

GRINDING



Technical Guide





GRINDING

For more than 40 years GRINDING has been synonymous with the production and distribution of consistently high quality abrasive products.

GRINDING offers a wide range of flat and depressed centre cutting-off and grinding wheels, coated abrasives and diamond tools. These are available in several thicknesses for various machines and applications.

The range is designed to be used in many industrial sectors (petrochemical, food, ship building, construction, etc). The range achieves excellent performance while ensuring an excellent quality/price ratio.

Conformity with the most stringent international safety standards is guaranteed.

Today, more than ever, we are here to supply high quality products that perform longer. Our range has been designed for professionals to reach ambitious targets. Customer satisfaction is our number one priority.



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SAINT-GOBAIN

In 1998, GRINDING was acquired by Saint-Gobain, the world leader in the habitat and construction markets. Saint-Gobain designs, manufactures and distributes building materials, providing innovative solutions to meet the growing demand in emerging economies for energy efficiency and for environmental protection.

AN INNOVATION DRIVEN GROUP



Since 1665, Saint-Gobain has consistently demonstrated its ability to invent products that improve quality of life. As one of the top 100 industrial groups in the world, Saint-Gobain continues to deploy its technological know-how, often in partnership with the most prestigious universities and laboratories. To give an idea of our commitment to innovation, 20% of Saint-Gobain products did not exist five years ago. Innovation and research are critical factors in Saint-Gobain's sustainable habitat and construction strategy, ensuring the Group has a competitive edge. Ambitious programs and cross-functional measures that generate synergy among the different businesses, innovation

and research also help drive short, medium and long-term growth. Although the greater part of research and development work is focused on improving manufacturing processes and developing new ranges of products in Saint-Gobain's traditional markets, the Group is also keen to break into new markets with its innovations. To achieve this goal, Saint-Gobain has been consistently increasing its R&D budgets for several years, streamlining its organisation and signing partnership agreements with internationally recognised organisations and universities.



THE ACTIVITIES OF SAINT-GOBAIN

Innovative Materials:

Flat glass for building, transportation and solar energy;
Ceramic materials, plastics, abrasives, crystals, textile solutions

Construction Products:

Glass wool, plasterboard, cast-iron pipe, industrial mortars, exterior products

Building Distribution:

Distribution of building materials for professionals and general public

Packaging:

Glass bottles and jars

Today, GRINDING is one of the brands of Saint-Gobain, the world's leading abrasives manufacturer, the only international supplier of abrasives that manufactures each of the 3 major types of abrasives; Bonded Abrasives (resinoid and vitrified), Coated Abrasives, and Diamond products. This is supported by exceptional technology, complete and innovative product lines, an irrefutable reputation for quality and safety, and experienced, committed, passionate people. Saint-Gobain Abrasives takes time to understand and fulfil its evolving customer needs. This is reflected in its worldwide market leader status.

PERFECTION CAN ONLY COME FROM TECHNICAL EXPERTISE

Anyone who seeks perfection understands the importance of a thorough technical knowledge to successfully overcome any problems which may face him in his quest. It is because of our ever-increasing technical expertise that the wheels we produce are capable of working under the most extreme conditions. Each and every wheel from GRINDING is an example of the quality and precision achieved from many years experience together with extensive Technical and Marketing research. They are manufactured from the finest quality raw materials using the most advanced equipment available. The exclusive compositions of our wheels have been perfected over the years by our experts whose consistent aim has been three-fold: performance excellence, highest possible safety and maximum versatility. All our products are in strict compliance with current environmental and safety regulations. This brochure is a practical guide to the use of our wheels and intended for both the newcomer and the experienced user to obtain the best possible results with safety from our products. If you require further information or assistance GRINDING's Technical Service is always at your disposal.

When you choose GRINDING, you choose:

- Highly technical and safe product
- A complete product range
- Technical support and advice
- World-wide support
- Wide range of specifications for professional and individual users

Quality without compromise. The best raw materials (abrasive grits, resin, fibre glass, reinforcements) combined with the most advanced manufacturing equipment and a motivated technical team are the secret to GRINDING's excellence.



SAFETY, HEALTH AND ENVIRONMENT



The personal safety of workers using abrasive wheels is our primary concern. All GRINDING products are developed, manufactured and safety tested in accordance with the European standards. They also comply with the international standard of **oSa** (Organisation for the Safety of Abrasives), which pursues in close collaboration with **FEPA** (Federation of European Producers of Abrasives) the objective of supporting both, the currently attained safety standards and their further development.

Our responsibility to customers, particularly in the area of safety and comfort, is taken very seriously. Products are designed and produced to the most stringent quality standards to guarantee optimum personal safety and user comfort. Saint-Gobain Abrasives is an active member of both FEPA and oSa.

GRINDING products comply with all expectations of European health, safety and environmental standards.

FEPA, the Federation of European Producers of Abrasives, is dedicated to the promotion of safety in the use of abrasives and is actively involved in the preparation and implementation of the European (EN) and International Standards (ISO) for Abrasives and Grinding Machines.

oSa

In 2000, GRINDING and Saint-Gobain Abrasives were one of the founding members of the Organisation for the Safety of Abrasives (oSa). All member companies of oSa have to implement strict manufacturing, safety and quality standards that comply with the requirements of EN, and are regularly audited to ensure conformity. The oSa symbol displayed on an abrasive product is a further guarantee to the user of product safety and quality.

The internal testing and certification is based on the following standards:

- Safety requirements for bonded abrasive products (EN12413:2007)
- Safety requirements for coated abrasives (EN13743:2002)
- Safety requirements for diamond blades (EN13236:2010)

Thus the oSa symbol on the abrasive signifies enhanced application safety for the user, a reduced liability risk and excellent brand image for manufacturers, traders and those in marketing.

ISO9001, certifies Quality Management system is in accordance with requirements of quality standards.

ISO14001, certifies Environmental Management system is in accordance with requirements of environmental standards.

OHSAS18001, health and safety at work certification.



We are part of the World Class Manufacturing program of Saint-Gobain. Through a complete involvement of all employees, the principal is to review and organise all steps of our production in order to reach the manufacturing excellence standards set by the Group at world level. These very high standards cover safety, quality, production capacity and efficiency and service to our customers.

We aim at reaching manufacturing excellence, and to focus resources on operations that truly add value to our customers.

CUTTING-OFF AND GRINDING WHEELS



CUTTING-OFF AND GRINDING WHEELS

Cutting-off and grinding wheels are made from abrasive grains bonded together with synthetic resins and chemical fillers. They are multi-pointed cutting tools designed to remove chips from the workpiece. As the grain dulls, frictional heat rises, allowing the dulled grain to be released, exposing new cutting points.

CONSTRUCTION OF THE WHEEL

The wheel is made of abrasive grain (about 75%), resin bond (about 25%) reinforced with fibre glass.

The wheel characteristics are summarised in a single product specification.

EXPLANATION OF THE SPECIFICATION

A	24	R	B	F	41
Grain type	Grit size	Hardness	Bond type	Glass cloth	Shape
A	24	L	B	F	41
C	to	to			42
Z	60	Z			27
ZA					29

GRAIN TYPES:

A	Aluminium oxide
C	Silicon carbide
Z	Zirconia alumina

HARDNESS:

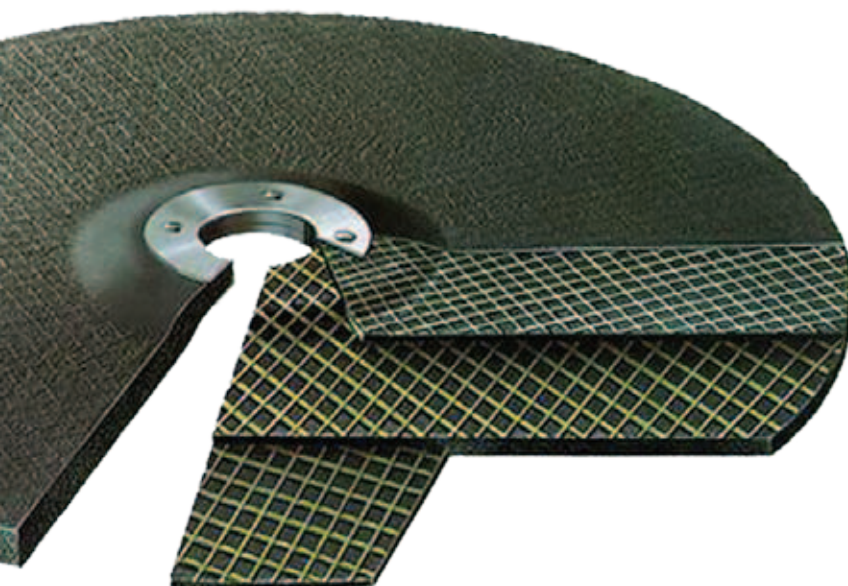
represented by a letter:

Soft: L, M, N and O

Medium: P, Q, R and S

Hard: T, U, V, X, Y and Z

Note: the hardness scale differs from one brand to the other.



DIFFERENT WHEEL CONSTRUCTIONS

CUTTING-OFF AND GRINDING WHEELS FOR PORTABLE MACHINES ≤ 230 MM

Cutting-off wheels

BF41 with 2 glass cloths

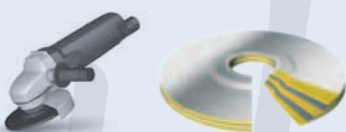


BF42 with 2 glass cloths



Grinding wheels

BF27 with 3 glass cloths



BF29 with 2 glass cloths

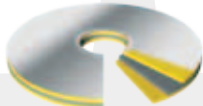


LARGE DIAMETER CUTTING-OFF WHEELS ≥ 250 MM

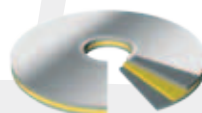
Chop saw machine



BF41 with
2 glass cloths
standard



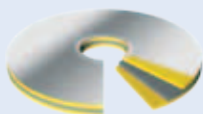
BF41 with
1 glass cloth (1RT)



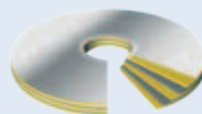
Petrol saw machine



BF41 with
2 glass cloths



BF41 with
3 glass cloths



Stationary machine



BF41 with
3 glass cloths



Glass cloth reinforcements are required in the construction of the wheel to allow heavy duty grinding and cutting operations.

It allows the wheels to withstand high stresses and helps to contain fragments if the wheels should fracture in use.



EXPLANATION OF THE GRIT SIZE

FEPA grit size = the number of grain aligned on one inch (25,4 mm)



FEPA grit size (Mesh)	Average grit size in μm
14	1470
16	1230
20	1040
22	885
24	745
30	625
36	525
40	438
46	370
54	310
60	260
70	218
80	185
90	154
100	129

Coarse

Fine

EXPLANATION OF GRAIN TYPES

Aluminium oxide (A)

Aluminium Oxide - Corundum - 95% Al_2O_3 - Macro crystalline

Also known as brown abrasive; tough and extremely hard, this is the most used abrasive mineral. It is particularly well adapted for grinding and cut-off applications on steel. It is produced from bauxite (80% Al_2O_3), purified in electric arc ovens and mixed with some carbon and iron powder. To increase its strength, some titanium oxide is also added.

Semi Friable Aluminium Oxide - 98% Al_2O_3 - Macro crystalline

Brown/ruby coloured abrasive, not as tough or as hard as regular brown abrasive, it allows easy grinding because it is more friable. It is produced from bauxite (80% Al_2O_3), purified in electric arc ovens and mixed with some carbon and iron powder. It is most suitable for grinding and cutting-off applications on high tensile materials.

Silicon carbide (C)

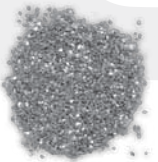
Silicon carbide - SiC - Macro crystalline

It is manufactured from silica (glass phase) and carbon powder. It is a bright black grain, harder and more brittle than aluminium oxide abrasives. Particularly effective on low tensile strength materials like cast iron and non-ferrous metals (bronze, brass, copper, titanium). It performs well on masonry, stone and concrete. Hard materials such as glass, and ceramics can be ground with silicon carbide.

Zirconia alumina (Z)

Zirconia alumina oxide - ZrO - Micro crystalline

It is a mix of aluminium and zirconium oxide, very efficient for high stock removal under high pressure. The grain fractures under pressure continuously exposing fresh sharp cutting surfaces. Because the grains remain sharp during the grinding process, the bond can hold the grains in the bond matrix longer, extending cut rate and wheel life. It performs well on stainless steel, alloyed steels, cast iron and bronze.



REINFORCEMENT

An important feature of the wheel is the glass reinforcement. GRINDING uses only the best quality glass cloths to allow the wheels to operate safely, at very high speeds and under ever-increasing working pressure.

The reinforcement cloths are woven fibre glass discs coated with the same type of resin used in the bond. Our job consists to optimise the wheel construction using different types of glass cloths, different mesh dimensions and thicknesses of the fibres.

The different types and weights of reinforcement cloths and their selection are based on:

1. No delamination of the wheel when the cloth is incorporated into the wheel during pressing
2. Improved bursting speed and bending resistance of the wheel
3. Highest resistance to extreme conditions and misuse

For more information please refer to EN12413:2007 version and the safety and quality section of this brochure.

RESINS & FILLERS

Resins

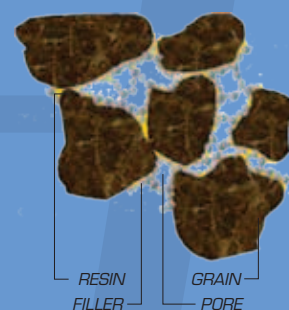
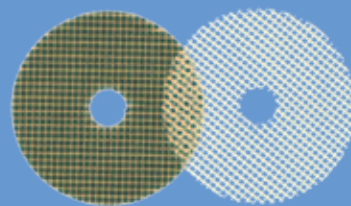
Resins, which represents about 25% of the formula, are organic and made from bakelite. Two different types are used: liquid and powder. Because these resins are organic, their properties change over time. This is why the wheels are stamped with an expiry date on the ring. The "stable" period during which the product can be used is three years from the production date.

Fillers

Fillers are additional elements which help in the manufacturing process and during the use of the wheel.

The main functions of the filler are:

- to reinforce the resin bond
- to prevent sticking of the wheels to the baking plates
- to reduce friction of the wheel with the workpiece (lubricating effect)
- to absorb grinding energy and decrease temperature



METAL BORE RING

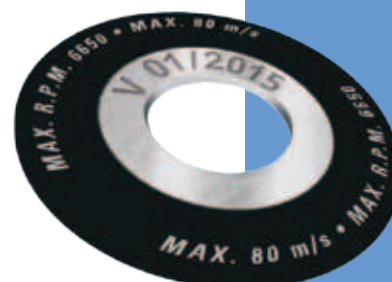
The metal ring has 3 functions:

- To indicate the validity date
- To centre the wheel on the machine spindle
- To protect the spindle of the machine from the abrasive

The validity date must be indicated on the wheel according to the European standard EN12413:2007.

Example: V01 / 2015

- V: stands for "Validity"
- V01: January, February, March
(You can use the wheel till the end of that quarter)
- V04: April, May, June
- V07: July, August, September
- V10: October, November, December
- 2015: is the year



GUIDE TO LABEL READING



- A** Label colour-coded according to application
- B** GRINDING trademark
- C** Application
- D** Coloured stripe indicating the allowed speed (red = 80m/s and green = 100m/s)
- E** Wheel dimension
- F** Safety pictograms
- G** oSa safety certification
- H** Technical specification
- I** Article number
- J** Barcode
- K** Made in the European Union (product origin)
- L** Maximum revolutions per minute and maximum operating speed

GUIDE TO BOX LABEL READING



- A** Application
- B** Dimensions
- C** Safety pictograms
- D** Technical specification
- E** Barcode
- F** Article number
- G** oSa safety certification
- H** Batch number

APPLICATION COLOUR CODES



BLACK - Steel



YELLOW - Stone



BLUE - Inox



SILVER - Alu

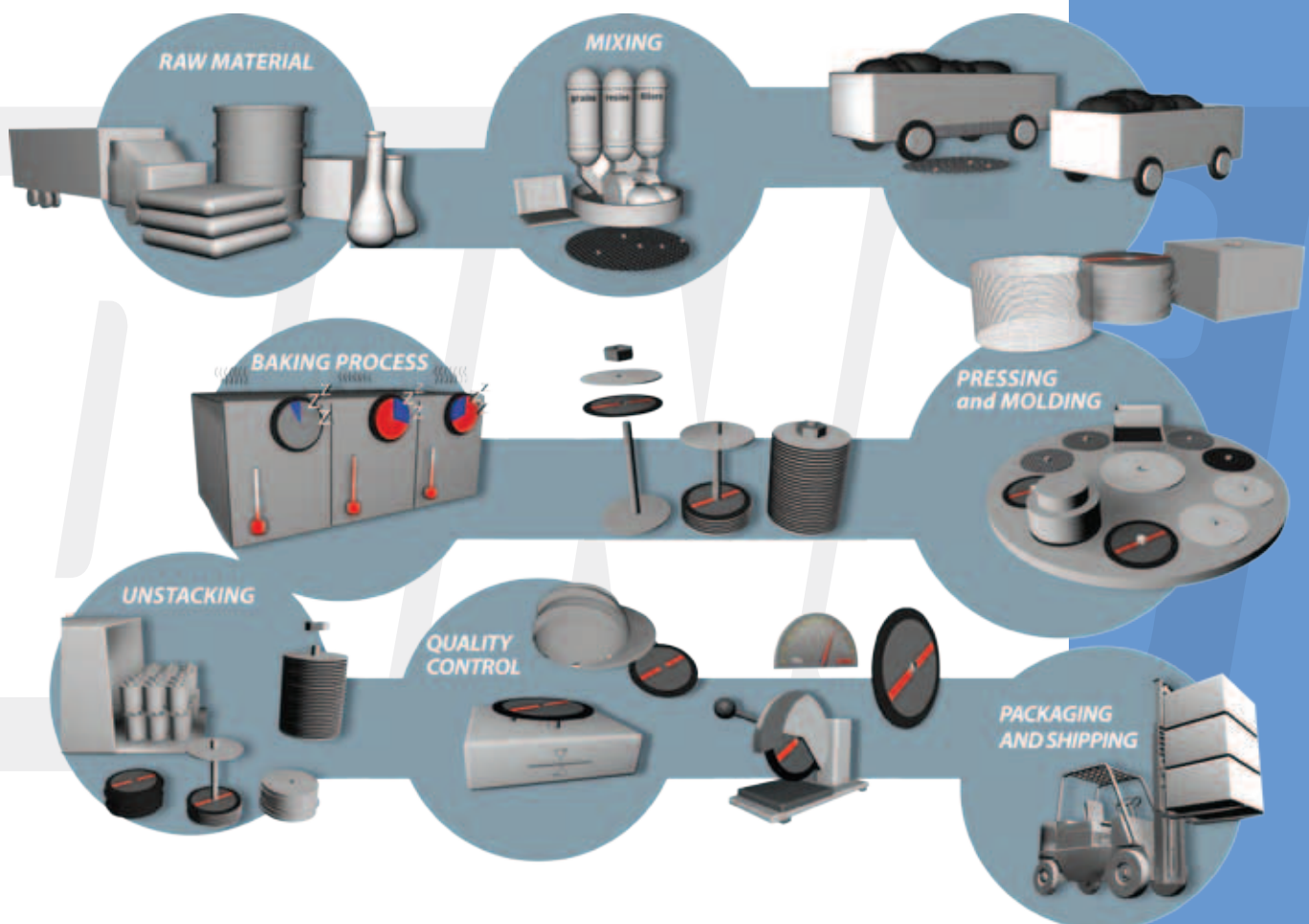


GREEN - Cast iron

PRODUCTION PROCESS

To obtain the best possible quality, only the most reliable and durable raw materials are selected for our products.

See our production process at a glance:



MIXING

The mixing stage is where quality starts. Mixing is computer controlled and each ingredient is automatically weighed. Abrasives are firstly blended together with liquid resin in a bowl. Then the mix is transferred into a second bowl where powder resin and various fillers are added.

PRESSING

Pressing is the operation where the abrasive mix, glass fibre reinforcing mesh, label and bore ring are put together. Product homogeneity, dimensional stability and low vibration characteristics in the wheels are highly dependant on the pressing stage. For this reason Saint-Gobain Abrasives is continuously investing in high-tech and automated pressing machines.



BAKING

Strongly clamped between metal plates, stacks of wheels are put into the oven for approximately 24 hours. This is the third critical step of the manufacturing process. By closely following the theoretical curve and computer controlled temperature system, Saint-Gobain Abrasives is constantly giving end-users the highest quality and consistency they request.



QUALITY CONTROL

1

The diameter, the thickness, the arbor hole dimension, the weight and the balance of the wheel are measured before and after baking.

2

The wheel performance is checked. Regular lab tests are carried out to verify that the wheels comply to the standards set.

3

The bursting speed is checked. (Maximum operating speed x safety factor)
For portable angle grinders - Diameter 50-125mm; $80 \text{ m/s} \times 1,73 = 138 \text{ m/s}$ (503 km/h)
For portable angle grinders - Diameter 150-230mm; $80 \text{ m/s} \times 1,87 = 150 \text{ m/s}$ (539 km/h)
For fixed cutting-off machines; $80 \text{ m/s} \times 1,41 = 113 \text{ m/s}$ (407 km/h)
For fixed cutting-off machines; $100 \text{ m/s} \times 1,41 = 141 \text{ m/s}$ (508 km/h)
For portable petrol saws ($\varnothing 300\text{mm}$); $80 \text{ m/s} \times 1,87 = 150 \text{ m/s}$ (539 km/h)
For portable petrol saws ($\varnothing 350\text{-}400\text{mm}$); $100 \text{ m/s} \times 1,87 = 187 \text{ m/s}$ (673 km/h)

For more information check table 4 of the latest version EN12413:2007



To ensure a constant performance, the wheels are tested on a regular basis either by robots or manually. Three parameters are commonly measured:

- 1 - **G - RATIO** $\hat{=}$ Life time. G - ratio $\hat{=}$ loss of material weight / loss of wheel weight
- 2 - **Material Removal Rate (MRR)** $\hat{=}$ Cutting speed. It is measured in a volume by time interval.
- 3 - **Energy absorbed** by the machine $\hat{=}$ Comfort

PACKAGING & LABELING



The boxes used to pack the wheels must ensure products are kept safe and intact during transportation and handling.

A sticker is applied to each box, which gives a description of the product and the fabrication number. If a problem occurs, this number can be used to trace the problem back to the manufacturing process.

RECOMMENDATION FOR USE

HANDLING:

Handle wheels with care and do not use wheels which show any sign of damage. Contact your supplier if you have any doubt.

STORAGE:

Ensure that the wheels are free from damage during transit and are stored and used on a strict "first in, first out" basis. Store the wheels in a dry and frost-free room, avoid wide variation in temperature and avoid wet surfaces.

MOUNTING:

Ensure that the spindle speed marked on the machine does not exceed the maximum operating speed marked on the wheel. Never modify the bore of the wheel and do not force the wheel onto the spindle. Ensure that there is no clearance between the bore and the spindle. Always use appropriate straight and recessed flanges having the same diameter and no damage or encrustations.

For flat and depressed centre wheels, the flange diameter should be as follows:

- 19mm** for wheels less than 100mm diameter, up to 10,00 mm bore
- 32mm** for wheels of 100mm diameter, over 10,00 mm and up to 16,00 mm bore
- 41mm** for wheels over 100mm and up to 230mm diameter with 22,23 mm bore

AWARENESS OF HAZARDS:

Be aware of the following hazards when grinding or cutting with abrasive wheels and take the necessary precautions explained to minimise the risk:

- bodily contact with the rotating wheel
- wheel breakage
- grinding debris, dust, fumes and mists
- vibration
- noise

GUARDS:

Guards are supplied with the grinding machine and must not be modified or removed.

They must be capable of catching broken wheel fragments effectively and capable of withstanding the impact caused by wheel breakage.

The guard must at least cover half of the wheel to ensure maximum protection. Only the part of the wheel required for the grinding operations is to be left unprotected.

TRIAL RUN:

Before any cutting or grinding operation, each wheel must run for at least 30 seconds at its full operating speed.

WORKPLACE CONDITIONS:

A clean and tidy working environment will make the work safer. Adequate working space, good lighting and heating should be considered.

PERSONAL PROTECTION:

Safety goggles, ear defenders, safety gloves, dust masks and, if conditions are severe, additional face protection must be worn, as well as leather aprons and safety shoes.



Wear ear protection



Wear eye protection



Wear a dust mask



Wear gloves



Read the instructions



Do not use for side grinding



Do not use a damaged wheel

GENERAL PRECAUTIONS

Safety instructions provided by the machine manufacturers must be followed. Where fitted, all guards, covers and hoods must be in place, and should not be modified in any way. Abrasives should not be used near inflammable material or in an environment where there is a risk of explosion. Sparks should be directed away from the face and body, if possible towards the floor. Dust extraction equipment must be used whenever it is available. The instructions for use given by the abrasive manufacturer must be followed e.g. 'Not to be used without a support'. The workpiece must be firmly fixed before starting work. Check all wheels visually before use and make certain that the product is suitable for the application. No modifications should be made to abrasive products after delivery. When using a portable grinder always switch it off and allow the machine to stop completely before putting the tool down.

RECOMMENDED PRACTICE



PORTABLE GRINDING

Grinding Rough Work

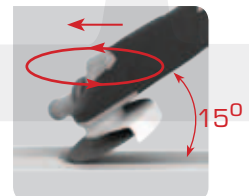
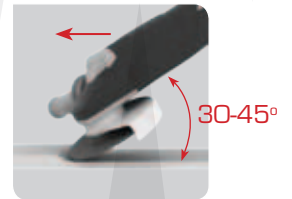
Do not use a cutting-off wheel for fettling/grinding

Do not work with the side of a wheel

Work at a constant angle of between 30 and 45 degrees; move the angle grinder back and forth to minimise the build up of heat

Grinding Finishing Work

Work at a constant angle between 15 and 30 degrees
Rotary action



PORTABLE CUTTING-OFF

Arrange the workpiece so that a uniform section can be cut



NO



YES



NO



YES



PRODUCTIVITY AND EFFICIENCY

When the rotating wheel is brought into contact with the workpiece, each abrasive grain acts as a small cutting tool and produces chips of the material being ground.

This occurs for each grain in contact with the work for every revolution of the wheel. Eventually, the abrasive grain wears and becomes blunt and in this condition, no longer cuts into the workpiece. This results in frictional heat which in turn causes thermal degradation of the bond around the blunt abrasive, causing it to fall out of the wheel. This process continues during cutting/grinding, consuming the wheel as metal is removed and the wheel is said to be "self-dressing".

With soft grade wheels, very little pressure is required for grinding and the wheel is said to be "free-cutting". However, the wheel wears out fast and may not give a good economical performance. Very hard wheels require higher applied pressures to make them perform but if they are too hard the bond will not release the blunt

abrasive quickly enough and the wheel will glaze and burn the workpiece. It is therefore necessary to select a wheel hardness which gives an acceptable balance of freedom of cut and metal removal rate.

The wheel hardness must be selected according to the application and material hardness. A hard grade wheel is recommended for softer materials, the sharpening and grinding of edges and the cutting of small sections, and a soft wheel for the hard materials, grinding of flat surfaces and for cutting-off large sections. The main factor in wheel selection therefore is the area or type of grinding contact; softer wheels and coarser grits for large areas of contact (see fig. 1), harder wheels and finer grits for small ones (see fig. 2).

Note that: harder wheels have a longer life and softer wheels have a faster cut.



fig. 1



fig. 2

HARDNESS & APPLICATIONS

K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
					Cut off of hard materials										
			Cut off of loading materials						Cut off of soft materials						
			Grinding of hard materials												
								Grinding of soft materials							
		Grinding of loading materials													

SIMPLY A BETTER DEAL

We understand that to maintain the competitive advantage in tough economic times the productivity has to be higher than ever before. GRINDING grinding and cutting-off wheels are most effective in material removal and lifetime. You can save time and money in your production process. Do the same job in less time using less wheels. Fewer wheels need to be de-mounted than with competitor wheels.

The performance difference between GRINDING wheels and competitor wheels lead to a much better all over operational price/performance ratio. Effectiveness is your benefit with GRINDING abrasives.

Please contact us for more information about an in-house application test or a dedicated calculation on your specific usage and production situation. More savings, better performances!

OPERATING SPEEDS

GRINDING products are designed and tested for certain applications and operating speeds. Choose a wheel suitable for the application material. Suitable materials are indicated on the wheel label. Before mounting the grinding or cutting-off wheel on the machine, ensure that the operating speed of the machine does not exceed the maximum operating speed as it is marked on the product.

WHEEL DIAMETER (mm)	MAXIMUM OPERATING SPEED (RPM)	
	80 m/s	100 m/s
50	30600	
63	24300	
76	20150	
80	19100	
85	18000	
100	15300	
115	13300	
125	12250	
150	10200	
180	8500	
200	7650	
230	6650	
250/254	6150	
300/305	5100	6400
350/356	4400	5500
400/406	3850	4800
450/457	3400	4250
500/508	3100	3850

SAFETY RECOMMENDATIONS FOR THE USE OF CUTTING-OFF AND GRINDING WHEELS

Always

- Read the safety instructions provided by the machine and wheel manufacturer
- Keep the working area well lit, clean, tidy and free from obstructions
- Avoid slippery and uneven floors and do not work on ice or snow
- Ensure other workers in the vicinity and passers-by are protected from sparks and debris
- Handle wheels with great care, grinding wheels are very fragile and can be easily damaged
- Store wheels in dry and frost-free conditions avoiding wide variations in temperature and the risk of damage
- Visually check the wheel for damage or defects and conduct a ring test before mounting
- Ensure that the wheel is suitable for its intended use and that the markings are intact and legible
- Use the correct tools when mounting or removing a wheel
- Ensure mounting flanges are in matched pairs, clean, free from burrs and undistorted
- Use blotters to prevent wheel slippage where supplied by the wheel manufacturer
- Ensure that workrests and clamping devices are secure and properly adjusted
- Ensure guards are in position and correctly adjusted so that they do not foul the wheel
- Rotate the wheel manually to ensure that it runs true and freely before turning on the power
- Wear the appropriate personal protective equipment at all times
- Conduct a trial run, standing clear of the machine before using the wheel
- Dress wheel frequently to remove uneven wear and ensure that it is cutting correctly
- Allow the wheel to come to rest naturally after turning off the machine
- Ensure the workpiece is properly supported or clamped so that it cannot move during grinding or cutting
- Spin out residual coolant from the wheel before turning off the machine
- Report wheel breakages, keeping hold of all of the debris for examination
- Ensure machine spindle speed is checked periodically using a tachometer
- Ensure that damaged or defective wheels and worn-out wheels are destroyed to prevent them from being used
- Ensure that the wheel is removed before transporting or storing portable machines

Never

- Allow untrained persons to handle, store, mount or use abrasive wheels
- Mount or remove a wheel until the machine has been isolated from its power source
- Mount a wheel that cannot be identified or one which does not bear the correct marking
- Mount a wheel on a machine which does not display its spindle speed
- Mount a wheel which is beyond its marked expiry date or recommended shelf life
- Mount a wheel that has been dropped or damaged or one that has not been stored correctly
- Force the wheel to fit on the mounting device or modify the bore size
- Tighten flanges with excessive force or use a hammer or extension
- Use damaged, distorted or dirty flanges and fastening screws
- Use a machine which is not in good condition or one with a damaged guard
- Start the machine until the wheel guard is in place and fastened securely
- Stand directly in front of a grinding wheel whenever the machine is started after mounting a wheel
- Start the wheel in contact with the workpiece or any other object
- Exceed the maximum operating speed marked on the wheel
- Never work from a ladder or in a position where you do not have full control of the machine
- Apply excessive shock or pressure to the wheel or allow it to overheat
- Grind on the side of a wheel which is not designed for the operation
- Never apply side pressure by trying to cut curves or by grinding surfaces with cutting-off wheels
- Allow the wheel to bounce or be trapped or pinched in the cut
- Never use type 27 depressed centre grinding wheels at a shallow angle or try to cut with them
- Dress the wheel with any device other than that recommended
- Stop the wheel by applying force to the wheel or put down a machine until the wheel has stopped running
- Wear the wheel down to the mounting flanges or beyond the correct adjustment of the workrests
- Allow coolant to run on a stationary wheel or leave the wheel running on an unattended machine

To minimise accidents due to unsafe abrasives only use products bearing the osa® logo

Organization for the Safety of Abrasives **OSA**

GRINDING

TROUBLESHOOTING

CUTTING-OFF WHEELS

WHEEL DOES NOT CUT

Cause	In case of blue cutting: wheel too hard or too thick
Solution	Use softer or thin cutting wheels
Cause	Peripheral speed too low
Solution	Increase rpm up to maximal allowed operating speed

EXCESSIVE WEAR

Cause	In case of white cutting edge: wheel too soft
Solution	Use a harder wheel
Cause	Operating speed too low
Solution	Increase rpm up to maximal allowed operating speed
Cause	Decrease of rpm during cutting
Solution	Use a machine with more power, reduce pressure on the machine

CRUMBLD WHEEL EDGE

Cause	Cutting-off wheel used for grinding operations
Solution	Use a grinding wheel for a grinding operation
Cause	Workpiece is moving
Solution	Clamp the workpiece properly
Cause	Too much side-pressure
Solution	Apply only a radial pressure to the wheel

ARBOUR HOLE OR CENTRE BREAK OUT

Cause	The wheel gets stucked in the workpiece/material
Solution	Use more radial pressure & swing the wheel forwards and backwards
Cause	Cutting-off wheel used for grinding operations
Solution	Use a grinding wheel for a grinding operation
Cause	Too much side pressure
Solution	Apply only a radial pressure to the wheel
Cause	Different diameter top/bottom flange
Solution	Use flanges with the same diameter

GRINDING WHEELS

WHEEL DOES NOT GRIND

Cause	Wheel too hard, wheel glazing
Solution	Use a softer wheel
Cause	Not enough pressure
Solution	Increase pressure
Cause	Machine power too low
Solution	Use a machine with more power
Cause	Loading & wheel glazing (non-ferrous metals)
Solution	Use the GRINDING Alu wheels which counteract loading & wheel glazing

EXCESSIVE WHEEL WEAR

Cause	Wheel too soft
Solution	Use a harder wheel
Cause	Too much pressure
Solution	Reduce pressure, let the wheel do the grinding
Cause	Decrease of the peripheral speed
Solution	Use a machine with more power, reduce pressure on the machine
Cause	Too low peripheral speed
Solution	Use the maximum allowed operating speed

CRUMBLED WHEEL EDGE

Cause	Grinding angle too flat
Solution	Change angle to 30-45 degrees
Cause	Workpiece is moving
Solution	Clamp the workpiece properly
Cause	Too much pressure
Solution	Reduce pressure, let the wheel do the grinding

CRACKS ON THE BOTTOM OF THE WHEEL

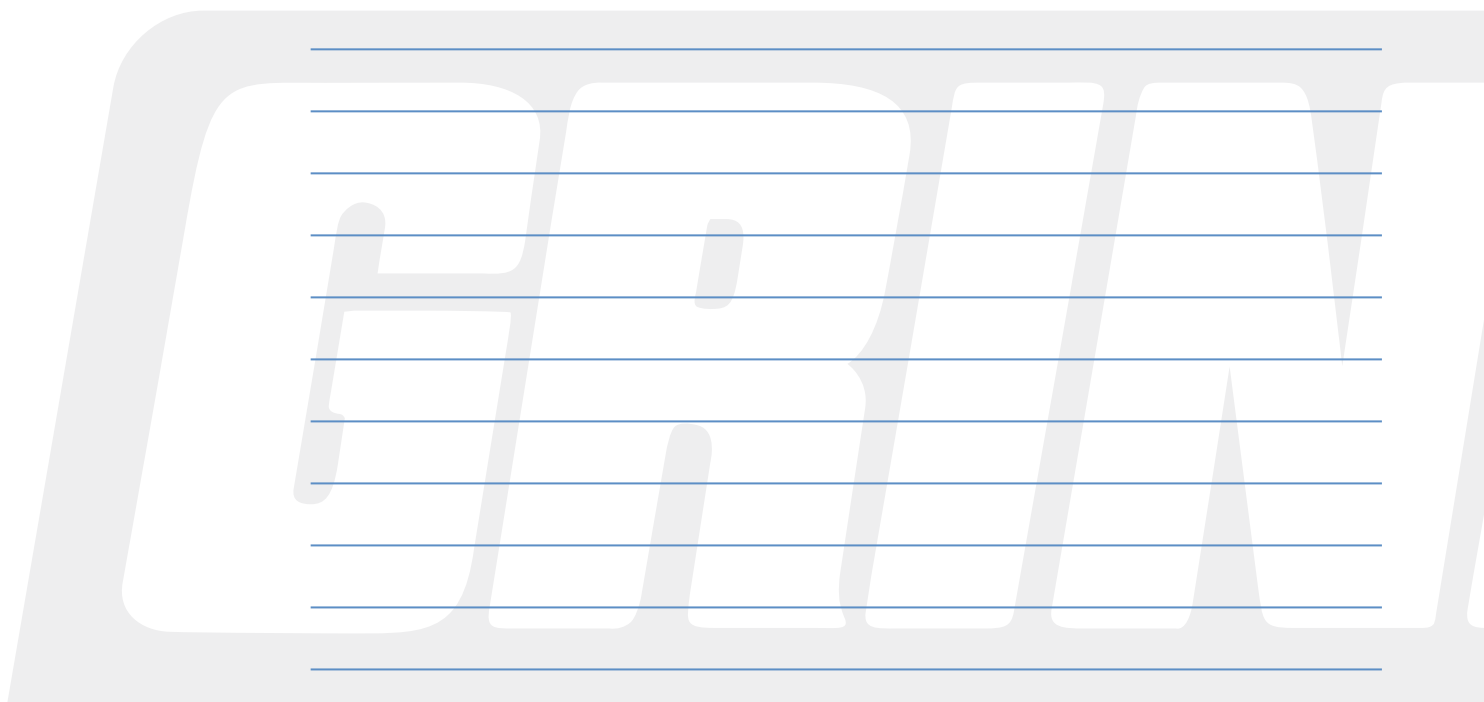
Cause	Contact area too large
Solution	Reduce the contact area
Cause	Too much pressure
Solution	Reduce pressure, let the wheel do the grinding

UNBALANCE

Cause	Dirty flanges
Solution	Clean the flanges
Cause	Wheel mounting insecure
Solution	Tighten the flanges
Cause	Flanges with different diameter
Solution	Replace the flanges



Handwriting practice lines consisting of five horizontal blue lines.



Handwriting practice lines consisting of ten horizontal blue lines.

DIAMOND PRODUCTS

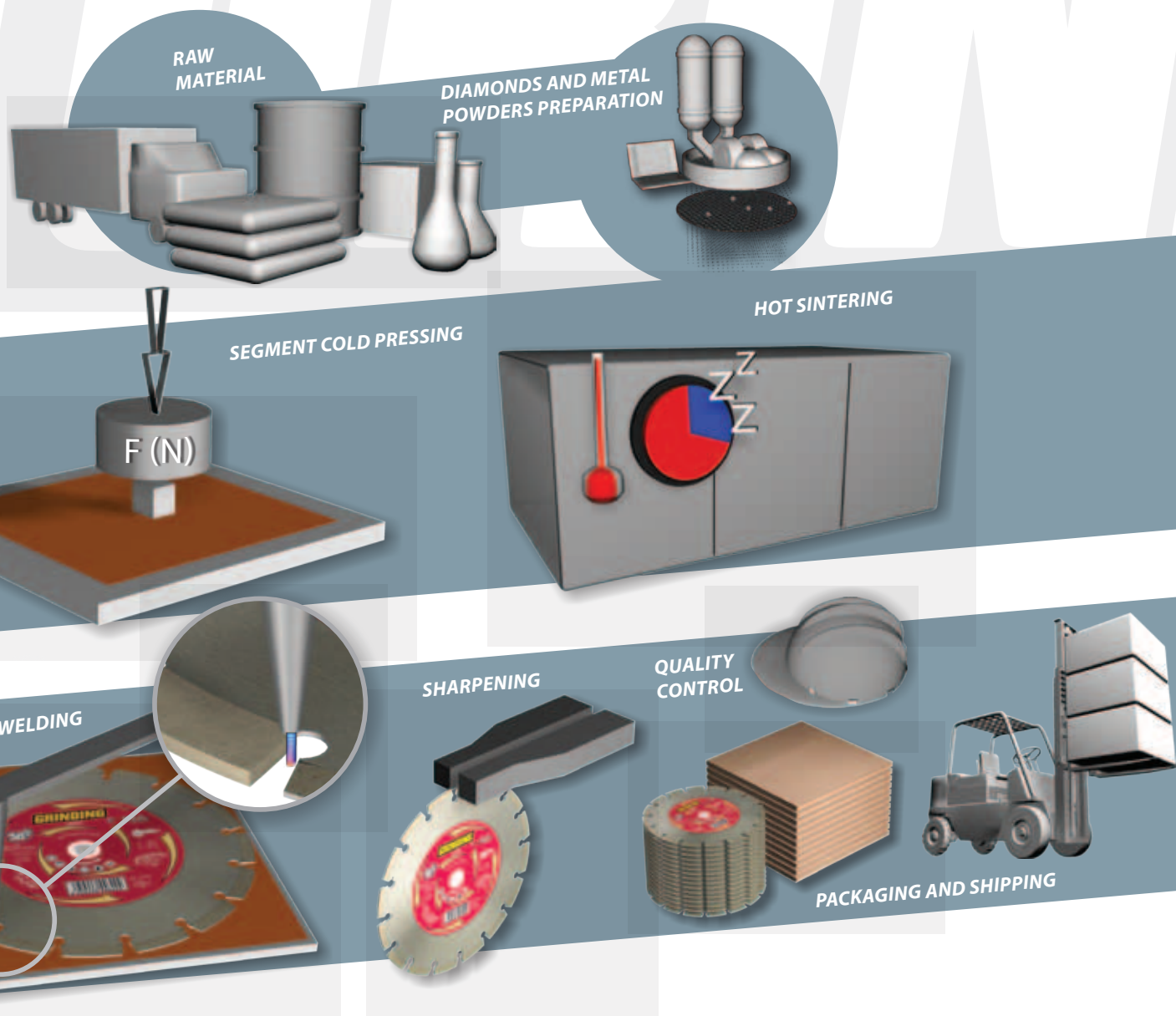


DIAMOND BLADES

GRINDING offers a complete range of sintered and laser-welded diamond blades, with continuous or segmented rim, for wet or dry professional cutting. The blades are designed for a wide range of construction materials such as: granite and marble, ceramic and clay tiles, asphalt, reinforced concrete, bricks and concrete. GRINDING diamond blades are designed to withstand difficult working conditions and meet professional needs, both in terms of performances and safety. It results in outstanding, consistent, best price/performance products.

We are strongly committed to quality and service to our customers. Our proximity to the market is critical in our strategy to launch innovation and technical solutions above the market standards.

PRODUCTION PROCESS - LASER WELDED BLADES

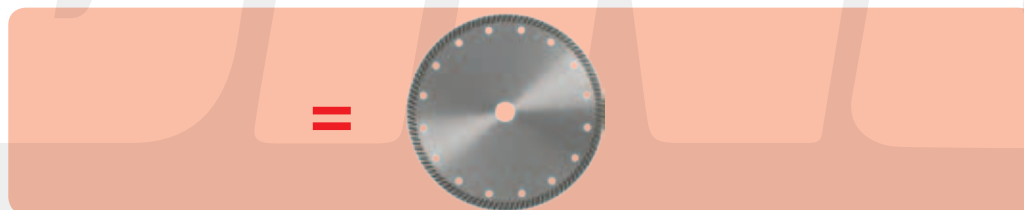
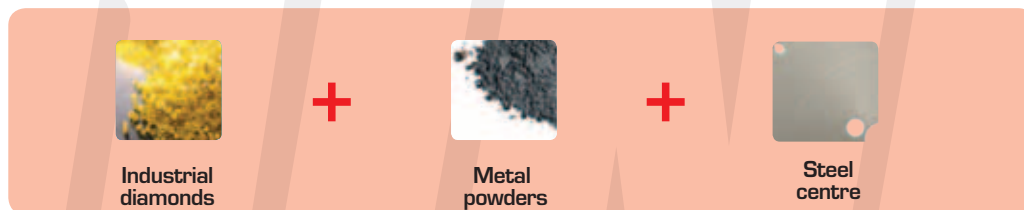


COMPONENTS OF THE DIAMOND BLADE

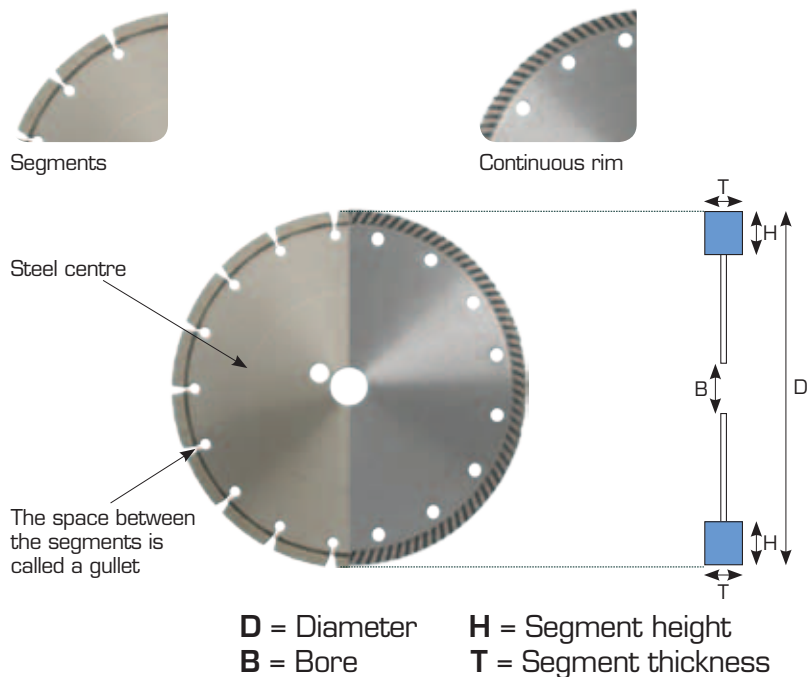
1. LASER-WELDED DIAMOND BLADES



2. SINTERED DIAMOND BLADES

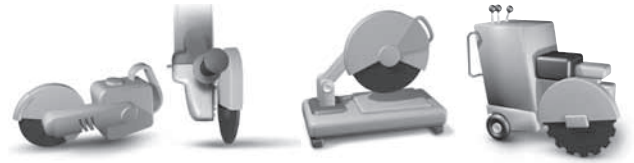
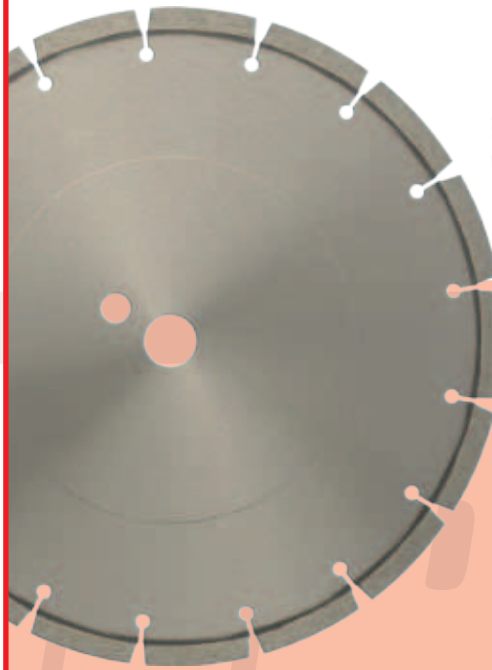


TWO TYPES OF DIAMOND BLADES



WHICH GEOMETRIES FOR WHICH APPLICATION?

SEGMENTED - NARROW GULLET



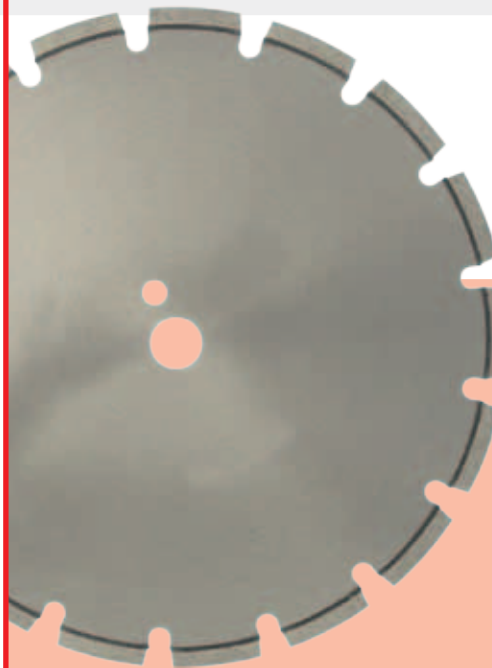
Applications:

Building materials, reinforced concrete, bricks and granite.
Medium to hard materials (e.g. stone, concrete)

Benefits:

- Evacuation of small particles
- Easy cut (comfort)
- Fast cutting

SEGMENTED - TYPE WIDE GULLET



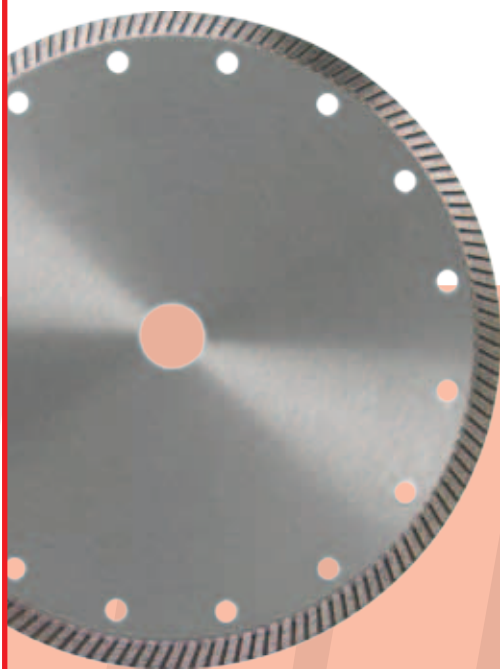
Applications:

Asphalt, green concrete and abrasive materials.

Benefits:

- Evacuation of coarse particles
- Fast cut
- Reduced wear of the steel centre

JET / TURBO TYPE

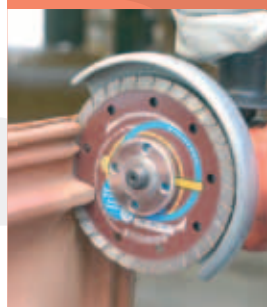


Applications:

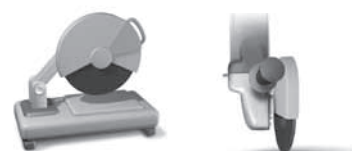
Building materials, tiles, roof tiles, bricks, concrete, marble and granite.

Benefits:

- Smooth and fast cutting
- Easy cut (comfort)
- Quality cut



CONTINUOUS RIM TYPE



Applications:

Hard tiles, clay tiles, single baked and double baked ceramic tiles, natural stone, gres and friable materials.

Benefits:

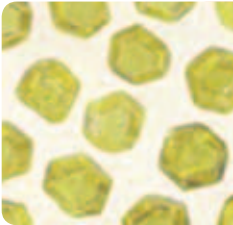
- Smooth and precise cutting
- Easy cut (comfort)
- Quality cut



HIGH QUALITY PERFORMANCE FOR CONSISTENCY

DIAMONDS

Selecting the right diamond quality ensures the best cutting performance and product life. We differentiate industrial and natural diamonds.



Industrial diamonds of the best grades have a sharp and regular shape, and constant characteristics.

The industrial diamonds that we use in our production ensure consistent performances and cutting speeds.



Natural diamonds or low grade industrial diamonds have irregular shapes, and their hardness and resistance to wear may vary greatly.

METAL BOND

The metal bond of the segments must be adapted to the hardness of the material to cut, and to the application (machine type, power...).

The diamonds are mixed with various metal powders, which form the metal bond during the hot sintering.

The composition of the metal bond mix depends on the machine application and power, and on the materials to be cut.

For instance, hard metal powders like titanium carbide are used to harden the metal bond and provide a longer product life in abrasive materials. Softer metals like copper are used in specifications for cutting hard materials, to allow the self-sharpening of the diamond blade.



Titanium carbide



Iron



Copper

The diamond grit size influences greatly the comfort, cutting speed and finishing quality. Smaller diamonds are required for hard materials, to ensure a smoother cut and to keep the diamond blade sharp, while larger diamonds can be used in abrasive materials to allow for a faster cutting speed.

Industrial diamonds can be manufactured in several quality grades. Premium quality diamonds have more regular shapes, better consistency, more aggressive cutting behaviour and better resistance to wear.

GUIDE TO LABEL READING



A GRINDING trademark

F Barcode

B Use wet or dry

G Blade dimensions

C Maximum revolutions per minute and maximum operating speed

H Sense of rotation arrow

D Safety pictograms

I Laser engraving, product type and code

E Safety certifications

J Application

APPLICATION COLOUR CODES



RED -
Building materials



YELLOW -
Hard concretes
(technical
applications)



GREEN -
Ceramic, stones
& Tiles

GRINDING

TROUBLESHOOTING DIAMOND PRODUCTS

PREMATURE WEAR OF STEEL CENTRE

Steel centre wears away faster than the diamond segment (Highly abrasive particles are being generated during cutting)	If material cut is very abrasive, wear-retardant cores should be used. Use sufficient water to flush the abrasive dust out of the cut.
1. Brazed protection segment	Caution: Wear-retardant cores are not always the final answer to eliminate undercutting. Blades should be inspected periodically during use.
2. Double height segment	
3. Slant segment	

STEEL CENTRE WARPAGE

Blade core has been overheated	Provide proper amount of water to both sides of the blade. Check to make sure water pump is producing sufficient water and that no blockage occurs in water lines.
Blade core has been overheated as a result of blade spinning on spindle	Check spindle and arbour hole for damage. Tighten spindle nut and make certain that the drive pin is functioning on floor saws.
Blade core has been overheated because of blade core rubbing side of material being cut	Properly align machine to allow straight cutting. Avoid twisting the blade in cut. Maintain a strong grip on saw. Make certain that spindle RPM is correct so that blade operates at its recommended speed.
Unequal pressure on flanges	Flanges should be identical in diameter and of the recommended size.
Machine spindle RPM does not match blade RPM	Use blade with proper RPM to match machine spindle RPM

BLADE IS WOBBLING

Blade mounted on a damaged or worn machine	Check for damaged or worn out bearings, bent or worn out blade spindle. Also check flanges to make sure they are clean, flat, and of the manufacturer's recommended diameter.
Blade being run at improper operating speed (RPM)	Make sure that the spindle is turning at the proper RPM to match the recommended speed of the blades. Use a tachometer to make certain the machine spindle is set at the proper operating speed.
Blade bent	Stop using this blade.

BLADE WORN OUT-OF-ROUND

Worn out spindle bearings on floor saws or handheld saws	Install new spindle bearings or spindle as required.
Engine not properly tuned on floor saws or handheld saws	Tune engine.
Blade arbor hole damaged from previous incorrect mounting	Contact blade manufacturer.
Machine spindle worn out. A groove may have been scored on the spindle as a result of previous blade spinning on the spindle.	Replace worn out spindle.
Blade slipping on spindle.	Tighten spindle nut on the machine. Make certain the drive pin is functioning where supplied. Use proper blade specification.

ARBOUR HOLE OUT-OF-ROUND

Flanges are not properly tightened, causing blade to either rotate or vibrate on spindle.	Wrench-tighten spindle nut to make certain blade is adequately secured to prevent rotation on spindle.
Worn out, bent or dirty flanges which do not allow proper blade clamping.	Clean or replace flanges, make sure they are not worn out, and tighten spindle nut properly.
Blade not properly mounted.	Ensure that the blade is mounted on the proper diameter of spindle before tightening spindle nut. Ensure pin hole slides over drive pin.

UNEVEN SEGMENT WEAR

Insufficient water flow, generally on one side of the blade, which reduces side clearance.	Flush water system. Make certain that water is being adequately and equally distributed to both sides of the blade.
Saw head misaligned.	Replace bad bearings, worn out machine spindle or realign spindle. On concrete saws, ensure the engine runs smoothly, to prevent harmonic vibrations, which in turn cause the blade to pound on a regular cycle basis.
Blade not properly mounted.	Check saw head alignment both vertically and horizontally.



SHORT BLADE LIFE

Using the wrong blade on a specific material.	Use the proper blade specification, as recommended by the manufacturer, depending on your machine power and the hardness and type of aggregate cut.
Bad spindle bearings, worn blade arbor or misaligned machine spindle.	Replace defective parts.
Loss of power, resulting from loose drive belts or improper voltage.	See instruction manual for proper belt tightening, replace worn out belts, make sure proper line voltage is being supplied to the motor.
Inadequate water flow to the blade	Make sure water hoses are clean and free from any blockages. Ensure correct water flow based on blade diameter (see chart on previous page).
Power of the machine is too high for the specification	Refer to the application chart to define the proper specification to be used based on the power of your saw.

BLADE WILL NOT CUT

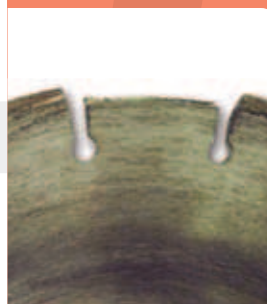
Blade is too hard for the material being cut (Improper blade specification).	Refer to blade application chart for the proper blade specification based on the type and hardness of the aggregate.
Blade has glazed over, probably as a result of being used on a too hard material	Sharpen the blade by cutting softer abrasive material to expose diamonds. If continual sharpening is required, this would indicate that the blade specification is too hard for the material being cut.
Insufficient power to allow blade to cut properly	Tighten belts in accordance with machine maintenance instructions, use correct voltage at motor and/or use adequate horse-power for cutting application.
Failure to initially break in new blade on specific material being cut.	Allow blade to sharpen itself on the material to be cut when first placing it on the saw. This is the proper way to break in a blade. Do not force the blade into the cut as this will generally worsen the problem.

SEGMENT LOSS

The material and/or saw was not held firmly, which caused the blade to twist or jam in the cut.	Hold material or saw firmly.
Not sawing in a straight line with overcorrecting caused the blade to twist or jam in the cut.	Properly align saw to allow straight cutting, avoid twisting the blade in the cut.
Defective flanges which cause the blade to flutter in the cut or fail to properly support the blade in perfect alignment.	Clean foreign material from flange surfaces, or replace flanges if they are under manufacturer's recommended diameter or are bent or deformed.
Steel centre is worn thin as a result of undercutting by abrasive particles generated during cutting.	With very abrasive aggregates, wear-resistant cores should be used to prevent undercutting. Blades must be inspected periodically during use. Use sufficient water to flush the abrasive dust out of the cut.
Blade is too hard for material being cut causing the segment to glaze over. The segment separated due to impacts or fatigue.	Use the proper blade specification for the material being cut.
Overheating due to inadequate supply of coolant (water or air). This usually comes with wheel colorations on the core in the area of segment loss. Overheating of blades may cause core cracks or segment loss.	Wet cutting – provide adequate water flow on both sides of the blade. Look for line blockages. On concrete saws, temporary loss of water can result from equipment running over water feed hoses. Dry cutting – periodically allow blades to run out of the cut. The blade will cool in a few seconds so that sawing may continue.
Inadequate water flow to the blade	Make sure water hoses are clean and free from any blockages. Ensure correct water flow based on blade diameter.
Power of the machine is too high for the specification	Refer to the application chart to define the proper specification to be used based on the power of your saw.

CRACKS IN SEGMENT

Blade is too hard for material being cut.	Use blade with softer bond.
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Always

- Observe the safety recommendations of the machine and diamond tool manufacturer.
- Exercise care when handling diamond tools.
- Keep the working area well lit, clean and tidy. Avoid slippery and uneven floors and ice or snow.
- Ensure other workers in the vicinity and passers-by are protected from sparks and debris.
- Store diamond tools on a full, flat surface, hung on a peg or in suitably constructed racks. Lightly lubricate to prevent rusting.
- Visually check the diamond tool for damage such as core cracks and missing or deformed segments.
- Check that the diamond tool is suitable for the application and that the markings are intact and legible.
- Use the correct tools at all times when mounting or removing a diamond tool.
- Observe direction of run markings.
- Ensure mounting flanges are in matched pairs, clean, free from burrs and undistorted.
- Ensure an adequate coolant supply to both sides of the diamond tool if cutting wet.
- Ensure that the workpiece is secure and cannot move whilst being cut.
- Ensure guards are in position and correctly adjusted so that they do not foul the diamond tool.
- Rotate the diamond tool manually to ensure that it runs true and freely before turning on the power.
- Wear suitable protective clothing.
- Observe the operating speed recommended by the diamond tool or machine manufacturer.
- Run the diamond tool for at least 30 seconds at maximum operating speed after mounting or re-mounting diamond tools.
- Ensure the diamond tool is running true and without vibration. Check frequently for undercutting or loss of tension.
- Allow the diamond tool to come to rest naturally after turning off the machine.
- Ensure machine spindle speed is checked periodically using a tachometer.
- Ensure that the diamond tool is removed before transporting or storing portable and mobile machines.
- Be aware of the possible risks when using diamond tools, especially cutting debris, sparks, fumes, dust, noise, vibrations...

Never

- Permit untrained people to handle, store, mount or use diamond tools.
- Mount or remove a diamond tool until the machine has been isolated from its power source.
- Mount a diamond tool that cannot be identified or one which does not bear the correct marking.
- Mount a diamond tool on a machine running at a speed higher than the maximum operating speed of the diamond tool or mount on a machine which does not bear its spindle speed.
- Use diamond tools for cutting metal unless specifically designed to do so.
- Mount a diamond tool that has been dropped, damaged or incorrectly stored.
- Apply force to fit the diamond tool on the mounting device, fit diamond tools with oversized bores or alter the bore size.
- Use drive pins or blotters to prevent slippage on hand-held diamond tools (risk of blockage).
- Tighten flanges with excessive force or use a hammer or extension.
- Use damaged, distorted or dirty flanges and fastening screws.
- Use a machine which is not in good condition or one with a damaged guard.
- Turn on the machine until the wheel guard has been re-fitted, secured and adjusted correctly.
- Stand in the line of the diamond tool when starting the motor after fitting or re-fitting a diamond tool.
- Start the diamond tool in contact with the workpiece or any other object.
- Work from a ladder or in a position where you do not have full control of the machine.
- Force the diamond tool to cut or allow it to overheat.
- Try to cut curves, turn in the cut or grind with a diamond tool that is not designed to do so.
- Allow the diamond tool to bounce or be trapped or pinched in the cut.
- Press against the diamond tool surface to stop it or put down a machine until the diamond tool has stopped running.
- Leave the coolant running on a stationary diamond tool or leave the diamond tool running on an unattended machine.
- Re-tip diamond tools which are not suitable for this.
- Use diamond tools for dry cutting on hand-held machines, unless specifically authorised.

To minimise accidents due to unsafe abrasives only use products bearing the oSa® logo



COATED ABRASIVE PRODUCTS

FLAP DISCS

GRINDING offers to professional users a complete range of flap discs, with nylon or fibreglass backings. The discs are made of high quality abrasive cloth and are available in flat or conical shape to allow working on flat as well as on round surfaces.

GRINDING flap discs ensure high stock removal, long life and good performance. The range of available grits is wide enough to cover all possible grinding requirements, from the finest to the roughest.



ADVANTAGES:

- High stock-removal
- Comfortable to work with
- High performance
- Long life
- Lower dust emission
- Reduced vibration
- Reduced noise

COMPONENTS OF A FLAP DISCS

ABRASIVE TYPES

The ideal abrasive grain offers maximum resistance to point wear, yet fractures before serious dulling occurs, thereby satisfying both stock removal and finishing requirements.



ALUMINIUM OXIDE

is a tough and well adapted abrasive to grind high tensile materials, such as carbon steel and alloy steels. Wherever toughness (ability to resist fracturing) is the main consideration, aluminium oxide outperforms all other abrasive grains.



ZIRCONIA ALUMINA









has a unique self-sharpening characteristic which gives it long life on difficult to grind materials, steel and stainless steel in particular. Zirconia alumina is well suited for heavy grinding of all kind of metals, as the controlled fracturing of the grain continuously produces sharp, new abrading points.



CERAMIC

aluminium oxide is a tough and dense abrasive due to its micro structure. The extremely small micron sized particles break off during grinding, producing multiple new cutting edges. As it stays sharp, especially when used in medium and high pressure operations, it cuts at a higher rate than other abrasives. It is recommended for use on forged and carbon steels, stainless steels, high nickel and cobalt alloys. To improve performances ceramic grain coated abrasives can be treated with a "Supersize" coating, an active cooling agent for easy cutting and increased productivity.

BACKING-PAD TYPES

PLASTIC - FLAT	DL- P FLAT	Flap discs with a flat plastic backing pad			
FIBRE - FLAT	DL- F Flat	Flap discs with a flat fibre backing pad			
FIBRE - CONICAL	DL- F Conical	Flap discs with conical fibre backing-pad			

ADVANTAGES

A plastic backing-pad is soft, very comfortable for a use on contoured parts.

A fibre glass backing-pad can offer a higher aggressiveness since it is stiffer.

SHAPE TYPES



Flat

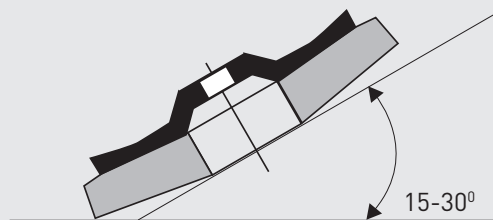


Conical

The incidence angle between the machine and the surface has to be adapted to the shape of the flap disc used. Each flap disc shape is will work best for the following applications:



- used primarily on flat surfaces
- best for blending and smoothing



- optimal for contoured surfaces and edge grinding
- greater stock removal on flat surfaces
- best for heavy stock removal

FLAP DISC DENSITY



MAXI

High density
Heavy duty applications (long life)

STD

Standard density
All types of industrial applications

ECO

Medium density
Value for money

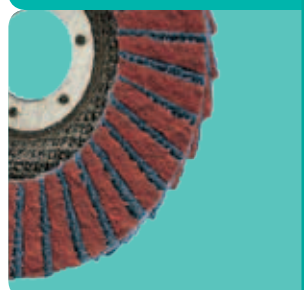
POSITIONING OF THE FLAPS



- **Single flaps:** Flaps are positioned one on the top of the other. Cloth specification (abrasive and type of backing cloth) is the same. This is the most common configuration used in the market.



- **Double flaps:** Flaps are made with the same cloth specification (same abrasive and same type of cloth) but are grouped and glued 2 by 2 on the pad (usually on plastic backing pad). This particular configuration provides a more aggressive cut due to the so called "sledgehammer effect".



- **Twin flaps:** In this innovative flap disc configuration the flaps are made with 2 different cloth specifications (ceramic grain and zirconium alumina grain). The flaps are grouped and glued 2 by 2 on the pad. The twin flap disc technology offers the fastest cutting rates, due to the mix of premium ceramic and zirconium alumina cloth specifications.

GUIDE TO LABEL READING



A GRINDING trademark

B Disc diameter and hole size

C Safety certifications

D Grit type and size

E Barcode

F Product type and code

G Safety pictograms

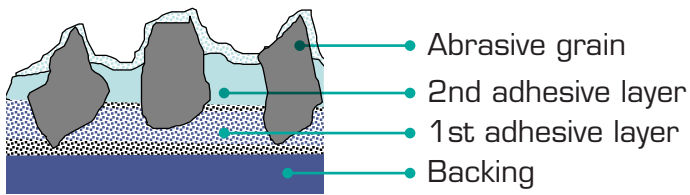
H Maximum revolutions per minute and maximum operating speed

I Coloured stripe indicating the allowed speed

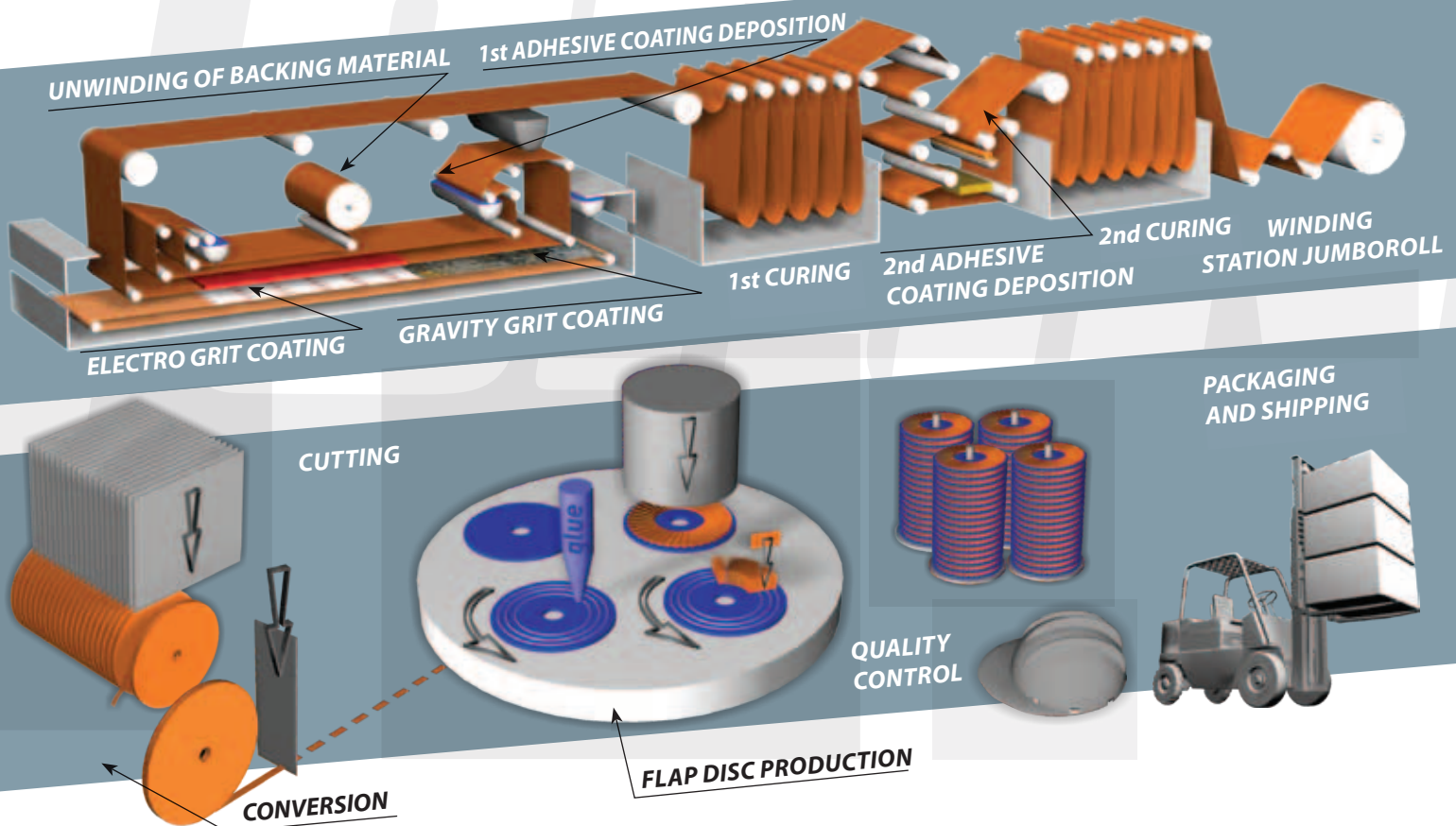
J Applications

PRODUCTION PROCESS - FLAP DISCS


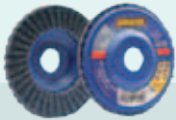
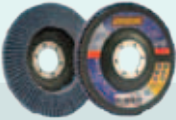



WHAT IS A COATED ABRASIVE?



Coated abrasives are the result of an industrial process developed throughout the years. The product is made of three components: flexible or semi-rigid backings to which abrasive grains are bonded by two adhesive coatings.



THE GRINDING PRODUCT RANGE

<div> <div>PREFORMANCE</div> <div>QUALITY</div> </div>	APPLICATION	PLASTIC	FIBRE	RANGE
	Inconel, stainless steel, high tensile steel, high-alloy steel, chrome, titanium, hard to grind metals			PLATINIUM
	Stainless steel, metals, aluminium, cast iron.			GRINDING
	Metals, stainless steel and nonferrous metals			FORZA
	Metals, stainless steel and nonferrous metals			

1

ADVANTAGES PLATINIUM:

GRINDING Platinum flap discs allow an increase in the cut rate of up to 50% if compared with a traditional Zirconium flap disc.

On high strength steel, stainless steel, inconel, chrome, titanium, the GRINDING Platinum flap disc is much more effective when compared to an ordinary zirconium flap disc. Flaps made of ceramic grain make the difference. Platinum outperforms in these tough applications.

The Supersize coating keeps the temperature of the working surface much lower if compared with a traditional flap disc. These advantages limit the risk of burning the work piece and consequently reduce the possibility of work piece rejection.

To really appreciate the performance of GRINDING Platinum flap discs a powerful angle grinder machine is required.

2

ADVANTAGES GRINDING MAXI:

All the zirconium GRINDING flap-discs DL-F in grit 40-60-80 are designed with the new MAXI construction system. The quantity of abrasive cloth in these new MAXI flap-discs is up to 35% higher if compared with a standard GRINDING flap-disc and up to 50% if compared to an economic version. The MAXI flap-disc is particularly appropriate for intensive application and allows a remarkable saving in time and money.

FIBRE DISCS

GRINDING offers to the professional user a range of fibre discs designed for high performance in even the toughest applications. The GRINDING range is based on aluminium oxide discs, available in different diameters and grit sizes to meet market needs.

They are suitable for applications on metals, non ferrous metals, wood, aluminium, cast iron, plastic and bronze.



Applications:

Metals, non ferrous metals, wood, aluminium, cast iron, plastics, bronze



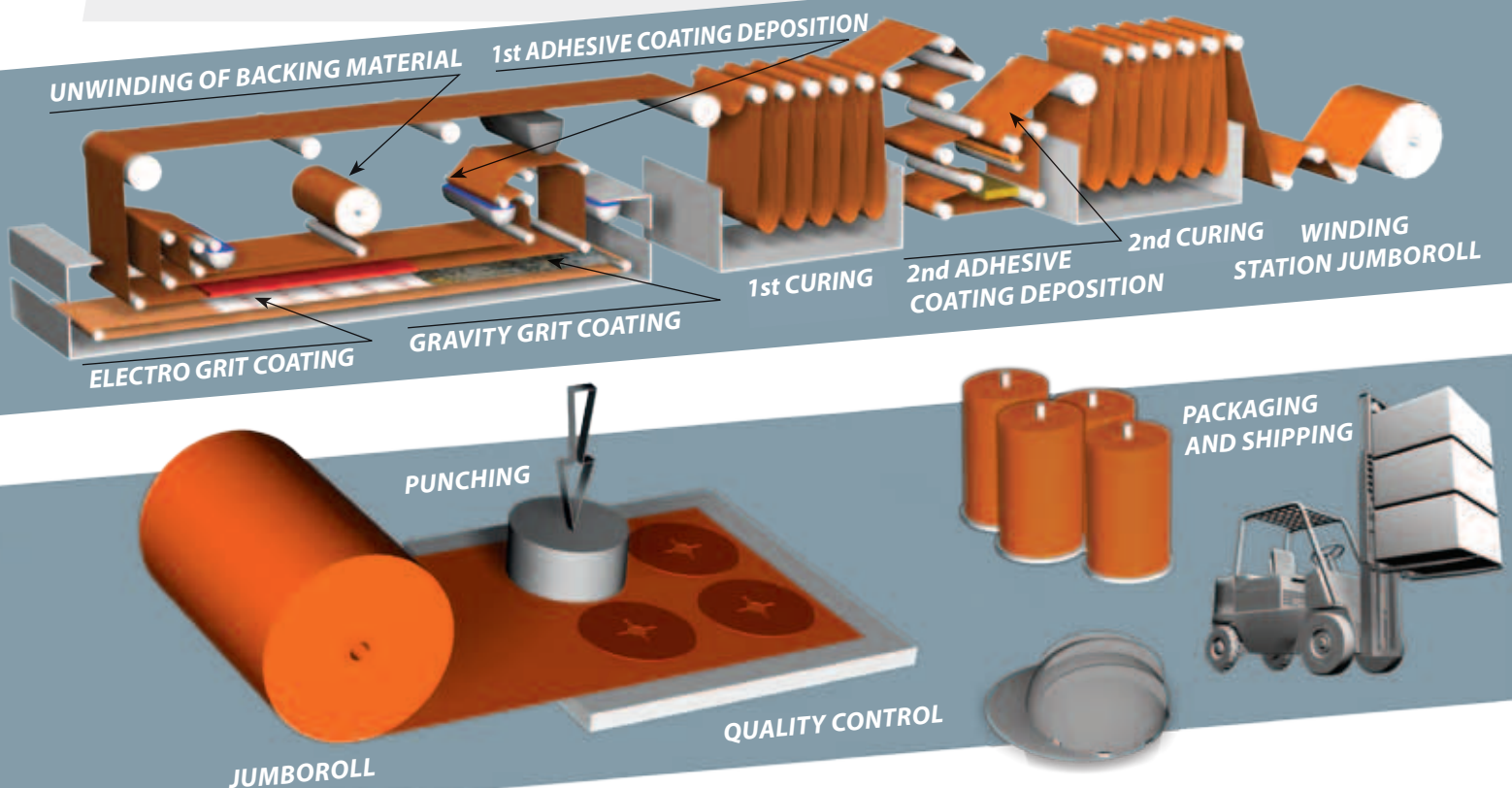
Always use a backing pad when working with fibre discs.



BACKING PAD

Density	Recommended grit size	Application
Medium	For grit 60 and finer	Weld removal Finishing
Hard	For grit 50 and coarser	Stock removal, Edge grinding Chamfering, Blending

PRODUCTION PROCESS - FIBRE DISCS



SAFETY IN THE STORAGE & USE OF COATED ABRASIVES

TRANSPORT & STORAGE

All coated abrasives should be handled carefully. Damage can be caused by mishandling, which should be avoided.

Coated abrasives should be stored in dry, frost free conditions. They should be kept away from heat sources, cold, damp walls, doors or windows and should not be in direct contact with the floor. Temperatures and relative humidity should be between 18 to 22°C and 45 to 65%. Coated abrasives should not be exposed to direct sunlight. Products should be kept in their original packaging until immediately before use. Once unpacked, they should be stored in a way which avoids distortion.

PERSONAL PROTECTION

Wear safety goggles, ear defenders, safety gloves and dust masks. If conditions are severe, additional face protection, leather aprons and safety shoes must be worn.

GENERAL PRECAUTIONS

Safety instructions provided by the machine manufacturers must be followed. Where fitted, all guards, covers and hoods must be in place on the machine during grinding, and should not be modified in any way. Abrasives should not be used near inflammable material or in an environment where there is a risk of explosion.

Sparks should be directed away from the face and body, if possible towards the floor. Dust extraction equipment must be used whenever it is available. The instructions for use given by the abrasive manufacturer must be followed e.g. 'Not to be used without a support'. The workpiece must be firmly fixed before grinding starts. Check all abrasives visually before use and make certain that the product is suitable for the application. No modifications should be made to abrasive products after delivery.

When using a portable grinder always switch it off and allow the spindle to stop completely before putting the tool down. Wet grinding should only be carried out on machines designed for this purpose and with abrasives designated as suitable for this type of operation.



Ear Protection



Eye Protection



Respiratory (dust) Protection



Wear Gloves



Read Instructions

TROUBLESHOOTING

GLAZING

Formation of a layer of workpiece material ground and melted over the cutting edges of the coated abrasive grains. Cutting rate is drastically decreased.

Cause	<ul style="list-style-type: none">• Grit too fine• Grinding pressure not correct (too low or too high)• Improper abrasive specification.
Solution	<ul style="list-style-type: none">• A too fine grit can promote glazing, a coarser grit is more aggressive and the renewal of the grain will be higher; glazing will disappear• If pressure is too low, grain and cloth wear are not possible. Increase pressure.• If pressure is too high (Reduce pressure), speed of the disc will decrease (glazing and reduced wear of the cloth) and overheating will take place (burning of the work piece)• Ceramic grain will prevent glazing since the crystal microstructure is sharper and more friable.

LOADING

Loading of the free space between the abrasive grains with ground material results in a decrease of the stock removal and cut rates.

Cause	<ul style="list-style-type: none">• The work piece material is too sticky and soft (e.g. aluminium)
Solution	<ul style="list-style-type: none">• You can re-sharp the disc by grinding with higher pressure; this will remove the loading from the abrasive cloth and it will expose new and sharp grains.• To prevent loading you can use a lubricant stick, this lubricant will reduce clogging significantly.• With extremely sticky metals (e.g. aluminium) the best choice is to select the GRINDING ECO flap disc and change it once the cutting rate has drastically decreased.



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