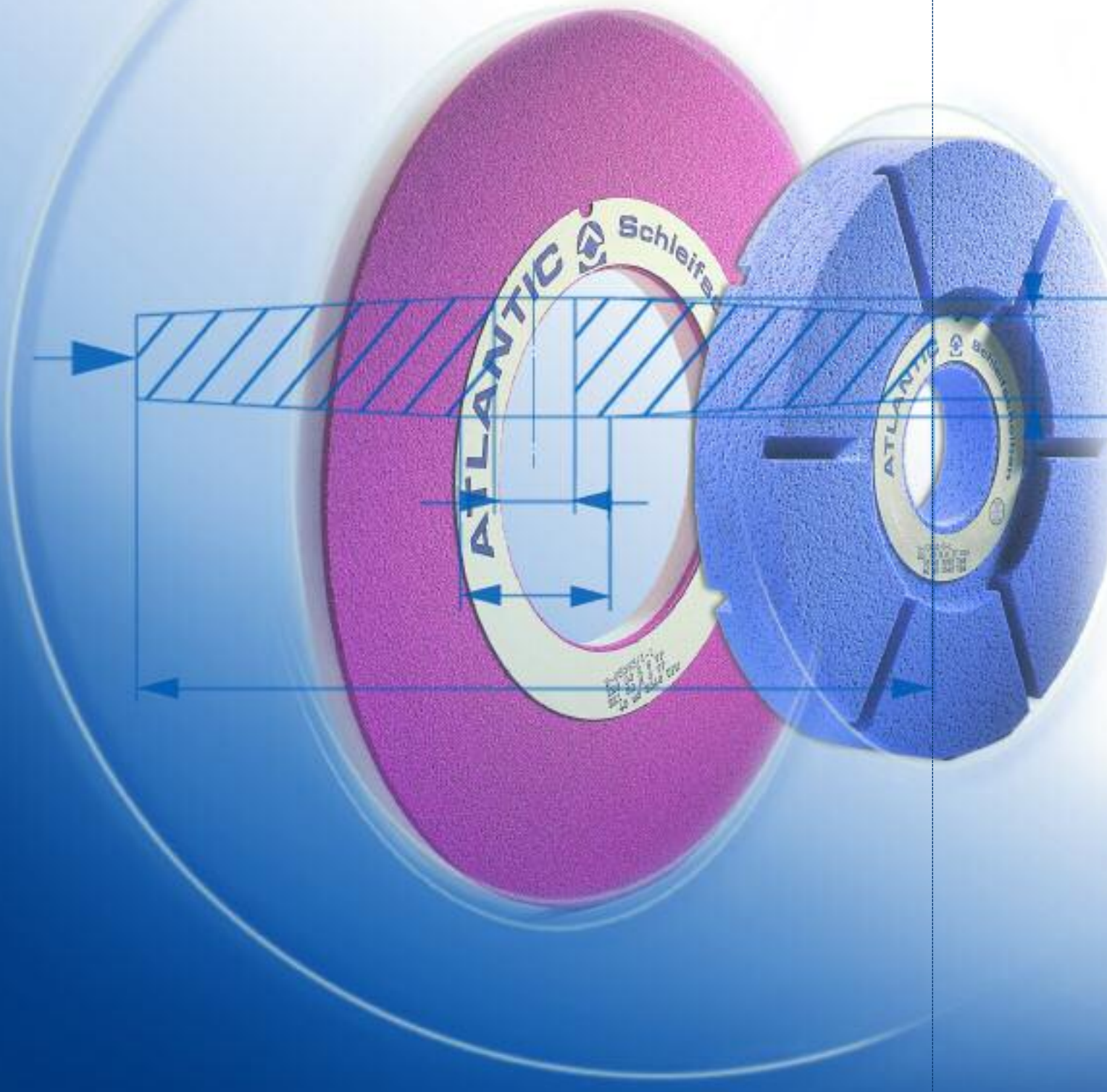
ATLANTIC
GRINDING WHEELS + HONING STONES

creative & dynamic

Grinding wheels and Segments



The proven product range to meet the highest demands

A wide selection for the perfect finish

The use of high performance abrasives has become an important factor regarding both the function and economic viability of production in most areas of industry. The progress in tool development relates directly to the continuous optimisation of the quality of abrasive products; Atlantik GmbH has sold such products throughout the world for over 80 years under the trade name **ATLANTIC**.

Atlantik GmbH is your competent partner for the service and customer orientated production of bonded abrasives in all types of grain (aluminium oxide, silicon carbide, sintered aluminium oxide, diamond and cubic boron nitride) in both resin and vitrified bonds.

More possibilities from A – Z with millions of permutations

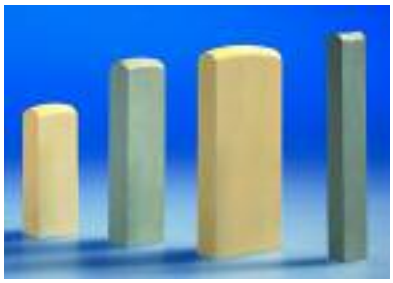
ATLANTIC abrasive products are used in the automobile, steel and bearing industries as also indeed within their supply chain.
In order to satisfy the requirements, **ATLANTIC** abrasive products achieve high stock removal rates and good surface finish.

Today, the company produces approx. 40 000 different products from which numerous variations are also possible.

Competence to the core

The various application requirements can seldom be fulfilled with a universal specification.
The quality is specifically tailored to the application.

- Grinding wheels and segments
- Diamond and CBN wheels
- Honing and superfinishing stones



Contents

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For all industrial applications

Atlantik GmbH is one of the leading manufacturers of bonded abrasives.

Individually tailored **ATLANTIC** grinding wheels achieve not only high stock removal rates but also the highest surface finishes in all areas of application.

We offer grinding wheels in vitrified bonds for normal working speeds of up to 40 m/s, and special peripheral speeds of 50 m/s, 63 m/s, 80 m/s, 100 m/s and 125 m/s. Wheels in resin bond are available for normal speeds of up to 50 m/s and also for special higher rated speeds of 63 m/s and 80 m/s.

Of the utmost importance: precision and cost effectiveness

ATLANTIC grinding wheels can be individually and exactly tailored to suit the respective requirements of the workpiece. Our defined production processes in conjunction with the latest production technology guarantees safety, reliability and a consistent standard of quality.

The **ATLANTIC** grinding wheel selection includes a wide variety of possibilities – from very dense to an extremely open structure. Profile holding capability and durability are assured by the use of precisely defined bonding raw materials and grain types.

From goods inwards to despatch, the manufacturing process uses up-to-date production techniques. Grinding machines using **ATLANTIC** grinding wheels can show their real potential: **precision and cost effectiveness.**

Ball bearings

Valves

Fuel injection components

Production process

Up-to-date technology for the highest quality standards

The manufacture of high quality grinding wheels utilizes up-to-date production technology from start to finish.

It is the interaction of all factors which forms the basis of a first class product, which in turn supports and realizes our customers' goals; Atlantik GmbH can be relied upon as a true partner **– Constructive co-operation for future development and continuous improvement.**

Production process

Customer ⟷ **Technical advice**

Order

Sales

Production planning

Determining individual production parameters

Raw materials

Quality control

Inspection of raw materials to quality control standards

Raw material stores

Mixing

Mixing of grain and bonding to pre-defined recipe

Pressing department

Pressing a grinding wheel to pre-defined instructions

Firing

Vitrified bonded grinding wheels: firing

Resin bonded grinding wheels: curing

Quality control

E-modulus, hardness, density

Finishing

Face, diameter, profiling

Final quality control and marking

Checking to current standards and guide lines

ATLANTIC
GRINDING WHEELS + HONING STONES

Certified management systems

The certified management systems document our information-orientated business activities which guarantee the quality, environmental and safety issues.

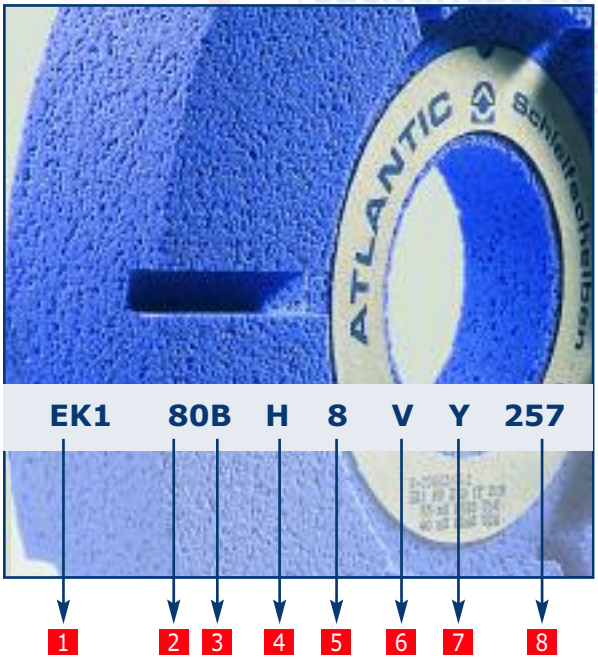
Organization for the Safety of Abrasives

ATLANTIC operates to DIN EN ISO 9001, ISO/TS 16949 and DIN EN ISO 14001.
Internal audits ensure a regular control in various areas covering all product criteria. The high standards guarantee a quality and precision workmanship; quality upon which you can rely and plan ahead.

Method of product identification – grain type

Identification

A letter-numeral coding system is used to specify the **ATLANTIC** products. By using a complete combination of quality control methods, the precise quality is guaranteed. The documentation of this data ensures traceability and the ability to reproduce the identical **ATLANTIC** product.



1 Grain type
2 Grit size
3 Grit combination*
4 Hardness
5 Structure
6 Bonding
7 **ATLANTIC** Type of bonding
8 Porosity*

* This information is optional

Grain

In the main, crystalline synthetic hard materials are used as the grinding media. The most common and conventional types are alumina (aluminium oxide) and silicon carbide.

Fused alumina

Alumina is a crystalline aluminium oxide (Al_2O_3) and is divided into the degree of purity i.e. NK - HK - EK (the purest). The raw materials are melted in an electric arc furnace at approximately 2000 °C; NK and HK grain types are produced from calcined bauxite, EK from pure alumina. The toughness of the grain can be influenced by the use of different additives and defined cooling processes. An increase in the Al_2O_3 content increases the hardness and the friability of the grain.

Microcrystalline sintered alumina

Microcrystalline sintered alumina differentiates itself from the conventional fused alumina by the method of production and properties. The special manufacturing process produces a sintered alumina, which is particularly uniform with a fine crystalline grain structure.

The fine crystalline structure allows only the breaking-off of small particles from the whole, even under increasing pressure; this results in each complete grain particle being used to its maximum effect.

Silicon Carbide

Silicon Carbide (SiC) is a pure synthetic product and is produced from quartz sand and coke heated in an electric resistance furnace to approximately 2200 °C. One differentiates between green and black silicon carbide, which has a slightly higher toughness.

Silicon Carbide is harder, more brittle and sharper edged than alumina. Silicon Carbide is mainly used on hard and brittle materials e.g. grey cast iron, tungsten carbide and non-ferrous metals.

NK: **95-96 % Al_2O_3**
in grain types NK1 - NK9

HK: **97-98 % Al_2O_3**
in grain types HK1 - HK9

EK: **99.5 % Al_2O_3**
in grain types EK1 - EK9

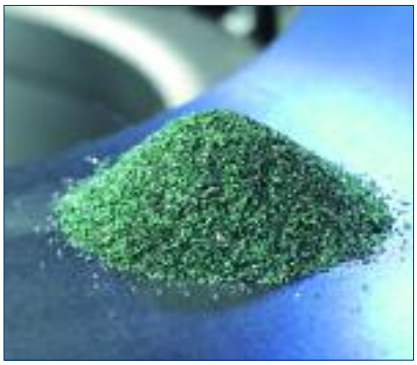
EB or EX microcrystalline sintered alumina
in grain types EX1 - EX9

Silicon carbide
in grain types SC1 - SC9

SB or SX microcrystalline sintered alumina
in grain types SX1 - SX9

Pure fused alumina

Microcrystalline sintered alumina



Silicon carbide

Grit size identification

ATLANTIC products use grit sizes according to DIN ISO 6344. The grain particles are sorted into various groups using standardised sieves. The nominal grit size results from the number of holes per inch in the sieve (mesh). This means, for example, 60 grit size has been produced from a sieve with 60 mesh holes per inch. The greater the number, the finer the grit size.

Grit sizes finer than 240 are no longer classified in terms of mesh size; they are the result of a complex sedimentation process.

International comparison

The following table compares the various international standards

Grit size (mesh)	Average grit diameter in µm			
	DIN ISO 6344	JIS	ANSI	
8	2600			
10	2200			
12	1850	1850	1850	
14	1559			
16	1300	1300	1300	
20	1100	950	950	
24	780	780	780	
30	650	650	650	
36	550	550	550	
40		390		
46	390		390	
50		330		Macro grits
60	270	270	270	
70	230		230	
80	190	190	190	
90	160		160	
100	140	165	140	
120	120	120	120	
150	95	95	95	
180	80	80	80	
200	70			
220	60	70	70	
240	45	57	57	
280		48	37	
320	29	40	29	
360		35	23	
400	17	30	17	
500	13	25	13	
600	9	20	9	
700		17		Micro grits
800	7	14	7	
1000	5	12	4	
1200	3	10	3	
1500	2	8		
2000	1	7		
2500		5		
3000		4		
4000		3		
6000		2		
8000		1		

Hardness – structure – pore inducers

ATLANTIC
GRINDING WHEELS + HONING STONES

Hardness of grinding wheels

The hardness denotes the strength by which each particle of grain is retained by the bonding within the grinding wheel. An alphabetical letter identifies the hardness whereby
A represents very soft and
Z very hard.

The Grindo-Sonic method

This method measures the vibration frequency of the grinding wheel. It is dependent upon the physical properties and the dimensions. The results can be converted into the E-Modulus, which assists in establishing a nominal value of the grinding wheel hardness.

Zeiss Mackensen

This method of hardness checking uses quartz pneumatically blasted into the grinding wheel under well-defined conditions. The impact of the blasting media into the surface of the grinding wheel frees both grit and bonding particles resulting in an indentation on the surface of the wheel; the softer the wheel, the deeper the indentation.

Degree of hardness

A to D	**extremely soft**
E to G	**very soft**
H to K	**soft**
L to O	**medium**
P to S	**hard**
T to Z	**very hard**

The Grindo-Sonic method

Zeiss Mackensen method

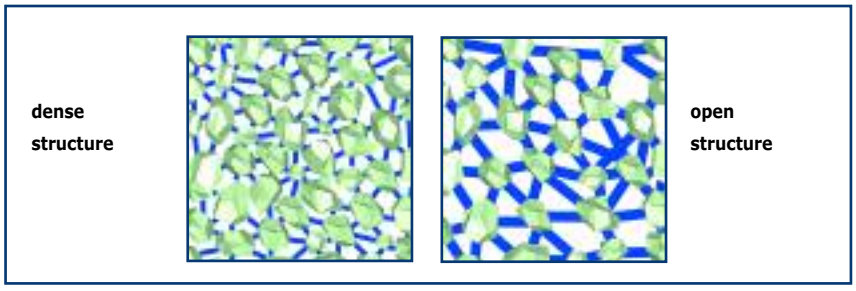
Structure

The structure of a grinding wheel is denoted by a number from **1** to **18** which relates to the spacing between each individual grain particle.
Low numbers mean small spacing, higher numbers mean large spacing.

1 to 4	**dense**
5 to 7	**normal**
8 to 11	**open**
12 to 18	**very open**

Pore inducers

The volume of pores is dictated by the percentages of grain and bonding used. More coolant is present in the grinding zone by using an open structured wheel; this reduces the risk of burning. The structure of a grinding wheel can be controlled by the use of pore inducers i.e. type, size and amount to suit the individual application.



Bonding

Bonding

The bonding has the job of retaining the grain within the grinding wheel until the grinding process blunts the grain particle; at this point, the bonding should release the grain, thus presenting a new and sharp particle. The bonding type and the percentage of bonding used depends on the grinding application.
ATLANTIC grinding wheels are manufactured in two basic bonding types:
vitrified bond (**identification V**) and resin bond (**identification RE**)

Vitrified bond

Vitrified bonds are a mixture of kaolin, quartz, feldspar and glass. The mixture of these components determines the bond characteristics. Vitrified bonds are resistant to oil and soluble oil; however, they are brittle and fragile. The ensuing grinding pressure breaks down the bond.

Resin bond

Resin bonds are mainly produced on a phenolic basis. They can be differentiated into those with and without fillers. Varying the phenolic resin and the fillers determines the characteristic of the bond. The breakdown of the bond is the result of grinding heat and pressure. The elasticity of the resin bonds makes them particularly suited to polishing and finish grinding applications, as well as fettling and dry grinding applications. When using soluble oil, it is important to note that the pH-value should not exceed 9; above this, the resin bond deteriorates.

Types of bond

Resin bond	Application	Vitrified bond
PBD, REI	Surface grinding	VY, VE, VF, VU, VO
–	Profile/creep-feed grinding	WVY, VF, VO
PBD, DC	Duplex	VK, VE, VO
DC, REI	Cylindrical between centres	RVJ, VX, VO
REI, PBD, ES	Centerless plunge	VK, VT, VF, VO
REI, DM, HS	Centerless thrufeed	VO, VK, VT, VF
ED1, ED9	Control wheel	V 22
PBD, AX, AL7, DP	Roll grinding	VE, VF, VO
REI, AX, AC	Bar grinding	VO, VK, VD, VF
–	Thread grinding	VF, VO
–	Gear tooth grinding	VF, VY
ES	Taper roller face grinding	–
AL7	Hypodermic needle grinding	–
AX, BM	Spring-end grinding	VU
REH, REC	Ball grinding	307
		For sintered alumina – bonding types VB or VY are used

The above examples represent successful applications when using different types of bond.
We can offer different bonding systems for special applications.

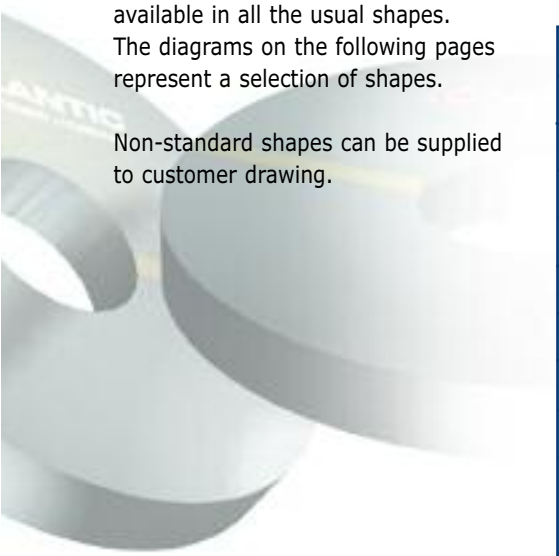
ISO Shapes

ATLANTIC GRINDING WHEELS + HONING STONES

All shapes are possible

ATLANTIC grinding wheels are available in all the usual shapes. The diagrams on the following pages represent a selection of shapes.

Non-standard shapes can be supplied to customer drawing.



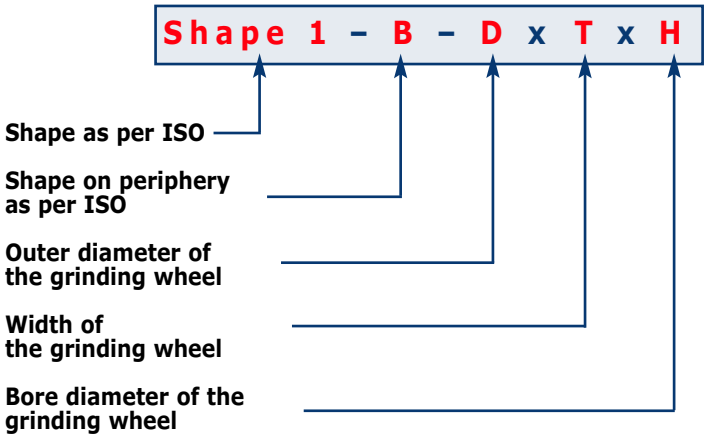
Description

A	Smallest width of segments
B	Width of segments and honing stones
C	Height of segments and honing stones
D	Outer diameter of grinding wheel
E	Back-wall thickness
F	Depth of recess one side
G	Depth of recess other side
H	Bore diameter
HG	Thread diameter of nut-inserts *
J	Diameter of outside back wall
K	Diameter of inside back wall
L	Length of segments and honing stones
N	Depth of tapers
NG	Number of nut-inserts *
P	Diameter of recess one side
P1	Diameter of recess other side
R	Radius
T	Overall width
TG	Depth of nut-insert *
U	Smallest width of tapered wheel
V	Angle of contact area/profile angle
W	Width of side wall
➡	Main grinding/contact face

* not to ISO 525

Example

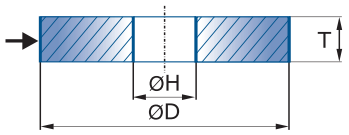
For certain applications, the contact face of a grinding wheel is profiled. This profile is identified by the shape on the periphery; it is also standardized.



Selection of ISO Shapes

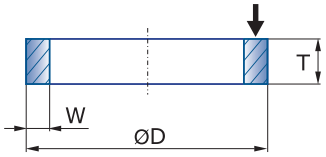
ISO Shape 1

Plain wheel
D x T x H



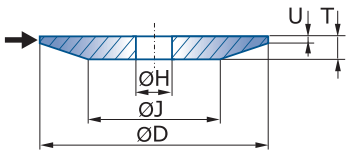
ISO Shape 2

Ring wheel
D x T x W



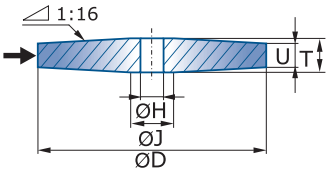
ISO Shape 3

Tapered one side
D/J x T x H



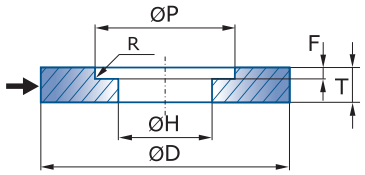
ISO Shape 4

Tapered both sides
D x T x H



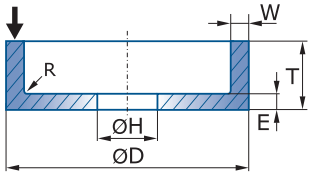
ISO Shape 5

Recessed one side
D x T x H - P x F



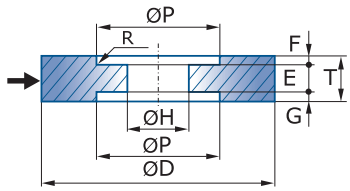
ISO Shape 6

Straight cup
D x T x H - W x E



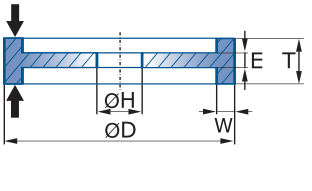
ISO Shape 7

Recessed both sides
D x T x H - P1 x F/G



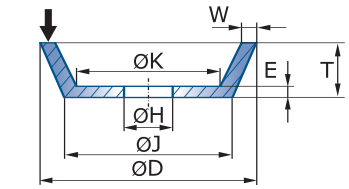
ISO Shape 9

Duplex straight cup
D x T x H - W x E



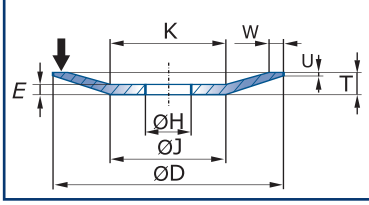
ISO Shape 11

Tapered cup
D/J x T x H - W x E



ISO Shape 12

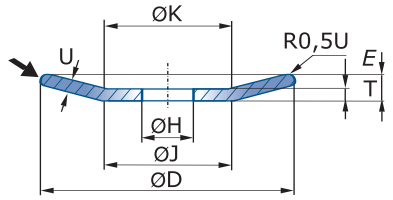
Dish wheel
D/J x T x H



➡ = Grinding face

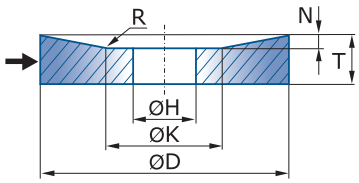
ISO Shape 13

Dish wheel D/J x T/U x H - K



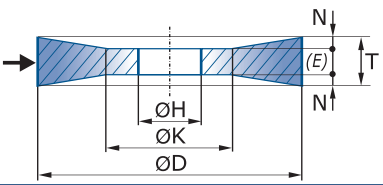
ISO Shape 20

Relieved one side
D/K x T/N x H



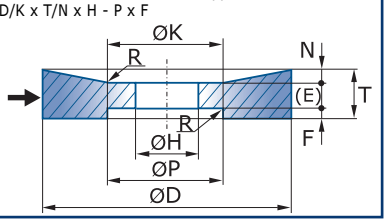
ISO Shape 21

Relieved both sides
D/K x T/N x H



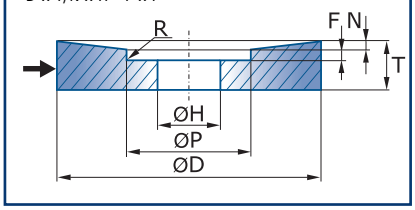
ISO Shape 22

Relieved one side – recessed opposite side
D/K x T/N x H - P x F



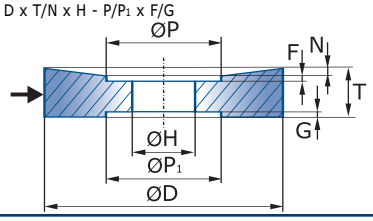
ISO Shape 23

Relieved and recessed one side
D x T/N x H - P x F



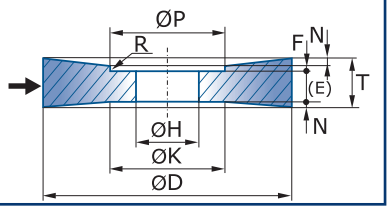
ISO Shape 24

Relieved and recessed both sides
D x T/N x H - P/P1 x F/G



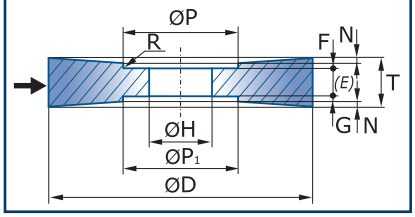
ISO Shape 25

Relieved both sides – recessed one side
D/K x T/N x H - P x F



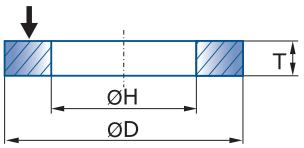
ISO Shape 26

Relieved and recessed both sides
D x T/N x H - P/P1 x F/G



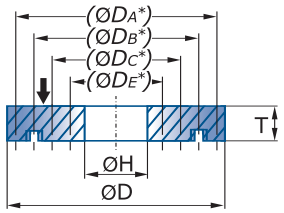
ISO Shape 35

Wheel cemented or mounted to backplate
D x T x H



ISO Shape 36

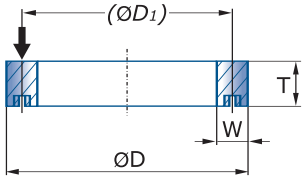
Nut-inserted wheel
D x T x H



* Pitch circle diameter of nut-inserts

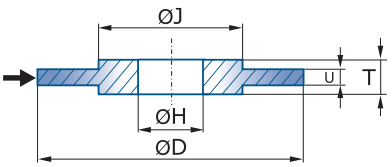
ISO Shape 37

Nut-inserted ring wheel – Nut pattern
D x T x W



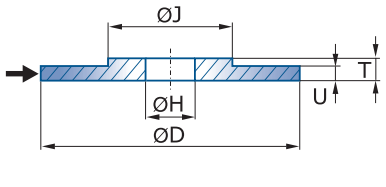
ISO Shape 38

Boss one side
D/J x T/U x H



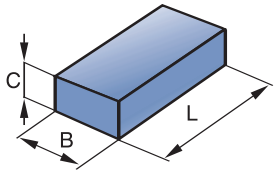
ISO Shape 39

Boss both sides
D/J x T/U x H

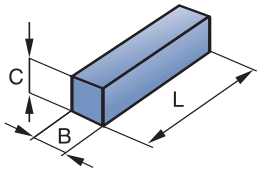


ISO Shapes

Hand stones and dressing sticks



Shape 9010 – B x C x L



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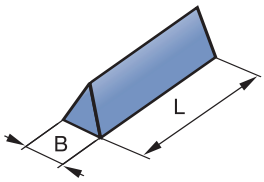

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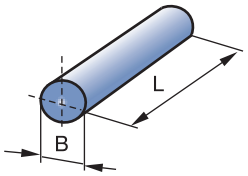
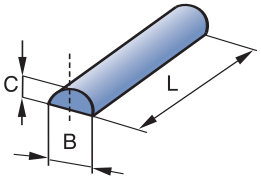
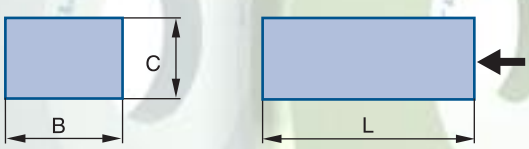


Shape 9030 – B x L

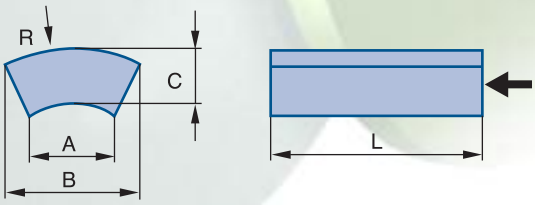


Shape 9040 – B x C x L

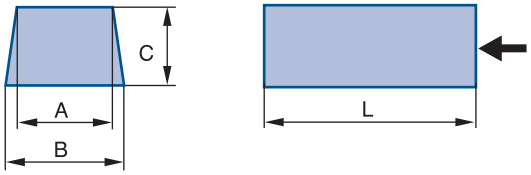
Grinding segments



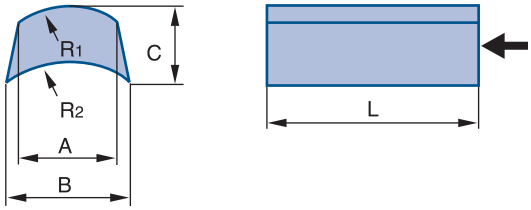
Shape 3101 – B x C x L



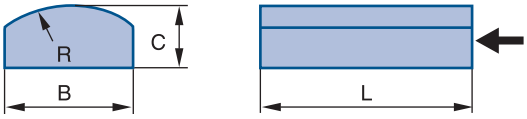
Shape 3104 – B x A x R x L



Shape 3109 – B x A x C x L

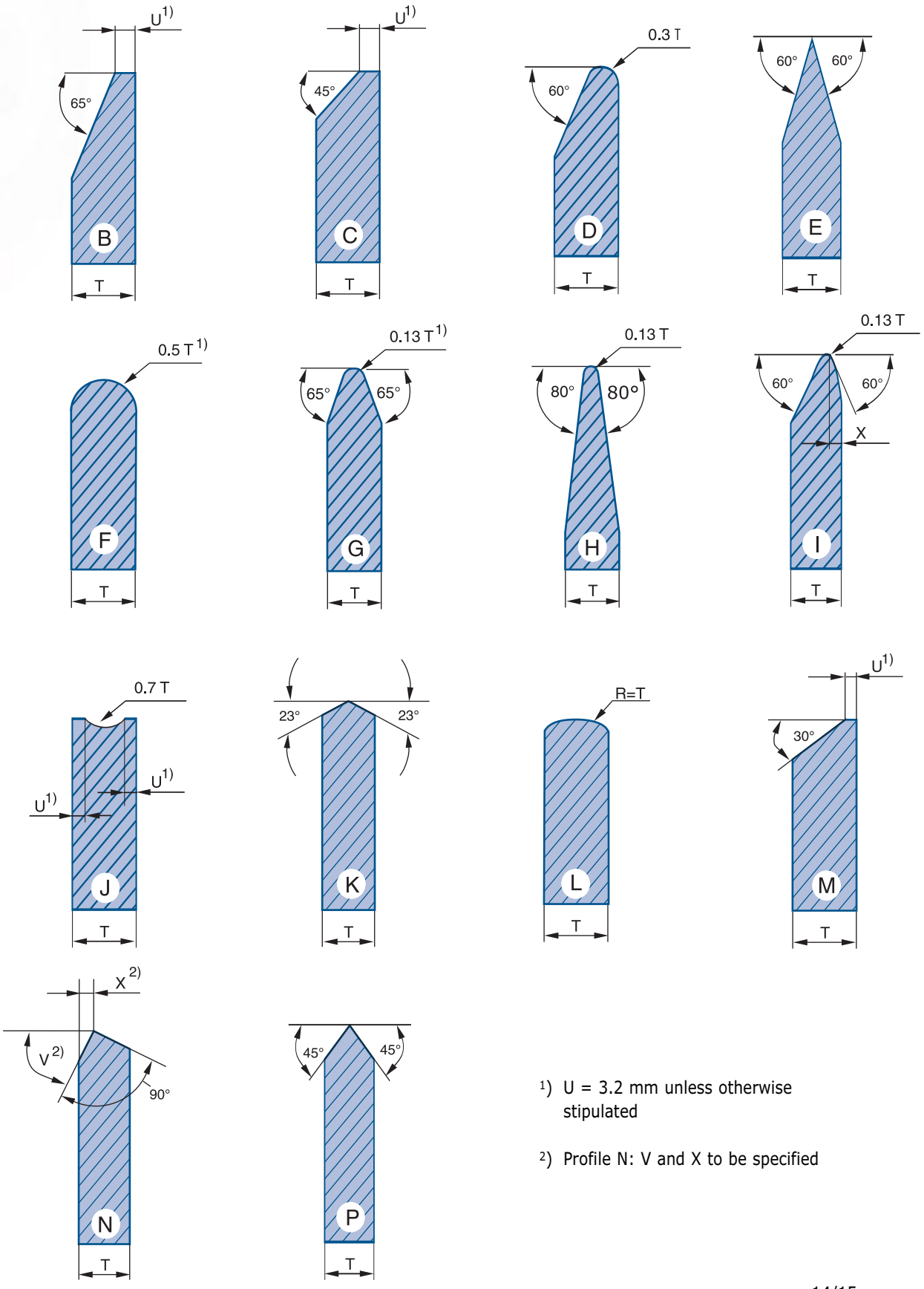


Dimensions to customer drawing



ATLANTIC
GRINDING WHEELS + HONING STONES

ISO Profiles



[1]) U = 3.2 mm unless otherwise stipulated

[2]) Profile N: V and X to be specified

Wheel mounting – peripheral cutting speed

Wheel mounting

An **ATLANTIC** grinding wheel ready for despatch conforms to DIN EN 12413.

The heavy point of the grinding wheel is marked with an arrow; this imbalance is technically unavoidable in the manufacturing process.

As a result of a play between the grinding wheel bore and spindle, the wheel 'hangs' causing eccentricity and additional imbalance.

It is therefore important to ensure that the arrows point downwards when mounting.

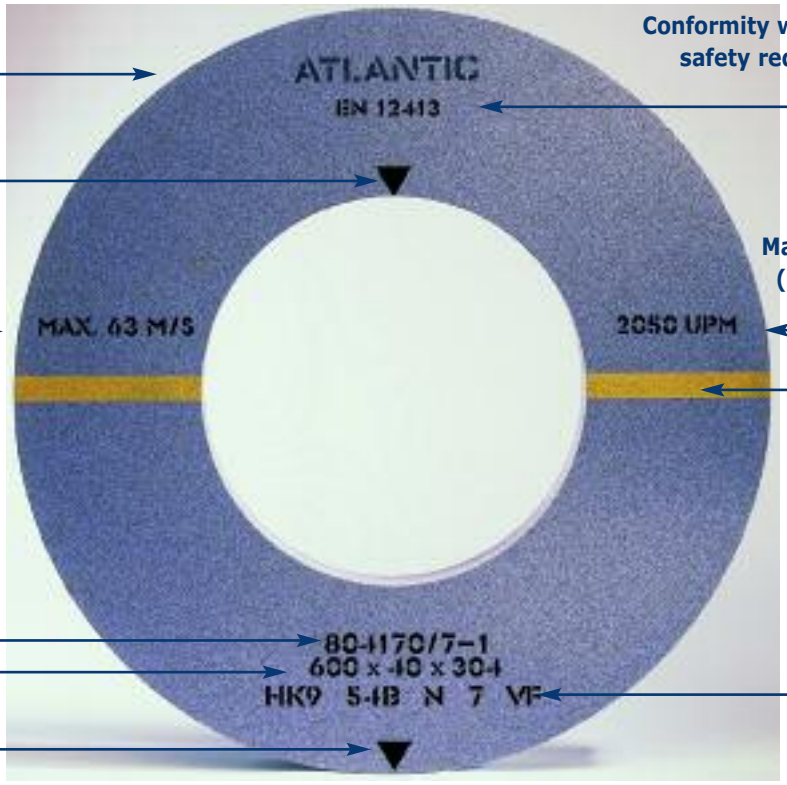
Both these imbalances can be minimized by wheel dressing if mounted correctly.

Before the grinding wheel is dismounted or stopped, it is important to allow the coolant to be centrifugally spun out of the wheel.

Cutting speeds

The maximum cutting speed of **ATLANTIC** grinding wheels is indicated in the adjoining table, and should never be exceeded.

Cutting speed	Colour code
up to 40 m/s	none
50 m/s	blue
63 m/s	yellow
80 m/s	red
100 m/s	green
125 m/s	blue/yellow



Name of manufacturer/distributor

Conformity with the standards for safety requirements of bonded grinding wheels

Contact point with spindle

Max. permissible R.P.M. (based on the nominal diameter)

Max. permissible cutting speed v_s

Colour code for permissible cutting speed (see table)

Batch number

Dimensions

Specification

Mounting arrow

ATLANTIC
GRINDING WHEELS + HONING STONES

Dressing of grinding wheels with a fixed dressing tool

An important factor in the wheel dressing process using a fixed dressing tool is the contact-factor U_d. It describes the ratio between the contact width and traverse speed of the dressing tool. To some extent, this factor can be used to influence the cutting characteristic of a grinding wheel.

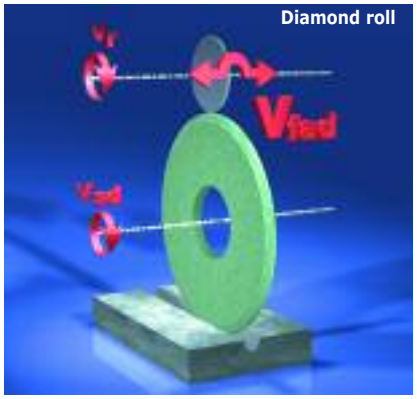
$$U_d = \frac{b_d}{f_{ad}}$$

Contact factor U_d
Contact width of dressing tool b_d
Dressing traverse speed f_{ad}

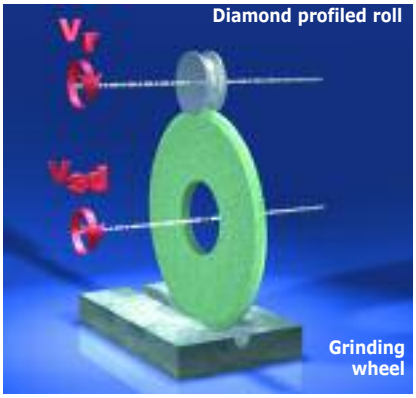
High contact factor (which means low traverse speed) produces a fine surface finish on the grinding face; a lower factor produces a coarser finish.

Dressing of grinding wheels with rotary dressing tools

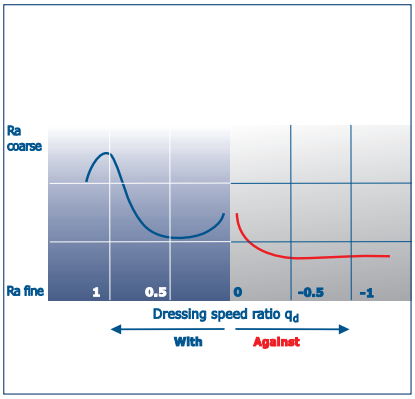
A rotary diamond dresser is normally used to generate the required profile on the periphery of the grinding wheel. This is achieved by the dressing tool following the contour i.e. path controlled, or by using a pre-profiled diamond roll.



Path controlled rotary dresser



Pre-profiled rotary dresser



Effect of dressing in the same / opposite rotational direction in conjunction with the dressing speed ratio (q_d) on the initial surface finish.

Influencing factors using a path-controlled rotary dresser

- **S**peed ratio $q_d = v_r / v_{sd}$
- **S**ame / opposite rotational direction
- **C**ross traverse per grinding wheel revolution f_d
- **I**nfeed a_d

Influencing factors using a pre-profiled diamond roll

- **S**peed ratio $q_d = v_r / v_{sd}$
- **S**ame / opposite rotational direction
- **D**ressing infeed per grinding wheel revolution v_{fd}

Coolant

The purpose of grinding coolant is to cool, lubricate and to remove swarf. Coolant can be divided into two groups:

- Soluble
- Neat oils

Soluble

Soluble is oil mixed with water. The normal concentration for grinding lies between 3 % – 5 %. Soluble has a greater cooling ability but a lower lubrication effect compared with neat oil. Soluble coolant can be used in conjunction with CBN type wheels.

In comparison to oil, a considerable reduction in wheel life will be experienced.

Neat oils

The heat in the grinding contact zone will be reduced due to the better lubrication effect.

Grinding oil is mainly used for thread and gear grinding, honing and superfinishing, and for diamond – CBN applications.

Applications

Surface grinding

Vitrified grinding wheels are mainly used for surface grinding. The achievable surface finish can be controlled by the composition of the wheel and the machine parameters. Due to the wide variety of application conditions, the qualities stated should only be used as a guideline.

Surface grinding	ATLANTIC Specification
Case hardened and normal tool steel, and alloyed steel, hardened up to 63 HRC	EK1 46 - F7 VF
over 63 HRC	EK1 46 - E8 VY
Tempered steel	EK8 46 - G7 VY
Grey cast	SC9 46 - G7 VU
Non-ferrous – light alloyed metals	SC9 46 - E8 RE PBD
High alloy steel	EK8 46 - F7 VF
Chrome steel	EK6 46 - E9 VY 207

Profile surface grinding

Profile surface grinding incorporates two grinding methods – with reciprocating traverse and small infeed, and slow traverse with considerably higher infeed. A certain pore volume is essential for the removal of swarf and to obtain sufficient coolant in the wheel. Profile grinding wheels are manufactured in vitrified bonds. A high degree of form-holding ability is achieved by using special wheel structures.
Due to the wide variety of application conditions, the qualities stated should only be used as a guideline.

Profile surface grinding-reciprocating	ATLANTIC Specification
Case hardened and normal tool steel, and alloyed steel, hardened up to 63 HRC	EK8 60 - D12 VE 25 N
over 63 HRC	SC9 100 - B10 VO 258
Tempered steel	EK8 70 - C12 WVY 407
High alloy steel	EK6 70 - C11 VF 357

Creep - feed	ATLANTIC Specification
Case hardened and normal tool steel, and alloyed steel, hardened up to 63 HRC	EK8 100 - B12 WVY 407
over 63 HRC	SC9 100 - A 12 VO 408
Tempered steel	EK8 60 - B13 VE 25X
High alloy steel	EK8 80 - A 14 VEB 50X
Turbine blade (CD-grinding*)	EK8 60 - C 12 WVY 407

* continuous dressing

Cylindrical grinding between centres

Cylindrical grinding between centres is the grinding of outer diameters and/or flat surfaces of rotational symmetrical workpieces, which are held between the work holding and centring device.

Typical application examples are the grinding of shafts, axles, pins, crankshafts and camshafts (cam profile) and hydraulic cylinders. Due to the linear contact created between the grinding wheel and component, it is possible to maintain a good coolant supply in the grinding contact area.

Material	ATLANTIC Specification	
	Standard	High performance
Universal application for a variety of materials – hard and soft	EK1 70 - I8 RVJ	
Case hardened and normal tool steel and alloyed steel hardened up to 63 HRC	EK8 60 - J7 VX	EX3 80 - K7 VY
High speed steel up to 63 HRC	EK1 60 - I7 RVJ	EX3 80 - J7 VY
High speed steel over 63 HRC	SC9 60 - H8 VO	
Tempered steel	EK8 60 - I6 RVJ	EX3 60 - J8 VY
Grey cast iron	SC9 80 - I6 VO	
Non-ferrous and light alloyed metals	SC9 54 - I8 VO	
High-alloyed steels	SC9 120 - F8 VU	EX3 100 - J7 VY
Chrome steel	EK6 80 - F8 VF	EX3 100 - G8 VY

Centerless grinding

In thrufeed grinding, the workpiece is centred by the grinding wheel, control wheel and the workrest blade, and is fed between the wheels. The linear support also permits long components with relatively small diameters to be ground.

In plunge grinding, the wheel is plunged into the workpiece, whereby stepped diameters and profiles can be ground.

Centerless grinding wheels in a vitrified bond are used for small diameters and thin-walled workpieces.

Resin bonded wheels are mainly used in conjunction with high stock removal rates, or where a self-sharpening effect and a particularly good surface finish are required.

Centerless grinding – thrufeed

Workpiece	Material	Hardness	Stock (mm)	Surface finish (µm)	ATLANTIC Specification
Shock absorber rods Rough grind (before chroming)	Tempered steel induction hardened	58 HRC	0.3	< 2.0 R_z	Infeed: EX7 60 - M6 RE REI Middle: EK3 80 - L6 RE REI Outfeed: EK3 100 - K6 RE REI
Shock absorber rods Finish grind (before chroming)			0.1	< 1.0 R_z	Infeed: EK1 180 - K8 RE REI Outfeed: EK1 320 - J9 RE REI
Shock absorber rods Finish grind (after chroming)	Chrome		0.05	0.1 R_a	Infeed: NK1 180 - O12 RE HD Outfeed: NK1 280 - O12 RE HD
Bearing rings	100 Cr 6	62 HRC	0.3	0.4 R_a	HK9 60H - J5 VK
Shafts	tempered steel	58 HRC	0.2	1.5 R_z	Infeed: EK1 100 - H7 VF Outfeed: EK1 220 - H7 VF
Shafts, axles	case hardened steel	62 HRC	0.2	0.4 R_a	EK1 80 - H5 VT
Twist drills	HSS	64 HRC	0.15	0.4 R_a	EK3 80 - O6 RE AX
Control wheels				Resin bond Vitrified bond	NK1 120 - B ED9 NK1 150 - Z10 V 22

Centerless grinding – plunge

Workpiece	Material	Hardness	Stock (mm)	Surface finish (µm)	ATLANTIC Specification
Shafts and bolts	Case hardened steel	hard and soft	0.3	1.3 R_z	EK1 150 - J7 RVF
Bolts	Tempered steel		0.2	0.6 R_a	HK9 60 - J5 RVJ
Cylindrical punches	Tool steel	62 HRC		0.4 R_a	EK1 80 - J7 VE
Spherical rollers	Bearing steel	60 HRC	0.5	0.4 R_a	HK7 100 - M9 RE HS
Taps	HSS	62 HRC	0.3	0.6 R_a	EK8 70 - L6 RVJ
Camshafts	Cast iron		0.2	2.5 R_z	EB3 60 - J7 VB
Shafts	Aluminium		0.15	2.0 R_z	SC9 60 - H9 VO 206 W
Control wheels				Resin bond Vitrified bond	NK1 120 - B ED9 NK1 150 - Z10 V 22

Applications

Bar grinding

Bar grinding is a centerless grinding application, and is mainly applicable to the steel industry. The total stock is removed in one or more passes. This operation is characterized by the length of the workpiece which is generally many times more than the width of the grinding wheel.

The demands made of the grinding wheel are extreme; high stock removal rate, roundness of the bar and, in addition, high thrufeed rates.

Bar grinding

Material	Hardness	Stock (mm)	Surface finish (µm)	ATLANTIC Specification
Varying materials	Hard and soft	0.25	0.4 R_a	HKT 54 - I6 VK
Tempered steel	Tempered	0.25		NK1 60 - J7 VF
Tool steel	Soft	0.25	0.4 R_a	SC8 54 - 04 RE AC
Spring steel		0.25	3.0 R_z	SC9 54 - O6 VD
HSS	63 HRC	0.2	0.4 R_a	EK3 70 - P6 RE AX
High alloyed steel		1.0	0.7 R_a	Infeed: NS5 46 - M6 RE REI Outfeed: NS5 54 - K6 RE REI

Internal grinding

Internal grinding wheels require a wheel specification with a relatively open structure due to the large contact area between workpiece and grinding wheel; this guarantees removal of swarf particles, and allows an ample coolant supply to the area of contact.

When grinding thin-walled bores, the grinding pressure must not be too excessive. For cost-effectiveness, the wheel diameter should be approximately 80 % of the bore diameter.

Internal grinding

Material	ATLANTIC Specification	
	Standard	High performance
Case hardened and normal tool steel and high alloy steels up to 63 HRC	HK9 80 - I7 VK	EK1 70 - I8 VE
Tempered steel	EK8 60 - I7 VY	EX5 54 - J7 VY
High speed steel up to 63 HRC	EK8 60 - K6 VU	EX3 60 - J7 VY
High speed steel over 63 HRC	SC9 80 - M5 VD	EX3 80 - J7 VY
Grey cast iron	NK1 60 - K7 VK	EX5 60 - K8 VY
Non-ferrous and light alloyed metals	SC9 60 - J6 VU	
Chrome steel	EK6 100 - I7 VY	EX5 100 - I8 VY

ATLANTIC GRINDING WHEELS + HONING STONES

Gear tooth ginding

There are two basic methods of gear profile grinding; either a grinding wheel is used which corresponds exactly to the profile of the gear, or the gear tooth profile is gererated by the control system of the machine.

Gear tooth grinding

Workpiece	Material	Hardness	Module	ATLANTIC Specification
Transmission gears	Case hardened steel	58-62 HRC	0.8 - 3.5	EK8 100 - E10 VF 358 or EK1 120 - F11 VY 408
		58-62 HRC	3.75 - 8	EX3 120 - G11 VY 408
		58-62 HRC	< 2.0	EX3 120 - C13 VY 508
Worm gears	Case hardened steel	58-62 HRC	0.5 - 3	EK8 80 - F11 VF 307
			4 - 20	EK1 80 - F11 VF 307
			21 - 25	EK1 54 - F10 VF 257
				EK1 46 - G9 VF 207
Gears	HSS	63 HRC	2.5	EX3 100 - G11 VY 408

Thread grinding

Apart from the grindability of the component material and the required surface finish, the thread pitch and root radius are important criteria in formulating the thread grinding wheel specification. In the main, fine grit wheels from 150-600 are used. By utilizing a specially defined bonding matrix in conjunction with an efficient coolant system, the risk of burning is minimized.

Puddled thread grinding wheels contain a special homogeneous pore structure, which extends to even the smallest profiles on the periphery; this considerably reduces the wheel wear at the root radius, which in turn means better quality and wheel life particularly for thread pitches of under 1 mm.

Thread grinding – single profile wheels with a cutting speed lower than or equal to 40 m/sec

Metric ISO threads Pitch in mm	ATLANTIC Specification	
	High speed steel HSS, Cast	Hardened tool steel, case hardened and tempered steel
0.25 - 0.35	SC9 500 - J9 VO	EK1 500 - J8 VF
0.40 - 0.70	SC9 400 - J9 VO	EK1 400 - J8 VF
0.80 - 1.0	SC9 320 - K8 VO	EK1 320 - J8 VF
1.25 - 1.5	SC9 280 - K8 VO	EK1 240 - J7 VF
1.75 - 2.5	SC9 220 - J8 VO	EK1 220 - J7 VF
3.0 - 4.0	SC9 180 - I8 VO	EK1 180 - H6 VF
5.0 - 5.5	SC9 180 - H8 VO	EK1 180 - H6 VF
6.0	SC9 150 - H7 VO	EK1 150 - F6 VF

Thread grinding – single and multi profiled wheels with a cutting speed greater than 40 m/sec

Metric ISO threads Pitch in mm	ATLANTIC Specification	
	High speed steel HSS, Cast	Hardened tool steel, case hardened and tempered steel
0.25 - 0.35	SC9 500 - H8 VO	EK1 400 - H7 VF
0.40 - 0.70	SC9 400 - H8 VO	EK1 320 - I7 VF
0.80 - 1.0	SC9 320 - I8 VO	EK1 280 - I7 VF
1.25 - 1.5	SC9 240 - I7 VO	EK1 220 - H6 VF
1.75 - 2.5	SC9 180 - H7 VO	EK1 220 - H7 VF
3.0 - 4.0	SC9 150 - G7 VO	EK1 150 - H6 VF
5.0 - 5.5	SC9 120 - G7 VO	EK1 120 - H6 VF
6.0	SC9 100 - G6 VO	EK1 120 - G6 VF

Puddled thread grinding wheels	ATLANTIC Specification
Taps	SC9 400 - I20 VOH
Thread rolls	SC9 320 - H20 VOF 53

Roll grinding

In addition to a short grinding cycle and high stock removal rates, the grinding wheel must also be capable of producing a good surface finish. In hot rolling mills, a finish requirement of 0.4-2.0 µm R_a for work rolls and 0.6-1.2 µm R_a for back-up rolls are the norm.

Regrinding in a hot rolling mill

			ATLANTIC Specification	
Types of roll	**Material**	**Surface finish R_a (µm)**	**Standard**	**High performance**
Work rolls	(HSS) High chrome	0.4 - 0.8	EK3 46 - J6 RE PBD	EX6 46 - J6 RE PBD
		0.6 - 1.2	EK3 36 - K6 RE PBD	EX6 36 - K6 RE PBD
		> 1.6	EK3 24 - K6 RE PBD	EX6 24 - K6 RE PBD
	Indefinite	0.4 - 0.8	SC5 46 - J6 RE PBD	SX6 46 - J6 RE PBD
		0.6 - 1.2	SC5 36 - K6 RE PBD	SX6 36 - K6 RE PBD
		> 1.6	SC5 24 - J6 RE PBD	SX6 24 - K6 RE PBD
	All	0.4 - 0.8	SC5 46 - J6 RE PBD	SX6 46 - J6 RE PBD
		0.6 - 1.2	SC5 30 - K6 RE PBD	SX6 36 - K6 RE PBD
		> 1.6	SC5 24 - K6 RE PBD	SX6 24 - K6 RE PBD
Back-up rolls	All	–	EK3 30 - K6 RE PBD	EX6 30 - K6 RE PBD

Regrinding of rolls

A good compromise must be found between the extremely high volume of stock to be removed, high stock removal ratios and good surface finishes – both measured and optically assessed. In addition, a further special requirement is the grinding of the barrel, in most instances to a convex or concave shape; other special profiles are sometimes required. The total grinding costs, i.e. machine costs/hour are of greater significance when regrinding, more so than rough grinding; this means that an optimum grinding process must be found to suit both rough and finish grinding operations.

ATLANTIC grinding wheels make it possible to realise an optimal solution due to their universal effectiveness, their high technical standard, and the availability of a wide selection of qualities.
The performance of a roll grinding wheel is, even today, measured by the wheel life, which means **the number of rolls ground**.

A further criterion regarding the evaluation of a roll grinding wheel is the grinding time required per roll; this varies widely, i.e. a floor-to-floor cycle of 1 hour for work rolls, up to 6-8 hours for back-up rolls. As a result of increasing pressure to reduce costs, there is also a greater significance of ever increasing machine automation to enable cycle times to be reduced. Cycle times of 25-35 minutes per work roll and 90-120 minutes for back-up rolls can be achieved when using modern grinding machines in conjunction with specially selected **ATLANTIC** grinding wheels.

Roll grinding

In a cold rolling mill, a surface finish of 0.4 - 0.03 µm R_a is required. Proven specifications are detailed below. It is, however, sometimes necessary to formulate a specification to suit the on-site application parameters to achieve an optimum performance.

Regrinding in a cold rolling mill

			ATLANTIC Specification	
Type of roll	**Material**	**Surface finish R_a (µm)**	**Standard**	**High performance**
Work rolls	Forged steel	0.4 - 0.8	EK3 46 - H6 RE DP	–
		0.3 - 0.6	EK3 60 - H6 RE DP	–
	HSS	0.2 - 0.4	EK3 80 - H6 RE DP	–
		0.1 - 0.4	EK3 100 - G6 RE DP	–
		0.08 - 0.12	EK1 180 - F10 RE PBD	–
		0.06 - 0.08	EK1 320 - G11 RE ES	–
		0.05 - 0.07	EK1 500 - G11 RE ES	–
		0.05 - 0.03	PK2 800 - F10 RE ER	–
Back-up rolls	Steel	EK3 30 - J6	EK3 30 - J6 RE PBD	EX6 30 - I6 RE PBD
	Indefinite	SC5 30 - I6	SC5 30 - I6 RE PBD	SX6 30 - J6 RE PBD

Example when ordering

The following details are necessary for an efficient processing of orders:

Grinding wheel Shape 1 -N(X5 V60) 300 x 40 x 127 - EK1 80 -G7 VY -50m/s

- Description
- Shape
- Profile
- Outer diameter
- Width
- Bore
- Specification
- Maximum operating speed

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GRINDING WHEELS + HONING STONES
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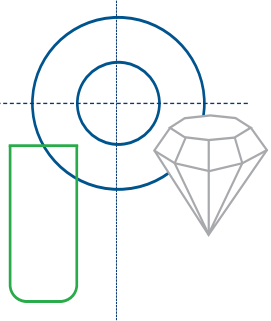


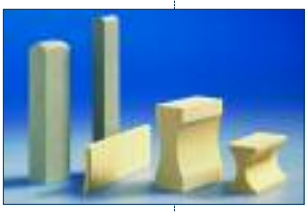
Product range – Grinding wheels – Honing stones

The required results can be achieved by the use of optimally selected abrasive media and individually tailored specifications from the **ATLANTIC** product range.

We manufacture:

- **Grinding wheels and segments**
- **Honing and superfinishing stones**
- **From 2 to 1 250 mm diameter**
- **In aluminium oxide and silicon carbide**
- **In diamond and CBN**
- **In vitrified and resin bond**
- **Up to grit size 2 000 and superfine qualities to achieve the finest surface finish**

in all common sizes and profiles – special profiles are manufactured to drawing at customer's request.



- **Surface grinding**
- **Profile surface grinding**
- **Cylindrical grinding**
- **Internal grinding**
- **Centerless grinding**
- **Bar grinding**
- **Roll grinding**
- **Thread grinding**
- **Gear tooth grinding**
- **Crankshaft grinding**
- **Cam grinding**
- **Ball grinding**
- **Tool grinding**
- **Track grinding**
- **Hypodermic needle grinding**

Wheel 3000/1.07 GB