

Diamond Core Drilling Operator Information



PCD1700HH



AGCDM160



AGCDM250



Pcd3300



AGCDM80



AGTANK140

AGVAC140

When choosing a core drill machine there are two main factors to consider, firstly what are the largest diameter holes typically required and is hand held drilling a requirement.

Diamond core drill machines are rated for the largest core they can cut either as hand held or mounted on a core drill stand (rig). After this decision is made then choosing a machine is clear and straight forward.

Drilling larger diameters in concrete requires a core drill stand but if only drilling in brick or soft materials then hand held is acceptable. * **Please note** that reconstituted limestone is classed as a concrete product.

Models Available

*AGCDM80 intended for hand held up to 100mm dia in brick and small diameter concrete core drilling.

* PCD17000 HH used for hand held drilling up to 133mm dia in brick or rig mounted 90mm in concrete or reconstituted limestone blocks.

*AGCDM160 is versatile as it is hand held up to 200mm dia in brick or rig mounted 160mm in concrete.

* AGCDM250 can only be used on the supplied drill stand and drills up to 250mm dia in concrete.

* PCD3300 can only be used on the supplied drill stand and drills up to 350mm dia.

COMPARE DIAMOND CORE DRILLING MACHINES AT April 2016					
Model Number	AGCDM80	PCD1700HH	AGCDM160	AGCDM250	PCD3300
Power Watts	1700W	1700W	2000W	2200W	3300
Voltage	220/240V 50-60Hz	230/240V 50-60Hz	230V/50Hz 110V/60Hz	230V/50Hz 110V/60Hz	110V/220V 230V/ 50-60Hz
No Load Speeds RPM	500-1000 700-2300	950/2100/2400	400 - 850 750 - 1640 1550 - 3450	650/1000/1250	460/900
Max Drilling Diameter Concrete on Rig	80mm	90mm Ø	160mm	250mm	350mm
Max Drilling Diameter Brick by Hand	100mm Ø	133mm Ø	200mm	Rig Only	Rig Only
Spindle Fitting	½" BSP	1 ¼"UNC	1 ¼"UNC & female ½" BSP	1 ¼" UNC	1 ¼" UNC
Rig Mounted or hand held	Both	Both	Both	Rig Only	Rig Only
Rig Model Available	AGDMRIG	AGDMRIG & PCD1500SS	AGDMRIG & PCD1500SS	Supplied on AGDMRIG	Supplied on Rig
Net Weight KG	3.8 KG	10 KG	6 KG	25.3 KG	56.5 KG
Collar Diameter	43mm	60mm	60mm	N/A	N/A
Variable Speeds	Yes	No	Yes	No	No
Soft Start	Yes	No	Yes	No	No
Overload Protection	Yes	No	Yes	Yes	Yes
Electronic Speed Control	Yes	No	No	No	No
Clutch	Mechanical	Mechanical	Mechanical	Mechanical	Mechanical
Plug AMP	10 A	10 A	10 A	10 A	15 AMP
R.C.D.	Yes	Yes	Yes	Yes	Yes
Water Swivel	Yes	Yes	Yes	Yes	Yes
Packaging	Carry Case	Carry Case	Carry Case	Freight Carton	Freight Trunk

Quick Read Guide – Critical Points for Core Drilling

Drilling Concrete

- 1. The core drill rig must be bolted down 100% firmly** – even a .5mm vibration typically where anchored to an uneven floor/wall can result in damage to both the core bit and the machine. Ensure all is tightened securely – see page 5
- 2. The drill speed (R.P.M.) should be correctly chosen** for the diameter of the core bit. In essence the smaller the diameter then the greater the speed allowable. See speed chart on page 6.
- 3. Use the water swivel** to deliver water through the drill collar which flows down inside the core bit and washes away the waste and keeps the diamond cool. Sufficient water flow is required for the diameter, speed and material type being cored.
- 6. Sufficient power.** The core drill machine wattage must suite the largest diameter and depth of drilling undertaken. Insufficient power means that coring cannot be undertaken and the machine will be damaged. See Dymaxion Machine Chart inside cover.
- 7. Drill bit must be turning before contacting the surface**
- 8. Winding force** – do not force the winding handle to drill faster than the motor can cope with. See No:6/.
- 9. Maintain the diamond crown in 'sharp' cutting condition.** See Page 8.
- 10. Keep electrics dry.** Do not allow water to run back over the machine. Keep the RCD elevated from water and slurry.
- 11. If 'hand drilling'** maintain the same drilling angle at ALL times to avoid jamming and uneven wear to the core bit.
- 12. If excessive vibration or 'snatching'** at the core barrel is detected – stop and remove the machine, break out the core and investigate – remove loose 'rubble' material, pieces of cut steel rod. If drilling in a brick wall and wall ties are encountered then remove with bull nosed pliers. Ignoring these symptoms may cause segment damage or loss.
- 13. Use a suitable core drill bit** – Dymaxion core bits are concrete rated but will also cut most materials encountered. Brick and Limestone rated core bits will not cut concrete.
- 14. Allowing sufficient time.** Cutting with diamonds is an abrasive technology and is the slowest of all cutting methods. With SDS percussive concrete drilling we are used to a quick result but 'grinding' concrete with embedded steel can take many times longer. Please have realistic expectations as to the time core drilling in concrete requires. If drilling is *very slow* then likely the core bit is blunt. See Page 8. And the 'slurry tip' at No: 6.

General Note to Core Drillers.

Wet diamond core drilling into 'site poured' concrete can vary from site to site such that no two coring jobs are ever the exact same so that even for experienced core driller's attention needs paying.

Most of the uncertainty is caused by the variable ingredients of each concrete pour – what age is the concrete, what hardness and size of stone was used, chemical additives to produce harder MPA's (megapascals), how much steel reinforcing rod will be drilled etc.

This publication is not an instruction manual but does contain tips and suggestions to make diamond core drilling both safer for the operator and efficiently achieve the wanted outcome.

Personal Safety Advice

Wear suitable clothing and personal safety equipment:-

Do not use a wet core drill machine without an R.C.D. connected in the power supply.

Protective clothing

Steel Cap Boots

Safety glasses

Ear muffs and if others are working around to you wear a hard hat.

The user should not be tired when operating core drill machines.

Site Safety

- Make a safety assessment of the site before you start work. Consider the safety of others who may be working in the same area this includes your power chords, water hoses, concrete slurry and water generated

- Always remember when coring through floors above ground level, once 'through' the core will release and fall to the lower level and can cause even fatal injury – the area below must be restricted with a barrier and guarded by a supervisor. Please check 'site' safety regulations.

Building Safety

- If coring through suspended concrete floors check with the appropriate site supervisor as diamond core bits will cut through tensile steel rods which can 'invalidate' the integrity of the entire floor!

- Ensure you do not drill through imbedded service pipes and conduits (gas, water, electricity) as serious personal injury to you and others may occur and cost a great deal to repair. Consider using concrete scanning services to eliminate the dangers and repair costs. Before drilling, building plans should be consulted to avoid damage to imbedded site services.

Duty of Care

The intended core drill machine user must **first read and understand the User Manual** supplied with the equipment and before operating the machine. Core drilling machines are generally powerful with high torque properties and must be operated with a level of understanding to ensure job success and personal safety.

Getting Started

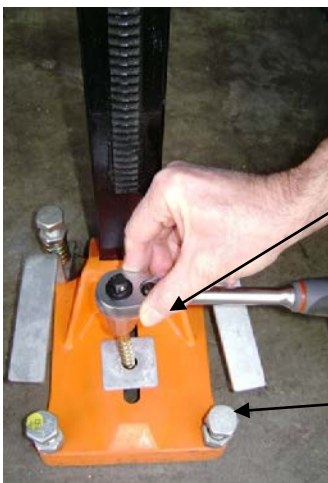
You have read available manuals and information and have assembled the core drill machine. If hand drilling (without a rig) ensure all ancillary handles are fitted and well tightened. If rig drilling ensure you have carefully mounted the machine onto the rig as failure to fully tighten clamping devices can cause vibration when drilling. If 'collar clamping', make sure the machine collar is fully and squarely seated into the female rig collar, generally tightening both left and right hex head bolts consecutively a little at a time ensures firm fixing.

Note that some machines can only be used as supplied ready attached to a rig, in this sense you are using 'fixed machinery'. DYMAXION rig mounted only models include AGCDM250 and PCD3300. Other models such as PCD1700HH and AGCDM80 and AGCDM160 can either be used by hand or fixed to a core drill rig. (See www.bordo.com.au for product catalogues)

Advise when Rig Drilling

The rig must be 100% tightly anchored to the surface if not then vibrations will 'set up' which may damage the machinery and the core bit. A strong vibration 'pulse' can even strip the segments from the core barrel.

No: 1/

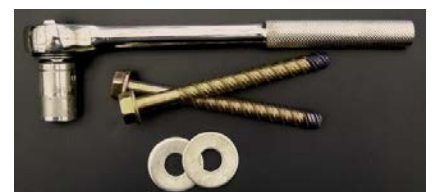


For securely bolting down the core drill machine rig base onto concrete floors or walls, Concrete Screw Bolts or Dyna Bolts together with spreader washers and a ratchet socket driver makes the task quick and efficient. Two bolts may be used for large diameter core drilling.

Note: not suitable for brick, consult your fastenings supplier.

These are the four surface levelling bolts common on all rigs. After securely tightening down the centre bolt/s then next wind down each of the four corner bolts until each just touches the surface.

TIP. Make up a tool kit specific to core drilling. Include Dynabolts or appropriate alternative, sds bits, large diameter steel washers for rig centre U slot bolting, Stilson/spanners for locking/unlocking core bits, ratchet & socket/s and the tools supplied with your core drill machine and rig. A dedicated water hose reel if drawing from water mains etc.



No: 2/ before connecting the power supply, wind on the core barrel and rotate to ensure free clearance.
Note: Never allow electrical cords, plugs, RCD's to come into contact with water or site slurry – they must be elevated clear away from water and slurry. Damaged RCD units is a common cause for machine failure.

No: 3/ Select the appropriate machine speed for the diameter of core bit. Generally it is wiser to start with slower speeds and increase if necessary to achieve a speed that produces optimum performance. See speed chart below. **Read more.** *If the speed is too high the diamond segment will be 'skipping' over the grinding surface so the steel which holds the diamonds will NOT be wearing away to expose new diamonds and the cutting edge becomes 'blunt' or 'glazed over'. Note that "diamonds perform optimal cutting at a predetermined surface speed, therefore every core bit should be run at the proper speed.*

Core bit MM diameter	RPM	Core bit MM diameter	RPM
Up to 25	3200	152	530
50	1600	175	475
76	1050	203	400
100	800	254	320
125	650	300	265

No:4/ Connect the power supply to the core drill machine and connect the water supply. Start the machine first ensuring the core bit is not in contact with the surface, allow a small amount of water via the water swivel ON/OFF tap at the machine head.

No:5/ First Core Bit Entry. Use gentle drilling pressure until the diamond crown is fully embedded. The head of the core drill bit will require some applied side pressure to 'steady' the initial entry into the concrete. As the diamond crown meets the surface and both are parallel with each other – there is a tendency (more with smaller diameters) for the core barrel to 'crawl' (wander) away from true center because there is no pilot drill system to lock the barrel in the drilling position. This 'steading' lateral pressure is applied just above the diamond segments.

A section of heavy timber is sometimes used but not on the 'inbound' rotation but on the outbound rotational side! – simply to prevent any chance of chosen 'steady' from being 'drawn in' and jamming between the core bit and the rig mast!

This tendency to 'crawl' or whip away from the drilling position is less of an issue with larger diameter core bits but can be difficult to control with diameters up to 'say' 100mm and the longer the core bit then more the tendency for whip or crawl to occur.

No:6/ Core drilling is now underway – the following practices are used to optimize coring efficiency:-
1/ **Water Flow.** Commonly too much water is used – “For best results operators should apply water until the slurry begins to look like heavily creamed coffee, this consistency proves to be the most effective when wet core drilling” Read *more: Too much water flow constantly washes away the ‘abrasive’ waste material which is needed to keep wearing away the steel matrix and thus keep the diamonds exposed. Too little water will cause diamond segment overheating as lack of coolant, regrinding of the same waste material already cut (critical in vertical floor cuts) and in extreme cases with such heat buildup the concrete slurry can reach a critical state where it can ‘set hard’ in a few seconds!*

Maintain constant firm drilling pressure. Diamonds cut by abrasion so the diamond crown needs to be kept in firm contact with the concrete which means drawing amp’s close to the machines rating but do not exceed the amp rating by forcing the feed pressure as this will overheat the electronic motor parts and cause premature failure (burnout).

No:7/ When you have reached the drilling depth then leave the motor running until the core bit is wound up clear above the surface as core bits may jam in the hole.

Conclusion. These are some critical factors when core drilling site poured concrete:-

Rig 100% firmly bolted down:

Run at the correct speed (also found by trial):

Correct amount of water supply:

Correct amount of constant drilling pressure.

Other Issues Arising When Core Drilling Site Poured Concrete

Electricity supply from generators.

Never use an extension cord longer than 30 meters (preferably much less) due to the ever increasing resistance in current flow - the further the machine is from the power supply then the greater the resistance in the flow and supply of current. It is important to use heavy duty (1.5mm square) extension cords for supplying electricity to core drill machines – 1.5mm square copper allows a less restricted flow of current to the machine.

If operating on construction sites check with the site Electrician for example a Power Supply Site Box may have 25 AMPS allocated to it – but when two or more appliances are plugged in the available AMPS may drop below the required level for the core drill machine to safely operate.

When core drill motors are under increasing load they will draw more AMPS and if not available this can cause critical damage to the motor through severe overheating. Such damage is not included in a warranty

Keeping the diamond segments sharp.

Diamond segments typically become 'blunt' in common with all other cutting edges. The diamond becomes progressively blunt due to a combination of reasons but these are options for re sharpening:-

1/ Run the diamond crown into a coarse abrasive material such as natural limestone, an abrasive brick such as 'internal leaf' brick or old red brick. The abrasiveness will strip away the overburden of steel to expose new diamond.

2/ Break out the core from the hole you are currently drilling. Throw in a handful of 'sharp' builders sand (natural unprocessed sand is best such as on the Perth Plain), add some water to make a paste like cream consistency, run the core bit at a 'slower' speed into the sand, do so for 'say' 2 minutes – you can apply just slight pressure but not to start coring the concrete again!

3/ Do the same as above but most efficient of all is with **Silicon Carbide** grit (say 80#) or second best is with Aluminum Oxide grit (80#) – both of these are for sale via a Google search and are relatively cheap.

4/ Sharpening Blocks (sticks) are available from some brand name diamond suppliers, best is to buy Silicon Carbide.

5/ Read and follow the core drilling practice outlined previously at Nos: 6 – less water and create a creamy concrete slurry which 'sharpen' the diamonds.

Is it the correct diamond segment for the material you are cutting?

DYMAXION diamond core drill bits are rated to cut reinforced concrete and are described as General Purpose because they should also cut most other construction materials and will also cut limestone blocks (composite or natural) concrete or clay pavers, brick, asphalt, CFC and even granite and some natural stone.

Brick rated core drill bits (Dymaxion Kit CBTBKIT1 & 2) will not cut concrete or any cement composed products. Dymaxion also offer special Natural Limestone rated core bits typically used in W.A. for fencing when coring directly into natural limestone blocks or 'ground geology limestone'.

Basic Instructions When Hand Drilling Without a Drilling Rig. Concrete and Brick.

Generally we do not recommend drilling much above 65mm in diameter in reinforced concrete without a core drill rig however the following are some tips

1/ Ensure all auxiliary handles are attached to the machine.

2/ **When drilling concrete you must connect the water supply to the water swivel** on the core drill machine, it is not necessary when drilling clay brick. It is virtually impossible to drill down into a concrete floor without running water through the core barrel as the ground waste material cannot effectively be removed. Measures such as running an external hose pipe against the barrel side do not work. Water must be run to inside the barrel thus flushing the waste constantly out and onto the surface.

3/ The machine is fitted with an R.C.D. unit. Although water protected you must keep this unit clean and away from water and drilling slurry.

4/ **Select the correct speed for the diameter of the core bit being used.** A general rule is small diameters on higher speeds and large diameters on slower speeds. If in doubt then start with a slow speed and change to higher speeds by trial. The correct speed allows the diamond cutting head to fully connect or engage with the surface of the material and allow the abrasive grinding action to take place. Too high a speed and the diamond segments 'skip' over the surface without fully engaging the material. This issue of which speed is important. See speed chart at **Nos:3** this document.

5/ **When hand drilling, you need a guide or template** to keep the core barrel steady in the chosen cutting position – without a template the barrel will rotate away from the intended starting position and is dangerous for the operator and will often damage the diamond segments.

A simple template can be made up from wood or sheet material as shown. The template can be pinned to the concrete wall or stood on when floor drilling, the template can be removed once the segments have



6/ **When hand drilling you must adopt a 'steady stance'!** You need to be well balanced as the barrel will turn clockwise to your right and you need to counter the rotational 'drag', the larger the diameter then the more noticeable this is.

You must maintain a straight and unwavering drilling direction. There is an important safety reason for maintaining a 'true' directional cut – if you have drilled say to 100mm in depth and you allow the barrel to skew at a different angle then usually the wall of the barrel will bind in the cut which can cause the barrel to jam while the motor may still be straining to run. Often the clutch will engage and relieve the 'jam' but in some cases if the clutch is not activated then the force of the jam can cause the operator to lose balance with possible injury resulting.