

FH711E



Operators Manual

Manufactured exclusively for

GEO-EXPLORE STORE

GEO-EXPLORE STORE (PTY) LTD

www.geoexplorestore.co.za

Key to Symbols

Symbols on Machine:

WARNING! The machine can be dangerous if used incorrectly or carelessly which can cause serious or fatal injury to the operator or others



Please read the operator's manual carefully and make sure you understand the instructions before using the machine



Always wear:

- Approved protective helmet
- Approved hearing protection
- Protective goggles or a visor
- Breathing mask



Danger : Risk of cut

Hand protection must be worn



Eye protection must be worn



Ear protection must be worn



Mask must be worn



Symbols in the operator's manual:

Inspection and/or maintenance should be carried out with the motor **switched off** and the **plug disconnected**



Always wear approved protective gloves



Regular cleaning is required



Visual check



Protective goggles or a visor must be worn



Safety Instructions

Steps before using

- Please read the operator's manual carefully and make sure you understand the instructions before using the machine.
- This machine is designed for and intended for
CORE CUTTING
- The machine is intended for use in industrial applications by experienced operators.
- Keep the workplace tidy. Disorder leads to accident risks.
- Also read the operating manual enclosed.

Always use common sense

It is not possible to cover every conceivable situation you can face. Always exercise care and use your common sense. Avoid all situations which you consider to be beyond your capability. If you still feel uncertain about operating procedures after reading these instructions, you should consult an expert before continuing.

Do not hesitate to contact your dealer if you have any more questions about the use of the machine. We will willingly be of service and provide you with advice as well as help you to use your machine both efficiently and safely.

All information and all data in the Operator's Manual were applicable at the time the Operator's Manual was sent to print.

WARNING! Under no circumstances should you modify the original design of the machine without approval from the manufacturer. Always use original spare parts. Unauthorized modifications and/or accessories may lead to serious injury or death user or others.

Personal Protective Equipment

WARNING! You must use approved personal protective equipment whenever you use the machine. Personal protective equipment cannot eliminate the risk of injury but it will reduce the degree of injury if an accident does happen. Ask you dealer for help in choosing the right equipment

Protective Helmet	
Hearing protection	
Protective goggles or a visor	
Breathing mask	
Heavy-duty, firm grip gloves	
Tight-fitting, heavy-duty and comfortable clothing that permits full freedom of movement	
Boots with steel toe-cape and non-slip sole	
Always have a first aid kit nearby	

Operation Checklist

A Pre Operation Check List

- 1. Press Emergency stop.
- 2. Make sure power plug is "OFF" or unplug power lead.
- 3. Walk around the machine and clear any unwanted materials, tools or obstructions.
- 4. Shake machine to feel if it's secure, visually check the presence of nuts and bolts.
- 5. Check that the power lead is good and that the plug is proper and secure.
- 6. Check to feel that the belt guard , blade guard are secure.
- 7. Check if the core holder is well placed and held firm. NB not loose
- 8. Check if the conveyor is sturdy, firm and running well. NB no play or side movement.
- 9. Is the handle firm?

B. Checking the Blade

- 1. Check if the blade is running in the centre of the slot, NB not touching the the sides.
- 2. Check the if direction of blade arrow is the same as arrow on blade cover.
- 3. If blade is changed, ensure that the locating pin is comfortable and seating well.
- 4. If blade is changed, always ensure that the blade holder contact surfaces are clean.
- 5. Check if the blade holder nut is tight, Left hand thread to tighten, NB turning nut clockwise , loosens the blade. Always use the correct spanner.
- 6. Are you happy with all aspects checked thus far?
- 7. If yes , continue.
- 8. If no, consult your supervisor.
- 9. If you are inspecting the machine and you have to leave , Repeat A1 and A2 every-time you return

Operation of machine

C. Operation of Machine

- 1. Put on your safety gear as per requirement of personal health and safety.
- 2. Make sure that you have all loose clothing and hair tucked away.
- 3. Switch the water valve to "OPEN" position.
- 4. You are now ready to operate the machine.
- 5. Plug the power lead to the power source and switch " ON " the mains switch.
- 6. Place the correct size core into the holder, with the cutting mark in line with the blade
- 7. Release the emergency stop by twisting the knob, the machine is ready to be switched on.
- 8. Always keep focus on the cutting application and be aware to keep your hands away from the blade.
- 9. Press the start button and the machine is now alive with the blade spinning.
IMPORTANT: Always use your left hand to push or pull the conveyor and your right hand to operate the emergency stop switch.
- 10. Bring the work piece closer to the blade slowly, by pushing the handle towards the blade.
- 11. Gently apply a light consistent forward pressure and allow the blade to do the work, don't force or rush the cut.
- 12. When the conveyor has fully past the blade and the core holder is clear of the blade, press the emergency stop button.
- 13. Remove the split core pieces, only when the blade has stopped.
- 14. Return the conveyor to the start point and clean the slot of any chipped pieces, with a brush or flush using a bucket of water.
- 15. You are now ready to repeat the cutting procedure.
- 16. **If at any time you hear the machine sounding different , press the emergency stop and call the supervisor in charge.**

D. At the end of the day

- 1. At the end of the day , Press the emergency stop and unplug the power lead.
- 2. Open drain plug and drain the water from the machine.
- 3. Brush out all residue from cutting procedure and clean the machine.
- 4. Clean pump filter and flush pump with clean water.
- 5. Check if your tool kit is complete.
- 6. Is the machine clean enough for the next shift.
- 7. **Very Important :** Service the machine at least once every three months , to replace any worn parts and to make sure that all nuts and bolts are tight and secure.

PLEASE NOTE THAT MACHINE IS SET AT FACTORY, ANY ADJUSTMENTS SHOULD ONLY BE MADE IF SETTINGS HAVE SHIFTED DURING TRANSIT

BLADE AND MOTORHEAD SET-UP



TIGHTEN THE 4 ARBOR BOLTS



LOOSEN 4 BOLTS FIXING MOTOR CARRIER TO THE BRIDGE. LOOSEN BUT DON'T REMOVE



SLIDE HEAD ALONG SLOT UNTIL BLADE IS IN LOCATION OF SLOT IN THE CORE HOLDER



FIT INNER BLADE HOLDER AND ENSURE THAT LOCATING PIN OR GRUB SCREW IS IN PLACE. CHECK IF SHAFT KEY IS IN.



FIT BLADE, NOTING THE DIRECTIONAL ARROW. FIT OUTER BLADE HOLDER COVER. TIGHTEN WITH SPANNER, LHT THREAD



LOOSEN BRIDGE FIXING BOLTS TO SET THE HEIGHT OF THE BLADE IN RELATION TO THE CORE HOLDER



ADJUST BRIDGE HEIGHT UNTIL THE BOTTOM EDGE OF BLADE IS ABOUT 22MM OFF THE CONVEYOR TABLE



SQUARE HEAD TO THE BRIDGE TIGHTEN THE 4 FIXING BOLTS, KEEPING AN EYE ON THE LOCATION OF THE BLADE TO THE SLOT ON THE CORE HOLDER.



CHECK IF BLADE IS COMFORTABLE IN SLOT, THEN REMOVE THE CORE HOLDER



USING A PROPER SQUARE, SET THE BLADE SQUARE TO THE TABLE SURFACE



LOOSEN BOLTS AND ADJUST HEIGHT UNTIL BLADE IS SET SQUARE TO TABLE. TIGHTEN KEEPING AN EYE THAT THE SQUARE IS CORRECT



THE BLADE IS NOW SQUARE TO THE TABLE. COVERS CAN NOW BE REPLACED.

BELT CHANGE

TAKING OFF



USE A LEVER OR A SCREWDRIVER AND LEVER BELT OVER OUTSIDE EDGE OF PULLEY



ROTATE MOTOR PULLEY ANTI CLOCKWISE. BE CAREFUL NOT TO PINCH YOUR FINGERS



CONTINUE ROTATING PULLEY UNTIL THE BELT IS FULLY OFF

FITTING BELT ON



PLACE BELT ON PULLEY. USING A LEVER OR SCREWDRIVER, GUIDE BELT INTO THE VEE - GROOVE. ROTATE MOTOR PULLEY, IN AN ANTI CLOCKWISE DIRECTION UNTIL THE BELT IS ON. BE CAREFUL NOT TO GET PINCHED IN THIS PROCEDURE.



PLEASE INSPECT THE BELTS ON A MONTHLY PERIOD.

CORE GUIDE SETTING



TIGHTEN 4 BOLTS FIXING THE ARBOR



LOOSEN 6 BOLTS HOLDING THE CORE GUIDE. PULL IN THE DIRECTION OF ARROWS



...UNTIL BLADE SITS GENTLY ON THE BEHIND EDGE OF THE SLOT.



GENTLY TRAVERSE THE CONVEYOR TO ENSURE THAT THE BLADE IS CONSISTENT ALONG THE REAR ...



... EDGE OF SLOT, ON ENTRY, ALONG THE FULL LENGTH AND ON LEAVING THE SLOT.



THE BLADE IS NOW PARALLEL WITH CORE HOLDER



GENTLY MOVE THE ENTRY POINT OF THE BLADE TO THE CENTRE OF SLOT. TRY TO MAINTAIN THIS....



CAREFULLY SET THE EXIT POINT TO THE CENTRE OF THE SLOT. TRAVERSE THE TABLE TO ENSURE THE...



... CENTERING OF THE BLADE ON ENTRY AND LEAVING THE SLOT. NOTE THAT THE BOTTOM EDGE OF BLADE SHOULD BE ABOUT 10 MM FROM THE BOTTOM OF THE SLOT



WHEN YOU ARE HAPPY, MARK THE CORNERS AND TIGHTEN THE BOLTS. DO NOT OVER TIGHTEN...



... AS THE RUBBER CUSHION WILL SQUEEZE AND THE CORE HOLDER WILL NOT SEAT STRAIGHT.



AFTER TIGHTENING THE 6 BOLTS, CHECK TO CONFIRM THAT THE BLADE IS IN NO CONTACT WITH ANY SURFACE.

BELT, PULLEY SET-UP



MOTOR
PULLER
NUTS

USE A SQUARE AND SET
THE MOTOR SQUARE TO
THE MOTOR CARRIER



ADJUST MOTOR PULLER
BOLTS UNTIL BELT IS AT
IT'S CORRECT TENSION,
KEEPING MOTOR SQUARE
TO MOTOR CARRIER



MEASURE DISTANCE OF
MOTOR ON BOTH ENDS,
TO THE EDGE TO
ENSURE THAT IT IS
SQUARE.



TIGHTEN NUTS AND BOLTS
USING TWO 13MM SPANNERS
OVER TENSIONING CAN
DAMAGE BEARINGS



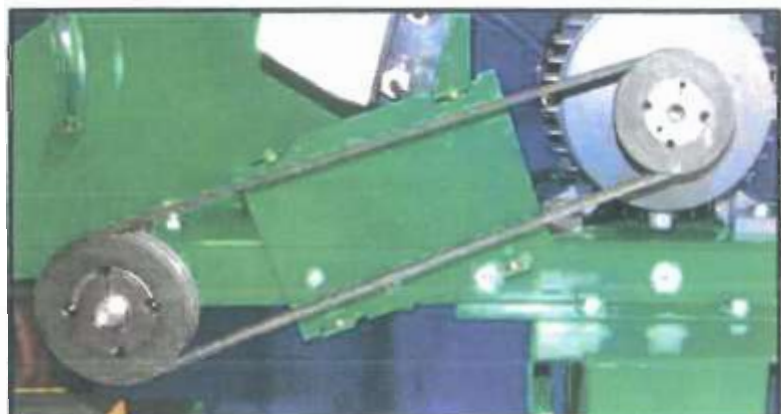
FIT ON PULLEYS AND
TAPER BUSHES,
ENSURING THAT SHAFT
KEYS ARE IN PLACE.
USE CORRECT SIZE HEX
KEYS



USING A STRAIGHT
EDGE, ALIGN THE
PULLEY EDGES SO THAT
BOTH PULLEYS ARE
PERFECTLY STRAIGHT
TO EACH OTHER



TIGHTEN HEX NUTS FULLY



THE MOTOR, BELTS, AND PULLEYS ARE NOW SET.

NB.

1. PULLEYS THAT ARE NOT STRAIGHT WILL CAUSE BELTS TO FRAY AND CAUSE DANGER..
2. LOOSE BELTS WILL SLIP, EFFICIENCY LOSS.
3. OVER TENSIONED BELTS WILL CAUSE FAILURE OF BEARINGS



RE CHECK BELT TENSION

711 Part list

Part No	Part name	Qty
711-001	Machine Chasis	1
711-002	bridge	1
711-003	Motor carrier	1
711-004	Motor carrier angle brackets	2
711-005	belt guard	1
711-006	belt guard bracket	1
711-007	belt guard bracket spacer	
711-008	blade guard	1
711-009	DOL plate	1
711-010	motor pullers	2
711-011	legs	4
711-012	short leg brackets	2
711-013	long leg braket	1
711-014	square tube guides	2
711-015	conveyor table	1
711-016	conveyor handle	1
711-017	conveyor lock brackets	4
711-018	Core holder brackets	2
711-019	Spanner	1
BI 711-01	6005 2RS C3	2
bl 711-02	6200 2RS C3	8
bl 711-03	6000 2RS C3	4
bl 711-04	Belt SPZ 1010	2
bl 711-05	Motor pulley SPZ 71x2 1108	1
bl 711-06	Motor pulley SPZ 95x2 1610	1
bl 711-07	Taper Bush 1108 24mm	1
bl 711-08	taper Bush 1610 20mm	1
JL 711-01	Overload 12- 18	1
jL 711-02	Big gland	2
jL 711-03	Medium gland	2
jL 711-04	Small gland	1
JL 711-05	Toggle	1
jL 711-06	Toggle booth	1
jL 711-07	Emergency Stop	1
jL 711-08	2,5 3 core cable 3,5 m	1
jL 711-09	2,5 straight ferrules	3
jL 711-10	2.5 round ferrule terminals	3
jL 711-11	cable ties	15
jL 711-12	cable ties holders	15
jL 711-13	Plug Tops	1

jL 711-14	boot lace end	20
jL 711-15	D O L	1
jL 711-16	1.5 2 core	
l 711- 01	8mm nipple	4
i 711- 02	8mm T-Piece	1
i 711- 03	8mm Valve	1
i 711- 04	3/4 Plug	1
i 711- 05	clamp	1
i 711- 06	1/2" Tap washer	2
b711-01	t-piece	1
G711-01	Arbour body	
g711-02	Shaft	
g711-03	Blade Holder	
g711-04	Key blade holder	
g711-05	key Pulley	
g711-06	Locating pin	
KLB711-1	Pump	1
	6mm copper	
	8mm copper	
	12mm clear hose	
	Elbow 10mm	
m 1	220v 2.2 kw B3 90L Ft	1
m 2	220v 3.0 kw 100L ft	
m 3	380v 5,5 Kw 132 ft	
m 4	380v 7,5 Kw 132 ft	

Geo-Explore Store FH711E Electric Motor & Saw Specifications

Name: Duiker
Model: FH711E Petrol Engine

Specifications:		
Petrol Engine:	220v	380v
Displacement	2.2kw 50Hz	2.2kw 50Hz
Net Power:	2810 rpm	2810 rpm
	MY 90L/2	MS 90L/2

Max. Blade x Bore	Ø350 x 25,4mm		
Peripheral Speed	40mps (Tool speed 2300rpm @ Ø350mm)		
Max. Cutting Depth	110mm		
Max. Cutting Length	500mm		
Dimensions LxWxH	Length	Width	Height
Assembled	1210mm	610mm	1450mm
Dim. Legs removed	1210mm	610mm	800mm
Crated	1350mm	800mm	1000mm
Weight	125kg		
Weight crated.	165kg		

Features	Benefits
Removable legs	Ease of transportation and storage
Heavy guage material	Durability
Fixed Head	Ø350mm Diameter Blades ensuring optimum blade life.
Emergency Stop	Operator safety

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HAZARD IDENTIFICATION & RISK ASSESSMENT

The following notes should be read in order to understand the methodology and terminology used in the risk assessment.

DEFINITIONS and EXPLANATORY NOTES

HAZARD -

Anything or situation that has a potential to cause injury, illness or damage.

Example; a hole in the ground is a hazard.

RISK -

The risk of injury, illness or damage arising from the hazard.

Example; someone or something might fall into the hole.

Risk is measured in terms of "CONSEQUENCE" and "LIKELIHOOD"

CONSEQUENCE -

The possible result of anything or someone coming into contact with the hazard.

*Examples; shallow hole – twisted ankle
deep hole – serious or fatal injury*

LIKELIHOOD -

How likely is it that someone will be injured or something damaged.

Examples; if the hole is in an area where people are working then it is very likely that someone will fall in.

if the hole is in a very isolated area it is much less likely that someone will fall in.

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RISK RATING -

The risk is rated from 1 to 4 with 1 being the highest risk. The ratings given on the assesment form are made as if no preventative or mitigating controls have been put in place. The ratings will therefore decrease considerably once appropriate controls have been established.

N.B. Please see attached risk rating matrix and explanatory notes.

* * * * *

RISK RATING MATRIX AND EXPLANATORY NOTES

LIKELIHOOD	CONSEQUENCE	RISK RATING
HIGH	HIGH	1
LOW	HIGH	2
HIGH	LOW	3
LOW	LOW	4

LIKELIHOOD -

This is rated high when people are exposed to the hazard.

CONSEQUENCE -

This is rated high if any possible incident could lead to a lost time injury or worse or property damage in excess of R5,000.00.

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HAZARD IDENTIFICATION & RISK ASSESSMENT

SITE PLANT EQUIPMENT OPERATION ASSESSED:
GEO-EXPLORE STORE - CORE SPLITTER

DATE OF ASSESSMENT: 09/09/2011

ASSESSED BY: **CLIVE POOLE**
S.E.H. Management Services

HAZARD	RISK		RECOMMENDED ACTIONS
	FREQUENCY/EXPOSURE	POSSIBLE CONSEQUENCES	
ELECTRICITY, INSTALLATION, AND	Persons operating the splitter, as well as those working nearby, are continually exposed to electrical hazards especially in view of the wet operating environment.	<ul style="list-style-type: none"> o Electrocutation - injury or death. 	1
WORK AREA	Any person working at or near the splitter may slip, trip or fall. Poor visibility can also cause slips, trips and falls and operator errors.	<ul style="list-style-type: none"> o Severe injury. 	1

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CUTTING BLADE	<p>The operator is exposed to the revolving cutting blade whenever the machine is activated.</p> <p>Casual and unauthorised activation and use of the splitter creates an even greater likelihood of injury.</p> <p>The blade may break during operation.</p>	<ul style="list-style-type: none"> o Severe injury. 	1	<ul style="list-style-type: none"> o All work areas and walkways are to be clearly illuminated. o Establish a safe operating technique which minimises the risk of the blade coming into contact with the operator's hands. o The operator(s) must be trained in the safe operation of the machine. o Strictly limit access to the cutter. o Check the blade, as per operating instructions, before each use. o Do not operate with a damaged blade. o Personal protective equipment must be worn which should include eye/face protection and hand protection.
ROCK CHIPS, SPLINTERS AND FRAGMENTS	<p>In the course of cutting, rock chips, splinters or fragments may result which might injure the operator.</p>	<ul style="list-style-type: none"> o Severe injury. 	2	<ul style="list-style-type: none"> o Operator must wear adequate PPE for the hazards and risks o Only cut core using the correct - provided by supplier, - core holder in the sliding tray. o Operator and support personnel must wear protective footwear.
FALLING OBJECTS	<p>The operator and support personnel may be exposed to the risk of falling/dropped objects such as sample trays or sample itself.</p>	<ul style="list-style-type: none"> o Severe injury. 	2	<ul style="list-style-type: none"> o The operator must be competently trained in the safe pre-shift inspection, and operation of the splitter. o No repairs or maintenance are to be done on the machine unless the power source is isolated and locked out.
MOVING PARTS OF MACHINE INCLUDING DRIVE BELTS AND BLADE	<p>The operator may be exposed to all the visible moving parts of the machine. Persons doing repairs and maintenance can be exposed to all the moving parts.</p>	<ul style="list-style-type: none"> o Severe injury. 	2	<ul style="list-style-type: none"> o Both the operator and support crew must be trained in the safe procedures at or
OPERATOR AND SUPPORT CREW.	<p>The operator and support crew members may at any time be,</p>	<ul style="list-style-type: none"> o Severe injury. 	2	<ul style="list-style-type: none"> o Both the operator and support crew must be trained in the safe procedures at or

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	or become, unfit to operate at or around the splitter. The causes of this can range from fatigue to alcohol/drug use.			around the machine, including training on the hazards and risks involved and the preventative or mitigating actions required.
VISIBILITY	The operator's visibility may be affected by poor lighting or spray	Severe injury.	2	<ul style="list-style-type: none"> The operator must be instructed to stop whenever visibility is poor.
DUST	If dry cutting is permitted, dust will result, and the operator, and those working near to the splitter, will be exposed to it. Visibility may also be affected.	Respiratory system disorder.	3	<ul style="list-style-type: none"> If dry cutting is permitted, only the correct type of blade should be used, and appropriate dust masks worn, by operator and those working nearby.
NOISE	The operator and those working near to the splitter are exposed to noise.	Hearing impairment.	2	<ul style="list-style-type: none"> If the core splitter's operating noise levels are over 82dB, persons working at, or near the machine, must wear hearing protection of the correct attenuation.
MANUAL HANDLING OF CORE SPLITTER	The core splitter has a mass of 125Kg. The ILO guidelines for occupational lifting are e.g. men aged 20 to 25 – 25Kg. Less for others.	Severe injury from strains, sprains and skeletal damage.	2	<ul style="list-style-type: none"> Use mechanical lifting and moving equipment, or - Use enough personnel (5 or more) who have been trained in the correct manual handling techniques.
VIBRATION	The operator may be exposed to vibration from physical contact with the machine	Hand, arm vibration syndrome. Damage to machine and sample if excessive.	3	<ul style="list-style-type: none"> Push handle must be rubber or wood The operator should avoid leaning against, or keeping right arm from continuous contact with the machine If vibration is excessive the machine should be stopped and checked. Position machine on solid level base. Pre-operation inspections and regular services and maintenance.
EFFLUENCE	Water containing cuttings/fines	Environmental pollution	3	<ul style="list-style-type: none"> Adequate controlled capture and drainage

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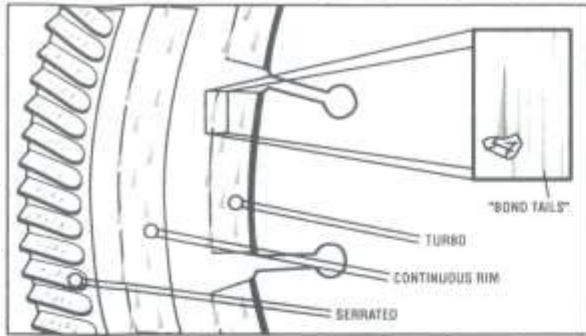
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	<p>from the process will be generated during operation.</p>	<ul style="list-style-type: none"> o Visibility impairment o Slips on spillage – injury o Excessive water usage 		<ul style="list-style-type: none"> o of spray and other effluence. o Spray direction control and capture into drainage o Settling sumps (obtainable from core-splitter supplier) o Water reticulation o Correct disposal procedure for cuttings/fines
<p>LABELLING OF SWITCHES AND OTHER CONTROLS</p>	<p>Operator(s), and others, will be exposed to the possibility of activating, or de-activating, the wrong switch or control.</p>	<ul style="list-style-type: none"> o Mechanical malfunction, possibly leading to: <ul style="list-style-type: none"> ▪ Injury ▪ Equipment and/or sample damage 	<p>3</p>	<ul style="list-style-type: none"> o Train all personnel who may come into contact with the core-splitter as to the purpose of the relevant operational switches, push buttons and emergency power source cut-outs. o Label all mechanical/electrical operating levers, switches and push-buttons.

What is a diamond blade?



WHAT IS A DIAMOND BLADE?

A diamond blade is a circular steel disc with a diamond bearing edge. The edge can have one of three configurations: segmented, continuous rim or turbo. The blade core is a precision-made, steel disc which may have slots. The slots (also called "gullets") provide faster cooling by allowing water or air to flow between the segments. The slots also allow the blade to flex under cutting pressure.

Most blade cores are tensioned at the factory so the blade will run straight at proper cutting speeds. Proper tension also allows the blade to remain flexible enough to bend slightly under cutting pressure and "snap" back into position. Diamond segments or rims are made up of a mixture of diamonds and metal powders. Diamonds used in blades are almost exclusively manufactured diamonds in various grit sizes and quality grades. In the manufacturing process, the metal powder and diamond grit mixture is hot pressed at high temperatures to form a solid metal alloy (called the bond or matrix) in which the diamond grit is retained.

The segment or rim is slightly wider than the blade core. This side clearance allows the cutting edge to penetrate through the material without steel drag. To attach the diamond rim or segments securely to the steel core, several different processes are used.

1. BRAZING

Silver solder is placed between the segment or rim and the core. At high temperatures, the solder melts and bonds the two parts together.

2. LASER WELDING

The diamond segment and steel blade core are welded (fused) together by a laser beam.

3. MECHANICAL BOND

A notched, serrated or textured blade core may be used to "lock" the diamond rim or segments onto the edge of the blade. Mechanical bonds usually include brazing or other metallurgical bonding processes to hold the rim or segments in place.

4. DIFFUSION BOND

Mechanical bond process guaranteed for normal useful life of the blade.

HOW DO DIAMOND BLADES WORK?

Diamond blades do not really "cut" like a knife...they grind. During the manufacturing process, individual diamond crystals are exposed on the outside edge and sides of the diamond segments or rim. These exposed surface diamonds do the grinding work. The metal "matrix" locks each diamond in place. Trailing behind each exposed diamond is a "bond tail" which helps support the diamond.

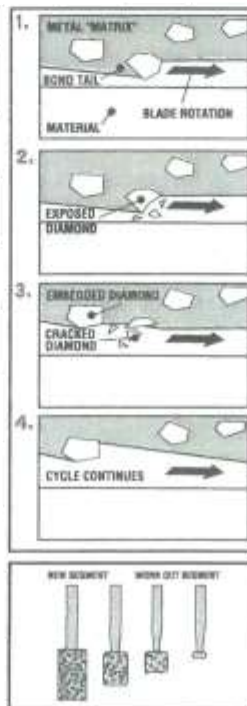
While the blade rotates on the arbor shaft of the saw, the operator pushes the blade into the material. The blade begins to cut through the material, while the material begins wearing away the blade.

Exposed, surface diamonds score the material, grinding it into a fine powder. Embedded diamonds remain beneath the surface.

Exposed diamonds crack or fracture as they cut, breaking down into even smaller pieces. Hard, dense materials cause the diamonds to fracture even faster.

The material also begins to wear away the metal matrix through abrasion. Highly abrasive materials will cause the matrix to wear faster, allowing new layers of diamond exposure to continue cutting.

This continuous grinding and wearing process continues until the blade is "worn out." Sometimes a small, unusable part of the segments or rim may remain. It is important to understand that the diamond blade and the material must work together (or interact) for the blade to cut effectively.



In order for a diamond blade to work properly, the diamond type, quality and grit size must be suited for the saw and the material. The metal matrix must also be matched to the material to be cut.

Blades for cutting hard, dense (less abrasive) materials (such as tile, hard brick, stone or hard-cured concrete) require a softer metal matrix. The softer metal matrix wears faster, replacing worn-out diamonds fast enough for the blade to keep cutting.

Blades for cutting soft, abrasive materials (such as block, green concrete or asphalt) must have a hard metal matrix to resist abrasion and hold the diamonds longer.

How to choose the right diamond blade.

BEFORE YOU GET STARTED

Decide which is most important to you: the initial price of the blade or the cost per cut. For smaller jobs or occasional use, a low priced blade may be preferable. For larger jobs or regular use, a higher priced blade will actually be less expensive to use because it will deliver the lowest cost per cut. For really big jobs, the lowest possible sawing cost (cost per foot) is usually much more important than the initial price. Husqvarna has a grading system to help you identify the different performance levels of blades.

KNOW THE TYPE AND HORSEPOWER OF THE SAW BEING USED

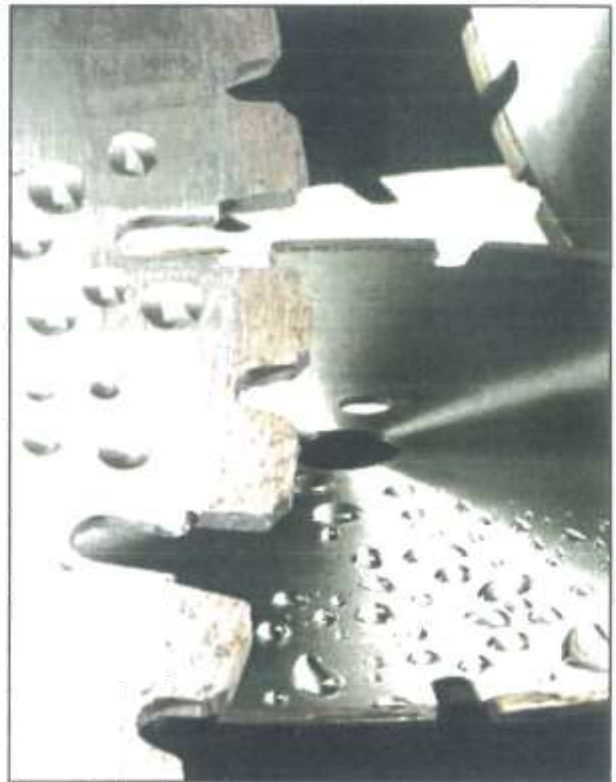
A list of different types of equipment you may use diamond blades on is provided on page 5. There is a corresponding symbol for each, and these symbols are used throughout the catalog to help you locate the right blade. Blades that are to be used on power cutters have to be rated at higher rpms. Please refer to the chart on page 269. All Husqvarna high-speed cut-off blades are rated at the appropriate, higher rpms.

CORRECTLY IDENTIFY WHAT YOU ARE CUTTING

Correctly identifying the material you are going to cut is the most important factor in choosing a blade. It directly affects the cutting speed and the life of the blade. You will find diamond blade recommendation charts throughout the catalog to help you locate the proper blade for your job. Most Husqvarna blades cut a RANGE of materials. For maximum performance (cutting speed and life), the material should be matched to the blade as closely as possible. As a general rule, determine the material which will be cut most often, or the material for which top blade performance is most important.

CHOOSE WET OR DRY CUTTING

Choosing wet or dry may be a matter of user preference or job requirement. When using a power hand tool such as a power hand saw, it is not safe to use water because of the electrical power source. However for concrete saws, wet cutting is usually preferred because you can cut deeper when using water as a coolant. For tile and masonry saws, either wet or dry cutting blades can be used. For power cutters, dry blades are more popular, but they are often used wet to control dust. Wet blades **MUST** be used with water. Dry blades may be used **EITHER** dry **OR** wet, as the job or equipment allows.



THE SIGNIFICANCE OF SEGMENT HEIGHT

Total segment heights may be misleading because of non-diamond bearing segment bases necessary for the laser welding or brazing process. That is why Husqvarna shows you exactly how much of each segment has diamonds and can actually be used to cut.

Diamond blade segment height by itself is not a true measure of a blade's value. Many other factors affect a blade's performance and consequent value. Consider the diamond size, concentration and quality, the hardness of the bond, the cutting power (torque) of the saw, and how well the blade specification is matched to the material being cut.

Diamond blade performance - concrete cutting.

FACTORS INVOLVING CONCRETE

When cutting concrete, several factors influence your choice of diamond blades. These include:

- Compressive strength
- Hardness of the aggregate
- Size of the aggregate
- Type of sand
- Steel reinforcing (rebar)
- Green or cured concrete
- Abrasivity of the aggregate

The guidelines in this section are for general reference only. The best source for information on the characteristics of the concrete to cut is from the original contractor. Contact your local Department of Transportation or City Hall for help in finding this information.

COMPRESSIVE STRENGTH

Concrete slabs may vary greatly in compressive strength, measured in pounds per square inch (PSI). Most concrete roads are 4,000-6,000 PSI, while typical patios or sidewalks are about 3,000 PSI.

Concrete Hardness	PSI
Critically hard	8,000 or more
Hard	5,000 - 8,000
Medium	4,000 - 6,000
Soft	3,000 or less

SIZE OF THE AGGREGATE

The size of aggregate affects diamond blade performance. Large aggregates tend to make a blade cut slower. Smaller aggregates tend to make a blade cut faster. The most common sizes of aggregate are:

- Pea Gravel..... Variable in size, usually 3/8" or less in diameter
- 3/4" Sieved size
- 1-1/2" Sieved size

HARDNESS OF THE AGGREGATE

There are many different types of rock used as aggregate. Hardness often varies even within the same classification of rock. For example, granite varies in hardness and friability.

The Mohs scale is frequently used to measure hardness. Values of hardness are assigned from one to ten. A substance with a higher Mohs' number scratches a substance with a lower number - higher Mohs' scale numbers indicate harder materials.

The scale below shows the Mohs' scale range. Aggregate hardness is one important factor when cutting concrete. Because hard aggregate dulls diamond grit more quickly, segment bonds generally need to be softer when cutting hard aggregate. This allows the segment to wear normally and bring new, sharp diamond grit to the surface. Softer aggregate will not dull diamond grit as quickly, so harder segment bonds are needed to hold the diamonds in place long enough to use their full potential. Most aggregates fall into the 2 to 9 range on the Mohs scale. Some commonly used aggregates measure this way on the Mohs' scale.

Mohs' Scale
1 - Talc
2 - Gypsum
3 - Calcite
4 - Fluorite
5 - Apatite
6 - Feldspar
7 - Quartz (Si O ₂)
8 - Topaz
9 - Corundum (Al ₂ O ₃)
10 - Diamond

Diamond blade performance.

Moh's Range	Description	Aggregates
8-9	Critically hard	Flint, chert, trap rock, basalt
6-7	Hard	Some river rock, some granites, basalt, quartz, trap rock
4-5	Medium hard	Some granites, some river rock
3-4	Medium	Dense limestone, sandstone, dolomite, marble
2-3	Medium soft	Soft limestone

TYPE OF SAND

Sand is part of the aggregate mix and determines the abrasiveness of concrete. "Small aggregate" is usually sand. Sand can either be sharp (abrasive) or round (non-abrasive). To determine the sharpness of sand, you need to know where the sand is from. Crushed sand and bank sand are usually sharp; river sand is usually round. Green concrete is more abrasive than cured concrete because when concrete is not fully cured, sand can easily be scraped off the surface being cut. More loose sand means more abrasiveness.

STEEL REBAR REINFORCING

Heavy steel reinforcing tends to make a blade cut slower. Less reinforcing tends to make a blade cut faster. Light to heavy rebar is a very subjective term.

Examples include:

- Light** Wire mesh, single mat
- Medium** #4 rebar, every 12" on center each way (OCEW), single mat
Wire mesh, multi-mat
- Heavy** #5 rebar, 12" OCEW, single mat
#4 rebar, 12" OCEW, double mat

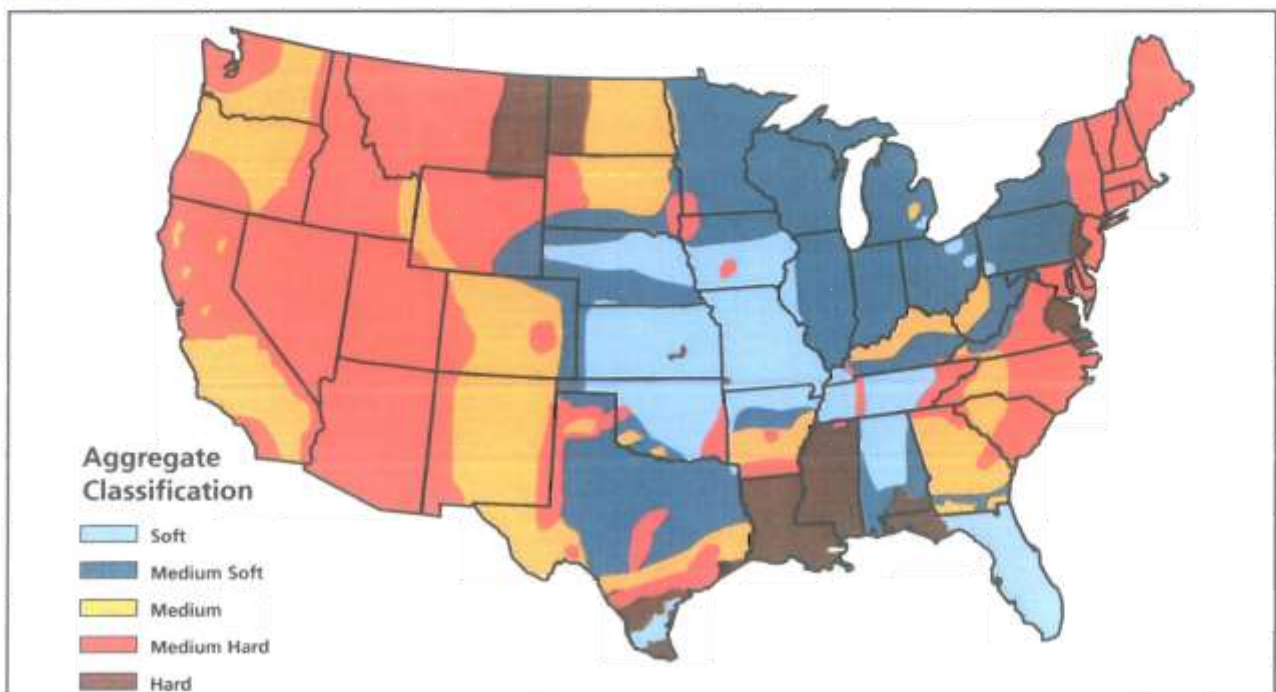
Heavy rebar can also result from different grades of steel. Typical rebar is grade 40 steel. Grade 60 steel would make the example of #4 medium rebar, above, into a heavy rebar. Rebar gauges are in eighths of an inch - #4 rebar is 1/2" diameter, #5 is 5/8". Where rebar specifications do not exist on a road, pull a core sample before buying a blade.

GREEN OR CURED CONCRETE

The drying or cured time of concrete greatly affects how the material will interact with a diamond blade. Green concrete is freshly poured concrete that has set up but is not yet fully cured. It is softer and more abrasive than cured concrete. You need a harder bonded blade with undercut protection to cut green concrete. You need a softer bonded blade to cut the same concrete in a cured state.

The definition of green concrete can vary widely. Weather, temperature, moisture in the aggregate, time of year and the amount of water in the mix all influence curing time. Concrete now has additives which can either shorten or extend curing time. Consult your mix design to find the relative curing time for your job. As soon as wet concrete sets up and does not spall or ravel, green cutting can begin.

AGGREGATE MAP



Diamond blade trouble shooting.

Few Husqvarna diamond blade problems are caused by warranty failures - less than 1/10% (.001). Most problems result from

- Using the wrong blade for the job
- Using the blade improperly
- Equipment problems

This trouble shooting guide will help identify, diagnose and correct diamond blade problems. The following are samples of some of the problems you may encounter in the field, with a cause and remedy guide to diagnose and correct these problems.

SYMPTOM	CAUSE	REMEDY
Loss of tension	Blade being used on misaligned saw.	Check for proper saw alignment.
	Blade is excessively hard for the material being cut, creating stress on the steel center.	Make certain blade is correct for material being cut.
	Material slippage causing blade to twist and become kinked or bent.	Maintain tight grip on material while sawing.
	Utilizing blade flanges that are under size or not the same diameter, creating uneven pressure on the center.	Make certain blade flanges are proper size and identical diameter, minimum 3-7/8", 4-1/2" on concrete saws, 6" minimum on diamond blades that are 30" diameter and larger.
	Blade being used at improper RPM.	Make certain bladeshaft is turning at the proper RPM by using a tachometer. This is especially important with concrete saws.
	Blade improperly mounted on arbor shoulder becomes bent when flanges are tightened.	Hold blade securely on arbor shoulder until outside flange and nut are firmly tightened.
Segment loss	The material slips during cutting which twists or jams the segments loose.	Hold the material securely while cutting.
	Blade is too hard for the material it is cutting, creating excessive dullness which makes the segment pound off, or fatigue.	Use a softer blade specification.
	Worn blade flanges fail to provide proper support and cause the blade to deflect.	Replace both blade flanges.
	Out-of-round blade rotation resulting in pounding, caused by worn arbor or bad bearings in the shaft.	Replace worn arbor and/or bearings.
	Overheating can usually be detected by blue color on steel center and generally confined to the area where the segment was lost.	Check the water system for blocked water passages. Test pump to see if it is functioning. For dry cutting, it may be necessary to make shallower cuts and allow the blade to run freely every few minutes in order to let the air cool it.



SYMPTOM**CAUSE****REMEDY****REPAIR NOTE:**

It is possible to replace two or three missing diamond segments, providing the steel center is not cracked or undercut badly. If many segments are missing, or if there is less than 50% of blade life remaining, repairing the diamond blade may not be economical. **Be certain to eliminate mechanical or operational problems before installing replacement blades.**

Cracked segments

Blade is too hard for material being cut.

Use correct blade with softer bond.



Eccentricity



The bond is too hard for the material being cut. The hard bond retains the diamonds, and they begin to round off, causing the blade to become dull. Instead of cutting, the blade begins to "pound," causing the blade to wear out-of-round.

Change to a softer bond, which will wear away more readily allowing the dull diamonds to be released and sharp, new cutting edges to become exposed.

The saw bladeshaft may have a groove scored in it, caused by a blade spinning between the flanges. A new blade, installed on the arbor shaft, will seat into the groove, and immediately run eccentrically when the saw starts.

Replace worn shaft.

If the bladeshaft bearings are worn, the shaft and mandrel will run eccentrically, causing the blade to wear out-of-round. This happens most often with concrete saws when proper lubrication of the bearings is neglected.

Install new bladeshaft bearings. In some cases it might also be necessary to replace the bladeshaft if it is worn or out of alignment.

Overheated blade

Adequate coolant was not provided.

Check the water supply for adequate volume and for obstructions in the water system. Use dry blades **ONLY** for shallow cutting (1-2" deep) or step cutting. Allow blade to run freely every 10 to 15 seconds in order to increase cooling airflow.



Arbor hole out-of-round

Saw arbor badly worn due to improperly seated blades.

Be certain the blade is properly seated on arbor before tightening flange.


Blade flanges not properly tightened permitting blade to rotate on shaft.

Always wrench tighten the arbor nut. Never hand tighten. Always use hex nuts. Never use wing nuts.



Blade flanges or arbor shaft worn and not providing proper blade support.

Check blade flanges or arbor shaft for wear. Both flanges should be no less than that recommended by the manufacturer. Replace worn parts.

SYMPTOM	CAUSE	REMEDY
Blade won't cut	Blade is too hard for materials being cut (examples: block or general purpose blade being used for extended period on hard brick. Asphalt blade being used to cut hard concrete).	Consult dealer or manufacturer for proper blade to cut materials on job.
	Insufficient power to permit blade to cut properly (loose V-belts, low voltage, motor lacks horsepower).	Check belts, voltage, horsepower.
	Blade has become dull because of continuous use on fairly hard or vitrified material.	Dress with abrasive material until diamonds become exposed again. This may be necessary occasionally, but if dullness occurs too hard for the material.
	Blade segments appear to still have plenty of life, but blade won't cut.	Some harder-bonded blades designed for abrasive materials require a non-diamond bearing section at the base of the diamond segment for better adherence to the steel core. A blade used to this stage has worn out in the normal manner and should be replaced.
Excessive wear	Using the wrong blade on highly abrasive material (example: glazed tile blade on concrete block).	Consult the dealer or manufacturer for the proper blade specification for abrasive material.
	Lack of sufficient coolant to the blade. Often detected by excessive wear in the center of the segment (note: in both above cases, diamonds will usually be highly exposed).	Clean up water system. Make certain water pump is functioning properly.
	Wearing out-of-round accelerates wear. Usually can be caused by bad bearings, worn shaft or using a blade too hard for the materials being cut.	Check bearings and arbor. If worn, replace with new parts before installing another blade.
	Insufficient power caused by loose V-belts, inadequate voltage, or improper RPMs.	Tighten belts (taut). Replace worn belts. Check voltage. Use proper size extension cord.

SYMPTOM**CAUSE****REMEDY**

Cracked core



Blade is too hard for material being cut.

Use correct blade with softer bond.

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

The saw operator should use steady, even infeed pressure, and be careful not to twist or jam the blade in the cut.

Overheating through inadequate water supply or improper use of dry cutting blades.

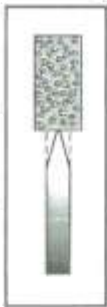
Use adequate water to cool wet-cutting diamond blades (for example, 2-5 gallons per minute for concrete saws). Allow adequate airflow around dry-cutting diamond blades to prevent overheating. **NEVER USE A BLADE WITH A CRACKED CORE!**

Undercutting



Undercutting is a condition in which the steel center wears faster than the diamond segment, especially in the areas where the segment and core are joined. The condition is caused by highly abrasive material grinding against the blade during the sawing operation. Usually materials containing sand are responsible for this condition, called segment loss.

The flow of swarf (abrasive cuttings) must be distributed over a wider area, away from the critical segment area with undercut retardant segments or other types of undercut protectors specially positioned around the steel center to change the pattern of constant abrasion. Although successful in most cases, undercut protectors do not provide 100% protection.



Uneven segment wear

Segments are worn on one side, reducing side clearance. It is usually caused by misalignment of the saw or a lack of sufficient water on both sides of the blade.

Check saw alignment. Clean water system, making certain that water is properly applied to the leading edge of the blade flanges. Check to see if pump is supplying sufficient, even water.



Blade is worn out-of-round due to bad bearings, worn arbor or excessive dulling condition. See section on excessive wear.

Replace bearings or worn arbor as required.

How to choose the right diamond blade.

MAXIMUM BLADE CUTTING DEPTHS

Diameter (Inches)	Cutting Depth
Concrete Saw Blades	
7"	1-1/2"
8"	2"
12"	3-5/8"
14"	4-5/8"
16"	5-5/8"
18"	6-5/8"
20"	7-5/8"
24"	9-5/8"
26"	10-5/8"
30"	11-3/4"
36"	14-3/4"
42"	17-1/2"
48"	19-3/4"
Wall & Hand Saw Blades	
14"	4-5/8"
18"	6-1/2"
24"	9-1/2"
30"	11-1/2"
36"	14-1/2"
42"	17-1/2"
48"	20-3/4"

Diameter (Inches)	Cutting Depth
Masonry Saw Blades	
14"	5"
18"	7"
20"	8"
Tile Saw Blades	
4"	3/4"
4-1/2"	1"
5"	1-1/4"
6"	1-3/4"
7"	2-1/4"
8"	2-3/4"
9"	3-1/4"
10"	3-3/4"
Power Hand Saw Blades	
3-3/8"	1/2"
4"	1"
4-1/2"	1-1/4"
5"	1-1/2"
7"	2-1/2"
8"	3"
High-Speed Saw Blades	
12"	4"
14"	5"
16"	6"

DIAMOND BLADE OPERATING SPEEDS

Dia.	Recommended Operating Speed (RPM)*	Maximum Safe Speed (RPM)**
4"	9,072	15,000
4-1/2"	8,063	13,300
5"	7,257	12,000
6"	6,048	10,185
7"	5,184	8,730
8"	4,536	7,640
9"	4,032	6,790
10"	3,629	6,115
12"	3,024	5,095
12"HS†		6,300
14"	2,592	4,365
14"HS†		5,460
16"	2,268	3,820
16"HS†		4,500
18"	2,016	3,395
20"	1,814	3,055
22"	1,649	2,780
24"	1,512	2,550
26"	1,396	2,350
28"	1,296	2,185
30"	1,120	2,040
32"	1,134	1,910
36"	1,008	1,700
42"	864	1,455
48"	756	1,275

† HS is for high-speed diamond blades.

* Based on 9,500 sfpm (surface feet per minute) - the general optimum performance range for cutting concrete and masonry products is +10%. For hard, dense materials such as stone and tile, the optimum performance speed is 10-25% less than the speeds shown above.

Bladeshaft speeds (rpms at no load) for most tools will be higher than the recommended operating speeds shown above. Under normal sawing conditions, the actual bladeshaft speed of the tool will slow down under load, and should fall within the optimum speed range.

**This speed (rpm) represents the maximum safe speed [in revolutions per minute (rpm)] at which each blade can be used. Before using any blade, make sure the bladeshaft (arbor) speed or the tool is within the "maximum safe" limit of that blade.

Note: Diamond blade cutting depths listed above are approximate. Actual cutting depth will vary with the exact blade diameter or saw type (or brand), or the exact diameter of the blade collars (flanges). Cutting depth will also be reduced if saw components (motor housing, blade guard) extend below the blade collars (flanges).

KEEPING YOUR DIAMOND BLADE COOL TO EXTEND ITS LIFE AND IMPROVE ITS PERFORMANCE

Dry cutting diamond blades may be used dry, eliminating the need for water tanks, water hoses or wet slurry clean-up. These blades depend on airflow around the blade to prevent excessive heat build-up during cutting.

Use dry diamond blades for "intermittent" sawing. After every 10 to 15 seconds of cutting, take pressure off the blade and allow it to run back up to full speed for several seconds. This "cooling" interval allows air to flow around the blade and dissipate the heat. Use dry diamond blades ONLY for shallow cutting (1-2" deep) or step cutting (making several shallow passes to reach the full depth required).

Husqvarna dry cutting diamond blades are also designed to cut equally well wet, if the job or equipment permits.

Wet cutting diamond blades MUST be used with water to prevent excessive heat build-up during cutting. Using water on the blade also reduces dust and helps remove cuttings.

A continuous water flow is critical. Using "wet" blades without water, even for a few seconds, causes excessive heat and blade damage, and creates a safety hazard. Check the saw or tool carefully before using a wet cutting diamond blade. Make sure it is safe to use the saw or tool with water.