



# BLADE SAFETY AWARENESS

Informational Guide to Working Safely with Blades



**AQUACUT / TILERS TOOLS**

Service Providers of the Year  
award winners, Association of  
Professional Landscapers



This brochure seeks to pass on information and tips for the proper use of diamond blades and highlight the correct safety when using the blades.

# ABOUT AQUACUT GROUP

Aquacut has decades of experience shaping and finishing porcelain, stone, and metals to create individually designed, functional and aesthetically pleasing finishes. The company has an envious reputation for deliverability and quality. Aquacut's bespoke finishes are installed in the premises of many well-known entities around the world, including in the UK.

St Paul's Cathedral  
Blackpool Council  
Ipswich City Council  
Manchester Airport  
Heathrow Airport  
Harrods

River Island  
McLaren Motors  
Leeds / Bradford Airport  
Old Trafford  
Dr Martens  
Costa Coffee

Nissan  
Seat  
Ford  
Bentley  
Land Rover  
Southampton Council

Gatwick Airport  
Selfridges  
Nandos  
Bridlington Council  
Mercedes  
East Midlands Airport

Aquacut is based in Cheshire in two locations. The fabrication business has two workshops in the market town of Knutsford while the Tilers Tools and Babilonia divisions operate from Appleton, just off the M56 / M6 motorway junction. Aquacut Limited was established in the 1990's and quickly established a reputation for first class services to the landscape, tiling and building sectors. We have two websites:

[www.aquacut.co.uk](http://www.aquacut.co.uk) | [www.tilerstools.co.uk](http://www.tilerstools.co.uk)

Feel free to browse these, call us on **01565 750666** (Aquacut) or **01565 344860** (Tilers Tools and Babilonia), or drop into Appleton for a visit, you'll be made most welcome. Aquacut and Tilers Tools are members of The Tile Association, The Association of Professional Landscapers, and the Horticultural Trades Association.

The Association of Professional Landscapers awarded Aquacut and Tilers Tools their Service Provider and Manufacturer of the Year Award.

# CONTENTS

01

---

BLADE HEALTH AND SAFETY

02

---

SIDE GRINDING HAZARDS

03

---

DIAMOND BLADE DO'S AND  
DONT'S

04

---

BLADE TECHNICAL  
INFORMATION

05

---

DIAMOND BLADE PROBLEM  
DIAGNOSTICS

06

---

SEGMENT DAMAGE  
AVOIDANCE

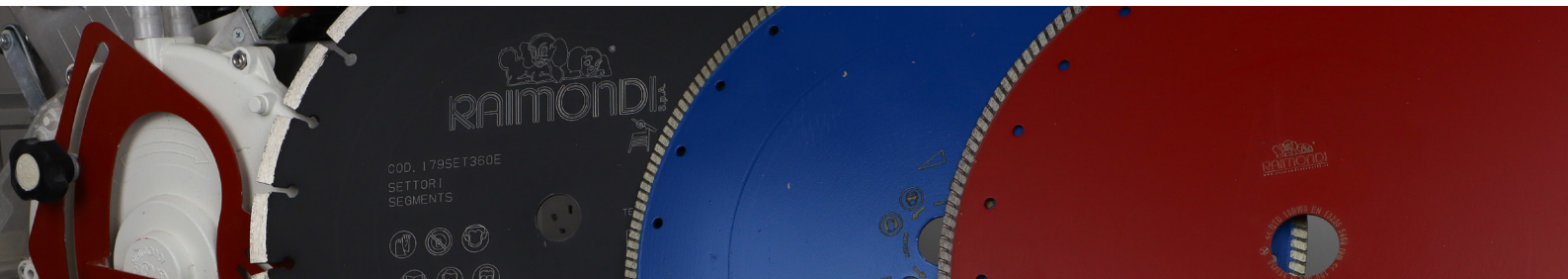
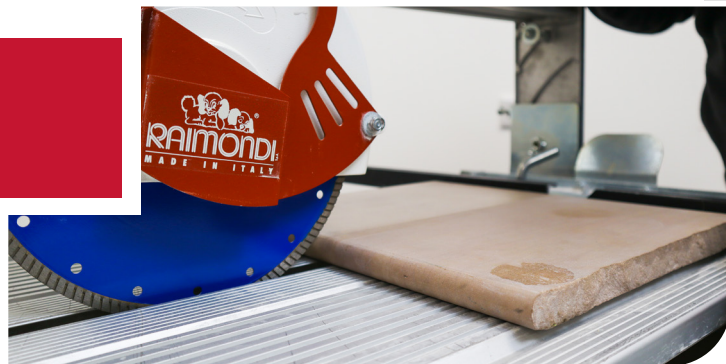
## BLADE HEALTH AND SAFETY

Before reading this booklet, it is important that you familiarise yourself with the correct PPE & safety procedures when operating diamond blades. Using diamond blades can be dangerous if used incorrectly.

You must always wear the correct PPE; goggles or safety glasses with the correct rating and gloves should always to be worn.

Only use the correct blade for the material you are cutting, never force or thrust the blade and use water for cooling when requested by the manufacturer.

Machine minimum speeds should always match the rating of the blade.





## SIDE GRINDING HAZARDS

### What is side grinding?

Side Grinding is the dangerous and improper use of a disc or diamond blade which should be used for the purpose of cutting only. One of the most common safety hazards associated with accidents when using diamond blades or abrasive discs is side grinding.

Side grinding is a dangerous and very common habit and is highlighted in all reputable manufacturers safety handbooks which accompany cut off saws and angle grinders at time of purchase.

Most users are naïve or ignorant about their dangerous habits until it is too late due to an accident or fatality, or they have been made aware by a diligent safety supervisor or safety conscious supplier.



### Why do users side grind?

Due to the popularity of cut off saws, they are widely available and are therefore the go-to saw for cutting most site materials. However, they aren't the most accurate and therefore users remove unwanted material by shaving off excess material with the side or cutting face of the blade. This habit may have been more forgiving in softer cementitious material with small aggregates, so when the user is tasked with cutting harder material such as granite with naturally formed clusters / veins of aggregates or precast concrete with large aggregates of quarry shot / stone, the user usually finds out the hard way by damaging the blade or injury.



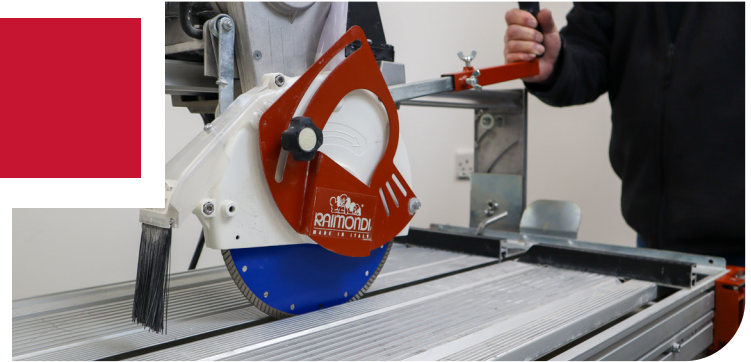
Example of side grinding.

## DIAMOND BLADE DO'S AND DONT'S

All diamond blade manufacturers are concerned that their products are used safely. Please follow the Do's & Don'ts listed below for use of diamond saw blades. This material is on correct use of diamond blades and is intended to prevent the hazardous operation of diamond saw blades.

### WET CUTTING DO'S

1. **Do** follow the manufacturers recommended blade specifications for material being cut.
2. **Do** inspect the diamond blade for damage that may have occurred during shipment or due to previous use.
3. **Do** check mounting flanges for equal diameter, excess wear, or flatness. Mounting flanges must have adequate relief around the arbour.
4. **Do** be sure that the diamond saw blade is mounted on a correct diameter blade shaft between proper blades flanges and is securely hand-tightened with a wrench.



7. **Do** follow the manufacturer's recommended pulley sizes and operating speeds. For specific blade diameters refer to manufacturer's operating manual.
8. **Do** operate saw with proper safety attire, i.e. safety glasses, safety helmet, safety shoes, hearing protection.
9. **Do** examine blade periodically for cracks in the steel center or segments, or excessive wear under the segments.





## WET CUTTING DONT'S

1. **Don't** use a diamond blade without checking manufacturer's recommendations for the material to be cut. Improper selection can cause excessive blade wear and possible damage to the diamond saw blade and/or machine and create an unsafe operating condition.
2. **Don't** use a new diamond blade or remount a used blade which has a core that is not flat or is cracked, which shows segment damage or loss, or which has a damaged arbour hole.
3. **Don't** use mounting flanges on which the bearing surfaces are not clean and flat.
4. **Don't** force blade onto machine blade shaft or mount blade on undersized blade shaft. Either condition can result in unsafe operating conditions and excessive blade wear.
5. **Don't** mount blade on machine that does not meet the minimum requirements set forth in the manufacturer's manual.



## DRY CUTTING DO'S

1. **Do** follow the manufacturer's recommended blade specifications for material being cut and suitability for dry cutting applications.
2. **Do** inspect the diamond blade for damage that may have occurred during shipment or due to previous use.
3. **Do** inspect the diamond blade periodically during use for core flatness, fatigue cracks, segment damage, undercutting and damage to the arbour hole.
4. **Do** check mounting flanges for equal and correct diameter, excess wear or flatness. Mounting flanges must have adequate relief around the arbour.
5. **Do** be sure that the diamond saw blade is mounted on a correct diameter blade shaft between proper blades flanges and is securely hand-tightened with the wrench provided or an adjustable wrench no longer than 8".
6. **Do** check for proper saw machine conditions. Spindle bearings should be free of end and radial play. Consult the operating manual from the saw manufacturer for proper machine maintenance conditions.
7. **Do** follow the manufacturer's recommendation for operating speeds for specific blade diameters.
8. **Do** maintain a firm grip on hand-held saws during cutting operation.
9. **Do** wear proper safety equipment at all times. Always wear safety glasses, footwear, snug fitting clothing, hearing and head protection and respiratory equipment where required.



## DRY CUTTING DON'T'S

1. **Don't** dry cut except with a blade specifically designed for dry cutting by the manufacturer.
2. **Don't** force blade onto machine blade shaft, alter the size of the mounting hole, or tighten mounting nut excessively. Use of bushing to reduce arbour hole size is not recommended for diamond blades used on high-speed saws.
3. **Don't** exceed the maximum operating speed established for the blade.
4. **Don't** operate a saw without proper safety guards in place. NEVER OPERATE ANY SAW, WET OR DRY, WITHOUT A BLADE GUARD!
5. **Don't** stand in direct line with dry diamond or abrasive blades during start-up or operation.
6. **Don't** cut or grind with the sides of a diamond blade.
7. **Don't** force the blade into the material; allow the blade to cut at its own speed. Forcing the blade may cause over heating or blade damage.
8. **Don't** make long continuous cuts with a dry blade. Allow the blade to cool by turning in air every 10 to 15 seconds. The harder the material being cut the longer the cooling periods should be.
9. **Don't** use the blade to cut material other than that specified by the manufacturer.
10. **Don't** use the blade on a type of saw other than that specified by the manufacturer.
11. **Don't** allow the blade to deflect in the cut.
12. **Don't** attempt to cut curves or radials with a straight cutting blade, consult your supplier for advice on a suitable blade.

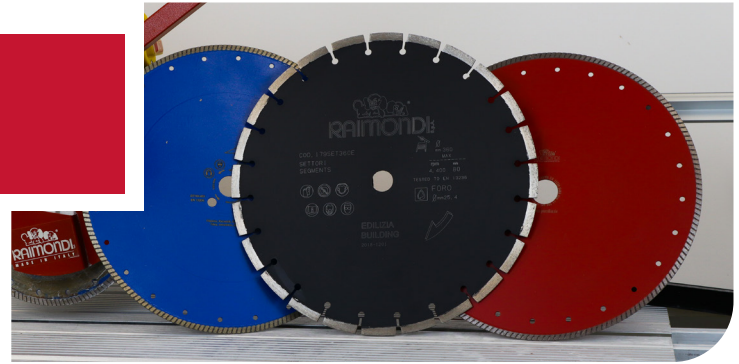
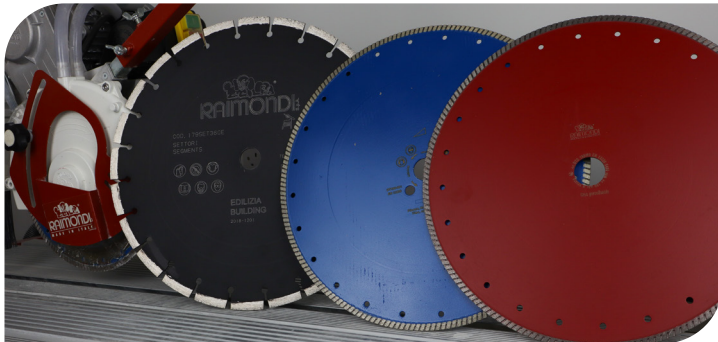


Please feel free to call us to discuss your project and equipment needs. We can be contacted on 01565 344860 or email [sales@tilerstoools.co.uk](mailto:sales@tilerstoools.co.uk)

## BLADE TECHNICAL INFORMATION

Diamond blades are designed to cut many materials such as porcelain, tiles, concretes, asphalt and many others materials (some even for cutting metals). They are made in many different styles designed for maximum cutting performance.

Blades are made from a metal blank; the outer edge is called the matrix and this is the part which houses the diamonds. The matrix can be segmented or continuous. For cutting hard materials, the matrix is a soft alloy and for cutting soft material the matrix is a hard alloy. The matrix is wider than the blank to allow the cutting residue to pass and prevent the blade jamming.



In addition to diamond blades, diamond core bits are available. The core drills come in many sizes from 6mm to 100mm. The main body of the drill is a steel tube with a shaft to fit into the drill with a matrix of diamonds on the leading or cutting Edge. These core drills are designed to be used with water and are described as humid use.

The bits are used for drilling porcelain, tiles, marble or granite. A cordless drill is usually sufficient at low speed. The secret is to keep the drill bit cool, lubricated with water, and flushed out regularly.

Drilling too fast will destroy the integrity of the diamond and reduce the length of the life core bit.

If used correctly, and kept cool you should be able to hold the bit without it being hot after the process. The use of a dressing stone is also advised for these bits.



## The Diamonds

In most cases the diamonds are synthetically manufactured to specific shapes, depending on what material they are to cut, though some segments can contain a mix of synthetic and real. Synthetic diamonds have exactly the same degree of hardness as natural diamonds but, whereas natural diamonds vary in structure, synthetic ones can be manufactured to optimum structures that remain consistent.

They can also be adjusted in grain size and crystalline shape to suit the cutting of specific materials and thereby optimise the life of the blade. Blade life is not solely dependent on how many diamonds are present, but rather on a balance between diamond concentration and bond composition, in relation to the material to be cut.

There are three different methods of joining the segments to the blank:

**Sintering** - This fuses the bond metals, with heat and high pressure, onto the blank. Cheaper blades use this process.

**Laser welding** - Used for high quality blades where the join is permanent. Any segment-loss is almost always caused by user error.

**Soldering** - On large diameter wet cutting discs, the segments are brazed to the blank using silver solder. Because a wet blade will be working with cooling water, it will not require its segments to be joined at high temperature.

## Bond

Materials to be cut will rank somewhere on a scale from hard & dense to soft & abrasive; this is known as the 'MOHS' scale.

When the material is hard, such as glass, the diamond grain will wear down or break. Therefore, it is necessary for the bond to be soft allowing it, and the diamond grain, to wear away evenly. When the material is soft, such as asphalt, the diamond grain will remain in good condition.

However, the bond will need to be hard to withstand wear from the abrasive large particles found in asphalt and other soft materials. A blade designed for cutting granite, but used on asphalt, would suffer rapid bond wear and consequential loss of unworn diamonds. An asphalt blade used to cut granite would result in rapid diamond loss on the surface of the segment but with the bond remaining intact, resulting in no cutting action. The perfect wear is when diamond grain is released evenly, exposing new diamond and where the bond trails behind each diamond like a comet tail, giving it support and optimum cutting.

## Blank

The core is made from heat treated high alloy steel and balanced to withstand the stress of rotating up to 7,950m/sec (for a 300mm blade) without warping. Blanks can be made in various designs to bring consistent perfection to the cut.

Where the finished appearance of the cut is important, such as on porcelain tiles or granite worktops, the segment will be manufactured as a continuous rim without the spaces, known as gullets. This type of blade can be run dry up to certain depths, as specified by the manufacturer, although water will always extend the life of the blade. When cutting beyond those depths, water is recommended. To help disperse dust, the sides of a continuous rim can be evenly divided with many countersunk channels. These can either be at right angles or oblique, to the centre of the core and are known as turbo blades.

Continuous rim blades can be made with a contoured profile in the shape of radius, bevel or ogee, to cut granite or marble worktops.



## Segmented Blade

All other blades will have an infinite number of variations on the relationship between segment length and height to gullet width and depth and whether the gullet ends with a circle or a curve. The material to be cut is the defining factor.

The objectives to cutting asphalt are to remove it in large particles, at speed, without clogging, so a wide gullet is appropriate. With asphalt or green concrete being very abrasive, the appropriate blade is designed with a few of the segments having a 'drop' at one end. This minimises wear on the core and prevents undercutting of the segment.

Other blades feature gullets set at 30 degrees and with turbo segments. Some have patterns of holes through the core which helps to reduce noise, increase cooling and producing a 'see-through' effect when running at speed.

With technological advances it has now become possible to produce blades that will cut an ever broader mix of materials, from combinations of granite, steel and cast iron to asphalt, concrete and occasional metal.

## Final Consideration

The more features the blade offers, the more the blade will cost although higher quality blades will always give a better return on investment than cheaper ones. When choosing a blade, whether high quality or budget range, the all-important factor is to select the correct segment for the material.

Fig (A)

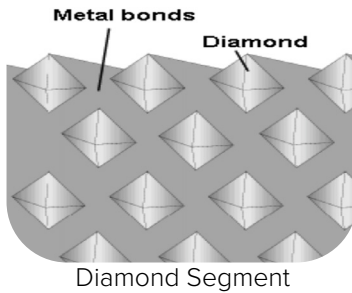


Fig (B)

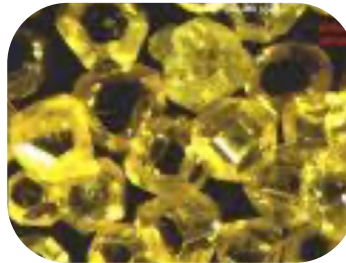
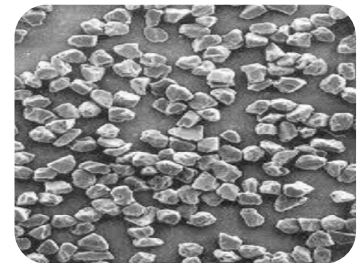


Fig (C)



## DIAMOND BLADE PROBLEM DIAGNOSTICS

The following is a guide designed to help you identify, diagnose, and correct a problem with a diamond blade. Listed are examples of common problems, their cause and a plan to remedy.

### Overheated Blade

**CAUSE:** Adequate coolant was not provided.

**REMEDY:** Check water supply for adequate volume and for obstructions through water system. Use dry cutting blades only for shallow cutting (1"-2") or step cutting. Allow the blade to spin freely every 10 seconds to increase cooling air flow.

### Segment Loss

**CAUSE:** The material slips during cutting which twists or jams the segments loose.

**REMEDY:** Hold the material securely while cutting.

**CAUSE:** Blade is too hard for the material being cut, causing excessive dullness, which in turn causes the segments to pound off or fatigue.

**REMEDY:** Use a softer blade specification.

**CAUSE:** Worn blade flanges fail to protect the core from deflecting, improper support.



**REMEDY:** Replace both blade flanges.

**CAUSE:** Overheating, usually detected by a bluish colour on the steel core.

**REMEDY:** Check water system on wet cutting saws. For dry cutting make shallower cuts and allow the blade to air-cool properly, free of pressure or excessive dulling condition.

Replace worn bearings or arbour shaft as needed.





### Arbour Hole Out-of-Round

**CAUSE:** Saw arbour badly worn due to improperly seated blade.

**REMEDY:** Be certain the blade is properly seated on the arbour before tightening the flange.

**CAUSE:** Blade flanges are not properly tightened, permitting blade to rotate on the shaft.

**REMEDY:** Always wrench tighten arbour nut. Never hand tighten. Always use hex nuts, never use wing nuts.

**CAUSE:** Blade flanges are worn and not providing support.

**REMEDY:** Check flanges for wear, replace worn flanges will crack. The saw operator should use steady, even in-feed pressure, and be careful not to twist or jam the blade in the cut.

**CAUSE:** Overheating through inadequate water supply or improper use of dry cutting blade.

**REMEDY:** Use adequate water to cool wet cutting diamond blades. Allow adequate airflow around dry cutting blades to prevent overheating.

Never use a blade with a cracked blank/core.

### Cracked Segments

**CAUSE:** Blade is too hard for material being cut.

**REMEDY:** Use correct blade with softer bond.

### Uneven Segment Wear

**CAUSE:** Segments are worn on one side, reducing side clearance. It's usually caused by misalignment of the saw or uneven water flow on both sides of the blade.

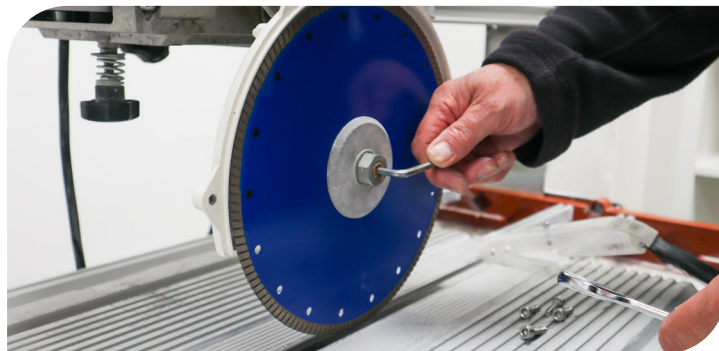
**REMEDY:** Check saw alignment. Clean the water system, making certain that water is applied evenly to the leading edge of the blade. Check pump for supply of sufficient water.

**CAUSE:** Blade is worn out-of-round due to bad bearings, worn arbour.

**REMEDY:** Replace bearings in saw.

**CAUSE:** Using the wrong blade on abrasive material.

**REMEDY:** Consult the dealer or manufacturer for the proper blade specifications for material being cut.



**CAUSE:** Lack of sufficient coolant to the blade. Often detected by excessive wear in the centre of the segment. (NOTE: In both cases, diamonds will be highly exposed).

**REMEDY:** Clean the water system, checking the pump works correctly.

**CAUSE:** Wearing out-of-round accelerates wear. Usually caused by bad bearings, worn shaft or using a blade too hard for material.

**REMEDY:** Check bearings and arbour. If worn, replace with new parts before operating.

**CAUSE:** Insufficient power caused by loose V-belts, inadequate voltage or improper RPM's.

**REMEDY:** Tighten belts (taut). Replace worn belts. Check voltage. Use proper size extension cord. Long leads or incorrect cable diameter cause power drop off.

#### Cracked Blank/Core

**CAUSE:** Blade too hard for material being cut.

**REMEDY:** Use correct blade with softer bond.

**CAUSE:** Excessive cutting pressure, or jamming or twisting the blade in the cut can cause the blade core to bend or flex. When subjected to extreme stress and metal fatigue, the blade's steel core.

**REMEDY:** Reduce downward pressure, let the diamonds do the work.

#### Blade Won't Cut

**CAUSE:** Blade is too hard for material being cut.

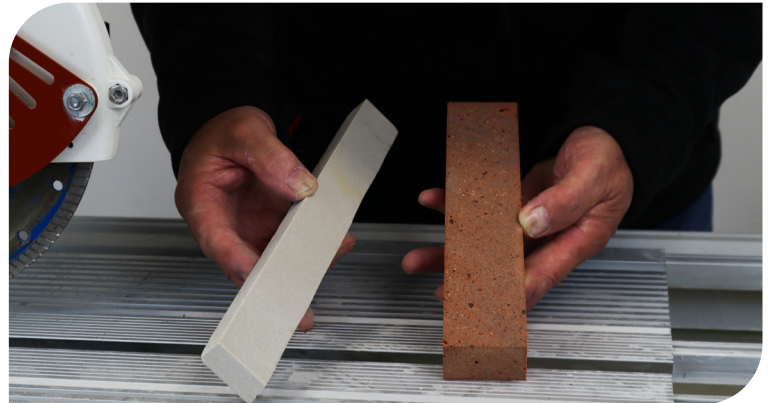
**REMEDY:** Consult dealer or factory for proper blade to cut materials on the job.

**CAUSE:** Insufficient power to permit blade to cut properly (loose V-belts, low voltage, horsepower).

**REMEDY:** Check belts, voltage, and horsepower.

**CAUSE:** Blade has become dull because of continuous use on fairly hard or vitrified material.

**REMEDY:** Dress with abrasive material until diamonds are exposed again. (This may be needed occasionally, if it is often occurring blade is probably too hard, particularly in hard porcelain types due to density and extreme hardness of the product). Use a very fine sharpening block made from aluminium oxide, abrasive sandstone or gritty fine red brick.

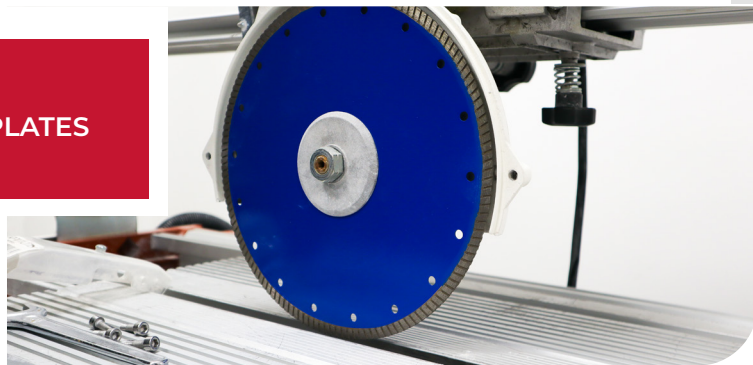


## SEGMENT DAMAGE AVOIDANCE - DIRTY CLAMP PLATES

There are many reasons a segment may chip or detach during operation. These are avoidable if good housekeeping and safety is practiced, one of the more common is “dirty clamp plates” and this is the focus of this circular.

Segments can become chipped or may detach in the event of the blade not being secured correctly causing the blade to flutter and chip. This is more common in blades which carry a higher segment, as these are more vulnerable than a standard segment. The most common cause of this is dirty clamp plates. Clamp plates may have grit or remnants of previous discs blotter glue which prevents the clamp plates adhering to the blade blank firmly. This causes the blade to flutter and in turn chips the segment or in some cases segment loss.

This is most common on petrol disc cutters due to the multiple variables and vibration properties which cannot be avoided with these saws.



Granites and other stone types with large pieces of natural elements offer less tolerances than cementitious material when cutting. This coupled with poor cutting practices and habits from the saw operative exacerbate the chances of segment damage.

Typical site environments cannot avoid the transfer of sand or other dusty gritty particles to material, plant and machinery; open windy conditions can blow dusty particles around freely. But with vigilance and good practice before any incidents this can be addressed and avoided.

As petrol saws seem to be the standard go-to saw for most site cutting applications due to their versatility, it's important to carry out routine regular checks before and during cutting and especially when mounting the blade.

### Routine Checks When Mounting Blade

(In addition to good standard practice and manufactures guidelines).

- Make sure the blade is suitable for the material you're cutting.
- Check the blade for any imperfections or tiny stress cracks, signs of glazing, particularly if used before.
- Do check the clamp plates for wear and replace if diameter decreases as per manufacturers guidelines.
- Be careful as these plates can become razor sharp, use protective gloves to avoid being cut.
- Clean any residue of hard glue from previous blades which may have transferred during use with heat. This can be done with wire wool, sandpaper or stiff wire brush, make sure to clean to bare metal.
- When mounting the blade, do it in as dust and wind free conditions as possible, avoid placing the blade on the ground. Make sure to tighten firmly and use the correct procedure and tools to stop the blade from rotating when tightening. To use your hand only is incorrect to stop the blade from rotating. Use the blade lock mechanism within the saw to stop rotating when tightening.
- When transporting the saw by van or other vehicle, it is recommended to remove the blade from the saw. To avoid damage from contact with other machinery; which may untension the blade which can also contribute to segment damage or loss due to fluttering when operating the saw.
- Never side grind, the saw is designed only as a cut off saw this is very dangerous and very common.
- Never start cutting at a face and side corner angle simultaneously, always cut into the main body of the material and then bring the cut within the cut to the face edge. This will reduce the chance of dangerous kick back energy.







Fig A: Blade Blank Dirt Ring

Dirt ring residue as a result of dirt under the clamp plates, this slips and crushes under pressure, scratching the blank causing it to wobble.



Fig B: Blade Section Segment Chipped

Two chipped segments at each corner, laser weld held firmly not all segments chipped

ADVANCED **PIKUS 130** | PATENTED  **RAIMONDI**  
MADE IN ITALY

## CONTACT US

Unit 4A Stretton Distribution Centre  
Off Grappenhall Lane  
Appleton  
Warrington  
WA4 4QT

### AQUACUT LIMITED

01565 750666  
sales@aquacut.co.uk  
[www.aquacut.co.uk](http://www.aquacut.co.uk)

### TILERS TOOLS

01565 344860  
sales@tilerstools.co.uk  
[www.tilerstools.co.uk](http://www.tilerstools.co.uk)



## MEMBERS OF THE FOLLOWING ORGANISATIONS



The Association of  
Professional Landscapers

