



We design, manufacture and supply wide range
of general-purpose and special abrasive tools

ABRASIVE TOOLS

PRODUCT CATALOGUE / ISSUE 6.1



WE OFFER NEW, INNOVATIVE ABRASIVE TOOLS:

- 1. Using abrasive micro-aggregates along with resin and vitrified bonding, differentating from conventional tools by:**
 - Improvement of the abrasiveness of the grinded surface,
 - Power decrease during the process of grinding (more beneficial stereo metric parameters),
 - Limiting the sizing (clogging) in the work surface of the grinding wheel with shavings of the stock,
 - Making a more stable management of the grinding wheel.
- 2. With the usage of the synthetic resin composition, distinguishing among the tools with phenolic-formaldehyde resin by:**
 - Improvement of the roughness of the grinded surface,
 - Increase of the efficiency of the grinding operations.



ABRASIVE TOOLS PRODUCT CATALOGUE

ISSUE 6.1

ANDRE ABRASIVE ARTICLES

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RESINOID BONDED ABRASIVE TOOLS



VITRIFIED BONDED ABRASIVE TOOLS


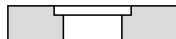
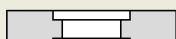
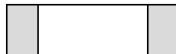


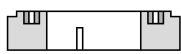







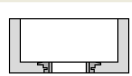
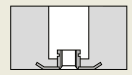
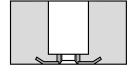





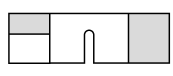

SEMI-FLEXIBLE ABRASIVE TOOLS

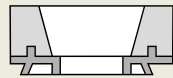
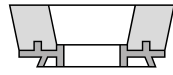
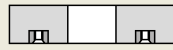
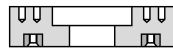
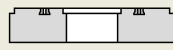

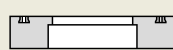

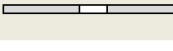


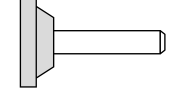

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RESINOID BONDED ABRASIVE TOOLS


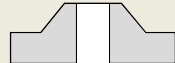
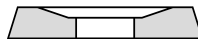
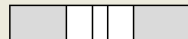
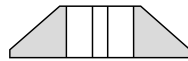
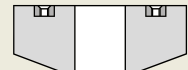
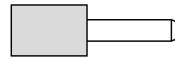
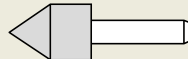
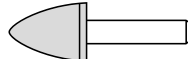
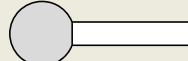

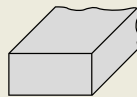
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INTRODUCTION

The object of this catalogue are the general-purpose and special abrasive tools designed, manufactured and supplied by ANDRE ABRASIVE ARTICLES, Koło, Poland.

This catalogue supersedes the previous fourth issue and takes into account all novelties introduced to production program of the Plant. The ANDRE ABRASIVE ARTICLES Firm belongs to a group of middle-sized European manufacturers of abrasive tools. Its production output is being sold in Poland, on European markets and in other continents. The firm was established in 1987. The founder, owner and Director General is Mr. Robert Andre M.Sc, a graduate of Poznan University of Technology.

The ANDRE ABRASIVE ARTICLES Firm has introduced the Integrated Quality, Environmental and Work Safety Management System consistent with:

- PN-EN ISO 9001:2008
- PN-EN ISO 14001:2005
- PN-N 18001:2004

Standards.

We invite you to technical and commercial co-operation.



TRADE INFORMATION

Ordering mode.

Important!

Typical, general-purpose and ready available from store abrasive tools are supplied immediately after they are ordered.

Orders for other atypical and special abrasive tools are accepted in accordance with the mutually agreed mode and dates.

Order.

1. The order will be complete if the following elements have been accurately defined:
 - Quantity
 - Type, Shape / Profile
 - Dimensions
 - Characteristics
 - Required operating speed*
2. On page 101 in this catalogue there is a "Questionnaire" allowing for collecting of the data necessary for selection of the correct technical characteristics for the given grinding tool.

*) In Table 4 on page 26 a series of normalized operating speeds is presented. In case the speed parameter is missing in the order, this means an acceptance of appropriate standard, normalized values.



PRZEDSIĘBIORSTWO
FAIR PLAY



TECHNICAL INFORMATION

Definitions

Bonded abrasive tools are production tools that perform their task by cutting material being ground. They consist of abrasive grains and a bonding agent.

Abrasive material - natural or synthetic mineral substance disintegrated into grains of defined size and shape, having cutting properties.

Bond - material that holds together abrasive grains.

Grain and micrograin size - a number that expresses the range of grain dimensions (also referred as granulation, granularity).

Grade and micrograin dimensions - dimensions of grains and micrograins of abrasive material expressed in [mm] or [µm].

Grade (of hardness) of bonded abrasive tool - the strength with which the bond holds the abrasive grain together. Expressed in letters from E to W.

Structure - a number that expresses the percentage portion of abrasive grain in the whole volume of abrasive tool.

In accordance with origin criterion, abrasive materials can be divided into:

- natural
- synthetic materials, obtained in electrothermal as well as in physical and chemical processes

In accordance with grade of hardness criterion, they can be divided into:

- hard
- extra hard materials.

Abrasive tools manufactured from the hard abrasive materials are essentially divided into:

- bonded
- coated

In case of bonded abrasive tools, abrasive grains are held together by a bonding material: vitrified, resin, rubber or magnesite.

The following groups can be distinguished here: grinding wheels, grinding segments, abrasive sticks.

In case of coated abrasive tools, the abrasive layer is bonded with paper, fabric, fibre backing material by adhesive. Sheets, tapes, belts, discs, etc. may be distinguished here.

The ANDRE ABRASIVE ARTICLES manufactures bonded abrasive tools using hard abrasive materials. Assortment and technical characteristics are presented in the following catalogue sheets.

ABRASIVE MATERIALS

Tools made by "ANDRE" contain modern, hard abrasive materials.

Aluminum oxide (synthetic corundum) - $\alpha\text{Al}_2\text{O}_3$

Aluminum oxide in different variations is the most frequently used abrasive material.

It is melted from bauxite or aluminium oxide at temp. over 2000° C in electric furnaces.

95A - Normal aluminium oxide (brown)

It is prepared from bauxite. Contains 95% Al_2O_3 , ~ 3% titanium dioxide (TiO_2) oraz ~1-2% other admixtures. It is the most resistant synthetic corundum and is characterized by its high ductility. It is used for cutting-off and rough grinding of low-alloy steels, stainless steels, cast iron, especially for high rates of stock removal.

97A - Semifriable aluminium oxide (grey)

It is prepared from calcinated bauxite with aluminium oxide addition. Contains 97% Al_2O_3 corundum and is characterized by medium hardness and strength. It is used for precision grinding and tool grinding.

99A - Friable aluminium oxide (white)

It is prepared from pure aluminium oxide. It is the purest synthetic corundum and contains over 99% Al_2O_3 . It is characterized by its high hardness and brittleness. It is used for precision grinding, e.g. surface and cylindrical grinding, sharpening of cutting tools.

CrA - Chromium aluminium oxide (pink)

It is prepared from aluminium oxide with an addition of up to several percent of chromium oxide. It is characterized by its high hardness and higher strength in comparison with white aloxite. It is used for precision grinding of high-alloy steels, sharpening of cutting tools.

M - Monocorundum (grey)

It is prepared from bauxite by reduction process. Contains over 99% Al_2O_3 . It is characterized by its high microhardness and mechanic strength and has an excellent self-sharpening ability. It is used for grinding of high-alloy high-speed steels and sharpening of tools. Excellent for grinding of complex profiles.

ZrA - Zirconia aluminium oxide

It is prepared from aluminium oxide or bauxite with an addition of zirconium dioxide. It is characterized by the highest microhardness and mechanic strength among other aloxites. It is used for highly efficient grinding of cast iron, grinding of steel semiproducts using high pressures.

Silicon carbide (carborundum) - SiC.

Prepared from high-silica sand of high purity and petroleum coke in resistance furnaces using the synthesis process. The second, after diamond, in respect to hardness.

99C - Green silicon carbide

High purity silicon carbide is green and contains 99% SiC min. It is used for grinding of sintered carbides, ceramics, stones, sharpening of cutting tools with sintered carbide inserts.

98C - Black silicon carbide

Contains 98% SiC and more amount of admixtures. Similarly to 99C, it is used for grinding of sintered carbides, ceramic materials, concrete, stone, rough grinding of castings (fettling) made of hard and fragile white cast iron and for cutting of concrete, stone and white cast iron.

TABLE 1: GRAIN SIZES IN ACCORDANCE WITH FEPA 42-D-1984 AND PN/M-59107 STANDARDS

Macrograins				Micrograins	
FEPA designation	Mean sizes of grain [mm]	FEPA designation	Mean sizes of grain [mm]	FEPA designation	Mean sizes of grain [μm]
F4	5,600 - 4,750	F36	0,600 - 0,500	F230	56,0 - 50,0
F5	4,750 - 4,000	F40	0,500 - 0,425	F240	46,5 - 42,5
F6	4,000 - 3,350	F46	0,425 - 0,355	F280	38,5 - 35,0
F7	3,350 - 2,800	F54	0,355 - 0,300	F320	30,7 - 27,7
F8	2,800 - 2,360	F60	0,300 - 0,250	F360	24,3 - 21,3
F10	2,360 - 2,000	F70	0,250 - 0,212	F400	18,3 - 16,3
F12	2,000 - 1,700	F80	0,212 - 0,180	F500	13,8 - 11,8
F14	1,700 - 1,400	F90	0,180 - 0,150	F600	10,3 - 8,3
F16	1,400 - 1,180	F100	0,150 - 0,125	F800	7,5 - 5,5
F20	1,180 - 1,000	F120	0,125 - 0,106	F1000	5,3 - 3,7
F22	1,000 - 0,850	F150	0,106 - 0,075	F1200	3,5 - 2,5
F24	0,850 - 0,710	F180	0,090 - 0,063	-	-
F30	0,710 - 0,600	F220	0,075 - 0,053	-	-

SYMBOLS AND DESIGNATIONS OF ABRASIVE TOOLS

Designation system of abrasive tools

Designation of abrasive tool, consistent with the Standard ISO 525, consists of the following groups of alphanumerical characters separated by character "-".

I group	-	Type + profile
	-	Dimensions
II group	-	Technical characteristics
III group	-	Permissible operating speed (for grinding wheels)

as well as a name and/or manufacturer's mark.

In addition, the following additional information, in the form of inscriptions or symbols, may be present on abrasive wheels, segments and sticks:

- colour strips acc. to speed colour code
- safety marks and/or certificate numbers
- pictograms, personal protection symbols, instructions, limitations in application
- designation, e.g. "STEEL", "CONCRETE", "INOX", "ALUMINIUM", etc.
- symbol of static unbalance orientation of grinding wheel or direction for mounting on spindle

This will be discussed in the following Sections of this Catalogue.

Table 2 on page 11 presents a sequence of designations in marking for abrasive tools manufactured by ANDRE ABRASIVE ARTICLES, Koło.

Shape designations

Standard shapes and sequence of dimensions are presented in the **Table 3 on page 14**. The Table is a fragment of Standard ISO 525. Other than standard types, shapes, dimensions of abrasive tools, used on grinding machines in the whole world, may also exist. Therefore, these catalogue sheets contain a wider range of them.

Dimensions

The catalogue sheets specify dimensions of abrasive tools that have been supplied to our customers till now. Other dimensions, shapes, profiles and characteristics may be a subject of analysis, agreements and supplies.

Technical characteristics

Technical characteristics describe features of abrasive tool that have a direct effect on grinding results and work safety. Rules for selection of individual elements of characteristics for particular conditions and requirements of grinding operations will be discussed separately; examples of typical applications will be presented.

Permissible operating speed of grinding wheel.

Each grinding wheel has its defined maximum permissible operating speeds: rotational speed and peripheral speed.

The operating speed of grinding wheel is expressed as follows:

- rotational speed $n [\text{min}^{-1}]$ = revolutions per minute [rpm] or [1/min.], [obr/min.]
- peripheral speed $v [\text{m} \cdot \text{s}^{-1}]$ = metres per second or [m/s]

The formulae for expressing "n" as a function of "v" and vice versa are:

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

$D [\text{mm}]$ = diameter of grinding wheel

Table 4, page 26 facilitates the conversion of the a.m. values for the most commonly used diameters of grinding wheels.

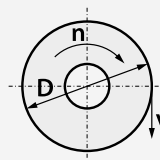


Fig. Graphical presentation of relationship between peripheral "v" and rotational "n" speeds.

The user must check that the maximum permissible rotational speed specified on the wheel is consistent with that stated on the grinding machine.

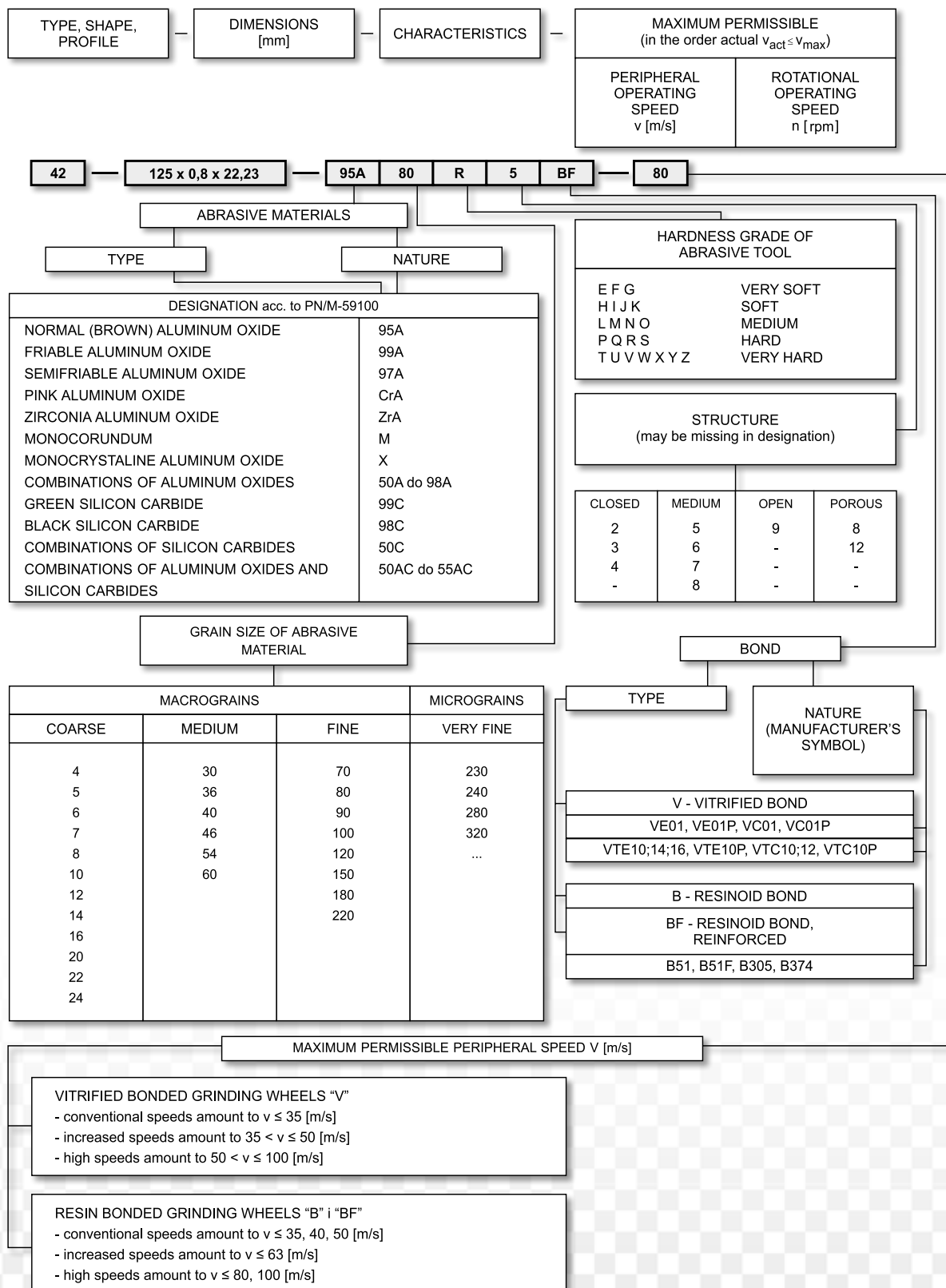
In no circumstances the maximum permissible rotational speed of grinding wheel should be exceeded. In case of machines with infinitely variably or stepwise control of spindle speed the rotational speed of grinding wheel can be increased as the wheel wears but no more than the maximal permissible peripheral speed of grinding wheel.

The maximum permissible rotational speed for mounted points is depended on the length the spindle overhangs the grinding machine clamp. This relationship is illustrated in **Table 5 on page 27**.



TABLE 2

**DESIGNATION SYSTEM FOR BONDED ABRASIVE TOOLS MANUFACTURED
BY ANDRE ABRASIVE ARTICLES, KOŁO, POLAND**



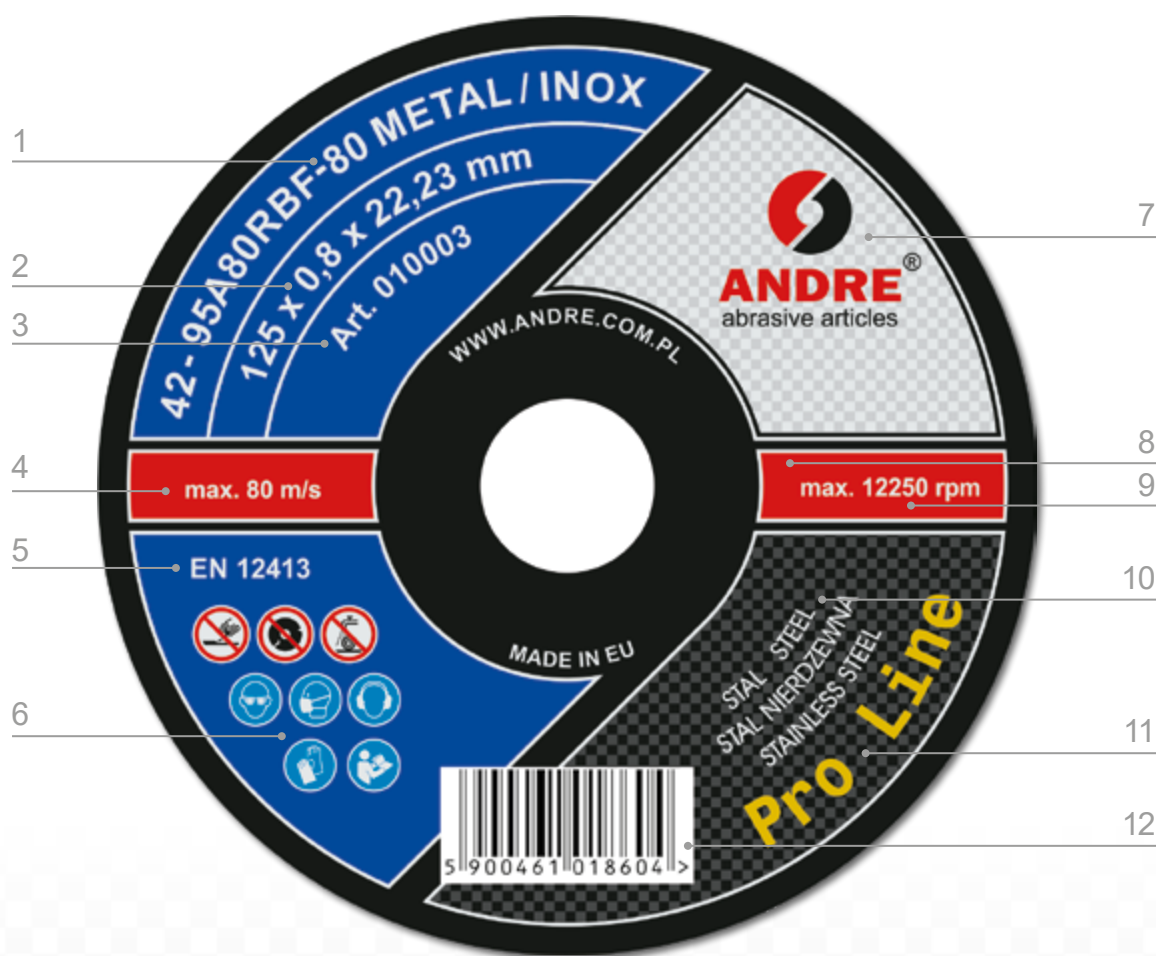
SYMBOLS AND DESIGNATIONS OF GRINDING WHEEL – EXAMPLE

Designation of grinding wheel acc. to ISO 525

Example:

Depressed centre cutting-off wheel, Type 42, of the following dimensions: D=125 [mm], U=0,8 [mm], H=22.23 [mm] and characteristics 95A80RBF, maximum permissible peripheral speed $v_s=80$ [m/s], made in METAL / INOX version is marked as follows:

42 - 125 × 0,8 × 22,23 - 95A80RBF-80 METAL / INOX



1 - Type / Grinding wheel characteristics together with maximum permissible peripheral speed, 2 - Dimensions of grinding wheel, 3 - Product code, 4 - Vs Maximum permissible peripheral speed [m/s], 5 - Safety Standard No., 6 - Pictograms - Safety symbols, 7 - Manufacturer name and mark, 8 - Colour strip acc. to colour code, 9 - Maximum permissible rotational speed [rpm], 10 - Application / material to be ground, 11 - Product line, 12 - EAN Bar code.

PICTOGRAMS - SAFETY SYMBOLS



Use ear protection



Use eye protection



Use mask



Use hand protection



Follow instruction

Only permitted for grinding
at an angle greater than 10°

Not permitted for face grinding



Do not use if damaged







Not permitted for wet grinding



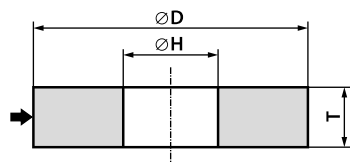
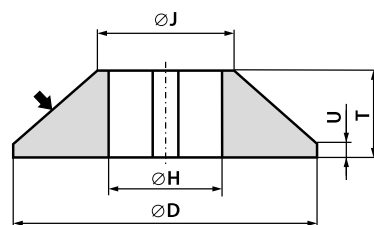
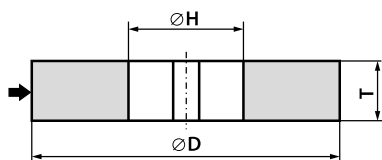
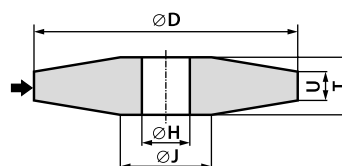
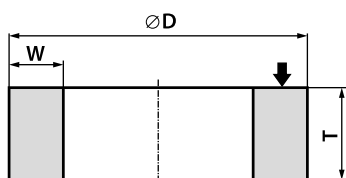
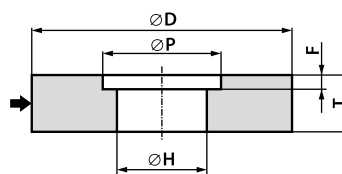
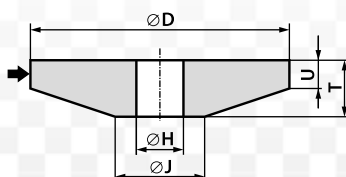
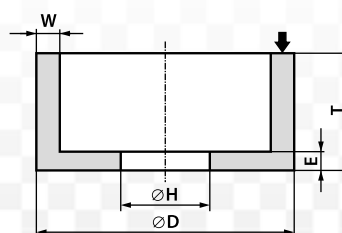
Not permitted for hand-held machines

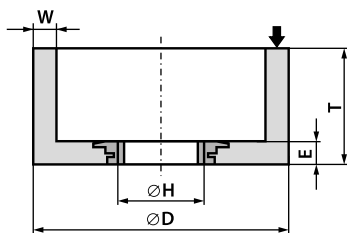
Colour strip - additional visual information on maximum permissible operating speed in accordance with colour code (from EN 12413).

Maximum permissible peripheral speed [ms ⁻¹]	No. of strips and colour	
50		1 x blue
63		1 x yellow
80		1 x red
100		1 x green

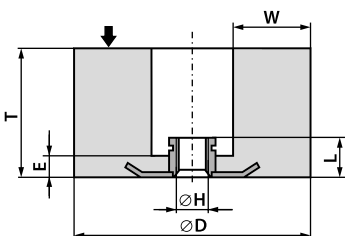
**PRODUCT LINES OF TYPE 27, 41 AND 42
GRINDING WHEELS**



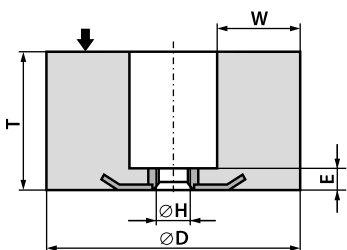
TABLE 3**STANDARD DESIGNATIONS FOR SHAPES AND DIMENSIONS OF ABRASIVE TOOLS
(FRAGMENT OF ISO 525)****TYPE 1**Straight grinding wheel
1 Profile* - D × T × H**TYPE 301**Wheel for corn hulling machines EKONOS
301 - D / J × T / U × H**TYPE 101**Wheel for corn hulling machines EKONOS
101 - D × T × H**TYPE 4**Wheel tapered on both sides
4 - D / J × T / U × H**TYPE 2**Cylinder wheel
2 - D × T - W...**TYPE 5**Wheel recessed on one side
5 Profile* - D × T × H - P...F...**TYPE 3**Wheel tapered on one side
3 - D / J × T / U × H**TYPE 6**Straight cup wheel
6 - D × T × H - W...E...

TYPE 6001

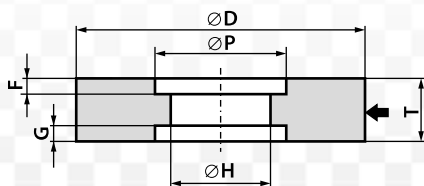
Straight cup wheel with a central threaded insert
6001 - $D \times T \times H - W \dots E \dots$

TYPE 6002

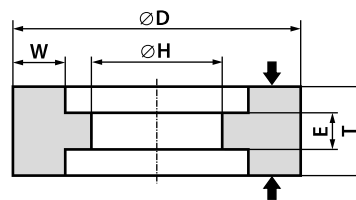
Straight cup wheel with a central threaded insert
6002 - $D \times T \times H / L - W \dots E \dots$

TYPE 6003

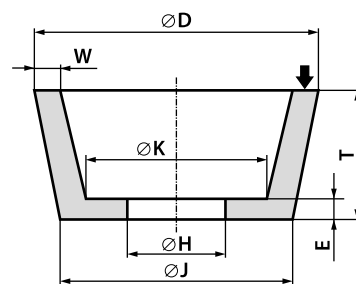
Straight cup wheel with a central threaded insert
6003 - $D \times T \times H - W \dots E \dots$

TYPE 7

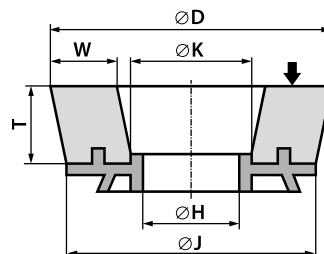
Wheel recessed on both sides
7 Profile* - $D \times T \times H - P \dots F \dots G \dots$

TYPE 9

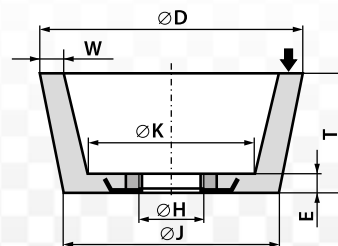
Double cup wheel
9 - $D \times T \times H - W \dots E \dots$

TYPE 11

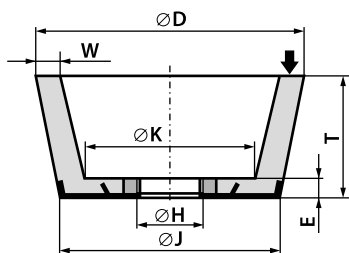
Taper cup wheel
11 - $D / J \times T \times H - W \dots E \dots K \dots$

TYPE 1102

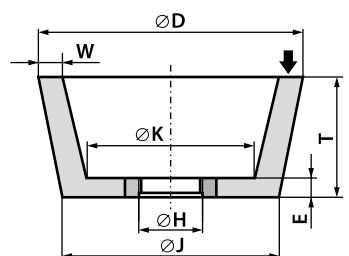
Taper cup wheel with a spiral
for a quick change mounting
1102 - $D / J \times T \times H - W \dots K \dots$

TYPE 1112

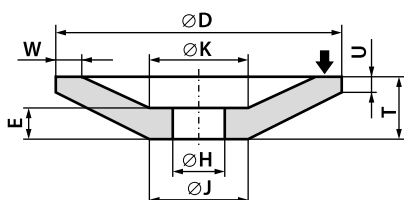
Taper cup wheel with a central threaded insert
1112 - $D / J \times T \times H - W \dots E \dots K \dots$

TYPE 1113

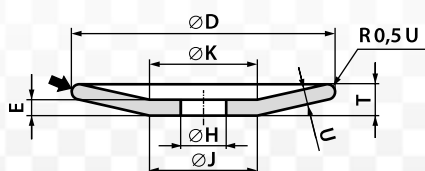
Taper cup wheel
with a central threaded insert
1113 - D / J × T × H - W...E...K...

TYPE 1114

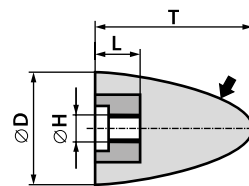
Taper cup wheel
with a central threaded insert
1114 - D / J × T × H - W...E...K...

TYPE 12

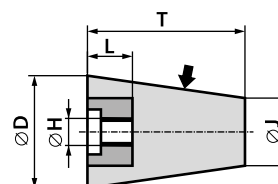
Dish wheel
12 - D / J × T / U × H - W...E...K...

TYPE 13

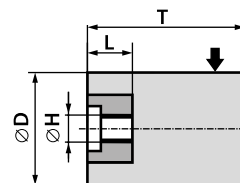
Saucer wheel
13 - D / J × T / U × H - E...K...

TYPE 16

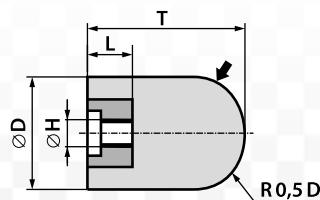
Cones and plugs, tapered roll shaped,
with a threaded insert
16 - D × T - H × L

TYPE 17

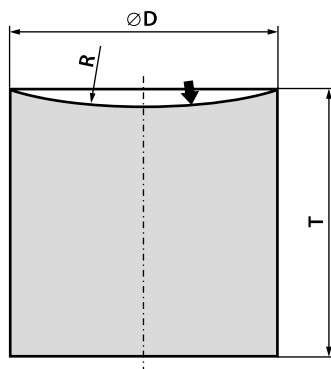
Cones and plugs, tapered
17 - D / J × T - H × L

TYPE 18

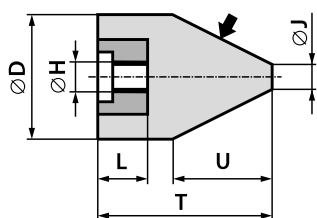
Cones and plugs, cylindrical
18 - D × T - H × L

TYPE 18R

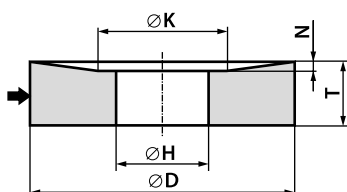
Cones and plugs, roll shaped with a threaded insert
18R - D × T - H × L

TYPE 1801

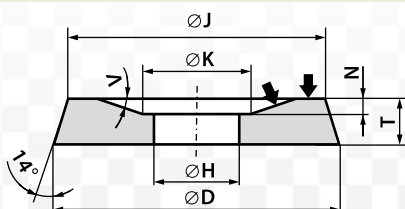
Cylindrical wheel with spherical working surface
1801 - $D \times T - R...$

TYPE 19

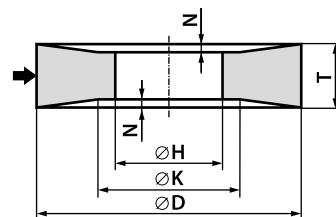
Cones and plugs, cylinder-conical with a threaded insert
19 - $D / J \times T / U - H \times L$

TYPE 20

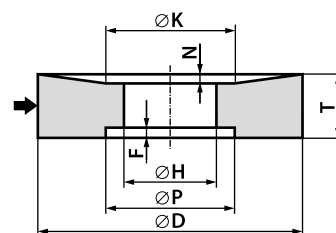
Wheel relieved on one side
20 - $D / K \times T / N \times H$

TYPE 2001

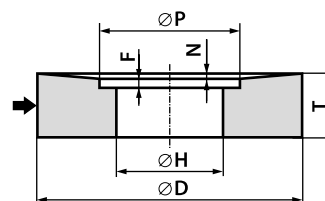
Special shape wheel
for vegetable pulp mills
2001 - $D / J \times T \times H - V$ - Drawing No.

TYPE 21

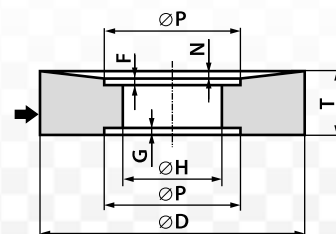
Wheel conically relieved on both sides
21 - $D / K \times T / N \times H$

TYPE 22

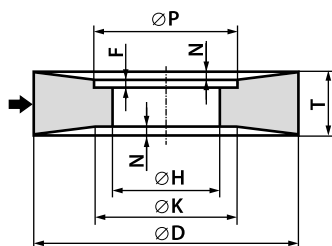
Wheel conically relieved on one side
and recessed on the other side
22 - $D / K \times T / N \times H - P... F...$

TYPE 23

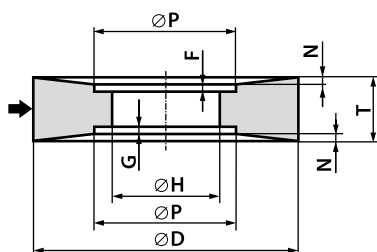
Wheel relieved
and recessed on one side
23 - $D \times T / N \times H - P... F...$

TYPE 24

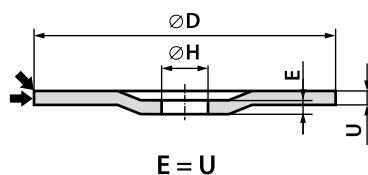
Wheel relieved, recessed on one side
and recessed on the other side
24 - $D \times T / N \times H - P... F... G...$

TYPE 25

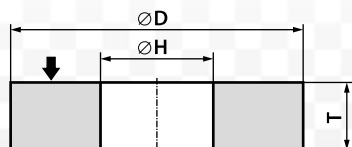
Wheel relieved, recessed on one side
and relieved on the other side
25 - D / K × T / N × H - P...F...

TYPE 26

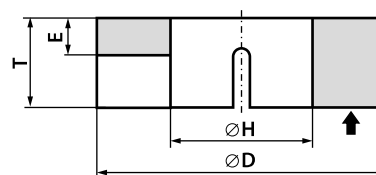
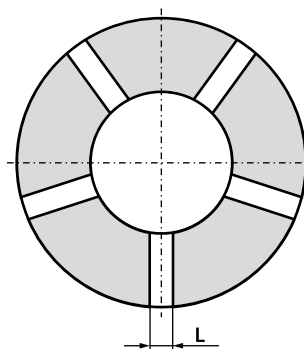
Wheel relieved
and recessed on both sides
26 - D × T / N × H - P... F...G...

TYPE 27

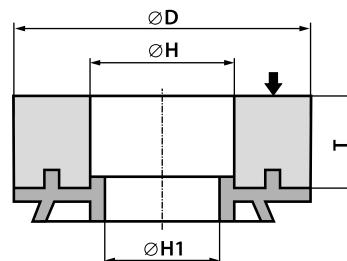
Depressed centre wheel
27 - D × U × H

TYPE 35

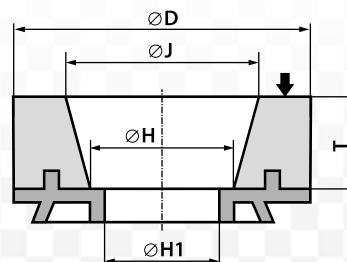
Disc wheel
35 - D × T × H

TYPE 3501

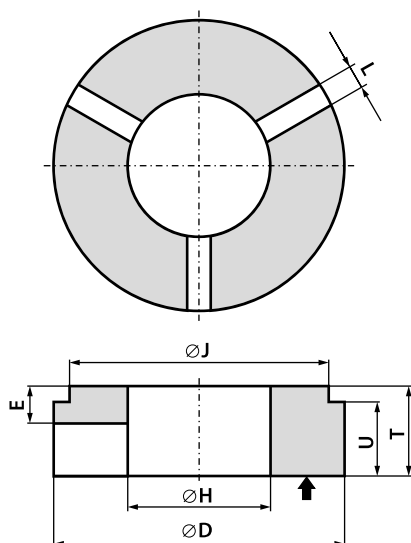
Disc wheel with slots
3501 - D × T / E × H - L...n...
n - number of slots

TYPE 3502

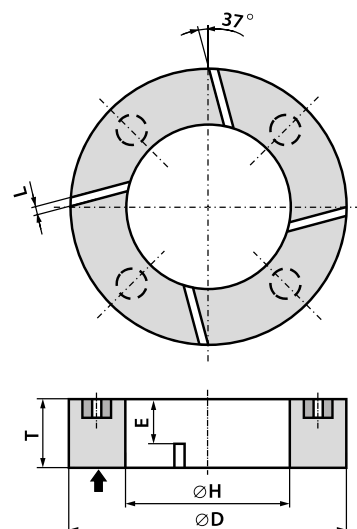
Disc wheel with a spiral for quick-change mounting
3502 - D × T × H / H1

TYPE 3503

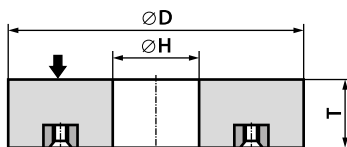
Tapered wheel with a spiral
for quick-change mounting
3503 - D / J × T × H / H1

TYPE 3504

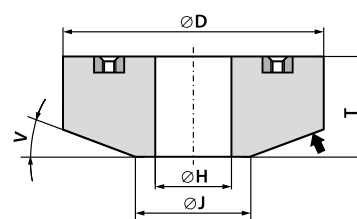
Wheel relieved on one side
and with slots on the opposite side
3504 - $D / J \times T / U / E \times H - L \dots n \dots$
n - number of slots

TYPE 3610

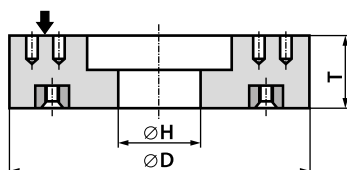
Wheel with threaded inserts and incisions
3610 - $D \times T \times H$ - Drawing No.

TYPE 36

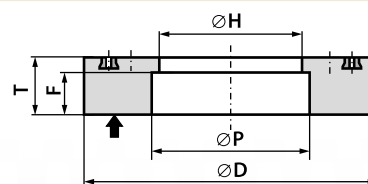
Disc wheel with threaded inserts
36 - $D \times T \times H$ - Drawing No.

TYPE 3611

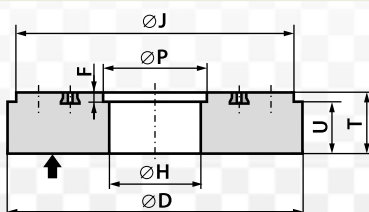
Taper wheel with threaded inserts
3611 - $D \times T \times H$ - Drawing No.

TYPE 3601

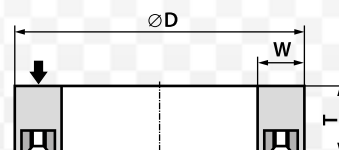
Disc wheel with threaded inserts
and with perforation holes on the working side
3601 - $D \times T \times H$ - Drawing No.

TYPE 3612

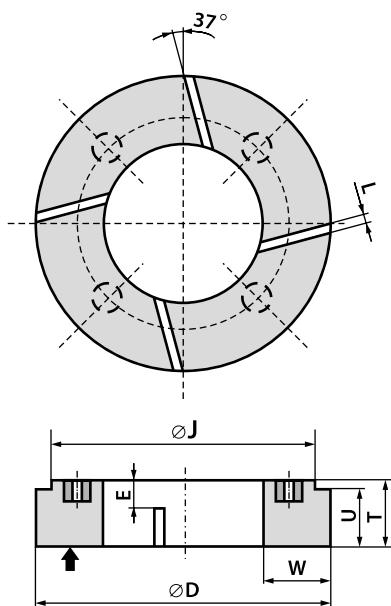
Taper wheel with threaded inserts,
recessed on the working side
3612 - $D \times T \times H$ - Drawing No.

TYPE 3603

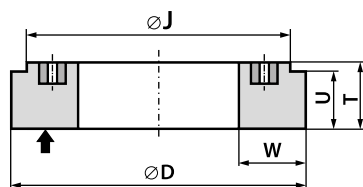
Wheel with threaded inserts,
relieved on the clamping side
3603 - $D \times T \times H$ - Drawing No.

TYPE 37

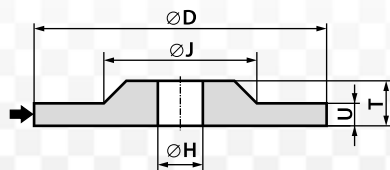
Cylinder wheel with threaded inserts
37 - $D \times T \times W \dots$ - Drawing No.

TYPE 3701

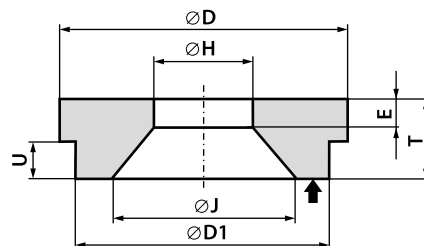
Cylinder wheel with threaded inserts, relieved on one side and with slots on the opposite side
3701 - $D \times T - W \dots$ - Drawing No.

TYPE 3703

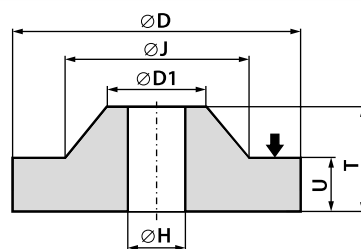
Cylinder wheel with threaded inserts, relieved on one side
3703 - $D \times T - W \dots$ - Drawing No.

TYPE 38

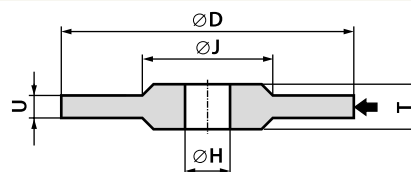
Hubbed wheel
38 Profile* - $D / J \times T / U \times H$

TYPE 3801

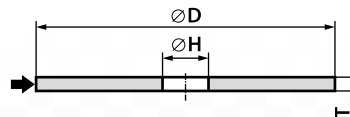
Wheel with special shape intended for rubbing through of vegetable pulp
3801 - $D / J \times T / U \times H$ - Drawing No.

TYPE 3802

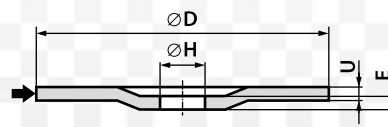
Wheel with special shape intended for rubbing through of vegetable pulp
3802 - $D / J \times T / U \times H$ - Drawing No.

TYPE 39

Double hubbed wheel
39 Profile* - $D / J \times T / U \times H$

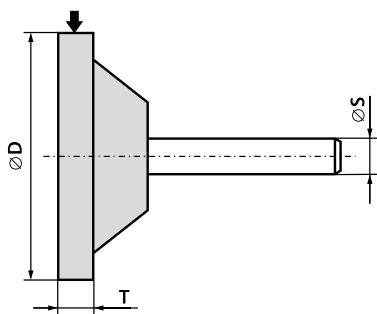
TYPE 41

Straight cutting-off wheel
41 - $D \times T \times H$

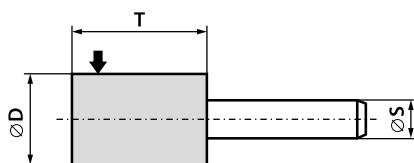
TYPE 42

$E = U$

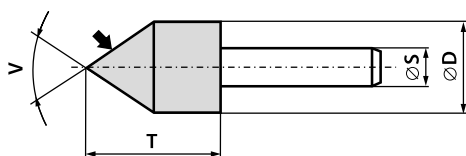
Depressed center cutting-off wheel
42 - $D \times U \times H$

TYPE 5201

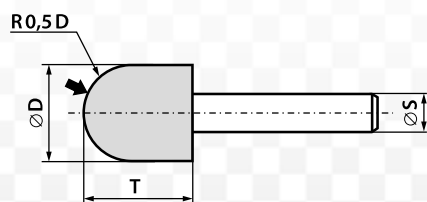
Mounted point,
flat with a conical reinforcement
5201 - D × T × S

TYPE 5210

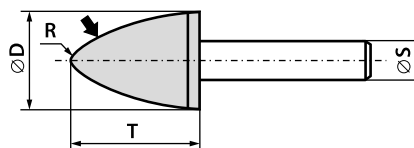
Mounted point, cylindrical
5210 - D × T × S

TYPE 5211

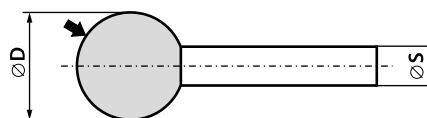
Mounted point, cylindrical with conical end
5211 - D × T × S - V

TYPE 5213

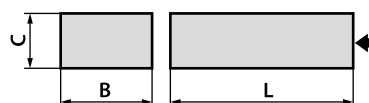
Mounted point, cylindrical with rounded end
5213 - D × T × S

TYPE 5220

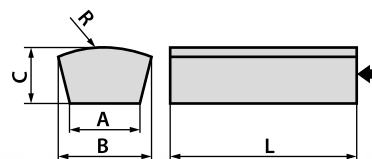
Mounted point, ogival shape
5220 - D × T × S - R...

TYPE 5230

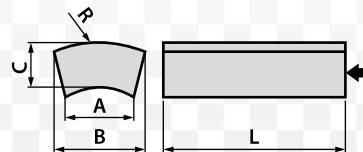
Mounted point, spherical
5230 - D × S

TYPE 3101

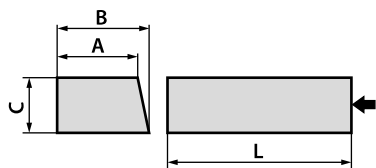
Segment, rectangular
3101 - B × C × L

TYPE 3103

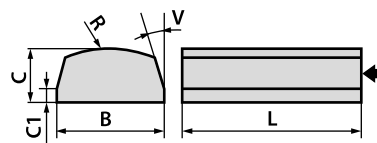
Segment, trapezoidal with outside radius
3103 - B / A × C × L - R...

TYPE 3104

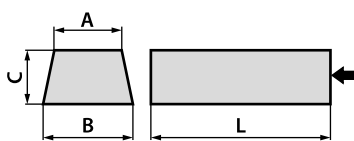
Segment, with inner and outer radius
3104 - B / A × C × L - R...

TYPE 3108

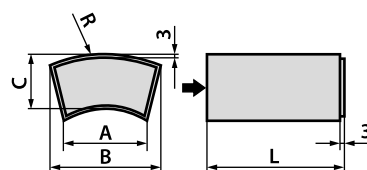
Segment, rectangular-trapezoidal
3108 - $B / A \times C \times L$

TYPE 3114

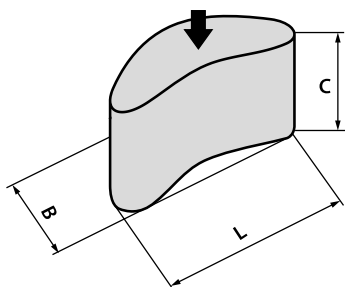
segment, rectangular, ring-shaped,
chamfered on both sides
3114 - $B \times C / C1 \times L - R...V...$

TYPE 3109

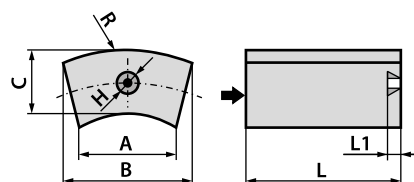
Segment, trapezoidal
3109 - $B / A \times C \times L$

TYPE 3115

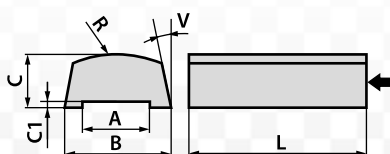
Full segment, ring-shaped, DISCUS Type
3115 - $B / A \times C \times L - R...$

TYPE 3110

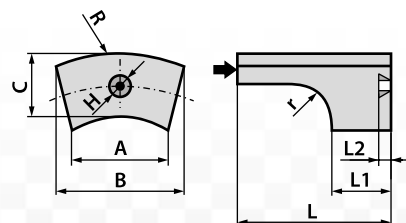
Segment, kidney-shaped
3110 - $B \times C \times L$

TYPE 3116

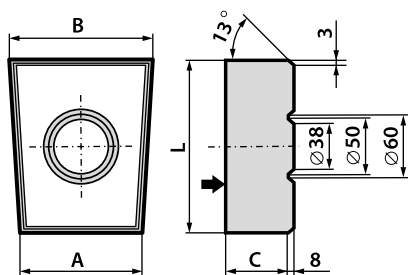
Full segment, ring-shaped, DISCUS type,
with a threaded insert
3116 - $B / A \times C \times L - R... - H / L1$

TYPE 3113

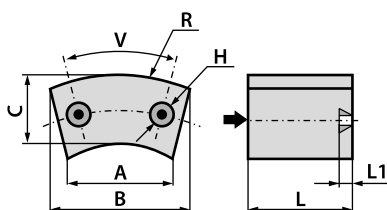
Segment, with outer and inner radius and recess
3113 - $B / A \times C / C1 \times L - R...V...$

TYPE 3117

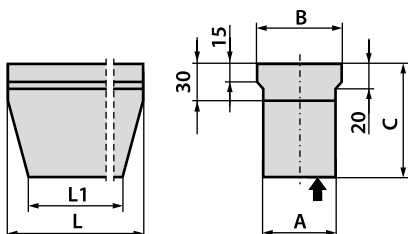
Segment, DISCUS type, recessed,
with a threaded insert
3117 - $B / A \times C \times L / L1 - R...r... - H / L2$

TYPE 3118

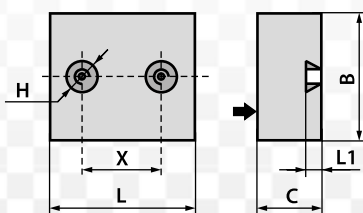
Segment, shaped, DISCUS type
3118 - $B / A \times C \times L$

TYPE 3119

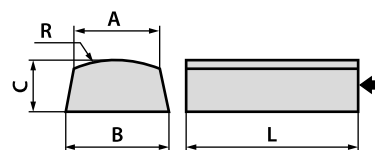
Segment, with outer and inner radius
and with two threaded inserts
3119 - $B / A \times C \times L - R... - H / L1 / V$

TYPE 3120

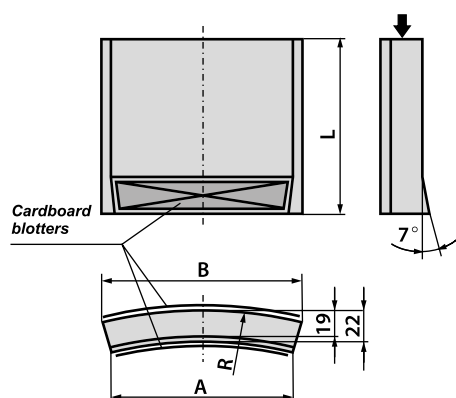
Segment, shaped for rail grinding
3120 - $B / A \times C \times L / L1$

TYPE 3121

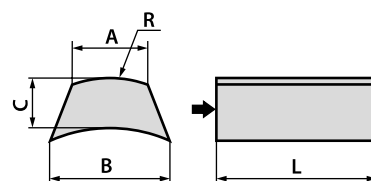
Segment, rectangular with two threaded inserts
3121 - $B \times C \times L - H / X / L1$

TYPE 3122

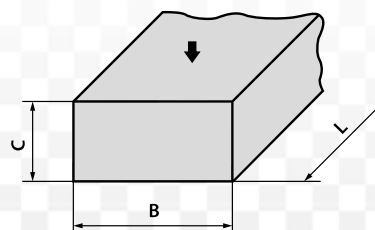
Segment, taper with outer radius
3122 - $B / A \times C \times L - R...$

TYPE 3123

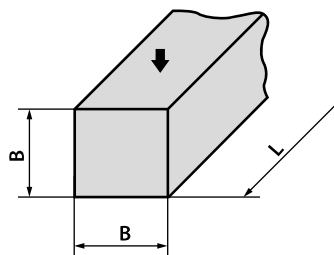
Segment, ring-shaped, chamfered
3123 - $B / A \times L - R...$

TYPE 3124

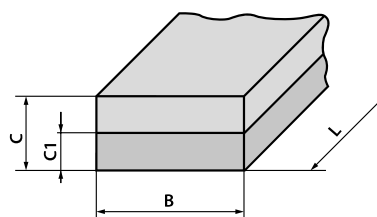
Segment, taper with inner and outer radius
3124 - $B / A \times C \times L - R...$

TYPE 5410

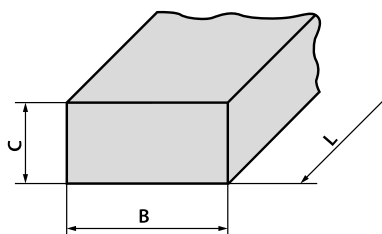
Wheatstone, rectangular
5410 - $B \times C \times L$

TYPE 5411

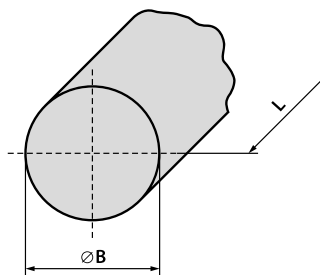
Wheatstone, square
5411 - B x L

TYPE 9020

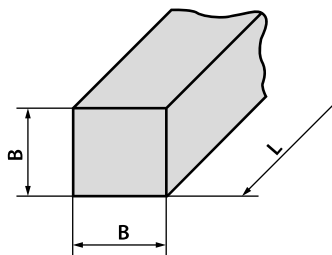
Wheatstone, rectangular, two-layered
9020 - B x C / C1 x L

TYPE 9010

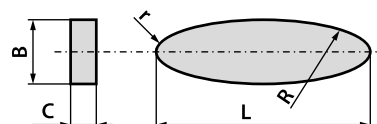
Wheatstone, rectangular
9010 - B x C x L

TYPE 9030

Wheatstone, round
9030 - B x L

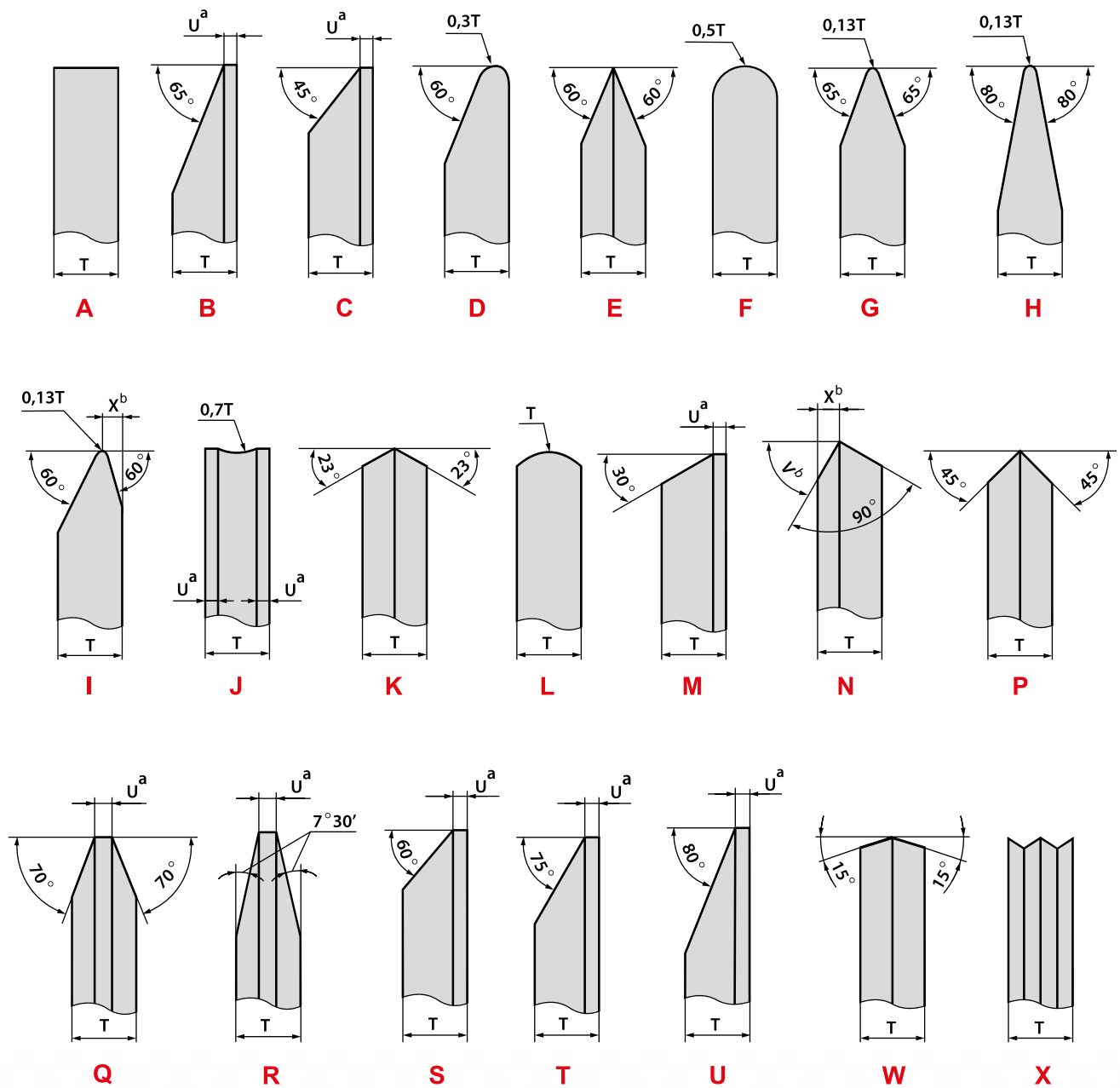
TYPE 9011

Wheatstone, square
9011 - B x L

TYPE 9050

Wheatstone, oval
9050 - B x C x L - R...r...

PROFILES



a) $U = 3,2$ [mm] unless otherwise ordered.

b) V and X values need to be specified with order.

Profile X is non-standardized; can be made to drawing delivered by the customer.

TABLE 4

SPEED CONVERSION TABLE FOR VARIOUS DIAMETERS OF ABRASIVE WHEELS

Wheel diameter in [mm]	Maximum permissible peripheral speed V in [m/s].																	
	5	6	8	10	12	16	20	25	32	35	40	50	63	80	100	125	140	160
Rotational speed n [rpm]																		
6	16000	19100	25500	31900	38200	51000	64000	80000	102000	112000	128000	160000	201000					
8	12000	14400	19100	24000	29000	38200	48000	60000	76500	84000	95500	120000	150000	191000				
10	9600	11500	15300	19100	23000	30600	38200	48000	61200	67000	76500	95500	120500	153000	191000			
13	7400	8850	11800	14700	17700	23550	29500	35600	47100	51500	58800	73500	92600	118000	147000	184000	206000	
16	6000	7200	9550	11950	14350	19100	23900	29850	38200	41800	47800	59700	75200	95500	120000	150000	168000	191000
20	4800	5750	7650	9550	11500	15300	19100	23900	30600	33500	38200	47800	60200	76500	95500	120000	134000	153000
25	3850	4600	6150	7650	9200	12300	15300	19100	24500	26800	30600	38200	48200	61200	76500	95500	107000	123000
32	3000	3600	4800	6000	7200	9550	11950	14950	19100	20900	23900	30000	37600	48000	60000	75000	84000	95500
40	2400	2900	3850	4800	5750	7650	9550	11950	15300	16750	19100	23900	30100	38200	47200	59700	67000	76500
50	1950	2300	3100	3850	4600	6150	7650	9550	12250	13400	15300	19100	24100	30600	38200	47750	53500	61200
63	1550	1850	2450	3050	3650	4850	6100	7600	9750	10650	12150	15200	19100	24300	30250	37900	42500	48500
80	1200	1450	1950	2400	2900	3850	4800	6000	7650	8400	9550	12000	15100	19100	23900	29850	33500	38200
100	960	1150	1550	1950	2300	3100	3850	4800	6150	6700	7650	9550	12100	15300	19100	23900	26800	30600
115	830	1000	1350	1700	2000	2700	3350	4200	5350	5850	6650	8350	10500	13300	16650	20800	23250	26600
125	770	920	1250	1550	1850	2450	3100	3850	4900	5350	6150	7650	9650	12250	15300	19100	21400	24500
150	640	770	1050	1300	1550	2050	2550	3200	4100	4500	5100	6400	8050	10200	12700	16000	17850	20400
180	530	640	850	1100	1300	1700	2150	2700	3400	3750	4250	5350	6700	8500	10650	13300	14900	17000
200	480	580	765	955	1150	1550	1950	2400	3100	3350	3850	4800	6050	7650	9950	11950	13400	15300
230	420	500	665	830	1000	1350	1700	2100	2700	2950	3350	4200	5250	6650	8350	10400	11650	13300
250	380	460	615	765	920	1250	1550	1950	2450	2700	3100	3850	4850	6150	7650	9950	10700	12250
300	320	380	510	640	765	1050	1300	1600	2050	2250	2550	3200	4050	5100	6400	8000	8850	10200
350/356	280	330	440	550	655	875	1100	1400	1750	1950	2200	2750	3450	4400	5500	6850	7650	8750
400/406	240	290	385	480	575	765	960	1200	1550	1700	1950	2400	3050	3850	4800	6000	6700	7650
450/457	210	255	340	425	510	680	850	1100	1400	1500	1700	2150	2700	3400	4250	5350	5950	6800
500/508	190	230	310	385	460	615	765	960	1250	1350	1550	1950	2450	3100	3850	4800	5350	6150
600/610	160	190	255	320	385	510	640	800	1050	1150	1300	1600	2050	2550	3200	4000	4500	5100
750/762	130	155	205	255	310	410	510	640	820	895	1050	1300	1650	2050	2550	3200	3600	4100
800/813	120	145	195	240	290	385	480	600	765	840	960	1200	1550	1950	2400	3000	3350	3850
900/914	110	130	170	215	255	340	425	535	680	750	850	1100	1350	1700	2150	2700	3000	3400
1000/1015	100	115	155	195	230	310	385	480	615	670	765	960	1250	1550	1950	2400	2700	3100
1060/1067	95	110	150	185	220	295	365	455	585	640	730	910	1150	1500	1850	2300	2550	2950
1200	90	105	140	175	210	280	350	435	560	610	695	870	1100	1400	1750	2200	2450	2800
1220	85	95	130	160	195	255	320	400	510	560	640	800	1050	1300	1600	2000	2250	2550
1500	65	75	105	130	155	205	255	320	410	450	510	640	805	1050	1300	1600	1800	2050
1800	55	65	85	110	130	170	220	265	340	375	425	535	670	850	1100	1350	1500	1700

(Fragment of EN 12 413)

TABLE 5

MOUNTED POINTS - DEPENDENCE OF THE MAXIMUM PERMISSIBLE ROTATIONAL OPERATING SPEED ON THE OVERHANG LENGTH OF THE SHAFT

D	T	S	L ₂	Maximum permissible rotational operating speed n_{\max} for shaft overhang L ₀					
				5	10	15	20	25	30
3	6	6	40	206 100	206 100	206 100	206 100	161 300	127 300
4	8			177 400	177 400	177 400	177 400	149 200	118 800
5	10			157 800	157 800	157 800	157 800	135 100	108 800
6	10	6	40	159 100	159 100	159 100	159 100	127 900	103 700
	13			131 500	131 500	131 500	131 500	116 500	95 200
8	10			119 300	119 300	119 300	119 300	113 700	93 400
8	16	6	40	119 300	119 300	119 300	111 300	91 600	76 500
10	2			95 400	95 400	95 400	95 400	95 400	95 400
10	10			95 400	95 400	95 400	95 400	95 400	83 700
10	13	6	40	95 400	95 400	95 400	95 400	88 900	74 400
	20			95 400	95 400	95 400	82 200	69 100	58 700
	25			83 200	83 200	83 200	69 800	59 200	50 700
10	32	6	40	62 800	62 800	62 800	56 900	48 800	42 300
13	3			73 400	73 400	73 400	73 400	73 400	73 400
	6			73 400	73 400	73 400	73 400	73 400	73 400
13	13	6	40	73 400	73 400	73 400	73 400	73 400	62 500
	20			73 400	73 400	73 400	73 400	56 200	48 200
	25			66 000	66 000	66 000	55 800	47 700	41 200
13	32	6	40	52 800	52 800	52 800	45 200	39 000	34 000
	40			42 400	42 400	42 400	36 600	31 900	28 000
16	4	6	40	59 600	59 600	59 600	59 600	59 600	59 600
	6			59 600	59 600	59 600	59 600	59 600	59 600
	20			59 600	59 600	59 600	55 100	47 000	40 500
	25			59 600	59 600	54 400	46 200	39 700	34 400
	32			59 600	51 200	43 400	37 200	32 300	28 200
	40			47 800	40 500	34 700	30 100	26 300	23 100
	50			35 600	31 300	27 200	23 800	21 000	18 600
20	6	6	40	47 700	47 700	47 700	47 700	47 700	47 700
	10			47 700	47 700	47 700	47 700	47 700	47 700
	20			47 700	47 700	47 700	44 800	38 300	33 100
	25			47 700	47 700	43 900	37 400	32 200	28 000
	32			47 700	41 100	34 900	30 000	26 100	22 900
	40			38 200	32 400	27 900	24 200	21 200	18 700
	50			29 200	25 100	21 800	19 100	16 900	15 000
25	8	6	40	38 100	38 100	38 100	38 100	38 100	38 100
	10			38 100	38 100	38 100	38 100	38 100	38 100
	16			38 100	38 100	38 100	38 100	36 500	31 500
	20			38 100	38 100	38 100	36 200	31 000	29 600
	25			38 100	38 100	35 300	30 100	26 000	22 700
	32			38 100	32 900	28 000	24 200	21 000	18 500
	40			30 500	26 000	22 300	19 400	17 000	15 100
	50			23 300	20 100	17 400	15 300	13 500	12 100
32	8	6	40	29 800	29 800	29 800	29 800	29 800	29 800
	16			29 800	29 800	29 800	29 800	28 900	25 000
	20			29 800	29 800	29 800	28 400	24 500	21 300
	32			29 800	25 700	22 000	18 900	16 500	14 500
	40			23 800	20 300	17 500	15 200	13 400	11 800
40	6	6	40	23 800	23 800	23 800	23 800	23 800	23 800
	10			23 800	23 800	23 800	23 800	23 800	23 800
	13			23 800	23 800	23 800	23 800	23 800	23 200
	20			23 800	23 800	23 800	22 800	19 700	17 100
	32			23 800	20 600	17 600	15 200	13 200	11 600
	40			19 100	16 200	14 000	12 200	10 700	9 500
50	8	6	40	19 000	19 000	19 000	19 000	19 000	19 000
	13			19 000	19 000	19 000	19 000	19 000	18 700
	25			19 000	19 000	17 700	15 200	13 200	11 500

(Fragment of EN 12 413)

GENERAL RULES FOR STORAGE AND TRANSPORT OF ABRASIVE TOOLS. INSPECTION OF GRINDING WHEELS ON RECEPTION.

Grinding and cutting-off processes are characterized by a high dynamics. Operating speed of 50 [m/s] corresponds to 126 [km/h] and 80 [m/s] corresponds to 290 [km/h]. Therefore, abrasive tools should be handled observing appropriate rules.

Storage and transport of abrasive tools have a close relation with work safety and require that appropriate rules are to be observed. Users must be aware of danger if these rules are not observed.

Service reliability and work safety depend on suitable protection in the following stages: packaging, shipment, protection against damage and environmental conditions, transport, handling by forwarding agent, unloading at customer, storage, handling by customer, mounting, start-up, operation.

Abrasive tools, especially grinding wheels, though they have a high resistance to a burst, are susceptible to impacts, drops, bending stresses. Therefore, they are to be treated with great care during handling. Impacts, throws or drops on a hard surface may develop scratches or invisible cracks which can be a cause of burst during operation and a danger for body or life.

Grinding wheels or segments must not be wet at transport or storage, as this may be a cause of static unbalance or damage caused by frozen water.

Once a batch of goods is received its packing should be examined for possible damage in transit.

If any damage exists, make together with forwarding agent, an appropriate report including identification information, description and results of the damage. Report this information to supplier.

Then, the grinding wheels shall be subject to detailed inspection for any damages and defects, preferably by using a sound test and visual inspection. In case any doubts exist, consult with the supplier.

The sound test of grinding wheels is carried out in the following manner. Vitrified grinding wheels are to be lightly tapped with a non-metallic instrument, for example a screwdriver handle in the case of small grinding wheels or a wooden mallet in the case of heavier grinding wheels, which should be stood on a hard and clean area of floor.

The best point to strike the grinding wheel is approximately 45° on either side of its vertical axis, near its periphery. Before each strike, turn it through 45° until it has been tapped around its entire circumference (see Fig.)

A good grinding wheel rings with a clear note. A cracked one rings with a dull, quickly fading note. Such grinding

wheels must not be used and they shall be retested by the manufacturer's service.

Resinoid grinding wheels are tested in the same manner but in this case they do not emit the same clear tone (muffle).

The presence of a crack may be indicated by a change of the tone as well.

Grinding wheels should be carefully unpacked and cleaned with a brush or compressed air. Striking the wheels against each other is strictly prohibited!

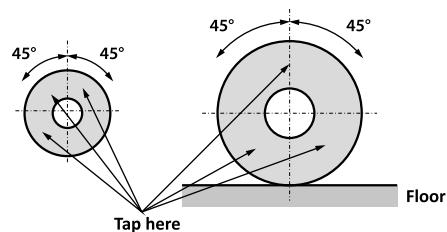


Fig. Sound test by tapping for grinding wheels

Protective pads for safety clamping of grinding wheels shall be removed from carton boxes unless they are bonded but have been supplied loose acc. to individual agreement. They shall be transferred, together with the grinding wheel, to a mounting place or directly on grinding machine.

The abrasive tools are to be stored in a dry, spacious, suitably ventilated room in possibly constant temperature in the range from 10 to 30°C and humidity not higher than 70%.



Due to possibility being damaged by damp and frost, the abrasive tools shall not be stored in temperatures below 4°C. This warning also applies to rooms where „wet” grinding operations using grinding coolant are performed or where the grinding wheels may be damped.

Organic bonded abrasive tools, marked by letters „B” or „BF”, are susceptible to moisture alkali or acid environment and temperature changes. Therefore, they are not to be stored together with chemicals and protected against excessive heat, especially from one side, by a close vicinity to heaters, for example.

Abrasive products with type of bond B and BF for use on hand-held machines (except mounted points and wheels, plugs and cones) shall be marked with a date of expiry. The date of expiry shall be within 3 years from the date of manufacture. It is expressed as month and year e.g. V04/2021.

The way in which the grinding wheels should be laid is shown in the Figure below.

The best and at the same time comfortable solution is ver-

tical position of grinding wheels on two parallel wooden beams. Large grinding wheels are to be laid on beams directly on an even floor and other ones on suitably profiled racks with profiles and dimensions adapted to dimensions of wheels.

These racks shall be made of wood or steel structure lined with soft material, wood or rubber for example.

Stacking height must not be a cause of damage to grinding wheels, especially those on the bottom of the stack.

The same rules are to be observed when handling grinding wheels within the area of production shops as well as on working stands. Wheels are to be handled carefully to prevent dropping them or subjecting them to impact each other or hard objects.

Position of wheels during handling should be similar to that on racks. Transport on trucks especially adapted for that purpose, padded with rubber and rubber wheels, is recommended. Wheels may be rolled along the floor provided that a suitable rubber blanket or other protection is available.

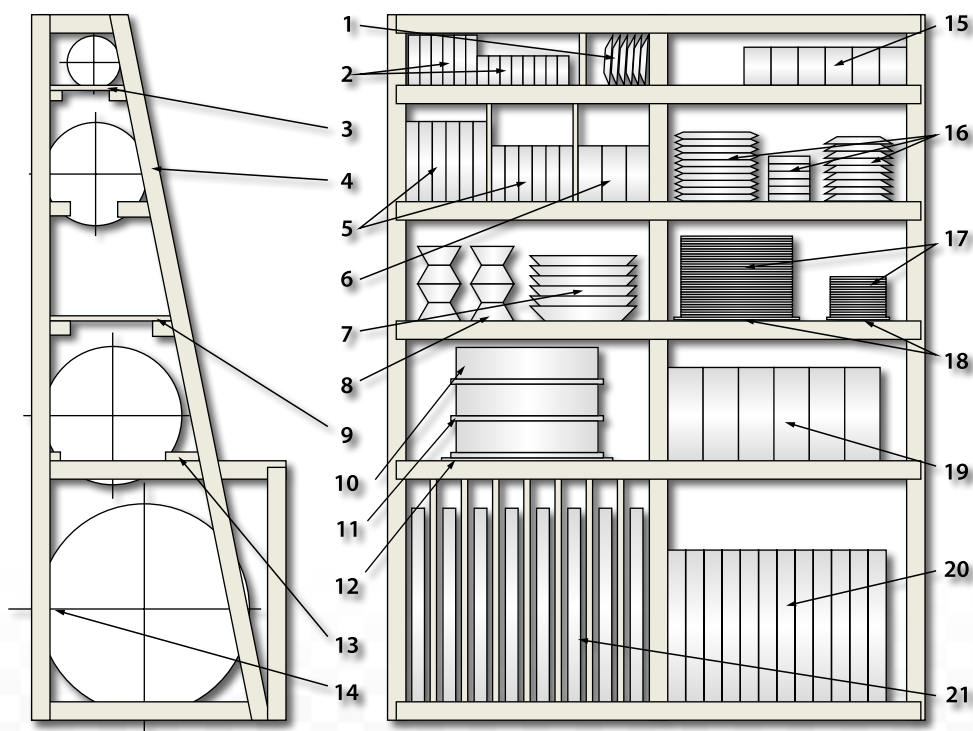


Fig. Example of rack for storing grinding wheels

1 - Small dish wheels, 2 - Small plain wheels, 3 - Lightly inclined shelves for small wheels to prevent falling them out, 4 - Back wall with protective lining, 5 - Plain wheels, 6 - Small cylinder wheels, 7 - Large dish wheels, 8 - Taper cup wheels laid alternatively, one the opposite way to the other, so that large and small diameters coincide, 9 - Flat shelf for cutting-off shaped and cylinder wheels, 10 - Thin-walled and soft cylinder wheels, 11 - Separating corrugated board, 12 - Steel or ceramic even supporting plate, 13 - Two-point cradle support for wheels standing on their circumference, 14 - Front edge of wheels, 15 - Small cylinder cup wheels, 16 - Flat profile wheels, 17 - Flat cutting-off wheels, 18 - Steel or ceramic even supporting plate, 19 - Thick hard cylinder wheels, 20 - Medium size plain vitrified wheels, 21 - Large wheels.

SAFETY IN GRINDING AND CUTTING-OFF OPERATIONS WITH ABRASIVE TOOLS

Preparation, mounting and operation of abrasive tool on machine should be performed in accordance with applicable instructions that include recommendations and requirements of: a manufacturer of grinding machine, manufacturer of grinding wheel, operation sheets for grinding operations.

The preparatory and mounting works should be performed by a qualified, trained person or some other worker under the surveillance of authorized person.

The following checks should be performed before the wheel is mounted on the machine spindle:

1. Check the condition of grinding wheel:
 - External appearance: mechanical damages, cracks, scratches, dents, chipping. Such an inspection is to be carried out under the good lighting.
 - Perform a sound test. Refer to description in the previous Section: Storage
 - Check a designation of grinding wheel; especially, compare the maximum rotational speed marked on the wheel with the maximum rotational speed of the machine spindle.

Only grinding wheels which have the maximum permissible speed equal or higher than the actual speed of spindle may be mounted on the spindle. The maximum permissible speed marked on the wheel may not be exceeded under no circumstances

2. Check the condition of grinding machine and elements that directly operate with the grinding wheel, especially:
 - Check the actual rotational speed of spindle, especially after any repair of grinding machine
 - Check condition of locating surfaces for the grinding wheel and clamping faces of flanges that are to:
 - » have dimensions to applicable regulations
 - » be flat, clean, without defects and should move smoothly without any jamming
 - » be square in relation to the datum surfaces
 - » clamping flanges are to be paired and have: the same outer diameters, the same recesses and shapes. They should clamp grinding wheels only on ring-shaped faces with the same pressure on both sides. This prevents the grinding wheel to be clamped on the edge of bore which is susceptible to chipping and cracking
 - » adaptor flanges must be balanced
 - Adaptor of grinding wheel transfers a drive; make sure that it is correctly located and fixed on the spindle
 - Make sure that the grinding wheel fits freely on the spindle or adaptor. To ensure the a.m. requirement, grinding wheel bores have positive tolerances on them and grinding wheel spindles negative tolerances.

• Clamping nuts and screws of grinding wheel.

The clamping nut should be tightened only sufficiently to ensure that the flanges drive the wheel and prevent slip. Screws on multiple screw type flanges should be tightened gradually and the tightening should proceed from one screw to one diametrically opposite and then in crisscross sequence. Make sure that screws and nuts screw in and out freely without any jamming or resistance.

• Blotters.

Blotters are made of flexible and compressible material, e.g. cardboard or plastic, and are placed between the flange and the grinding wheel (see Fig.)

The blotters should be between 0.2 and 1.0 mm thick and their diameter must be at least that of the flange. The purpose of the blotters is to:

- take up any distortion between the flange and the wheel, within the area of flange pressure
- reduce the risk of slippage between the wheel and the flanges
- distribute, equally, the axial clamping force when the nut is tightened, over the entire contact area between the flanges and grinding wheels

In general, two blotters of the same size are either laid against or glued to the two faces of any given wheel.

Blotters are supplied by manufacturer or on customer request.

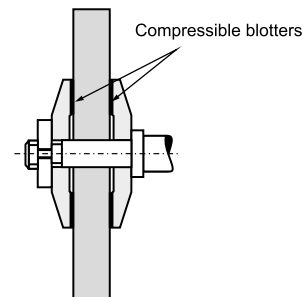


Fig. Grinding wheel mounting with its flanges and blotters

Blotters are not necessary in the following cases:

- on small wheels $D \leq 20$ mm
- on type 27 depressed centre wheels
- on type 29 semi-flexible wheels
- on plain cutting-off and depressed centre wheels, types 41 and 42, $D \leq 230$ mm
- on steel centred cutting-off wheels, type 43
- on type 4 wheels with tapered flanges
- on straight and flared cup wheels type 6 and 11, with the centre nut
- on cemented disk or threaded insert disc wheels types 35 and 36
- on cemented cylinder and threaded insert cylinder wheels types 2 and 37
- on type 31 segments
- on type 52 mounted wheels and points
- on plugs and cones with central threaded inserts, types

16 and 19

- honing stone type 54 and hand stone type 90
- on extra thin laminated wheels $T \leq 0.5$ mm, used for slitting and cutting-off



Example: Blotter may also be an identification label

When the grinding machine have a positioning marks, then its position on the spindle should correspond to the marks and inscriptions.

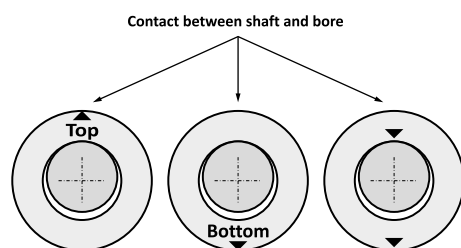


Fig. Example of positioning marks

• Mounting - securing.

When clamping the adaptor flanges with screws, tightening should proceed from one screw to one diametrically opposite and then in crisscross sequence (similarly to car wheels), without exerting an excessive clamping pressure.

It is recommended to use a torque wrench. Approximate tightening torques for the clamping screws, according to German recommendations, are shown in Table.

Tightening torques for the clamping screws

Thread of clamping screw	Height of grinding wheel in mm*	
	<30	≥30
	Recommended torque in [N m]	
M10	30	40
M12	40	60
M16	60	80
M20	80	100

*) For multiple wheel mounting, use the torque for a given diameter and the total height of all wheels in the assembly.

- Static/dynamic balance
- Where a device for static or dynamic balancing is available, correct balancing of the assembly: grinding wheel, washers, adaptor
- Carefully mount the assembly of the grinding wheel and adaptor on the grinding machine spindle. Tighten screws and nuts.
- After the grinding wheel is fitted on the grinding machine spindle:
 - » remove all necessary objects and tools from the grinding machine
 - » close and fasten guards, adjust work rests and holders
 - » turn the grinding wheel by hand, to check if it rotates freely; make sure that run-out does not exist.
- All grinding wheels of over 100 mm in diameter, before the first use and after each new mounting, should be subject to a trial test by idle running. This test should be carried out in the presence of person authorized for grinding wheel mounting.

Time of the trial test should be:

- for portable grinding machines - 1/2 minute,
- for all other grinding machines - 1 minute.

The a.m. test may be carried out only when the hazard area is protected and the guard is installed in the proper position.

The grinding wheel may be used only after the satisfactory completion of the a.m. test.

After the test is carried out, the grinding wheel may be dressed, checked and corrected in the range of its balancing and put into operation.

Final comments:

- Hand grinding machines should be protected against jamming of grinding wheel in material. In case of hand cutting-off grinding machines, the cutting-off wheel should be placed in the slit in the straight position.
- Before the hand grinding machine may be put away on a bench it should be switched off and completely stopped. It is strictly prohibited to throw grinders with grinding wheels mounted.

Manufacturer of grinding wheels takes no responsibility for any personal injuries nor machine damages or other material losses resulting from failure in observance of the a.m. safety rules during grinding operations with abrasive tools.

GRINDING WHEEL MOUNTING SYSTEMS - EXAMPLES.

Grinding machines are designed for various grinding wheel and segment mounting systems. Due to safety regulations, elements that directly match the grinding wheel must meet standard requirements.

Examples are shown in the following Figures

Designations:

- Q - ratio of diameters
- D - grinding wheel diameter
- H - diameter of grinding wheel bore
- d_f - flange diameter of wheel adaptor
- $DS = 1/2 (D - H)$ - height of grinding wheel side surfaces
- h - coverage
- b - width of gripping rim surface

$$Q = \frac{H}{D}$$

Mounting systems:

- Centre bore and clamping flange
- Threaded inserts in the grinding wheel or segment
- Mounting by means of a backplate
- Segments mounted on a clamping fixture
- Mounting by means of integral mandrel

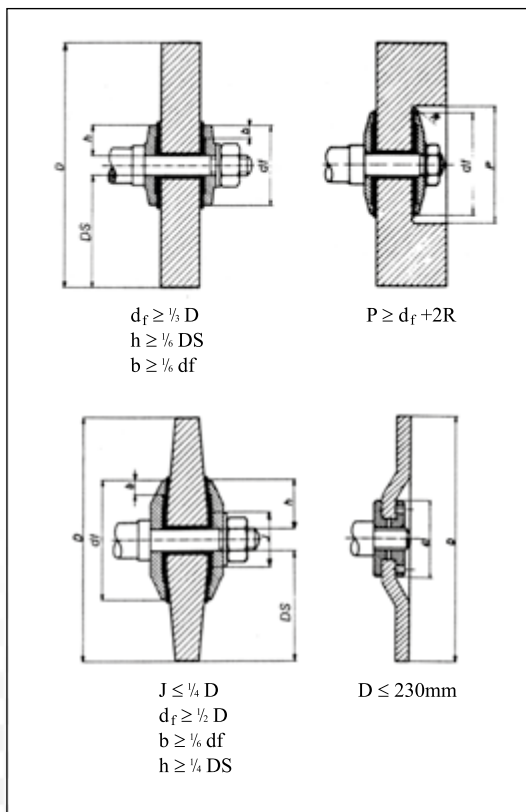


Fig. By means of clamping flanges for wheels with small bore $Q \leq 0,20$

Fig. By means of flange adaptor for wheels with large central bore
 $Q > 0,20$

$$h \geq \frac{1}{6} DS$$

$$b = h - (2 \div 6 \text{ mm})$$

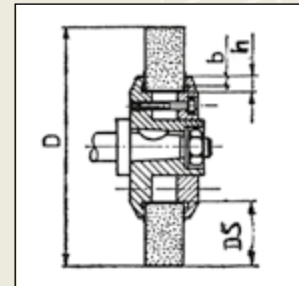
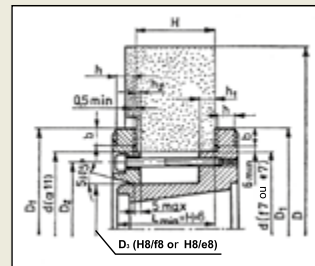
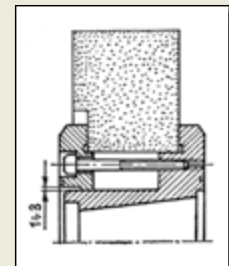


Fig. Hubbed flanges for straight wheels (acc. to PN/M-60625)



Execution A



Execution B

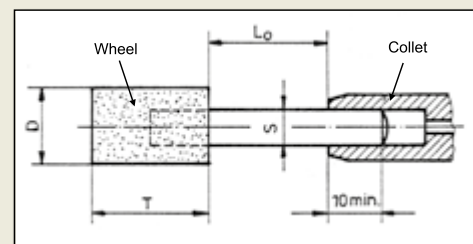


Fig. Mounted wheels and points

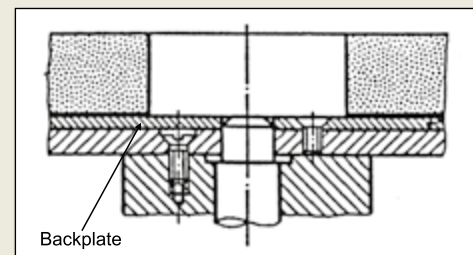


Fig. Grinding wheel cemented to a backplate and bolted to the machine spindle.

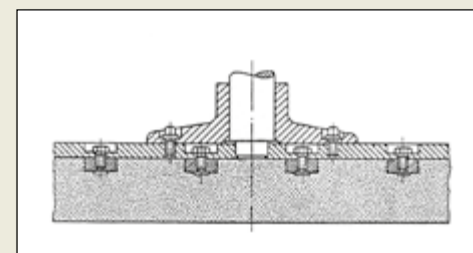


Fig. Grinding wheel bolted to a backplate and bolted to the machine spindle.

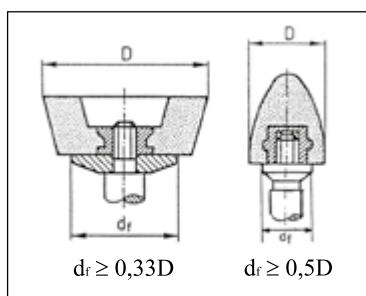


Fig. Mounting system for a plug or cone with a central threaded insert.

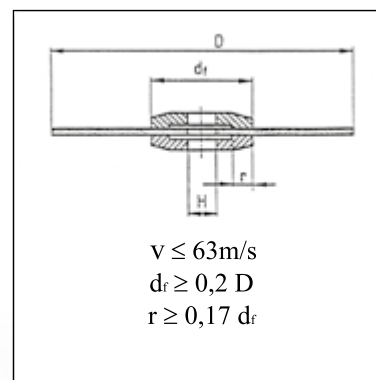


Fig. Straight recessed flange for plain cutting-off wheels, when $V \leq 63$ m/s

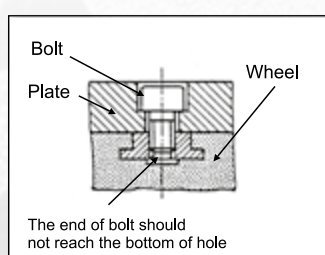


Fig. Correct arrangement of inserts and bolts.

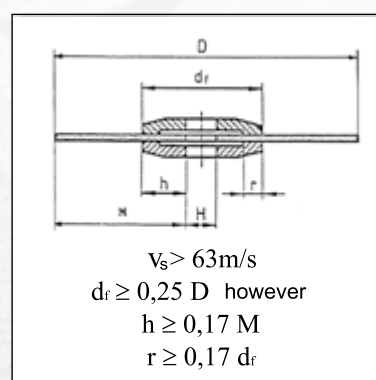


Fig. Straight recessed flange for plain cutting-off wheels, when $V > 63$ m/s

Straight recessed flanges for plain, cutting-off wheels (with the exception of plain cutting-off wheels with $D \leq 230$ mm for hand held grinders).

Straight recessed flanges for plain, cutting-off wheels should have the following diameters, depending on the operating speed

Diameter of flange $d_f \geq 0,2D$, where $V \leq 63$ m/s and hole diameter $H \leq 0,1D$

Diameter of flange $d_f \geq 0,25D$, where $V > 63$ m/s

Where grinding wheels with large diameter holes are involved, the area covered by the flange must not, however be less than 0.17 of radial diameter of the cutting-off wheel (0.17 M)

PROTECTIVE GUARDS

Grinding wheels must be guarded by appropriate protective guards on grinding machines. These guards must be capable of catching broken wheel fragments effectively. Only that part of the wheel required for grinding may be left unprotected.

Certain operations may require even the entire working area to be guarded.

The following wheel types may be operated without guards:

- mounted wheels and points Type 52
- cones and plugs with central threaded inserts Types 16 to 19
- resinoid wheels Type 4 of diameter ≤ 200 mm

GUARDS FOR BENCH AND PEDESTAL GRINDERS

The maximum angle of aperture is 90° .

The angle extending above the horizontal axis of the spindle must not exceed 65° (see Fig.).

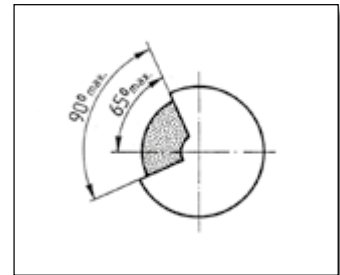


Fig. Guard for bench and pedestal grinders.

When using wheels with the diameter $D > 150$ mm, the guard should be of such a design that permits its adjustment so that the clearance between the periphery of the wheel and the end of the guard does not exceed 5 mm (see Fig.).

Position of work rest must be adjustable as well.

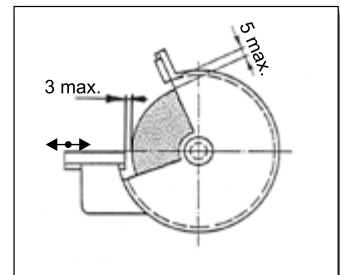


Fig. Clearance between the periphery of the wheel and the adjustable guard and work rest.

Fixed bench and pedestal grinders that run at the speed 63 m/s or more may be equipped with additional internal guards.

These internal guards are designed to close the aperture in the main guard in case of wheel breakage being moved down by the broken wheel fragments (see Fig.).

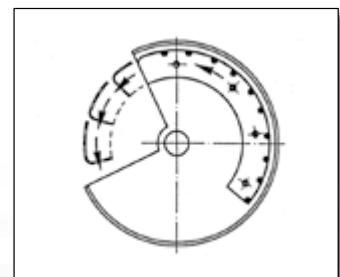


Fig. Rotating or pivoting internal guard.

GUARDS FOR SWING FRAME GRINDERS

A maximum aperture angle of the guard for the swing frame grinders should not exceed 180° . The guard must enclose at least half of the wheel on both sides (see Fig.).

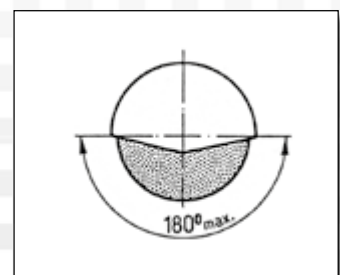


Fig. Guard for swing type grinder.

GUARDS FOR HAND HELD GRINDERS

GUARDS FOR DIRECT DRIVE HAND HELD GRINDERS

The maximum aperture should not exceed 185° . The guard must be so designed as to allow it to be opened (removed) on one side (see Fig.).

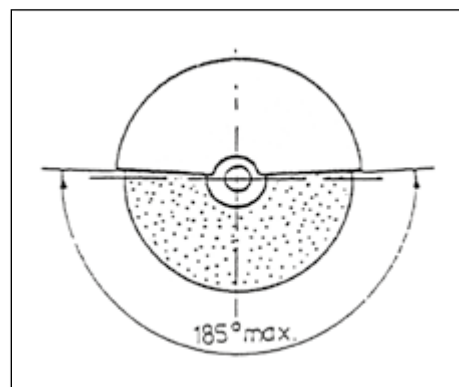


Fig. Guard for direct drive hand held grinder.

GUARDS FOR HAND HELD ANGLE AND FACE GRINDERS

Guards for type 27 grinding wheels should have a maximum aperture of 185° . They must be so designed as to be between the operator and the grinding wheel.

In case of straight and taper cup wheels, the guards must be adjustable and positioned in such a way so that only one part of the wheel is left unprotected.

When the protective band of the guard is adjustable the band is to be positioned so that the unprotected area T_0 , which is dependant on the thickness T of the grinding wheel, does not exceed the defined value.

The clearance between the periphery of new grinding wheel and the protective band must not be greater than 6 mm (see Fig.).

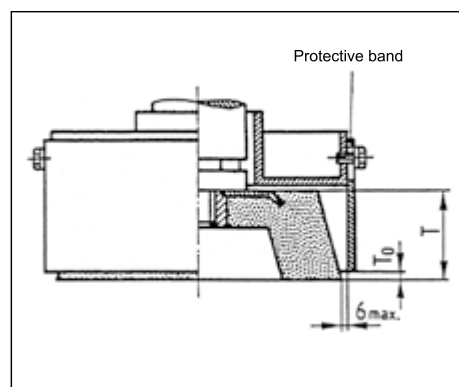


Fig. Band type guard.

GUARDS FOR CUTTING-OFF MACHINES

GUARDS FOR FIXED CUTTING-OFF MACHINES

Guards for fixed cutting-off machines. The maximum angle of the aperture is 150° . The guard must enclose the wheel on all sides with the exception of this aperture (see Fig.).

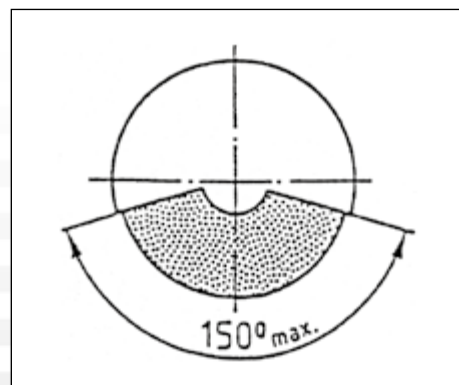


Fig. Guard for cutting-off machine.

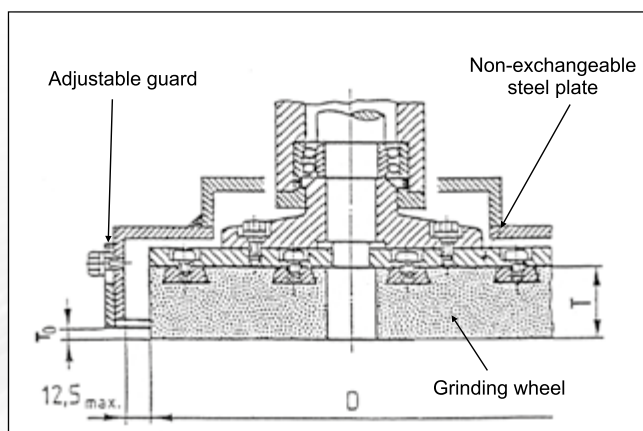


Fig. Adjustable guard of disc grinding wheel with threaded inserts.

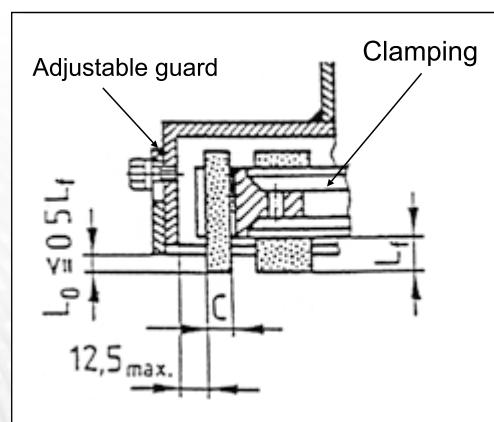


Fig. Adjustable guard of wheel head with abrasive segments.

TOTALLY ENCLOSED WORKING AREA

In case of precision grinding performed at speed over 63 m/s the grinding wheel must be totally enclosed. When a totally enclosed guard is used, the workpiece is fed in mechanical way with complete safety. In addition, in case of wheel breakage, the fragments of the wheel cannot be thrown out (see Fig.).

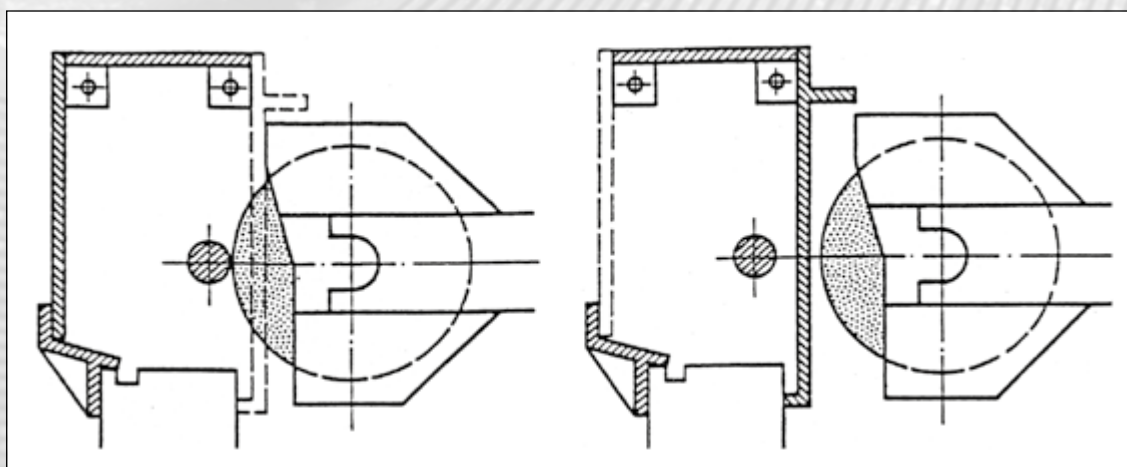


Fig. Example of a totally enclosed working area.

EYE PROTECTION

There are a lot of methods for the operator's eye protection: goggles or spectacles, face-screens, protective guards, etc. Follow the national safety regulations.

DECLARATION OF SAFETY

Our abrasive tools are not hazardous for health in the range of civil law orders and regulations. They are free of antimony, lead, cadmium, asbestos, free phenol and free formaldehyde. They are not subject to obligatory marking required by regulations for harmful materials.

WASTE DISPOSAL

The abrasive tool user is the owner of abrasive wastes and his obligation is to manage the waste in accordance with rules defined in the act on waste disposal and related regulations.

LODGING OF COMPLAINTS

In case requirements of contract or purchase order are not adhered, the customer shall have the right to lodge a complaint against the manufacturer or supplier.

The following information should be specified in the complaint note:

1. Type, dimensions, characteristics, operating speed of grinding wheel
2. Identification number together with manufacture date
3. Quantity supplied and quantity claimed
4. Delivery date and invoice number
5. Cause of complaint
6. Expectations of customer as to complaint processing

The manufacturer shall record, process and settle all complaints in accordance with applicable procedure. The customer shall be notified of results immediately after the procedure has been completed. The form of "Complaint Letter" is placed on page 100

RULES FOR SELECTION OF ABRASIVE TOOL CHARACTERISTICS TO GRINDING OPERATIONS

Specified in Table 2, page 11 combinations of abrasive - grain size - hardness grade - structure - bond type enable designing and manufacture of abrasive tools with a lot of different characteristics.

Moreover, a very wide range of industrial grinding operations and requirements require various abrasive tools, with properly adjusted parameters, to be available. An appropriate selection of abrasive tool characteristics so that they meet the requirements is the prerequisite for success.

Rules for selection of abrasive wheel or segment characteristics are as follows.

1. Worked material. Type and condition

- chemical composition
- hardness
- type of treatment prior to grinding operation

This is important for selection of:

- Abrasive material type
 - » as a general rule, the synthetic corundum abrasive is preferred on steel and cast iron
 - » silicon carbides are preferred on sintered carbides, ceramics, concrete, hard, brittle cast iron, etc.
- Grain size
 - » Fine grains are used on hard and brittle materials
 - » Coarse grains are used on soft and ductile materials
- Hardness grade
 - » low hardness grades are preferred on hard material
 - » high hardness grades are preferred on soft materials

2. Type and nature of grinding operation

- rough grinding (snagging)
- cutting-off
- precision grinding (rough or finish) and consequently: rate of stock removal and required surface roughness.

This is important for selection of:

- Grain size
 - » coarse grain for a quick removal of heavy stock, high depth of grinding and low surface roughness requirements
 - » fine grain for finishing and high surface roughness requirements

• Bonds

- » vitrified bonds for precision grinding but also resinoid bonds that enable surface finishing to be performed
- » rough grinding and cutting-off - only resinoid and reinforced resinoid bonds. At low operating speeds the vitrified bonds for rough grinding may be used as well.

3. Operating speed of grinding wheel

This is important for selection of:

- Bond - see Table 2, page 11.

The standard vitrified bond straight grinding wheels are intended for operation at operating speed of 35 [m/s] (40 and 45 [m/s] - depending on the grain size and hardness grade).

For resinoid bond, the conventional operating speeds are correspondingly 50 and 63 [m/s].

Increased speeds are: 45, 50 and 63 [m/s] - depending on the bond.

High speeds are: 80, 100 [m/s]

Notes:

- The increased operating speeds result in a higher "dynamic hardness" and, in contrary, the lower operating speeds result in the more soft grinding.
- In case the increased and high operating speeds are necessary, consult this with the manufacturer.
- **The maximum safety operating speed, specified on the grinding wheel must not be exceeded.**

4. Contact area between the grinding wheel and ground material

This is important for selection of:

- Grain size
 - » fine grains for small, narrow contact areas
 - » coarse grains for large contact areas
- Hardness grade
 - » higher hardness grade for small, narrow contact areas and vice versa

5. "Dry" grinding or "wet" grinding (with coolant)

This is important for selection of:

- Hardness grade
- As a general rule, the wet grinding enables use of one grade higher hardness in comparison with dry grinding.

6. Difficulty rate of grinding operation

This is important for selection of:

- Abrasive material
 - » heavy conditions of rough operation (snagging) requires normal aluminium oxide 95A and zirconia aluminium oxide ZrA or black silicone carbide 98C.
 - » brittle, refined abrasive materials - noble aluminium oxide, white 99A, chromium aluminium oxide CrA, monocrundum MA and their mixtures are used for finish grinding of hard, hardened high-quality steel
 - » intermediate abrasives: semi-noble aluminium oxide 97A and mixtures are used for grinding operations of medium working conditions and for special applications
 - » green silicon carbide 99C is used for grinding of sintered carbides and ceramics.

7. Grinding machine power

This is important for selection of:

- Hardness grade of grinding machine
 - » the higher power of grinding machine, the higher hardness grade of grinding wheel

Note:

When the power of grinding machine main motor is not sufficient, then the rotational speed of grinding wheel will be lowered and the grinding properties of the grinding wheel will be reduced which, in turn, may result in higher pressures, high temperatures and, as a consequence, damage of grinding wheel.

Example: The cutting-off grinder must be of 3 [kW] in power per each 100 [mm] of grinding wheel diameter which for the grinding wheel 41-300 makes the total power of main motor of 9 [kW].

8. Approximate relationship between surface roughness and grain size

Roughness number	R_a [μm]	Grain size								R_z [μm]
		46	60	80	100	120	150	180	220	
7	1,25	✓								6,3
8	0,63		✓	✓						3,2
9	0,32			✓	✓	✓				1,6
10	0,16					✓	✓	✓		0,8
11	0,08							✓	✓	0,4

Surface roughness - is a measure of the texture of a solid body surface. It is quantified by the vertical deviations of a real surface from its ideal form. Roughness value of the workpiece surface depends on material grade and on the way of its machining.

9. The following additional factors also affect on grinding results:

- grinding parameters: feed, speed of workpiece, depth of grinding
- grinding machine features: rigidity, technical condition, pressures during grinding
- dressing parameters and conditions
- skill of operator-grinder

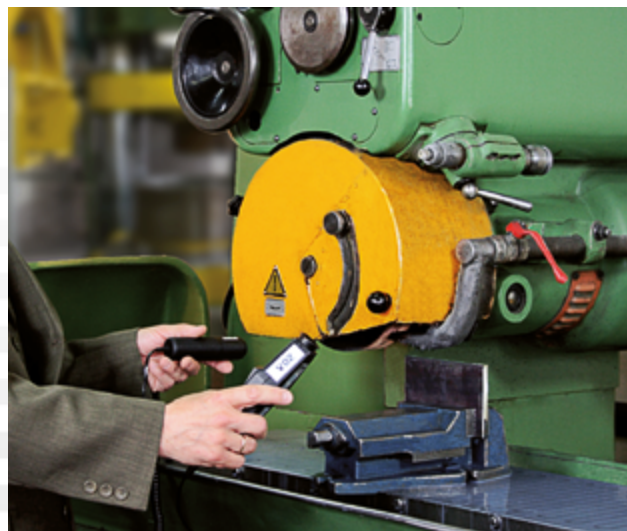
The above mentioned rules have certain exceptions but, they are commonly proven by practice.

10. Additional, practical guides

- Record characteristics and manufacturer's name of grinding wheel being mounted. If it occurs suitable then it will be sufficient to repeat the purchase order. If not, it will be the material for analysis for the supplier service.
- Substitution of symbols from grinding wheel designations from different suppliers by a designation of "Andre" may be a certain approximation but does not ensure the same grinding results. This results from different materials and parameters of manufacturing processes used by the manufacturers. Therefore, tools from a new supplier require to be tested in specified grinding conditions, especially before ordering a larger batch of the tools

Note:

Examples for application of particular grinding wheels and segments for various materials and grinding operations are presented in the following catalogue sheets.



This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

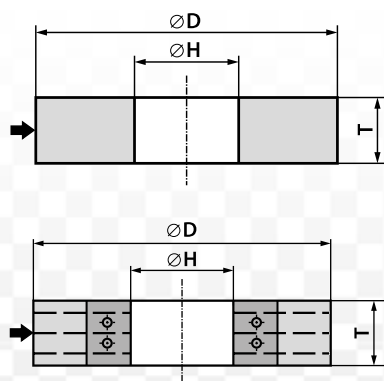


RESINOID BONDED ABRASIVE TOOLS

TYPE 1 - STRAIGHT GRINDING WHEELS**TYPE 5 - WHEELS RECESSED ON ONE SIDE****TYPE 7 - WHEELS RECESSED ON BOTH SIDES**

The Type 1 straight grinding wheels, both non-reinforced and reinforced with fibreglass discs or/and steel rings and, if necessary - with fine grit zone, form the most numerous group of general purpose and specialized abrasive tools. They are intended for precision and rough grinding on various materials such as hard and soft steels, stainless steels, cast iron, aluminium, bronze, brass, concrete, stone, terrazzo, ceramics and for sharpening of cutting tools.

They are used on fixed and swing-frame grinding machines, electric and pneumatic hand-held grinding machines, sharpening machines and grinding units. The Types 5 and 7 grinding wheels are intended for rough and precision grinding on various materials, tool sharpening, etc., e.g. grinding of terrazzo, ceramics (e.g. parapet walls, stairs) on hand-held grinders with so called "flexible shaft", for grinding of turnouts with carriage grinding machines.



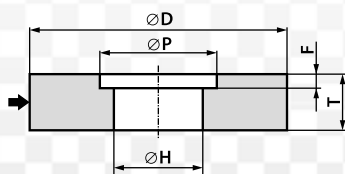
1 profile - D x T x H
 $H \leq 0,67D$

TYPE 1**Dimensions [mm]**

D	T	H
20	2 - 25	6
25	2 - 20	12
30	2 - 25	8; 10
35	2 - 25	10
40	2 - 30	10; 13; 16
45	2 - 30	10
50	2 - 25	8
	2 - 35	7; 13; 16
	2 - 40	20
60	2 - 35	13; 16; 20
65	2 - 45	16; 20; 32
75	2 - 35	10; 13
	2 - 50	20
80	4 - 25	10
	4 - 40	8; 12,7; 32
	4 - 35	16; 22,23
	4 - 50	20
90	4 - 60	20
	4 - 35	30; 32
100	4 - 50	20
	4 - 35	22,23
	4 - 40	32
112	4 - 25	22,23; 32
115	4 - 35	20; 32
125	4 - 15	12,7
	4 - 50	20
	4 - 60	32
127	4 - 25	12,7
150	4 - 35	10; 16
	4 - 25	12,7
	4 - 50	20
	4 - 30	25,4
	4 - 50	32; 51

160	4 - 40	12,7; 32
175	4 - 40	20; 32
	4 - 25	76
180	4 - 40	20; 32; 51
200	4 - 40	12,7; 20; 25,4; 51
	4 - 60	32
	4 - 35	76
	3 - 20*	32; 51
205	2 - 20*	76,2
225	2 - 20*	76,2
230	5 - 35	22,23; 25,4; 32; 50; 60; 100
250	5 - 30	22,23
	5 - 40	25,4; 32; 51; 60; 76; 120; 127
255	2 - 25*	76,2; 127
285	1,5 - 3,5*	203,2
295		
300	5 - 40	25,4
	5 - 30	40
	5 - 50	32; 50; 51; 60; 76
	5 - 80	127
305	2,5 - 25*	127
	1,5 - 25*	203,2
320	2 - 25*	203,2
350	2,5 - 25*	127
	5 - 65	32; 51; 127
	5 - 100	203; 203,2
400	5 - 80	40; 51; 80; 127; 150; 203; 203,2
406	2,5 - 25*	203,2; 304,8
450	8 - 80	51; 127; 150; 203; 203,2
500	8 - 100	40; 51; 127; 150; 152; 152,4
	8 - 35	76
	8 - 140	203; 203,2
	8 - 200	304,8; 305
508	6 - 25*	304,8; 305
	6 - 25*	
600	12 - 120	76; 127; 203; 203,2; 304,8; 305
610	12 - 200	203; 203,2; 304,8; 305
750	20 - 100	304,8; 305
762	20 - 100	304,8; 305

*) for grinding of drills and milling cutters



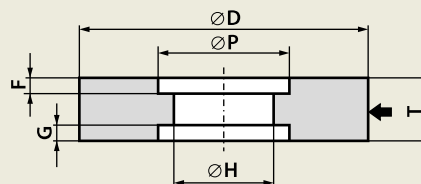
5 profile - D x T x H - P... F...

$$F \leq 0,5T \quad P > 0,33D$$

TYPE 5

Dimensions [mm]

D	T	H	P	F
100	20 - 30	25	54	5
			68	10
125	25 - 50	20	68	12
150	38 - 50	22,23	74	19
	24 - 60	32	93	12
	32 - 60		73	16
	40 - 60		72	20
200	26 - 55	51	118	13
250	24 - 40	25,4	152	12
	26 - 40		148	13
	28 - 40		150	14
	40 - 55	51	188	20
	48 - 50	60	150	24
	40 - 60	76	148	20
300	50 - 60		198	25



7 profile - D x T x H - P...F...G...

$$F+G \leq 0,5T \quad P > 0,33D$$

Dimensions for type 7 and types 1 and 5 are not shown in the table and need to be agreed on individually.

CHARACTERISTICS

Grinding wheel type	TYPE 1	TYPE 5	TYPE 7
Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives		
Grain size (granulation)	12 - 180*	14 - 120	36 - 180
Hardness grade	Q - W** I - T	K - R	K - P
Type and nature of bond	B; BF	B	B
Operating speed [m/s]	≤ 50 63*** 80***	≤ 50	≤ 50

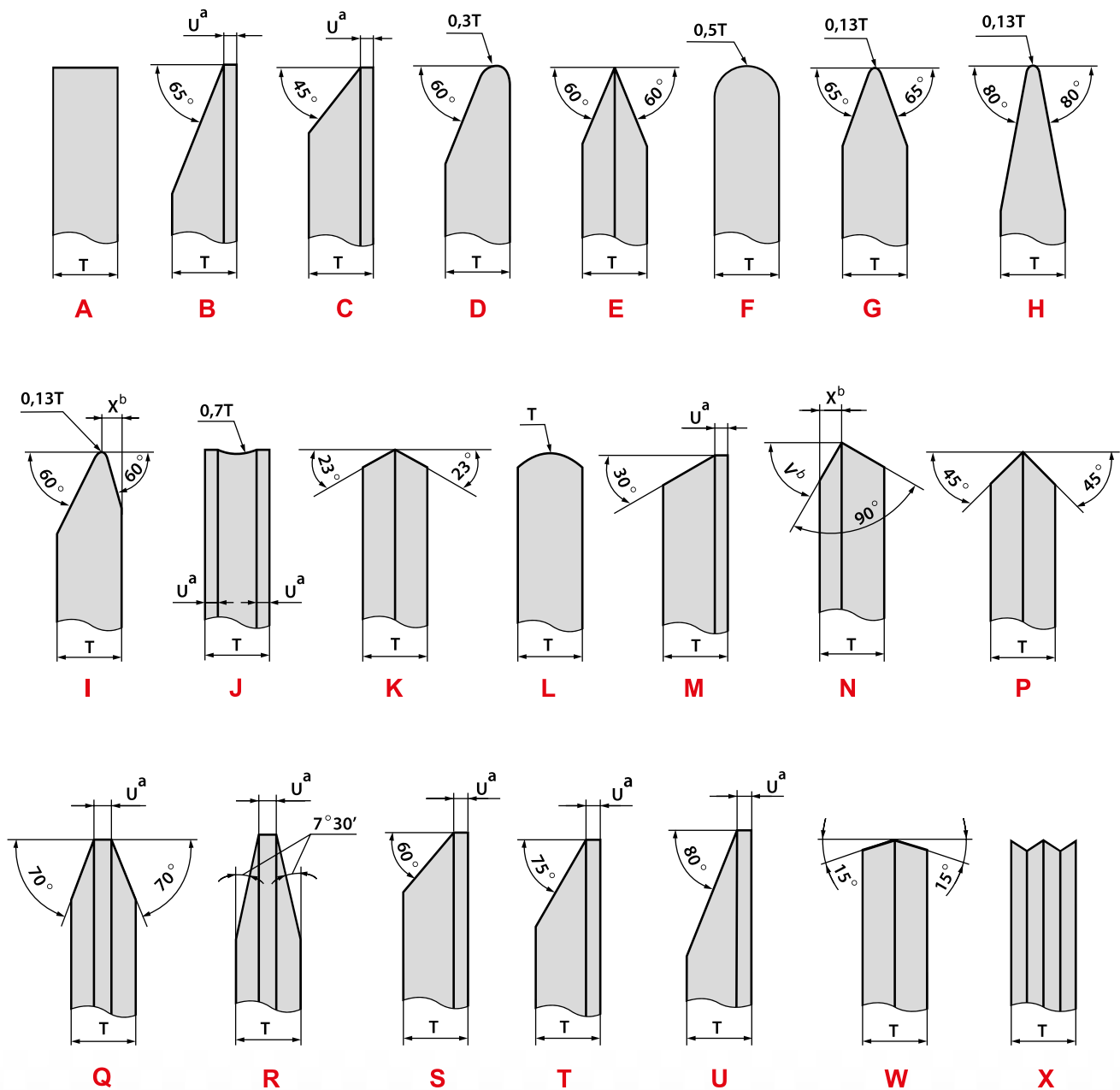
*) for grinding wheels with diameter $D \leq 100$ mm and thickness $T \leq 10$ mm the grit size ranges from 24 to 180.

**) grinding wheels for grinding of drills and milling cutters - the grit size ranges from 60 to 120; bond type - B.

***) dimensions of grinding wheels working at operational speed 63 and 80 m/s need to be agreed on individually

Profiles:

Straight grinding wheels can have a shaped profile on their periphery. Some of those profiles are standardized and are specified by a letter which follows the type number (see Marking Examples).



a) $U = 3,2$ [mm] unless otherwise ordered

b) please specify V and X values with order

Profile X - non-standardized, can be made in accordance with a drawing provided by the customer.

MARKING EXAMPLES

1 - 125 x 30 x 20 - 95A20Q6B569F - 80

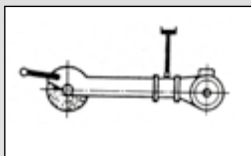
1 - 500 x 80 x 203 - 95A24Q5B51F - 50

1C - 350 x 40 x 127 - 98C60J7B - 50

APPLICATION EXAMPLES

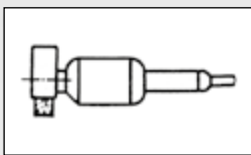
A. Rough grinding of various workpieces e.g. fettling, grinding of forgings, steel structures, regeneration

- manual feed of wheel or workpiece
- peripheral grinding



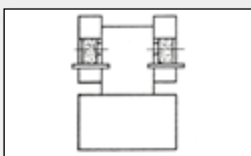
Swing frame grinding machine

- fettling
 - » cast steel - 95A14NB
 - » cast iron- 95A20PB, ZrA16PB, 98C16QB
- non-ferrous metals - 98C16NB



Portable direct drive grinder

- steel, in general - 95A16PB, 95A20QB
- cast iron - 98C20PB, 95A16PB
- cast steel - 95A14NB



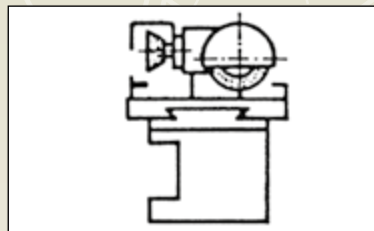
Double-wheel pedestal grinder

- steel, in general - 95A16QB
- cast iron - 95A20PB, ZrA16RB, 98C16QB
- cast steel - 95A16NB
- non-ferrous metals - 98C16NB

Note:

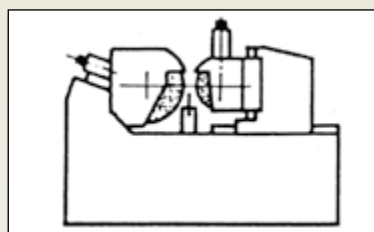
Depending on the grinding machine type wheels for each operating speed: 50, 63, 80 [m/s] can be supplied.

B . Precision grinding.



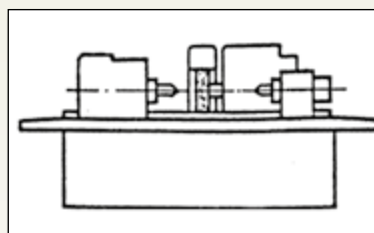
Tool grinder

- grinding of band saw blades - 99A60SB



Cylindrical grinder - centerless

- hardened steel - 99A60MB
- non-hardened steel - 95A54LB
- cast iron - 98C46KB
- porcelain - 98C60JB
- bearing rings - 96A60LB



Centre-type external grinder

- rolls for paper industry
 - » cast iron, granite, rubber - 99C46JB
 - » steel - 97A46JB
 - » rubber rolls - 99C36MB
- drill flute grinding - 97AM90W7BP89
- drill clearance grinding - 97AM90W7BP89
- drill point grinding - 97AM90V/W7BP83

TYPE 2 - CYLINDER WHEELS**TYPE 37 - CYLINDER WHEELS WITH THREADED INSERTS****TYPE 3701 - CYLINDER WHEELS WITH THREADED INSERTS, RELIEVED ON ONE SIDE AND SLOTS ON THE OPPOSITE SIDE****TYPE 3703 - CYLINDER WHEELS WITH THREADED INSERTS, RELIEVED ON ONE SIDE**

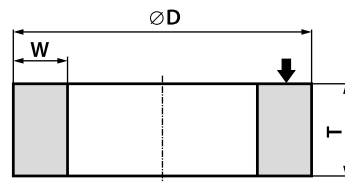
The Type 2, Type 37, Type 3701 and Type 3703 grinding wheels are intended for surface grinding on metal, concrete, terrazzo, ceramics.

They are used for face grinding and are distinguished by different clamping mode. They are also known as “frörsring”, among other for grinding and sharpening of bookbinder cutters, band saw tops, industrial floors and terraces.

Used on carriage grinding machines (e.g. Schwaborn), face grinders, so called “cut-off” machines (e.g. Graupner), plane grinders (e.g. Fickert).

It is necessary to define the alignment system, i.e.

- in relation to outer diameter
- in relation to hole diameter



2 - D x T - W...

$W < 0,17D$

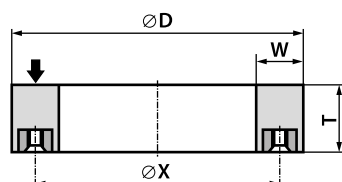
TYPE 2

Dimensions [mm]

D	T	W
190	80	12
250	100	25
300	90	45
400	80	45
508	90	48
600	100	59

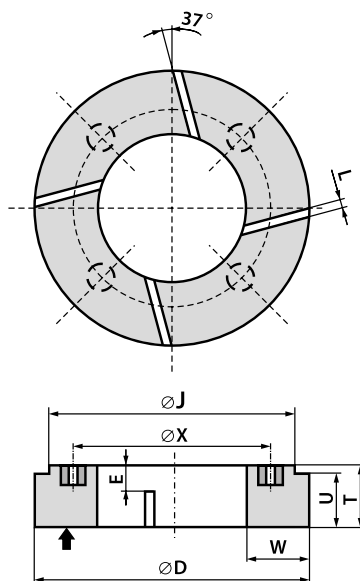
CHARACTERISTICS

Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives	
Grain size (granulation)	for D = 190 i 250	others D = 300, 400, 508 i 600
	36 - 120	14 - 120
Hardness grade	G - L	I - R
Type and nature of bond	B	
Operating speed [m/s]	≤ 40	

**37 - D x T - W... - Drawing No.** $W < 0,17D$

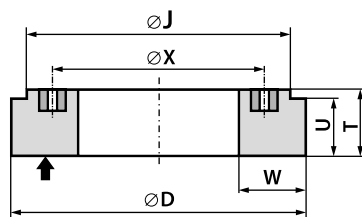
TYPE 37						
Dimensions [mm]					Spacing and number of threaded inserts	Drawing No.
D	T	W	X	Height of the threaded insert		
300	50	45	255	12	90° 4 x M10	PP/37/141
300	100	39	266,5	20	60° 6 x M10	PP/37/172
	150					
400	63	30	370	16	60° 6 x M12	PP/37/161
400	100	48	365	20	22°30' 16 x M12	PP/37/074
510	80	50	453	16	30° 12 x M12	PP/37/281

Grinding wheel characteristics need to be agreed on individually.

**3701 - D x T - W... - Drawing No.** $W < 0,17D$

TYPE 3701											
Dimensions [mm]									Spacing and number of threaded inserts	Number of slots n	Drawing No.
D	J	T	E	W	U	X	Slot width L	Height of the threaded insert			
300	269	62	24	50	55	235	10	12	90° 4 x M10	4	PP/37/071
			38								PP/37/228
			52								PP/37/167

Grinding wheel characteristics need to be agreed on individually.



3703 - D x T - W... - Drawing No.

$W < 0,17D$

TYPE 3703

Dimensions [mm]							Spacing and number of threaded inserts	Drawing No.
D	J	T	W	U	X	Height of the threaded insert		
300	269	62	50	55	235	12	90° 4 x M10	PP/37/248

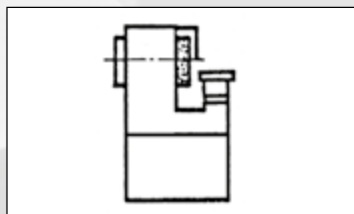
Grinding wheel characteristics need to be agreed on individually.

MARKING EXAMPLES

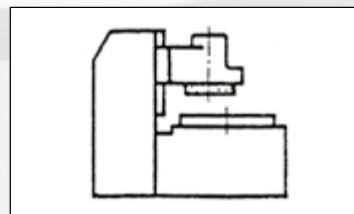
2 - 250 x 100 - W25-99A54G6B-30

3701 - 300 x 62 - W50-98C54M6B-35-PP/37/228

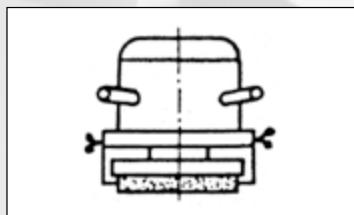
APPLICATION EXAMPLES



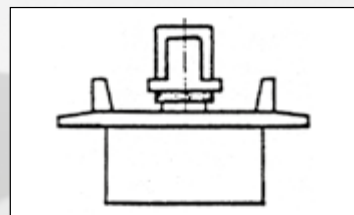
Horizontal spindle surface grinder



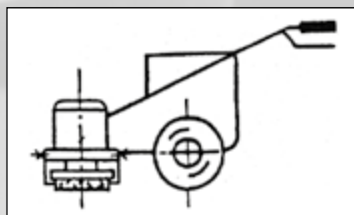
Verical spindle surface grinder with a rotary table



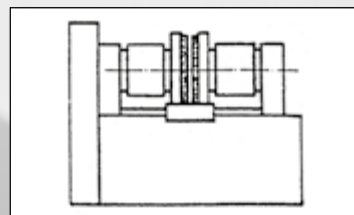
Portable vertical spindle grinder



Verical spindle surface grinder with reciprocating table (face grinding)



Carriage verical spindle grinder



Duble disc surface grinder with horizontal spindle

cast iron - 95A16NB, steel - 95A16NB, concrete - 98C20MB

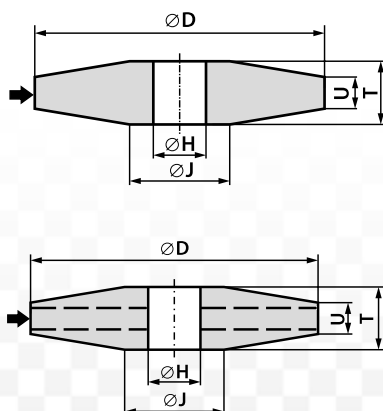
TYPE 4

WHEELS TAPERED ON BOTH SIDES



Due to their design and concave steel flanges, the Type 4 grinding wheels are protected against the possibility of slip off of wheel fragments.

They are used for rough grinding on steel, cast iron, cast steel, aluminium, bronze and other materials. They may be used on specialized electrical or pneumatic portable grinding machines, exceptionally without guards.



4 - D / J x T / U x H

D ≤ 200

TYPE 4

Dimensions [mm]

D	J	T	U	H
75	16	20	16	16
	20	19	16	
80	25	20	16	
		25	21	
		20	15	
100	25	25	20	
		32	27	

CHARACTERISTICS

Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives
Grain size (granulation)	14 - 60
Hardness grade	M - R
Type and nature of bond	B; BF
Operating speed [m/s]	≤ 50; 63*; 80*

*) characteristic for wheels operating at 63 i 80 m/s need to be agreed on individually

MARKING EXAMPLES

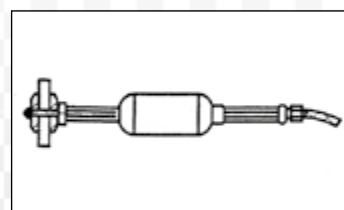
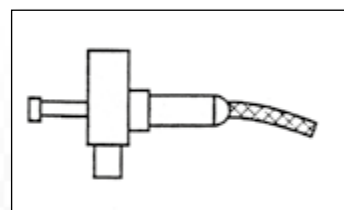
4 - 75/20 x 19/16 x 20 - 95A16Q5B51 - 50

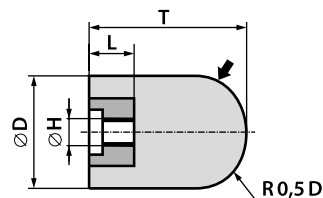
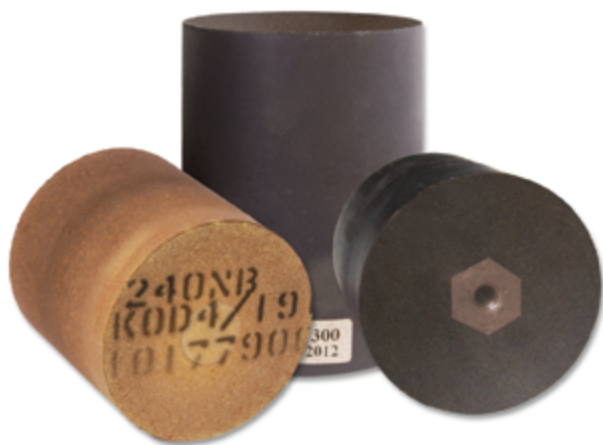
APPLICATION EXAMPLES

steel structures - 95A 16 QB

cast iron castings - 95A 20 PB; 98C 16 PB

concrete – 98C 20 MB

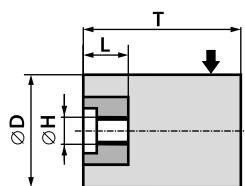


TYPE 18 - CYLINDRICAL PLUGS WITH THREADED INSERTS**TYPE 18R - CYLINDRICAL PLUGS WITH A ROUND NOSE, WITH THREADED INSERTS****TYPE 19 - CYLINDER-CONICAL PLUGS WITH THREADED INSERTS****TYPE 1801 - CYLINDER WHEELS WITH SPHERICAL WORKING SURFACE****18R - D x T - H x L**

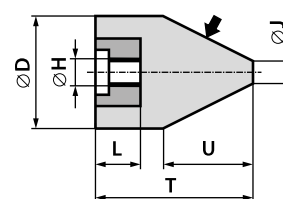
The Type 18, Type 18R and Type 19 grinding wheels with a threaded insert, sometimes called "fingerlike", are intended for rough and finishing grinding of holes and surfaces in confined areas of castings and metal workpieces.

They are used on electric or pneumatic portable straight grinders. Threaded insert allows for quick change of a worn grinding wheel.

The Type 1801 grinding wheels are intended for special applications – very precise grinding of bearing roller large ends.

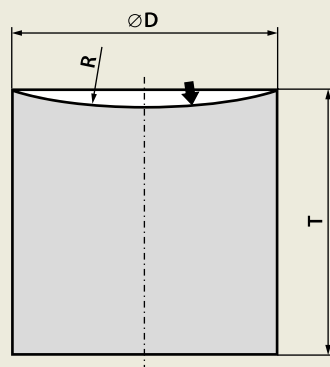
**18 - D x T - H x L**

TYPE 18			
Dimensions [mm]			
D	T	H	L height of the threaded insert
40	70	M12	25
	78	5/8"	
	80	1/2"-13 3/8"	
50	65	5/8"	20
80	80		25

**19 - D / J x T / U - H x L**

TYPE 19					
Dimensions [mm]					
D	J	T	U	H	L height of the threaded insert
80	20	80	55	5/8"	25

CHARACTERISTICS	
Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives
Grain size (granulation)	14 - 60
Hardness grade	M - R
Type and nature of bond	B
Operating speed [m/s]	≤ 50



1801 - D x T - R...

TYPE 1801		
Dimensions [mm]		
D	T	R
76,6	101,6	86,4
102,1		83,8
		120,7
152,8		116,8
		175,3
		233,7
		279,4

**Characteristics for the Type 1801 grinding wheels
need to be agreed on individually.**

MARKING EXAMPLES

18R - 40 x 80 - 3/8" x 25 - 95A24Q6B613 - 50
 18 - 50 x 65 - 5/8" x 20 - 98C16R6B97 - 50
 1801 - 152,8 x 101,6 - R233,7 - 99A240N8BMOD - 50

APPLICATION EXAMPLES

- casting iron - 98C24OB; 95A16RB
- bearing roller large end grinding - 99A240NB

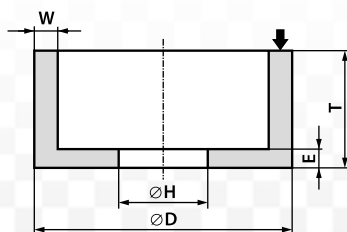


TYPE 6 - STRAIGHT CUP WHEELS**TYPE 6001, 6002, 6003 - STRAIGHT CUP WHEELS WITH A CENTRAL THREADED INSERT**

The Type 6 grinding wheels are manufactured in two design solutions, one with a through bore and the other one with a central threaded insert.

They are used both for rough and precision grinding on various materials and for cutter tool sharpening. Typical applications are: grinding of bearing races, sharpening of circular tools, paper cutters, saw blades, drills, milling cutters as well as for surface grinding of terrazzo surfaces.

The Type 6001, 6002, 6003 wheels are used on carriage grinders for grinding of railway rails.



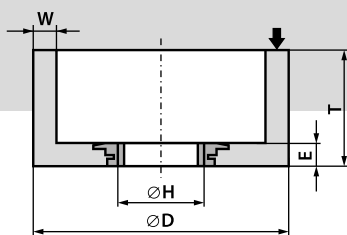
6 - D x T x H - W...E...

E ≥ 0,2T - for fixed grinders
E ≥ 0,25T - for portable grinders

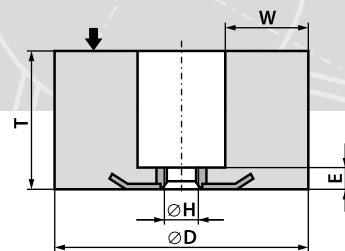
TYPE 6

Dimensions [mm]

D	T	H	W	E
40	30	16	7	7
50		20	7	7
60	40	20	8	11
			8	15
65	35	32	5	16
75	40	20	10	15
			17	15
		32	10	15
	50	20	20	20
80	60	32	15	12
90	40	20	15	15
		32	13	15
95	35	20	27	15
100	38	22,23	10	10
	40	20	12	12
		32	6	10
	50	20	12	12
	85		25	20
	100	22,23	20	20
	110		20	25
125	50	20	20	15
		32	7	12
			20	15
	70	20	20	
150	40	32	37	13
	50	51	37	14
	60	32	10	16
	63		10	16
			15	16
			15	19
	80		15	19
	51	15	19	
200	100	51	27	22
		76	25	26
			27	22

**6001 - D x T x H - W...E...**

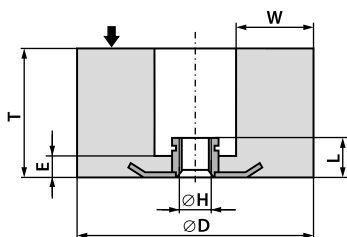
E ≥ 0,2T - for fixed grinders
E ≥ 0,25T - for portable grinders

**6003 - D x T x H - W...E...**

E ≥ 0,2T - for fixed grinders
E ≥ 0,25T - for portable grinders

TYPE 6001				
Dimensions [mm]				
D	T	H	W	E
80	32	M14	26,5	12
	72	5/8"	20	20
	60	M14	20	12
		M20	20	12
90	100	M20	15	25

TYPE 6003				
Dimensions [mm]				
D	T	H	W	E
90	100	M20	32,5	25
100	60		30	12
	85		30	24
	110		20	24
			30	24
125	65		32	13
150	55		42,5	18
	65		25	18
		5/8"	42,5	20

**6002 - D x T x H / L - W...E...**

E ≥ 0,2T - for fixed grinders
E ≥ 0,25T - for portable grinders

TYPE 6002					
Dimensions [mm]					
D	T	H	W	E	L Height of the threaded insert
125	65	M20	37	13	23
150			25	18	

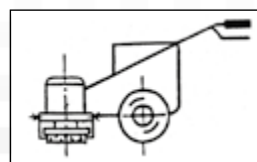
MARKING EXAMPLES

6 - 150 x 63 x 32 - W10E16-95A60J7B - 35

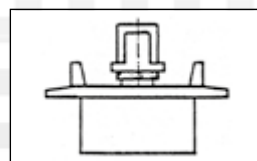
6002 - 150 x 65 x M20/23 - W25E18-95A16R5B97 - 50

CHARACTERISTICS

Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives
Grain size (granulation)	14 - 120
Hardness grade	I - R
Type and nature of bond	B
Operating speed [m/s]	≤ 50

APPLICATION EXAMPLES:

Railway and tram rails - 95A16QB



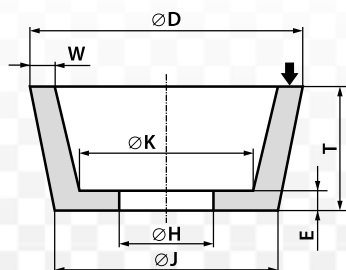
Roller bearing components - 99A80LB

TYPE 11 - TAPER CUP WHEELS**TYPE 1112, 1113, 1114 - TAPER CUP WHEELS WITH A CENTRAL THREADED INSERT**

The Type 11 grinding wheels are manufactured in various design solutions: with a through bore, with a central threaded insert-and and with reinforced bottom. They are used for rough and precision grinding on various materials such as steel, cast iron, bronze, brass, aluminium, concrete, stone, terrazzo, ceramics, e.g. welds of steel structures, castings, railway rails, terrazzo surfaces, levelling of concrete, repair works, etc.

Unique cutting surface of the taper cup wheels, in the form of cylinder, provides smooth grinding of required surface profile without any undesired "cuts" into material being ground.

They are used on portable vertical spindle grinders, electrically or pneumatically driven angle grinders, carriage grinders and grinding units.



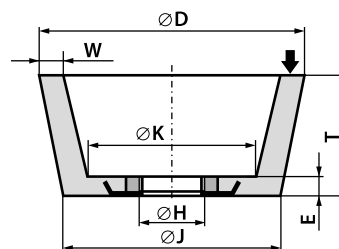
11 - D / J x T x H - W...E...K...

$E \geq 0,2T$ - for fixed grinders
 $E \geq 0,25T$ - for portable grinders

TYPE 11

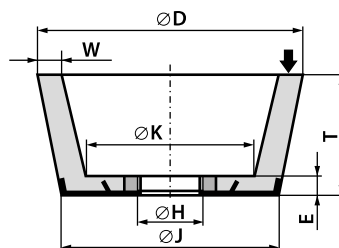
Dimensions [mm]

D	J	T	H	W	E	K
80	54	50	20	10	12	30
100	71	40	22,23	22	10	48
110	90	55		20	12	48
125	100	50	32	25	20	50
140	117	70	22,23	25	20	65
150	120	50	32	37	20	60



1112 - D / J x T x H - W...E...K...

$E \geq 0,2T$ - for fixed grinders
 $E \geq 0,25T$ - for portable grinders



1113 - D / J x T x H - W...E...K...

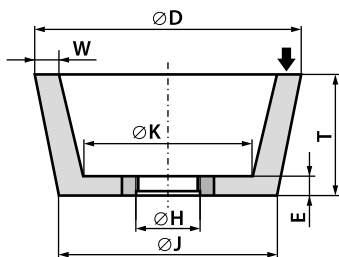
$E \geq 0,2T$ - for fixed grinders
 $E \geq 0,25T$ - for portable grinders

TYPE 1112 i 1113

Dimensions [mm]

D	J	T	H	W	E	K
110	90	55	M20*	20	18	48
			5/8"	20	20	48
			M14	20	20	48
125	100	50	M14	25	20	50
			5/8"	25	20	50
150	120	50	M14	40	20	54
			5/8"	40	20	54
				25	20	54

*) tylko TYPE 1112



1114 - D / J x T x H - W...E...K...

E ≥ 0,2T - for fixed grinders
E ≥ 0,25T - for portable grinders

TYPE 1114

Dimensions [mm]

D	J	T	H	W	E	K
80	54	50	M14	10	12	30
100	80			20	20	45

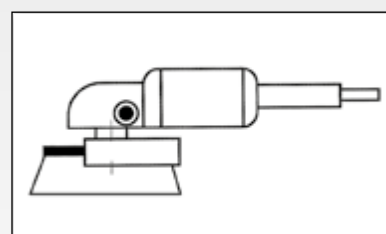
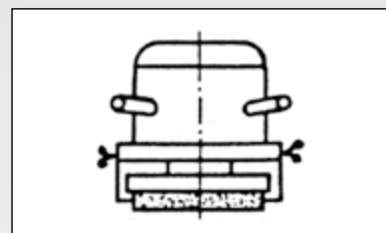
CHARACTERISTICS

Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives
Grain size (granulation)	14 - 120
Hardness grade	I - R
Type and nature of bond	B
Operating speed [m/s]	≤ 50

MARKING EXAMPLES

11-110/90x55x22,23mm-W20E12K48-98C16N6B97-50
1112-150/120x50x5/8"-W40E20K54-95A16P6B97-50
1113-125/100x50x5/8"-W25E20K50-95A16P6B97-50

APPLICATION EXAMPLES:



- Steel - 95A16PB
- Railway and tram rails – 95A16QB
- Cast iron - 95A20QB; 98C20PB
- Non-ferrous metals - 98C16NB
 - Cast steel - 95A16PB
 - Concrete - 98C20MB

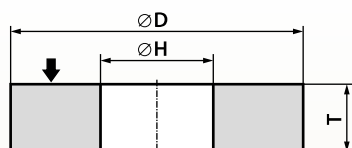


TYPE 35 - DISC WHEEL**TYPE 3501 - DISC WHEEL WITH SLOTS****TYPE 3504 - DISC WHEELS RELIEVED ON ONE SIDE AND SLOTS ON THE OPPOSITE SIDE**

The Type 3501 and Type 3504 disc wheels are intended for grinding on terrazzo, concrete, stone, ceramics, etc., in building and stonework industries for example.

They are cemented (glued) to a backplate and used for grinding of flat surfaces.

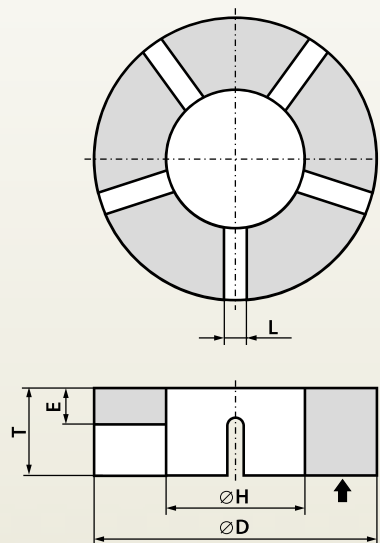
They are used on so called "elbow" wall grinders, carriage, portable or plane grinders.



35 - D × T × H

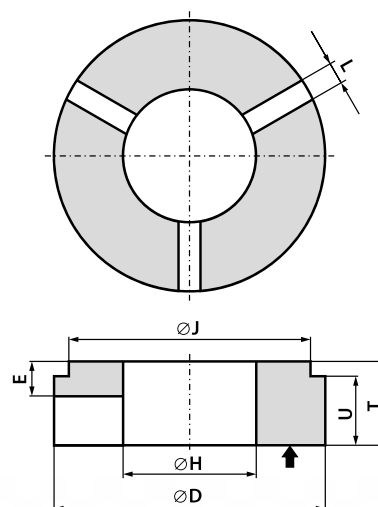
$H \leq 0,67D$

Dimensions and characteristics need to be agreed on individually.



3501 - D × T / E × H - L...n...

$H \leq 0,67D$



3504 - D / J × T / U / E × H - L...n...

$H \leq 0,67D$

TYPE 3501

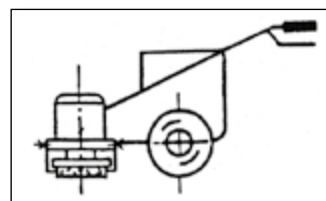
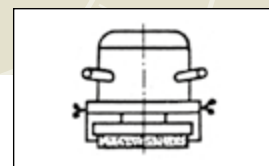
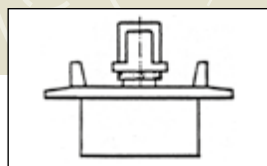
Dimensions [mm]					Number of slots n every V°
D	T	H	E	L	
200	45	51	10	14	5 every 72
250	30	160	10	15	3 every 120

TYPE 3504

Dimensions [mm]							Number of slots n every V°
D	T	H	J	U	E	L	
300	80	160	230	55	35	25	3 every 120

CHARACTERISTICS

Type and nature of abrasive	98C
Grain size (granulation)	16 - 180
Hardness grade	I – P
Type and nature of bond	B
Operating speed [m/s]	≤ 35

APPLICATION EXAMPLES**MARKING EXAMPLES**

35-250x50x150-98C16Q5B416-35
 3501-200x45/10x51-L14n5-98C20M6B-35
 3504-300/230x80/55/35x160-L25n3-98C36N6B-35

- Concrete - 98C20MB
- Terazzo - 98C54LB

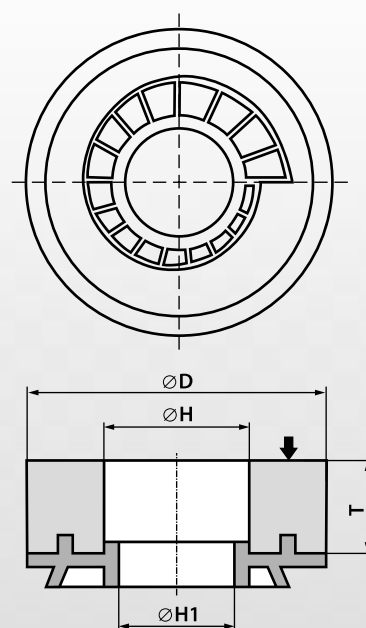
TYPE 3502 - DISC WHEEL WITH A SPIRAL FOR QUICK-CHANGE MOUNTING

TYPE 3503 - DISC WHEEL WITH A TAPERED HOLE AND WITH A SPIRAL FOR QUICK-CHANGE MOUNTING

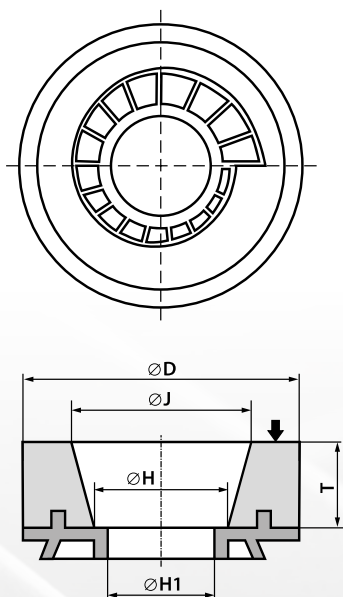
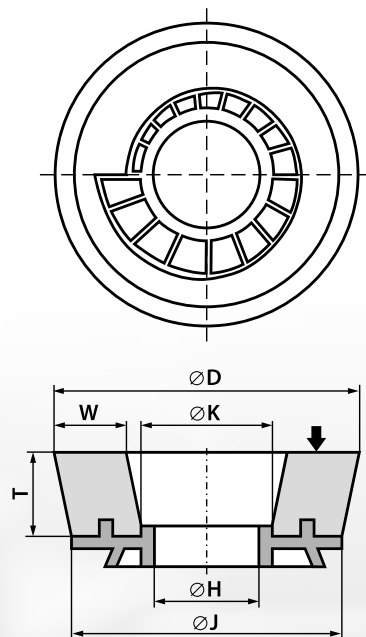
TYPE 1102 - TAPER CUP WHEEL WITH A SPIRAL FOR QUICK-CHANGE MOUNTING

The Type 3502, Type 3503 and Type 1102 grinding wheels are intended for grinding on terrazzo, concrete, stone, ceramics, etc. as well as for renovation of surfaces in building and stonework industries.

They are used on electrical portable angle grinders equipped with a quick-change catch plate.



3502 - D x T x H / H1

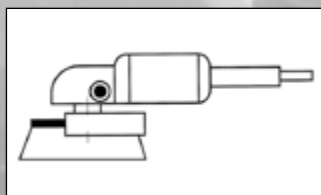
**3503 - D / J x T x H / H1****1102 - D / J x T x H - W...K...**

TYPE 3502			TYPE 3503			
Dimensions [mm]			Dimensions [mm]			
D	T	H/H1	D	J	T	H/H1
100	35	36/30	125	52	38	36/30

TYPE 1102					
Dimensions [mm]					
D	J	T	H	W	K
140	125	38	60	44	36
Dimensions of the spiral acc. to those on grinder catch plate (e.g. CELMA S.A.)					

CHARACTERISTICS	
Type and nature of abrasive	98C
Grain size (granulation)	16 - 180
Hardness grade	I - M
Type and nature of bond	B
Operating speed [m/s]	≤ 16

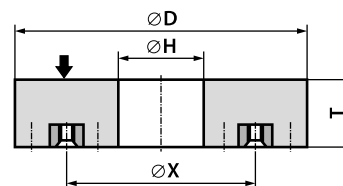
Equivalents:	
Branch marking "stonework"	grit size - approximate
"0"	20 and coarser
"1"	30 - 36
"2"	54 - 60
"3"	100 - 120

APPLICATION EXAMPLES

Terazzo - 98C20MB; 98C54LB; 98C100LB

MARKING EXAMPLES

3502-100x35x36/30-98C20J6B-16
 3503-125/52x38x36/30-98C100J6B-16
 1102-140/125x38x60-W44K36-98C54J6B-16

TYPE 36 - DISC WHEELS WITH THREADED INSERTS**TYPE 3601 - DISC WHEELS WITH THREADED INSERTS AND PERFORATION HOLES****TYPE 3603 - DISC WHEELS WITH THREADED INSERTS, RECESSED ON THE MOUNTING SIDE****TYPE 3610 - DISC WHEELS WITH THREADED INSERTS****TYPE 3612 - DISC WHEELS WITH THREADED INSERTS, RECESSED ON THE WORKING SIDE**

36 - D x T x H - Drawing No.
H ≤ 0,67D

This group of wheels is intended for surface grinding, both with a single wheel and in pairs.

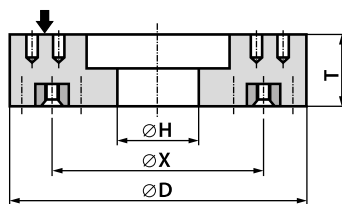
Inoperative side of the wheel has threaded inserts intended for mounting on catch plates of grinders.

They are applicable in bearing industry on grinding machines Rowland, Discus, for grinding and renovation of slicer cutter in railway engineering, for sharpening tobacco slicer cutters, for grinding and renovation of concrete and terrazzo surfaces.

They are used on carriage grinders, portable grinders as well as grinding units.

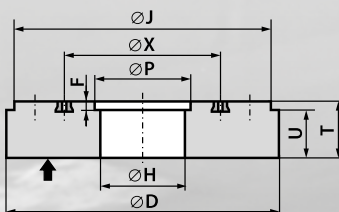
In automotive industry they are applied for grinding of piston rings.

TYPE 36						
Dimensions [mm]					Spacing and number of threaded inserts	Drawing No.
D	T	H	X	Height of the threaded insert		
100	60	32	66	12	90° 4 x M8	PP/36/199
125	60	55	90			PP/36/198
150	50	56	90			PP/36/392
	72	56	90			
	80	56	90			
250	30	160	205	14	90° 4 x M10	PP/36/140
	63	100	180		60° 6 x M10	PP/36/120
	80	150	200			PP/36/195
450	90	250	375	14	36° 10 x M10	PP/36/162
	100	203	270 373	16	72° 5 x M10 36° 10 x M10	PP/36/209
500	150	305	431,8		30° 12 x M10	PP/36/065
585	65	10	133,4 285,8 381 508		120° 3 x M10 51°26' 7 x M10 51°26' 7 x M10 25°43' 14 x M10	PP/36/024
585		260	381 508	14	51°26' 7 x M10 25°43' 14 x M10	PP/36/088
600	75	305	370,5 530,5	12	60° 6 x M16 x 1,5 30° 12 x M16 x 1,5	PP/36/069
	125					
	130					
750	40	350	440 640	16	36° 10 x M10 24° 15 x M10	PP/36/089
762	76,2	25,4	108		120° 3 x M10	PP/36/230
			279,4		45° 8 x M10	
			457,2		30° 12 x M10	
			673,1		22°30' 16 x M10	



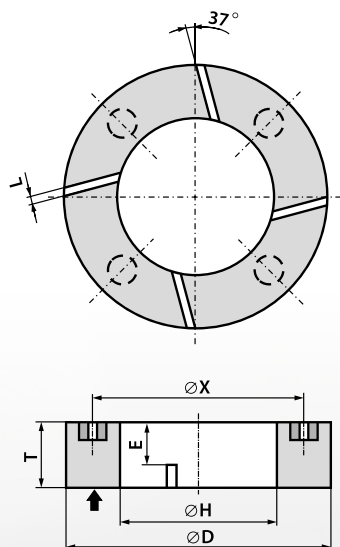
3601 - D x T x H - Drawing No.
 $H \leq 0,67D$

TYPE 3601						
Dimensions [mm]					Spacing and number of threaded inserts	Drawing No.
D	T	H	X	Height of the threaded insert		
585	65	10	133,4	12	120° 3xM10	PP/36/025
	65	19	285,8		51° 26' 7 x M10	PP/36/208
	70		381		51° 26' 7 x M10	
			508		25° 43' 14 x M10	
660	55	50	204		60° 6 x M10	PP/36/027
			406		60° 6 x M10	
			609		30° 12 x M10	
750	65	25,4	108 279,4 457,2 673,1	12	120° 3 x M10	PP/36/250
762	76,2	25,4			16	45° 8 x M10
				30° 12 x M10		
				22°30' 16 x M10		
					120° 3 x 3/8"	PP/36/030
					45° 8 x 3/8"	
					30° 12 x 3/8"	
					22°30' 16 x 3/8"	



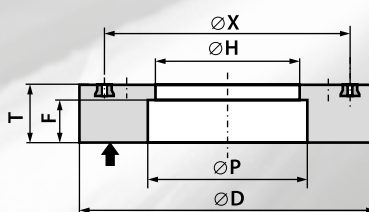
3603 - D x T x H - Drawing No.
 $H \leq 0,67D$

TYPE 3603									
Dimensions [mm]									Drawing No.
D	J	T	H	P	F	U	X	Height of the threaded insert	
450	433	70	138	151	8,2	61,8	224	14	PP/36/066
								362	



3610 - D x T x H - Drawing No.
 $H \leq 0,67D$

TYPE 3610									
Dimensions [mm]							Number of slots n	Spacing and number of threaded inserts	Drawing No.
D	T	H	E	L	X	Height of the threaded insert			
250	50	160	30	10	205	12	4	90° 4 x M10	PP/36/235
450	60	203	30	7	270 373	16	4	72° 5 x M10 36° 10 x M10	PP/36/302



3612 - D x T x H - Drawing No.
 $H \leq 0,67D$

TYPE 3612								
Dimensions [mm]							Spacing and number of threaded inserts	Drawing No.
D	T	H	P	F	X	Height of the threaded insert		
450	70	138	200	55	224 362	14	60° 6 x M10 30° 12 x M10	PP/36/152
600	75	305	315	55	370,5 530,5	12	60° 6 x M16 x 1,5 30° 12 x M16 x 1,5	PP/36/042

Each wheel type has its separate drawing that can be supplied on request

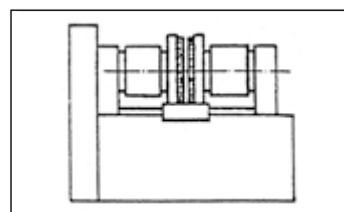
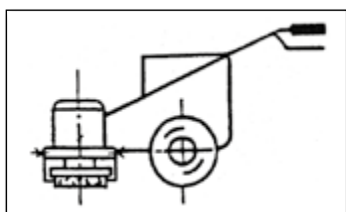
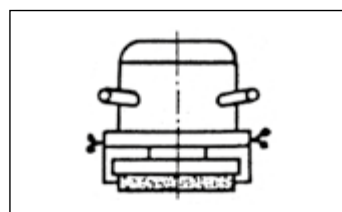
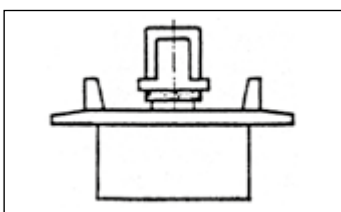
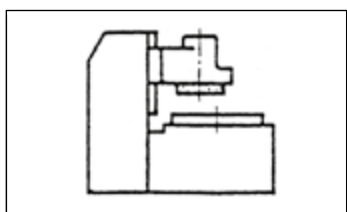
CHARACTERISTICS*	
Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives
Grain size (granulation)	14 - 220
Hardness grade	E - R
Type and nature of bond	B
Operating speed [m/s]	≤ 35 40* 50*

*) Grinding wheels with characteristics and speeds 40 and 50 m/s need to be agreed on individually

MARKING EXAMPLES

36-125x60x55-95A16P6B97-50-PP/36/198
 3601-762x76,2x25,4-99A60K9B549-30-PP/36/030
 3603-450x70x138-95A20P5B305-35-PP/36/066
 3610-250x50x160-98C20M5B469-25-PP36/235
 3612-600x75x305-95A80N7B312MOD-35-PP/36/042

APPLICATION EXAMPLES



- Bearing rings - 99A 60JB
- Piston rings - 98C 60JB
- Railway rails - 95A16QB
- Concrete - 98C20MB

TYPE 27

DEPRESSED CENTRE GRINDING WHEELS



The Type 27 grinding wheels are a very popular group of general purpose and specialized abrasive tools intended for rough grinding on various materials.

They are commonly used in building, shipbuilding, metal, foundry, engineering, chemical and other industries as well as in smaller workshops. They can be used on portable electrically or pneumatically driven portable horizontal/vertical spindle grinders.

Most often operated at angles 20-35°, but not less than 10° and at an angle 90° if required by the specificity of the operation.

Depending on application and grinding requirements, a wide range of the Type 27 grinding wheels is available for customer, refer to the following Table.

1. PRODUCT LINE - ECO LINE

• ECO LINE version

These grinding wheels are intended for not very demanding grinding operations. Similar applications like in the case of the STANDARD version.

They can also be used for grinding operations where the STANDARD version is too hard.

2. PRODUCT LINE - PRO LINE

• STANDARD version

Basic version. General purpose type.

These grinding wheels are intended for most grinding operations on steel, cast iron, cast steel materials with large, continuous surfaces and with considerable grinding allowances.

For grinding machines of medium/regular power and for medium operating conditions.

• EXTRA version

Increased hardness. Long service life

These grinding wheels are intended for grinding on steel, cast iron, cast steel workpieces with non-continuous, narrow, sharp surfaces where the operating surface of the grinding wheel is subject to aggressive counteraction of workpiece and thus causing a premature wear.

For grinders of mean/standard power and for mean operating conditions.

They can also be used on grinders with increased parameters: air-operated, turbine or electrical with a higher frequency of power supply

They are characterized by a higher hardness than the standard versions and a longer service life

When a high rate of stock removal causes a local overheating in the form of burns on material being ground or "loading" of active wheel surface, use the STANDARD version.

• INOX version

These grinding wheels are intended for grinding on stainless, acid resistant and high-alloy steels. They are able to perform so called "cool" grinding. Successfully used for grinding of carbon and alloy constructional steels.

These wheels do not contain iron, sulphur and chlorine. They don't cause corrosion or discoloration of the material being ground.

• ALUMINUM version

These grinding wheels are intended for grinding on non-ferrous metals such as aluminium, bronze, brass.

• STONE version

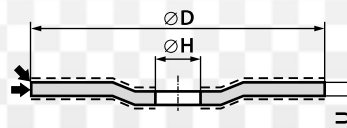
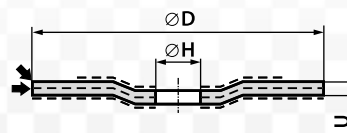
These grinding wheels are intended for grinding on concrete, reinforced concrete, terrazzo, natural and artificial stones, ceramics as well as hard, brittle cast iron and also for descaling and desanding of castings.

3. PRODUCT LINE – MASTER LINE

• MASTER LINE version

Special abrasive material. These grinding wheels are intended for grinding on steel, cast iron, cast steel workpieces with large surfaces and high grinding allowances, They require grinding machines with high parameters, especially increased power and rigidity: pneumatic, turbine or electrical with an increased frequency of supply power, They are characterized by the highest metal removal rate.

It is possible to design a grinding wheel meeting individual customer's needs.



GRINDING WHEELS TYPE 27 – FOR GENERAL-PURPOSE AND SPECIAL APPLICATIONS

CHARACTERISTICS TYPE - Dimensions [mm] ØD x U x ØH	A30QBF-80	A24QBF-80	95A30QBF-80 STANDARD	95A24QBF-80 STANDARD	95A30TBF-80 EXTRA	95A24TBF-80 EXTRA	95A30QBF-80 INOX	50A30PBF-80 ALUMINIUM	98C30QBF-80 STONE	98C24QBF-80 STONE	55A30QBF-80	55A24QBF-80	max. permissible operating speed [rpm]
27 - 115 x 4,0 x 22,23	✓		✓		✓		✓	✓	✓		✓		13 300
27 - 115 x 6,0 x 22,23	✓		✓		✓		✓	✓	✓		✓		
27 - 115 x 8,0 x 22,23			✓		✓		✓	✓	✓		✓		
27 - 125 x 4,0 x 22,23	✓		✓		✓		✓	✓	✓		✓		12 250
27 - 125 x 6,0 x 22,23	✓		✓		✓		✓	✓	✓		✓		
27 - 125 x 8,0 x 22,23			✓		✓		✓	✓	✓		✓		
27 - 150 x 4,0 x 22,23		✓		✓		✓	✓	✓		✓		✓	10 200
27 - 150 x 6,0 x 22,23		✓		✓		✓	✓	✓		✓		✓	
27 - 150 x 8,0 x 22,23				✓		✓	✓	✓		✓		✓	
27 - 180 x 4,4 x 22,23				✓		✓							8 500
27 - 180 x 6,0 x 22,23		✓		✓		✓	✓	✓		✓		✓	
27 - 180 x 8,0 x 22,23				✓		✓	✓	✓		✓		✓	
27 - 180 x 10,0 x 22,23				✓		✓							
27 - 230 x 4,4 x 22,23				✓		✓							6 650
27 - 230 x 6,0 x 22,23		✓		✓		✓	✓	✓		✓		✓	
27 - 230 x 8,0 x 22,23				✓		✓	✓	✓		✓		✓	
27 - 230 x 10,0 x 22,23				✓		✓							
PRODUCT LINE	ECO LINE		PRO LINE								MASTER LINE		

APPLICATION - PURPOSE

steel - general purpose	✓	✓										
ordinary constructional steel	✓	✓	✓									
higher-hardness steel	✓	✓										
higher-strength steel	✓	✓					✓					
tool and high-alloy steel	✓	✓					✓					
stainless and acid resistant steel							✓					
welds	✓	✓	✓									
steel - bevelling					✓							
steel – grinding of narrow, discontinuous areas					✓							
steel – high power grinding machines					✓						✓	
cast steel	✓	✓										
cast iron – general purpose	✓	✓										
chilled cast iron									✓			
cast iron – descaling and desanding									✓			
ductile cast iron	✓	✓			✓							
grey cast iron	✓	✓										
aluminium and its alloys								✓				
non-ferrous metals								✓				
concrete, terazzo									✓			
stone, ceramics									✓			

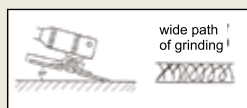
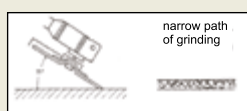
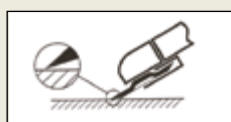


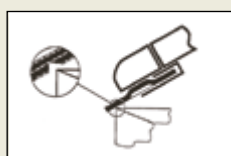
Fig. Effect of grinding angle on the width of grinding path



Correct grinding angle



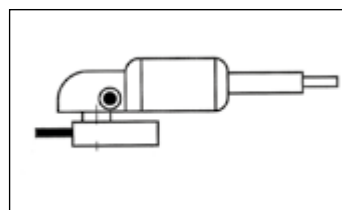
Precaution!
risk of wheel chipping



Do not grind side surface of wheel
Reinforcement may be damaged



Portable horizontal / vertical spindle grinder



Portable angle grinder



TYPE 41**FLAT CUTTING-OFF WHEELS****TYPE 42****DEPRESSED CENTRE CUTTING-OFF WHEELS**

The Type 41 and Type 42 grinding wheels make a numerous, popular group of general purpose and specialized abrasive tools intended for cutting-off various materials.

They are commonly used in building, steelwork, machine-building, shipbuilding, metallurgical, foundry, chemical and other industries as well as in tool rooms and smaller workshops.

Depending on their size and requirements they operate on the following types of grinding machines: portable, bench, tool, laboratory, fixed, swing frame, carriage with electric, pneumatic, hydraulic or engine drive.

They are reinforced with glass fiber discs and intended for operation at speeds 80 [m/s] and 100 [m/s] (special reinforcement).

Limitation in use: RE6 "Face grinding prohibited"

1. PRODUCT LINE - ECO LINE**• ECO LINE Version**

These grinding wheels are intended for not very demanding cutting-off operations. Similar applications like in the case of the STANDARD version.

They can also be used for grinding operations where the STANDARD version is too hard.

2. PRODUCT LINE - PRO LINE**• STANDARD version**

These cutting-off wheels are intended for most cutting-off operations on steel, cast iron, cast steel materials, especially for workpieces of larger cross-sectional areas: round or square bars, flat bars, sheets, bosses in castings.

Intended for grinders of a medium/regular power and lower rigidity and for medium cutting conditions.

They are characterized by a medium hardness grade thus enabling a quicker and lighter cutting-off, especially on harder materials.

• EXTRA version

Increased hardness; long service life.

These cutting-off wheels are intended for cutting-off operations on steel, cast iron, cast steel materials,

especially thin-walled workpieces: tubes, profiles, sheets, bars, sections.

Intended for cutting-off grinders with increased rigidity and higher operating parameters; also for grinders with an increased power: air-operated or electrical with increased frequency of supply power.

• METAL / INOX version

Thin wheels ($T \leq 2$ mm) intended for efficient, precision cutting.

Short cutting time, reduced energy consumption, reduced waste of the cut material, long service life, less operator fatigue.

They can be used for cutting-off constructional, tool, stainless and acid-resistant steels. These wheels do not contain iron, sulfur and chlorine.

They don't cause corrosion or discoloration of the cut material.

• INOX version

These cutting-off wheels are intended for cutting-off operations on stainless and acid resistant steels.

In so called "thin" version they can be applied for effective, precision cutting and in general purpose version for typical cutting operations. They may also be used for cutting-off constructional carbon and alloy steels.

These wheels do not contain iron, sulphur and chlorine. They don't cause corrosion or discoloration of the material being ground.

• ALUMINUM version

These grinding wheels are intended for cutting-off operations on non-ferrous metals such as aluminium, bronze, brass.

• SERIA 500 version

Special wheels intended for cutting-off operations on steel and in particular for cutting of rubber conveyor belts with steel cords inside or for cutting of steel cords only. They can also be used for other cutting-off operations with high power grinding machines.

• PROFIL version

Special wheels intended for cutting-off operations on operating platform grids. They can also be used for similar operations on profiled workpieces.

• RAIL version

These grinding wheels are intended for cutting-off operation on railway and tram rails carried out with high power engine driven, electrically or hydraulic driven grinders.

They can also be used for other operations, e.g. cutting-off of big cross-sectional rollers, life-saving works.

• STONE version

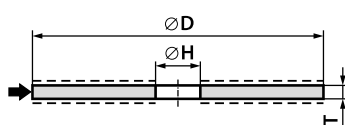
These cutting-off wheels are intended for cutting-off operations on concrete, reinforced concrete, terrazzo, natural and artificial stones, ceramics as well as hard brittle cast iron.

3. PRODUCT LINE – MASTER LINE**• MASTER LINE version**

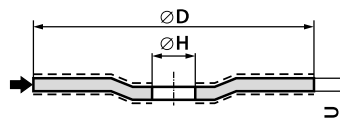
Made of special abrasive material. These grinding wheels are intended for cutting-off operations on steel, cast iron, cast steel workpieces with large surfaces and high grinding allowances,

They require grinding machines with high parameters, especially increased power and rigidity: pneumatic, turbine or electrical with an increased frequency of supply power, Thin wheels for precision cutting.

They are characterized by the highest cutting-off efficiency.

CUTTING-OFF WHEELS FOR GENERAL-PURPOSE AND SPECIAL APPLICATIONS
FOR MANUAL CUTTING-OFF

41 - D x T x H

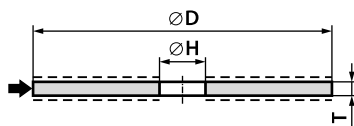


42 - D x U x H

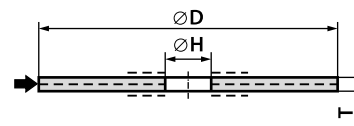
CHARACTERISTICS TYPE - Dimensions [mm] ØD x T/U x ØH	A24RBF - 80	A30RBF - 80	A36RBF - 80	A46RBF - 80	A60RBF - 80	95A24RBF - 80 STANDARD	95A30RBF - 80 STANDARD	95A24TBF - 80 EXTRA	95A30TBF - 80 EXTRA	95A36TBF - 80 EXTRA	95A36RBF - 80 METAL / INOX	95A46RBF - 80 METAL / INOX	95A60RBF - 80 METAL / INOX	95A80RBF - 80 METAL / INOX	max. operating speed [rpm]	
42 - 115 x 0,8 x 22,23														✓	13300	
41 - 115 x 1,0 x 22,23					✓								✓			
41 - 115 x 1,6 x 22,23				✓								✓				
41 - 115 x 2,0 x 22,23							✓		✓							
41 - 115 x 2,5 x 22,23		✓					✓		✓							
42 - 115 x 2,5 x 22,23							✓		✓							
41 - 115 x 3,0 x 22,23							✓		✓							
42 - 115 x 3,0 x 22,23		✓					✓		✓							
42 - 125 x 0,8 x 22,23														✓	12250	
41 - 125 x 1,0 x 22,23					✓								✓			
41 - 125 x 1,6 x 22,23				✓								✓				
41 - 125 x 2,0 x 22,23							✓		✓							
41 - 125 x 2,5 x 22,23		✓					✓		✓							
42 - 125 x 2,5 x 22,23							✓		✓							
41 - 125 x 3,0 x 22,23							✓		✓							
42 - 125 x 3,0 x 22,23		✓					✓		✓							
41 - 150 x 1,5 x 22,23					✓								✓		10200	
41 - 150 x 1,7 x 22,23				✓								✓				
41 - 150 x 2,0 x 22,23										✓						
41 - 150 x 2,5 x 22,23	✓					✓		✓								
42 - 150 x 2,5 x 22,23						✓		✓								
41 - 150 x 3,0 x 22,23						✓		✓								
42 - 150 x 3,0 x 22,23						✓		✓								
41 - 180 x 2,0 x 22,23			✓							✓	✓				8500	
42 - 180 x 2,0 x 22,23										✓						
41 - 180 x 2,5 x 22,23	✓					✓		✓								
42 - 180 x 2,5 x 22,23						✓		✓								
41 - 180 x 3,0 x 22,23						✓		✓								
42 - 180 x 3,0 x 22,23	✓					✓		✓								
41 - 230 x 2,0 x 22,23			✓							✓	✓					
42 - 230 x 2,0 x 22,23			✓							✓	✓				6650	
41 - 230 x 2,5 x 22,23	✓					✓		✓								
42 - 230 x 2,5 x 22,23						✓		✓								
41 - 230 x 3,0 x 22,23						✓		✓								
42 - 230 x 3,0 x 22,23	✓					✓		✓								
PRODUCT LINE	ECO LINE					PRO LINE										

CHARACTERISTICS TYPE - Dimensions [mm] ØD x T/U x ØH	95A30RBF - 80 INOX	95A36RBF - 80 INOX	95A46RBF - 80 INOX	95A60RBF - 80 INOX	95A80RBF - 80 INOX	56A30RBF - 80 ALUMINIUM	56A46RBF - 80 ALUMINIUM	56A60RBF - 80 ALUMINIUM	95A24U9BF - 80 SERIA 500	98C24RBF - 80 STONE	98C30RBF - 80 STONE	98C46RBF - 80 STONE	98C60RBF - 80 STONE	55A24RBF - 80	55A30RBF - 80	55A36RBF - 80 METAL / INOX	55A46RBF - 80 METAL / INOX	55A60RBF - 80 METAL / INOX	max. operating speed [rpm]
42 - 115 x 0,8 x 22,23					✓														13300
41 - 115 x 1,0 x 22,23				✓				✓					✓					✓	
41 - 115 x 1,6 x 22,23			✓				✓					✓					✓		
41 - 115 x 2,0 x 22,23	✓																		
41 - 115 x 2,5 x 22,23	✓					✓					✓				✓				
42 - 115 x 2,5 x 22,23	✓														✓				
41 - 115 x 3,0 x 22,23	✓										✓				✓				
42 - 115 x 3,0 x 22,23	✓					✓					✓				✓				
42 - 125 x 0,8 x 22,23					✓														12250
41 - 125 x 1,0 x 22,23				✓				✓					✓					✓	
41 - 125 x 1,6 x 22,23			✓				✓					✓					✓		
41 - 125 x 2,0 x 22,23	✓																		
41 - 125 x 2,5 x 22,23	✓					✓					✓				✓				
42 - 125 x 2,5 x 22,23	✓														✓				
41 - 125 x 3,0 x 22,23	✓										✓				✓				
42 - 125 x 3,0 x 22,23	✓					✓					✓				✓				
41 - 150 x 1,5 x 22,23				✓				✓					✓					✓	10200
41 - 150 x 1,7 x 22,23			✓				✓					✓					✓		
41 - 150 x 2,0 x 22,23																			
41 - 150 x 2,5 x 22,23	✓					✓								✓					
42 - 150 x 2,5 x 22,23	✓													✓					
41 - 150 x 3,0 x 22,23	✓					✓				✓				✓					
42 - 150 x 3,0 x 22,23	✓					✓				✓				✓					
41 - 180 x 2,0 x 22,23		✓										✓				✓			
41 - 180 x 2,5 x 22,23	✓					✓								✓					8500
42 - 180 x 2,0 x 22,23																			
42 - 180 x 2,5 x 22,23	✓								✓					✓					
41 - 180 x 3,0 x 22,23	✓					✓				✓				✓					
42 - 180 x 3,0 x 22,23	✓					✓			✓	✓				✓					
41 - 230 x 2,0 x 22,23		✓										✓				✓			6650
42 - 230 x 2,0 x 22,23		✓														✓			
41 - 230 x 2,5 x 22,23	✓					✓								✓					
42 - 230 x 2,5 x 22,23	✓								✓					✓					
41 - 230 x 3,0 x 22,23	✓					✓				✓				✓					
42 - 230 x 3,0 x 22,23	✓					✓			✓	✓				✓					
PRODUCT LINE	PRO LINE (continuation)													MASTER LINE					

CUTTING-OFF WHEELS FOR GENERAL-PURPOSE AND SPECIAL APPLICATIONS FOR MACHINE CUTTING-OFF



TYPE 41 - typically reinforced



TYPE 41 - SK version

41 – D x T x H

CHARACTERISTICS TYPE - Dimensions [mm] ØD x T x ØH	95A24RBF-80 STANDARD	95A24RBF-100 STANDARD	95A24RBSKF-80 STANDARD	95A24RBSKF-100 STANDARD	95A24TBF-80 EXTRA	95A24TBF-100 EXTRA	95A24TBSKF-80 EXTRA	95A24TBSKF-100 EXTRA	95A30RBF-80 INOX	56A24RBF-80 ALUMINIUM	95A24TBF-80 PROFIL	95A24RBF-80 RAIL	95A24RBF-100 RAIL	98C 24 RBF-80 STONE	max. operating speed [rpm]
41 - 300 x 3,0 x 32*	✓				✓				✓	✓				✓	5100
41 - 300 x 3,5 x 32*	✓		✓		✓		✓		✓			✓		✓	
41 - 300 x 3,5 x 32*		✓		✓		✓		✓					✓		6400
41 - 350 x 3,5 x 32*	✓				✓				✓	✓				✓	4400
41 - 350 x 4,0 x 32*	✓		✓		✓		✓		✓					✓	
41 - 350 x 3,5 x 32*													✓		5500
41 - 350 x 4,0 x 32*		✓		✓		✓		✓					✓		
41 - 400 x 4,0 x 32*	✓				✓				✓	✓	✓			✓	3 850
41 - 400 x 4,5 x 32*	✓		✓		✓		✓		✓					✓	
41 - 400 x 4,0 x 32*													✓		4 800
41 - 400 x 4,5 x 32*		✓		✓		✓		✓					✓		
41 - 450 x 4,5 x 32**	✓				✓									✓	3400
41 - 450 x 5,0 x 32**			✓				✓							✓	
41 - 500 x 5,5 x 51***	✓		✓		✓		✓							✓	3 100
41 - 600 x 7,0 x 76****	✓		✓		✓		✓							✓	2 550
PRODUCT LINE	PRO LINE														

Available also with holes in the following dimensions:

*) H = 22,23; 25,4; 40 [mm]

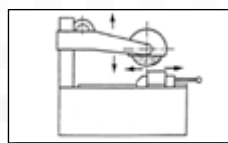
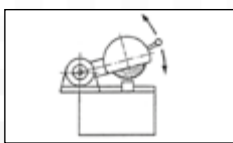
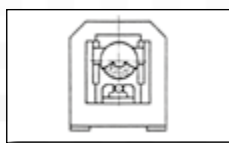
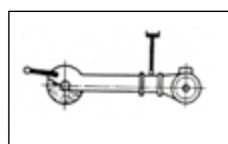
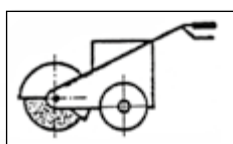
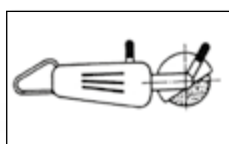
**) H = 51 [mm]

***) H = 40; 76; 80 [mm]

****) H = 60; 80 [mm]

APPLICATION / PURPOSE OF CUTTING-OFF WHEELS TYPE 41 AND 42

APPLICATION - PURPOSE		PRODUCT LINE										
		ECO LINE	PRO LINE									MASTER LINE
			STANDARD	EXTRA	METAL / INOX	INOX	ALUMINIUM	SERIA 500	PROFIL	RAIL	STONE	
Steel - general purpose		✓	✓		✓							
Constructional steel	- large cross-sectional areas	✓	✓									✓
	- small cross-sectional areas	✓	✓	✓	✓							
	- thin sheets, pipes, thin-walled profiles	✓	✓	✓	✓	✓						
	- operating platform grids								✓			
Tool steel		✓	✓		✓							
Stainless and acid resistant steel	- general applications				✓	✓						✓
	- thin sheets, pipes, thin-walled profiles				✓	✓						✓
Concrete, terazzo											✓	
Stone, ceramics											✓	
White cast iron, chilled cast iron											✓	
Grey cast iron, ductile cast iron		✓	✓	✓								✓
Cast steel		✓	✓	✓								✓
Aluminium and its alloys							✓					
Non-ferrous metals							✓					
Railway rails										✓		
Steel cords								✓				



MARKING EXAMPLES

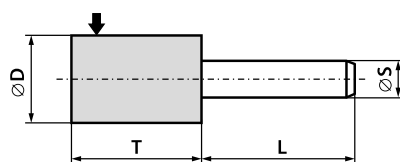
41 - 125 x 1,0 x 22,23 - 95A60RBF - 80 METAL / INOX

42 - 230 x 2,5 x 22,23 - 95A24U9BF - 80 SERIA 500

41 - 400 x 4,5 x 32 - 95A24RBF - 80 RAIL

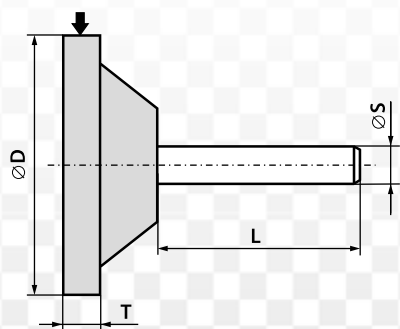
TYPE 5210 - MOUNTED POINTS, CYLINDRICAL**TYPE 5201 - MOUNTED POINTS, FLAT WITH CONICAL STRENGTHENING**

These mounted points are intended for manual grinding. Used for workpieces of cast iron, steel, cast steel. They may be operated on portable pneumatic and electric direct drive grinders.

**5210 - D x T x S**

TYPE 5210								
Dimensions [mm]								
D	T						S	
10			20				6	
13			20				6	
16			20	25	30		6	
20			20	25	30	40	6	
25	13	16	20	25	30	40	6	
30	13	16	20	25	30	40	6	
40	13	16	20	25	30	40	6	
					30	40		8
50	13	16	20	25	30	40	6	
					30	40		8

Typical length of the metal shaft L = 40 [mm]

**5201 - D x T x S****TYPE 5201**

Dimensions [mm]		
D	T	S
16; 20; 25; 30; 40; 50;	6	6

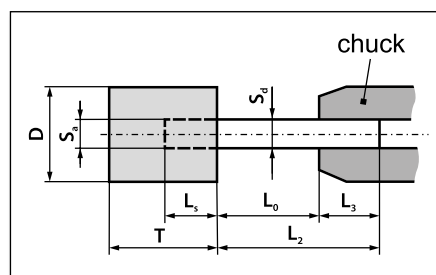
Typical length of the metal shaft L = 40 [mm]

CHARACTERISTICS

Type and nature of abrasive	95A 97A 99A CrA M ZrA 98C 99C mixtures of abrasives
Grain size (granulation)	16 - 60
Hardness grade	M - T
Type and nature of bond	B
Operating speed [m/s]	≤ 40

Maximum permissible operating speed depends on the overhang length of the shaft from the chuck of the grinder. Dependence of the maximum permissible rotational operating speed on the overhang length of the shaft has been shown in Table 5, page 27.

The parameters determining the mechanical strength of the shaft for bending are: overhang length of the shaft, geometry of the shaft and the grinding wheel, their material properties and the maximum operating speed.

**MARKING EXAMPLES**

5210-50x30x6-95A16Q6B305-40
5201-30x6x6-ZrA24S6B618-40

APPLICATION EXAMPLES**Cast iron castings**

- 95A 30 QB
- 98C 30 QB

GRINDING SEGMENTS AND WHETSTONES WITH ORGANIC BOND

The straight and shaped abrasive segments are intended for rough and finish grinding of flat workpieces made of hard and soft steels, cast iron, cast steel, non-ferrous metals, terrazzo, stones.

Widely used for grinding tops of circular saws, clutch and brake disks, ring faces, paper cutters.

The abrasive segments are used on surface grinding machines equipped with heads (chucks) for these segments, carriage grinders and grinding units.

The type 9010 rectangular whetstones are used:

- for manual smoothing of surfaces, rounding of edges
- as dressers for grinding wheels made of hard and extremely hard materials.

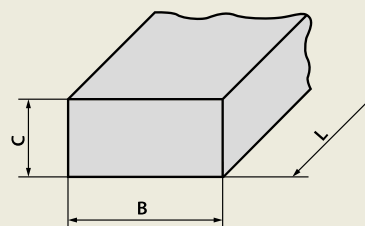


3101 - B x C x L

TYPE 3101 (RECTANGULAR)		
Dimensions [mm]		
B	C	L
25	25	150
51	51	101
80	25	150
	35	
	40	
90	35	150
		160
100	15	200
140	40	180
250	20	200
	25	
	40	
	50	
	40	250
	50	

MARKING EXAMPLES:

3101-80x25x150-96A36H7B328



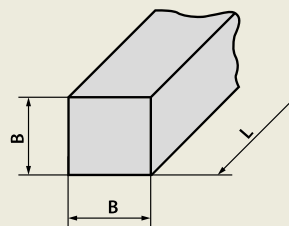
9010 - B x C x L

TYPE 9010 (RECTANGULAR WHETSTONE)

Dimensions [mm]		
B	C	L
40	15	200
	20	
50	20	200
	25	

MARKING EXAMPLES:

9010-50x20x200-98C16V5B469



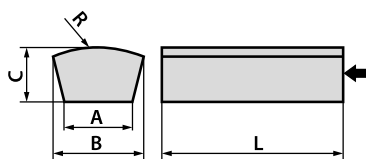
9011 - B x L

TYPE 9011 (SQUARE WHETSTONE)

Dimensions [mm]	
B	L
25	150

MARKING EXAMPLES:

9011-25x150-98C16V5B469

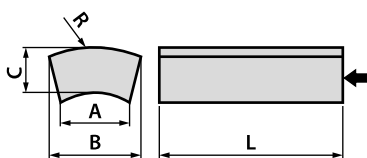


3103 - B / A x C x L - R...

TYPE 3103 (TRAPEZOIDAL WITH OUTSIDE RADIUS)				
Dimensions [mm]				
B	A	C	L	R
90	55	38	150	175
117	79	44	203	381

MARKING EXAMPLES:

3103-117/79x44x203-R381-99A120K7BMOD

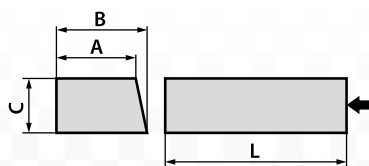


3104 - B / A x C x L - R...

TYPE 3104 (WITH INSIDE AND OUTSIDE RADIUS)				
Dimensions [mm]				
B	A	C	L	R
65	25	26	120	100
73	40	29	152	130
75	54	20	100	150
90	55	35	125	175

MARKING EXAMPLES:

3104-75/54x20x100-R150-99A36F6B

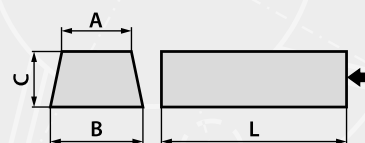


3108 - B / A x C x L

TYPE 3108 (RECTANGULAR-TRAPEZOIDAL)				
Dimensions [mm]				
B	A	C	L	
96	90	35	150	

MARKING EXAMPLES:

3108-96/90x35x150-99A36M6B

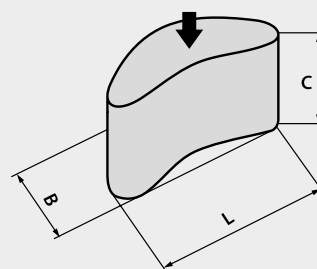


3109 - B / A x C x L

TYPE 3109 (TRAPEZOIDAL)			
Dimensions [mm]			
B	A	C	L
70	64	25	110
81	71	40	160
100	85	35	150
101	77	45	203
103	94	38	208
120	106	41	250
125	115	40	250

MARKING EXAMPLES:

3109-100/85x35x150-99A24J5B

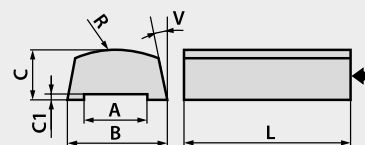


3110 - B x C x L

TYPE 3110 (KIDNEY-SHAPED)		
Dimensions [mm]		
B	C	L
55	75	150

MARKING EXAMPLES:

3110-55x75x150-98C54N5B

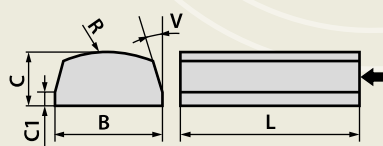


3113 - B / A x C / C1 x L - R...V...

TYPE 3113 (WITH OUTSIDE RADIUS AND RECESS)						
Dimensions [mm]						Degrees
B	A	C	C1	L	R	V
66	42	20	2	63	150	10°

MARKING EXAMPLES:

3113-66/42x20/2x63-R150V10-98C30M6B



3114 - B x C / C1 x L - R...V...

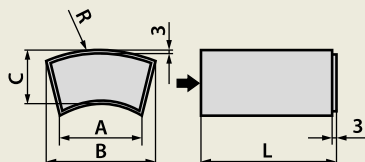
TYPE 3114

(RECTANGULAR-RING-SHAPED, CHAMFERED ON BOTH SIDES)

Dimensions [mm]					Degrees
B	C	C1	L	R	V
118	45	16	200	300	30°

MARKING EXAMPLES:

3114-118x45/16x200-R300V30-98C24R6B275



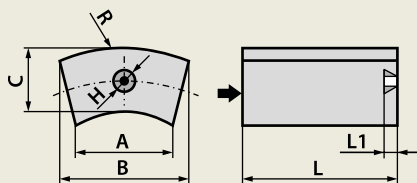
3115 - B / A x C x L - R...

TYPE 3115 (WITH OUTSIDE AND INSIDE RADIUS, DISCUS FULL SEGMENT)

Dimensions [mm]				
B	A	C	L	R
114	98,5	40	49	300

MARKING EXAMPLES:

3115-114/98,5x40x49-R300-99A36P6B275



3116 - B / A x C x L - R... - H / L1

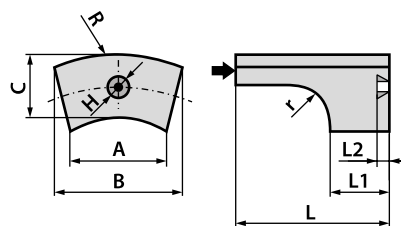
TYPE 3116

(WITH OUTSIDE AND INSIDE RADIUS, DISCUS SEGMENT WITH A THREADED INSERT)

Dimensions [mm]							
B	A	C	L	R	H	L1	
114	98,5	40	60	300	M16 x 1,5	13	
60	48	33	54	150	M12	13	

MARKING EXAMPLES:

3116-114/98,5x40x60-R300-M16x1,5/13-99A46P6B275



3117 - B / A x C x L / L1 - R... r... - H / L2

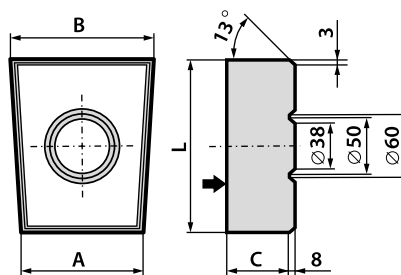
TYPE 3117

(WITH OUTSIDE AND INSIDE RADIUS WITH THREADED INSERT, DISCUS SEGMENT, RECESSED)

Dimensions [mm]									
B	A	C	L	L1	R	r	H	L2	
114	98,5	40	60	13	300	17,5	M16 x 1,5	13	

MARKING EXAMPLES:

3117-114/98,5x40x60/13-R300 r17,5-M16x1,5/13-99A46J5BP



3118 - B / A x C x L

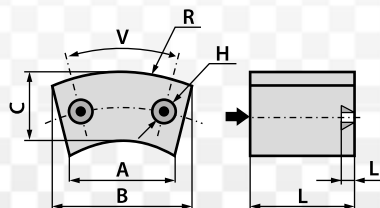
TYPE 3118 (SHAPED DISCUS)

Dimensions [mm]			
B	A	C	L
129	100	45	136
		50	
		60	

MARKING EXAMPLES:

3118-129/100x45x136-98C24Q5B431

Grinding segment type 3119 (with outside and inside radius) SCHWABORN
 3119-250/152,5x100x80-R250-M12/20/30-98C16R6B
 3 pieces per one set.



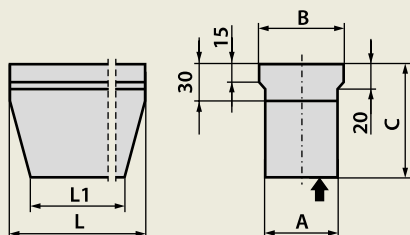
3119 - B / A x C x L - R... - H / L1 / V

TYPE 3119**(WITH OUTSIDE AND INSIDE RADIUS AND TWO THREADED INSERTS)**

Dimensions [mm]							Degrees
B	A	C	L	R	H	L1	V
250	152,5	100	80	250	M12	20	30°

MARKING EXAMPLES:

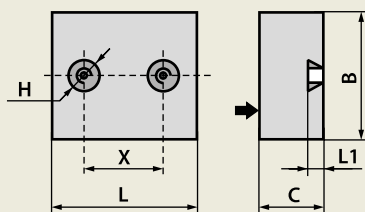
3119-250/152,5x100x80-R250-M12/20/30-98C16R6B

**3120 - B / A x C x L / L1****TYPE 3120****(SHAPED, FOR RAILS GRINDING)**

Dimensions [mm]				
B	A	C	L	L1
66	56	90	300	270

MARKING EXAMPLES:

3120-66/56x90 x300/270-95A24TB520

**3121 - B x C x L - H / X / L1****TYPE 3121****(RECTANGULAR WITH TWO THREADED INSERTS)**

Dimensions [mm]					
B	C	L	H	X	L1
80	40	95	M6	50	9

MARKING EXAMPLES:

3121-80x40x95-M6/50/9- 98C20M6B

Operating speed:

V = 13 [m/s] I - stage 1

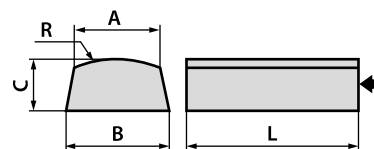
V = 26 [m/s] II - stage 2

For grinding operation:

For grinding of ceramic brick surface

Characteristic of grinding segment:

98C20M6B

**3122 - B / A x C x L - R...****TYPE 3122 (TAPERED WITH OUTER RADIUS)**

Dimensions [mm]				
B	A	C	L	R
63	57	20	100	130
65	57	25	85	150
103	88	38	206	225
103	82	56	230	225

MARKING EXAMPLES:

3122-103/88x38x206-R225-54AC100H7BMOD

CHARACTERISTICS

Type and nature of abrasive	95A 97A 99A CrA M 98C 99C mixtures of abrasives
Grain size (granulation)	24 - 120*
Hardness grade	G - R*
Type and nature of bond	B

*) general ranges – need to be agreed on for particular segment types

APPLICATION EXAMPLES:

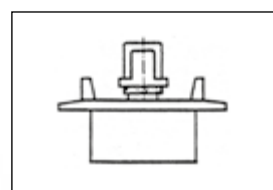
Non-hardened steel - 99A36JB

Cast iron - 99A30KB

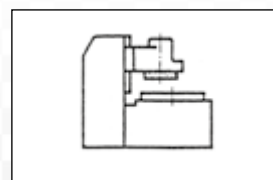
Concrete - 98C20MB

Ceramic materials - 98C30LB

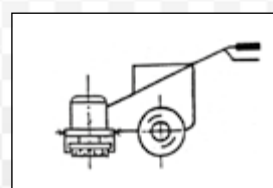
Dressing of grinding wheels - 98C16VB (typ 9010)

Surface grinders:

Rectangular table



Round table



Carriage grinder

[illegible]



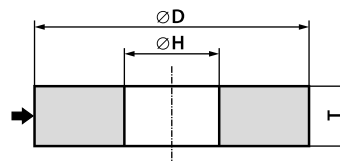
VITRIFIED BONDED ABRASIVE TOOLS

TYPE 1 - STRAIGHT GRINDING WHEELS**TYPE 2 - CYLINDER WHEELS****TYPE 5 - WHEELS RECESSED ON ONE SIDE****TYPE 7 - WHEELS RECESSED ON BOTH SIDES**

The vitrified straight grinding wheels belong to the most numerous group of general purpose and specialized abrasive tools.

Usually, they are used for precision grinding on various materials in grinding operations such as tool sharpening, surface grinding, centre-type and centreless cylindrical grinding, internal grinding, profile grinding as well as for workshop works and rough grinding.

The Tables below present standard shapes of straight grinding wheels.



1 profile - D x T x H
H ≤ 0,67D

TYPE 1												
Dimensions [mm]												
D	H T	10	12,7	20	25	32	51	76	127	203	305	370
80	3 - 50	✓	✓	✓								
90	3 - 50			✓		✓						
100	3 - 80			✓		✓						
125	3 - 60		✓	✓		✓						
150	3 - 50		✓	✓		✓	✓*					
175	3 - 50			✓		✓	✓					
180	3 - 50			✓		✓*	✓	✓*				
200	3 - 60			✓	✓	✓*	✓	✓*				
250	3 - 100			✓		✓	✓	✓	✓			
300	6 - 130					✓	✓	✓*	✓			
350	10 - 100					✓	✓	✓	✓	✓		
400	10 - 100						✓		✓	✓		
450	15 - 100						✓		✓	✓		✓
500	15 - 200						✓	✓	✓	✓*	✓	
600	20 - 200							✓		✓	✓*	
750	20 - 160										✓	
800	20 - 100										✓	

*) The holes are also made in inches, e.g. 31,75; 50,8; 76,2; 203,2; 304,8;

SMALL-DIMENSIONAL GRINDING WHEELS

TYPE 1														
Dimensions [mm]														
D	$\begin{matrix} H \\ T \end{matrix}$	2	2,5	3	4	5	6	7	8	10	13	16	20	32
5	5 - 15	✓	✓											
6	5 - 15	✓	✓											
7	5 - 15			✓	✓									
8	5 - 15		✓	✓	✓									
9	5 - 15			✓	✓									
10	5 - 15			✓	✓	✓								
12	5 - 15				✓	✓								
14	5 - 16				✓	✓	✓							
19,5	5 - 20						✓							
20	5 - 20									✓				
35	6 - 50									✓	✓	✓		
40	6 - 85									✓	✓	✓		
45	6 - 50									✓	✓			
50	6 - 50							✓	✓		✓	✓	✓	
55	6 - 60											✓	✓	
60	6 - 60										✓	✓	✓	
65	6 - 80											✓	✓	✓
70	6 - 50												✓	
75	6 - 50									✓	✓		✓	

MARKING EXAMPLES:

1-250x5x32-95A36P5VTE10-35

1C-200x8x32-CrA46L7VE01-35

**2 - D × T - W...** $W < 0,17D$

Remark:

It is necessary to determine the centring system, i.e.:

- in relation to the outer diameter,
 - in relation to the hole diameter,
- which implies the dimensional tolerances.

MARKING EXAMPLES:

2-150x80-W20-98A46K5VTE10-30

TYPE 2		
Dimensions [mm]		
D	T	W
100	80	10
150	80	20
200	100	20
200	60	25
200	80	24
200	90	20
250	100	50
250	90	25
300	75	50
350	70	40

Other dimensions are available on individual request.

TYPE 5, 7

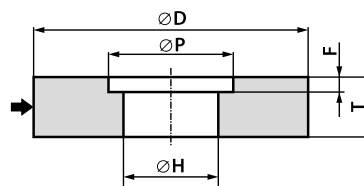
Dimensions [mm]

D	T	H	P	F = G
40	30 - 60	10	15	15
	60		21	30
	40 - 70	13	20	20
	30 - 70		25	15
50	40 - 70	12,7	21	20
	30 - 70	13	25	15
	50 - 75	16	25	25
	50 - 100	20	25	25
60	16 - 100	20	40	8
65	40 - 75	16	30	20
80	50 - 70	20	40	25
100	10 - 70	25	56	5
	60 - 70		60	30
100	20 - 60	20	70	10
	54 - 60		74	27
125	24 - 100	20	70	12
	54 - 100		74	27
150	38 - 105	22,23	76	19
	40 - 110	32	74	20
	54 - 110		76	27
	24 - 110		95	12
200	32 - 110	51	75	16
	26 - 100		120	13
	40 - 100		120	20
	50 - 100		120	25
250	16 - 70	25,4	150	13
	28 - 70		152	14
	24 - 70		153	12
	40 - 100	51	190	20
	50 - 100		185	25
	48 - 85		152	24
	52 - 70		152	26
300	40 - 110	76	150	20
	50 - 110	76	200	25
	90 - 220	203	267	45
460	53 - 250	228	311	26,5

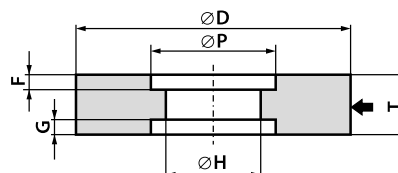
Other dimensions of recesses meeting condition
($P > 0,33D$; $F+G \leq 0,5 T$),
are available on individual request.

MARKING EXAMPLES:

5-500x90x127-P180F15-99A60K5VTE10-35
7-400x50x203,2-P265F12,5G12,5-CrA46J8VTE10-35

**5 profile - D x T x H - P...F...**

$$F \leq 0,5T \quad P > 0,33D$$

**7 profile - D x T x H - P...F...G...**

$$F + G \leq 0,5T \quad P > 0,33D$$

CHARACTERISTICS

		Low-temperature version V	High-temperature version VT
Type and nature of abrasive		95A 97A 99A CrA M 98C 99C Combinations of aluminum oxides Combinations of silicone carbides	
		9A(1-5)X* M(1-5)X	
Grain size (granulation)		16 - 220	16 - 400
Regulated structure	Hardness	H - N	G - T
	Structure	5 - 10	4 - 10
High-porous structure	Hardness	H - K	E - K
	Structure	Aluminum oxides - 12 Silicone carbides - 8	Aluminum oxides - 12 Silicone carbides - 8
Type and nature of bond		VE01; VE01P VC01; VC01P	VTE10; 14; 16 VTE10P VTC10; 12 VTC10P
Colored bond	Blue color	VE01N	VTE10N
	Brick color	VE01B	VTE16; VTE10B
Normal operational speed		See table below	
Increased operational speed		50; 63; 80 m/s special execution	

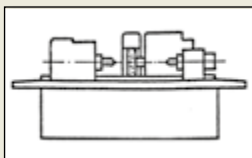
*) grain percentage share X (1=10%, 2=20% etc.)

Operational speed		
Granulation	Hardness	Operational speed
16 - 30	E - H	23 (25)
36 - 46	E - G	28 (30)
≥ 60	G - T	35 (43)

APPLICATION EXAMPLES

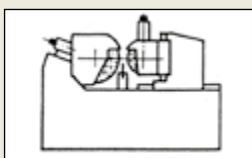
ROLLER GRINDING

- centre-type



Non-hardened steel -95A54L5VTE10-
Hardened steel -99A60K7VE01-

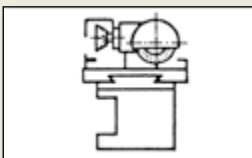
- centreless-type



Non-hardened steel -95A54M5VTE10-
Hardened steel -99A60K7VE01-
-97A60L7VE01-

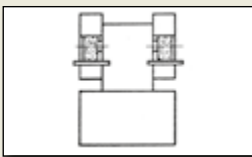
TOOL GRINDING

- mechanical



Drills -CrA46J8VTE10-
Milling cutters -CrA54J8VTE10-
Sintered carbides -99C60J8VTC10-
-98C60J8VTC10-

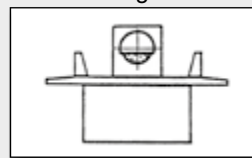
- manual



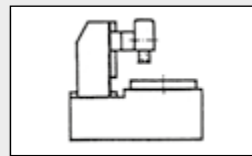
High-speed steel -99A46K7VE01-
Sintered carbides -99C54J7VC01-
Rough grinding of different
steel workpieces -95A36P5VTE10-

SURFACE GRINDING WITH
THE WHEEL PERIPHERY
- horizontal spindle

- rectangular table

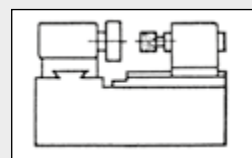


- circular table



Non-hardened steel -99A36J8VTE10-
Hardened steel -99A46J8VTE10-
Tool steel -99A46H8VTE10-
-CrA46H8VTE10-

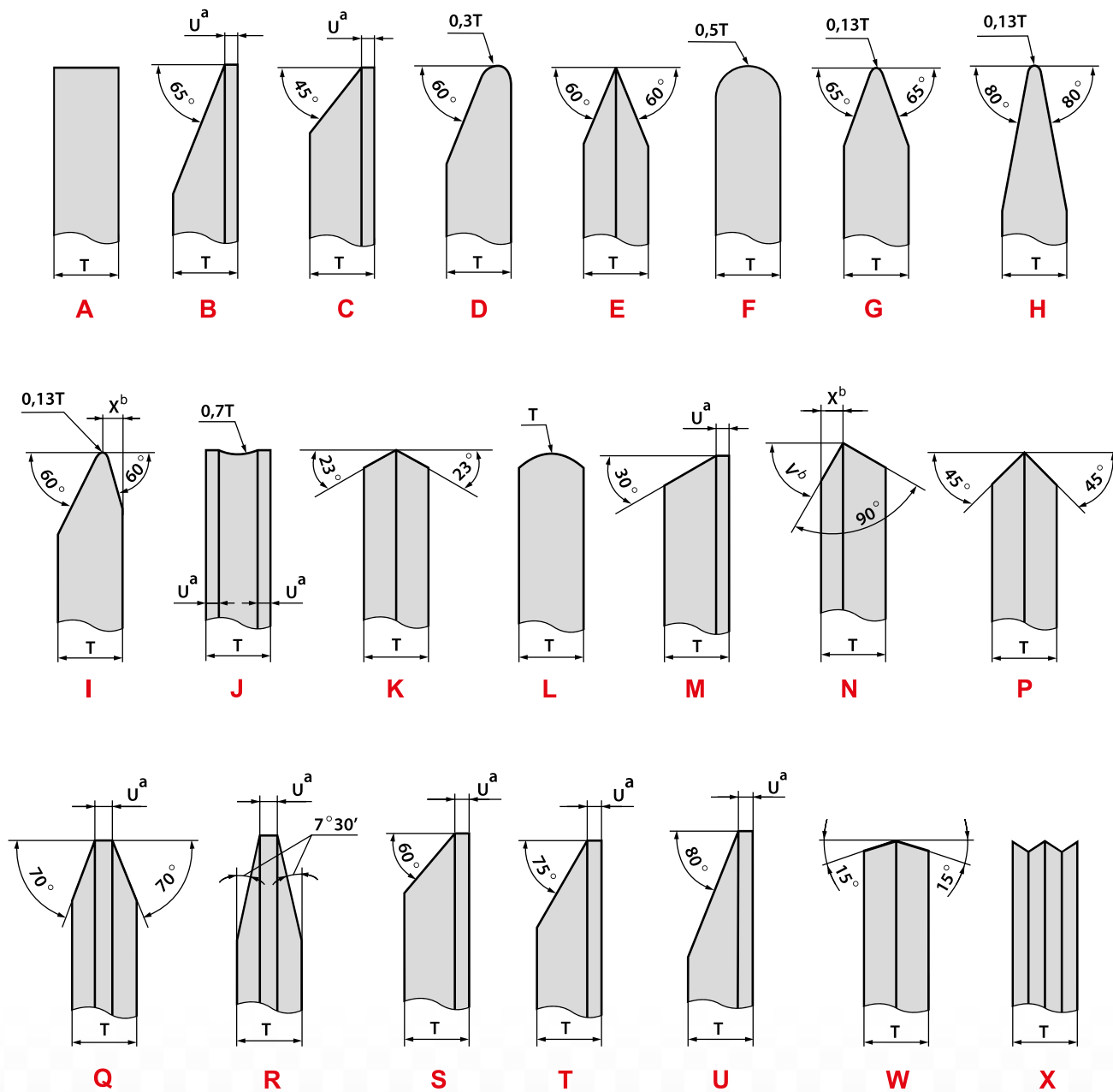
ID GRINDING



Non-hardened steel -99A46K5VTE10-
Hardened steel -M60K5VTE10-

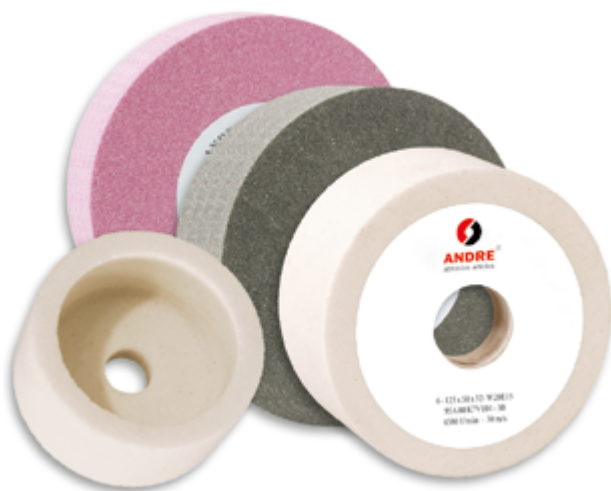
Profiles

Straight grinding wheels can have a shaped profile on their periphery. Some of those profiles are standardized and are specified by a letter which follows the type number.



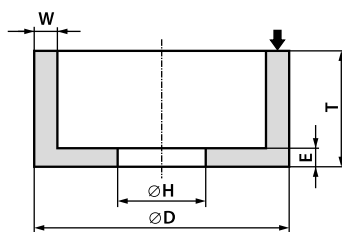
- a) $U = 3,2$ [mm] unless otherwise ordered
 b) please specify V and X values with order

Profile X - non-standardized, can be made in accordance with a drawing provided by the customer.



The vitrified straight cup grinding wheels are intended for grinding flat and shaped surfaces. They operate with their faces.

Generally, they are used for surface grinding and tool sharpening, e.g. grinding of paper cutters, circular tools, milling cutters.



6 - D x T x H - W...E...

$E \geq 0,2T$ - for stationary grinders
 $E \geq 0,25T$ - for hand-held grinders

TYPE 6				
Dimensions [mm]				
D	T	H	W	E
80	40	20	6	10
		32	15	12
90	40	20; 32	13; 15	15
100	27	20	12	12
	40	20	5	12
			6	10
			8	10; 12
			10	10
			12	12
		32	6	10
	50	20	8; 12	13
			10	10
			15	12
		32	6	10
			20	13
			51	9

TYPE 6 STRAIGHT CUP GRINDING WHEELS

D	T	H	W	E
125	40	20; 32	8	10
		32	20	15
	50	20	8	13
		31,75; 32	20	15
			7	12
		51	8; 10; 13	13
			20	15
	60	32	8	15
		50,8	22,5	20
	63	32	12	16
			22,5	20
150	30	32	8	13
			20	20
	50; 51	32	20	15
			32; 76	10
	60	32	15	15
			10	16
	63	32	10	16
			15	16; 19
	65	76	15	19
			15	19
	80	32	8	19
			10	15
			10; 12,5; 13	16
		51	15	19
			40	20
			7,5	15
175	50	32	15	19
			15	19
	60; 80	76	15	15
			25	20
	200	51	15	15
			17	17
200	60	76	20	20
			25	25
			35	26
			18	26
	70	127	25	26
			10	16
	80	76	23	23
			20	20
	100	51	25	23; 30
			27	31
			22	32
		76	25	26; 30
			35	25
			55	20
250	80	76	26	26
	100	76	62	30
300	50	76; 127	60	20
	60	76	50	30
	100	127	32	32
	125	127	25	25
350	60	127	20	20
	63	203	42	20

Other dimensions of recesses W, E, are available on individual request.

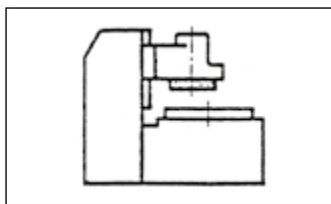
CHARACTERISTICS			
		Low-temperature version V	High-temperature version VT
Type and nature of abrasive		95A 97A 99A M CrA 98C 99C Combinations of aluminum oxides Combinations of silicone carbides	
		9A(1-5)X*; M(1-5)X	
Grain size (granulation)		36 - 120	24 - 220
Regulated structure	Hardness	H - N	H - T
	Structure	6; 7	4 - 9
High-porous structure	Hardness	H - K	E - K
	Structure	Aluminum oxides - 12 Silicone carbides - 8	Aluminum oxides - 12 Silicone carbides - 8
Type and nature of bond		VE01; VE01P VC01; VC01P	VTE10; 14; 16; VTE10P VTC10; 12; VTC10P
Normal operational speed [m/s]		35	25 - 30(35)

*) grain percentage share X (1=10%,2=20% itd.)

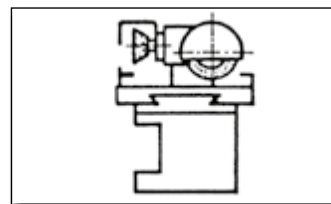
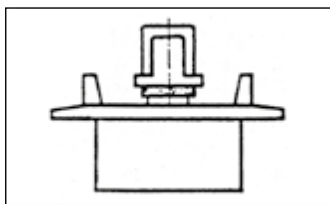
MARKING EXAMPLE

6-125x50x32-W8E13-CrA46J7VE01-25

APPLICATION EXAMPLES



non-hardened steel -99A36J7VE01-
hardened steel -CrA46J7VE01-



milling cutters

high-speed steel
-CrA46J8VTE10-

drills

high-speed steel
-99A54J8VTE10-
sintered carbides
-99C60J8VTC10-
-98C60J8VTC10-



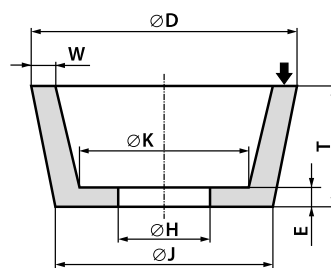
TYPE 11

TAPER CUP GRINDING WHEELS



The vitrified taper cup wheels are intended for grinding flat and shaped surfaces. They operate with their faces.

Generally, they are used for surface grinding and sharpening of tools such as milling cutters, paper cutters.

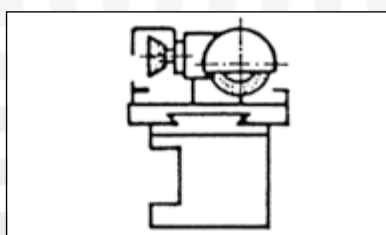


11 - D / J x T x H - W...E...K...

$E \geq 0,2T$ - for stationary grinders
 $E \geq 0,25T$ - for hand-held grinders

TYPE 11						
Dimensions [mm]						
D	J	T	H	W	E	K
80	57	32	13	6	6	46
	54	50	20	10	12	30
95	73,5	40	32	6,5	10	58
100	71	40	20	8	10	56
				8	12	56
	76	40	31,75; 32	8	10	56
125	96	40	20; 32	8	10	81
150	114	40; 50	32	10	13	96
				13	15	96
	120	50	32	37	20	60
175	60	50	32	10	15	50
200	180	100	76	16	25	140
220	210	60	32	10	20	190
225	75	76	32	15	20	60
250	200	140	76	31	30	151

CHARACTERISTICS		
	Low-temperature version V	High-temperature version VT
Type and nature of abrasive	95A 97A 99A M CrA 98C 99C Combinations of aluminum oxides Combinations of silicone carbides	
	9A(1-5)X* M(1-5)X	
Grain size (granulation)	46 - 100	36 - 80
Hardness grade	H - N	
Type and nature of bond	E01; C01	E10; C10
Operational speed [m/s]	25 - 35	25 - 33(35)



APPLICATION EXAMPLES:

Milling cutters

high-speed steel -CrA46J8VTE10-

Drills

high-speed steel -99A54J8VTE10-

sintered carbides -99C60J8VTC10- -98C60J8VTC10-

MARKING EXAMPLES:

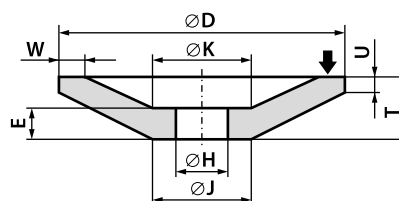
11-100/71x40x20-W8E12K56-CRA46K7VE01-33

TYPE 12

DISH GRINDING WHEELS



The vitrified dish wheels are intended for grinding and sharpening of tools such as milling cutters, reamers, counterbores.



12 - D / J x T / U x H - W...E...K...

$E \geq 0,5T$

TYPE 12

Dimensions [mm]

D	J	T	U	H	W	E	K
80	31	10	2,5	13	4	6	31
100	36	13	3,2	20	5	7	36
125	61	13	3,2	20; 32	6	7	61
150	66	16	3,2	20; 32	8	9	66
175	90	18	3,2	32	9	10	90
200	90	20	3,2	32	10	12	90
250	100	25	3,2	32	11	13	100

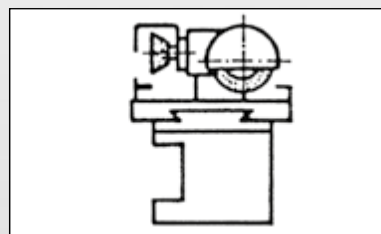
CHARACTERISTICS

Type and nature of abrasive	99A M CrA 98C 99C		
Grain size (granulation)	46 - 100		
Hardness grade	H - M		
Type and nature of bond	VE01; VC01; VTE10; VTC10		
Operational speed [m/s]	GRANULATION	Hardness	MAX
	24 - 30	J - M	33
	36 - 46	H - M	33(45)
	54 - 100	H - M	45

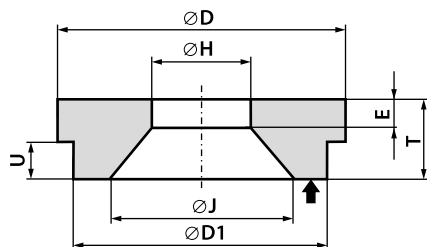
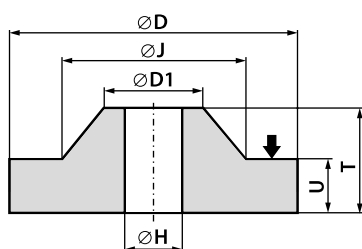
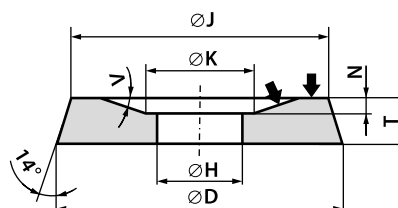
MARKING EXAMPLES:

12-175/90x18/3,2x32-W9E10K90-99A46K5VTE10-35

APPLICATION EXAMPLES



pull broaches -99A60K5VTE10-
sintered carbide milling cutters -99C60J8VTC10-
profile milling cutters -CrA46J8VTE10-
comb tools -99A60J5VTE10-

TYPE 3801; 3802 i 2001**GRINDING WHEELS FOR RUBBING THROUGH VEGETABLE AND FRUIT PULP****TYPE 101 i 301****GRINDING WHEELS FOR ECONOS GRAIN HULLERS****TYPE 3801****3801 - D / J x T / U x H - Drawing No.****TYPE 3802****3802 - D / J x T / U x H - Drawing No.****TYPE 2001****2001 - D / J x T x H - V... - Drawing No.****TYPE 2001**

Dimensions [mm]						[°]	Drawing No.
D	J	T	H	N	K	V	
263	250	26	110	9	120	19	PP/2001/387

CHARACTERISTICS - 2001

95A46Q5VTE10-40

95A60Q5VTE10- 40

CHARACTERISTICS

Type and nature of abrasive	95A
Grain size (granulation)	20 - 60
Hardness grade	L - O
Type and nature of bond	VTE10
Operational speed [m/s]	32; 50*

*) with a steel reinforcing ring on the wheel periphery

MARKING EXAMPLES

3801-250/173x29/15x140-95A60O5VTE10-- PP/3801/007	ONE PAIR
3802-239/170x40/22x25-95A46M5VTE10-35- PP/3802/012	

2001-263/182x26x110-19-95A46Q5VTE10-40-
PP/2001/387**APPLICATION EXAMPLE**

The type 3801, 3802 and 2001 grinding wheels are intended for rubbing through mustard, vegetable and fruit pulp. They operate in pairs.

TYPE 3801

Dimensions [mm]							Drawing No.
D	J	T	U	H	E	D1	
250	173	29	15	140	5	239	PP/3801/007F
330	245	31	16	203	6	320	PP/3801/193

CHARACTERISTICS - 3801

95A60O7VTE10

95A20O5VTE10

95A46O5VTE10

95A60O5VTE10

TYPE 3802

Dimensions [mm]						Drawing No.
D	J	T	U	H	D1	
239	170	40	22	25	120	PP/3802/012
320	240	40	24	19	172	PP/3802/194

CHARACTERISTICS - 3802

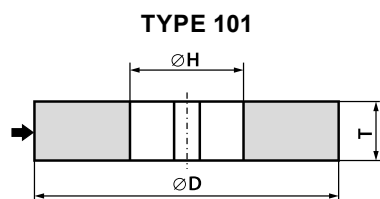
95A46L5VTE10-50 with a backplate

95A46M5VTE10-50 with a backplate

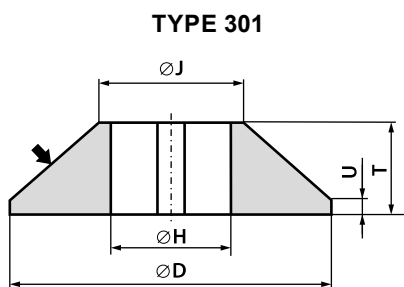
95A20M5VTE10-35

95A46M5VTE10-35

95A46Q5VTE10-35



101 - D x T x H



301 - D / J x T / U x H

TYPE	Dimensions [mm]					Drawing No.
	D	J	T	U	H	
101	250	-	60	-	106	PP/101/397
301	250	130	60	13	106	PP/301/396
CHARACTERISTICS						
98C12-24T5VTC12-40						

APPLICATION EXAMPLES:

The type 101 and 301 grinding wheels are applied in grain hullers "EKONOS" type.

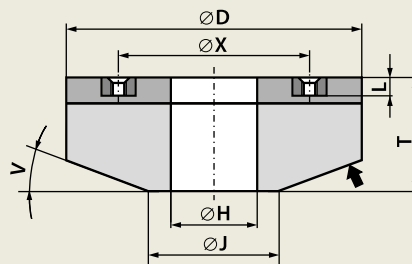
MARKING EXAMPLE:

101-250x60x106 98C16T5VTC12-40
301-250/130x60/13x106 98C16T5VTC12-40

TYPE 3611 - TAPERED GRINDING WHEELS WITH THREADED INSERTS



The type 3611 grinding wheels are intended for sharpening of tobacco slicer cutters..



3611 - D x T x H - Drawing No.

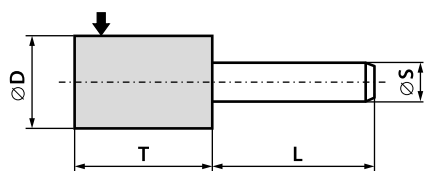
TYPE 3611										
Dimensions [mm]										
D	T	H	Thread of insert	No. of inserts	X	L	J	V	CHARACTERISTICS	Drawing No.
170	115	90	M8	4 co 90°	130	12	100	35°32'	99A54J7VE01-25	PP/3611/021
200	83	100	M8	4 co 90°	149	20	100	2°	CRA60J12VTE10P-38	PP/3611/123

MARKING EXAMPLES

3611-170x115x90-99A54J7VE01-25-PP/3611/021

TYPE 5210 - MOUNTED POINTS, CYLINDRICAL**TYPE 5211 - MOUNTED POINTS, CYLINDRICAL-CONICAL****TYPE 5220 - MOUNTED POINTS, CONICAL****TYPE 5230 - MOUNTED POINTS, SPHERICAL**

These mounted points are intended for precision and rough grinding. Used for workpieces of cast iron, steel, cast steel. They may be operated on portable pneumatic and electric direct drive grinders.

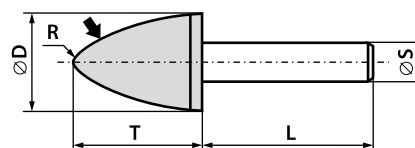
**5210 - D x T x S**

TYPE 5210 (MOUNTED POINTS, CYLINDRICAL)									
Dimensions [mm]									
D	T								S
	10	13	16	20	25	30	40	45	
10				✓					6/4
13				✓	✓				6/4
16			✓	✓	✓				6/4
						✓	✓		6
20			✓	✓	✓	✓	✓	✓	6
25		✓	✓	✓	✓	✓	✓	✓	6
30		✓	✓	✓	✓	✓	✓	✓	6
40	✓	✓	✓	✓	✓	✓	✓		6
							✓	✓	8
50	✓	✓	✓	✓	✓				6
					✓	✓	✓	✓	8

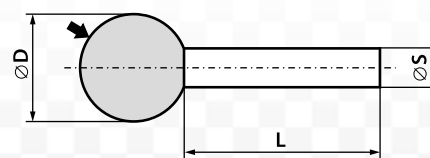
other dimensions on individual request.

**5211 - D x T x S - V**

TYPE 5211 (MOUNTED POINTS, CYLINDRICAL-CONICAL)			
Dimensions [mm]			
D	T	S	V
16	30	6	60°
20	35	6	60°
25	40	6	60°

**5220 - D x T x S - R**

TYPE 5220 (MOUNTED POINTS, CONICAL)			
Dimensions [mm]			
D	T	S	R
16	40	6	3,5
25	40	6	6
30	30	6	7,5
32	32	6	7,5
32	50	6	7,5
40	40	6	10

**5230 - D x S**

TYPE 5230 (MOUNTED POINTS, SPHERICAL)	
Dimensions [mm]	
D	S
30	6

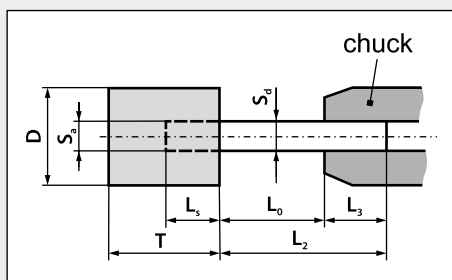
Minimum shaft length „L” – 35 mm

CHARACTERISTICS

Type and nature of abrasive	95A 99A CrA M 9A(1-5)X 98C 99C grain combinations
Grain size (granulation)	24 - 220
Hardness	K - R
Structure	5 - 7
Type and nature of bond	VE01; VC01; VTE10; VTC10
Operational speed for minimal length the spindle overhangs the grinding machine clamp	40 m/s

The maximum permissible rotational speed for mounted points is depended on the length the spindle overhangs the grinding machine clamp. The permissible rotational speeds for particular clamping situations are shown in Table 5 on page 27.

The parameters determining mechanical strength of the spindle are: the length the spindle overhangs the grinding machine clamp, geometry of the spindle and the grinding wheel, their material properties and the maximal rotational speed.

**APPLICATION EXAMPLES****Grinding of moulds and dies**

- CrA60J7VE01
- 99A46K7VE01

Cast iron castings

- 95A36N5VTE10
- CrA30P7VE01
- 98C46M6VC01

MARKING EXAMPLES

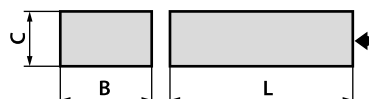
5210-25x40x6-CrA30P7VE01-25

**VITRIFIED BONDED
ABRASIVE SEGMENTS**

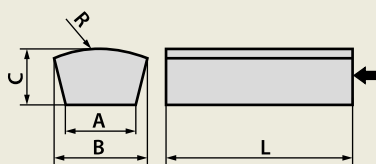
The straight and shaped abrasive segments are intended for rough and finish grinding of flat workpieces made of hard and soft steels, cast iron, cast steel, non-ferrous metals, terrazzo, stones.

Widely used for grinding tops of circular saws, clutch and brake disks, ring faces and sharpening of paper cutters.

The Type 31 abrasive segments are used on surface grinding machines with heads (chucks) for these segments, carriage grinders and grinding units.

**3101 (rectangular) - B x C x L****TYPE 3101 (RECTANGULAR)**

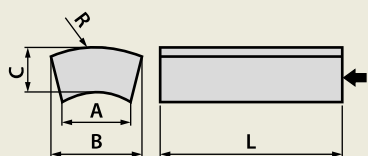
Dimensions [mm]		
B	C	L
20	50	200
25	25	150
30	8	100
50	70	100
51	51	101
70	5	200
80	25; 35; 40	150
90	35	150; 160
140	40	180
250	40; 50	200
250	40; 50	250



3103 - B / A x C x L - R...

TYPE 3103 (TRAPEZOIDAL WITH OUTER RADIUS)

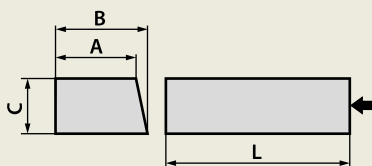
Dimensions [mm]				
B	A	C	L	R
90	55	38	150	175
116	79	43	204	381



3104 - B / A x C x L - R...

TYPE 3104 (WITH INNER AND OUTER RADIUS)

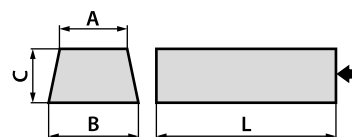
Dimensions [mm]				
B	A	C	L	R
65	25	25	120	100
73	40	17	152	130
75	54	20	100	150
90	55	35	125	175
100	85	17	80	100
154	94	60	165	225



3108 - B / A x C x L

TYPE 3108 (RECTANGULAR-TRAPEZOIDAL)

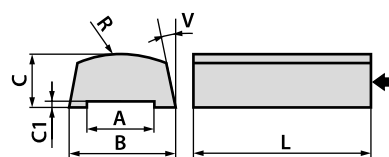
Dimensions [mm]			
B	A	C	L
95	90	35	150



3109 - B / A x C x L

TYPE 3109 (TRAPEZOIDAL)

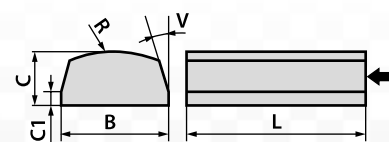
Dimensions [mm]			
B	A	C	L
60	47	21	120
61	55	20	165
70	64	25	110
			150
81	87	40	160
100	85	35	150
			200
	85	40	150
101	77	45	203
103	94	38	150
119	105	41	250
125	115	40	250



3113 - B / A x C / C1 x L - R...V...

TYPE 3113 (WITH OUTSIDE RADIUS AND RECESS FOR GRINDING OF ENGINE HEADS)

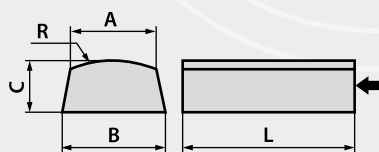
Dimensions [mm]						[°]
B	A	C	C1	L	R	V
66	42	20	2	63	150	10



3114 - B x C / C1 x L - R...V...

TYPE 3114 (RECTANGULAR-RING-SHAPED, CHAMFERED ON BOTH SIDES)

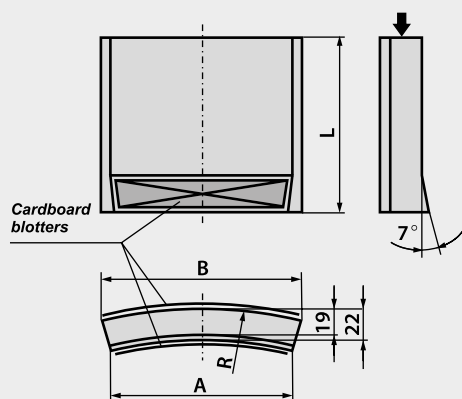
Dimensions [mm]					[°]
B	C	L	C1	R	V
117	45	203	17,5	260	60



3122 - B / A x C x L - R...

TYPE 3122 (TAPERED WITH OUTER RADIUS)

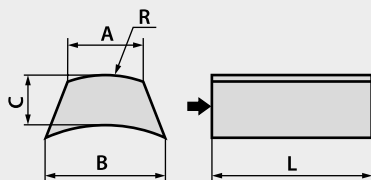
Dimensions [mm]				
B	A	C	L	R
63	57	20	100	130
65	57	25	85	150



3123 - B / A x L - R...

TYPE 3123 (RING-SHAPED, CHAMFERED)

Dimensions [mm]			
B	A	L	R
125,5	116,5	125	250



3124 - B / A x C x L - R...

TYPE 3124 (WITH INNER AND OUTER RADIUS, CHAMFERED)

Dimensions [mm]				
B	A	C	L	R
50	45	16	90	80
51,5	49	18	100	80

CHARACTERISTICS

		Low-temperature version V	High-temperature version VT
Type and nature of abrasive	99A CrA 98C Combinations of aluminum oxides		
		9A(1-5)X M(1-5)X	95A 97A
Grain size (granulation)		24 - 220	
Regulated structure	Hardness	H - K	G - K
	Structure	6; 7	5 - 9
High-porous structure	Hardness	G - K	E - K
	Structure	Aluminum oxides - 12 Silicone carbides - 8	Aluminum oxides - 12 Silicone carbides - 8
Type and nature of bond		VE01; VE01P VC01;	VTE10; VTE10P VTC10; VTC10P

APPLICATION EXAMPLES:

Circular blades - side surfaces
- 99A36J7VE01

Hardened steel
wide contact - 99A36I7VE01
narrow contact - 99A46J7VE01

Non-hardened steel - 99A30K7VE01

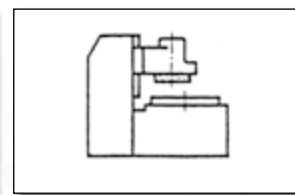
Cast iron - 99A30K7VE01

Ceramics - 98C30L7VE01

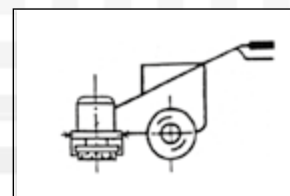
Engine heads Al+Zl - 98C30H8VTC10P

Surface grinders:

Rectangular table



Round table



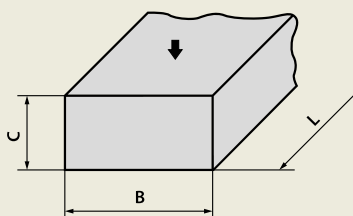
Carriage grinder



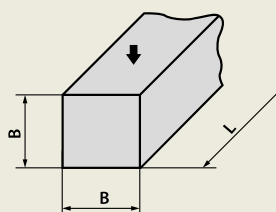
The hand stones are intended for manual (type 90) or mechanic (type 54) grinding of tools, smoothing of surfaces, tool sharpening, rounding of edges, deburring on workpieces made of steel, cast iron, cast steel, non-ferrous metals, ceramics, sintered carbides, etc.

May also be used as dressers for grinding wheels made of hard and extremely hard materials.

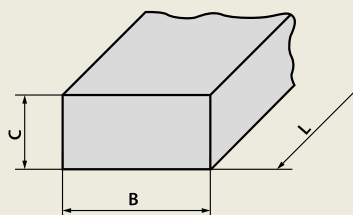
TYPE 5410
5410 - B x C x L



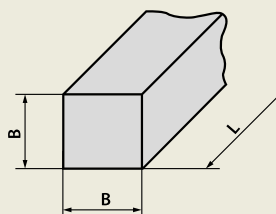
TYPE 5411
5411 - B x L



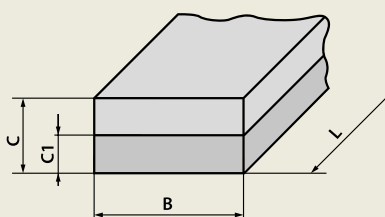
TYPE 9010
9010 - B x C x L



TYPE 9011
9011 - B x L



TYPE 9020
9020 - B x C / C1 x L



HAND STONES, TYPE 90 AND 54

The hand stones are manufactured in the following dimensional ranges:

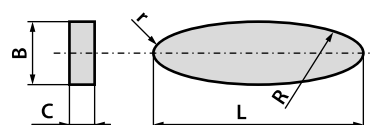
TYPE 5410; 5411; 9010; 9011

Dimensions [mm]		
B	C	L
3 - 250	3 - 50	25 - 250

For hand stones with hardness grade higher than "M" and grain size coarser than 46 and for multi-layer ones (minimal thickness of each layer amounts to 3 mm):

TYPE 9020

Dimensions [mm]		
B	C	L
25	10 - 25	200
35	10 - 25	150
40	10 - 25	200
50	10 - 25	200



9050 - B x C x L - R...r...

TYPE 9050

Dimensions [mm]				
B	C	L	R	r
36	13	230	500	6

CHARACTERISTICS

Type and nature of abrasive	95A 97A 99A M CrA 98C 99C Combinations of aluminum oxides Combinations of silicone carbides
Grain size (granulation)	16 - 400
Hardness grade	G - T
Type and nature of bond	VE01; VC01; VTE10; VTC10

APPLICATION EXAMPLES:

sharpening of scythes - 98C120J7VC01
rounding of edges - 99A180J7VE01
dressing of grinding wheels made of extremely hard materials
-99A120I7VTE10-
-99A180I8VTE10

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SEMI-FLEXIBLE ABRASIVE TOOLS

ABRASIVE FLAP DISCS



The abrasive flap disc are made of flaps coated with abrasive grain, fastened equally to the back plates made of impregnated glass fibre fabrics.

Advantages of abrasive flap discs:

- the best abrasive tool for deburring and finishing used on portable angle grinders for treatment of all metal types, in particular of stainless steel
- deburring and finishing of surfaces in one operation
- no scratches on the ground workpiece
- light, adapts easily to workpiece shapes
- easier grinding of corners
- silent operation
- direct mounting on a grinder without the necessity to use additional blotters

TYPE of abrasive coat on flaps:

• Regular aluminium oxide

General purpose abrasive material, intended for grinding on all ferrous and aluminium materials. It is cheaper material than the a.m. zirconia aluminium oxide.

• Zirconia aluminium oxide

Abrasive material for grinding with high pressures; recommended both for deburring and finishing grinding on ferrous metals and stainless steels.

• Special aluminium oxide

Coated abrasive material for special applications; considerably reduces "loading" of the abrasive discs and "burns" of workpieces. Recommended for grinding sheet metals and delicate workpieces made of stainless steel.

PRODUCT LINE - ECO LINE

Abrasive flap discs coated with regular aluminium oxide, for general applications that don't demand high operational features

PRODUCT LINE - PRO LINE

Abrasive flap discs coated with zirconia aluminium oxide, for general applications demanding high operational features.

PRODUCT LINE - MASTER LINE

Abrasive flap discs coated with ceramic aluminium oxide, for grinding operations demanding high-quality surface finishing and no-burns on the material being ground. They have also proven to be good for general applications.

Technical characteristics Dimensions [mm] ØD x ØH												Maximal operating speed	
	A40	A60	A80	ZrA40	ZrA60	ZrA80	ZrA120	CA40	CA60	CA80	CA120	[m/s]	[rpm]
115 x 22,23				✓	✓	✓	✓	✓	✓	✓	✓	80	13300
125 x 22,23	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		12250
180 x 22,23				✓	✓	✓	✓	✓	✓	✓	✓		8500
PRODUCT LINE	ECO LINE			PRO LINE				MASTER LINE					

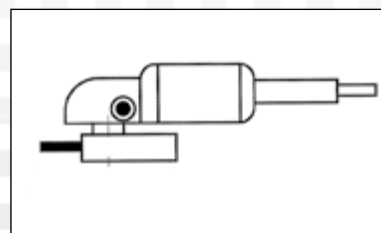
APPLICATION EXAMPLES:

- grinding of steel, aluminium, stainless steel
- cleaning of surfaces made of steel, aluminium, wooden and plastics
- deburring and rounding of edges
- removal of paint and rust
- grinding of weld seams

MARKING EXAMPLE

Abrasive flap disc -125x22,23-ZrA60-80 PRO LINE

MOUNTING ON PORTABLE ANGLE GRINDERS



SEMI-FLEXIBLE GRINDING DISCS WITH PROFILED ABRASIVE COATING



Made on the base of a very strong fibre backplate with a multi-layer resinoid abrasive material.

Due to a considerable amount of abrasive material and a special profile this disc is characterized by a long life, resistance to "loading", does not burn the ground material, etc..

Due to its excellent operational features in many cases it may be used in lieu of depressed centre grinding wheels, TYPE 27. Being more flexible it adapts easily to a shape of workpiece. Due to lower pressures it reduces the operator's fatigue.

Must be mounted together with a special plastic or rubber backplate.

TYPE of abrasive	Grain size	Dimensions	Maximal operating speed	
		[mm]	[m/s]	[rpm]
C Black silicon carbide	24, 36, 60	115 x 22,2	63	10500
		125 x 22,2		9650
		180 x 22,2		6700

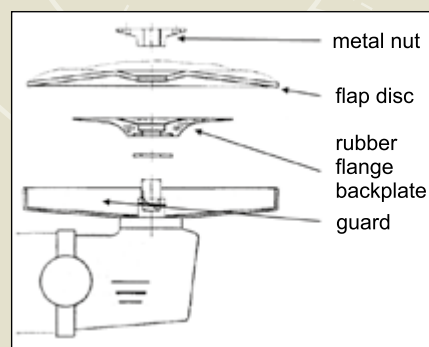
APPLICATION EXAMPLES

- grinding of marble, granite, terrazzo, concrete, ceramics, glass and cast iron
 - cleaning of ship hulls

MARKING EXAMPLE

Semi-flexible grinding disc-125x22,2-C24-63

MOUNTING ON PORTABLE ANGLE GRINDERS



GRINDING WHEELS CBS DISCS MADE OF UNWOVEN FABRIC FOR CLEANING, GRINDING AND POLISHING



Abrasive disc made of unwoven impregnated glass fabric, intended for cleaning, grinding and polishing.

Used on portable angle grinders and mounted without any additional blotters.

TYPE	Dimensions	Maximal operating speed	
	[mm]	[m/s]	[rpm]
CBS	115 x 22,23	80	13300
	125 x 22,23		12250

MARKING EXAMPLE:

Grinding wheel CBS-125x22,23-80

APPLICATION EXAMPLES:


- Removing of paints from steel surfaces without causing scratches,
- Removing of rust and dirt from various metal parts,
- Grinding of weld seams,
- Cleaning of wooden and plastics surfaces,
- Cleaning and polishing of all types of surfaces.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. The bottom portion of the page features a checkered pattern, likely indicating where the paper was cut from a larger sheet or its intended use as a template. There is no text or other markings on the page.


EXAMPLES OF DOCUMENTS

APPENDIX

FORM OF COMPLAINT

	LETTER OF COMPLAINT No. /			
COMPLAINT LODGER	Place		Date	
	Name, phone no.		Company name	
GRINDING TOOL	Type, dimensions		Designation, operational speed	
	Invoice No.	Delivery date	Lot No.	Number of pieces
TRANSPORTATION	Carrier		Way of transportation - Reg. plate No.	
DESCRIPTION OF THE PROBLEM	Appendixes, documents, if necessary please add an additional form, sketch, label			
WHERE THE PROBLEM OCCURRED	Name of the contact person, company name, address, phone no., date, time, shift			
CUSTOMER'S EXPECTATIONS				
OTHER REMARKS				
Name and signature of the person who lodged the complaint				

QUESTIONNAIRE FOR SELECTION OF GRINDING TOOL CHARACTERISTICS

ANDRE ABRASIVE ARTICLES Sp. z o.o. Sp. k. 62-600 Koło, ul. Przemysłowa 10 tel. +48632626300; e-mail: aaa@andre.com.pl			
QUESTIONNAIRE for selection of characteristics of grinding wheel, segment*/for registration of test results*			
Company (name, address):			
VAT Id. No.			
Responsible person:			
Tel.:		Fax:	
		E-mail:	
TYPE OF GRINDING / operation		GROUND WORKPIECE	
ROUGH GRINDING		Name:	
<input type="checkbox"/> manual cutting-off		Material:	
<input type="checkbox"/> machine cutting-off		TYPE:	
<input type="checkbox"/> manual grinding		Grade:	
<input type="checkbox"/> machine grinding		Condition:	
<input type="checkbox"/> swing frame grinding		- without heat treatment	
<input type="checkbox"/> surface grinding with a carriage grinder		- hardened	
<input type="checkbox"/> other (specify)		- heat-treated	
PRECISION GRINDING		-	
<input type="checkbox"/> external, between centres		Hardness HRc / HB / /*	
<input type="checkbox"/> external, centreless continuous / plunge */		Surface roughness:	
<input type="checkbox"/> surface, with wheel periphery		Grinding allowance:	
<input type="checkbox"/> surface, with wheel / segment face		GRINDING MACHINE	
<input type="checkbox"/> surface, parallel		Name, TYPE:	
<input type="checkbox"/> internal		Manufacturer:	
<input type="checkbox"/> "hand-off" tool sharpening		Spindle motor power: [kW]	
<input type="checkbox"/> machine tool sharpening		Grinding wheel rotational speed: [rpm]	
<input type="checkbox"/> other (specify)		Grinding wheel peripheral speed: [m/s]	
<input type="checkbox"/>		Grinding with coolant <input type="checkbox"/> YES <input type="checkbox"/> NO	
<input type="checkbox"/>		Coolant TYPE:	
GRINDING WHEEL USED TILL NOW / or being tested*			
Manufacturer:			
Type / name:			
Dimensions [mm]			
External diameter D:		Thickness T (U):	
		Hole diameter H:	
Other dimensions:			
Profile / shape / others (Dwg No.):			
Technical characteristics:			
Permissible working speed: rotational - [rpm],		peripheral - [m/s]	
Remarks on grinding results:			
Sample, test piece delivered: <input type="checkbox"/> YES: new grinding wheel / fragment of used one* <input type="checkbox"/> NO			
Other information:			
Forecasted demand (quantity / time period): /			
Date:		Signature:	

*) Cross-out when not applicable

[illegible]

[illegible]



andre.com.pl



UNBEATABLE QUALITY

ANDRE ABRASIVE ARTICLES
Spółka z ograniczoną odpowiedzialnością
Spółka komandytowa
PL 62-600 Koło, ul. Przemysłowa 10

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