SYNTEC
DIAMOND TOOLS

# ALL ABOUT DIAMOND TOOLS

DIAMONDS BLADES | CORE BITS | SURFACE PREPARATION

## INSTRUCTIONAL GUIDE

ALL ABOUT DIAMOND TOOLS

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# ABOUT SYNTEC DIAMOND TOOLS

### OUR HERITAGE

With over 40 years of experience in the diamond tool industry, **Paul Freer and Dennis Clift founded Syntec Diamond Tools in 1994.** The company has evolved into Australia's largest diamond tool manufacturer and a pioneer in developing, manufacturing, and supplying innovative products.

Syntec Diamond Tools now boasts a 26,000-square-meter manufacturing site in South Australia, a full-service facility and office in California, over 50 employees, and global product exports.

### OUR FOCUS

Syntec Diamond Tools is committed to providing excellent customer service. Our team of experts is available on-site to assist with sales, technical support, and customer enquiries in two different time zones. Our offices in Australia and the USA are fully equipped to facilitate our Syntec Diamond Tools products. Our products are available for resalers, rental/hire agencies, and straight-to-end users such as trade services. **Our diamond tools are created with a focus on performance, which extends to our dedicated customer service.**

### OUR IDEAS AND INNOVATION

Syntec Diamond Tools has been at the forefront of innovation in the diamond tool industry and strives to meet challenges through ongoing investment in research, development, machinery and product testing. Examples of this include ground-breaking segment designs and configurations. Syntec is responsible for making the first-ever Arrow Segment, which is now popular throughout the surface preparation industry.

Instead of copying what is already on the market, we continue to innovate new tooling increasing quality and durability. Both our Rapida and Trojan segments, for example, are innovations that were first created to solve grinding issues for our customers and later rolled out worldwide. Syntec has developed a Fast Change System, allowing a contractor to use a taper wedge system to quickly change tooling or slide in a Velcro-backed resin holder. The contractor can then streamline their tooling to one style by replacing their plates with Syntec Fast Change. Syntec also continues to lead the industry with the most innovative PCD tooling in the market. From ½" wide PCD cutting blades used in micro trenching for fibre optic cable to the most durable and productive PCD's available in the surface preparation market.

AUSTRALIAN MADE

SYNTEC™ DIAMOND TOOLS

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# SYNTEC DIAMOND TOOLS

## COMPANY OVERVIEW

Syntec Diamond Tools is a leading provider of high-quality diamond tools, specialising in designing and manufacturing premium diamond blades, core bits, and surface preparation tools. Our comprehensive range caters for diverse industrial applications, offering precision cutting, drilling, grinding, and shaping solutions for materials such as concrete, asphalt, stone, and stone. Committed to quality and innovation, Syntec remains at the forefront, delivering cutting-edge solutions.

## SUPPORTING AUSTRALIAN MADE

Emphasising our commitment to supporting Australian-made products, Paul and Dennis, proud of their Australian heritage, prioritise **local manufacturing in Berri, South Australia.** With a strategic investment in state-of-the-art machinery, Syntec not only upholds the principles of Australian production but also ensures consistent quality and competitive pricing across its diverse range of products. This dedication is evident in their manufacturing process, from meticulous raw material selection to rigorous quality control measures. Since 2016, Syntec proudly holds the certification as Australian Made, highlighting their unwavering commitment to high standards. The Australian-made symbol on their products assures customers of their authenticity and the use of quality materials. Syntec's devotion to superior quality further solidifies its position as an industry leader in diamond tool manufacturing.

AUSTRALIAN MADE

# KNOW YOUR APPLICATION

## ASK THE RIGHT QUESTIONS

Ensure you maximise the performance/life of your diamond blade by knowing the answers to these key questions.

What material are you cutting?

Do you know the Hardness (Mpa) of the material?

What type of equipment (horsepower/RPM) are you using?

Is the cutting application wet or dry?

What size tool does your machine take?

What is the depth of the cut?

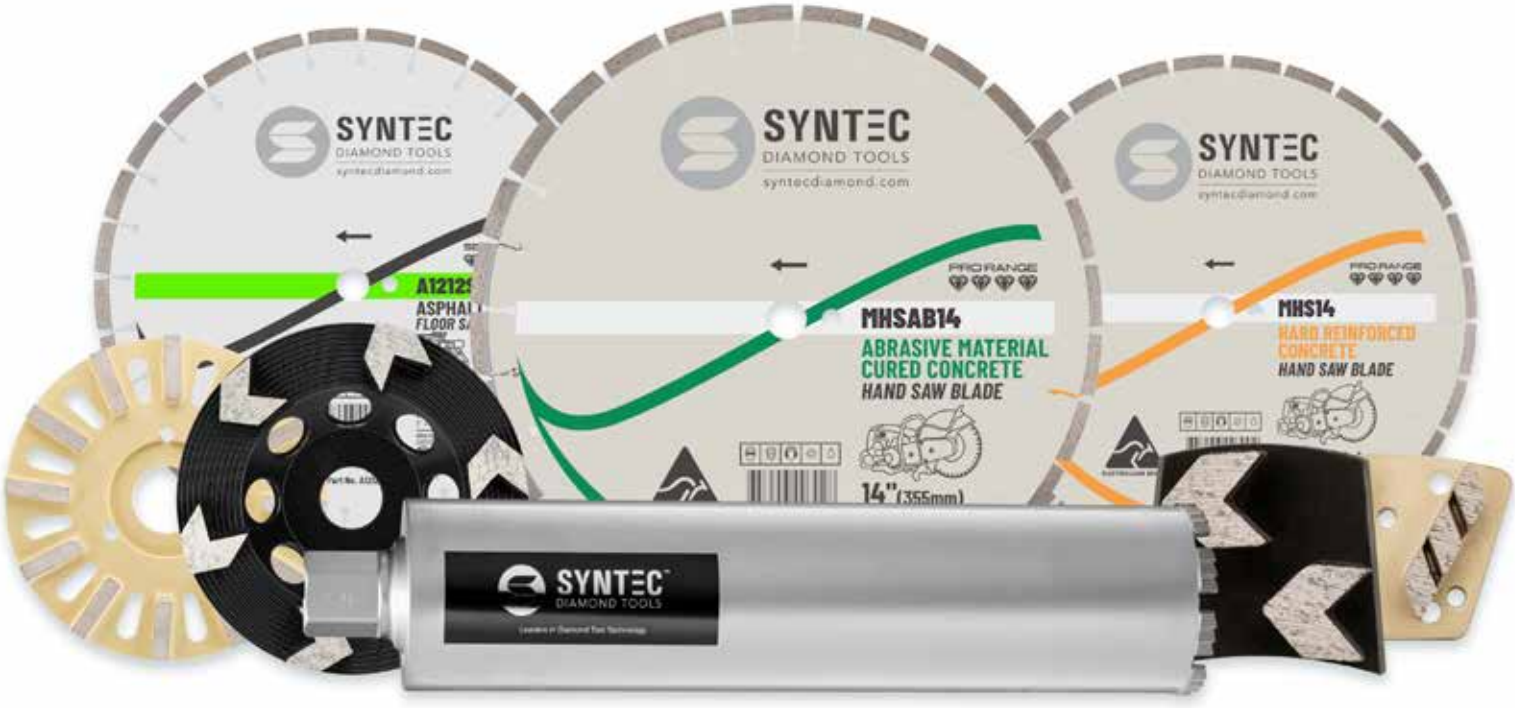
What finish/performance are you trying to achieve?

What is more critical, cutting speed, blade lifespan or cost?

# OUR CATALOGUES

## VIEW OUR SYNTEC DIAMOND TOOL CATALOGUES

Scan the provided QR code using your smart phone or tablet to view our extensive range and explore our latest catalogue. Our catalogue showcases a diverse selection of high-quality diamond tools for precision cutting, drilling, and surface preparation solutions.



# ALL ABOUT DIAMONDS

### INTRODUCTION TO DIAMOND CRYSTALS:

Diamonds used in Syntec Diamond Blades, Core Bits and Surface Preparation are all manufactured in various ways depending on the outcome and performance of the tool. We consider the following: grit, quality grades, concentration, and bond. The diamonds Syntec Diamond uses are lab-made synthetic diamonds as they are generally more robust, last longer, withstand higher temperatures and are more uniform in their characteristics than natural diamonds, resulting in a tool that will perform more consistently.

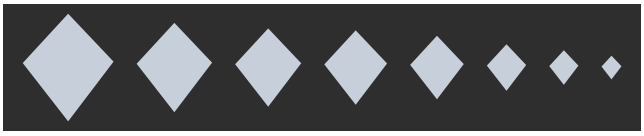
### DIAMOND CONCENTRATION:

The diamond concentration is a critical factor influencing the tool's cutting performance. Depending on how concentrated the diamond particles within the bond are, they typically require a higher machine horsepower to achieve optimal results.

High concentration Low concentration

### DIAMOND GRIT:

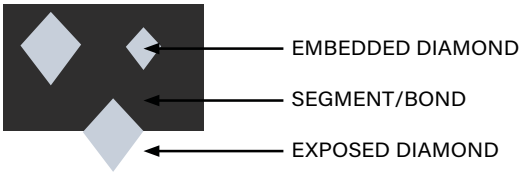
The particle size of the diamond, known as the grit, influences the finish. A lower number indicates a coarser grit, while a higher US MESH number indicates a finer grit. Finer grits are used to eliminate scratches, polish the concrete, and achieve a shiny surface, whereas a coarser grit is applied for aggressive coating removal. Selecting the appropriate grit is crucial for achieving the desired finish.



| Coarse Grit | Medium Grit | Fine Grit |
|---|---|---|
| 16/20 30/40 | 50/60 70/80 | 100/120 140/150 |
| US MESH | US MESH | US MESH |

### EMBEDDED AND EXPOSED DIAMOND:

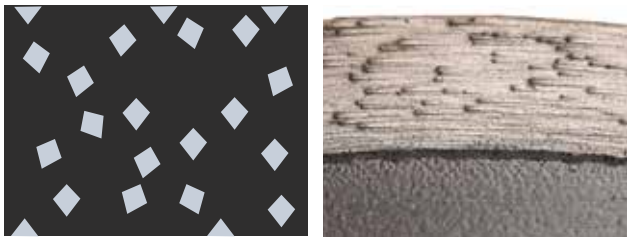
'Embedded diamonds' in a blade segment are encased within the bond material, while 'exposed diamonds' protrude from the segment surface, making direct contact with the material for efficient grinding.




### CPP TECHNOLOGY:

CPP stands for Controlled Particle Placement, a technology with which diamonds are placed into the bond in a specific arrangement. CCP ensures even wear and high-cutting performance throughout the segment's life. Without CCP technology, diamonds are still relatively distributed in even amounts throughout the bond, i.e. you would never find all the particles in only one corner of a segment. However, measuring their exact position is not possible.

Cpp Tech + High Diamond Concentration



Cs (Conventional Segment) + Low Diamond Concentration

### BOND:

The bond is a metal alloy encasing the diamonds, also known as the segment. The bond's role is to encase diamonds and wear them away at an appropriate speed. Ensuring you have selected the correct bond is essential as a soft bond wears away faster, revealing new diamonds quicker, which is crucial for hard materials. A medium bond balances wear resistance and cutting speed, suitable for general-purpose cutting like concrete. On the other hand, a harder bond is designed for softer materials, revealing new diamonds are slower, providing an extended lifespan, which is particularly effective for abrasive materials such as asphalt.

It's important to note that selecting the incorrect bond may result in glazed-over diamonds or cause premature diamond wear. Knowing the relationship between material hardness and bond is paramount for tool longevity, quality of the cut, and desired outcome. For more information, refer to the Blades' Material and Bond Compatibility' on page 12.

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# DIAMOND BLADES


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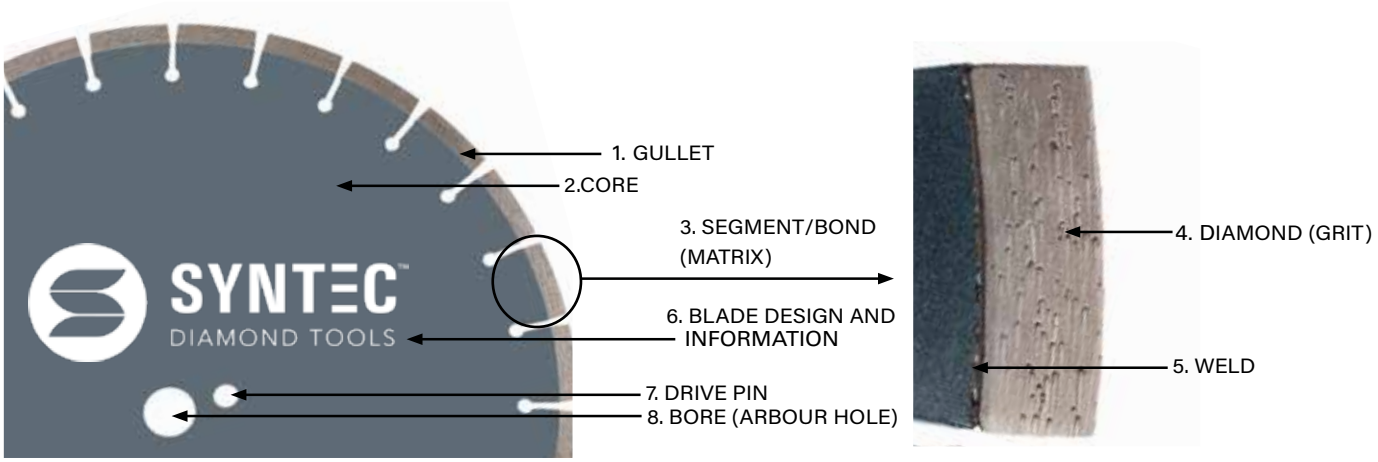
# WHAT IS A DIAMOND BLADE

### INTRODUCTION:

Syntec's Diamond Blades uses synthetic diamonds within the bond. Another known name is segment. The segment sits on the diamond blade's edge/circumference of the blade's core. The blade is an essential tool across different industries, catering to resellers, rental/hire agencies, and end-users like trade services designed to cut concrete, asphalt, and stone professionally. This chapter contains information about Syntec's Diamond Blades. It covers the different types of segments, gullets, blade grades and available ranges. Moreover, it discusses the compatibility of material, machine and bond hardness. Also, there is a troubleshooting guide that you can refer to in case of any issues.

## DIAMOND BLADE DIAGRAM




### 1. GULLET:

Whilst the diamond blade is cutting, the gullet is responsible for debris removal and, most importantly, preventing the blade from overheating. Gullets also enhance blade flexibility, reducing the risk of core cracks in demanding applications.

### 2. CORE:

Our premium diamond blades feature a tensioned, high-alloy, heat-treated steel core, ensuring superior performance compared to alternatives that use sheet metal cores. Proper tensioning guarantees a straight cut and flexibility under pressure, with some blades complemented by features like cooling holes for dry-cutting applications.

### 3. SEGMENT/BOND:

Diamond crystals and bonding metal powders (Matrix) are hot-pressed into segments designed to wear at a suitable rate to cut the material. Regardless of blade type, the segment is slightly wider than the core, allowing the cutting edge to penetrate material without core contact.

### 4. DIAMOND:

Synthetic diamond crystals, also known as grit, are located within the segment and embedded in the bond. These diamonds play a crucial role in cutting hard materials during various applications.

### 5. WELD:

Segments are laser-welded onto the blade's core, creating a robust connection that withstands high temperatures. Laser-welded segments allow full use of segment depth and last approximately 35% longer than sintered diamond blades.

### 6. BLADE DESIGN AND INFORMATION:

On the blade core, information is printed, which consists of the following: brand name, blade range (pro/semi-pro/premium/tradesman), product name, application, equipment compatibility, measurements of blade diameter, bore diameter, part code, bar code, Australian made stamp and safety icons.

### 7. DRIVE PIN:

A drive pin is a hole found near the blade's centre. The drive pin securely attaches the diamond blade to a saw, ensuring a stable and effective connection.

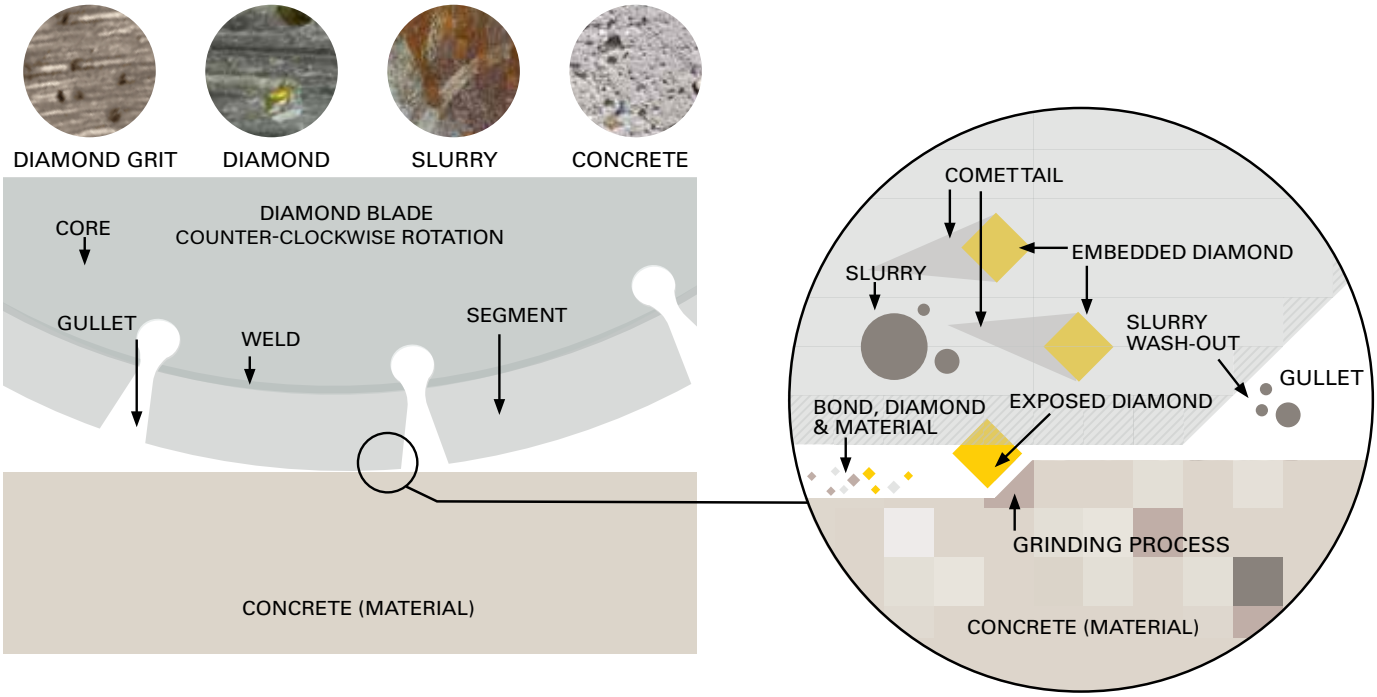
### 8. BORE (ARBOUR):

The bore of a diamond blade is the central opening that fits onto the saw's arbour. It secures the blade in place for cutting. If the blade's bore is incompatible with the saw you want to use it with, you can utilise a bush to step down the bore size so that it fits tightly. You can find more information about this on page 14.

# THE GRINDING PROCESS

### GRIND NOT 'CUT'

Diamonds don't 'cut'; instead, they generate friction, grinding materials into a fine powder upon contact. During manufacturing, the diamond segment undergoes a 'breaking in' process, grinding the top layer of the bond to reveal the diamond crystals responsible for the actual cutting. The bond holds these diamonds in place, which gradually wears away, unveiling new diamonds. The bond, diamond, and material relationship reflects the segment's cutting effectiveness and lifespan. Choosing the right blade for the application determines if the blade's formulated bond holds the diamond in place long enough to get maximum use from the diamonds. When the bond is incorrect, one of two things will happen: either the bond will wear away too quickly, releasing and exposing the next layer of the diamond, also known as premature diamond loss or glazing, where the bond matrix encapsulates the diamonds within.




# THE MANUFACTURING PROCESS

### LASER WELDING PROCESS

Syntec predominantly employs the laser welding method in crafting diamond blades, reserving sintered blades for custom orders exceeding a specific length. Renowned for its efficiency, laser welding is the superior technique for bonding diamond segments to a blade's core despite its higher cost. This advanced method facilitates the rapid welding of 50 blades per hour at dimensions of 50 x 230mm, underscoring its speed and precision. Noteworthy for its strength and versatility, laser welding ensures the durability and adaptability of Syntec diamond blades across diverse cutting applications. Throughout the manufacturing process, key steps include:

1. Accurate weighing and mixing of diamond and bond powders.
2. Place the mix into segment-shaped moulds, followed by loading into an isostatic press to reduce porosity.
3. Loading segment moulds into a furnace for high-temperature treatment, resulting in increased hardness.
4. Tested blade tension to ensure flexibility.
5. Loading the hardened segments and steel cores into a laser welding machine for individual welding.
6. Dressing the blade to expose diamonds.
7. Safety testing, where a percentage of each batch undergoes stress testing.
8. Finalising the product through painting, etching, labelling, and packing.

# CUTTING EDGE MATERIALS

### CORE

The core made of high-quality steel can vary, and it is selected based on factors like strength, durability, and the specific demands of the cutting application.

### SEGMENT

The segments of the blade are typically composed of synthetic diamond crystals and bond. The bond's material blend consists of a mixture of cobalt, Nickel Tungsten, Bronze and other metals.

### WELD

In laser-welded blades, the welding material is often a high-strength alloy. This alloy is chosen for its ability to securely join the segments to the core through the laser welding process.

# TYPES OF SEGMENTS

## INTRODUCTION

Segments are a crucial element of the diamond tool, acting as the functional end that interacts with the material. The mixture of diamond crystals and bonding metal powders, accomplished through a hot pressing process, creates these segments. Deliberately wider than the core, they guarantee ample clearance during cutting. Syntec Diamond Tools utilises six main segment types: Regular, N-shaped, Twin, Turbo, Agresso, and Castle. Each style is meticulously crafted for specific cuts and tailored to different materials, showcasing the versatility below.

### REGULAR

The regular segment is the most popular design formulated for long-segment life, durability, and compatibility with various materials.

### N-SHAPED

The N-shaped is shaped like an 'N' to reduce surface area and combined with the turbo texture, enabling faster cutting. CPP (Arix) gives the N-shaped segment a more consistent cut.

### TWIN

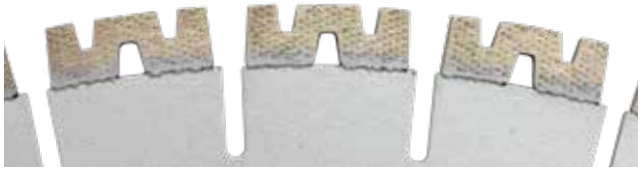
Twin segments use less surface area and more gullets, allowing for better clearance.

### TURBO

Turbo segments have a similar surface area to the regular segment, including the turbo-serrated texture, which aids a faster and more aggressive cut.

### AGRESSO

The Agresso is specifically designed for the new generation battery electric hand saw. The Agresso segment, used wet or dry, is intended to clear the slurry as it cuts and does not jam in the groove.

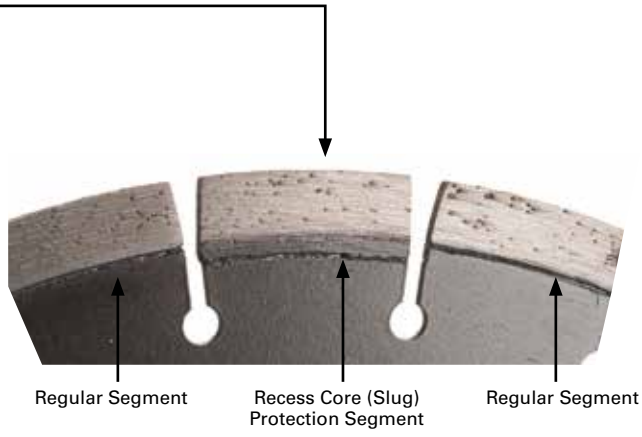


### CASTLE

The Castle segment is a high-quality diamond concentrate designed for fast, aggressive cutting on high-frequency saws and tough material.

### PROTECTION SEGMENTS

Suppose the core of a blade wears faster than the segments. In that case, it leads to a condition known as under-cutting, which is a common issue in asphalt and green concrete applications where an abrasive slurry accumulates on the blade, eroding the metal core right beneath the segments weld. 'Under-cutting' nowadays is shielded with protection segments that reduce the core's erosion process, ultimately preventing early segment loss. Our blades use recessed cores (slugs), allowing a larger segment to sit in position; depending on the number of segments, for example, a 24-segment blade may have four protective segments evenly distributed, protecting five segments between them. These protection segments push the slurry away from the regular segment welds, preventing segments from popping off due to slurry erosion on the weld joint.



# TYPES OF GULLETS

### INTRODUCTION

Gullets in diamond blades are the spaces between segments designed to keep the blade cool and allow appropriate air flow and slurry removal, improving cutting performance, especially in more abrasive materials. Below are three types of Gullets that Syntec Diamond Tools use.

### KEYHOLE

Keyhole gullets in diamond blades alleviate stress during cutting, enhancing their resilience proportional to the hole's radius, although it has the potential to produce a whistling sound. The keyhole is particularly effective for cutting hard, abrasive materials like concrete, stone, or ceramic tiles; these blades facilitate efficient debris removal and cooling, making them indispensable for demanding construction and masonry tasks.

### U-SHAPED

Wider gullets in blades enhance strength and slurry removal efficiency, particularly suitable for heavy-duty cutting tasks like those on stone, yet less ideal for precision or finer cuts due to their broader profile; typically employed in stone blades for demanding applications prioritising strength and efficient slurry removal over precision.

### NARROW SLOT

A narrow slot gullet is particularly useful for tasks requiring precision and clean cuts, as they facilitate efficient debris removal without compromising cutting accuracy.

# TYPES OF BLADES

### SEGMENTED BLADES:

Segmented diamond blades provide the fastest cutting speed and longest life span, making them ideal for various building materials, including concrete, reinforced concrete, green concrete, and asphalt. They are available in diameters larger than 12".

### CONTINUOUS RIM BLADES:

Continuous rim diamond blades offer a smooth, solid edge, perfecting finish without chipping. They are ideal for hard materials like marble, porcelain, granite, ceramic, and quarry tile. Continuous rim blades are slower in cutting speed compared to segmented blades.

### TURBO BLADES:

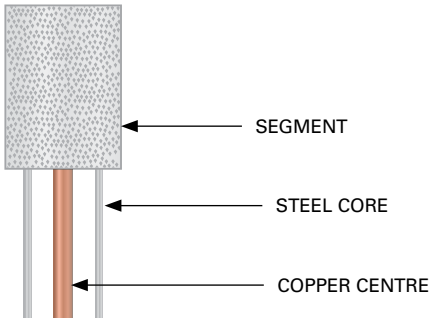
Turbo blades combine advantages from both segmented and continuous rim blades, offering a faster, more aggressive cut tackling tougher materials. They have a constant rim with a serrated edge, providing a smooth cut with more minor shocks. They are ideal for roof tiles, unglazed tile, masonry, brick, block paver, stone and concrete. Turbo blades are generally available in smaller sizes (4"-14").

### SILENT BLADES:

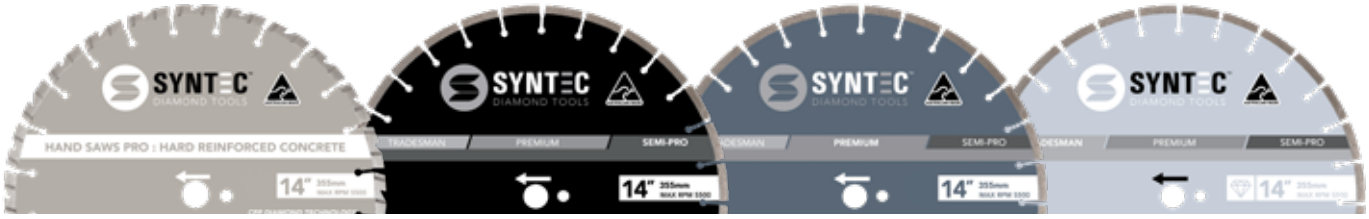
Silent blades feature a 'vibration damped' design with a sandwich core, laminating two steel cores around a copper centre, effectively reducing noise levels by up to 15 dB. Ideal for noise-sensitive job sites, these blades minimise cutting noise and high-pitched ringing sounds and offer enhanced vibration resistance, thereby extending blade life, improving sawing quality, and enhancing operator safety. Our range includes silent blades tailored for masonry, core, and refractory applications, ensuring optimal performance on machines where the blade noise isn't overpowered.

### SILENT BLADE DIAGRAM

Internal Diagram of a Silent Blade Core and Segment.



# SYNTEC DIAMOND BLADE GRADES




### PRO

Highest diamond quality and concentration. Ideal for professionals. Maximum speed and life.

### SEMI PRO

Ideal for general contractors who use blades frequently. High speed and life.

### PREMIUM

High diamond quality, medium to high diamond concentration. Ideal for typical applications.

### TRADESMAN

High diamond quality and medium diamond concentration. Great value and performance Ideal for general purpose/trades.

# SYNTEC DIAMOND BLADE RANGE

### FLOOR SAW BLADES:

Suitable for high horsepower (>25HP) walk-behind floor saws.

Torque tested for a solid bond, ensuring maximum speed and life.

Available with 12mm segment height for hard, medium, and soft concrete and 10mm for asphalt.

Included in the range is Loop / Joint blades and Semi Pro Low HP blades.

### HAND SAW BLADES:

Features a 12mm segment height for fast cutting speed and extended lifespan

Available in Pro, Semi-Pro, Premium, and Tradesman ranges for diverse applications

Suitable for hard reinforced concrete, abrasive materials, concrete, concrete/asphalt, and asphalt.

Featuring in this collection are blades with CPP technology and protection segments.

### WALL SAW BLADES:

Syntec offers a full range of wall saw blades, tensioned for various wall saws - hydraulic, high-cycle and pneumatic.

13mm twin segments and configured blades for concrete, reinforced concrete, brick, and block.

Bond developed for free-cutting with a 9-hole pattern matching flush mounts from other major brands.

### BRICK & MASONRY BLADES:

Syntec's high-performance cutting blades for brick and masonry offer quick and accurate cutting with 12mm segments for extended life.

Featuring a high diamond count, they provide smooth cuts in wet or dry conditions.

Ideal for various materials, including clay bricks, concrete pavers, besser blocks, sandstone, granite, marble, and blue-stone.

Options include blades for hard clay brick, clay/concrete block pavers, and abrasive block pavers, including a silent laminate version.

### CORE SAW BLADES:

Designed to cut soft, medium, and rigid materials, offering optimal meterage of cuts per blade.

Mechanically balanced for straight-edge cutting, minimising off-centre deviation and increasing cutting speed.

Available in 12" (305mm) and 14" (355mm) sizes for electric and hand-operated core saws, with a silent laminated version.

### EARLY ENTRY BLADES:

Used to make controlled, shallow cuts in fresh concrete to prevent random cracks.

Gold blade for same-day cutting, red blade for next-day cutting, and purple blade for cutting after 2-3 days.

### CRACK CHASERS / TUCK POINTERS:

Crack Chasers feature wedge-shaped segments for fast cutting and exceptional blade life.

They are designed for cleaning and widening cracks or imperfections in concrete and masonry surfaces.

Tuck Pointers are used to remove mortar joints and prepare abrasive surfaces quickly.

### REFRACTORY BLADES:

High-quality blades designed for cutting virtually any refractory material.

High diamond concentration for aggressive cutting and superior blade life.

Available in high alumina and silica carbide variations, with a silent laminate finish and CPP version.

### RESCUE / DUCTILE IRON BLADES:

Specially developed for time-sensitive applications, it is ideal for fire and rescue.

Provides high-speed cutting on a wide range of materials, including ductile iron, steel, plastic, concrete, and more.

Vacuum brazed, laser welded finish for superior quality with minimal sparking.

# MOHS HARDNESS SCALE

The Mohs scratch test is a method used to determine the relative hardness of minerals by scratching them against materials of known hardness on the Mohs scale, ranging from 1 (softest) to 10 (hardest). Refer to the chart to see the equivalent hardness of the mineral and everyday materials/objects.

### MOHS SCRATCH TEST TOOLS


### MOHS HARDNESS CHART

| MINERAL NAME | SCALE NUMBER | MATERIALS AND COMMON OBJECTS |
|---|---|---|
| **Diamond** | 10 | |
| **Corundum** | 9 | Alumina |
| **Emerald/ Topaz** | 8 | Masonry Drill Bit (8.5) |
| **Quartz** | 7 | Granite |
| **K-feldspar** | 6 | Steel Nail /Basalt (6.5) |
| **Apatite** | 5 | Slate/Glass (5.5) |
| **Fluorite** | 4 | Aluminium/Limestone |
| **Calcite** | 3 | Bronze (3.5)/Plastic (1-4) |
| **Gypsum** | 2 | Asphalt/Fingernail (2.5) |
| **Talc** | 1 | Crayons/Chalk (1-2.5) |

# MATERIALS

### FACTORS AFFECTING CONCRETE SURFACE HARDNESS

Determining the hardness of the concrete surface for grinding/cutting involves considering various factors. While specifications from the concrete manufacturer provide a starting point, other variables such as weather, concrete mix, and aggregates also play significant roles. Concrete typically achieves about 50% strength after seven days and fully cures after 28 days.
Testing methods like a Mohs scratch test kit or a rebound hammer help assess concrete hardness. Syntec Diamond Tools meticulously engineer their blades to cut various concrete forms precisely and meet the diverse needs of the construction and cutting industries. To ensure exceptional performance, selecting the appropriate blade bond that matches the material hardness is crucial to prevent glazing or premature diamond loss, thus ensuring optimal blade life and performance.

Concrete reinforcing steel bars (Rebar), steel wire strands, or wire mesh in the concrete enhances its strength. Cutting concrete containing Rebar increases costs due to slower cutting speeds and reduced blade life. For instance, if the concrete contains 1% steel by cross-sectional area, the blade life may shorten by about 25% compared to concrete with no steel. Concrete with 3% steel can reduce blade life by as much as 75%.

### MATERIAL AND BOND COMPATIBILITY

There are many hardness tests, commonly used are the Rebound Hardness Test, which measures surface hardness; The Mohs Hardness Test, which is a method of ranking minerals based on their relative scratch resistance; and the Compression Test, which evaluates the force strength of materials (the Compression Test is considered a destructive test). To select the right blade, testing the material before cutting is crucial. It is important to note that the provided information is only a guide and should not replace testing as many factors, such as location, condition, and curing state, can affect the hardness of the material.

| HARD BOND | MEDIUM BOND | SOFT BOND | SPECIALISED BOND |
|---|---|---|---|
| **SOFT MATERIALS:** | **MEDIUM MATERIALS:** | **HARD MATERIALS:** | **VERY HARD MATERIALS:** |
| **<20 MPa concrete (Mohs 1.5-5)** | **<30 MPa concrete (Mohs 3-6)** | **<40 MPa concrete (Mohs 6-7)** | **60+ MPa concrete (Mohs 7-9)** |
| (Roads, Pavement, Domestic ) | (Car Parks, Factories, Commercial) | (Bridges, Piers) | (Nuclear plants, Foundries) |
| Asphalt/Asphalt over concrete | Limestone | Sea gravel | Ceramics |
| Gyprock (Drywall) | Marble | River Gravel | Porphyry |
| Soft Ceramics | Travertine | Terrazzo | Basalt |
| Green Concrete | Slate | Engineered Stone | Granite/Hard Granite |
| Low-Strength Concrete | Ductile Iron | Sandstone | Flint |
| Self-Consolidating Concrete | Brick/Refractory Brick | Quarry Tile | Quartz |
| Stamped Concrete | Paver (Concrete) | Hard Ceramics | Alumina |
| Exposed Aggregate Concrete | Porcelain/ Ceramic Tile | | |
| Shotcrete | | | |
| Pervious Concrete | | | |
| Fibre-Reinforced Concrete | | | |

# GUIDE TO CHOOSING THE RIGHT BLADE

## VARIABLES THAT AFFECT PERFORMANCE

Several factors influence the performance and overall value of a blade. These include the size, concentration, diamond quality, the bond's hardness, the saw's cutting power, and the degree to which the blade specifications align with the cut material. Please refer to the 'Variables that affect performance chart' as a guide.

## THE CHEAPEST BLADE CAN COST YOU THE MOST

**Rule of Thumb:** The more expensive blade features high-quality diamonds and materials, which yield superior performance. When considering labour costs and other time-specific expenses, the aim is to complete the job as quickly as possible, and often, a high-performing blade proves to be the most cost-effective option in the long run.

## SAFETY & PPE

The majority of issues with diamond tools arise due to one of the following reasons: The tool specifications don't match the job, the operator misuses the tool, or the machine is faulty.

## CUTTING DEPTHS AND SPEEDS

Use the chart below as an approximate guide for the cutting depths of Diamond blades. Various factors, including the specific blade diameter, type or brand of saw, and the exact diameter of the blade collars (flanges), all contribute to the cutting depth.

**Rule of thumb:**
Cutting depth is 1/3 of the blade diameter.

| DIAMETER | | CUTTING DEPTH | | MAXIMUM SAFE SPEED |
|---|---|---|---|---|
| INCH " | MM | INCH " | MM | RPM* |
| 4" | 101.6 | 1.33" | 33.86 | 15200 |
| 5" | 127 | 1.66" | 42.33 | 12200 |
| 6" | 152.4 | 2" | 50.80 | 10185 |
| 7" | 177.8 | 2.33" | 59.26 | 8730 |
| 9" | 228.6 | 3" | 76.20 | 7640 |
| 12" | 304.8 | 4" | 101.60 | 6300 |
| 14" | 355.6 | 4.66" | 118.53 | 5500 |
| 16" | 406.4 | 5.33" | 135.46 | 3820 |
| 18" | 457.2 | 6" | 152.40 | 3365 |
| 20" | 508 | 6.66 | 169.33 | 3055 |
| 24" | 609.6 | 8" | 203.2 | 2500 |
| 26" | 660.4 | 8.66" | 220.13 | 2350 |
| 30" | 762 | 10" | 254 | 2040 |
| 36" | 914.4 | 12" | 304.8 | 1700 |

| VARIABLES | CONDITION | CUTTING SPEED | BLADE LIFE |
|---|---|---|---|
| Bond Hardness | Harder | Slower | Longer |
| | Softer | Faster | Shorter |
| Diamond Quality | Lower | Slower | Shorter |
| | Higher | Faster | Longer |
| Diamond Grit Size | Coarser | Faster | Longer |
| | Finer | Slower | Shorter |
| Diamond Concentration | Lower | Faster | Shorter |
| | Higher | Slower | Longer |
| Horsepower | Lower | Slower | Longer |
| | Higher | Faster | Shorter |
| Blade RPM | Higher | Faster | Shorter |
| | Lower | Slower | Longer |
| Water Flow | Correct | Faster | Longer |
| | Incorrect | Slower | Shorter |
| Cutting Depth | Shallow | Faster | Longer |
| | Deep | Slower | Shorter |
| Material Hardness | Harder | Slower | Longer |
| | Softer | Faster | Shorter |
| Aggregate Size | Larger | Slower | Shorter |
| | Smaller | Faster | Longer |
| Steel Reinforcement | Less | Faster | Longer |
| | More | Slower | Shorter |

## HELPFUL TIPS

1. Do not force the blade. Use consistent pressure, and the tool does the cutting itself.

2. Turn the equipment on; the blade must be spinning before it contacts the surface with adequate water flow. Otherwise, it will kick back.

3. The higher the horsepower, the more torque a blade has and the more course the bond should be.

4. Rule of thumb: Efficient cutting requires one horsepower per inch of blade diameter.

5. The smaller a blade is, the lower the cutting depth, but the higher the power and speed of cutting.

6. Multiple shallow cuts, also known as step cuts, are better than long single cuts.

7. If the direction arrow on your blade has worn away, observe the direction in which the comet tails fall behind the diamonds. Refer to the diagram located on page 8.

8. An adequate water flow is crucial – ideally, the slurry should resemble heavily creamed coffee. Too much water will wear away the bond, and too little water leads to overheating.

# WET VS DRY CUTTING

### WHAT IS WET AND DRY CUTTING

There are two ways to cut materials: wet cutting and dry cutting. Wet cutting involves using water to cool the blade while it operates, which reduces the heat produced by friction, making it perfect for cutting abrasive materials. On the other hand, dry cutting is done without water. It is important to note that wet cutting is the preferred option due to its many benefits, including safety, efficiency, and longer tool life. Dry cutting exposes the operator to greater risk and releases harmful dust in the working area. Ensure that appropriate Personal Protective Equipment (PPE) and dry-cutting safety equipment such as vacuums are used when dry-cutting. For more information, please see page 36.

### WET CUTTING DO'S

- Wear PPE and remove any hazards from the area.
- Ensure adequate water supply to both sides of the blade.
- Ensure the water resembles a coffee-like slurry.
- Ensure you're using a wet diamond blade.
- Ensure the blade is running at the correct speed before cutting.
- Follow the manufacturer's recommended safety guides.

### DO NOT

Do not force the blade or rush the cutting process.

Do not use a machine with a damaged or open blade guard.

Do not have unsafe electrical connections in the working area; ensure GFCIs are used.

Do not leave water unattended. To prevent slip hazards; make sure to clean the area for operator safety, prevent environmental risks, and mitigate possible chemical exposure.

### DRY CUTTING DO'S

- Use personal safety equipment, including safety masks and safety-certified vacuums.
- Ensure that the workplace is well-ventilated and the exposure to respirable crystalline silica (silica dust) does not exceed the standard limit of 0.05 mg/m3 (eight-hour time-weighted average).
- Ensure the blade is running at the correct speed and the arrow on the blade coincides with the machine's rotation direction before cutting to avoid blade kickback.
- Ensure you're using a dry-cutting blade.
- Ensure no potential risks and the area is clean and safe while operating.
- Follow manufacturer instructions before operating.

### DO NOT

Do not make long continuous cuts with a dry blade (carry out a slight pendulum movement to keep the blade cool).

Do not cut too deep in a single pass or apply too much pressure on your diamond blade through the cut.

Do not ignore signs of blade warping, smoke, or friction. Excessive heat generated at the blade's cutting edge is hazardous to the tool, equipment, personnel and material.

Do not attempt to cut curves with your blade.

Do not use dry blades for raking out mortar joints, metals, or other unsuitable materials.

**For more safety information, read Crystalline Silica on page 36.**

# BLADE ACCESSORIES

**BUSH1-20-2.4**
Most sought after is the BUSH 1"-20mmx-2.4mm

### BUSHES

The purpose of bushes is to help fit the blade bore to the saw's arbour. Bushes ensure proper alignment and secure blade attachment to the saw, preventing slippage or wobbling during operation. Contact your local representative for the custom bush details located on page 3.

**SPHU150**
34 cm x 6 cm x 5 cm

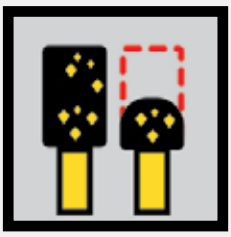
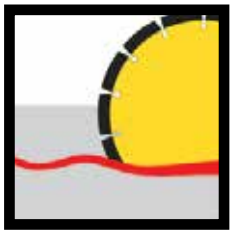
### SKID (EARLY ENTRY)

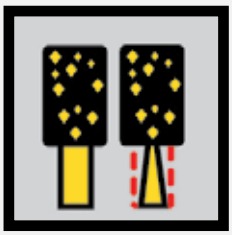
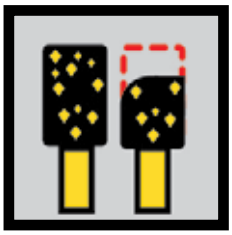
A saw skid enhances concrete cutting by offering stability and precision. It guides the blade along a straight path, ensuring accurate and consistent cuts while minimising vibrations. Its primary aim is to improve cutting efficiency and quality.

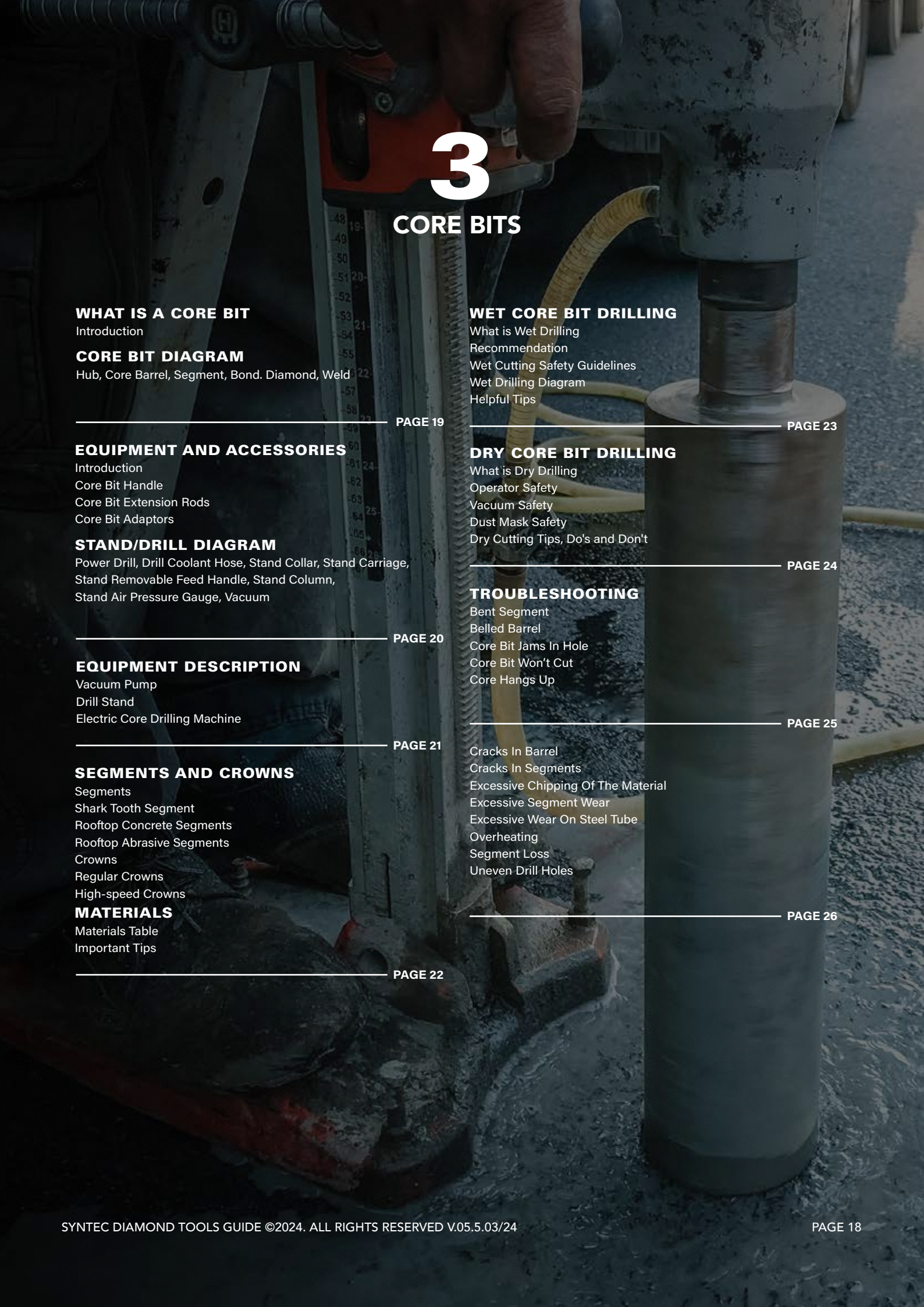
# TROUBLESHOOTING

The majority of issues with diamond tools arise due to one of the following reasons:
The tool specifications don't match the job, the operator misuses the tool, or the machine is faulty.

| PROBLEM | DESCRIPTION/CAUSE | SOLUTION |
|---|---|---|
| **Blade out of Round**  | If the blade doesn't run smoothly, pay attention to the following: | Tune the engine. |
| | | Replace the bearings or lubricate the machine. |
| | | Ensure the condition of the spindle. |
| | | Re-bore the blade if it is still in good condition. |
| | | Replace the arbour bush or shaft. |
| | | Choose a blade with a softer or harder bond. |
| | | Tighten, clean or replace the flange. |
| | | Ensure the shaft has the correct diameter and the pinhole slides over the drive pin. |
| **Burning / Discolouration** | If your blade has turned black or blueish, this is an indication that it has overheated. Burning is one of the most common issues and can lead to several others, such as loss of tension or cracks in the core. | Increase water flow, check the direction of the water stream and make sure there are no blockages. Allow the blade to cool by running at full speed outside the cut. |
| | | Reduce the pressure on the blade and avoid cutting too deep. |
| **Cracks in Core**  | Cracks in the blade appear when the tool is under extreme pressure creating metal fatigue. The extreme pressure can potentially generate the core to bend, flex, and eventually crack. **WARNING: Never use a cracked blade** | Choose a blade with a softer bond. |
| | | Apply steady, even pressure without twisting the blade during the cut. |
| | | Increase the water supply. |
| | | Allow the blade to cool down in between cuts and ensure adequate airflow. |
| | | Check shaft and bearings and replace if needed. |
| | | Replace blade, tighten shaft nut, check the operating speed as well as the drive pin. |
| **Cracks in Segments**  | Segments in tools such as saw blades can develop cracks due to various reasons, including overheating, improper use, incorrect bond/material hardness, and incorrect installation. **WARNING: Replace the blade when a segment is cracked or broken.** | Test the material hardness and choose a blade with a softer or harder bond. Some cases the bond does not match the material hardness. |
| | | Reduce the cutting speed and increase water pressure. Ensure no rebar is in the material, or a blade's life expectancy reduces significantly. |

| PROBLEM | DESCRIPTION/CAUSE | SOLUTION |
|---|---|---|
| **Excessive Wear** | Purchasing the wrong blade can result in the diamonds becoming over-exposed. Excessive wear occurs when the bond does not match the application, leading to excessive wear and impacting the blade's lifespan. | Choose a harder bond. |
| | | Check that the water supply is adequate. |
| | | Tension the belt or replace it if it is worn. |
| | | Check the bearings and spindles and replace them if they are worn. |
| | | Reduce the cutting speed. |
| | | Check the alignment of the blade and machine. |
| | | Ensure the drive spindle is rotating at the right speed. |
| **Glazing (blade won't cut)**  | Over time, a blade's bond wears away, exposing diamonds to continue cutting. If, however, the bond doesn't wear away as intended, diamonds no longer get exposed, resulting in the blade slowing down until it eventually stops cutting. This smoothing of the blade's cutting edge is called glazing. | Choose a blade with a softer bond. |
| | | Dress or sharpen the blade with a soft concrete block or abrasive wheel to expose diamonds. If reoccurring, switch to a blade with a softer bond. |
| | | Reduce the amount of coolant. |
| | | Reduce operating speed. |
| | | Switch to a machine with higher horsepower and check and tighten belts. |
| | | Check the tension on the drive belt. |
| | | Check the direction of the arrow on the blade. If the arrow is no longer visible, check which way the bond tail behind a diamond is facing. Mount so that the diamond sits ahead of the bond tail when turning. |
| **Loss of Tension / Blade doesn't Run Steadily**  | When a blade loses its tension, it will appear to wobble as the machine spins it. Ensure the blade runs steadily and is used correctly for a clean cut. Issues like improper speed, mismatched arbour holes, shaft size, or a bent blade from dropping or twisting can affect the cut quality. | Align saw correctly and ensure the shaft diameter and the bore is correct, clean and flat. |
| | | Choose a softer bond to reduce stress, or switch to a new blade. |
| | | The material must be held in place firmly. |
| | | Check the intended RPM and whether the spindle is rotating accordingly. |
| | | Tighten the blade shaft nut, check drive pin is working correctly and ensure adequate water supply. |
| | | Choose a blade with more side clearance or better suited to the material. |
| **Misalignment** | Not mounting the blade correctly on the saw/ equipment can lead to several issues when using it. | Tighten or replace the flanges. |
| **Overexposed Diamonds / Premature Diamond Loss** | Over time, a blade's bond wears away, exposing diamonds to continue cutting. If the bond wears away too quickly, the diamonds within the bond aren't supported anymore and fall out before the diamond is fractured or dull. | Choose a blade with a harder bond. |
| | | Test the material hardness to ensure it doesn't need a specialised bond. |

| PROBLEM | DESCRIPTION/CAUSE | SOLUTION |
|---|---|---|
| **Segment Loss**<br>  | In the unlikely event of segments falling off a blade, these can be the causes:<br><br>**WARNING:**<br>**Replace the blade when a segment is cracked or broken.** | Ensure not to apply too much pressure, check the bond and the material hardness, and ensure there is no rebar in the cut. |
| | | Check the blade's alignment. |
| | | Increase the water supply and let the blade run for a few minutes before continuing. |
| | | Replace the blade if the material is very abrasive; you may need a specialised bond. |
| | | Replace the blade as well as the bearing, realign the shaft or replace the blade mounting arbour. |
| | | Use a blade with the correct specifications for the application. |
| | | Ensure blades are handled carefully. |
| | | Use a blade with undercut protection, supply adequate water to the core and avoid cutting into the sub-base. Flush out the cut to remove debris and slurry. |
| **Short Blade Life**<br>  | Several factors can shorten the life of a blade considering the following steps can ensure a longer tool life. | Select the right blade for your application, i.e., one with a softer/harder bond. Test the material to ensure the hardness matches the tool. |
| | | Cut with the addition of water and ensure sufficient amounts are reaching the cutting area on both sides of the blade. |
| | | Keep an eye on the cutting depth and avoid cutting into the sub-base. |
| | | Keep the machine steady and allow the blade to do the cutting. |
| | | Check the blade's ideal RPM. |
| **Uneven Segment Wear**<br>  | If the segments wear only on one side, it impacts the blade's side clearance. | Check that the water is distributed evenly. |
| | | Replace the bearings, worn arbour shaft or misaligned spindle. |
| | | Check the wheels and their alignment on floor saws. Check the carriage alignment on masonry bench saws. |
| | | Choose a blade with a softer/harder bond. |



# 3
# CORE BITS


**WHAT IS A CORE BIT**
Introduction

**CORE BIT DIAGRAM**
Hub, Core Barrel, Segment, Bond. Diamond, Weld

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**EQUIPMENT AND ACCESSORIES**
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Core Bit Extension Rods
Core Bit Adaptors

**STAND/DRILL DIAGRAM**
Power Drill, Drill Coolant Hose, Stand Collar, Stand Carriage, Stand Removable Feed Handle, Stand Column, Stand Air Pressure Gauge, Vacuum

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**EQUIPMENT DESCRIPTION**
Vacuum Pump
Drill Stand
Electric Core Drilling Machine

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**SEGMENTS AND CROWNS**
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Shark Tooth Segment
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**TROUBLESHOOTING**
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Cracks In Barrel
Cracks In Segments
Excessive Chipping Of The Material
Excessive Segment Wear
Excessive Wear On Steel Tube
Overheating
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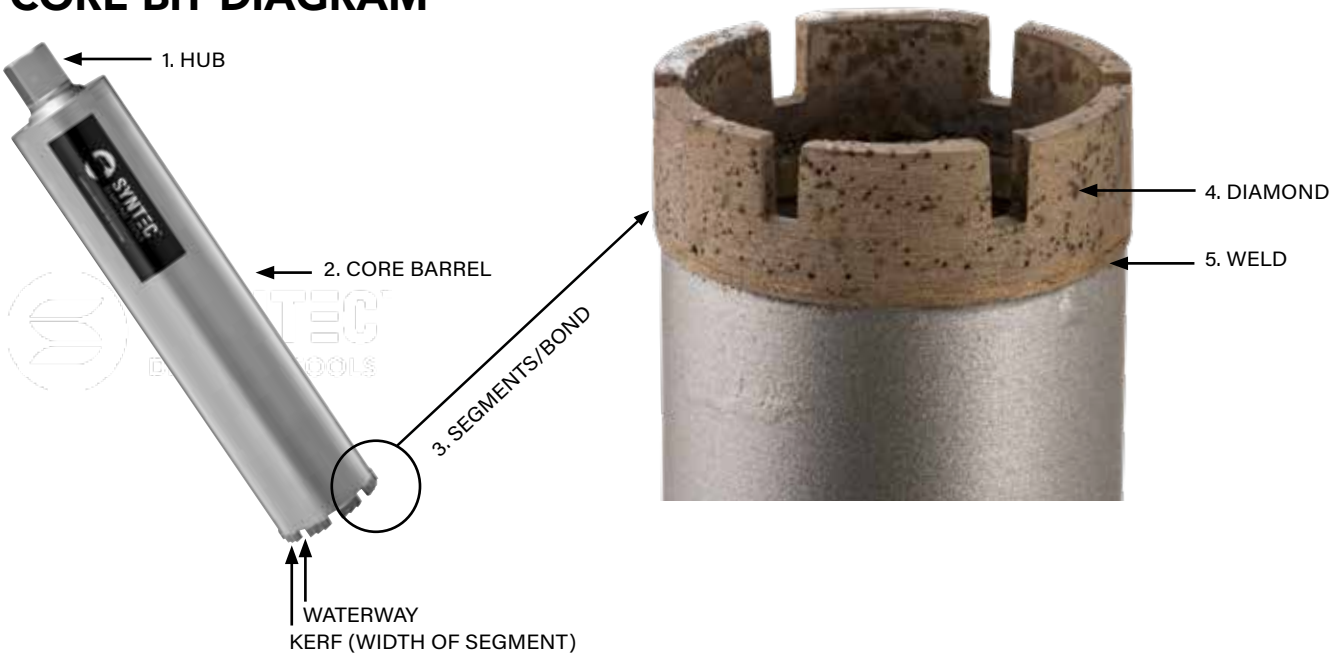
# WHAT IS A CORE BIT

### INTRODUCTION:

A core bit, a specialised drilling tool, creates cylindrical holes or “cores” in various materials like concrete, masonry, stone, and asphalt. It consists of a hollow, cylindrical tube with diamond-embedded segments at its cutting edge. As the core bit rotates and applies downward pressure, it grinds away the material, creating a clean and precise hole. Core bits are used in construction industries, requiring accurate and efficient hole drilling. With over two decades of manufacturing experience, Syntec designs core bits for light and heavy-duty drilling, offering premium quality laser-welded diamond segments that provide optimal drilling speeds and maximum performance. Wet cutting methods are recommended to increase cutting speed and tool life and eliminate hazardous dust, such as silicosis.

# CORE BIT DIAGRAM




### 1. HUB:

The hub is a central component in a core bit assembly, serving as the connection point between the core barrel and the drill rig. The hub is crucial in transmitting rotational force from the drill rig to the core barrel for effective drilling.

### 2. CORE BARREL:

The barrel is the 'body' of the core bit and is responsible for the width and length of the overall cut. In operation, the segments attached to the bottom of the barrel grind the material while the barrel houses the material within

### 3. SEGMENT/BOND:

Segments positioned on the bottom of the barrel are responsible for the cut; these are a compilation of metals known as 'bonds' that wear away and release diamond crystals. Core bit segments can be designed in two ways for longevity. The smaller barrels will adopt crowns, and larger barrels will have segments more discussed on page 22, 'segments and crowns.'

### 4. DIAMOND:

Diamonds embedded in the core bit’s segments are the primary cutting elements. Diamonds’ hardness and abrasive properties make them practical for drilling through various materials—the quality and type of diamonds and segment type influence the cutting speed and performance.

### 5. WELD:

Welding is affixing the segments onto the core barrel. Proper welding is crucial for establishing a secure and durable bond between the segments and the core barrel. Most of our segments are laser-welded onto the core bits, forming an exceptionally robust bond capable of withstanding high temperatures. Furthermore, laser-welded segments enable the full utilisation of segment depth and are reputed to have a lifespan of approximately 35% longer than that of sintered core bits.

# EQUIPMENT AND ACCESSORIES

### INTRODUCTION:

Understanding the relationships between the essential components of a core drilling system is crucial for achieving optimal results. Syntec Diamond Tools offers a comprehensive range of equipment, including an electric core drill, stand, and vacuum pump, as well as a variety of accessories such as a core bit handle for easy transportation, core bit extension for increased drilling depth, and adapters for compatibility with different drill bit sizes. With Syntec's high-quality equipment and accessories, you can be confident in your ability to tackle any core drilling project with precision and efficiency.

**CORE BIT HANDLE**

| PART NO. | WEIGHT MAX |
|---|---|
| 1 1/4"7TPI - Hi Speed Core Bit Handle | 30kg |

**CORE BIT EXTENSION RODS**

| PART NO. | LENGTH |
|---|---|
| EXROD150 | 150mm |
| EXROD300 | 300mm |
| EXROD450 | 450mm |

**CORE BIT ADAPTORS**

| PART NO. | DESCRIPTION |
|---|---|
| ADAPTOR-7UNC-1/2"BSP | 1-1/4" 7UNC Male to 1/2"BSP Male |
| ADAPTOR-HILTI-7UNC | Hilti to 1 1/4" Male UNC-1/2"BSP Female |

# STAND/ DRILL DIAGRAM

### 1. POWER DRILL:

A power drill is a versatile tool that allows you to attach core bits quickly, providing power to the cut. There is more description on page 21.

### 2. DRILL COOLANT HOSE:

The drill coolant hose is essential in drilling operations as it supplies cooling fluid directly to the drilling area. Known as wet cutting, it reduces friction and heat build-up, enhancing drilling performance. For more wet-cutting information, visit page 23.

### 3. STAND COLLAR:

The collar securely holds the power drill, connecting it to the standing mast (column), ensuring stability during drilling.

### 4. STAND CARRIAGE:

The stand carriage is designed to travel up and down the stand column, fixing it into place and making height adjustments.

### 5. STAND REMOVABLE FEED HANDLE:

The feed handle tightens any height or angle adjustments. Ensure the core drill remains fixed by rotating the feed handle securely.

### 6. STAND COLUMN:

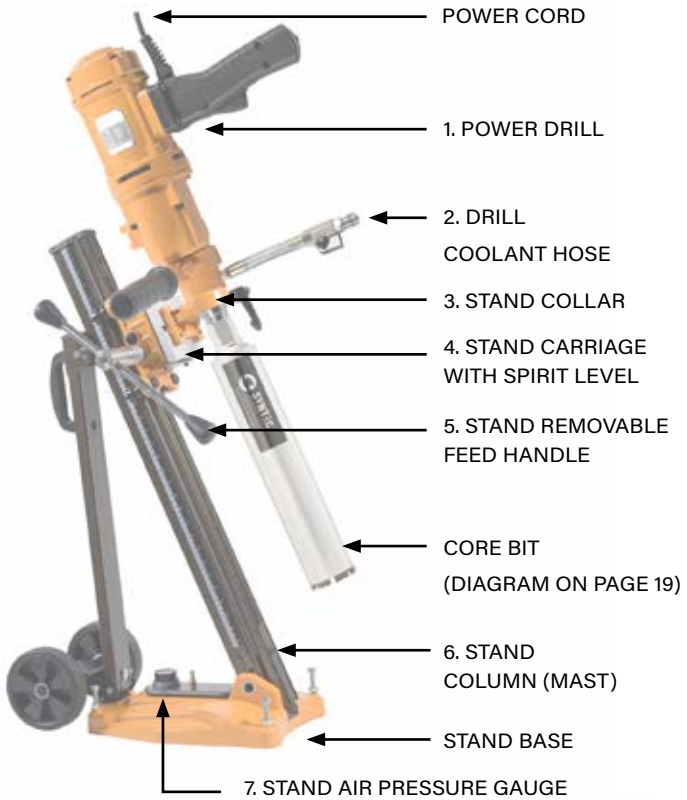
The stand column provides structural support and precision. While the carriage travels along the column, visible measurements help assist in correct depths during drilling operations.

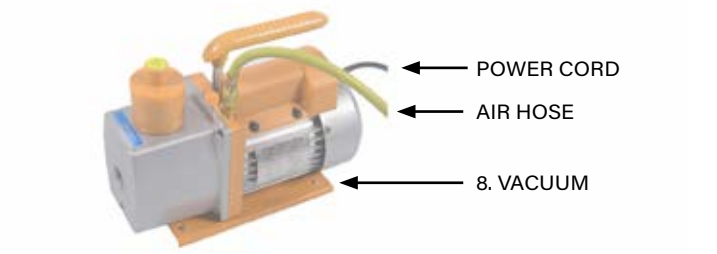
### 7. STAND AIR PRESSURE GAUGE:

The air pressure gauge displays the current suction power.

### VACUUM:

The vacuum anchors the drill stand to the ground, minimising movement and enhancing stability during drilling operations.



# EQUIPMENT DESCRIPTION

## VACUUM PUMP

| PART NO. | SPECS | |
|---|---|---|
| 2RS-2 | Voltage: | 220V / 50Hz |
| | Free Air Displacement: | 4.5 CFM |
| | Ultimate Vacuum: | 3x10-1 Pa |
| | Power (HP): | 1/2 HP |
| | Oil Capacity (ml): | 330 ml |
| | Dimensions (mm): | 290 x 115 x 220 |
| | Weight (kg): | 9 kg |

### DESCRIPTION:

The Syntec Vacuum Pump is ideal for areas where mechanical anchors are not feasible. It securely fastens the drill stand base through powerful suction to most tiled and concrete surfaces.

## DRILL STAND

| PART NO. |
|---|
| KCY-280F |

### DESCRIPTION:

The full-sized drill stand, featuring a convenient quick-release motor mount, is helpful for optimal functionality. It offers versatility as it can be used as a bolt-down stand or with a vacuum base when equipped with a vacuum pump. The integrated vacuum base eliminates anchoring or clamping, ensuring a fast setup for efficient operations. The back support is securely clamped to the column, providing stability through a rigid locking system. Additionally, adjustment screws on the base plate, carriage, and back support can be easily adjusted using the feed handle. Despite its full-sized design, the drill stand is compact and easily transported. Its lightweight, adjustable aluminium stand allows for tilting, enabling easy drilling of holes from 45o to 90o.

## ELECTRIC CORE DRILLING MACHINE

| 2X SPEED MOTOR SPECS<br>PART NO. SCY-90-2BS | 3X SPEED MOTOR SPECS<br>PART NO. SCY-90-3BS |
|---|---|
| Voltage 240V | Voltage 240V |
| Input power 1800w | Input power 2100w |
| Max Drill Diameter<br>90mm hard materials<br>152mm soft materials | Max Drill Diameter<br>150mm hard materials<br>180mm soft materials |
| Frequency 50-60Hz | Frequency 50-60Hz |
| RPM 800/3600 | RPM 630 / 1400 / 3000 |
| Drill Rig Attachment:<br>60mm clamping collar | Drill Rig Attachment:<br>60mm clamping collar |

2X SPEED MOTOR

3X SPEED MOTOR

### DESCRIPTION:

Hand-held electric drilling machines with 2-speed or 3-speed motors are designed to offer maximum productivity. They come with a gearbox with oil bath lubrication and an overload clutch, enabling wet and dry drilling without changing accessories. The machine also provides levelling assistance and has durable full-metal housing. Additionally, it includes a complete tool-set in a practical carry case with overload protection. These machines have many applications, such as wet drilling in concrete, masonry, and stone. They can be used for stitch drilling for plumbing, air conditioning, and ventilation openings. These machines can also core holes in ceilings, walls, and floors without hammering and vibration.

# SEGMENTS AND CROWNS

## SEGMENTS:

Segments are the metal alloy bond that holds the diamonds responsible for the cut. Different segment types are responsible for other finishes; the available types Syntec Diamond Tool offers are Sharktooth, Rooftop Concrete and Rooftop Abrasive. Segments, unlike crowns, are individually attached to the barrel, usually chosen for larger core barrels, as the segment's size is big enough to be securely welded.

### SHARK TOOTH SEGMENTS

- For reinforced concrete, exposed aggregate and pre-cast concrete.
- Developed with a softer bond for a fast, aggressive cut and long life.
- Serrated design grips straight into the substrate, reducing deviation from the point of contact.

### ROOFTOP CONCRETE SEGMENTS

- For reinforced concrete, exposed aggregate and pre-cast concrete.
- Developed for a long life.
- Enable a fast starting of cut.

### ROOFTOP ABRASIVE SEGMENTS

- For abrasive materials.
- Developed with a hard bond for a long life.

## CROWNS:

A crown is a continuous band of diamond segments encircling the entire circumference of a core drill barrel, providing a smooth and consistent cutting action. Crowns are usually used for smaller core barrels as the weld breaks off if they are segmented. Having a crown allows more surface area to be secured.

### REGULAR CROWNS

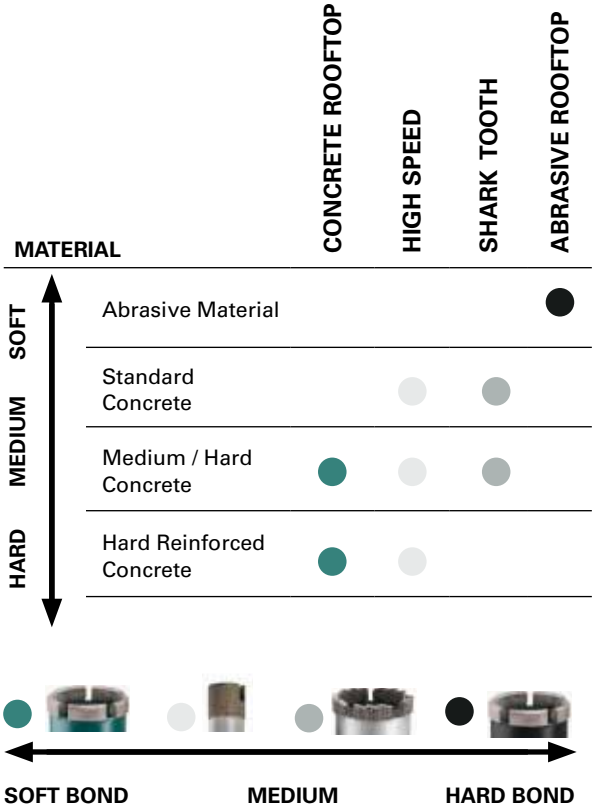
- For reinforced concrete, exposed aggregate and pre-cast concrete.
- Featured on core bits < 45mm in diameter.

### HIGH-SPEED CROWNS

- For heavily reinforced / high MPa concrete.
- Featured on core bits < 45mm in diameter.
- Developed with a softer bond and larger diamonds to make faster cutting easier.
  and reduce the likelihood of the bit grabbing when hitting reinforced parts.

# MATERIALS

Like diamond blades, core bits are also available in several variations to suit different applications or materials. We offer coring tools for a broad spectrum of applications, ranging from reinforced concrete to abrasive materials such as masonry, with a standard drill depth of 430mm and 1 ¼" UNC fitting across diameters from 12mm - 610mm. Our High-speed Core Bits come in 12 - 45mm diameters, feature a high-speed fitting (1/2" BSP) and are ideal for hand drilling with a shorter drill depth of 350mm.




## MATERIAL TABLE:

Presented in the table is a general guide and recommendation for the compatibility of products with various materials. It is crucial to consider the following factors to extend segment life, minimise premature diamond wear, and prevent diamond glazing.
Glazing occurs when the bond is too hard to cut the material, resulting in the absence of diamonds on the segment surface. On the other hand, premature diamond wear happens when the bond is too soft, and the diamonds do not effectively cut the material before the bond releases them.

## IMPORTANT TIPS:

Ensure the core-bit segment 'bond' matches the material, drill speed, and application. To prevent glazing during slow drilling, adjust water flow and confirm the drill is set-up correctly.

Ensure to monitor slurry colour and motor speed changes when drilling through concrete. Material variations can lead to drill overheating, reduced cutting efficiency, and compromise core bit integrity, posing risks to operator safety.

# WET CORE BIT DRILLING

## WHAT IS WET DRILLING

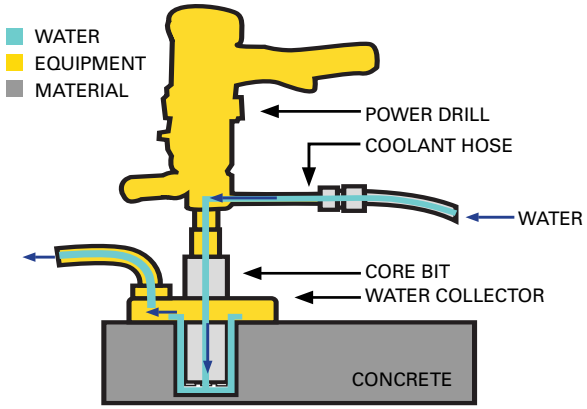
There are two ways to cut materials: wet cutting and dry cutting. Wet cutting involves using water to cool the core bit. Water enters the core bit while it operates, which reduces the heat produced by friction, making it perfect for cutting abrasive materials and preventing core bit jamming. Dry cutting refers to cutting without the use of water. For more information on dry cutting, please refer to page 24.
It is important to note that wet cutting is the preferred option due to its many benefits, including safety, efficiency, and longer tool life. Additionally, water minimises dust, significantly reducing safety hazards associated with airborne particles.

## RECOMMENDATION:

Wet cutting is preferred because it effectively eliminates harmful dust and prolongs the core bits' life.

## WET DRILLING DIAGRAM

A water collector minimises mess and maximises the benefits of wet drilling. It captures water used during drilling, directing it to a collection tank, resulting in a clean and controlled environment. The diagram shows the wet cutting process.




## WET CUTTING SAFETY GUIDELINES

- Always turn on the water supply before activating the drill motor to prevent water jacket seals from overheating.
- Secure the core drill to the work surface to eliminate movement leading to bit binding in the hole. Use base levelling screws or a vacuum pump for stability.
- Ensure a sufficient water supply to keep the diamond segments cool and continuously flush abrasive cuttings from the hole.
- Slowly lower the bit into the cut to prevent skidding or lateral movement of the drill bit.
- Maintain steady pressure on the bit during drilling; avoid forcing the bit into the material.
- If the drilling rate decreases, check the core bit for glazing. Slower penetration may indicate the need to redress the segments for optimal sharpness.
- When encountering steel rebar, relax pressure by about one-third and allow the bit to cut at its rate.
- For high PSI concrete or concrete with hard aggregate, address glazing by either reducing water flow by half or pouring masonry sand into the hole until the core speeds up. Gradually increase water flow until it returns to its original state. Repeat until the diamond is open again.
- When drilling is complete, reduce the water flow and back the core bit out of the hole with the motor running.
- Make sure to follow the manufacturer's instructions. If you require additional assistance, consult the troubleshooting guide on page 25.
- For additional safety information visit page 36.

## HELPFUL TIPS:

Regularly inspect the condition of the core bit before drilling to ensure it is in good condition for optimal performance.

Ensure the drill and core bit are correctly aligned to avoid unnecessary wear and tear and maintain the accuracy of the drilling.

Stabilise the material being drilled to prevent movement during the drilling process.

Consider using a pilot hole for smaller diameter core bits to enhance accuracy and prevent deviations.

Keep track of the drilling depth to meet project specifications and avoid over-penetrating the material.

Stop drilling intermittently to clean the core bit, removing accumulated debris and ensuring continuous cutting efficiency.

Apply appropriate lubricants to the core bit, especially when drilling through tough or dense materials.

Select the core bit based on the specific material, considering its hardness and composition for optimal results.

# DRY CORE BIT DRILLING

## WHAT IS DRY DRILLING

Dry core bit drilling is the process of precise hole cutting without using a lubricant such as water. Most tradespeople, such as plumbers, heating and ventilation workers, electricians, kitchen installers, and general builders, still use dry cutting. Dry cutting is favoured for its speed and convenience, which is desirable for indoor applications and situations. Though dry cutting is convenient, it poses a significant risk to operators if equipment and personal protection are not used.

## OPERATOR SAFETY

When performing core bit drilling, minimising the risk of inhaling dangerous debris is crucial. Consider using wet drilling as it can significantly reduce the amount of dust produced. However, if wet drilling is not an option, use the correct safety vacuum and dust mask while ensuring the area is well-ventilated.

## VACUUM SAFETY

It is essential to use the proper hazard classification for the job and guarantee that the vacuum has a functioning alarm indicator. For effective dust removal position a dust collector shroud around the working area and dispose waste correctly once operating.


Vacuum, suitable for gypsum, aluminium and general dust and dirt.


Suitable for wood, concrete and MDF dusts.


Mostly metal vacuum, suitable for silica dust, asbestos and lead.

## DUST MASK SAFETY

Dust masks are a vital measure to protect operators from breathing harmful debris. However, it is essential to note that dust masks should not be your only defence. Dust masks differ from manufacturer to manufacturer, so take note of the micrometre protection range and filtration percentage. Most harmful dust, such as silica, are below 0.1 micrometres.

P1 respirators are designed to retain approximately 80% of particles smaller than 2 micrometres. They are commonly used for low levels of dust or non-toxic particles, such as those generated when grinding materials like graphite, gypsum, cement, plaster, and marble.

P2 (N95) respirators retain approximately 94% of particles smaller than 0.5 micrometres. They protect against particles commonly found in environments where silica levels are above 10%, as well as asbestos, copper, and carbon-containing silica dust. However, due to rigorous regulations, it's important to note that silica/asbestos work requires additional precautions beyond wearing a P2 respirator.

P3 (FFP3) respirators retain approximately 99.95% of particles smaller than 0.5 micrometres. They offer protection against various hazardous substances, including beryllium, antimony, arsenic, cadmium, cobalt, nickel, radium, strychnine, and radioactive particles. P3 respirators are typically recommended for high-risk environments where exposure to highly hazardous substances is likely.

## DRY CUTTING TIPS

Dry core bit cutting is used in various trades and applications for convenience and effective results. However, it's essential to follow some crucial "do's and don't take note of the following tips.

When using dry diamond cores, it's critical to prevent dust build-up in the hole to avoid potential issues. The most serious concern is that the core may get jammed in the hole, leading to machine "kicking" and possible operator injury if the machine lacks a safety clutch.

During wetter/winter months, when bricks and blocks retain moisture, there is an increased risk of core jamming due to damp dust forming a paste around the core body. To mitigate this risk, periodically withdraw the bit from the hole, allowing debris to disperse, especially after each inch of material penetration. Clearing the hole every couple of inches in drier conditions suffices as the dust is less likely to bind to the core body.

### DO'S

- Always wear appropriate personal protective equipment (PPE).

- Select the correct core segment bond for the application.

- Use a dedicated diamond core drill with a mechanical or electronic safety clutch.

- Use dust collector shroud, vacuum and P2 dust mask.

- Periodically clear debris from the hole during drilling to prevent core jamming.

- Apply gentle pressure to maintain core contact with the material surface, allowing the core to perform effectively.

- Avoid forcing the core, as it negatively impacts drilling speed and core lifespan.

- If the core becomes jammed, remove it manually to avoid damaging the drill's safety clutch—more information on page 25.

### DON'T

- Avoid using hammer action with a core bit.

- Refrain from excessive pressure while drilling, as it reduces drilling speed and may damage the machine.

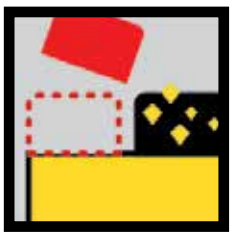
- Do not perform long continuous drilling motions without periodically clearing debris by partially withdrawing from the hole.

- Avoid drilling hard materials like cast concrete, granite, or porcelain with dry diamond cores.

# TROUBLESHOOTING

The majority of issues with diamond tools arise due to one of the following reasons:
The tool wasn't matched to the job, the tool wasn't used correctly or the machine is faulty.

| PROBLEM | DESCRIPTION/CAUSE | SOLUTION |
|---|---|---|
| **Bent Segments** | Straight segments are vital for precision cutting. Deformation may occur due to excessive pressure when drilling through rebar, insufficient coolant, or tough materials. | Replace core bit and decrease pressure when cutting rebar. |
| | | Increase water supply. |
| | | Select a suitable core bit. |
| **Belled Barrel** | When excessive pressure is exerted, the barrel can lose its shape, signifying an instance of the operator applying too much force. | Decrease pressure and replace the core bit to enhance drilling safety and accuracy. |
| **Core bit Jams in Hole**  | The core bit may become lodged in the drill hole when the material or patches within it are excessively hard, filling the hole with rubble from broken-off segments. This issue is compounded by inadequate side clearance on the core bit, preventing the segments from operating effectively. | Immediately stop the drill to prevent any further damage or complications. |
| | | Reverse the drill by spinning the core bit counter-clockwise. Note that this option is only applicable if the drill has a reverse feature. |
| | | Remove the drill and attempt to dislodge the core bit by creating wedges around the circumference of the core barrel. Add lubricant, rock it side to side, or use a core bit extractor. |
| | | Flush out the drill hole thoroughly before proceeding with further drilling, and ensure a sufficient coolant supply. Check the side clearance and replace the core bit if necessary. |
| **Core Bit won't Cut**  | Over time, the bond of a core bit wears away, enabling the diamonds to continue cutting. However, if the bond doesn't wear away as intended, the diamonds remain concealed, causing the core bit to slow down until it eventually stops cutting gradually. This smoothing of the core bit's cutting edge is known as glazing or polishing. Various factors can contribute to a core bit not cutting efficiently. Identifying the problem and its root cause is essential to applying the correct solution. | Reduce RPM speed. |
| | | Increase drilling pressure and decrease speed of rotation. |
| | | Rectify or sharpen the core bit using a soft concrete block or abrasive stone to expose diamonds by drilling 3-5 holes with ample water to uncover new diamonds. Alternatively, adding a small amount of builder's sand down the hole can achieve the same effect. Run the drill slower with reduced downward pressure, allowing an abrasive paste to form and sharpen the segments. If the issue persists, consider selecting a core bit with a softer bond. |
| | | Decrease the water flow and ensure even distribution. The water should appear milky or cloudy. |
| | | Tighten anchor and ensure stability. |
| | | Ensure that the machine's horsepower is sufficient and matches the drilling diameter. |
| | | Adjust the carriage on the side to reduce play. |
| | | Check inside of core bit. |
| **Core Hangs Up** | The core may become stuck in the core barrel due to insufficient water to remove the slurry or if the core barrel is dented from previous attempts to remove stuck pieces by hammering on it. | Increase water flow after removing bit and driving core out with a spike through the hub. Remove debris. |
| | | Replace the core bit. |

| PROBLEM | DESCRIPTION/CAUSE | SOLUTION |
|---|---|---|
| **Cracks in Barrel**<br>**WARNING:**<br>**Never use a cracked barrel** | When the core bit is subjected to extreme pressure and metal fatigue, the barrel can eventually crack. | Reduce pressure.<br>Use a core bit with a softer bond. |
| **Cracks in Segments** | When utilised incorrectly, the core bit's segments may crack, indicating that the bond is too hard and the drill is moving while drilling. | Decrease the RPM or use a core bit with a softer bond.<br>Hold the drill firmly or mount it on a stand. |
| **Excessive Chipping of the Material** | With the correct application, core bits provide a clean cut. If the material is chipping, possible causes include the core bit's bond not being suitable for the material, insufficient coolant reaching the drilling area, incorrect RPM or the material or drill is moving. | Select a bond that suits the material.<br>Ensure the water supply is adequate.<br>Alter speed in line with recommendations.<br>Ensure the material is held in place using clamps or apply a drill stand. |
| **Excessive Segment Wear**<br>**WARNING:**<br>**Never use a bent barrel** | Incorrect specifications can result in over-exposure of diamonds in a segment, leading to excessive wear and impacting the bit's lifespan. This may occur due to insufficient coolant, low RPM, excessive motor power, a vibrating drill. | Check and Increase water supply.<br>Increase speed within recommended RPM.<br>Adjust machine power to match core bit diameter.<br>Ensure drill rig/stand is secured firmly and stable. Check bearings, rollers, spindle and drill, etc. Tighten carriage guides.<br>Choose core bit with the right specifications. |
| **Excessive Wear on Steel Tube** | Excessive wear can cause the tube to thin, diminishing the lifespan of the bit. This wear may be exacerbated by factors such as a vibrating drill, a warped or misaligned barrel, or a cluttered hole with debris. | Replace barrel.<br>Ensure the drill rig is secured firmly. Check bearings, rollers, etc.<br>Flush out debris, rebar fragments, etc. with increased water supply.<br>Ensure barrel is aligned and centred on drill spindle. |
| **Overheating** | Overheating commonly occurs when drilling harder materials and to insufficient water reaching the drilling area. | Enhance water flow both through the core and around the sides of the drill, directing it toward the drilling area for improved cooling and lubrication. |
| **Segment Loss**<br>  | Core bit segments can fall off due to various reasons. These include an incorrect bond, excessive bouncing, overheating, insecure anchoring, hitting loose rebar, or starting the drilling process at high speed. Identifying and addressing these issues is essential for maintaining safe and effective core drilling. | Lower speed or use a core bit with a softer bond.<br>Increase water supply.<br>Hold the drill firmly or mount it on a stand.<br>Flush out debris, rebar fragments, etc. with increased water supply.<br>Tighten anchor or check vacuum pressure.<br>Decrease RPM until rebar is cut and increase water flow.<br>Start with a lower speed and gradually increase it.<br>To remove a core bit segment from the material, wedge a chisel in the concrete. Tap gently to create space, and then pry out the segment using either air pressure, water lubricant, or a screwdriver before resuming the cutting process. |
| **Uneven Drill Holes** | Uneven drill holes can occur when the material being drilled or the drill itself vibrates; this is evident when the core bit is vibrating and the material is in motion. | Ensure the machine is mounted correctly onto the drill rig/stand and the core bit is tightly connected to the machine.<br>Check the machine's condition and replace worn parts if needed. |

# 4

# SURFACE PREPARATION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**SEGMENT DIAGRAM**
Arbour Hole, Water Hole/Cooling Holes, Segment/Bond, Supa Spike, PCD

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**ALTERNATIVE BONDS**
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**TROUBLESHOOTING**
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Discolouration Of Floor
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Overexposed Diamonds / Premature Diamonds Loss
Poor Overall Finish
Scratches When Using Tools With Resin Bonds
Segment Loss

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# WHAT IS TOOLING (SEGMENT)

### INTRODUCTION:

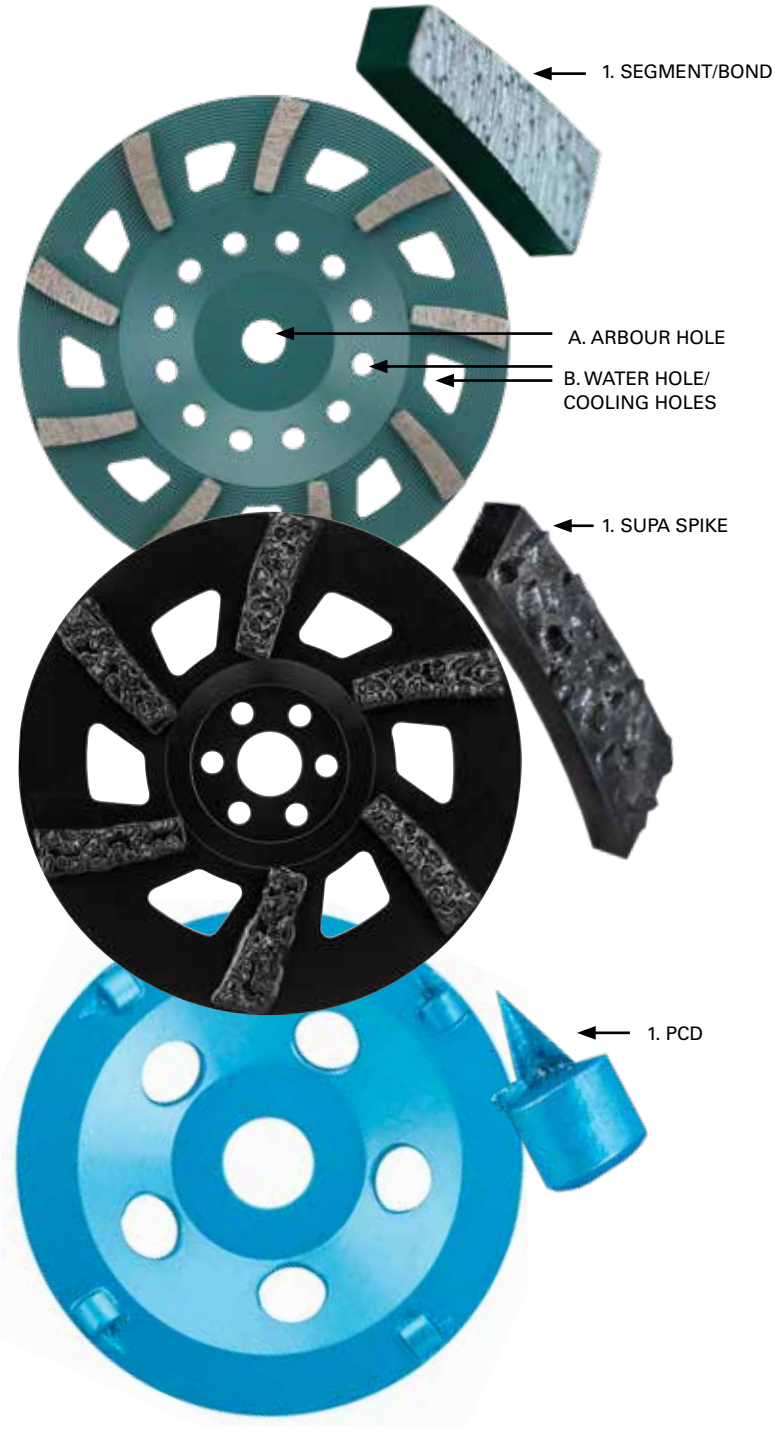
In surface preparation, 'segment' holds two meanings. It signifies the diamond matrix 'bond' used to cut/grind concrete, but sometimes the segment is referred to as the tooling. Surface preparation is an art that involves lots of cleaning and patience to successfully achieve the desired finish. This chapter will cover segment and tooling types, wet and dry grinding, tooling compatibility types, additional accessories and the surface preparation process.

As a general rule of thumb,

a) The more segments a tool has, the less aggressive the grind due to more surface area and less weight on each segment.

b) The smaller the segment, the more down-force creating a more aggressive cut also meaning it will wear out sooner.

# SEGMENT DIAGRAM




### A. ARBOUR HOLE:

The arbour hole on a concrete surface preparation tooling is the mounting point for attaching to the hand/walk behind grinder, ensuring secure attachment and proper alignment for efficient and precise grinding.

### B. WATER HOLE/COOLING HOLES:

The water/cooling holes allow for controlled water/air flow depending on whether you are cutting dry or wet. These holes help lubricate or cool the grinding action, reduce friction, control dust, and extend the lifespan of the tooling.

### 1. SEGMENT/ BOND

Segments are individual units comprising of diamond and bond responsible for the cut. These segments are strategically positioned and designed to maximise cutting efficiency. The arrangement and composition of segments vary based on the intended material and desired finish. Higher MESH means finer grit- refer to page 5 covering diamond grit.

### 2. SUPA SPIKE:

Supa spike technology comprises polycrystalline diamond (PCD). The super spike is an aggressive segment perfect for removing stubborn glue and paints on concrete. A hybrid between standard PCD and a standard segment.

### 6. PCD:

Polycrystalline Diamond (Standard PCDs) is an aggressive but more controlled tool than the super spike. Similarly to Supa Spike, standard PCDs quickly remove epoxy, urethane, paints and glues, acrylics, mastic and waterproofing. More information is available on page 32.

# TYPES OF SEGMENTS

## INTRODUCTION:

Syntec Diamond Tools offers a variety of segment types designed for concrete surface preparation. These segments serve various purposes, ranging from aggressive profiling to refined polishing, and can suit a wide range of surface conditions and desired outcomes. An operator can achieve professional and lasting results by understanding these segments more deeply.

**ICON LEGEND**

R REMOVE G GRIND P POLISH

### SUPA SPIKE

**Suited for: Removal of light glue and paint.**

Leaving a rougher surface profile on concrete for epoxy keying purposes, Supa Spikes is a shot blaster alternative. They represent the happy medium between a PCD and a metal bond and are perfect for removing light glue and paint (<2mm); however, they are unsuitable for general grinding concrete.

### T-SHAPED

**Suited for: Removal of light coatings and high spots. General concrete prep for coating.**

T-cups effectively remove light coatings and leave a smooth concrete surface free of contaminants to create a long-lasting bond with any coating. The T-shaped segments prep edges, reducing gouge marks and eliminating the problem of uneven wear caused by tilting spiral cups.

### ARROW

**Suited for: Removal of thin vinyl glue, carpet glues, light coatings and mortars—aggressive grinding of bare concrete.**

Prep concrete and remove the coating, all in one step. Arrow segments pierce light coatings with a sharp leading edge and a 10-degree positive rake. Like a ship's bow segment, the arrow segments tear and pull away.

### ROUND

**Suited for: General concrete prep.**

The round segment is ideal for finer grits with a less leading straight edge, a large surface area and no specific corner. This design helps minimise deep scratching and excessive gouging, especially on uneven floors.

### MINI ARROW

**Suited for: Removal of coatings, epoxy and mastic.**

The smaller the arrow, the more aggressive it is. Mini arrow segments tear through coatings and eliminate the gumming up of segments.

### SPIRAL

**Suited for: Removal of soft and abrasive materials like thin set from concrete—general concrete prep.**

Spiral cups are used for edging with hand grinders. Fewer segments give more speed, while more segments offer twice the life. If the concrete is softer, more segments are better for removing soft and abrasive materials like thin sets. However, they tend to leave aggressive circles or horseshoe marks. For less scratch, use round D26 segments.

### DOUBLE BAR

**Suited for: Removal of light coatings and general concrete prep.**

With their angled positioning, Double Bar (V-segments) provide fewer scratch marks.

# TYPES OF SEGMENTS (CONTINUED)

Refer to the icon legend and product description to understand the elements of the particular segment type. Syntec Diamond tools have a vast range of tooling options, all unique, providing different results. For additional information and assistance, contact our representatives. Details are available on page 3.

**ICON LEGEND**

R REMOVE G GRIND P POLISH

R

## DOUBLE ROW

**Suited for: Grinding of concrete with bumps and imperfections.**

These cups are arranged in a circular pattern and are effective at removing concrete bumps, but can cause noticeable horseshoe marks.

G

## TORNADO

**Suited for: Aggressive grinding of concrete.**

Tornado cups feature a flat core, allowing for more surface area to place longer segments that reduce gouging even more than spiral cups by not digging in as much. Tornado cups provide aggressive grinding with fewer ring marks, the three and 6-segment models being the most aggressive.

G

## TURBO

**Suited for: Aggressive grinding and shaping of natural stone, concrete, granite, marble.**

The best of both worlds - designed for aggressive stock removal and shaping of concrete or stone surfaces before smoothing these out with resins. Turbo cups don't leave horseshoe marks with their segments sintered closely together.

G

## SINGLE BAR

**Suited for: General concrete prep.**

It is ideal for removing concrete with a long leading edge. Single bar segments are designed to maximise performance when operating smaller machines. Double bar segments offer longer life and typically perform better under heavier machines. Bar segments are best used up to 80 grit, followed by round D26 segments if you want to move on to less of a scratch profile.

G

## BEVEL

**Suited for: General concrete grinding.**

Grinding at a slower rate and tapering, rather than cutting, the bevel shape enables machines to ride smoothly up and over-controlled edges, cracks and expansion joints while minimising chipping and reducing stress to machine gears, couplers and belts. Bevelled edge segments are also ideal when grinding uneven floors while reducing scratch marks.

R G

## NON-BEVEL

**Suited for: Light coating removal. General concrete grinding.**

Non-bevelled segments add more surface area and grind concrete under heavier machines without leaving scratch marks.

G

## SOLID

**Suited for: General concrete grinding.**

Ideal for straight-out concrete grinding, solid plugs offer excellent results on level smooth surfaces as they leave fewer marks than any segments with a corner.

G

## RAPIDA

**Suited for: Extremely hard trowel, smooth concrete that has been strengthened with curing agents.**

During the process, the curing agents form a membrane over the top of the concrete slab, which stops the water near the surface from evaporating too quickly and strengthens the concrete cap. These rigid surfaces require a specific bond that prevents the diamonds from glazing over. Syntec has developed a revolutionary bond for this application, allowing for powerful grinding on even the hardest concrete.

# ALTERNATIVE BONDS

After completing the metal bond grinding process, to achieve a smooth and shiny finish an operator must polish it. Polishing requires finer diamonds (higher MESH), which can effectively remove the minor scratches and pits left by the grinding process. However, using metal bonds for polishing can be counterproductive when the diamond grit is less than 100-150. Due to their high hardness and rigid structure, metal bonds can scratch the surface or provide a rougher finish. In such cases, alternative bonds, such as resin or vitrified bonds, can be used for polishing. These bonds are softer and more flexible than metal bonds, allowing them to conform to the surface and provide a smoother finish.

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P

## CERAMIC BOND

**(Wet Application Only)**

Ceramic bonds are the happy medium between metal and metal/resin bonds regarding aggressiveness. They provide exceptionally long life on hard and medium concrete and a beautiful finish. Ceramic cups are used for edging, often eliminating the need for a metal bond cup by preparing and polishing simultaneously. On the other hand, ceramic pads are designed for polishing under walk-behind grinders, working a little slower but, therefore, lasting longer than resin pads. Baked at 400°C, ceramic pads have a delicate, porcelain-like structure and are only recommended for professional use. Like dropping a plastic plate vs. a porcelain plate, ceramic tools can easily shatter when misused.

P

## METAL RESIN / HYBRID BOND

**(Wet and Dry Application)**

As the name indicates, metal resin bonds mix metal powders and resins. Metal resins, also known as hybrid bonds, offer double the lifespan of regular resins; hybrids are harder to wear but are only available up to 400 grit. If a higher grit is required, resins are the ideal solution. Unlike ceramics, metal resins can be used wet and dry.

P

## RESIN BOND

Similar to metal bonds, resin pads come in varying levels of hardness tailored for different applications, ensuring optimal wear rates of the bond. Resin pads, capable of holding diamonds up to 3000 grit, efficiently eliminate scratches caused by metal bonds, making them ideal for use on hard materials. However, resin pads wear down rapidly on abrasive floors. Avoiding excessive pressure or high machine speeds is crucial, as this can cause the resin to burn. Therefore, limiting the down pressure on each resin pad to 45kg is recommended. It's important to note that the actual weight of each resin pad depends on several factors, including the number of resin pads, machine balance, and whether the grinder is planetary or oscillating.

P

## BURNISHING PADS

Burnishing pads are natural or synthetic hog hair sprayed with a fine-grit diamond mixed with resin. They are used as the final steps in a polishing process to give an even higher level of shine than what can be achieved by regular polishing with resin diamonds. Often, burnishing pads are used with sealers that protect the floor, for example, against stains from red wine or vinegar spills in supermarkets. The heat generated by the burnishing pads while polishing the floor activates the sealer, forming a protective layer. Burnishing pads are available in a wide selection of diamond grits to cover all applications, from floor maintenance under auto scrubbers to terrazzo and concrete applications under high-speed burnishing machines.

P

## SPONGE RESIN BOND

Sponge resin pads were initially designed to restore or maintain already polished concrete and terrazzo floors that had lost their shine due to heavy foot traffic, providing the benefit of simultaneously cleaning and polishing the floor thanks to their nylon texture. They can, however, also be used for polishing cementitious overlays and concrete when wanting to achieve a so-called 'cream polish' that doesn't expose the aggregate. With their flexible backers, sponge resin pads contour to the floor, allowing them to reach minor low spots and take out resin swirl marks.

# PCD'S

### WHAT ARE PCD'S

PCD's, crafted with premium polycrystalline diamonds, remove coatings over 3mm, including glue, epoxy, mastic, urethane, black bitumen paint, and adhesives. Unrivalled in the coating removal industry, PCD's are more aggressive and durable than standard diamond cup wheels. Their scraping action eliminates segment gumming, maximising production.

While PCD's leave a rougher finish, they serve as an ideal initial step, removing approximately 50% of the coating before using a metal bond segment for the remainder. Syntec offers parts with stabilising buffer segments to reduce gouging, especially for inexperienced operators. PCD's with Mini Jet, Jet, or Full Jet provide a well-protected and durable option for various machine types. The jet stabilises PCD's, preventing them from falling out or digging too deeply. Although wear-resistant, PCD's lack impact resistance, requiring caution around joints, bolts, and steel.

Proper orientation is crucial to avoid scraping over material. Determining the need for a left- or right-hand rotating shoe/plate depends on the machine's disc spin direction, with consideration for 'Cretemowers' and planetary grinders. When using PCD plugs, ensure alignment in a straight line with the machine's centre.

ANTI-CLOCKWISE = LH

CLOCKWISE = RH

# WET VS DRY GRINDING

There are two surface preparation methods: wet and dry. Dry grinding is a popular method for surface preparation due to its lower disposal costs and faster job completion time. However, it generates fine dust, which can pose a safety hazard. Dry walk-behind grinders usually have a vacuum nozzle input and a shroud around the grinding area, and the connection allows a vacuum system to extract dust. Using a hazard-certified vacuum extractor can reduce exposure to dust but isn't a perfect deterrent as dust debris can escape the shroud. The safer method is wet, as wet conceals the dangerous dust, creating a slurry. Typically, wet walk-behind grinders have a hose input for water supply to control dust. It also cools the grinding surface during operation, aiding longer tool life. Unfortunately, wet is not as efficient as dry cutting and will need more resources to clean up the water, either by mopping up the slurry or using a wet vacuum system to collect and dispose of the water. Despite the additional clean-up required, wet grinding is considered safer due to the minimised dust exposure and is often preferred in environments where dust control and safety are top priorities.

# DIFFERENT TYPES OF TOOLING

Syntec offers a wide range of tooling to fit a variety of grinding machines providing ample options at affordable costs. With an array of tooling configurations, including alternative bonds and grits, you'll indeed find the right tool for your application.

### WEDGE BLOCK

### PUCK

### CUP WHEELS

### PLUGS

### GRINDING PLATES

### METAL BOND TOOLING

FAST CHANGE

BENT HTC

SLIM FIT

TRAZOID

UNI LOCK

SCHWAMBORN

SCANMASKIN

### HELPFUL TIPS:

1. The finer the grit, the slower the grinder speed should be.
2. Dry grinding: If you are producing dust, you are grinding. If not, the tooling is drifting over the surfacex.
3. Keeping the surface clean prevents scratches from foreign objects and enhances the visibility of the tool's results.
4. Do not polish green concrete that hasn't cured yet.

# ADDITIONAL ACCESSORIES

### CUP ADAPTORS:

**S-9mm M-14mm L-23mm XL-31mm**

The Cup Adaptor, ranging from small to extra large, is designed to fit within the arbour hole of a hand-held grinder. The purpose of a cup adaptor is to elevate the tooling within a shroud, allowing it to come into contact with the ground.

### SHROUDS:

**ECDS5" ECDS7"**

Dust shroud for concrete, masonry, and mortar grinding easily attaches to commercial vacuums for dust control. Universally compatible design fits most grinders in 5" and 7" sizes.

### UNILOCK FAST CHANGE PLATE:

**7" 3pc 10"6pc**

UniLock plates streamline the UniLock metal tooling system, enabling quick and effortless diamond tooling changes, ultimately saving valuable time.

### STONE MAINTENANCE PADS:

**50, 100, 200, 400, 800, 1500, 3000 grit**

The Stone Maintenance pads provide an alternative to circular polishing pads, offering optimal results across various grit levels.

### HAND POLISHING PADS:

Offering ease of use and versatility, our pads ensure professional finishes on various surfaces with exceptional control.

### PAD HOLDERS - M14:

**4" 5" 7"**

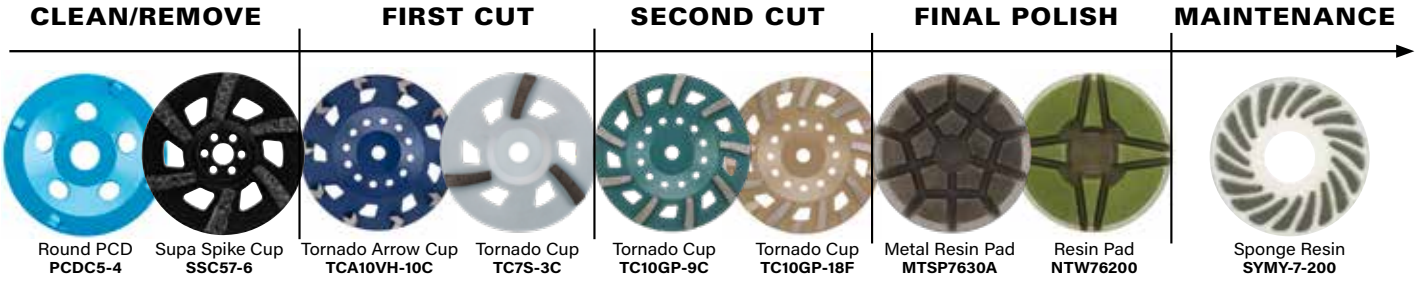
Our pads ensure professional finishes on various surfaces with exceptional control, offering ease of use and versatility.

### PLUG PAD HOLDER:

Similar to the M14 range, the plugs offer compatibility options to assist with polishing tasks.

# SURFACE PREPARATION PROCESS

Surface preparation is a crucial process that involves carefully removing, grinding, or polishing. Surface preparation consists of selecting the appropriate segment bond that matches the hardness of the concrete- this process is known as material profiling. To ensure optimal results, thoroughly clean the surface from slurry and debris before, during, and after each pass, and ensure the operator passes at a constant speed. In the first stages of surface preparation,  addressing cracks and making repairs before making multiple passes is recommended to prevent future problems. Also a Mohs scratch test can accurately determine concrete hardness and guide segment selection. w




### 1. CLEAN AND REMOVE:

The first step in surface preparation is removing any glue or residue to prepare for the first cut. PCD and PCD Supa Spikes are the perfect tools to remove concrete epoxy and glue, leaving a coarse finish. Refer to page 32 for more information about PCD's.

### 2. FIRST CUT:

Tooling with a coarse bond around 30/40 MESH grit is recommended to expose the aggregate. Aim for removing 2-3mm of the surface in several passes, with 0.5mm per pass.

### 3. SECOND AND THIRD CUTS:

Repeat the same procedure with a finer grit; the higher the MESH value, the smoother the finish. To easily remove grinding scratches, rings, or swirl markings, increase the MESH.

### 4. FINAL POLISHING STAGE:

Inspect the surface to determine its porosity. If the surface is firm, start polishing with 100 and 200-grit resin bond polishing pads, working your way up to finer grits depending on your final finish. Some use 400, 800, 1500, and 3000 grit pads to achieve sheen finish. If the concrete's porosity is weak, a densifier is recommended before polishing.

### 5. MAINTENANCE:

Sponge resin is applied to maintain shiny concrete surfaces, enhancing and preserving the concrete shine. It forms a protective layer that helps resist wear and tear while revitalising the shine, ensuring the concrete retains its glossy appearance.

### RULE OF THUMB:

Using more passes with each tooling is recommended, applying less forced pressure, and increasing the number of steps between 'meshes' is recommended. Also, check for foreign objects and unwanted surface scratches every pass.

# TROUBLESHOOTING

The majority of issues with diamond tools arise due to one of the following reasons:
The tool specifications don't match the job, the operator misuses the tool, or the machine is faulty.

| PROBLEM | DESCRIPTION/CAUSE | SOLUTION |
|---|---|---|
| **Cloudy Surface** | The final result of concrete grinding dramatically depends on the pouring and curing processes. If the concrete is tamped too hard or inadequately vibrated, solids may sink to the bottom, affecting the outcome significantly. | To clear cloudy surfaces, additional surfaces may need to be removed from the floor to access the aggregate. However, in most cases, this solution may not be viable. |
| **Discolouration of Floor** | Once an adhesive has discoloured the matrix, saving the floor becomes challenging as there are limited options for restoration. | Unfortunately, this issue cannot be fixed. |
| **Excessive Wear** | Incorrect specifications can lead to over-exposed diamonds, causing excessive wear and reducing the tool's lifespan, especially on highly abrasive materials. | Choose a more rigid bond.<br>Please note: the wear on abrasive material is generally higher and can only be reduced to a certain degree. |
| | | Insufficient coolant when grinding wet and operating at high speeds can also accelerate wear. Check that the water supply is adequate. |
| | | Reduce the grinding speed. |
| **Glazing (tool won't grind)** | If a tool's bond doesn't wear away as intended, diamonds may not be exposed sufficiently, causing the tool to slow down or stop grinding. | Choose a tool with a softer bond. |
| | | Dress or sharpen the tool with a soft concrete block or abrasive wheel to expose diamonds. If reoccurring, switch to a tool with a softer bond. |
| | | Saturate concrete (without the water puddling) to cool it. Alternatively, introduce sand or use cutting lubricants. |
| | | Reduce operating speed. |
| | | Reduce the amount of coolant. |
| **Isolated Thick or Deep Scratches** | Thick, deep scratches typically result from incorrect application, such as using the wrong grit or operating excessively. Variations in concrete hardness can also contribute to this issue, causing certain areas to scratch more quickly than others. | Select a finer grit or take more time when grinding more passes and less force/pressure. |
| | | Move slower and go through all steps from a coarser to a finer grit. Remove all scratches before moving on to the next step. |
| | | If many scratches occur, go back and use a coarser grit. |
| **Narrow and Deep Regular Marks** | Narrow, deep marks often occur when a tool is too aggressive for the application, indicating that the tool is excessively coarse and aggressive. | Select a finer grit or a tool with a larger surface area, e.g., a cup wheel rather than a plug, to distribute the pressure over a larger area. |

| PROBLEM | DESCRIPTION/CAUSE | SOLUTION |
|---|---|---|
| **Overexposed Diamonds / Premature Diamond Loss** | Premature diamond loss is when the segment bonding releases the diamonds easily. Premature diamonds is most likely from the segment being too-soft for the material that is being cut. | Choose a tool with a harder bond.<br><br>Increase the capacity of dust extraction and clean up the surface if necessary. |
| **Poor overall Finish** | In grinding, a step-by-step process is crucial for achieving a high-quality finish. Poor overall finish can be due to tooling scratches, insufficient passes, and too much pressure. | Choose a finer grit size and reduce the relative speed of the wheel and work piece.<br>Use smaller MESH steps<br>Less forced pressure and more passes with each tooling. |
| **Scratches when using Tools with Resin Bonds** | Using a finer grit, whether with a metal or resin bond, can lead to scratches if foreign objects become trapped between the surface and the grinding tool. | Check the tool every 20-30mins when grinding to ensure nothing is stuck in between, and clean the area if necessary. If grinding is wet, increase the water supply. |
| **Segment Loss** | If segments fall off a tool, it could be due to areas of the floor being 'above grade,' meaning they were raised above the surface level. | Cut off/hand grind surface to level or hit areas with a hammer to knock below grade.<br>Be very careful when using a hand grinder as too much material can be taken away, especially in low spots.<br><br>Spot grind the concrete with a concrete planer if the spot is above 10mm high. |

# 5
# SAFETY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## CRYSTALLINE SILICA

Silica dust can cause severe respiratory issues such as silicosis, lung cancer, and even death. Workers in construction industries exposed to fine dust and airborne minerals are particularly susceptible. Therefore, utilising an industrial vacuum cleaner for hazardous dust, ensuring good ventilation and wearing a safety mask for dry cutting is crucial for safe-guarding against potential hazards.

**Vacuums**: It is essential to note that there are different vacuum cleaner hazard classes: L-light, M-medium, and H-high Hazard. H-Class vacuums should have a functional alarm indicator to ensure the operator is aware of malfunctions. H-Class vacuums are required for most dry concrete cutting. Refer to the chart, which lists the percentage of silica found in the material.

| MATERIAL | SILICA (%) |
|---|---|
| **Marble and Limestone** | 2% |
| **Shale** | 22% |
| **Slate** | 25-40% |
| **Granite** | 25-45% |
| **Natural Sandstone** | 70-95% |
| **Engineered stone** | Up to 97% |

**Masks**: It is crucial to wear the correct mask for the job. P2 masks are preferred as their filtration rate is higher. Dust masks differ from manufacturer to manufacturer, so take note of the micrometre protection range and filtration percentage. Most harmful dust, such as silica, are below 0.1 micrometres. More information can be found on page 24.

**Recommended**: The best way to reduce crystalline silicosis exposure is to wet cut. Not only does it contain harmful dust within a slurry, but it also prolongs the use of the tools by cooling them during operation. Please note that this information is only a guide. To gain up-to-date information, please refer to Safe Work Australia.

## HEARING PROTECTION

Workers should avoid exposure to noise levels exceeding 85 decibels (on average) over an eight-hour work period. Machines such as lawnmowers and leaf blowers typically emit noise at around 85 decibels. The permissible exposure time varies depending on regulatory guidelines, individual factors, and the effectiveness of hearing protection devices. For example, a worker using Class 5 hearing protection, with an SLC(80) rating of 29 dB, can effectively reduce noise exposure. Using the SLC(80) formula, if the noise level is 109 dB, the effective noise level experienced by the worker would be 80 dB (109 dB - 29 dB = 80 dB)=16hrs exposure time.

| CONTINUOUS DB | WITH OUT PROTECTION | CLASS |
|---|---|---|
| **80 dB** | 16 hrs | 1 |
| **85 dB** | 8 hrs | 1 |
| **88 dB** | 4 hrs | 1 |
| **91 dB** | 2 hrs | 2 |
| **94 dB** | 1 hr | 2 |
| **97 dB** | 30 min | 3 |
| **100 dB** | 15 min | 4 |
| **103 dB** | 7.5min | 4 |
| **109 dB** | 2.9 min | 5 |
| **112 dB** | 57 sec | 5 |

# SAFETY PROTOCOLS

## PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) encompasses various items worn or used by workers to mitigate health and safety risks. This includes boots, ear plugs, respiratory protective equipment (RPE), gloves, goggles, hard hats, high visibility clothing, safety harnesses, safety shoes, and sunscreen. While PPE is a crucial aspect of risk management, it is one of the least effective safety control measures and must not be relied on to satisfy hazard control requirements.

## SAFETY

When working with diamond tools, safety should always be a top priority. This means appropriately training all operators on usage and safety protocols before handling equipment. It also involves adhering to the safety guidelines and recommendations provided by the manufacturer and your PCBU (Person conducting a business or undertaking) and complying with Australia's health and safety legislation/code of conduct.

To ensure a safe work environment, business safety officers conduct thorough risk assessments and implement control measures to mitigate potential risks. You should also provide workers with adequate training and supervision. It is essential to conduct regular inspections of your diamond tools for any signs of wear or damage and replace them promptly to prevent any safety hazards. Always follow the manufacturer's guidelines for installing tools to ensure that they match the saw's specifications.

## BLADES

It is crucial to follow the manufacturer's guidelines. Unauthorised modifications to your saw/machine may pose a significant risk and compromise the safety of those who use it. Machine operating speeds and conditions should be strictly adhered to to prevent overheating and potential blade failure, such as loss of tension and blade cracking. If you are experiencing problems with your blade, contact a synthetic diamond representative or refer to page 15 for our troubleshooting guide.

## CORE BITS

It is paramount to adhere to the manufacturer's guidelines and employ the appropriate rigging systems for core bits when necessary. Operators may often hand-hold the electric drill with an oversized core bit, exposing themselves to potential hazards. To mitigate such risks, allocating the time and resources to set up a stand with a effective rigging system will aid efficiency, accuracy and safety.

## SURFACE PREPARATIONS

Some concrete operators may attempt to expedite surface preparation time by grinding the concrete more aggressively with fewer passes and skipping grit levels without taking the proper intermediate steps. However, this can lead to various issues, including scratches or damage to the concrete and increasing exposure to airborne dust containing crystalline silica. Proper measures such as using certified dust vacuums or wet cutting can significantly reduce silica exposure. Read the topic of Crystalline Silica on page 36.

## OPERATORS MUST

Operators must prioritise safety when handling construction equipment to ensure a secure working environment; this involves conducting pre-operational equipment checks, wearing PPE, and following manufacturer guidelines. Regular training is also necessary to stay updated on safety regulations. Actively operating cautiously and attention to detail can prevent accidents and reduce work placement hazards.

## WHEN TO REPLACE PPE

1. Visible Damages
2. Hazardous Wear and Tear
3. Degradation or Contamination
4. Improper Fit
5. Outdated or Expired
6. Not Meeting Manufacturer's Recommendations
7. Non-Compliance with Australian Safety Standards
8. Exposure to Extreme Temperatures
9. Compromised Structural Integrity
10. Altered Performance
11. Visible Moisture or Soiling Damage
12. Operator Preferences

# SAFE WORK AUSTRALIA

## UP TO DATE INFORMATION

Ensure your business stays compliant and safe with the latest regulations from the Australian government. Scan the QR code to access up-to-date information directly from a reliable government source, keeping your workplace secure and employees protected.

For support or more information refer to Safe Work Australia by scanning the QR code.

https://www.safeworkaustralia.gov.au/

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# SAFETY GUIDELINES

## CRITICAL SAFETY PRECAUTIONS:

**Ensure Operator Training:**
Ensure operators are adequately trained and experienced in handling the equipment.

**Pre-use Inspection:**
Before operation, thoroughly inspect the machinery and associated equipment for signs of wear, damage, or malfunction. Replace or repair any compromised parts.

**Wear Appropriate PPE:**
Wear safety glasses, hearing protection, gloves, boots, high-vision clothing and a dust mask more PPE information found on page 37.

**Operate at Recommended Speed:**
Operate the machinery at the recommended speed for the specific tool and material. Excessive speed can lead to overheating and reduced cutting/grinding/polishing efficiency.

**Select the Correct Tool:**
Ensure you have the correct type and size tool for the material. Using the right tool enhances safety and efficiency.

**Use Heavy-Duty Extension Cords:**
Use heavy-duty extension cords (2.5mm or thicker) and keep them as short as possible to prevent power issues during operation.

**Secure rigging:**
Ensure you use the right machinery and rigging system when operating to enhance stability and precision and reduce the risk of the drill slipping or causing operator fatigue.

**Avoid Overloading:**
Do not overload the machine by applying excessive pressure. Allow the tool to do the cutting/grinding/polishing.

**Maintain a Clean Work Area:**
To reduce the trip hazards, keep the work area clean and free of obstacles.

**Ensure there are no Hazards:**
Examine the working area to ensure no gas, power, or water lines are present. Identify and mitigate potential hazards before drilling.

**Familiarise with Emergency Stop:**
Understand the emergency stop features of the machinery in case of any issues.

## EMERGENCY STOPS

**First Aid Accessibility:**
Ensure a well-equipped first aid kit is easily accessible near the drilling area. All personnel should know its location and how to use it.

**Operator Injury or Emergency:**
In an operator injury or emergency, promptly activate the emergency stop.

**Equipment Issues:**
If the machinery suddenly malfunctions or fails, triggering the emergency stop can prevent further damage and mitigate potential hazards.

**Material Encounter:**
Cease operations if the tool unexpectedly encounters a different or harder material than anticipated, posing a risk to the operator.

**Vibration or 'Snatching':**
If excessive vibration or a 'snatching' sensation exists, cease operations as it may indicate a problem.

**Loss of Control:**
Initiate an emergency stop or turn off the device via the power socket or lead if the operator loses control of the machine.

**Environmental Hazards:**
In the presence of environmental hazards, such as gas leaks, power issues, or dangerous weather, cease drilling, safely evacuate the area and resume inspection after reporting the problem.

**Overheating or Overloading:**
Cease drilling if the machine is overheating, producing unusual sounds, or emitting unusual smells. Please do not touch the equipment; allow it to fully cool down before assessing.

**Clear Reporting Procedure:**
Establish a straightforward reporting procedure for all workplace incidents, including personal injuries and equipment malfunctions/faults.

**Post-Incident Assessment:**
Ensure a thorough post-incident assessment is correctly implemented.

# SAFETY GUIDELINES

**Evacuation Protocols:**
Understanding the protocol during an evacuation is essential. In most construction companies, emergency safety personnel include roles such as safety manager/coordinator, safety officer, safety trainer, supervisor, emergency response supervisor, and EHS manager. To respond effectively, all personnel must be familiar with their emergency exits, safety protocols, and emergency contact information.

**Emergency Training:**

Conduct regular emergency drills to ensure all operators know the emergency stop features and can respond effectively in different emergency scenarios.

**Equipment Logbook:**
Maintain an equipment logbook to record regular maintenance, inspections, and any issues encountered. This logbook can provide valuable information for troubleshooting and preventive measures.

**Operator Well-Being:**
Operators' well-being is paramount in ensuring optimal productivity and safety in the workplace. Proper training and regular breaks are crucial in preventing fatigue and maintaining focus.

## SAFETY SHUT DOWN PROCEDURE:

**Secure the Power Source:**
Before performing any maintenance, ensure the drill is unplugged, and the power source is disconnected to prevent accidental activation.

**Turn off Water Flow:**
When removing the tool, turn off the water flow.

**Power Off and Cool Down:**
Power off the machine, wait for the motor to stop completely, and ensure the engine has cooled down before proceeding.

**Unlock Chuck Mechanism:**
If applicable, unlock the chuck mechanism by turning a key or releasing a lever to facilitate the removal of the diamond tool.

**Secure Cutting Tool And Use The Correct Wrench:**
Hold the tool securely. Use the correct wrench or key to loosen the tool from the machine carefully.

**Dispose of Debris:**
Promptly and safely dispose of any debris generated during removal to maintain a clean and organised work area.

**Inspect and Clean:**
After removing the diamond tool, inspect all equipment for wear, damage, or debris. Clean if necessary, ensuring the drill is in optimal condition for future use.

**Storing Equipment:**
After completing the task, store the diamond tools, accessories and machinery in their designated places to prevent damage and ensure easy access for future use.

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SYNTEC™
DIAMOND TOOLS

# ALL ABOUT DIAMOND TOOLS


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