
- high speed resinoid bonded glass reinforced grinding and cut-off wheels 3 STARS FLEX in diameters up to 1000 mm
- Swaty Fibre, flexible high speed discs for grinding of rounded surfaces in diameters from 115 to 180 mm
- flap grinding discs for grinding of rounded surfaces in diameters from 115 to 180 mm
- shank mounted flap discs in diameters from 30 to 80 mm
- grinding segments of various shapes and dimensions
- hone stones
- grinding tools for hand grinding – sticks, bricks
- special products

Grinding tools made of super hard abrasives - diamond and cubic boron nitride:

- DIABON production programme of grinding tools made of diamond and cubic boron nitride in resinoid bond is designed for precise grinding. Tools are produced in all types standardised per FEPA, up to the maximum diameter 600 mm
- core drills in diameters from 20 to 500 mm and diamond saws in diameters from 250 to 1600 mm in metal bond for applications in building and stone industries
- diamond grinding tools for glass industry in diameters from 4 to 600 mm
- grinding tools made of cubic boron nitride in vitrified bond in diameters from 4 to 100 mm, the application being mainly for internal grinding of high-alloyed steels with high hardness and toughness and for grinding of super alloys on the basis of Ni and Co.

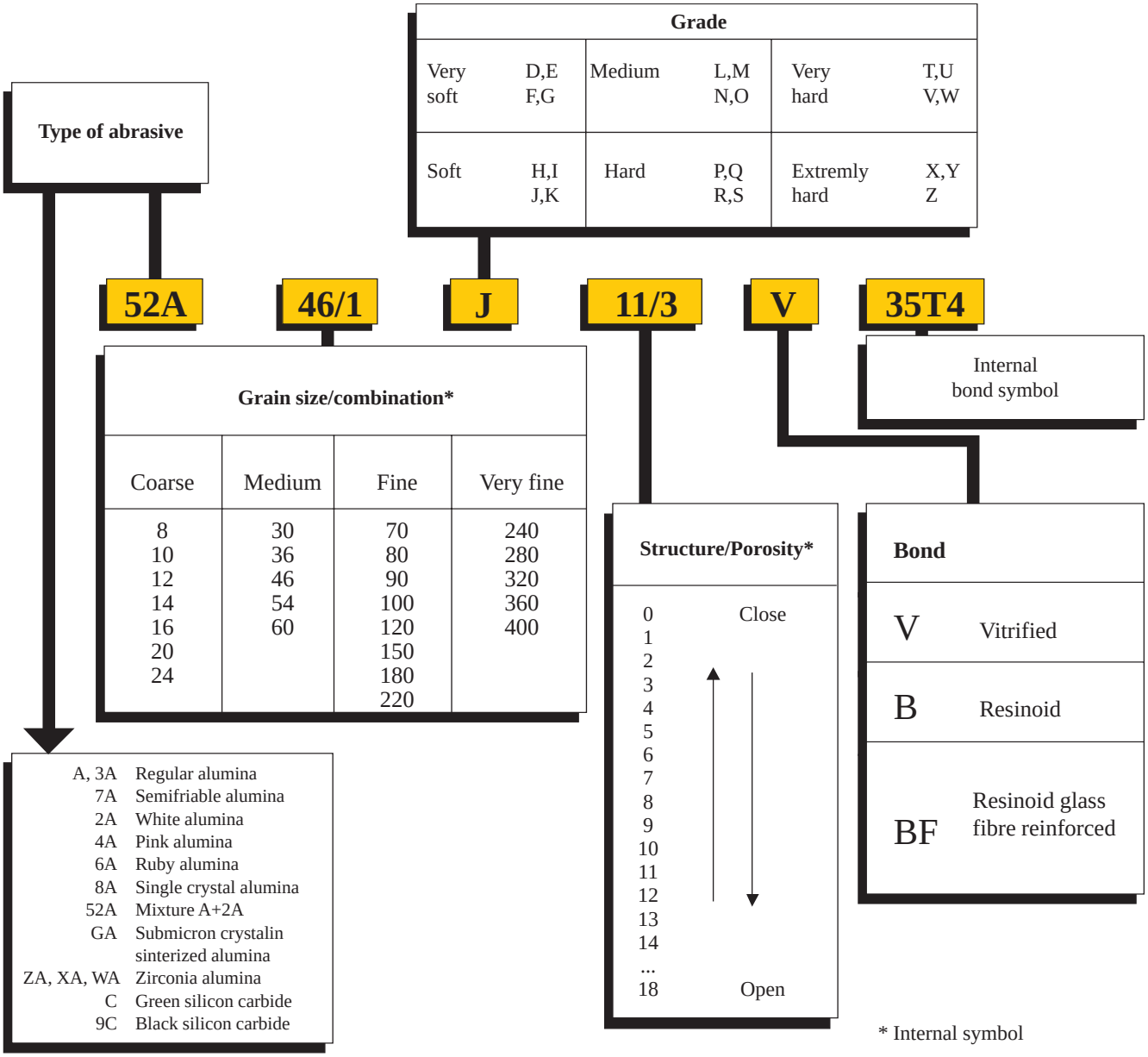
* Grinding wheels in bigger thicknesses are offered combined or glued of two or more pieces.

Marking System

To allow us to fully identify the abrasive product out of our production programme please specify the following data:
- The grinding wheel type
- Dimensions in mm
- Specification
- Wheel operating speed or spindle rotational speed
- Any special requirements regarding making of the grinding wheel (balance tolerance...)

The specification of a grinding tool is determined by the following elements:
- Class and type of the abrasive grain
- Grain size (and its combination)
- Hardness grade
- Structure
- Bond

System for marking the specification of grinding tools made of aluminas and silicon carbides:



* Internal symbol

Specification of the wheel material

The grinding tool consists of the abrasive grains, the binding components and pores.
The abrasive grains function as cutting blades, while the bond holds the cutting particles together and forms together with them a compact unity.

ABRASIVE GRAIN
For manufacturing of our basic programme of grinding tools we use several types of fused aluminas and silicon carbides.

Fused aluminas

We use several types of aluminas:
• Regular aluminium oxide (3A, A)
• Semi-friable aluminium oxide (7A, 52A)
• White aluminium oxide (2A)
• Pink aluminium oxide (4A)
• Dark red (ruby) aluminium oxide (6A)
• Single crystal aluminium oxide (8A)
• Submicron cristalyn sinterized alumina (GA)
• Zirconia alumina (ZA, XA, WA)

Field of application for individual types of aluminas

Type of abrasive	**Material to be ground**	**Mechanical characteristics of the material**
Regular aluminium oxide	Low-alloyed, unhardened steels	Tensile strength between 300-500 N/mm^2
Semi-friable aluminium oxide	General application	Grade up to 60 HRc
Processed aluminium oxide	High-alloyed steels, for precision grinding	Tensile strength higher than 500 N/mm^2 Hardness over 62 HRc
Special zirconia alumina abrasive stands out for its resistance against chemical, thermal and mechanical influence. It is used for producing hot and cold pressed grinding tools, which are applied under the hardest conditions.		
GA has an excellent capacity of cutting and very long life.		

Silicon carbide

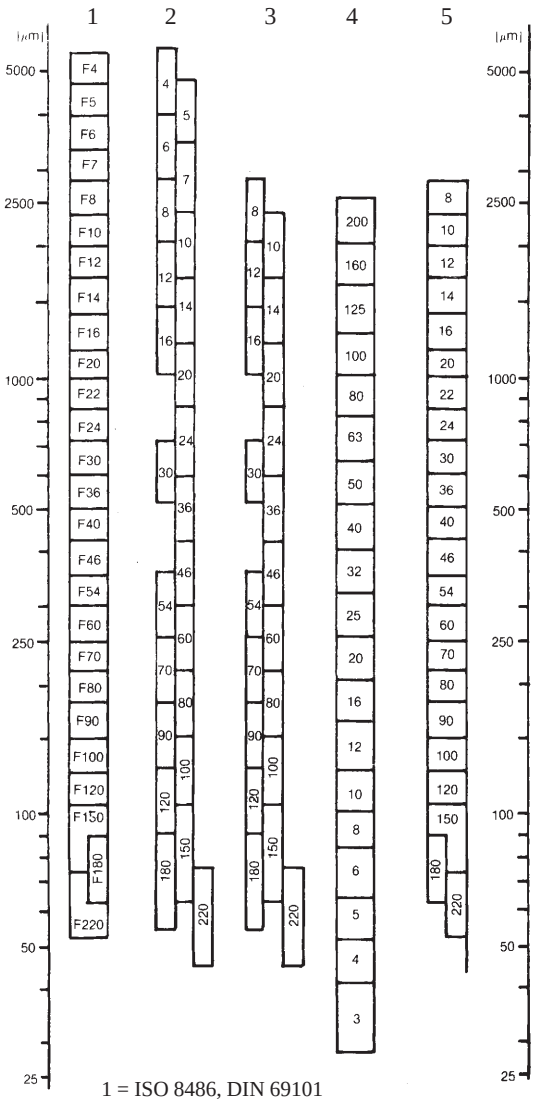
Two types are used:
Green silicon carbide (C) is an extremely hard material (hardness 9,5 on Mohs' scale). Because of its high cutting ability, it is suitable for processing carbide metals, gray iron and chilled iron, plastics, rubber, non-ferrous metals, ceramics, glass, nitralloy steels and acid-resistant steels.

Black silicon carbide (9C) is a little less brittle than silicon carbide and is used for grinding of all the above listed materials except carbide metals.

GRAIN SIZE

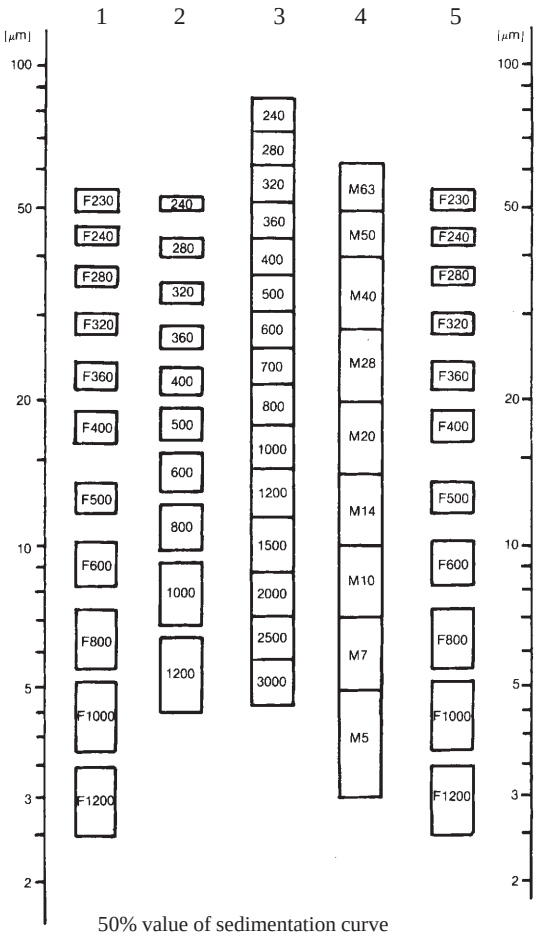
The grain size is designated by means of numbers according to the ISO Standard 8486.

A comparison of the national grain-size standards



1 = ISO 8486, DIN 69101
2 = ANSI B 74.12-1976 (USA)
3 = JIS R 6001-1973 (Japan)
4 = GOST 3647-71
5 = PN-76 M-59115 (Poland)

Micro-granulation



50% value of sedimentation curve

HARDNESS OF THE GRINDING TOOLS

The hardness of the grinding tools is proportional to the bond strength with which a single grain is tied in the bond-matrix. It depends on the following:

- The quantity and type of bond
- The structure
- The type of the abrasive grain
- Grinding tool making procedure

The grade of hardness is expressed by classes of hardness, designated with English alphabet letter symbols (capitals-D-Z).

STRUCTURE OF THE GRINDING TOOLS

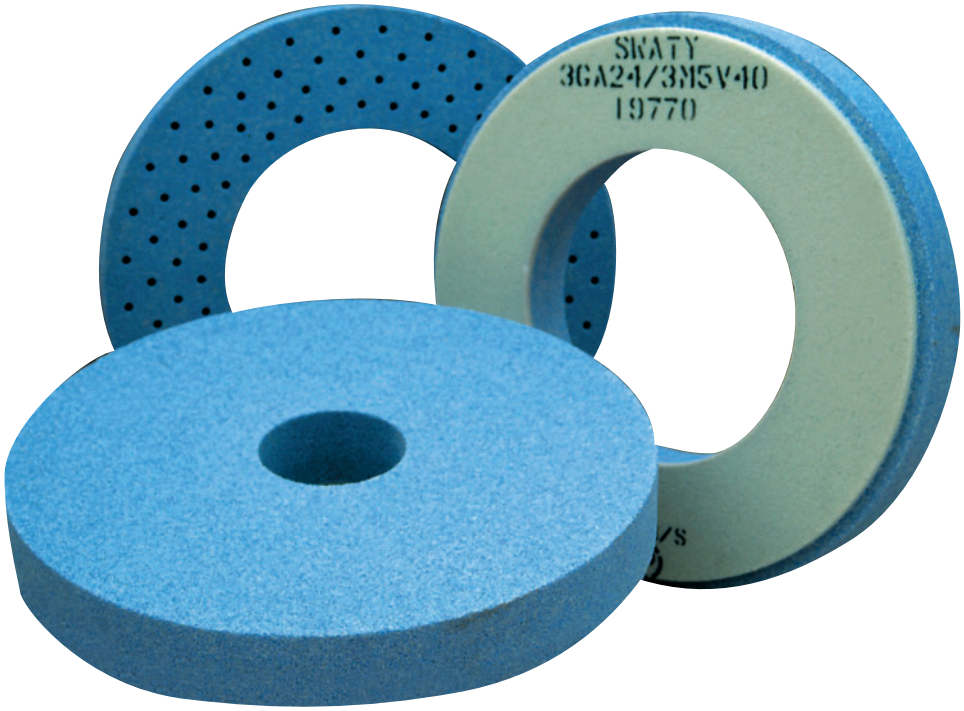
The structure of the grinding tools is designated with number symbols from 0-18. It depends upon the relative distance between the individual abrasive grains.

BOND

Vitrified bond
The main components of vitrified bonds are clays, kaolin, feldspar, frits and other ingredients. During the burning in ceramic kilns the components are partly fused and sintered. They also interact and during cooling they change into a state similar to glass or porcelain. Vitrified bond is brittle, it has no elasticity and is quite resistant to deformation. It is sensitive to impact, percussion, high load and changes in temperature. It is unaffected by moisture and dampness at temperatures higher than 0º C.

Resinoid bond
The main components of resinoid bonds are phenolic formaldehyde resins condensed to an infusible and insoluble state. The fillers regulate some technological and cutting characteristics of the bond. They also regulate hardness. The resinoid bond is less brittle, a little more elastic and is less resistant to deformation than the vitrified bonds. It also is a little less impact and percussion sensitive and less affected by changes in temperature than vitrified bonds, but it is not so stable as regards dampness and the influence of alkalic coolants.

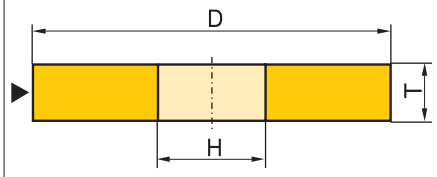
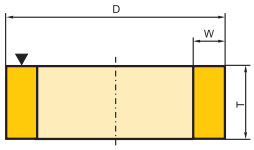
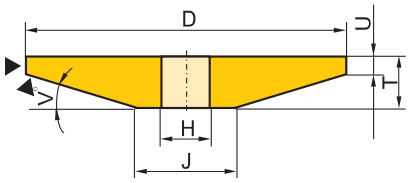
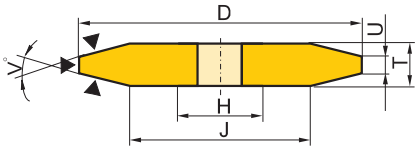
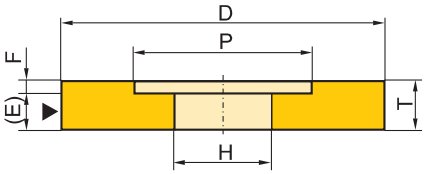
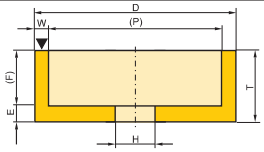
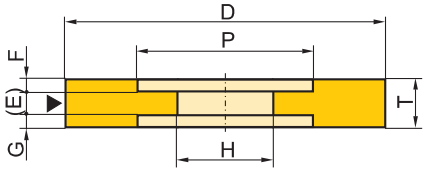
Reinforced resinoid bond
It is a variety of resinoid bond with fibreform material added (usually fibreglass-fabric). The bond thus reinforced exhibits a much greater range of strength and gives the products greater hardness as well as enables usage by increased operating speeds and side loads.



Vitrified grinding wheels made with GA Submicron crystalin sintesized alumina.

Designation of Grinding Tool Types (ISO 525)

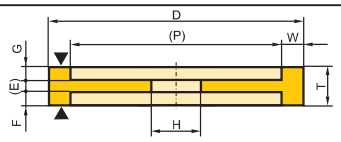
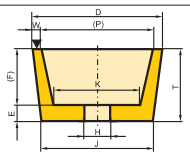
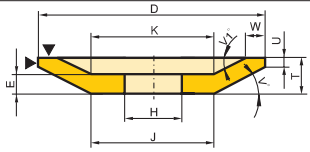
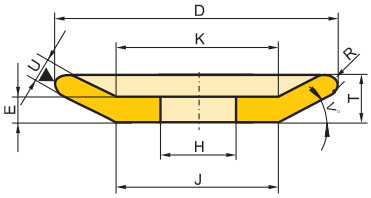
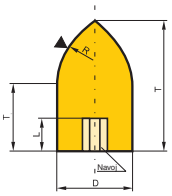
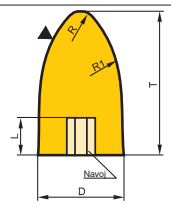
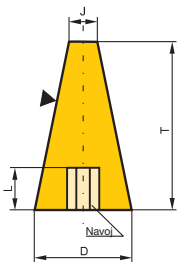
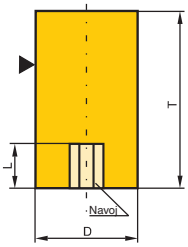
Basic types and their limitations (working face is marked on the sketch)

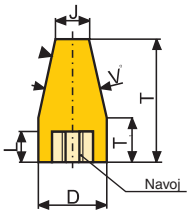
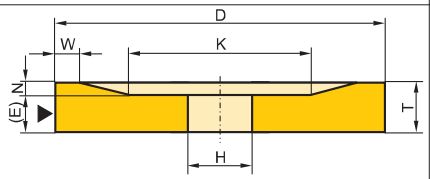
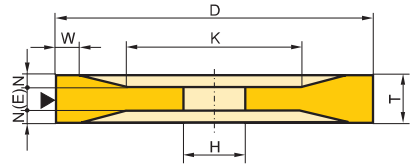
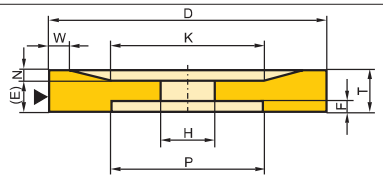
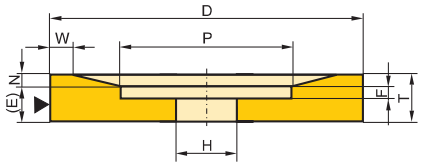
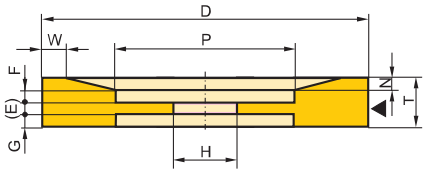
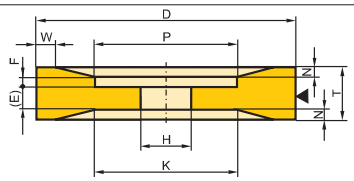
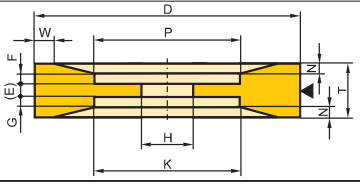
BASIC TYPE	SKETCH	DESIGNATION OF DIMENSIONS	LIMITS		
			BOND	PERIPHERAL SPEED *1 NORMAL	EXCEP.	DIMENSIONS
1..		Straigth grinding wheel D x T x H	V B BF	40 m/s 50 m/s 80 m/s	 1FK, 1VS 1A	H ≤ 0,67 D T > 0,02 D*2 T > 0,02 D T > 4 mm
2..		Grinding ring wheel D x T - W	V B	32 m/s 40 m/s		W < 0,17 D
3..		Grinding wheel tapered one side D/J x T/U x H - V..	V B	40 m/s 50 m/s		H ≤ 0,67 D
4..		Grinding wheel tapered both sides D/J x T/U x H - V..	V B BF	40 m/s 50 m/s 80 m/s	 - 4A	H ≤ 0,67 D
5..		Grinding wheel one side recessed D x T x H - P x F..	V B BF	40 m/s 50 m/s 80 m/s Limit for 5G is: V 35 m/s B 45 m/s	 - 5A	H ≤ 0,67 D E ≥ 0,5T 0,5T > E ≥ 0,3T
6..		Cylinder cup wheel D x T x H - W..	V B	32 m/s 40 m/s		0,3T > E ≥ 0,2T
7..		Grinding wheel recessed two sides D x T x H - P x F/G	V B	40 m/s 50 m/s		H ≤ 0,67D E ≥ 0,5D

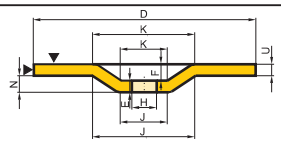
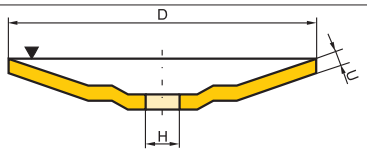
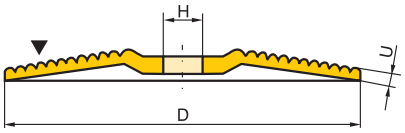
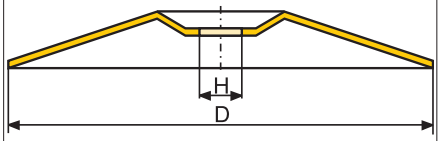
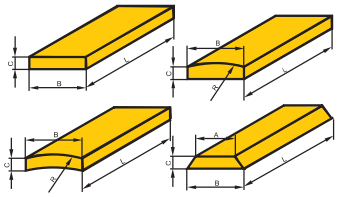
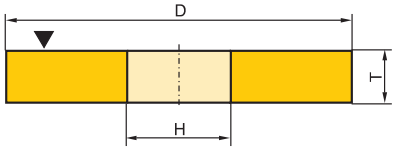
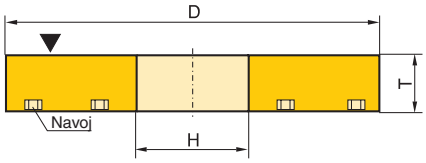
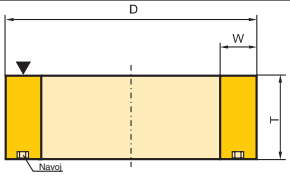
*1 By ordering the increased operating pheripheral speeds must obligatory be stated.
Normal operating peripheral speeds can be lower for softer and/or open structure grinding wheels.

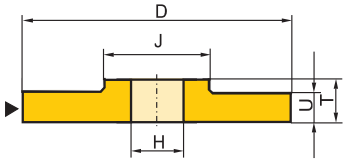
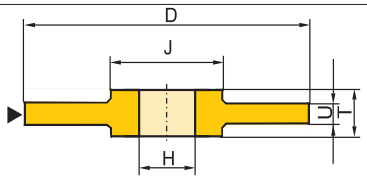
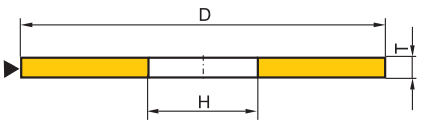
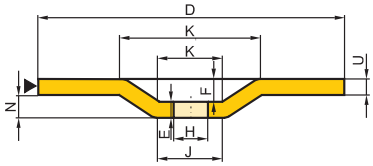
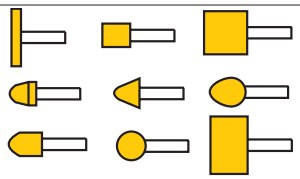
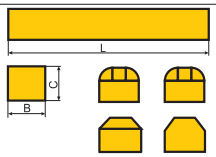
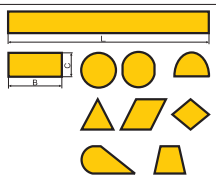
*2 D = 250 mm H = 0,67 D T > 0,01 D

•• All under groups derived from basic type.

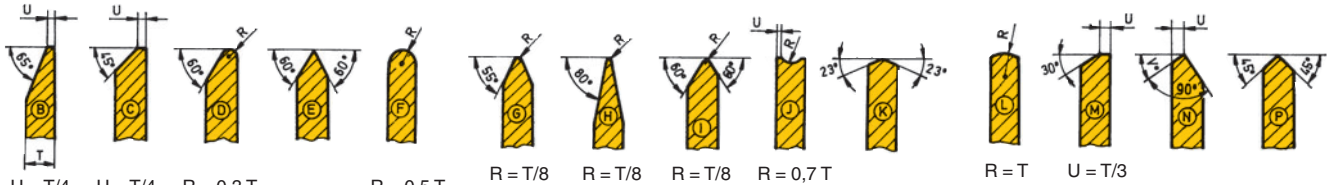
BASIC TYPE	SKETCH	DESIGNATION OF DIMENSIONS	LIMITS		
			BOND	PERIPHERAL SPEED *1 NORMAL EXCEP.	DIMENSIONS
9..		Both sides cylinder cup wheel D x T x H - W.. F.. G..	V B	32 m/s 40 m/s	H ≤ 0,67D 0,4T > E ≥ 0,2T
11..		Flaring cup wheel D/J x T x H - W.. E.. K..	V B	32 m/s 40 m/s	0,3T > E ≥ 0,2T
12..		Dish wheel D/J x T/U x H - W.. E.. K.. V..	V B	32 m/s 40 m/s	E ≥ 0,5T
13..		Face shaped dish wheel D/J x T/U x H - E.. V.. (K..)	V B	32 m/s 40 m/s	E ≥ 0,5T
15..		Grinding cone with nut D x T/T1 x nut - R..	V B	32 m/s 40 m/s	
16..		Grinding cone with nut D x T x nut - R.. /R1	V B	32 m/s 40 m/s	
17..		Grinding cone with nut D/J x T x nut for type 17R radius R.. to be specified	V B	32 m/s 40 m/s	
18..		Grinding cone with nut D x T x nut for type 18R radius R.. to be specified	V B	32 m/s 40 m/s	

BASIC TYPE	SKETCH	DESIGNATION OF DIMENSIONS	LIMITS		
			BOND	PERIPHERAL SPEED *1 NORMAL EXCEP.	DIMENSIONS
19..		Grinding cone with nut D x T x nut for type 19R radius R.. to be specified	V B	32 m/s 40 m/s	
20..		Grinding wheel relieved one side D/K x T/N x H	V B	40 m/s 50 m/s	H ≤ 0,67D E ≥ 0,5T
21..		Grinding wheel relieved both sides D/K x T/N x H	V B	40 m/s 50 m/s	H ≤ 0,67D E ≥ 0,5T
22..		Wheel relieved one side and recessed other side D/K x T/N x H - P x F	V B	40 m/s 50 m/s	H ≤ 0,67D E ≥ 0,5T
23..		Wheel recessed and relieved same side D x T/N x H - P x F	V B	40 m/s 50 m/s	H ≤ 0,67D E ≥ 0,5T
24..		Wheel relieved and recessed on one side, recessed on the other side D x T/N x H - P x F/G	V B	40 m/s 50 m/s	H ≤ 0,67D E ≥ 0,5T
25..		Wheel relieved and recessed on one side, relieved on the other side D/K x T/N x H - P x F	V B	40 m/s 50 m/s	H ≤ 0,67D E ≥ 0,5T
26..		Wheel relieved and recessed both sides D x T/N x H - P x F/G	V B	40 m/s 50 m/s	H ≤ 0,67D E ≥ 0,5T

BASIC TYPE	SKETCH	DESIGNATION OF DIMENSIONS	LIMITS		
			BOND	PERIPHERAL SPEED *1 NORMAL	EXCEP.	DIMENSIONS
27..		Depressed center wheel D x U x H	BF	80 m/s		D ≤ 230 mm 4 mm < U ≤ 10 mm
28..		Koolie hat type grinding wheel D x U x H	BF	80 m/s		D ≤ 230 mm 4 mm < U ≤ 10 mm
29..		Depressed semi-flexible grinding wheel Rondex D x U x H	BF	80 m/s		D ≤ 230 mm U ≥ 0,02D
30..		Fibre disc D x H	B	80 m/s		D ≤ 230 mm
31..		Grinding segment B x C x L B/A x C x L B x C x L - R.. B/A x C x L - R..				
35..		Straight wheel for side grinding D x T x H	V B	32 m/s 40 m/s		H ≤ 0,67D
36..		Grinding wheel for side grinding with inserted nuts D x T x H - n/nut (n= number of nuts)	V B	32 m/s 40 m/s		H ≤ 0,67D
37..		Grinding ring with inserted nuts D x T - W - n/nut (n=number of nuts)	V B	32 m/s 40 m/s		W < 0,17D

BASIC TYPE	SKETCH	DESIGNATION OF DIMENSIONS	LIMITS		
			BOND	PERIPHERAL SPEED *1 NORMAL EXCEP.	DIMENSIONS
38..		Grinding wheel stepped one side D/J x T/U x H	V B	40 m/s 50 m/s	H ≤ 0,67D
39..		Grinding wheel stepped both sides D/J x T/U x H	V B	40 m/s 50 m/s	H ≤ 0,67D
41..		Straigth cutting wheel D x T x H	B BF	50 m/s 80 m/s	D>230mm H≤0,33D T ≤ 0,02D oder D ≤ 230mm H ≤ 0,33D T < 4mm
42..		Depressed center cutting wheel D x U x H	BF	80 m/s	D > 230mm H ≤ 0,33D U ≤ 0,02D oder D ≤ 230mm H ≤ 0,33D T < 4mm
52..		Mounted wheel D x T - shaft	V B	40 m/s 50 m/s	3mm ≤ D ≤ 80mm
54..		Honing stone B x C x L			
90..		Grinding stick B x C x L			

Standard Peripheral Shapes (if not standard, U and V are to be specified by the user).



*1 By ordering the increased operating peripheral speeds must obligatory be stated.
Normal operating peripheral speeds can be lower for softer and/or open structure grinding wheels.

Standard dimensions of grinding tools in mm and inches

1. Standard diameters - D

	mm	Inches		mm	Inches
*	3	1/8	*	230	
*	4	5/32	*	250	
*	5	3/16		254	10
*	6	1/4	*	300	
*	8	5/16		305	12
*	10	3/8	*	350	
*	13	1/2		356	14
*	16	5/8	*	400	
*	20	3/4		406	16
*	25	1	*	450	
	30	1 3/16		457	18
*	32	1 1/4	*	500	
*	40	1 1/2		508	20
*	50		*	600	
	51	2		610	24
*	63	2 1/2		650	
	75			660	26
	76	3		700	
*	80			710	28
	82	3 1/4	*	750	
*	100			762	30
	102	4	*	800	
*	115	4 1/2		813	32
*	125		*	900	
	127	5		914	36
*	150		*	1000	
	152	6		1016	40
*	175		*	1060	
	178	7		1067	42
*	180			1100	
*	200			1118	44
	203	8	*	1250	
*	225				

* ISO DIN 603-1 to 603-12

2. Standard Thicknesses - T

	mm	Inches		mm	Inches
*	0,5			38	1 1/2
*	0,6		*	40	
*	0,8		*	50	
	1			51	2
*	1,2	3/64	*	63	
*	1,6	1/16		64	2 1/2
*	2	5/64		76	3
*	2,5	3/32	*	80	
	3	1/8	*	100	
*	3,2		*	102	4
	3,5	9/64	*	125	
*	4	5/32		127	5
*	5	3/16		150	
*	6			152	6
	6,4	1/4	*	160	
	7		*	200	
*	8	5/16		203	8
	9,5	3/8	*	250	
*	10		**	254	10
	12,7	1/2		300	
*	13			305	12
*	16	5/8	*	315	
*	20		*	400	
	21	13/16		406	16
*	25	1	*	500	
*	32	1 1/4		508	

** Grinding wheels with thickness from 254 up are made of two or more assembled wheels.

3. Standard Holes - H

	mm	Inches		mm	Inches
*	1,6	1/16	*	40	
*	2,5	3/32	*	50,8	2
*	4	5/32		(51)	
*	6		*	60	
	6,4	1/4		(76)	
*	8		*	76,2	3
	9,5	3/8	*	80	
*	10		*	100	
	12,7	1/2	*	127	5
*	13		*	152,4	6
	15,9	5/8	*	160	
*	16			(203)	
	19,1	3/4	*	203,2	8
*	20		*	250	
*	22,2	7/8		254	10
*	25		*	304,8	12
	25,4	1		(305)	
	31,8	1 1/4	*	400	
*	32		*	508	20
	38,1	1 1/2			

* ISO DIN 603-1 to 603-12

When ordering, please specify the following:

- The grinding wheel type*
- Dimensions in mm
- Specification, containing the following data:
  - Abrasive
  - Grain size
  - Grade of hardness
  - Structure
  - Bond
- Wheel operating speed or spindle rotational speed
- Type and trade mark of the grinding machine
- Specification of the workpiece and its thermal treatment state, the required surface finish and the designated performance.
  If possible, please enclose the marking label of the grinding wheel you had successfully used before.

Ordering example:

Product code		D x T x H		
1	**14192**	**250 x 25 x 25**	**A60/3M6V20**	**40 m/s**
Type	No.	Dimension of the wheel (mm)	Specification	Operating speed

In case you have already purchased the product from us and you know its product code it is sufficient to quote only this code in your purchase order.

* For non-standard types please add a sketch of the grinding tool!

Grinding process

The grinding process depends on a number of factors. By optimum conditions a high grinding effect is achieved and we get the required accuracy and surface finish.

Factors affecting the grinding process:

• Grinding conditions:
- Wheel peripheral speed
- Workpiece peripheral speed
- Feed speed
- Depth of cut

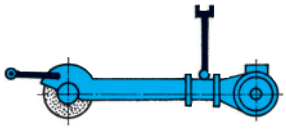
• Grinding machine:
- type of machine, stability of the construction accuracy, flexibility, vibrations,
- accuracy of the workpiece-mounting device,
- forming device

• Workpiece:
- Specification (composition, state…)
- Dimension and shape

• Grinding tool:
- Shape and size
- Specification

• Cooling liquid
- Type, composition
- State

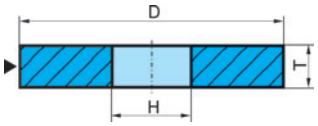
The specification selection guide is of a general character only since the grinding process is specific for each combination of the above listed factors and therefore a grinding tool with the same specification performs differently in different conditions.



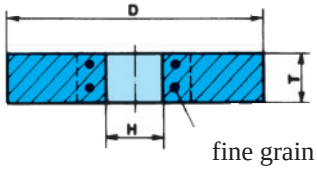
SNAGGING AND CUTTING

Rough Grinding – Snagging on Swing Frames and Stationary Grinding Machines

Grinding wheels
Type: 1, 1FK,1A,1AO



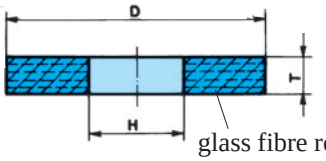
Type: **1**
Designation: 1-DxTxH



fine grain ring

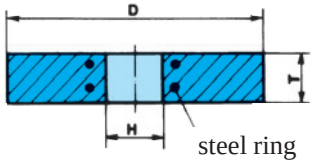
Type: **1FK**
1FK-DxTxH

Standard dimensions
D max = 600 mm
T max = 80 mm
H max = 305 mm



glass fibre reinforcement

Type: **1A**
Designation: 1A-DxTxH



steel ring

Type:**1AO**
1AO-DxTxH

They are used for snagging castings and dies (forgings) and materials after they have been cut or welded on stationary and swing frame grinding machines. The grinding operation is hand guided. A high grinding effect is demanded, independent of the surface finish. The operating peripheral speed can be 50, 63 or 80 m/s.

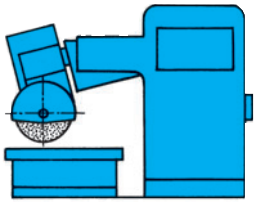
For grinding on stationary grinding machines somewhat softer wheels are used than those applied on swing frame machines.

For grinding at operating speeds up to 50 m/s wheels **type 1** are used, while for rough grinding (grain size up to 36) wheels **type 1AO** are applied. Grinding wheels for the use at an operating speed of 63 m/s are designed with a fine grain ring which provides for a higher wheel strength (**type 1FK**). Wheels with an operating peripheral speed of 80 m/s are reinforced (**type 1A**), the specifications being 52A16-24M-P6BF05.

Application	**Recommendations**				**for 50 m/s**	**for 63 m/s**
	Abrasive	Grain size	Grade	Structure	Bond	Bond
Non-ferrous material	9C	16-24	O-P	4	B04	B05
Steel casts	52A, 3A, 7A	14-24	O-R	3-4	B04	B69
High alloyed steels	52A, 7A	16-24	O-R	4	B04	B05
Gray cast iron	ZA, 53C	14-24	O-R	3-5	B68	B69
	ZA	16-20	O-Q	5-6	B78	B78
Spheroidal graphite iron	ZA, 52A	14-24	N-M	4	B04	B05
Malleable cast iron						
• before tempering	ZA, 53C, 9C	16-24	O-R	3-4	B68	B69
• after tempering	ZA, 52A	16-24	N	4	B04	B05

Ordering example:

1	500x60x127	53C 12/3 R4 B68, 50 m/s or 63 m/s
1FK	450x52x150	2ZA 16/3 Q4 B18, 50 m/s or 63 m/s
1FK	500x70x203	2ZA 16/1 R7 B27, 50 m/s or 63 m/s
1FK	600x60x203	2ZA 16/1 Q4 B18, 50 m/s or 63 m/s
1A	500x60x127	2ZA 14/9 R4 BF33, 80 m/s
1A	600x60x203	S2ZA 16/4 J7 BF05, 80 m/s for high alloyed steels

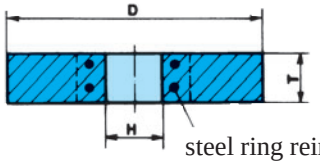


High – Pressure Grinding (Fettling)

Hot pressed snagging wheels

Hot pressed high density grinding wheels for working speed 80 m/s or 60 m/s.

Type: **1VS**
Designation:
1VS D x T x H



steel ring reinforcement

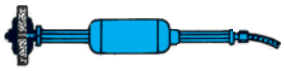
These wheels are designed to be used on automatic grinding machines (for example: Centro-Maskin, Schlütter, Sket etc.) and are ideal for snagging of billets, ingots, blooms and slabs – for steel works in rolling mills, smithies, and steel foundries. Hot pressed wheels are renowned for their high rate of stock removal and extremely long life. Swaty hot pressed wheels are manufactured to the highest standard and are covered by DSA 2873 safety certificate for speeds up to 80 m/s. This standard corresponds to German VBG-UVV49 and it is also in conformity with F.E.P.A. safety codes.

Grinding wheels are produced in the following dimensions (mm), whereby special tolerances for holes are implemented:

610 x 76 x 203,2 mm	for 80 m/s	hole tolerance	+ 0,55 + 0,26
610 x 76 x 304,8 mm	for 63 m/s	hole tolerance	+ 0,65 + 0,33

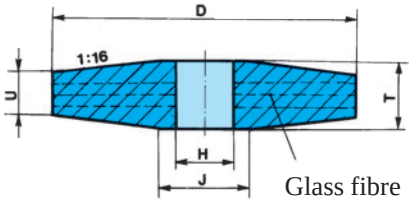
Wheels are manufactured of special aluminium oxides (for example zirconium aluminium oxide), respectively mixtures of special aluminium oxides in grain sizes 8 to 24.

Ordering example : 1VS 610x76x203,2 XA12ZB80, 80 m/s



Grinding on Portable Straight Grinding Machines

Grinding with wheels tapered both sides, Type 4KA



Glass fibre reinforcement

Grinding wheels tapered both sides for grinding without safety guard.

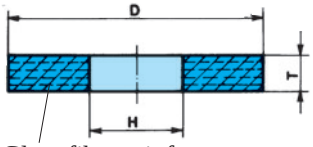
Designation:
4KA Dx T/U x H

Non-standard dimensions:
4KA D/J x T/U x H

4KA

APPLICATION	Recommendation				
	Abrasive	**Grain size**	**Grade**	**Structure**	**Bond**
Non-ferrous metals					
For 50 m/s	9C	24-36	N-Q	4-5	B
For 63 m/s	9C	24-36	N-Q	6-8	BF
Steel and cast steel					
For 50 m/s	3A, 7A	20-36	N-Q	4-5	B
For 63 m/s	3A, 52A, 7A	20-36	N-Q	6-8	BF
High-alloyed steels					
For 50 m/s	52A, 7A	24-36	N-Q	6-8	B
For 63 m/s	52A, 7A	24-36	N-Q	6-8	BF
Stainless and acid resistant steels					
For 50 m/s	52A	24-36	N-Q	4-5	B
For 63 m/s	52A	24-36	N-Q	6-8	BF
Chilled cast iron					
For 50 m/s	ZA, 9C	20-36	N-Q	6-8	B
For 63 m/s	ZA, 9C	20-36	N-Q	6-8	BF

Grinding with fibre-reinforced wheels, Type 1A, 1AM

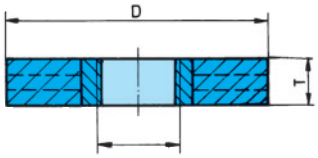


Glass fibre reinforcement

Designation:
1A DxTxH

1A

For peripheral speeds V = 80 m/s



Thread

Designation:
1AM D x T x nut

1AM

APPLICATION	Recommendation				
	Abrasive	**Grain size**	**Grade**	**Structure**	**Bond**
General application	3A, 52A, 7A, ZA	24-36	N-S	6-8	BF

Reinforced straight grinding wheels Type 1A
for grinding on portable straight grinding machines for 80 m/s

Table of dimensions (mm):

D	T					H				
50	4	6	8	10		6	9,5	10	13	
65	4	6	8	10		6	9,5	10	13	
75	4	6	8	10		6	9,5	10	13	
80	4	6	8	10		6	9,5	10	13	20
100	10	16	20	25			13		20	
125			20	25				16	20	25
150			20	25	32			16	20	
175			20	25	32			16	20	
200			20	25	32				20	25
225			20	25	32				20	22,2

Ordering example:

1A 125 x 25 x 25 mm 3A 16/1N4BF, 80 m/s
1A 150 x 25 x 25 mm 52A 24/3P6 BF05, 80 m/s
1A 200 x 25 x 25 mm 7A 24/3P5 B12, 80 m/s

Reinforced grinding wheels for snagging, type 1A and 27.

Grinding cones with nuts

Grinding cones with inserted nuts are suitable for snagging of castings and forgings and for rougher cleaning operations.

Grinding cones are used for off-hand grinding. Maximum peripheral operating speed for resinoid bonded grinding cones is 50 m/s, and 32 m/s for vitrified bonded cones.

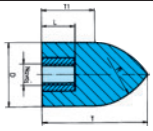
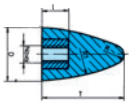
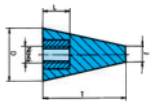
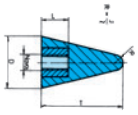
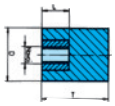
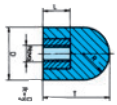
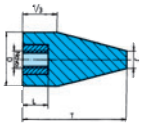
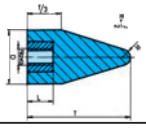
Application	Specification
Steel	3A24/3Q4B
Gray cast iron	52C24/3Q4B
Non-ferrous metals	9C16/6P2V

Marking of types and sizes:
D x T x thread

Ordering example:
16 – 32x50xM10

Upon special request the inserted nuts can be made with Whithworth instead of metric threads:
¾”-10, 5/8”-11, ½”-12, ⅜” –16.

Table of types and sizes in mm:

Type	Sketch	D	T	Thread	L	T1	J	R	R1
15		40 40 50	63 80 100	M10, M12 M12, M10 M12, M16	20 25 25	40 48 65		32 38 51	
16		32 40 50 63 80	50 63 80 80 100	M10 M12 M12 M16 M16	16 20 20 25 30			6 10 10 10 16	118 190 190 165 150
17		32	50 63	M10	16		10		
		40	63	M12	20		10		
		50	80 100	M12	20		13		
17R		63	100 125	M16	30		16		
		80	80 100	M16	25 30		20		
18		32	40 50 63	M10	16 20				
		40	40 50 63 80	M12	16 20 25				
18R		50	50 80 100	M12	20 25 30				
		63 80	80 80	M16	25 25				
19		32	63	M10	16		10		
		40	63	M12	16		10		
		50	80 100	M12	25		13		
19R		63	80 100	M16	25		16		
		80	80 100		25 30		20		

Grinding with mounted wheels

Mounted wheels are used in toolrooms for manufacturing of various tools and for snagging of castings and forgings (dies).
The maximum permissible peripheral speed for mounted wheels is to be calculated in relation to dimension and type of mounted wheel and in relation to the shaft and the way of mounting.
The range of mounted wheels we produce is rather wide. It includes types A, B, and W according to ISO standard, Swaty basic programme types and also nonstandard types.
Standard dimensions:
- Diameter D 2,5 to 80 mm
- Length T 2 to 70 mm
- Shank diameter S from 3 to 12 mm or diameter of a shank with thread from M 2,5 to M 10

Set of mounted wheels

Set 52 GAR

Set 52GAR includes 30 pieces of mounted wheels

Set 52 GAR 1

Set 52GAR 1 includes 10 pieces of mounted wheels

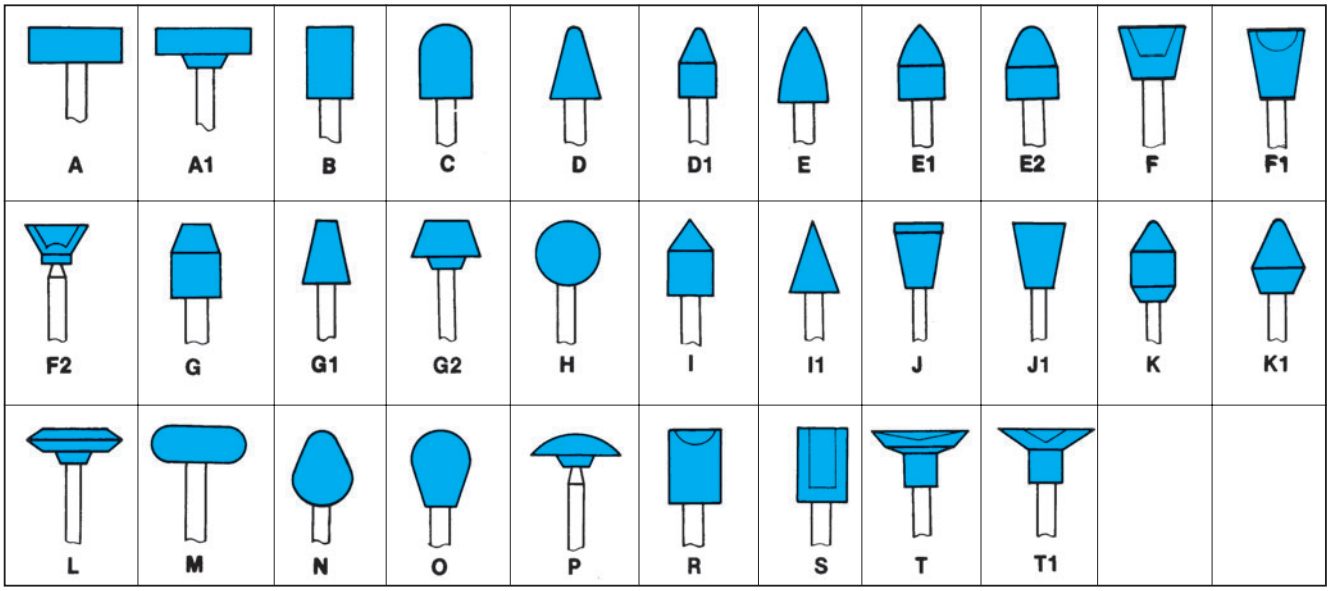
Special selection guide:

Application	**Wheel diameter**		
	< 8mm	**8 - 20 mm**	**> 20 mm**
General application	4A100/4O9V	4A60/4P6V	4A46/4P5V 4A36/4P5V
Deburring	4A120/3T9V	4A80/3T7V	4A60/3S6V
Snagging wheels			
• Forgings (dies)		52A60/3O6B	52A36/3O4B 52A46/3O5B
• Sand and casting		52A60/3R6V C60/3R6V C24/3R3V	52A36/3R5V C46/3R4V
Special steels		2A60/3P6V	2A46/3P5V

Specifications listed in the table are for offhand grinding.

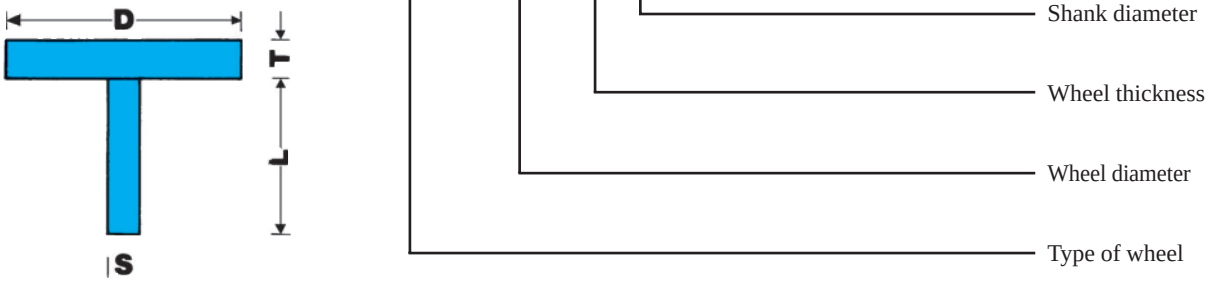
According to our internal standard made after recommendations of FEPA and ISO standards all our mounted wheels are marked with number 52 and an appropriate letter for type.

Type: 52



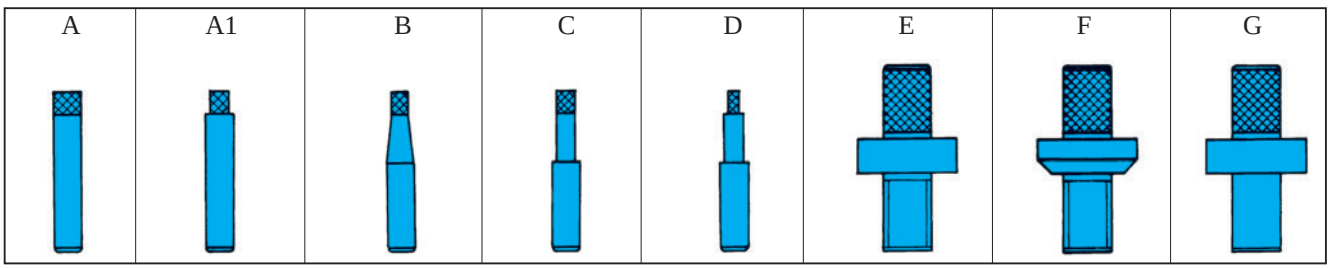
Designation:

52A-DxT-SxL + specification



Ordering example: 52A 30x30-6x40 4A 36/4O5V40, 40 m/s

Shank types



It is not necessary to indicate the shank type in the order. Our technicians will make the correct choice.

Range of mounted wheels

52 A

52A-6x6-3x30
52A-10x6-6x40
52A-10x10-3x30
52A-12x6-6x40/3
52A-12x6-3x30
52A-13x6-3x30
52A-13x6-6x40
52A-13x10-6x40
52A-13x10-M4x10
52A-13x10-3x30
52A-13x13-3x40
52A-13x13-3x30
52A-14x10-M4x12
52A-16x8-6x40
52A-16x13-6x40
52A-20x10-6x40
52A-20x12-3x30
52A-20x12-6x40
52A-20x13-6x40
52A-20x20-6x40
52A-25x10-6x40
52A-25x13-6x40
52A-25x25-6x40
52A-30x30-6x40
52A-32x10-6x40
52A-32x13-6x40
52A-32x16-6x40
52A-32x20-6x40
52A-32x25-6x40
52A-32x32-6x40
52A-40x10-6x40
52A-40x13-6x40
52A-40x20-6x40
52A-40x25-6x40
52A-40x40-6x40
52A-50x12-6x40
52A-50x25-6x40

52 A1

52A1-6x3-3x30
52A1-10x2-3x30
52A1-10x2-6x40
52A1-12x3-3x30
52A1-12x3-6x40
52A1-13x3-3x30
52A1-13x3-6x40
52A1-15x3-3x30
52A1-15x3-6x40
52A1-16x4-3x30
52A1-16x4-6x40
52A1-20x3-6x40
52A1-20x4-3x30
52A1-20x4-6x40
52A1-20x5-3x30
52A1-20x5-6x40
52A1-20x6-6x40
52A1-25x6-6x40
52A1-32x6-6x40
52A1-32x8-6x40
52A1-40x6-6x40

52B

52B-3x5-3x30
52B-3x5-6x40
52B-3x6-6x40
52B-3x6-3x30
52B-3x9-3x30
52B-3x13-3x30
52B-4x6-3x30
52B-4x8-6x40
52B-4x8-3x30
52B-5x6-3x30
52B-5x10-3x30
52B-5x10-6x40
52B-5x10-3x30
52B-5x13-3x30
52B-6x10-3x30
52B-6x12-6x40
52B-6x12-3x30
52B-6x20-6x40
52B-6x20-3x30
52B-8x95-M3x9
52B-8x10-6x40
52B-8x10-3x30
52B-8x13-M3x95
52B-8x13-6x40
52B-8x13-3x30
52B-8x15-6x40
52B-8x15-3x30
52B-8x16-6x40
52B-8x16-3x30
52B-8x20-6x40
52B-8x20-3x30
52B-10x12-6x40
52B-10x12-3x30
52B-10x13-3x30
52B-10x13-6x40
52B-10x20-6x40
52B-10x25-6x40
52B-10x30-6x40
52B-10x32-6x30
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52B-16x20-6x40
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52B-16x32-6x40
52B-16x40-6x40
52B-16x50-6x40
52B-20x25-6x40
52B-20x40-6x40
52B-20x50-6x40
52B-25x32-6x40
52B-25x40-6x40
52B-25x50-6x40
52B-32x40-6x40
52B-32x50-6x40

52C

52C-3x6-6x40
52C-3x6-3x30
52C-5x10-6x40
52C-6x10-3x30
52C-6x20-3x30
52C-6x20-6x40
52C-8x16-6x40
52C-8x16-3x30
52C-12x20-6x40
52C-12x20-3x30
52C-13x13-3x30
52C-13x13-6x40
52C-20x16-6x40
52C-20x25x6-40
52C-25x25-6x40
52C-32x51-6x40
52C-38x38-6x40

52 D

52D-10x10-6x40
52D-10x10-3x30
52D-12x12-6x40
52D-12x12-3x30
52D-16x16-3x30
52D-16x16-6x40
52D-20x20-6x40
52D-25x25-6x40
52D-25x70-6x40
52D-30x40-6x40
52D-32x32-6x40
52D-32x51-6x40

52 D1

52D1-6x10-3x30
52D1-20x29-6x40
52D1-30x30-6x40
52D1-32x32-6x40

52 E

52E-3x5-3x30
52E-3x5-6x40
52E-3x6-3x3
52E-5x10-6x40
52E-5x10-3x30
52E-8x15-6x40
52E-8x15-3x30
52E-8x16-6x40
52E-8x16-3x30
52E-10x20-6x40
52E-10x20-3x30
52E-12x20-6x40
52E-12x20-3x30
52E-20x32-6x40

52 E1

52E1-5x8-3x30
52E1-13x20-6x40
53E1-13x20-3x30
52E1-18x32-6x40
52E1-22x50-6x40
52E1-22x70-6x40

52E2

52E3-6x8-3x30
52E2-20x25-6x40

52F

52F-20x17-6x40
52F-25x16-6x40
52F-25x21-6x40
52F-32x26-6x40
52F-32x25-6x40
52F-40x33-6x40

52F2

52F2-20x5-3x30

52G

52G-20x25-6x40
52G-20x63-6x40
52G-25x32-6x40
52G-32x40-6x40

52G1

52G1-3x6-3x30
52G1-3x9-3x30
52G1-6x6-3x30
52G1-13x16-6x40
52G1-13x16-3x30
52G1-25x32-6x40

52G2

52G2-25x10-6x40
52G2-38x10-6x40

52H

52H-3x30
52H-3-6x40
52H-5-3x30
52H-5-6x40
52H-8-3x30
52H-8-6x40
52H-10-3x30
52H-12-3x30
52H-12-6x40
52H-13-3x30
52H-13-6x40
52H-15-6x40
52H-16-6x40
52H-20-6x40
52H-25-6x40
52H-30-6x40
52H-32-6x40

52I

52I-6x13-6x40
52I-6x13-3x30
52I-12x20-6x40
52I-12x25-6x40
52I-18x22-6x40
52I-20x20-6x40
52I-32x32-6x40

52I1

52I1-8x16-3x30

52J1

52J1-3x3-3x30
52J1-6x6-3x30
52J1-8x10-3x30
52J1-25x13-6x40

52K

52K-20x29-6x40

52K1

52K1-11x20-6x40
52K1-11x20-3x30

52L

52L-13x3-3x30
52L-32x6-6x40
52L-40x10-6x40

52M

52M-6x5-3x30
52M-13x10-6x40
52M-13x10-3x30
52M-20x8-3x30

52N

52N-20x25-6x40

52O

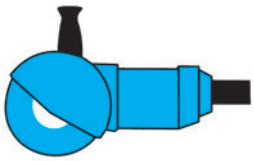
52O-6x6-3x30
52O-6x10-3x30
53O-10x13-3x30
52O-11x18-6x40
52O-17x18-3x30
52O-20x25-6x40

52P

52P-20x3-3x30

52R

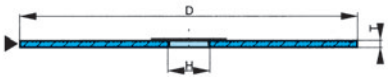
52R-6x8-6x40
52R-6x8-3x30
52R-6x13-6x40
52R-6x13-3x30
52R-8x10-6x40
52R-8x10-3x30
52R-10x10-3x30
52R-10x10-6x40
52R-10x13-3x30
52R-10x13-6x40
52R-13x13-3x30
52R-13x13-6x40
52R-20x20-6x40
52R-25x25-6x40



Grinding on Portable Angle Grinders

Straight cut-off wheels

Type: **41B**



Standard dimensions:
D: 76 - 230 mm
T: 2 - 3 mm
H: 10, 16 and 22,2 mm

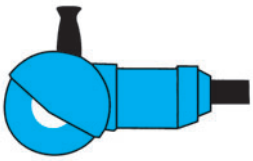
Designation:
41B D x T x H

Side reinforced straight cut-off wheels for offhand cutting on angle grinders for operating speed 80 m/s, furnished with one metal hole insert. Cut-off wheels meet the requirements of European Standard EN 12413 and their production is approved by Safety Certificate SUVA 381. Side grinding is not allowed.

Application:	Universal steel	Stone	Stainless steel	Aluminium	Cast iron
Commercial specification:	A30S1BF	C30P3BF	4A30N6BF	A30R5BF	A30P5BF
Standard dimensions mm	Product code				
76x3x10	41B 1669				
100x2,5x16	41B 147	41B 149	41B 999		
100x3x16	41B 812	41B 1663			
115x2,5x22,2	41B 122	41B 531	41B 612	41B 763	41B 799
115x3x22,2	41B 513	41B 529	41B 94	41B 933	41B 823
125x2,5x22,2	41B 100	41B 547	41B 1625	41B 1812	41B 800
125x3x22,2	41B 537	41B 538	41B 259	41B 1854	41B 824
150x2,5x22,2	41B 769		41B 1701		
150x3x22,2	41B 528	41B 562	41B 260		41B 262
180x2,5x22,2	41B 32		41B 1626	41B 867	
180x3x22,2	41B 507	41B 509	41B 112	41B 936	41B 97
230x2x22,2	41B 1091				
230x2,5x22,2	41B 25		41B 1560	41B 1806	41B 1610
230x3x22,2	41B 508	41B 510	41B 207	41B 1851	41B 113

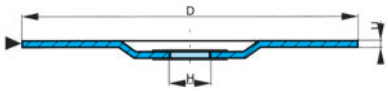
Cut-off wheels are also available with T = 2 mm in Specification A36T2BF for steel.

Packing: 25 pcs. in a carton (by request also 50 pcs.).



Depressed centre cut-off wheels

Type: 42



Standard dimensions:
D: 100 – 230 mm
U: 2,5 – 3,2 mm
H: 16 and 22,2 mm

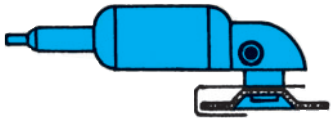
Designation:
42 D x U x H

Side reinforced depressed centre cut-off wheels for offhand cutting on angle grinders for operating speed 80 m/s, furnished with one metal hole insert. Cut-off wheels meet the requirements of European Standard EN 12413 and their production is approved by Safety Certificate SUVA 381. Side grinding is not allowed.

Application:	**Universal steel**	**Stone**	**Stainless steel**	**Aluminium**	**Cast iron**
Commercial specification:	**A30S1BF**	**C30P3BF**	**4A30N6BF**	**A30R5BF**	**A30P5BF**
Standard dimensions mm	**Product code**				
100x2,5x16	42 20	42 276	42 328	42 241	
115x2,5x22,2	42 128	42 149	42 50		42 03
115x3x22,2	42 123	42 125	42 64	42 271	42 58
125x2,5x22,2	42 13	42 150	42 201		42 197
125x3x22,2	42 124	42 126	42 68	42 388	42 119
150x2,5x22,2	42 296				
150x3x22,2	42 148	42 49	42 230		42 165
180x2,5x22,2	42 246	42 306	42 365		
180x3x22,2	42 130	42 134	42 185	42 245	42 127
230x2,5x22,2	42 247	42 248	42 198		
230x3x22,2	42 133	42 135	42 186	42 391	42 208

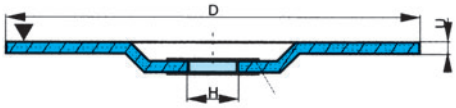
Cut-off wheels are produced also with U = 3,2 mm.

Packing: 25 pcs. in a carton (by request also 50 pcs.).



Depressed centre grinding wheels

Type: 27



Standard dimensions:

D: 100 - 230 mm
U: 4 - 10 mm
H: 16 and 22,2 mm

Designation:

27 D x U x H

Reinforced depressed centre grinding wheels for offhand grinding on angle grinders for operating speed 80 m/s, furnished with two metal hole inserts. The optimum operating angle between the material and the depressed centre grinding wheel is 20˚ to 35˚. Grinding wheels meet the requirements of European Standard EN 12413 and their production is approved by Safety Certificate SUVA 380.

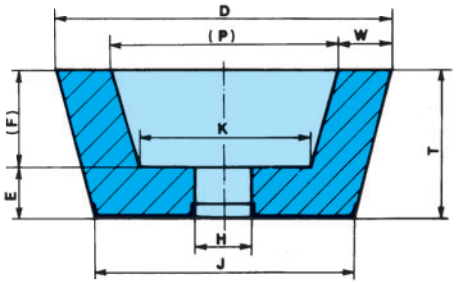
Application:	**Universal steel**	**Stone**	**Stainless steel**	**Aluminium**	**Cast iron**
Commercial specification:	**A30S1BF**	**C30P3BF**	**4A30N6BF**	**A30R5BF**	**A30P5BF**
Standard dimensions mm	**Product code**				
100x4x16	27 274	27 584	27 296		
100x6x16	27 252	27 52	27 535	27 632	27 659
115x4x22,2	27 273	27 116	27 64	27 347	
115x6x22,2	27 246	27 294	27 324	27 71	27 660
115x8x22,2	27 328	27 396	27 380		
125x4x22,2	27 16	27 336	27 66	27 348	
125x6x22,2	27 277	27 82	27 67	27 149	27 661
125x8x22,2	27 303	27 255			
150x4x22,2	27 119	27 322	27 345	27 349	27 506
150x6x22,2	27 266	27 241	27 208	27 350	27 662
150x8x22,2	27 117	27 397	27 537		
180x4x22,2	27 295	27 21	27 62	27 351	27 663
180x6x22,2	27 253	27 123	27 325	27 59	27 383
180x7x22,2	27 268	27 191	27 423	27 409	27 698
180x8x22,2	27 248	27 91	27 63	27 17	27 453
180x10x22,2	27 272	27 398			27 676
230x4x22,2	27 77	27 399	27 346	27 352	27 664
230x6x22,2	27 254	27 25	27 332	27 256	27 665
230x7x22,2	27 408	27 190	27 424	27 638	27 588
230x8x22,2	27 249	27 108	27 70	27 72	27 304
230x10x22,2	27 83	27 400	27 446		

Grinding wheels are produced also with U = 6,4 mm (1/4˝). For very hard working conditions we offer special specification with zirconia alumina (ZA). For an easy work on steel we offer Specification A24P1BF SOFT.
Packing: 25 pcs. in a carton.

Grinding with flaring cup wheels with metal flange, resinoid bonded

Table of dimensions:

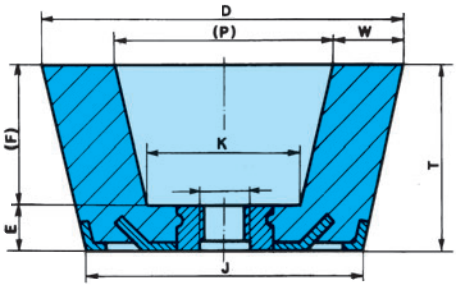
D (mm)	T (mm)	H (mm)
110	55	22
130	55	22
100	50	Thread
125	50	Thread
150	50	Thread



Flaring cup wheel with flange Type: **11P**

Designation:
11P DxTxH

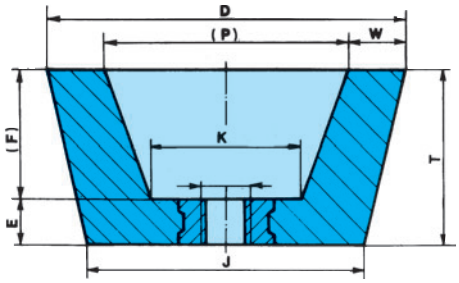
Designation of a non-standard type:
11P D/JxTxH-W../E../K..



Flaring cup wheel with flange and nut Type: **11MP**

Designation:
11MP DxT-nut

Designation of a non-standard type:
11MP D/JxT-thread-W../E../K..



Flaring cup wheel with nut Type: **11M**

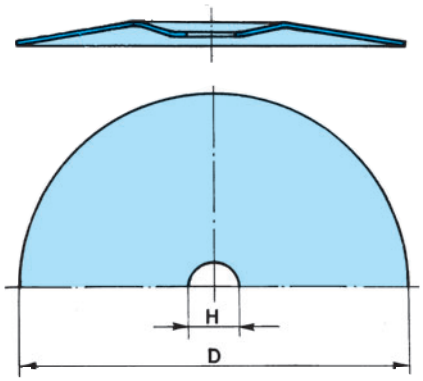
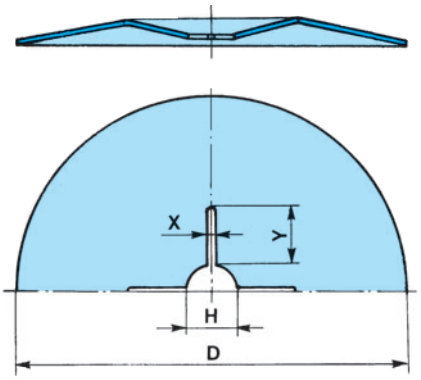
Designation:
11M DxT-nut

Designation of a non-standard type:
11M D/JxT-thread-W../E../K..

Application	Type of grinding	Recommendation
Steel	Rough	A16PB
	Medium	A36PB
	Fine	A60OB
		A80OB
	Very fine	A120LB
Stone	Rough	C16PB
	Medium	C36PB
	Fine	C60OB
		C80NB
	Very fine	C120LB

Ordering example: 11P 110x55x22,2 A36PB, 50 m/s

Fibre discs

	Type: **30A** with round hole	Designation: 30A DxH
	Type: **30B** with cross-slot	Designation: 30B DxH

Fibre discs are special products for processing rounded surfaces. They are used on angle grinders at an operating peripheral speed of 80 m/s.

Fibre discs for snagging steel and hard bronze are made of regular alumina (A) (rust and lacquer removing). If they are to be applied for processing of non-ferrous metals and non-metals, they are made of silicon carbide (C).

Table of dimensions:

D (mm)	**H** (mm)
115	22,2
125	22,2
150	22,2
180	22,2

They are available in different grain sizes:

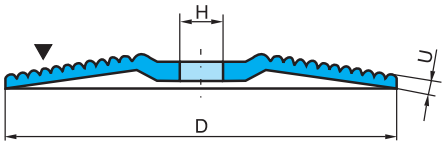
for rough grinding, snagging	16, 24
for general application	24, 36, 60
for finishing	80, 100, 120, (150)

Ordering example: 30B 180x22,2 A36, 80 m/s

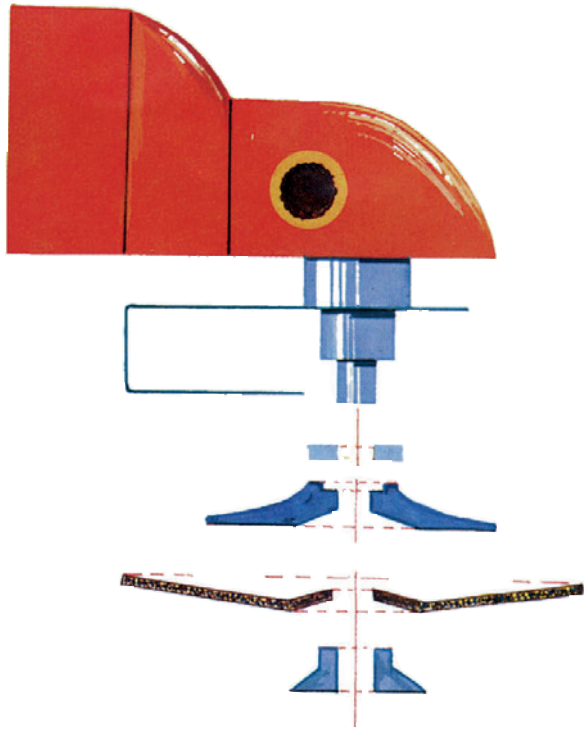
Semi-flexible grinding wheel – Swaty-Rondex

Type: **29**

Designation:
29 DxUxH



Dimensions (mm)	**Types of grinding**	**For steel**	**For stone**
115x3x22,2	Rough	A 24 RBF	C 24 RBF
125x3x22,2	Medium	A 36 RBF A 60 RBF	C 36 RBF C 60 RBF
180x3,5x22,2	Fine	A 100 RBF	C 100 RB



SWATY-RONDEX wheels are used on angle grinders with maximum operating speed up to 80 m/s.

Application:
- For grinding of straight and rounded metal surfaces as for instance: thanks, steel constructions, turbines, cisterns, carriage bodies;
- For processing stone and artificial stone;
- In civil engineering;

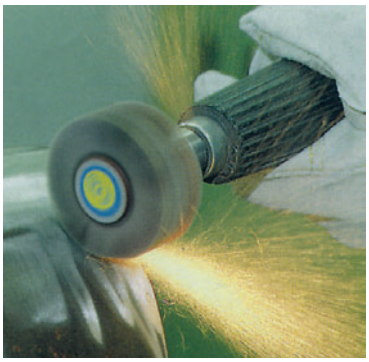
The grinding is cold with a reduced (limited) noise.

Swaty-Rondex grinding wheels should only be used with supporting pad.

Packing: 25 pcs. in a carton (by request also 50 pcs.)

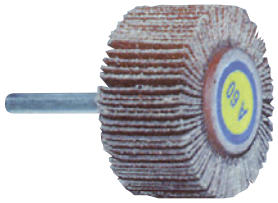
Ordering example:
29 180x3,5x22,2 A24, 80 m/s

Shank mounted flap wheels



Type: **52LA**, to be used for 30 m/s.
Flap wheels are used for quick and easy grinding of a wide range of materials. Flap wheel sheets, made of high quality grinding paper, can easily adjust to any, even very uneven surface.

Flap wheels made of aluminium oxide in grits A40 to A120 have the following application:
- Grinding of low-alloy steels
- Grinding of ductile and non-ferrous metals
- Grinding of wood
- Grinding of plastic



Flap wheels with zirconia in grits ZA 40 to ZA 120 are adequate for grinding and polishing of more requiring materials:
- Grinding of high-alloy steels
- Grinding of tough ductile and alloy metals
- Grinding of non-ferrous, heat treated and heat resistant steels

Flap wheels are produced in the following diameters and heights:

All flap wheels are mounted on 6mm thick and 40 mm long shanks.

How to order:
Wheel type – diameter x height – type of abrasive and grit size

Ordering example: 52 LA – 60 x 40 – ZA 80, 30 m/s.

Table of dimesions

Wheel diameter (mm)	**Wheel height** (mm)
30	15, 20, 25
40	15, 20, 25, 30
50	15, 20, 25, 30, 40
60	20, 25, 30, 40
80	20, 25, 30, 40

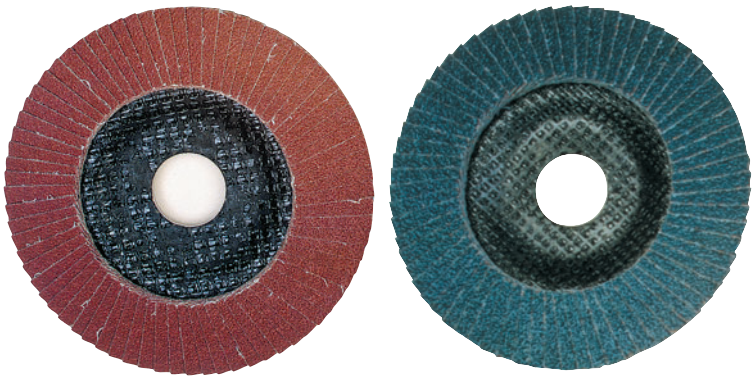
Flap discs

Type: **29LA, 27LA**
Flap discs are to be used at the operating peripheral speed 80 m/s. They meet the requirements of European Standard EN 13743.

Application:
- Coarse and fine grinding of brakes
- Edge grinding and removal of jagged edges
- Removal of dyes
- Cleaning of cast iron products
- Surface grinding
- Polishing

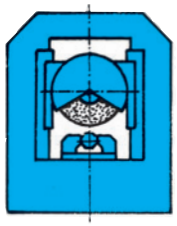
Fields of use:
- Aluminium, soft metals
- Steel
- Plastic, wood
- Alloyed steels
- Non-iron alloys
- Inox

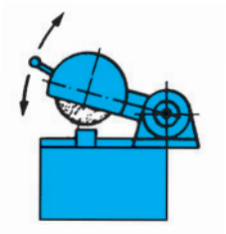
Dimensions (mm):
115x22,2
125x22,2
180x22,2

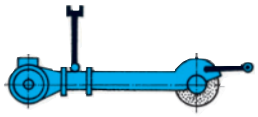


Flap discs 3 STARS are manufactured from regular alumina and zirconia alumina in grits 40, 60, 80, 100 and 120.

Ordering example: 29LA 115x22 ZA40, 80 m/s
Packing: 20 pcs. in a carton.







Cutting on Swing Frames and Stationary Grinding Machines

Cut-off wheels:

Type: **41B, 41CD, 41C2, 41CD2, 41C2D2**

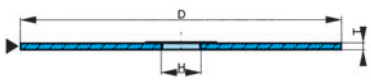


Table of dimensions:

D (mm)	T (mm)				H (mm)		
300	2,8	3	3,5	4	22,2	25,4	32
350	3	3,5	4		25,4	32	40
400		4	4,5		32	40	
450		4	4,5		32	40	
500		5	6		40		
600		6	7	(8)	40	60	80
800		8			80	100	
1000		10		12		100	152,4

Designation:
41B x D x T x H
Ordering example:

41B	300x3,5x25,4	A30 S 1BF for steel
41B	300x3,5x32	C30 P 3BF for stone
41C	350x3x25,4	7A 36/1 L10BF83 for Chop Saw
41C2	500x6x40	7A 24/2J10BF83 for high alloyed steel
41C2 D2K	813x9,5x100	S2WA20/9R9BF for big steel workpeces

Programme of production according to the way of application:

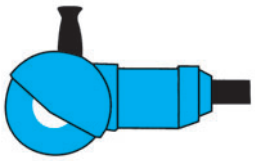
Machines and types of grinding	Maximum operating speed (m/s)	Diameter D (mm)
Swing frames and other grinding machines for offhand grinding	80	300-500
Stationary and mobile grinding machines for forced and hand guidance	100	300-800

They are produced in accordance with European safety standards pr EN 12413.

Specification selection guide (recommendation):

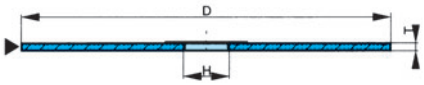
Application	Specification	Dimension D (mm)	Type
Construction steel	A30S1BF A24S1BF	300-350 400-500	41B 41CD, 41B
Rails	S3WA 24 BF	300-350	41PRB
Stone, brick stone, asbestos cement	C30P3BF	300-500	41B
Concrete, granite, asphalt, soft fire clay (soft refractories)	C30S4BF	300-350	41B
Aluminium and non-ferrous metals	A24P5BF	400-600	41B
Stainless steel	4A30N6BF	300-350	41B

For very hard working conditions special specifications with Zirconia alumina (ZA) are available.
Cut-off wheels with side-reinforcements (shape 41B) for higher side load and for cutting stone are also available as well as wheels with centrally inserted (one or more) reinforcement pieces (shapes 41CD, 41 C2, 41CD2, 41C2D2). Wheels thus designed are used when side-burning of the material at cutting-off smaller diameters and at offhand cutting is to be avoided.



Thin reinforced cut-off wheels

Type: **41B**



Standard dimensions:
D: 65 – 230 mm
T: 1 – 1,9 mm
H: 10, 16 and 22,2 mm

Designation:
41B D x Tx H

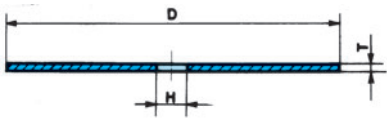
Side reinforced straigth cut-off wheels in resin bond for manual cutting on stationary machines and on angle grinders with operating speed 80 m/s, furnished with one metal hole insert. Thin cut-off wheels meet the requirements of European Safety Standard EN 12413 and their production is approved by Safety Certificate SUVA 381. Side grinding is not allowed. Thin cut-off wheels are manufactured in two specifications:
- for steel/inox
- for stainless steel Fe free, cast iron and Aluminium

Application Dimension	1 for 2 Steel / Inox Specification	Code	1 for 3 Inox/Aluminium/Cast Specification	Code
65x1x10	A60SBF	41 B 1376		
65x1,5x10	A60SBF	41 B 878		
76x1x10	A60SBF	41 B 151		
76x1,6x10	A46SBF	41 B 1169		
100x1x16	A60SBF	41 B 1502	A60QBF	41 B 850
100x1,6x16	A46SBF	41 B 1180	A46QBF	41 B 1246
115x1x22,2	A60SBF	41 B 757	A60QBF	41 B 1238
115x1,6x22,2	A46SBF	41 B 334	A46QBF	41 B 1497
115x1,9x22,2	A36TBF	41 B 1571	A36QBF	41 B 759
125x1x22,2	A60SBF	41 B 1288	A60QBF	41 B 1513
125x1,6x22,2	A46SBF	41 B 882	A46QBF	41 B 1498
125x1,9x22,2	A36TBF	41 B 1572	A36QBF	41 B 761
150x1,6x22,2	A46SBF	41 B 1258	A46QBF	41 B 1316
150x1,9x22,2	A36TBF	41 B 1573	A36QBF	41 B 1574
180x1,6x22,2	A46SBF	41 B 1549	A46QBF	41 B 696
180x1,9x22,2	A36TBF	41 B 1484	A60QBF	41 B 901
230x1,9x22,2	A36TBF	41 B 1599	A36QBF	41 B 963
For ceramic tiles and stone:				
115x1,6x22,2 Specification C 46 TBF, Code 41B-1906				

Packing: 50 pcs. in a carton.

Thin non-reinforced resinoid cut-off wheels

Type: **41**



Designation:
41 D x T x H

Non-reinforced straigth cut-off wheels for manual cutting on stationary cutting machines with operating peripheral speeds 50 m/s, 60 m/s, and 80 m/s. They are manufactured in specifications for metallographic tests, for non metal work pieces, and for special cutting.

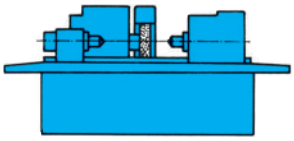
Table of dimensions (mm):

D (mm)	**T** (mm)	**H** (mm)
50	0,8-2,0	10
65		10
75		10
80		10
100	1,0-3,0	10
125		20 (16)
150		13 16 20 22,2 25 30 32
200		

Commercial specification for universal steel and cast iron: A60PB

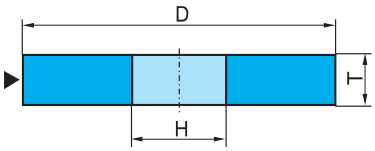
Ordering example:
41 150 x 1,5 x 20 A60PB, 50 m/s for cast iron
41 175x1,5x16 72 A60/1 08 B83 for bowden cables (covered by PVC)
41 200x1,5x20 72 A60/1 08 B83 for bowden cables (covered by PVC)

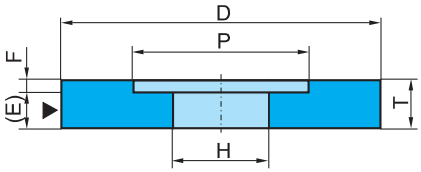
Packing: 25 pcs. in a carton

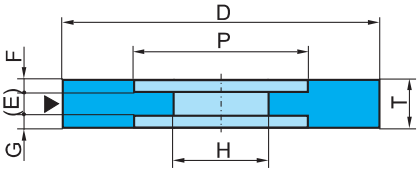


PRECISE GRINDING

Cylindrical Grinding







Type:

1 **5** **7**

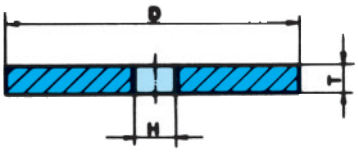
Recomendations

Application	Abrasive	Grain size	Grade	Structure	Bond
Unhardened steels	52A,A	54-60	K-L	8	V
Hardened steels <55 HRc 55-62 HRc 62-64 HRc	2A, 4A 4A, 6A 6A, 8A	60-80	J-L	8	V
Tool steel, high-alloyed	8A	60-80	J-K	8	V
Stainless steels	9C, C	54-60	J-L J-K	7 8	V
High-speed steels	58A, 4A	60-80	K-L	8	V
Chromium-plated material finishing polishing	4A 2A 9C	60-80 100-120 500	J-K K I-J	7-8 9 12-16	V B B
Non-ferrous metals (soft bronze, aluminium, brass)	9C, C	36-60	J-K	5-7	V
Hard bronze	52A, 4A	46-60	K-L	7	V
Gray cast iron	9C, 52A	46-60	J-K	6-7	V
Plastics	9C, C	36-60	H-J	9-11	V
Carbide metals	C 8A Diamond	60-100	H-K	7-8	V
Porcelain	9C	60-80	J	7	V
Stainless steel	2A, 52A	46-60	K-L	6-8	V

Table of dimensions of grinding wheels for cylindrical grinding

D (mm)	T (mm)	H (mm)
75	6-100	10 20 32
80	6-100	13 16 20 32
100	6-100	10 13 16 20 32
115	6-100	25,4 32
125	6-100	13 16 20 25 30 32 40 50,8 76,2
150	6-100	13 16 20 25 30 32 40 50,8 76,2
175	6-100	13 16 20 25 32 40 50,8
180	6-125	13 16 20 25 32 40 50,8
200	6-125	16 20 25 32 40 50,8 76,2
225	6-125	16 20 25 32 40 50,8 60
250	6-125	16 20 25 32 40 50,8 76,2 127
300	6-125	16 20 25 32 40 50,8 76,2 127 152,4 160
350	6-125	20 25 32 40 50,8 76,2 127 160 203,2
400	8-150	25 32 40 50,8 127 160 203,2
450	8-150	25 32 40 50,8 127 160 203,2 254 304,8
500	10-250	25 32 40 50,8 127 160 203,2 254 304,8
508	10-250	76
600	12-250	25 32 40 50,8 76,2 203,2 254 304,8
650	12-250	203,2 304,8
700	20-150	32 40 50,8 76,2 127 203,2 304,8
750	20-150	76,2 203,2 304,8
800	20-150	32 76,2 203,2 304,8
900	20-150	32 304,8
1000	25-100	76,2 304,8
1060	25-100	304,8
1250	25-100	304,8

Crankshaft grinding



Designation:
1MG D x T x H

Type: **1MG**

Application	Abrasive	Grain size	Grade	Structure	Bond
Crankpin and main bearings grinding • Carburized and tempered steels					
- automobiles	52A, 2A	46-60	L-N	5-7	V
- trucks and tractors	52A 2A	46-60	K-N J-K	6-7	V
• Steel casting					
- pregrinding	A	36-46	M-N	6-8	V
- final grinding	52A, 42A, 7A	54-60	K-M	6-8	V
Grinding of crankshaft journal	4A, 52A	54-60	L-M	6-7	V

Camshaft grinding - Type: **1MG**

Application	Abrasive	Grain size	Grade	Structure	Bond
Carburized steels	52A, 42A 2A, 4A	54-60 70-80	J-M L-M	6-8 6-9	V V
Steel casting					
- Rough grinding	A	36-46	L-M	6-8	V
- Pregrinding	52A	54-60	K-M	6-7	V
- Final grinding	42A, 2A, 7A	54-60	J-L	6-7	V

Range of dimensions of grinding wheels Type 1MG

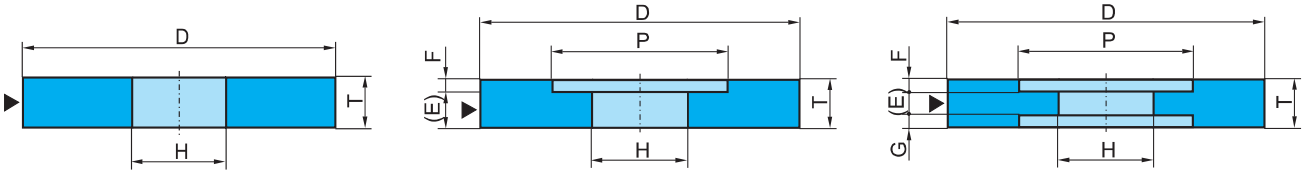
D (mm)	**T** (mm)	**H** (mm)
500	16 20 32	127 203,2
660	19 20 25 32	127 203,2 304,8
750	20 25 32 40	203,2 304,8
800	16 20 40 63	203,2 304,8
813	20 25 32	203,2
900	20 25 32 40	304,8
914	20 25 32 38	304,8
1000	32 40 50	304,8
1016	32	304,8
1060	32	304,8
1140	32 40 50 51 70	304,8

Ordering example: 1MG 660x19x203,2 52A 60/3M7V35, 40m/s.

Crankshaft grinding

Camshaft grinding

Roll grinding



Type:

1 **5** **7**

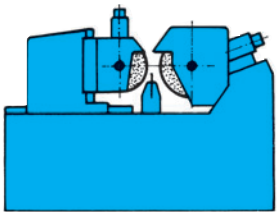
Application		Abrasive	Grain size	Grade	Structure	Bond
Cast iron rolls		9C, 2A	46-60	K-L	6-7	B
Chromium-casted rolls						
	- roughing	8A	60-80	J	7-8	V
	- finishing	8A	120-220	G-I	9	B
Rolls made of Cr-Ni steels						
	- rough grinding	8A, C	80	J	8	V
	- pregrinding	9C, C	120-280	H	10	
	- polishing	9C	400	H	11	
Crushig rolls made of austenitic manganese steels		2A	24-60	K-N	5-7	V B
Copper	- rough	9C, C	24-36	K	5-6	B
	- finishing	9C, C C	60-80 46-60	J H	7-8 7-10	B V
Rubber soft	- rough		2A	24	J-K	4 B
	- finishing	C	9C	46-60 H	J-L 7-10	5 B V
Rubber, hard		2A C	46-54 46-54	J-K Hi	13 6-10	V V
High-alloyed steels		2A	54-80	J-K	7-8	V
Hot mill rolls						
	chilled cast iron	9C, 52A	24-36	J-K	4-5	B
	steels	2A	24-36	J-L	4-5	B
Cold mill rolls						
	forged steel	2A	36-46	L	5	B
	live and cog rollers	2A, 52A	54-80	K-L	7-8	B

Ordering example:

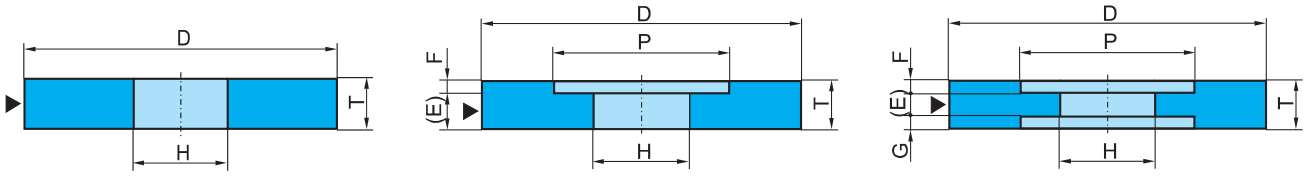
5 750x100x305-420x20 8A 54/3i36V35, 40 m/s for steel until 62 HRc for cold and hot mill rolls.

1 900x100x304,8 29 GC 36/2 J7 BX03, 50 m/s for live rolls for hot mill rolls on Hercules and Waldrich machine.

1 350x38x127 9C 220/1 F11 B50, 40 m/s for rolls renewal on Landis machine.



Cylindrical Grinding — Centreless



Type:

1 **5** **7**

Grinding wheels for centreless grinding thicker than 154 mm are assembled from two or more straight (type 1 RS) or oblique (type 1 PS) pieces. At request they can be glued (types 1 RLS and 1 PLS). Each piece of the so assembled grinding wheel can be manufactured in another specification or bond.
Peripheral speeds are:

35 – 45 m/s by vitrified bonded wheels and
35 – 50 m/s by resinoid bonded weels,

Ordering example:
1RSL 600 x 400 x 304,8 4A 60/2 J 6V35, 40 m/s

Cylindrical grinding - centreless

By this type of grinding the workpiece is not fixed in the machine but it lies between the grinding wheel, the regulating wheel and the rigid workpiece rest blade. Depending on the type of loading of the workpiece into the machine we differ among the following types of grinding:

1. Through-feed grinding
2. Plunge cut grinding
3. Grinding with a stop

By through-feed grinding the workpiece, which has to be of cylindrical shape without shoulders or heads, traverses through the machine between the grinding and the regulating wheel.

By plunge cut grinding the workpiece, which can be profiled (more diameters with shoulders) is infed between the two wheels, whereby the regulating wheel is less skewed than the grinding wheel.

Grinding with a stop is used for grinding of tapered workpieces, as are for example tapered heads on spiral drills. The workpiece is infed into the machine and is ground into the desired shape by the moment it reaches the stop.

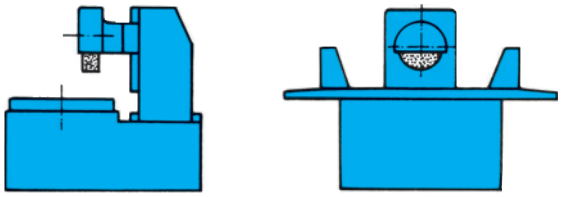
Specification of grinding wheels for grinding of different materials by through-feed grinding:

Application	**Recommendations**				
Material	**Abrasive**	**Grain size**	**Grade**	**Structure**	**Bond**
Unhardened steels	52A	60-80	L-M	7-8	V
Hardened steels	2A, 52A	60-80	K-M	7-8	V
Stainless steels	9C, 4A	54-60	J-M	7-8	V
High-speed steels	52A, 6A	60-80	K-M	8	V
Non-ferrous metals (soft bronze, aluminium, brass)	9C, C	36-46	L	5-6	V
Hard bronze	52A, 2A, 8A	 46-60	L M	 7	 V
Gray cast iron	 9C	52A 46-60	54-60 L	K 7	8 V
Plastics	9C, C	46-60	K	6	V
Porcelain	9C	36-60	J-K	6-7	V
Drill grinding	2A, 42A	54-60	L-M	6-8	V
Valve-stem grinding	52A, 2A	54-60	L-M	6-8	V
Grinding of bearings (external grinding of rings)	6A, 8A	100-120	M-N	7	V
Grinding of bars at passing	52A, 2A	46-80	K-N	5-7	V
Chromium plated material	2A	60-80	J-K	8	V

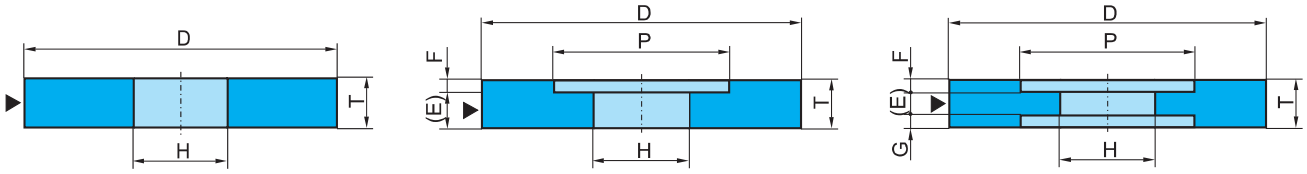
By the same roughness of the material surface grinding wheels for infeed grinding have to be for 2 to 3 grades finer than grinding wheels for through-feed grinding.

• For grinding of bars Ø 9-18 mm at passing of high grade steel or low alloyed steel we recommend:
1 600x250x355 S5 7C 60/9 08 B00, 50 m/s, for Lindköping machines.
• For grinding rotors of electrical motors at passing:
1RS 610x508x304,8 7A 36/1 L6V35.

Regulating wheels are produced in vitrified in resinoid and rubbed bond in the following specifications:
A80–120 T–8 V
3A 80–120 T7–8 B
A80–100 TR 11



Surface Grinding with Straight Grinding Wheels

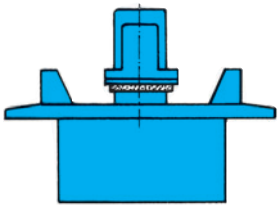


Type:

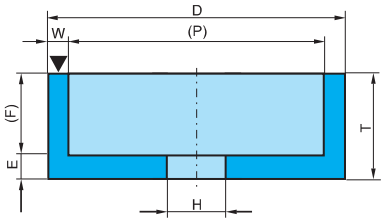
1 **5** **7**

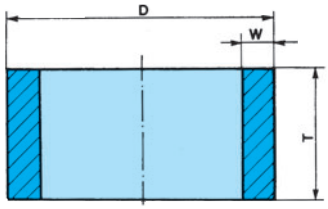
Application		Abrasive	Grain size	Grade	Structure	Bond
Steel	- unhardened	52A	36 - 46	K -M	6	V
	- hardened <55HRc	2A, 4A				
	55-62 HRc	4A, 6A	46 - 60	H- J	6 - 7	V
	62-64 HRc	6A, 8A				
Tool steel, high-alloyed		8A	46 - 60	H - J	6 - 7	V
Chromium plated		8A	46 - 80	I - J	8	V
Stainless and chemically resistant		8A	46 - 60	I - J	7 - 8	V
		C		I	6	
Carbide metal		C	46 - 60	H	6 - 7	V
		6A, 8A	46 - 60	H - I	6 - 7	V
Castings	- gray iron	52A	36 - 60		6	
		C	36 - 60		6	
	- spheroidal graphite iron	8A	36 - 60	J	5	V
		C	36 - 60		6	
	- chilled iron	C	36 - 46		6	
Aluminium, brass, soft bronze		9C, C	36 - 46	J	6	V
Hard bronze		52A	36 - 46	J - K	6 - 7	V
Copper and alloys		C	36 - 46	J	6 - 8	V
Plastics		9C, C	46 - 54	J	6 - 7	V
Stainless steel, soft		2A, 52A	46 - 60	K - L	6 - 8	V

Grinding Wheels for Grinding Skating Surface of Skis.
1 350x140x223 1A 14/9 S7 VX44
1 350x140x223 N8A 30/3 K12/3 VX35T4

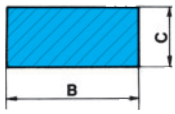


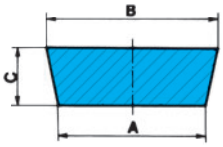
Surface Grinding with Cup Wheels, Cylinders and Segments

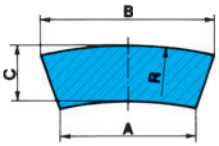


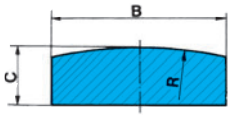


Type: **6** **2**









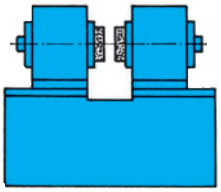
31A **31B** **31C** **31AA**

Additionally to the above types we can manufacture segments in many other shapes and dimensions.

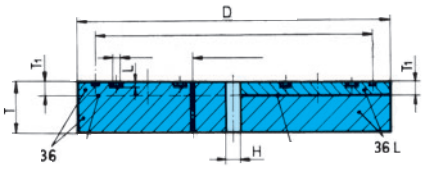
- 31B17 100/85x35x150 42A 30/1 I 8/3 V20 for knives
- 31S16 160x60x200 S4A 46/1 E8 B11 for knives
- 31S30A 166/150x75xT248 1ZA 20/9 OP2 B37/71 for rails.

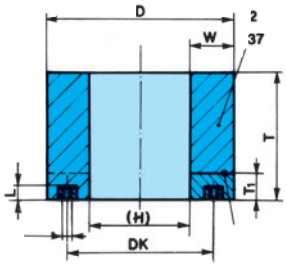
Application		Abrasive	Grain size	Grade	Structure	Bond
Steel - unhardened		52A	24-46	I - K	6	V
	<55 HRc	2A, 8A				
- hardened	55-62 HRc	4A, 6A	36 - 46	E - I	7 - 12	V
	62-64 HRc	6A, 8A				
Tool steel, high-alloyed		8A	36 - 46	E - I	7-12	V
- high-speed		2A - 42A	46	G-H	7	V
- stainless		2A, 8A	46-60	F-J	7-12	V
		C	36-46	J	5	
Gray cast iron and chilled iron		9C, C	24-36	H-K	5	V
		2A, 42A, 52A	46	I	12	
Aluminium and non-ferrous metals, brass		9C, C	24-36	H-J	5	V
Chromium plated surfaces		2A, 8A	46-80	G-I	12	V
		C		H	5	
Marble		9C	24	L	4	B
Plastics		9C	24-54	K	4	B
Hard fire clay (refractories)		9C	16-36	S	3	B

Ordering example: 31B51 120/106x41x250 3GA 30/2 K8 BO3
6 250x100-W9E20 52C 180/2 K11 BO3 for bearings



Double wheel Surface Grinding with Wheels with Inserted Nuts





Type: **36** **37**

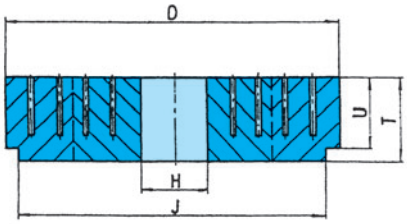
Designation: 36 D x T x H — number of nuts 37 D x T — W — number of nuts

Surface grinding with grinding wheels and ring wheels with inserted nuts, type 36 and 37.

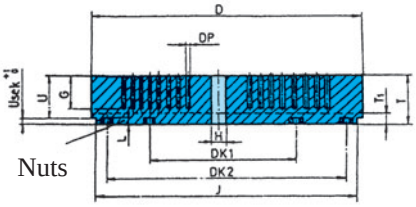
Application	Abrasive	Grain size	Grade	Structure	Bond
Side grinding of bearing rings	52A S52A, 52A	80-100 54-100	K-N J-N	8 6-8	V B
Grinding of (roller) bearing					
straight grinding	2 A	70-120	K-N	6-8	B
cylindrical grinding	6A, 2A	80-120	K-N	8	V
Clutch discs	9C	16-24	K-N	4	B
Grinding of brake lining	9C	16-24	K-N	4	B
Gears	2A	46-60	H-K	6	V
Piston rings					
gray cast iron	9C, C	24-100	K-M	6-8	B
steel	52A	24-100	K-M	6-8	B
Grinding of valve seats	9C	60-120	J-L	6-8	V B
Grinding of piston rods	52A	46-60	J	5	B

Ordering example for surface grinding of circular saw:
37L11 404x140-W37 S2A 70/1 G9 BO8
For front grinding of circular saws:
1 500x50x203,2 S2A 46/9 K6 B08/174

Grinding wheels for spring grinding



Perforated and stepped grinding wheel
Designation:
35UP - - D/J x T/U x H



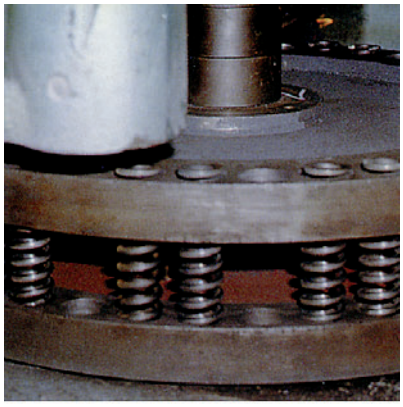
Perforated grinding wheel with nuts
Designation:
36UP - - D/J x T/U x H - n
n = number of nuts

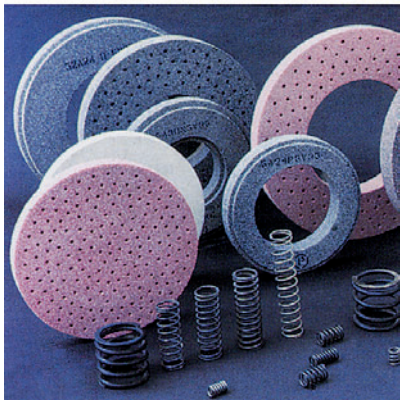
They are used for two-wheel side grinding on special machines such as WAFIOS, SCHENKER, and OMD. Grinding wheels are fixed on support wheels by special glues or by screws. In this case grinding wheels must be furnished with inserted nuts. Concerning the kind and distribution of nuts the buyer and the producer must previously agree about their position in the wheels.
As to the purpose and kind of use these grinding wheels are produced in different design: as straight grinding wheels, as straight grinding wheels without hole, and as stepped grinding wheels. Possible are designs with cooling holes. On special demand we deliver grinding wheels with strengthened peripheral zone.
On principle, grinding wheels for spring grinding are made of mixed aluminium oxide (52A) in vitrified bond (V35).
When a mild cut is required we recommend resinoid bond (B04, B08, B10).
The peripheral speeds usually do not exceed 32-35 m/s.
The most frequently used grinding dimensions are specified in the table below.

Spring wire	Recommendations				
	Abrasive grain	Grain size	Grade	Structure	Bond
Thick wire	GA, 52A	16-24	N-Q	4, 5, 6	V B
Medium wire	GA, 52A	24-46	L-N	4, 5, 6	V
Thin wire	GA, 52A, 2A	46-60	K-M	4, 5, 6	V

Ordering example:
35 UP 650/618x90/75x350 52A 16/3 NO 4 V 35, 35 m/s

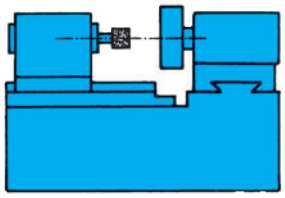
Dimensions D x T x H (mm)	Cooling holes	Nuts
150 x 30 x 20		
175 x 50 x 50		
175 x 50 x 0		X
225 x 50 x 50	X	
225 x 50 x 0		X
400 x 60 x 250		
450 x 60 x 200	X	X
450 x 60 x 0	X	X
450 x 65 x 200		
450 x 80 x 40	X, O	X
450 x 80 x 0	X, O	X
600 x 70 x 250	X	X
600 x 75 x 250	X	X
600 x 80 x 250	X	X
600 x 80 x 300	X	X
650 x 80 x 350	X	X
650 x 80 x 0	X	
650 x 90 x 350	X	X
660 x 100 x 150	X, O	X
660 x 120 x 150	X	X
650 x 100 x 350	X	
800 x 100 x 400		X
800 x 120 x 300		
915 x 120 x 200	X, O	X





O - perforation throughout the wheel

We offer these wheels made of Submicron crystal structured sintesized alumina (our internal marking GA) which we produce in different Specifications regarding the percentage of GA in the mixture.

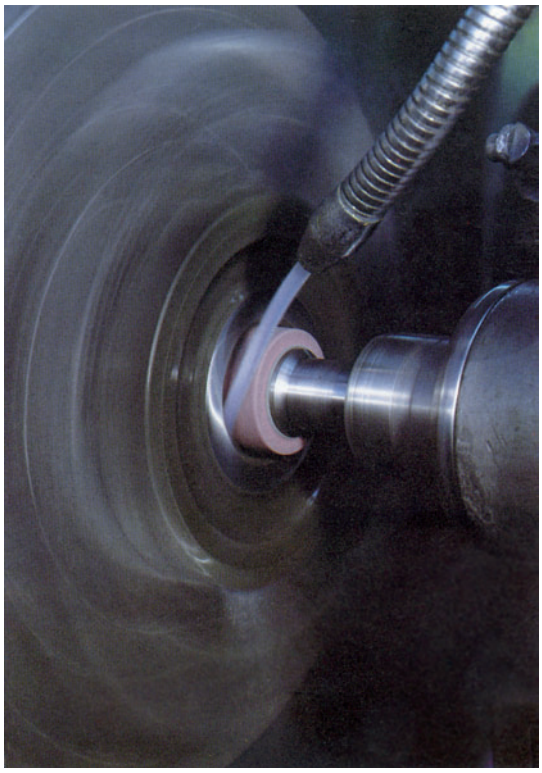


Internal Grinding

Types of grinding wheels for internal grinding:
1, 5, 5NA, 5NB, 5NC

Ordering example:
1 16x16x6 2A80/3 K8 V22, 40 m/s

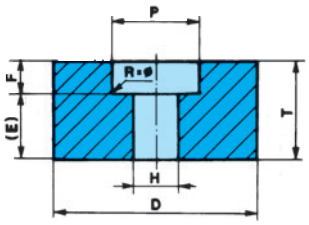
Application	Recommendations				
	Abrasive	Grain size	Grade	Structure	Bond
Heat treated steels, unhardened	52A 4A	46-80	K-L J-L	6-8	V
Hardened, low-alloyed steels (up to 62 HRc)	2A, 4A	46-80	J-K	6-8	V
Hardened, high-alloyed steels (62 HRc and more)	2A, 4A, 6A	46-80	I-J	6-8	V
Chromium steels	C 8A	46-70 46-80	J-K I-J	6-7 6-8	V
High-speeds steels (over 64 HRc)	2A, 8A	46-80	H-I	6-8	V
Hardened high-speed steels (over 64 HRc)	8A	46-80	I-J	6-8	V
Nitrited steels (over 64 HRc)	C	60-100	J-K	6-8	V
Alloys, friction resistant	C	60-100	I-K	6-8	V
Stainless, acid resistant steels (Cr-Ni 18/8)	9C,C 6A, 8A	46-60 46-60	I-J H-J	6 6-7	V
Carbide metals			Diamond		
Chromium-plated metals	8A	54-80	I-J	8-11	V
Plastics	9C	36-60	I-J	5-6	V
Gray cast iron (up to 70 SHORE)	9C	46-60	K-L	5-6	V
Chilled cast iron (over 70 SHORE)	9C	46-60	J-L	5-6	V
Hard bronze	9C, C	36-60	J-K	5-6	V
Aluminium and non-ferrous metals	9C, C	36-60	I-J	5-6	V
Steel, soft, stainless	52A	80	L	8	V
Internal grinding	2A, 52A	46-60	J-K	6-7	V



Internal grinding

For internal grinding of high speed, tool, bearing, and high-alloyed steels with hardness over 50 HRc, for surface hardened steels, cast iron, and NiCo super alloys with hardness over 35 HRc, by serial production the application of grinding tools made of boron nitride in vitrified bond is recommended due to more economical grinding.

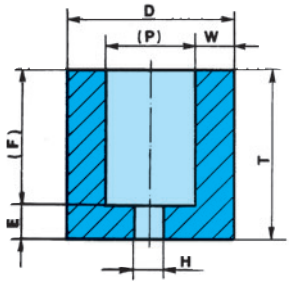
Tables of wheel types and dimensions for internal grinding in mm.



Type: **5NA**

Designation:
5NA D x T x H

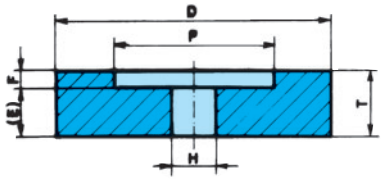
D	T								H	P	r
	16	20	25	32	40	50	63	80			
	F										
	8	8	9	12	15	18	25	30			
20	•	•	•	•					6	12	0.2
25	•	•	•	•					8	14	0.3
32	•	•	•	•	•				10	18	0.3
40		•	•	•	•	•			13	22	0.4
(45)		•	•	•	•	•			16	28	0.5
50			•	•	•	•	•		20	32	0.5
63				•	•	•	•	•	25	38	0.8
80					•	•	•	•	25	48	0.8



Type: **5NB**

Designation:
5NB D x T x H

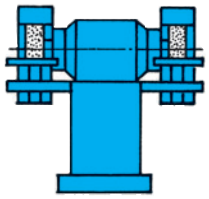
D	T						H	P	r
	25	32	40	50	63	80			
	F								
	17	22	27	34	45	55			
20	•	•					6	12	0.2
25	•	•					8	14	0.3
32	•	•	•				10	18	0.3
40		•	•	•			13	22	0.4
(45)		•	•	•			16	28	0.5
50			•	•	•		20	32	0.5
63				•	•	•	25	38	0.8
80				•	•	•	25	48	0.8



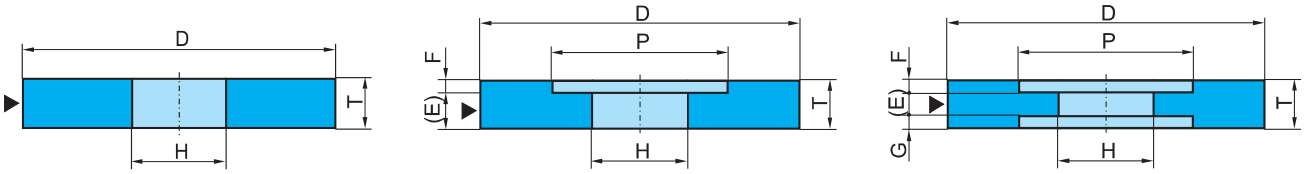
Type: **5NC**

Designation:
5NC D x T x H

D	T							H	P	r
	13	16	25	32	40	50	63			
	F									
	5	8	9	12	15	18	25			
32	•							13	21	0.3
36		•						16	26	0.3
40		•						16	26	0.4
45		•						20	32	0.5
50			•					20	32	0.5
56			•					25	41	0.6
69			•					25	41	0.8
63			•					32	52	0.8
80			•					32	52	0.8
80				•				32	60	0.8
100				•				32	60	1.0
100					•			51	76	1.0
125					•			51	76	1.2
125						•		51	88	1.2
150						•		51	98	1.6
150							•	76	116	1.6
200							•	76	118	2.0



Tool Grinding



Type:

1 **5** **7**

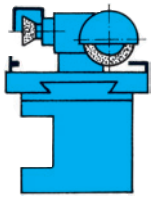
Tool grinding with straight grinding wheels type 1, 5, 7 (on stationary grinding machines)

Application	Recommendation				
	Abrasive	**Grain size**	**Grade**	**Structure**	**Bond**
Hand tools - unhardened tools	A, 4A, 52A A, 4A	46-60 80	L-M K-L	6-7 8	V
- tool steels	2A, 4A	46-60 80	K-L K	7 8	V
- high-speed steels	2A, 6A 2A, 6A	46-60 80-100	K-L J-K	7 8	V
Cutting tools and planning tools	2A, 4A	46-60	K-M	6-7	V
- tool steels	2A, 4A	80-100	J-K	6-7	V
- high-speed steels	8A, 82A 8A, 82A and CBN	46-60 80-100	J-K I-J	7 8	V
Carbide coated materials	C C and diamond	46-60 60-120	J-K J-K	6-7 6-7	V V

Range of dimensions:

D (mm)	**T** (mm)	**H** (mm)
125	20	20 (16)
150	20	32 (20) (16)
175	20	32 (20) (16)
200	20	32 (20)
200	25	32 (20) (25)
250	25	25

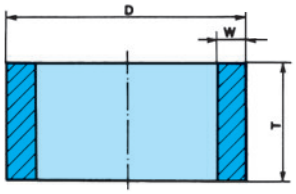
Ordering example:
1 200x20x20 2A60/3K7V20, 40 m/s



Tool grinding with straight grinding wheels, types 1, 5, 7 (on universal grinders)

Application	Recommendation				
Twist drills	**Abrasive**	**Grain size**	**Grade**	**Structure**	**Bond**
Tool steels					
< 10 mm	2A, (4A)	60-80	J-K	7-8	V
> 10 mm	2A, (4A)	46-60	K	7	V
High-speed steels					
< 10 mm	8A, 2A	60-80	J-K	7-8	V
> 10 mm	8A, 2A	46-60	K	7	V
Carbide coated materials					
< 10 mm	C	60-80	J-K	6-7	V
> 10 mm	C	46-60	K	6	V
Mining drills		C	46-60	J-K	6 V

Tool grinding with grinding wheels
type 2, 3, 4, 6, 11, 12 (on universal grinding machines)



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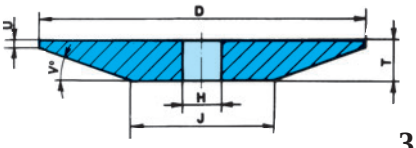

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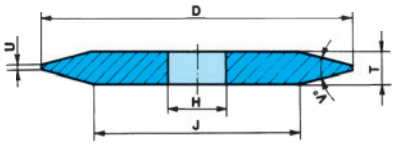

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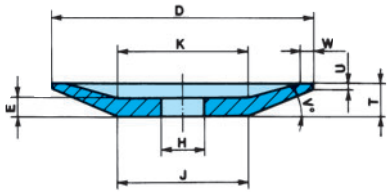

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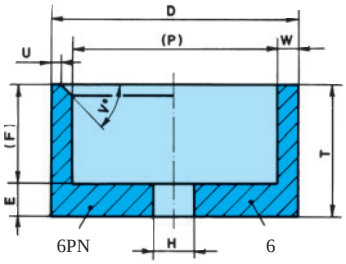

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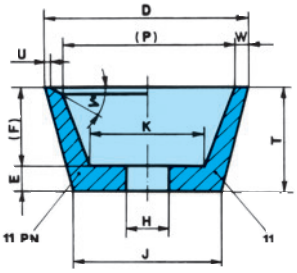


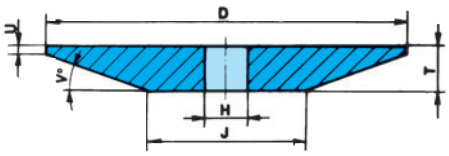
11

Application	Recommendation				
	Abrasive	**Grain size**	**Grade**	**Structure**	**Bond**
Cutting tools - tool steels	2A, 4A	46-60 70-80	J-K I-K	6-7 8	V
- high-speed steels	2A, 4A 8A	46-60 70-80	J-K	6-7 8	V
Hobs (grinding wheel type 3)	2A, 42A	46-60	J-K	7-9	V
Cutters and planning tools (Type 2, 6)	2A, 42A	46-60	I-K	7	V
Wood-cutters made of high-speed steels (Type 12)	2A	54-80	I-K	7	V

Table of dimensions for standard wheel shapes

Wheel tapered one side

Type: **3**



Designation:
3 DxTxH
Ordering example: 3 250 x 14 x 40

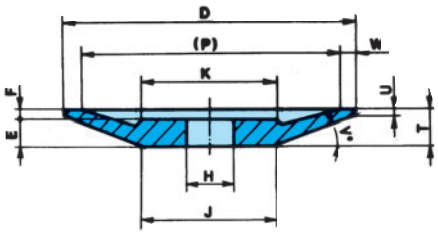
Designation of non-standard dimensions:
3 D/JxT/UxH-V

Table of standard dimensions (mm)

D	T	H	J	U
75	5	13	30	1
80	5	20	30	1
100	6	20	50	1,5
125	7	20	68	2
150	8	20	82	2
175	10	20	95	3
200	12	32 (20)	95	3
250	14	32	125	3

Dish wheel

Type: **12B**



Designation:
12B DxTxH
Ordering example: 12B 100 x 12 x 20

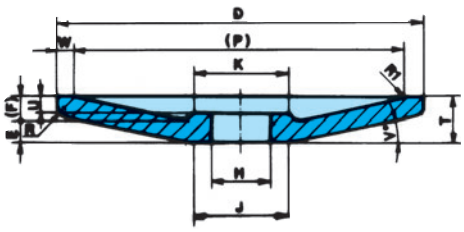
Designation of non-standard dimensions:
12B D/JxT/UxH-W../E../K../V..
Limiting dimensions: W=0,05 D, E ≥ 0,5 T

Table of standard dimensions (mm)

D	T	J/K	U	E	W	P	F	H
75	8	28	2	6	4	67	2	10, 13, 16, 20
80	8	30	2	6	4	72	2	16, 20, 25
100	12	35	3	8	6	88	4	16, 20, 25
125	14	10	3	9	6	113	5	16, 20, 25, 30, 32
150	15	50	3	10	7	136	5	16, 20, 25, 30, 32
175	18	60	3	11	8	159	7	20, 25, 30, 32, 35, 40
200	19	70	3	12	10	180	7	20, 25, 30, 32, 35, 40
250	21	100	3	14	12	226	7	20, 25, 30, 32, 35, 40

Dish wheel

Type: **12BH**



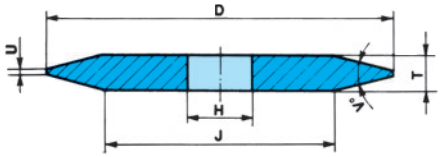
Designation:
12BH DxTxH
Ordering example: 12BH 175 x 22 x 20

Designation of non-standard dimensions:
12BH D/JxT/UxH-W../E../K../V..
Limiting dimensions: W=0,05 D, E ≥ 0,5 T

Table of standard dimensions (mm)

D	T	K/J	U	E	W	P	F	R/R1	H
175	22	50	10	10	10	155	12	4/2	20, 25, 30
200	25	60	11	11,5	8	184	13,5	4/2	20, 25, 30, 35, 40

Wheel tapered both sides
Type: **4**



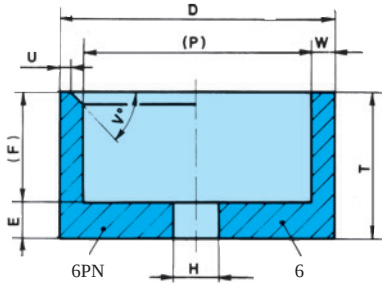
Designation:
4 DxTxH-V..
Ordering example: 4 100 x 9 x 20 - 15°

Designation of non-standard dimensions:
4 D/JxT/UxH-V..

Table of standard dimensions (mm)

D	T	H	U	V
75	8	13	2	15°
80	8	20	2	15°
100	9	20	2	15°
125	10	20	2	15°
150	12	20	2	15°
175	14	20	3	15°
200	16	32 (20)	3	15°
250	19	32	4	15°

Cylinder cup wheel
Type: **6, 6PN**



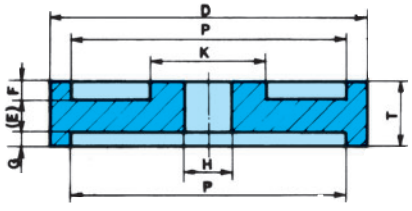
Designation:
6 DxTxH
Ordering example: 6 100 x 50 x 20

Designation of non-standard dimensions:
6 DxTxH-V../E..
Limiting dimensions: 0,5T > E ≥ 0,2T, W < 0.17 D

Table of standard dimensions (mm)

D	T	W	E	P	H
40	25	4	6	32	13, 16, 20, 25
50	32	5	8	40	13, 16, 20, 25, 30
63	40	5	8	53	16, 20, 25, 30
75	40	6	10	63	16, 20, 25, 30
80	40	6	10	68	16, 20, 25, 30, 35, 40
100	50	8	10	84	16, 20, 25, 30, 35, 40, 50, 60
125	63	8	13	109	16, 20, 25, 30, 32, 35, 40, 50, 60
150	80	10	16	130	16, 20, 25, 30, 32, 35, 40, 50, 60, 75, 85

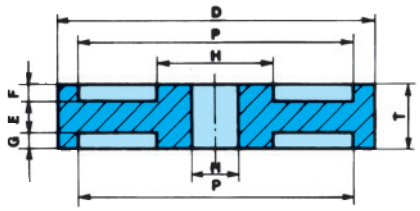
Wheel recessed both sydes, with hub
Type: **9P**



Designation:
9P DxTxH
Ordering example: 9P 100 x 10 x 20

Designation of non-standard dimensions:
9P D/KxTxH-PxF/G
Limiting dimensions: 0,5 T > E ≥ 0,2T

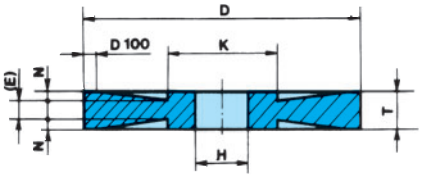
Wheel recessed both sides, with hubs
Type: **9PP**



Designation:
9PP DxTxH
Ordering example: 9PP 100 x 10 x 20

Designation of non-standard dimensions:
9PP D/KxTxH-PxF/G
Limiting dimensions: 0,5 T > E ≥ 0,2T

Wheel recessed both sides, with hub
Type: **21P**



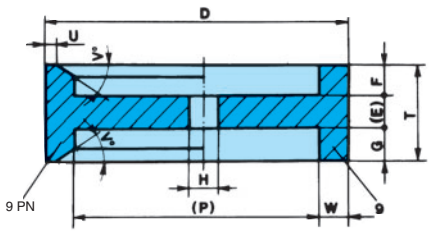
Designation:
21P DxTxH
Ordering example: 21P 100 x 10 x 20

Designation of non-standard dimensions:
21P D/KxT/NxH
Limiting dimensions: H ≤ 0,67D E ≥ 0,5T

Table of standard dimensions for wheels type 9P, 9PP, and 21P (mm)

D	T	H	K	P	F	N
100	6	20	50	94	-	1,5
100	10	20	50	94	1,5	3
150	6	20	70	144	-	1,5
150	10	20	70	144	1,5	3
150	15	20	70	144	2,5	4,5
175	20	32 (20)	70	167	3	6
175	25	32 (20)	70	163	4,5	7,5

Both sides cylinder cup wheel
Type: **9, 9PN**



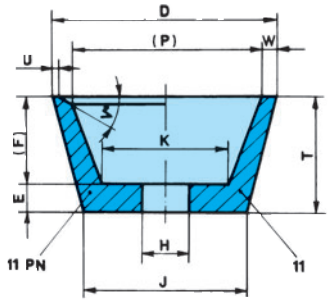
Designation:
9 DxTxH
Ordering example: 9 100 x 40 x 13

Designation of non-standard dimensions:
9 DxTxH-W../F../G..
Limiting dimensions:
0,5 T > E ≥ 0,2T, W < 0,17D

Table of standard dimensions (mm)

D	T	H	P	F/G	E	U	W
100	40	13	88	16	8	1,5	6

Flaring cup wheel
Type: **11, 11PN**



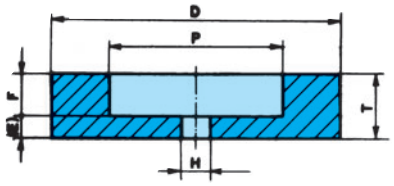
Designation:
11 DxTxH
Ordering example: 11 75 x 30 x 20

Designation of non-standard dimensions:
11 D/JxTxH-W../E../K..
Limiting dimensions:
0,5 T > E ≥ 0,18, W < 0,17D

Table of standard dimensions (mm)

	D	T	H	J	W	E	K
11	50	32	13, 16	27	4	8	22 (4)
	63	32	16, 20, 25	45	5	8	35
	75	32	16, 20, 25	53	6	8	45
	80	32	16, 20, 25	57	6	8	46
	100	35	16, 20, 25	71	8	10	56
	125	45	16, 20, 25	96	8	10	81
	150	50	16, 20, 25	114	10	13	96
11 H	250	140	100	200	30	38	140

Wheel recessed one side
Type: **5G**



Designation:
5G DxTxH
Ordering example: 5G 150 x 32 x 20

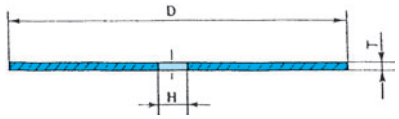
Designation of non-standard dimensions:
5G DxTxH-PxF
Limiting dimensions:
0,5 T > E ≥ 0,3T

Table of standard dimensions (mm)

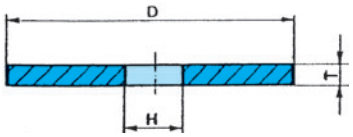
D	T	E	F	P	W	R	H
150	32	12	20	80	35	5	16, 20, 25
175	32	12	20	90	42,5	5	25, 30, 32, 35, 40, 50
200	40	15	25	110	45	5	25, 30, 32, 35, 40, 50
225	40	15	25	135	45	5	35, 40, 50
250	40	15	25	150	50	6	40, 50, 60, 75
300	50	20	30	180	60	6	50, 60, 75, 80, 125
350	63	22	41	210	70	6	125

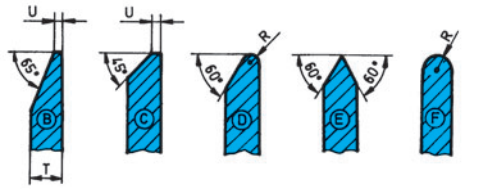
Grinding wheels for saw sharpening

Type **1 T**



Type **1**





U = T/4 U = T/4 R = 0,3 T R = 0,5 T

Type **1 DS-B**

Designation:
1 D x T x H

Designation of sharpening wheels with peripheral shape:
1-B, 1-C, 1-D, 1-E, 1-F

Designation of two layers wheels with peripheral shape:
1DS-B, 1DS-C, 1DS-D

We manufacture grinding wheels for saw sharpening in several specifications, depending on the material to be sharpened and the operating conditions. Saws can be sharpened offhand on simple machines, or automatically on more perfect machines. For offhand sharpening it is better to use harder wheels, because the hand pressure is not equal and the consequence is an excessive consumption of the wheel. For automatic sharpening the use of softer wheels is advisable, because the pressure is equal and an overheating and burning of the teeth is prevented.

For offhand sharpening we advise the use of grinding wheels in aluminum oxide regular (A or 3 A), grade M-O, or in mixed aluminium oxide 52A. For automatic sharpening grinding wheels in special aluminium oxide (2 A, 4 A) are recommended.

Table of dimensions:

D (mm)	**T** (mm)	**H** (mm)
100 150	1 1,5 2 2,5 3 3,5 4 4,5 5 5,5 6 8 10	20 25 30
175	1 1,5 2 2,5 3 4 6 8 10	32 51
200	1 1,5 2 2,5 3 3,5 4 4,5 5 5,5 6 8 10 13	20 25 30
250	1,5 2 2,5 3 3,5 4 4,5 5 5,5 6 8 10 13	20 25 30
300	6 8 10 13 15	32 100

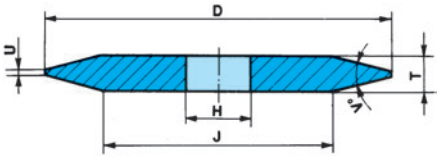
Ordering example:
1-C 150x10x20 4A80/3N8V35, 40 m/s
1 250x10x32 5GA60/1O10B33, 63 m/s

Grinding wheels with diameter 250 mm and less and with thickness 6 mm or less are considered thin grinding wheels and are marked with type 1T.

Gear Grinding

Biconical grinding wheels for gear grinding on **“Niles”**-system machines

Type: **4N**



Designation:
4N D x T x H-V
Ordering example: 4N 250x20x51-30˚

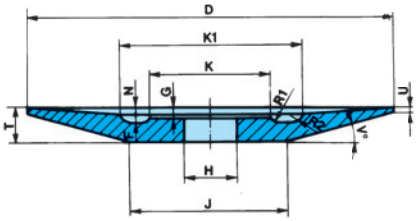
Designation of non-standard dimensios:
4N D/JxTx/UxH-V

Table of standard dimensions (mm)				
D	**T**	**H**	**U**	**V**
250	13	51	3	30° 40°
250	16	51	4	30° 40°
250	20	51	4	30° 40°
300	25	90	4	30° 40°
350	32	90	5	30° 40°

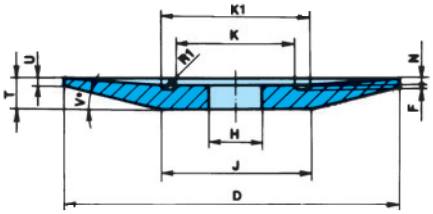
Application	**Diameter D (mm)**	**Recommendations**		
		Module 0,75 - 2	**Module 2,5 - 4**	**Module more than 4**
Heat-treated steels up to 120 kg/mm²	240 350	2A100/3K7V	2A70/3K7V 2A60/3J7V	2A54/3K7V 2A46/3J7V
Carburized steels hardened, e.g.: 16MnCr5	240 350	2A100/2J7V 2A100/319V	2A60/2I7V 2A60/2K7B	2A54/2K7V 2A54/2I6V 2A46/2I7/6V
Tool-steels, hardened and high-alloyed, (64 HRc) and high-speed steels	240 350	2A120/2H9V 2A100/2H8V	2A70/2I7V 2A60/2H7V	2A54/2I7/6V 2A46/3H7/6V
Nitrided steels (70 HRc)	240 350	C100/3J7V	C80/3J7V C80/3K7V	C60/3K6V C60/3J6V
Gray cast iron Chilled cast iron	240 350	2A100/1J8V	2A70/3K8V 2A60/3J7V 2A60/3J8/6V	2A54/3K8/6V 2A54/2K7V 2A46/3J8/6V
Non-heat-treated steels	240 350	52A100/3J9V 52A80/3J8V	52A60/3J7V	52A54/3J6V

Gear grinding on **“Maag”**-system machines

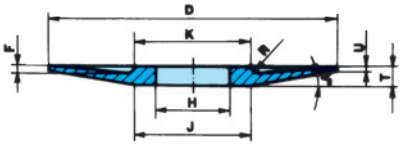
Grinding wheels type:
12M1, 12M2, 12M3, 12M4



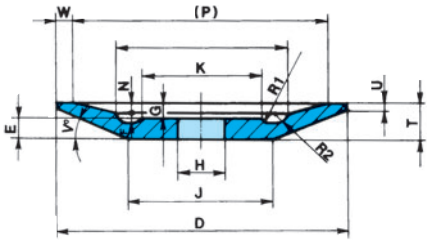
12M1



12M2



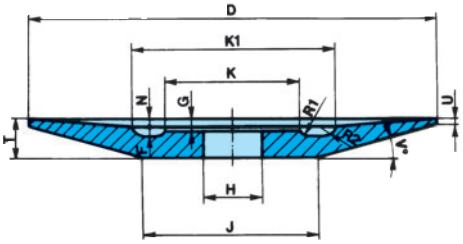
12M4



12M3

Application	**Recommendations**				
	Diameter D (mm)	**Module 1 - 1,5**	**Module 1,5 - 2,5**	**Module 2,5 - 5**	**Module more than 5**
Heat-treated steels	220-280 ≥ 340	4A100/3K7V	4A80/3J7V	4A60/3K7V 4A60/3J7V	4A46/3J7V 4A46/3I7V
Hardened steels	220-280 ≥ 340	42A100/3K7V	42A80/3J7V	42A60/3K7V 42A60/3I7V	42A46/3J7V 42A46/3I7V
High-speed steels hardened 64 HRc	220-280 ≥ 340	2A100/3J7V	2A80/3I7V	2A60/3IV 2A60/3H7V	2A46/3I7V 2A46/3H7V
Tool-steels 64 HRc	220-280 ≥ 340	8A80/3I7V	8A80/3I7V	8A60/3H7V 8A60/3H7V	8A46/3I7V 8A46/3H7V
Nitrided steels	220-280 ≥ 340	C100/3I7V	C80/3I7V	C60/3J6V C60/3J6V	C60/3J6V C60/3J6V
Gray cast iron	220-280 ≥ 340	2A100/3K14/4V	2A80/3J12/4V	2A60/3J12/3V 2A60/3I12/3V	2A46/3J12/3V 2A46/3I12/3V

Dish wheel for gear grinding
per **“Maag”** system
Type: **12M2**



Designation:
12 M2 DxTxH
Ordering example: 12 M2 220x18x40

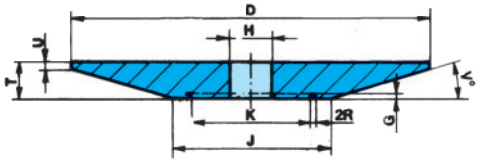
Designation of non-standard dimensions:
12 M2 D/J/KxT/UxH-V..

Table of standard dimensions (mm)

D	J	K	K1	H	F	N	T	U	R1	R2
220	120	80	140	40	8	2,2	18	2,3, 4,6	8	6
280	120	80	140	40	8	7	25	4,8	8	6
340	120	130	180	40	8	7	25	4,8	8	6

Wheel tapered one side **“Klingelnberg”**

Type: **3K1**



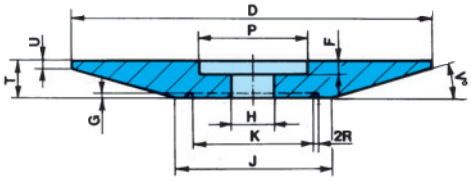
Designation:
3K1 DxTxH
Ordering example: 3K1 250x14x40

Designation of non-standard dimensions:
3K1 D/JxT/UxH-V..

Table of standard dimensions (mm)

D	J	K	T	U	2R	G	V°	H
250	170	110	14	3	10	5	15°	30, 32, 35, 40, 50
250	180	110	17	5	10	5	15°	30, 32, 35, 40, 50
250	190	110	22	8	10	5	15°	30, 32, 35, 40, 50

Wheel tapered one side,
with a recession on the straight side
“Klingelnberg”
Type: **3K2**



Designation :
3K2 DxTxH
Ordering example: 3K2 250x14x40

Designation of non-standard dimensions:
3K2 D/JxT/UxH-PxF-V..

Table of standard dimensions (mm)

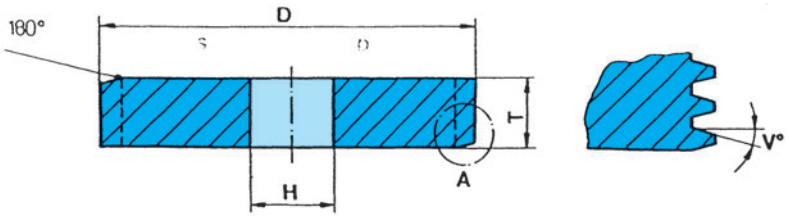
D	J	K	T	U	P	2R	G	V°	H
250	170	110	14	3	100	10	5	15°	30, 32, 35, 40, 50
250	180	110	17	5	100	10	5	15°	30, 32, 35, 40, 50
250	190	110	22	8	100	10	5	15°	30, 32, 35, 40, 50

Gear grinding on **“Reishauer”**-system grinding machines

Grinding wheels type: **1Z, 1ZD**

1Z – wheel with module-thread
1ZD – wheel with double module-thread

Designation:
D x T x H - module/V



Type: **1Z**

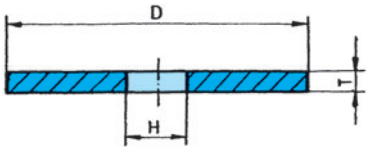
Dimensions (mm)	Module	Specification	Designation Reishauer
350x62x160	0,5-0,9	8A, 82A 240/1 H 11 V	SW 1
	1-1,75	8A, 82A 220/2 H 10 V	SW 2
	2-2,25	8A, 82A 180/2 I 10 V	SW 3
	2,5-3,5	8A, 82A 150/2 J 10 V	SW 4
104 350x84x160	1-1,75	8A, 82A 220/2 H 10 V	SWZ 5
	2-2,75	8A, 82A 180/2 H 10 V	SWZ 6
	3-3,75	8A, 82A 150/2 I 10 V	SWZ 7
	4-6	8A, 82A 120/2 I 9 V	SWZ 8
	more than 6-7	8A, 82A 100/2 J 9 V	SWZ 9
104 400x84x160	1,0-1,75	8A, 82A 180/2 H 10 V	SWT 11
	2-2,75	8A, 82A 150/2 I 10 V	SWT 12
	3-5	8A, 82A 120/2 I 9 V	SWT 13
	more than 5-7	8A, 82A 100/2 I 9 V	SWT 14
	more than 7	8A, 82A 90/2 J 8 V	SWT 15

Indicated specifications are recommended for steels and gears of a grade higher than 55 HRc. For grinding gears with a grade of hardness up to 55 HRc the hardness of the wheel can be increased for one degree, according to the choice of specification.
For special grinding requirements (high face stability), instead of white aluminium oxide (2A) single crystal aluminium oxide (8A) should be used.

Thread Grinding

Grinding wheels type: **1NA**

Designation:
1NA D x T x H



We manufacture single profile and multiprofile thread grinding wheels in shapes 1NA, 5NAV, and 7NAV. They are produced in vitrified bond with grain size from 150 to 400 and in diameters D 300 to 500 mm. Hole size H is 127 to 160 mm.

In relation to the size of the thread profile we recommend the use of the following specifications:

Single profile thread grinding wheels T = 6 to 16 mm (T ~ 0,03D)

Thread profile size		Recommendation	
Metric (mm)	Whitworth number of threads per inch	Hardened high-speed and tool steel	Construction steel
1 - 1,5	40 - 28	2A 400 13/6 V	2A 400/1 K 11 V
1,75 - 2,5	26 - 20	2A 320/1 J 13/6 V	2A 320/1 K 10 V
3,0 - 4,0	20 - 14	2A 280/1 J 13/6 V	2A 280/1 K 10 V
4,5 - 5,5	12 - 10	2A 240/1 J 13/6 V	2A 240/1 K 10 V
6,0	9 - 7	2A 220/1 J 9 V	2A 220/1 K 9 V
	6 - 4,5	2A 180/1 J 9 V	2A 180/1 K 9 V
	4 - 3	2A 150/1 J 9 V	2A 150/1 K 9 V

Multiprofile thread grinding wheels T = 20 to 100 mm

Thread profile size		Recommendation	
Metric (mm)	Whitworth number of threads per inch	Hardened high-speed and tool steel	Construction steel
1 - 1,25	40 - 28	C 400 V	2A 400 V
1,25 - 2,0	24 - 20	C 360 V	2A 320 V
2,0 - 3,0	20 - 16	C 320 V	2A 280 V
3,0 - 4,0	16 - 12	C 280 V	2A 240 V
4,5 - 6,0	10 - 6	C 240 V	2A 220 V
	5 - 4	C 220 V	2A 180 V
	4 - 3	C 180 V	2A 150 V

Types and tolerances of thread grinding wheels

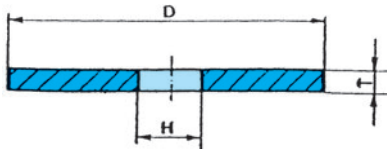
All thread grinding wheels, that is single and multiprofile wheels, are manufactured without profile which is later made by the user himself. The standard allowed wheel balance and the thickness tolerance of thread grinding wheels type 1NA, 5NAV and 7NAV are defined in our factory standard tolerances and do not need to be specified for each produced grinding wheel.

Ordering example: 1NA 350 x 35 x 160 2A220/1I9V40, 40 m/s

For Medical injection Needles:
1NA 450x40x127 C600JBX03, 50 m/s

Grinding Wheels for Grinding Grooves of Cutting Tools
at peripheral speed 80 m/s

Type: **1UT**



Designation: 1UT D x T x H

Cold pressed resinoid bonded grinding wheels used for wet grinding, for drill grooves shaping, etc., all made out of cylindrical workpieces.

Table of dimensions (mm):

D	T	H
100	1,0 - 20,0 (every 0,5mm)	13
150		44,5 32
175		
200		
250		76
300		203,2
400		203,2 304,8
450		203,2 304,8
500		304,8

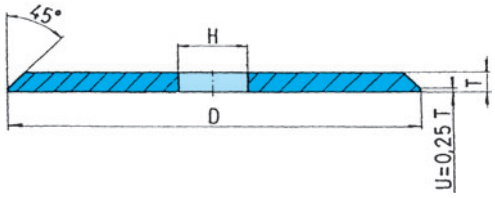
Thickness tolerance: TT =+0,2 -0

Specification: 8A (80)100-120 R-T 8-9 B18 (GA)

Ordering example: 1UT 200x6x32 8A 120/3S8B18, 80 m/s
1UT 400x8x203,2 8A 120/2 S8B18, 80 m/s for HSS till 65 HRc on machines Hertline or Göhring.

Profile Grinding on Cylindrical Workpiece, Saw Teeth Shaping

Type: **1, 1-C, 1T-C**



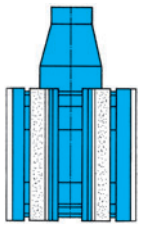
1T-C

Table of dimensions (mm):

D	T	H
350	8, 10	127
400	12, 14,18	203,2

These are straight grinding wheels in vitrified bond, somehow softer and of a more opened structure, made of sharper aluminas. They are made for higher speeds of 50 and 63 m/s.

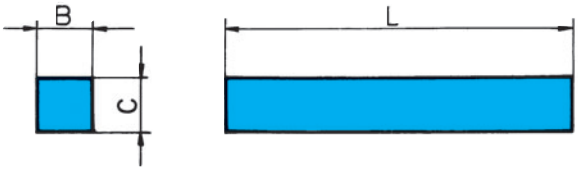
Ordering example: 1-C 400x8x127 NPA70/2LM9/6V40, 63 m/s

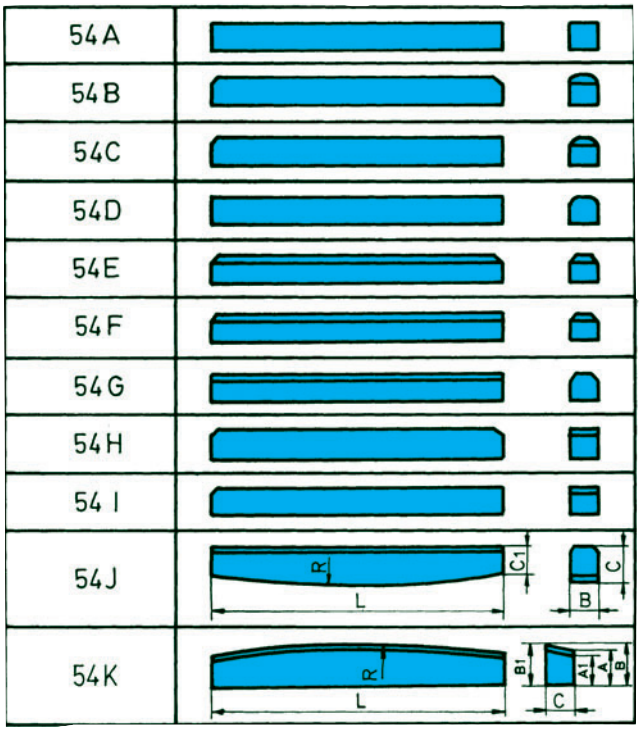


Honing

Hone Stones

Type: **54**





Designation:
54 B x C x L

Ordering example:
54 A 13x13x20

Hone stones are actually grinding sticks, the diference is that they are only used for mechanical working on a machine - for honing the inside of various cylinders and tubes.

For working parts of gray cast iron hone stones in silicon carbide are used, for working steel parts they must be in white or pink aluminium oxide, mainly vitrified bonded.

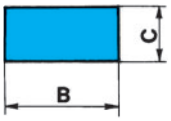
When selecting the quality, it should be taken into account if working of new cylindrical surfaces or reconditioning of worn out cylindrical surfaces is concerned.

Application	Abrasive	Grain size	Grade	Structure	Bond
Cylinder Processing in Motor Industry					
Prehoning	C, 9C	70-90	E-I	8-10	V
Final honing	C, 9C	120-600	E-I	10-14	V
Cylinder Processing in Industry of Pneumatic Devices					
• Unhardened steels					
Prehoning	52A	70-120	E-J	8-12	V
Final honing	2A	120-400	E-I	10-14	V
• Hardened steels					
Prehoning	2A, 8A	70-120	E-J	8-12	V
Final honing	2A, 8A	120-400	E-I	10-14	V
• Gray cast iron					
Prehoning	C, 9C	70-120	E-J	8-12	V
Final honing	C, 9C	120-400	E-I	10-14	V

HAND GRINDING

Grinding Sticks

Rectangular grinding stick



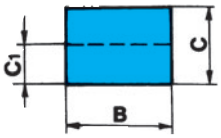
Type and designation: **90PR**

90PR BxCxL

Table of dimensions (mm):

B	6	10	12	25	30	25	40	50	30	50
C	3	5	6	6	13	6	20	25	13	25
L	100	100	150	100	200	100	125	150	200	200

Combination stone



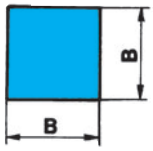
90KB

90KB BxC/C1xL

Table of dimensions (mm):

B	25	25	40	50	50
C	20	6	20	25	25
L	100	100	125	150	200

Square grinding stick



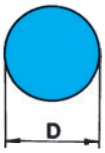
90KV

90KV BxL

Table of dimensions (mm):

B	6	8	10	10	15	20
L	100	100	100	150	150	200

Round stick



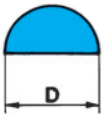
90OK

90OK DxL

Table of dimensions (mm):

D	6	8	10	10	15	20	25
L	100	100	100	150	150	200	200

Half-round stick



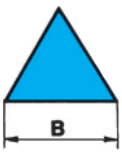
90PO

90PO DxL

Table of dimensions (mm):

D	6	10	12	15	20
L	100	100	150	150	200

Triangular stick



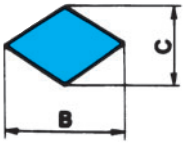
90TR

90TR BxL

Table of dimensions (mm):

B	6	8	10	10	15	20
L	100	100	100	150	150	200

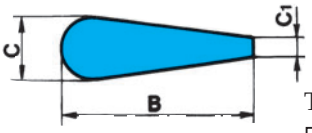
Rhomboid stick



Type and designation: **90RO**

90RO BxCxL
Ordering example:
90RO 10x5x100

Carving tool stick



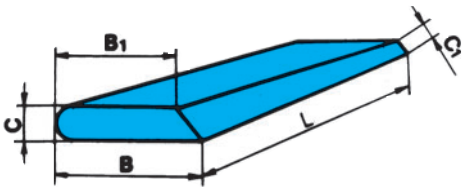
90DL

90DL BxC/C1xL

Table of dimensions (mm):

B	C	C1	L
25	6	1	100
35	10	3	100
45	10	0	100

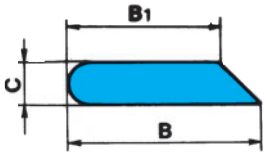
Trapezoid shaped knifeblade stick



90TN

90TN B/AxC/C1xL
Ordering example:
90TN 50/37x13/3x150

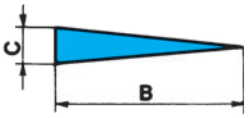
Trapezoid shaped convex stick (halfround)



90TO

90TO BxCxL
Ordering example:
90TO 45x13x50

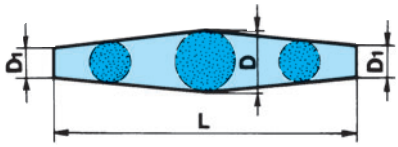
Knife-blade stick



90NO

90NO BxCxL
Ordering example:
90NO 25x3x100

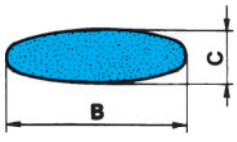
Shoemaker stick (file)



90CE

90CE D/D1xL
Ordering example:
90CE 25/15x230

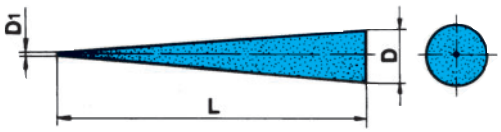
Smith stick (ellipse shaped)



90EL

90EL BxCxL
Ordering example:
90EL 35x10x150

Pointed stick

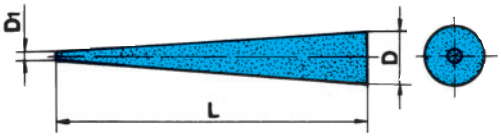


Type and designation: **90SI**
90SI D/D1xL
Ordering example:
90SI 8/1x75

Table of dimensions (mm):

D	D1	L
8	1	75
7	0	75

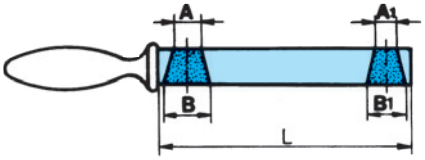
Grinding stick, conical



90KO

90KO D/D1xL
Ordering example:
90KO 13/6x100

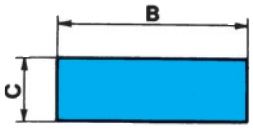
Grinding stick with grip



90TZR

90TZR B/AxCxL
Ordering example:
90TZR 45/30x30x230

Rubbing Bricks

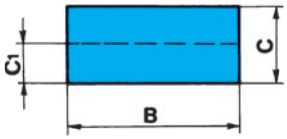


90BO

90BO BxCxL
Ordering example:
90BO 110x30x190

Rubbing bricks are used for manual grinding of stone, marble, terrazzo mosaic, concrete and similar materials. We produce them from vitrified bonded silicon carbide in grits C20, C36 and C60.

Rubbing bricks combined

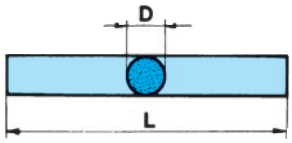


90K

90K BxC/C1/C2xL
Ordering example:
90K 50x25/12,5x150

Dressing Tools for Grinding Wheels

Grinding dresser

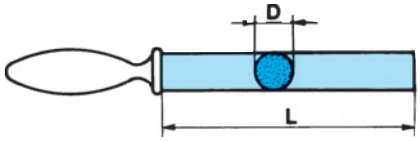


Type and designation: **90OKP**

90 OKP DxL

Ordering example:
90 OKP 30x200

Dressing bar with handle

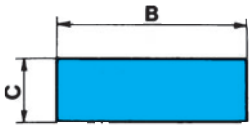


90PC

90 PC DxL

Ordering example:
90 PC 25x245

Flat dresser

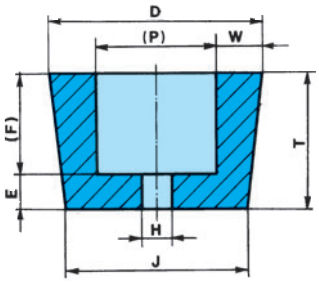


90BP

90 BP BxCxL

Ordering example:
90 BP 50x30x200

Dressing cup



11CL

11CL D/JxTxH-PxF

Ordering example:
11CL 80/75x60x20-50x40

Reccomended specifications for grinding sticks, rubbing bricks and dressing tools

Grinding sticks and bricks, type: **90 ...**

Standard specifications			
Abrasive grain		From alumina, commercial designation "A"	From silicon carbide, commercial designation "C"
Coarse	16 - 24		(9) C24V
	30 - 46		(9) C36V
	54 - 70		(9) C60V
	80 - 90	(2) 4A80V	(9) C80V
	100 - 120	(2) 4A120V	(9) C120V
Medium	150 - 180	(2) 4A150V	(9) C150V
	220 - 280	(2) 4A240V	(9) C240V
Fine	320 - 500	(2) 4A400V	(9) C400V

Soft specification			
Abrasive grain		From alumina, commercial designation "A"	From silicon carbide, commercial designation "C"
Coarse	100 - 120	(2) 4A120JV	(9) C120HV
Medium	150 - 180	(2) 4A150JV	(9) C150HV
	220 - 280	(2) 4A240IV	(9) C240GV
Fine	320 - 500	(2) 4A400IV	(9) C400FV

Combination sticks

Type: **90KB, 90KBR, 90KKR**
2/3 – coarse layer
1/3 – fine layer

Standard specification		Soft specification	
Specification	Commercial designation	Specification	Commercial designation
Coarse/fine „A”	4A 120/2A 400 V	Coarse/fine „A”	4A 120 J/2A 400 I V
Medium/fine „A”	4A 240/2A 400 V	Medium/fine „A”	4A 240 I/2A 400 I V
Coarse/fine „C”	9C 120/C 400 V	Coarse/fine „C”	9C 120 H/C 400 F V
Medium/fine „C”	9C 240/C 400 V	Medium/fine „C”	9C 240 G/C 400 F V

Combination sticks are available also in combination with white alumina (2A).

Rubbing bricks combined
Type: **90K**
1/2 – coarse layer
1/2 – fine layer

Commercial designation “C”
9C16/C60V
9C24/C60V
9C36/C80V

Dressing tools
Type: **90BP, 90OKP, 90PC**

Grain size		Commercial designation
16	Very coarse	C16RV
20 - 24	Coarse	C24RV
30 - 46	Medium	C36QV
54 - 70	Fine	(9) C60PV
80 - 90	Very fine	(9) C80PV

Grinding Tools for the Use in Agriculture

Grinding tools for mowing machines

Type: **4TR**

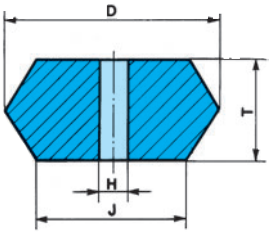


Table of dimensions (mm):

D	J	T	H
140	120	70	16 (32)
130	110	80	16
130	100	70	16
85	60	80	16 (32)

Designation:
4TR D/JxTxH

Ordering example:
4TR 85/60x80x16
A 60/3 M7 V20

We make these wheels
in the following specifications:
A36/3M6V20,
A46/3M6V20,
A60/3M7V20

Scythe stone

Type: **90BK**

Designation:
90BK BxCxL

Ordering example:
90BK 35x13x230
C 180/9 K 10 V

Scythe stones are marked with "three stars". They are used for sharpening scythes, knives and other cutting devices. They can be applied both for dry and wet sharpening. Two specifications are available:
C 180/9K10V and A 180/2N10V.

Special products

- Millstones in food industry
- Aerators
- Coatings for peelers
- Fire-proof products on the basis of silicon carbide
- Porous wheels for silo floors (bottoms) in cement works

• **Swaty elast**

Type: **90 EO**

Elastic grinding stones for industry and home use.
They are used for fettling and polishing of metal, glass, plastics, and enamel covered surfaces.

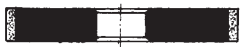
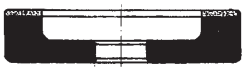
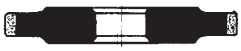
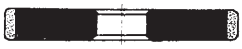
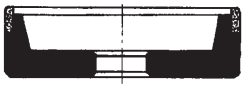
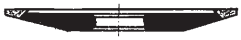
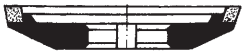
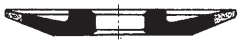
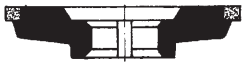
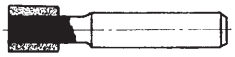
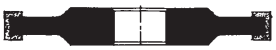
Dimensions: 40x20x80 mm
40x20x50 mm
Ordering example:
90 EO 40x20x50 2A 100-RD01

Specifications:
2A60R1-coarse
C60R1-coarse
2A100R1-medium
C100R1-medium
2A240R1-fine
C240R1-fine


SWATY M
SWATY
CBN SPECIAL
SWATY
DIAMANT SPECIAL

Diamond and CBN Grinding Tools, Resinoid bonded

Standard types table: These grinding wheels meet the requirements of European standards EN 13236.

1 A1		6 A2 6 A2-D	
14 A1		11 A2	
1 L1		12 A2	
14 EE1		12 V2	
14 F1		6 A9	
1 FF1		11 V9	
9 A3		12 V9	
4 A2		1 SVM	
12 A9		12 A2-1	
4 ET9		4 V9	
4 BT9		12 B9	
12 A2-45		1 A1 W 1 A8 W	
6 V9		14 U1	

By request we produce grinding tools also in non-standard dimensions.

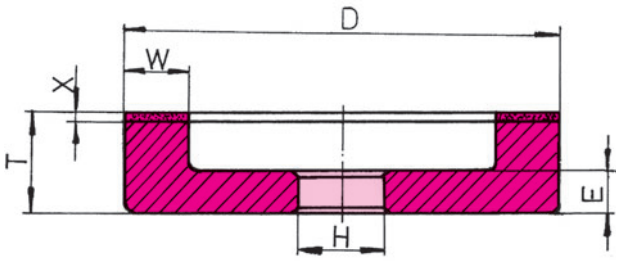
Fields of application

Diamond and boron nitride (cubic boron nitride – CBN) DIABON grinding tools are suitable for the most demanding work since they ensure quality and precise, fast and economical grinding. DIABON tools distinguish themselves for high profile persistence and high material removal ability. They enable low pressure grinding without overheating and therefore even by materials hardest to work on no defects or cracks appear.
Diamond and boron nitride DIABON grinding tools are produced in resinoid bond. Their application is universal whereby they can be used for dry and wet grinding.

When ordering please specify the folowing:
1. Grinding tool type
2. Grinding tool dimensions
3. Quality specification:
   - type of abrasive,
   - grain size,
   - bond hardness grade,
   - concentration of abrasive grain,
   - bond type
4. Grinding method (wet or dry)

Ordering example:

6A2 100-6-2 102 B 107 R 100 B 47 S



6 A2	grinding tool type
100	grinding tool diameter (D)
6	abrasive coating width (W)
2	abrasive coating thickness (X)
	hole diameter (H)
102 B	grain type
107	grain size
R	hardness grade
100	concentration (%)
B 47 S	bond

Give hole diameter only if not standard (20mm).

If you can not specify order data yourselves please consult our technicians.

Quality specification

Grain size

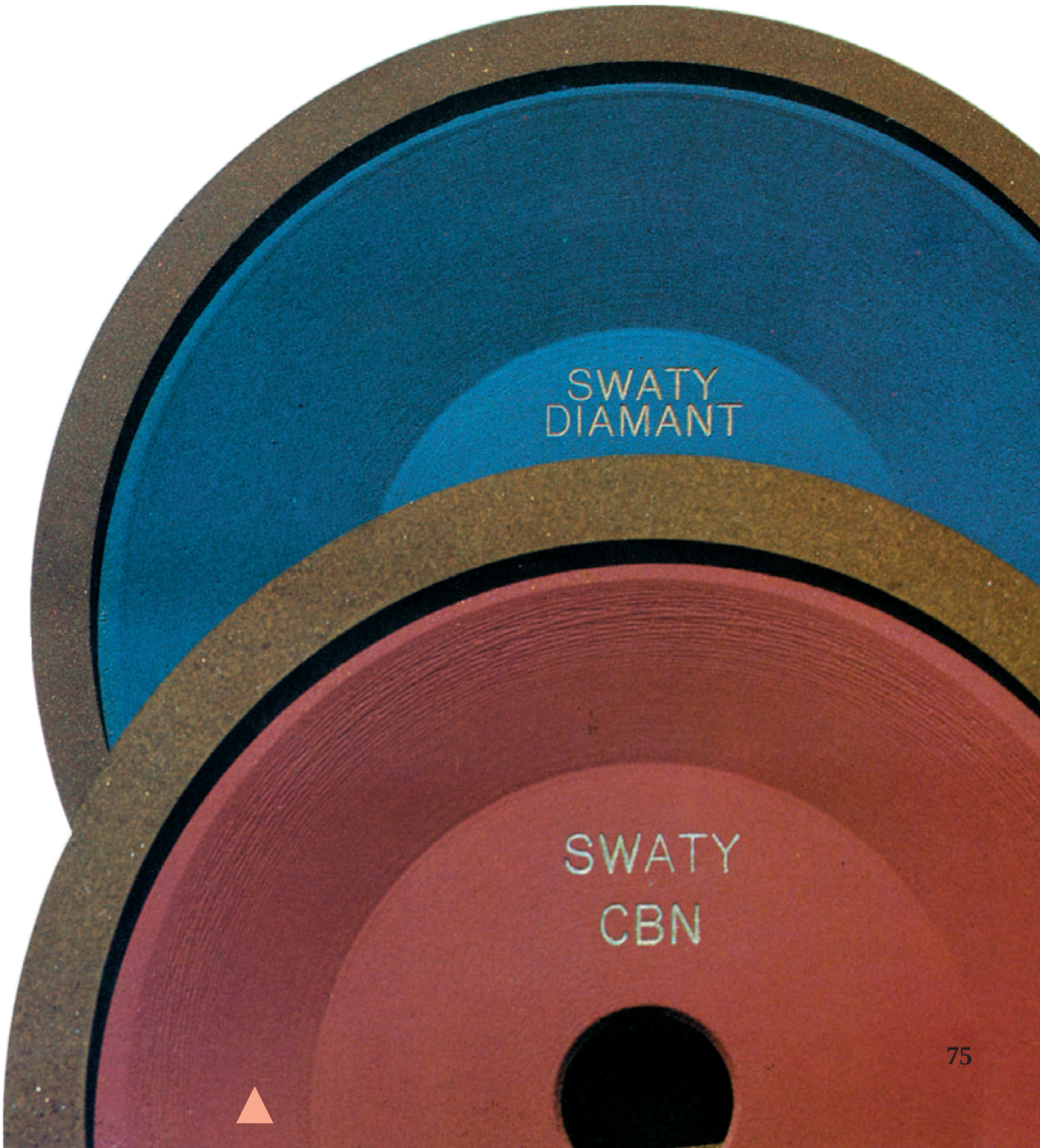
When choosing grain size you have to consider that fine grain sizes give better surface finish and increase profile persistence but dicrease grinding effectivness.

Therefore it is most economical to choose the coarsest grain size that still gives requierd surface quality. Diamond and CBN grain sizes according to FEPA standard are shown in the table below.

Type of grinding	Grain size
Very rough grinding	D 151-126 B 151-126
Rough grinding	D 107-64 B 107-64
Fine grinding	D 54-46 B 54-46
Precise grinding and polishing	30-15 µm 10-12 µm

Table of grain sizes

601	Coarse
501	
426	
356	
301	
251	
213	
181	
151	
126	
107	
91	
76	
64	
54	
46	Fine



Hardness	Application
N medium	for grinding wheels and cups with wide abrasive layer
R hard	for grinding cups with standard abrasive layer quality and wheels with increased resistance to wear
T very hard	for special applications

Hardness of grainding tool depends on bond quantity and bond structure.

Bond	Application
B 40S	universal application (wet and dry grinding)
B 45S	for wet and dry grinding, for grinding of special materials (combination of steel and tungsten carbide)
B 47S	for CBN grinding tools

Concentration of diamond or CBN grain is the weight of diamond or CBN grain in one volume unit (cm3) of abrasive coating. Concentration 100 means there are 0,88 grams (4,4 carats) of diamond or CBN grain in one cm3 of abrasive coating, i.e. about 25 % of total volume. Other concentrations are shown in the table.

Concentration %	g/cm^3	carats ct/cm^3
25	0,22	1,1
50	0,44	2,2
75	0,66	3,3
100	0,88	4,4
125	1,10	5,5
150	1,32	6,6

Effectiveness of DIABON grinding tools depends much on the concentration of diamond or CBN grain.

High concentration (100 – 125)
is used with rougher grain sizes, for cylindrical and profile grinding, by small contact areas, and by narrower abrasive coating.

Low concentration (50-75)
is used with finer grain sizes, for frontal and flat grinding (cup wheels), and by wider abrasive coating.

Peripheral speed depends on grinding process (grinding, sharpening), on grinding method (wet or dry grinding), and on required surface quality. Higher peripheral speeds enable better surface finish and reduce wearing out of the grinding tool. Consequently it is more economical to use medium peripheral speeds by very rough grinding and by sharpening since at such speeds it is possible to flush away grinding dust and carry off heat continuously.

The following guidelines can be of help for choosing the correct peripheral speed:

Type of grinding	Grinding method			
	Wet		Dry	
	Diamond	CBN	Diamond	CBN
Surface grinding	20-30 m/s	22-35 m/s		
Internal grinding	10-20 m/s	18-30 m/s	8-12 m/s	15-20 m/s
Cylindrical grinding	20-30 m/s	25-35 m/s		
Tool grinding	18-28 m/s	20-30 m/s	15-20 m/s	18-25 m/s

ABRASIVE		APPLICATION		Abrasive characteristics during grinding
		Wet grinding	Dry grinding	
DESCRIPTION	GRIT DESIGNATION	Material	Material	
Synthetical diamond with metal coating	**101D**	Carbide metal General application	Carbide metal General application	- Good cutting ability - Good for sharpening and external round grinding
	102D	Carbide metal Combination carbide metal / steel	Carbide metal Combination carbide metal / < 15% steel	- Good cutting ability - Optimum relation between cutting ability and pressure by grinding
	103D	Carbide metal Ceramic carbide metal on the basis of TiC-TiN	Carbide metal Ceramics	- Very good cutting ability - Good durability - No cracks in material by grinding
	104D	Carbide metal Combination carbide metal / < 15 - 75% steel		- Optimum durability - Increased grinding pressure - Optimum economy considering effectiveness
	501D	Carbide metal Ceramics	Carbide metal Ceramics	- Microgrits (from D15 to D30)
CBN with metal coating	**101B**	Precise grinding of steel matrices, alloyed steels, stainless steels, and other hard alloyed steels of hardness between 58 - 64 HRc		- Good cutting ability - Appropriate for sharpening
	102B			- Good workpiece surface - Good cutting ability - Good durability of the wheel - Reduced grinding pressure
	103B			- Increased toughness - Increased thermal resistance - Maximum grinding wheel durability - Increased material removal ability - Worse workpiece surface

Mounting of grinding tools

Balancing of DIABON grinding tools is so accurate that by properly mounted tool the radial and axial stroke are not bigger than 0,02 mm. Hole tolerance is H7.
By tool mountig well balanced flanges should be used. All contact areas (flange-spindle and flange-grinding tool) should be clean.
On grinding tools with frontal abrasive coating rotating direction is always marked by an arrow and it must be obligatory considered when mounting the tool on the grinding machine.
Diamond and CBN grinding tools should therefore be used on well maintained grinding machines with stable construction so that no vibrations appear during grinding process. If the grinding machine vibrates workpiece surface quality is not good and grinding tool wears out faster.

Maintenance

If all grinding parameters are chosen properly, grinding tool is self-sharpening.

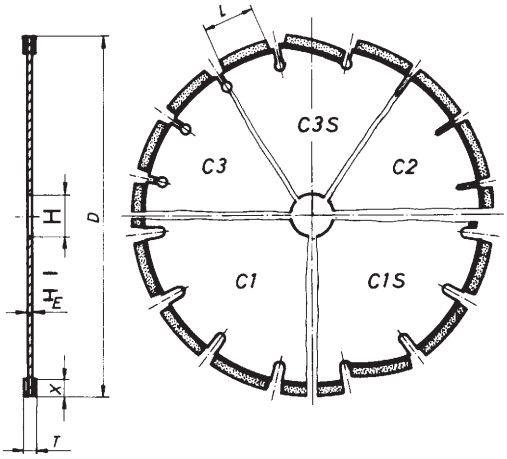
If application is not correct, abrasive coating fills up with grinding dust and gets blunt. In such a case sharpening is needed to open the structure and remove the grinding dust.

How to open the abrasive coating:

- with silicion carbide or white aluminium oxide grinding wheels in hardness I-L and in a little coarser grain size than the applied DIABON grinding tool is. Truing grinding wheel should be mounted on a supporting grinding machine and should rotate in the same direction as the DIABON grinding tool, however with a speed 20 – 30 m/s. DIABON grinding tool should rotate with small peripheral speed 12 m/s.

Diamond Saws

Diamond saw blade shape:



How to order:
Shape designation D – T – X – H quality specification
Ordering example: C1 300 – 2,4 – 5 – 25,4 AS

Dimensions

Diameter (mm)	Segment dimensions (mm)			Number of segments		H (mm)
	L	T	X	C1, C1S	C2, C3, C3S	
300	40	2,4	5; 7; 10	18	21	Per order
350	40	2,8	5; 7; 10	21	25	
400	40	3,2	5; 7; 10	24	28	
450	40	3,6	5; 7; 10	26	32	
500	40	3,6	5; 7; 10	30	36	
550	40	4,4	5; 7; 10	32	40	
600	40	4,4	5; 7; 10	36	42	
700	40	5,0	5; 7; 10	40	50	
800	40	5,5	5; 7; 10	46	57	
900	24	6,5	5; 7; 10	64		
1000	24	7,0	5; 7; 10	70		
1200	24	7,5	5; 7; 10	80		

Field of use	Saw shape	Quality specification	Peripheral speed (m/s)
Asphalt	C1, C1S	AS	35-40
Fresh concrete	C3,C3S	SVB	30-50
Fresh reinforced concrete	C3	SVB-A	30-40
Old concrete	C3	STB	30-40
Old reinforced concrete	C3	STB-A	30-50
Marble	C2	M	30-40
Granite	C2	G	25-40
Hard fire-clay	C2,C3	ST	30-45
Soft fire-clay	C2,C3	SM	40-50
Roof tiles	C3	SAL	30-45

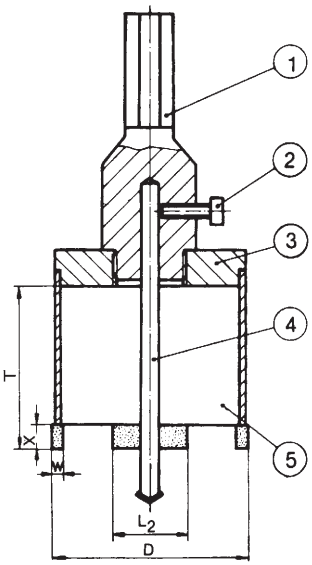
Diamond saw for cutting materials like granite or marble can be manufactured in the silent version – marking SIC2 (SIC3)

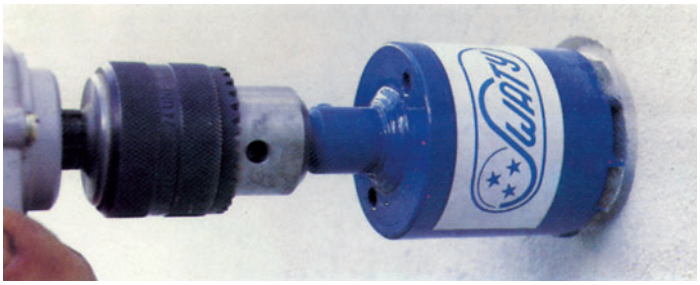
Apart from newly manufactured products Swaty also renews diamond saws, diamond core drills, milling cutters and gang saw blades.

Diamond Core Drills

Diamond core drills, designed for use on hand drilling machines

How to order:
Designation D – T – X – W
Ordering example: DKS 32 – 60 – M16
When ordering please specify
the material you are working on.





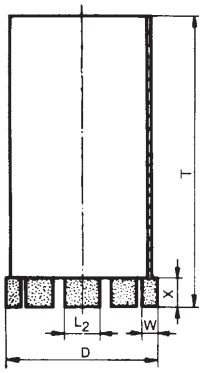
Core drill dimensions D – T – X – W (mm)	Segment dimensions (mm)	Useful core drill length (mm)
22 - 60 - 7 - 3 32 - 60 - 7 - 3 52 - 60 - 7 - 3 82 - 60 - 7 - 3 105 - 60 - 7 - 3	Dimension of mounted segment depends on core drill diameter	50

1. Shank S12
2. Screw
3. Thread adaptor M16
4. Centre drill
5. Diamond core drill

They are designed for drilling installation holes in various construction materials like concrete, reinforced concrete, asphalt, ceramics, all by the help of hand drilling machines of 800 or more Watts power. Drilling is dry. The optional working speed is between 5 and 8 m/s.

Diamond core drills, designed for use on special machines

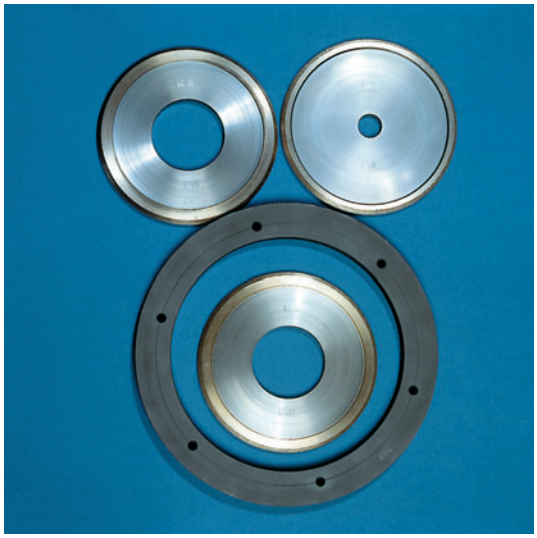
How to order:
Designation D – T – X – W
Ordering example: DK 32 – 200 – 7 – 4
When ordering please specify
the material you are working on.



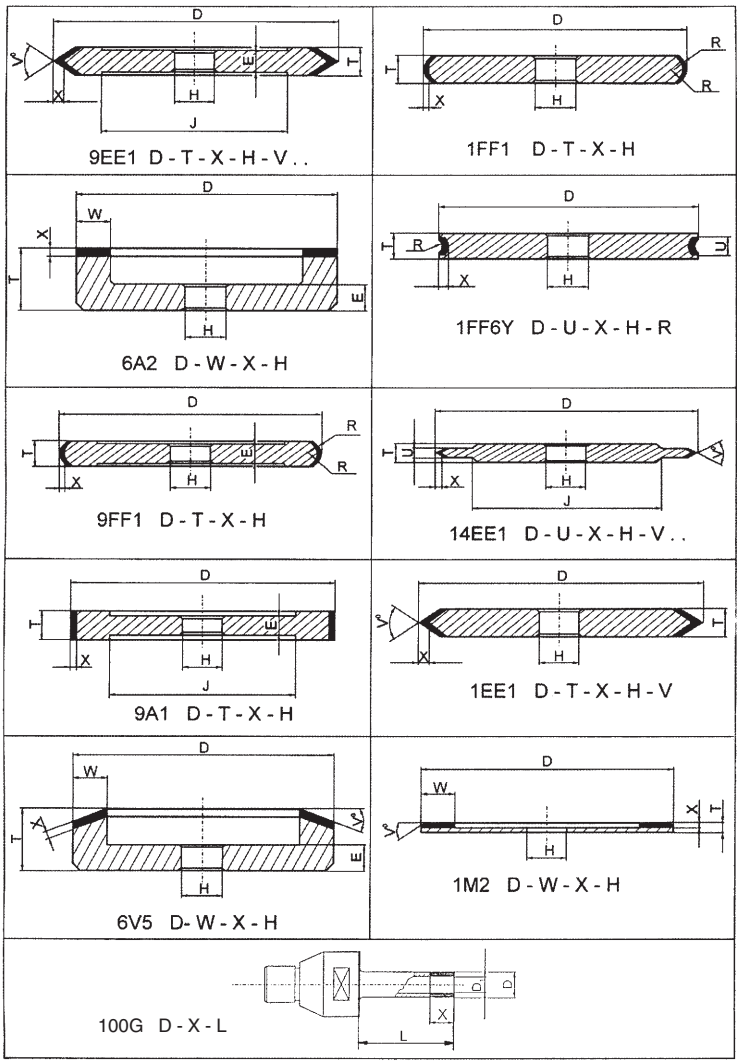
Core drill dimensions (mm)		Segment dimensions (mm)		
D	**T**	**W**	**X**	**L2**
20 - 400	Per order	Per order	7	24

They are designed for drilling outlet and installation holes in various building materials like concrete, reinforced concrete, asphalt, stone, brick. Cooling by drilling is obligatory. Recommended working peripheral speeds are from 2 to 4 m/s.

Diamond Grinding Tools for Glass Grinding



Grinding tool shapes and the way of ordering:



*) The type 1FF6Y can also be used for grinding of car windshield rims.

Ordering example:

- 14EE1 150-10-10-H-V115 119D39-42MBO2, 63 m/s
  for decoration
- 100G 42 – 12 – 60 114D181 – 50MB02
  for glass boring

You can order diamond grinding tools in grain sizes M25 to D251 as per FEPA standard.
For decoration work we suggest the following:
- M25, M40 – fine grinding, tarnishing
- D46, D54 – fine grinding before chemical treatment
- D213, D251 – rough grinding

We produce diamond tools in various types of metal bonds. Appropriate grinding tool quality should be agreed upon together with the user whereby the type of workpiece, surface quality and grinding method should be considered.

For Dressing of Diamond Tools we offer ceramic bonded grinding sticks
Type 90PR BxCxL in 2A150/1H8V20 and
Type 90KV B/CxL in Specifications:
2A220/1J10V35 for fine grinding
2A100/1L9V35 for rough grinding.

(Glass can also be ground with grinding wheels type 1 ST in vitrified bond made of silicon carbide or even aluminium oxide: 1ST 150x10x25 mm 2A320/1P12V22)

Range of Diamond Tools for glass Grinding

Shape	Dimension
9EE1	80-20-10-V140
9EE1	100-10-10-V115
9EE1	12-8-10-V110
9EE1	12-10-10-V115
9EE1	150-8-10-V110
9EE1	150-10-10-V115
9EE1	150-13-10-V110
9EE1	150-15-10-V115
9EE1	150-20-10-V135
9EE1	150-25-10-V115
9EE1	150-30-10-V105/V135
9EE1	150-32-10-V110/V150
9EE1	150-35-10-V140
9EE1	200-8-10-V135
9FF1	100-20-10-R40
9FF1	50-10-10-R10
9FF1	150-16-10-R8
9FF1	250-20-10-60-R10
9FF1	250-35-10-60-R20
9FF1	250-35-10-60-R40
1A1	150-30-10-60
1A1	150-25-10-60

Diamond Plate for Glass Surface Grinding.

These tools are to be used for surface grinding of glass and ceramical workpieces.
We produce them with Resinoid Bond.
Grain sizes:
- Coarse: D181, D301
- Medium: D76, D126
- Fine: D39, D54

Dimensions:
Diameter 300 - 600 mm.
Designation: 1A2M D-W-X-H
Range of dimensions:
400-150-5-35
400-175-5-40
600-230-5-38

Diamond plates are produced for manual grinding and for automatical grinding.

General rules

For a safe grinding the following agents are responsible:

- The machine builder
- The grinding wheel manufacturer
- The user of grinding wheels and machines

The machine builder must guarantee for the proper stabilitiy of the grinding machine construction and for the adequate safety of the protection hoods. The grinding wheel manufacturer should ensure that the wheels are safe in grinding.
This can be achieved by selection of appropriate components and adequate technological procedures. Throughout the production process inspection of the wheels is preformed whereby not only quality but especially safety in grinding is guaranteed since the safety test preformed at the end is the essential part of the control. The instructions for safe use are either on the wheel itself or on the marking labels (indication of the premissible revolutions per minute or the class of grinding).

The safety test includes:
- Test-run at overspeed (determining wheel strength, centrifugal load),
- Visual inspection,
- Sound test by grinding wheels in vitrified bond with diameter bigger than 80 mm.

The test is caried out according to the DSA regulations.
The users of the grinding tools should provide for an adequate storage and transport of the grinding wheels to the grinding location. They must also provide correct mounting of the wheels. The user should never exceed the indicated maximum operating speed given on the label enclosed with each grinding wheel.
The operating person must be fully familiar with rules concerning safe grinding.

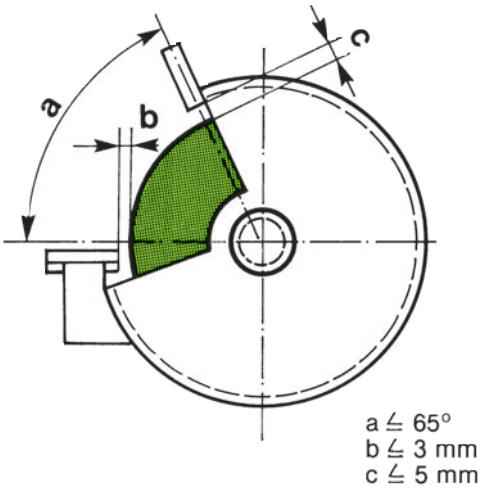
When controlling the technical parameters of manufactured grinding wheels we keep to the following standards:
- to DIN ISO 603-1 to 603-12 as standard for standard dimensions
- to DIN ISO 13942 as standard for diameter tolerances (TD), thickness tolerances (TT) and hole tolerances (TH)
- to EN DIN ISO 6103 as standard for wheel balance tolerances
- to DIN ISO 13942 as standard for radial and axial stroke tolerances
- to EN DIN 12413, item 5, as standard for final control of the manufactured wheels.

Grinding on portable grinding machines

Portable grinders belong to the most commonly used grinding machines and it is therefore surprising that working with them is often accompanied by troubles. So, in addition to the general rules, the following should be considered:

- If the machine is air driven, the speed of the spindle (revolutions per minute) should be regularly checked and (re)adjusted to correspond with the machine builder's declaration.
- The machine should not be operated without safety guard. This requirement does not apply to the both sides tapered wheels with mounting flanges according to DSA.
- Side-grinding operations should never be performed with cutting-off wheels because they not withstand the excessive side pressure, so extreme caution should be paid here! Side grinding should only be performed with depressed centre grinding wheels with a thickness of at least 4 mm.
- Operators must always be protected by protection devices such as safety goggles, safety leather aprons, gloves and other protective clothing.

Safety guards



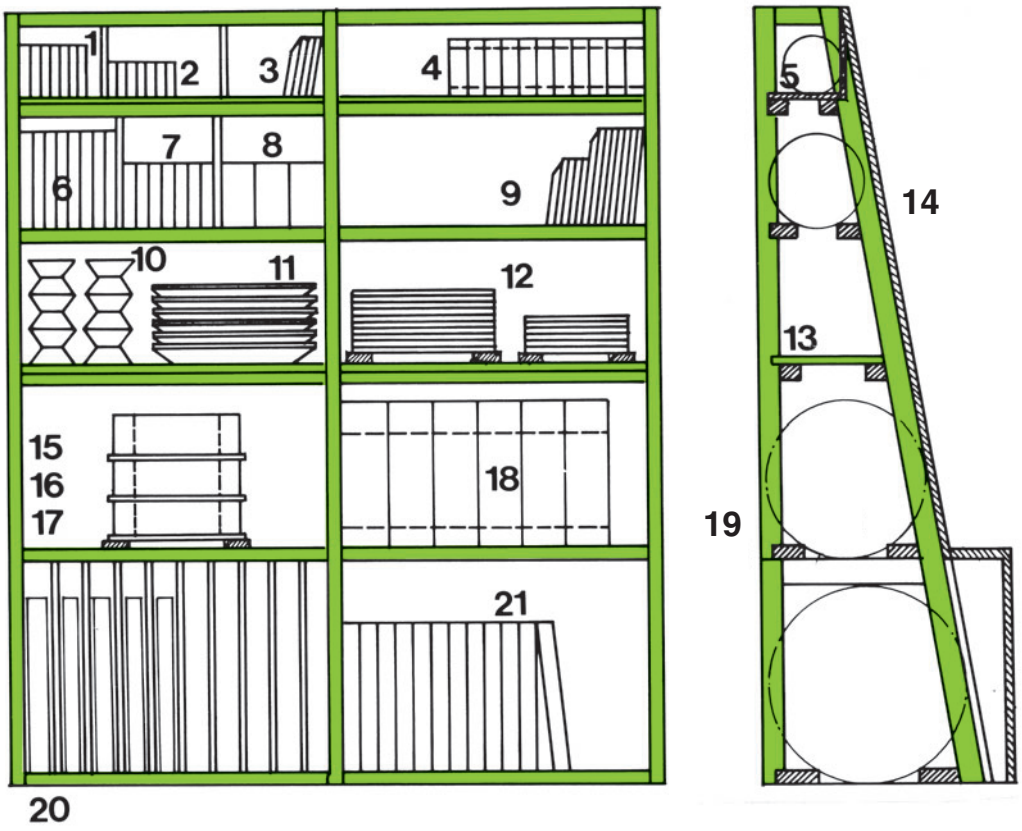
Example: Safety guard on stationary grinding machines with manual feeding.

All abrasive tools must be protected by means of safety guards made of steel or other suitable materials. Safety guards must fit the grinding machine and suit the conditions of work.

The distance between the work-support and the grinding wheel should never exceed 3 mm, the distance between the wheel and the top of the guard opening should not exceed 5 mm. The maximum exposure should not exceed 65˚.

With hand-feed grinding machines the wheel wear should be considered by means of proper adjustment of the work support and the closing of the safety guard with the shield.

Storage of the grinding tools



The figure shows most adequate way of storage:

1 - Straight wheels
2 - Straight wheels
3 - Small dish wheels (type 12)
4 - Small cups and cylinders
5 - Inclined shelf for small wheels
6 - Straight wheels
7 - Straight wheels
8 - Straight wheels
9 - Saw sharpening wheels
10 - Flaring cup wheels
11 - Large dish wheels
12 - Cutting-off wheels; flat rigid support-plate of steel or similar material
13 - Flat shelf for cutting-off wheels and shape wheels
14 - Protection back wall
15 - Corrugated paper cushions
16 - Thin-wall or soft grade cylinders
17 - Supporting plate—steel or thick vitrified abrasive wheel
18 - Thick-rim or hard grade cylinders
19 - Front edge of wheels should not protrude in front of supports
20 - Large straight wheels
21 - Medium sized straight wheels

Abrasive tools should not be stored in rooms where they are subject to humidity (maximum allowed relative humidity is 75%). They should neither be exposed to various solvents and temperature changes, because all of these factors have a negative effect on the strength of the resinoid bonded abrasive tools.

All abrasive tools should be stored as near as possible to the grinding location in order to prevent damage such as breakage etc., and to avoid the concentration of humidity and dampness during winter transports.

Since abrasive tools break easily care should be taken by handling and trucks or other suitable conveyances which provide protected transporting of larger and heavier abrasive tools should be used. Suitable racks, shelves, drawers or boxes should be provided for storing various types of abrasive tools. The following suggestion should be paid attention to:

- Large diameter wheels are best stored in upright position on nether rack-shelves;
- Thick-wall wheels are also stored in an upright position, whereas thin-wall wheels should be laid flat on a flat surface; between wheels corrugated paper cushions should be placed as separator;
- Both thin wheels and cutting-off wheels should be laid on a flat surface to prevent twisting;
- On the upper shelves smaller grinding tools and standard shape abrasive wheels are stored;
- Abrasive sticks, mounted wheels and other small abrasive tools can be stored in boxes.

Such storage rooms should be available both for new wheels and partly used wheels.
Shelf life of vitrified bonded wheels is unlimited.

All resinoid bonded wheels including resinoid bonded wheels reinforced with glass reinforcements can be stored for a limited time only because resinoid bonds age.

Shelf life of non reinforced resinoid bonded wheels is one year and of wheels with glass reinforcements 3 years. After the shelf life period expires resinoid bonded wheels must be tested for usage according to the safety standard regulations or they should be disposed of (destroyed).

Recommendations

Grinding can be:
• Wet–with use of coolants;
• Dry–without the use of coolants

Rough grinding (snagging) and cutting-off are as a rule dry grinding operations. Coolant is used in grinding non-metals, in precision grinding, and usually also in tool grinding.

Vitrified bonded grinding wheels are not affected by chemical influence of the coolants. When resinoid bonded grinding tools are used for wet grinding, special types of bond (less affected by the damaging influence of the cooling agents) should be used. In such cases customers should always indicate that the grinding tool is to be used for wet grinding.
Resinoid bonds designated for wet grinding are: B03, B08, B09, B10, B11.

By wet grinding the following rules must be observed:
• Always use plenty of coolant. The jet of the solution should have the same width as the grinding tool and it should run directly upon the workpiece at the grinding point, so that it can both wash the grinding tool and cool the workpiece simultaneously.
• The coolant must meet the following requirements:
• It must have a cooling and lubricating effect, detergent power and an anticorrosive effect;
• It should not foam;
• It should not be inflammable;
• It should not decay easily;
• It must be ecologically safe.

Notice:
When wet grinding jobs are preformed, the grinding tool should be obligatory centrifuged after the grinding operation. Coolant-soaked wheels are unbalanced, which can cause wheel breakage when the machine is run again. Resinoid bonded wheels should also be centrifuged, so as to avoid the damaging effect of coolant when the wheel is not in use.

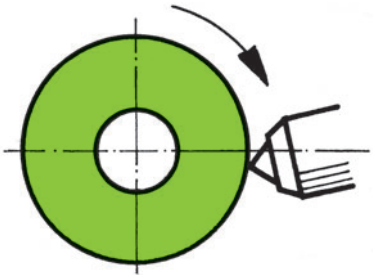
Truing and dressing of grinding tools

If during the operation the wheel gets dull or is loading, or if it looses its geometrical form, the wheel should be dressed. When working with diamond dressers, the following should be considered:

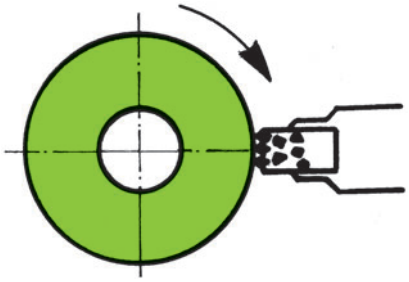
- When selecting a single point diamond dresser, the following chart should serve as a guideline:

Grinding wheel diameter D (mm)	**Carat** (1 Carat = 0,2 g)
100	0,25 - 0,5
150	0,3 - 0,6
200	0,5 - 1
300	0,8 - 1,2
400	1 - 1,5
500	1,2 - 2,5
600	2 - 3
800 and more	3

- The operating angle between the grinding tool and the single point of a diamond dresser should be between 10˚-15˚.
- The depth of dressing should not exceede 0.03 mm.



- The operating angle between the grinding tool and multi point diamond dresser is 90˚.



- Prior to dressing, plenty of coolant should be provided for, directed exactly upon the diamond.

A finer surface can be obtained by a smaller depth of dressing or by a smaller feed.

Mounting

The procedure:
Skilled and well trained person only should be assigned to mounting of grinding wheels.

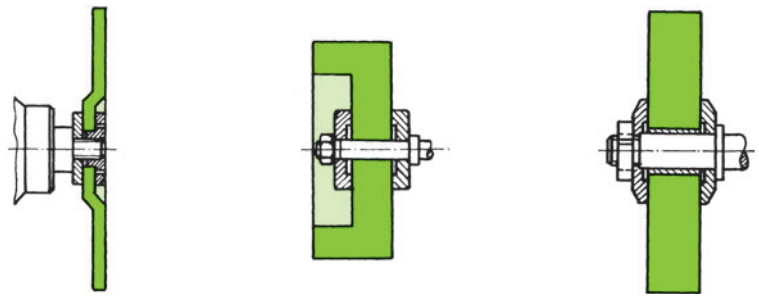
Prior to mounting, wheels must be suspended and given a ring test. Mounting of wheels upon the spindle or other mounting device must be preformed without force or use of hammer and it must warrant for a safe and firm hold.

The grinding wheel should be fastened by means of flanges made of cast iron, steel or similar material, except when the class of grinding or type of operation require another kind of fastening.

Blotters made of compressible material (rubber, soft cardboard, felt, leather…) should always be used between flanges and wheels. After each remounting the grinding wheel should be test-run at full operating speed for at least five minutes, during which time the danger-area should be well protected. Only after the test has proven statisfactory, the wheel can be applied. The maximum premissible operating perpheral speed should never be exceeded. (The maximum operating speed is marked on the wheel or wheel label). Therefore prior to mounting, it must be ensured that the number of revolutions/min indicated on the machine does not exceed the maximum premissible rotational speed of the grinding tool. Special attention should be paid to machines with adjustable rotational speeds for grinding tools. With grinding tools that are mounted by means of screws and are therefore furnished with one or more nuts (grinding wheels, cylinders, segments), the screws should be checked for their length, because at mounting too long screws pull the nuts out.

Mounting of straight grinding wheels

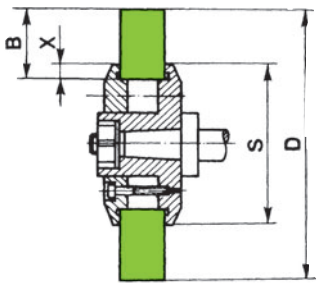
Straight grinding wheels with small holes



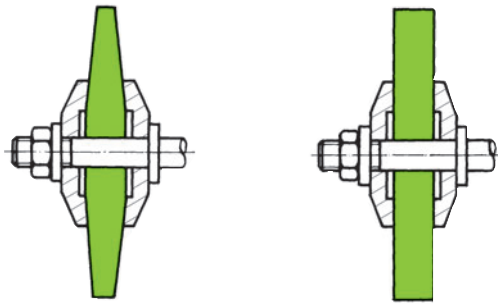
Mounting procedures and types of flanges for various types of grinding tools according to DSA standard regulations.

Straight grinding wheels with large holes

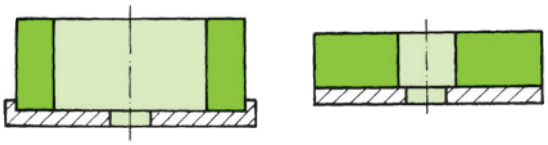
D=grinding tool diameter
S=diameter of the mounting flange



Grinding wheels without safety guards

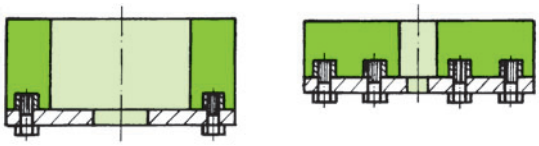


Gluing to the mounting plate



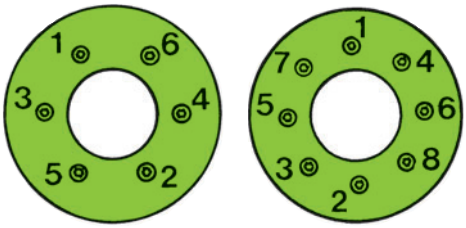
Grinding wheels and ring wheels for straight grinding, glued to mounting plates.

Screwing to the mounting plate



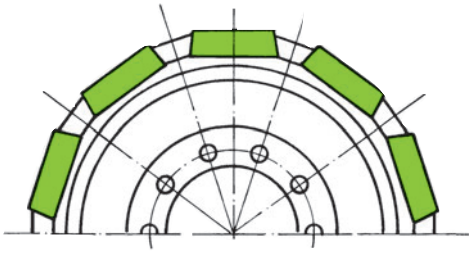
Grinding wheels and cylinders with inserted nuts for straight grinding, screwfastened to the plates.

Sequence of tightening screws



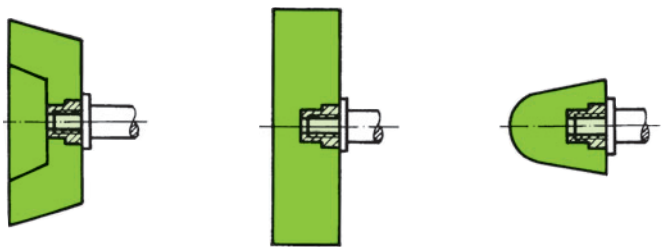
To tighten screws on multiple screw flanges, torque wrenches should be used. As a rule, the torque should not exceed 27 Nm. The tightening should proceed in a crisscross manner. (See figure!)

Mounting of segments



The chuck for mounting segments.

Mounting of grinding tools with central inserted components.



Mounting of grinding tools with inserted nut or shank.

After the wheel mounting, the safety guard should be secured in its place!

Peripheral speeds

Maximum operating peripheral speeds

The maximum operating speed of a grinding wheel depends upon:
- The wheel type and the dimension
- The specification of the wheel
- The type of grinding (forced mechanical guidance, offhand guidance)
- The grinding machine construction

The peripheral speeds are divided into normal (standard) and higher than normal speeds (special speeds).

Table of standard maximum operating speeds (m/s) dependent upon the shape and wheel specification and class of operating.

Bond	Designation	Class of operating	Wheel type	Maximum permissible operating speed (m/s)
Vitrified	V	Peripheral	1, 3, 4, 5, 7, 16, 17, 18(R), 19, 20, 21, 22, 23, 24, 25, 26, 38, 39, 52	40
		Side grinding	2, 6, 9, 11, 12, 31, 35, 36, 37	32
Resinoid	B	Peripheral	1, 3, 4, 5, 7, 16, 17, 18(R), 19, 20, 21, 22, 23, 24, 25, 26, 38, 39, 52	50
Resinoid Fibre reinforced	BF	Side grinding	2, 6, 9, 11, 12, 31, 35, 36, 37	40
		Cutting	41	50

All our products are made in accordance with FEPA Safety Standards and with German VBG-UVV49 Safety Regulations.

Higher operating speeds

All peripheral speeds higher than those listed in the table of standard peripheral speeds, including the operating speed 50 m/s, are considered higher speeds. Wheels approved for special (higher) speed application are accordingly marked by means of one or two stripes in diferent colours across the wheel diameter.

Maximum operating peripheral speed m/s		**Colour stripe**
50	1 x blue	
63	1 x yellow	
80	1 x red	
100	1 x green	
125	1 x green 1 x blue	

Application of grinding tools at higher speeds is allowed only in case if the grinding wheel is definied and declared for operations at higher speeds and this only on machines with appropriate constructions and guards. In countries with different regulations and safety requirements, usage declarations or authorizations from appropriate authorities must be obtained, such as SUVA (for Switzerland).
Swaty grinding wheels meet the requirements of European Safety Standards EN 12413, EN 13743 and EN 13236.

Pheripheral speeds table

Number or revolutions per minute dependent on the wheel diameter and the operating peripheral speed

D (mm)	v (m/s)													
	15	16	20	25	30	32	35	40	45	50	60	63	80	100
	n (rpm)													
25	11500	12200	15300	19100	22900	24400	24700	30600	34400	38200	45800	48100	61100	76400
32	8950	9550	11900	14900	17900	19100	20900	23900	26900	29800	38500	37600	47700	59700
40	7160	7640	9550	11900	14300	15300	16700	19100	21500	23900	28600	30100	38200	47700
50	5730	6110	7640	9550	11500	12200	13400	15300	17200	19100	22900	24100	30600	38200
63	4550	4850	6060	7580	9100	9700	10600	12100	13600	15200	18200	19100	24300	30300
80	3580	3820	4770	5970	7160	7640	8360	9550	10700	11900	14300	15000	19100	23900
100	2860	3060	3820	4770	5730	6110	6680	7640	8590	9550	11500	12000	15300	19100
125	2290	2440	3060	3820	4580	4890	5350	6110	6880	7640	9170	9630	12200	15300
150	1910	2040	2550	3180	3820	4070	4460	5090	5730	6370	7640	8020	10200	12700
175	1640	1750	2180	2730	3270	3490	3820	4370	4910	5460	6550	6880	8730	10900
180	1590	1700	2120	2650	3180	3400	3710	4240	4770	5310	6370	6680	8490	10600
200	1430	1530	1910	2390	2860	3060	3340	3820	4300	4770	5730	6020	7640	9550
225	1270	1360	1700	2120	2550	2720	2970	3400	3820	4240	5090	5350	6790	8490
230	1250	1330	1660	2080	2490	2660	2910	3320	3740	4150	4980	5230	6640	8300
250	1150	1220	1530	1910	2290	2440	2670	3060	3400	3820	4580	4810	6110	7640
300	955	1020	1270	1590	1910	2040	2230	2550	2860	3180	3820	4010	5030	6370
350	819	873	1090	1360	1640	1750	1910	2180	2460	2730	3270	3440	4370	5460
400	716	764	955	1190	1430	1530	1670	1910	2150	2390	2860	3010	3820	4770
450	637	679	849	1060	1270	1360	1490	1700	1910	2120	2550	2670	3400	4240
500	573	611	764	955	1150	1220	1340	1530	1720	1910	2290	2410	3060	3820
550	521	556	694	868	1040	1110	1220	1390	1560	1740	2080	2190	2780	3470
600	477	509	637	796	955	1020	1110	1270	1430	1590	1910	2010	2550	3180
650	441	470	588	735	881	940	1030	1180	1320	1470	1760	1850	2350	2940
700	409	437	546	682	819	873	955	1090	1230	1360	1640	1720	2180	2730
750	382	407	509	637	764	815	891	1020	1150	1270	1530	1300	2040	2550
800	359	382	477	597	716	764	836	955	1070	1190	1430	1500	1910	2390
900	318	340	424	531	637	679	743	849	955	1060	1270	1340	1700	2120
1060	270	288	360	450	541	577	631	721	811	901	1080	1140	1440	1800
1250	230	245	305	380	458	488	534	610	685	760	915	960	1020	1525

Revolutions per minute for various diameters of abrasive wheels are calculated through the peripheral speed according to the following formula:

$$n = \frac{60 \cdot v \cdot 1000}{D \cdot \pi}$$

v = peripheral speed (m/s)
D = diameter of the wheel (mm)
π = 3,14
n = revolutions per minute (rpm)

QUESTIONNAIRE/TEST GRINDING REPORT

Grinding wheel factory SWATY, d.d.
2000 Maribor, Slovenia
tel. +386 (0)2 330 10 51
fax +386 (0)2 332 77 70

CUSTOMER: _____

GRINDING TOOL:
Manufacturer: Type: Wheel size: Specification: Ident No.:

Consumption per year: _____ Was the grinding tool suitable? YES NO

Workpiece surface:	The wheel:	The wheel:	Wheel face:	Wheel wear:
1. good	1. grinds well	1. remains open	1. stable	1. low
2. too rough	2. does not	2. loads a little	2. gets round	2. normal
2. too fine	3. burns	3. loads (much)	3. crushes out	3. high

Efficiency of grinding tool (number of pieces, number of cutts)

GRINDING MACHINE - GRINDING PROCEDURE

Grinding operation: _____

Machine type: _____

Grinding wheel operating speed: _____ m/s Revolutions: RPM _____

Workpiece speed: _____ m/s Revolutions: _____ RPM

Table feed speed: _____ m/min Feed _____ µm Infeed: µm _____

Mounting of workpiece: _____ Dressing with: _____

Dressing speed: 1. slow 2. middle 3. quick or _____ m/min

❑ Wet grinding with: _____ ❑ Dry grinding

Cooling amount: 1. slow 2. middle 3. quick or _____ l/min

Surface: Rugotest Ra: CLA-AA RZ

N _____ _____ µm _____ inch _____ µm

WORKPIECE: _____

Material specification: ❑ unhardened ❑ hardened ❑ heat treated steel:

Marking: _____ Hardness: _____ HB Hro HV SH...

Tensile strength: _____ N/mm² Elasticity +3 +2 +1 0 -1 -2 -3 Plasticity +3 +2 +1 0 -1 -2 -3

Workpiece analysis: C Si Mn P S Co Cr Ni Cu Al Mo V W Ti _____ _____ _____ _____ _____

_____

Dimensions of grinded surfaces of workpiece: _____ Sketch: _____

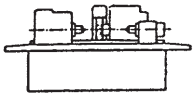
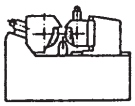
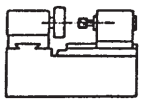
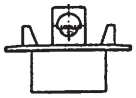
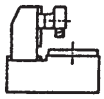
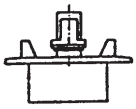
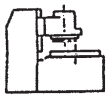
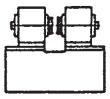
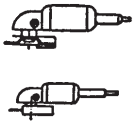
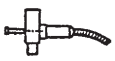
Condition of workpiece: ❑ Not ground ❑ Rough ground ❑ Preground

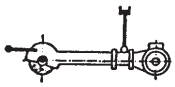
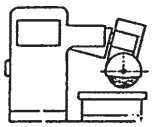
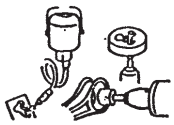
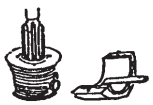
Notes: _____

Date _____ Signature: _____

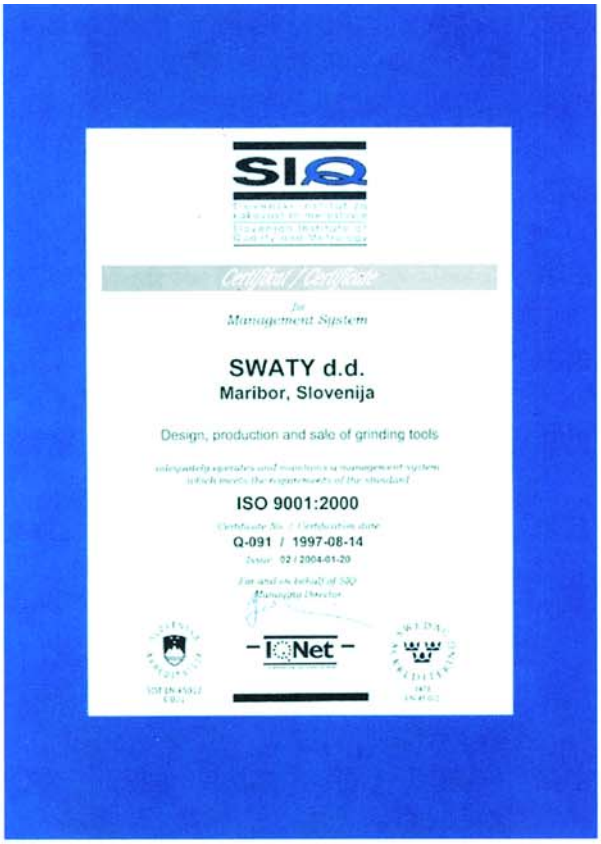
Manufacturer's recommendation:

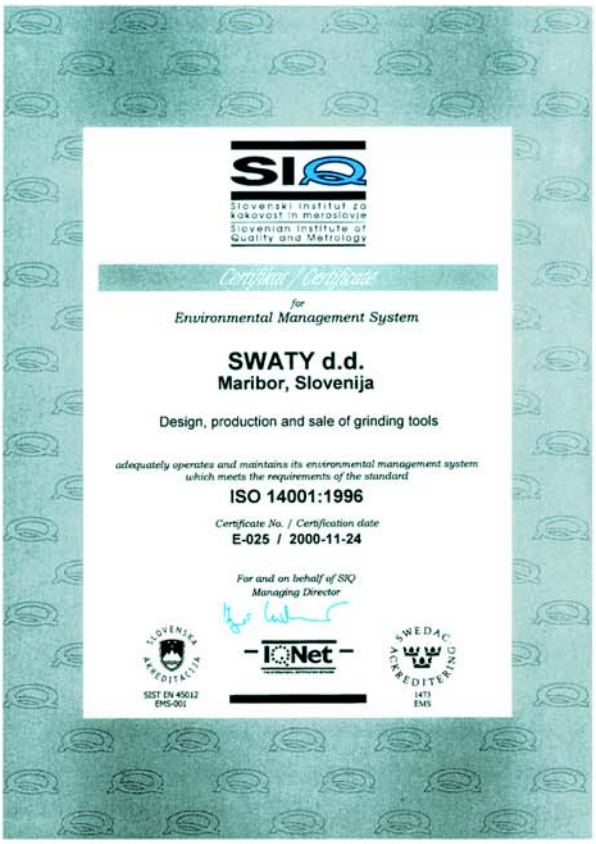
TYPES OF GRINDING AND APPROPRIATE TYPES OF GRINDING TOOLS

1		TYPE: 1, 5, 7, 20, 21, 22, 23, 24 CYLINDRICAL GRINDING BETWEEN CENTRES
2A 2B		TYPE: 1, 5, 7 CENTRELESS GRINDING TYPE: 1, 5, 7 CENTRELESS GRINDING
3		TYPE: 1, 5, 6, 11 INTERNAL GRINDING
4		TYPE: 1, 5, 7 SURFACE GRINDING WITH TRANSVERSATING TABLE
5		TYPE: 1, 5, 7 SURFACE GRINDING WITH ROTATING TABLE
6		TYPE: 2, 6, 31, 35, 37 SURFACE GRINDING WITH TRANSVERSATING TABLE
7		TYPE: 2, 6, 31, 35, 36, 37 SURFACE GRINDING WITH ROTATING TABLE
8		TYPE: 2, 35, 35, 37 DOUBLE WHEEL STRAIGHT GRINDING
9		TYPE: 3, 4, 5, 6, 11 TOOL GRINDING
10		TYPE: 1, 5 OFFHAND GRINDING
11A 11B		TYPE: 27, 28, 29, 30 OFFHAND GRINDING TYPE: 41.., 42 OFFHAND CUTTING
12		TYPE: 4A, 4K OFFHAND GRINDING WITHOUT SAFETY GUARDS
13		TYPE: 1A OFFHAND GRINDING

14		TYPE: 1A OFFHAND CUTTING
15A 15B		TYPE: 1A, 1AO, 1FK GRINDING WITH SWING-FRAME MACHINES TYPE: 41.. CUTTING-OFF WITH SWING-FRAME MACHINES
16		TYPE: 41.. CUTTING-OFF, MANUAL INFEED OF WORKPIECE
17		TYPE: 41.. CUTTING-OFF, MANUAL INFEED OF WHEEL
18		TYPE: 41.. CUTTING ON STATIONARY GRINDING MACHINES
19A 19B		TYPE: 1A FLOOR GRINDING TYPE: 41.. FLOOR CUTTING
20		TYPE: 2, 31, 35, 36, 37 OFFHAND FLOOR GRINDING
21		TYPE: 1VS HIGH-PRESSURE GRINDING (SNAGGING)
22A 22B		TYPE: 52.. SHARPENING TYPE 52.. OFFHAND TOOL GRINDING
23A 23B		TYPE: 54.. HONING TYPE: 90.. OFFHAND SHARPENING
24		TYPE: 54SF SUPERFINISHING
25		TYPE: 1NA, 1Z, 1ZD, 3, 12 GEAR AND THREAD GRINDING
26	OTHER TYPES OF GRINDING:	TYPE:

Since the year 1879





Conception of Quality Grinding

Swaty d.d. Grinding Wheels Factory