

Diamond Bits





VIEWING OPTIONS:

To make our catalog easier to read we recommend using a two page display, as some sections have one page for the exploded view and one for the parts listing. Changing these settings will allow you to see the exploded view and parts listing on the screen at the same time. This can be easily done with the following steps.

Adobe PDF Viewer

In Adobe PDF Viewer, from the main toolbar choose 'View', then 'Page Display', turn on 'Two-Up' and 'Show Cover Page During Two-Up'

FoxIt PDF Viewer

In FoxIt PDF Viewer, from the main toolbar choose 'View', then 'Page Display', turn on 'Facing' and 'Show Cover Page During Facing'



CME Diamond Bits

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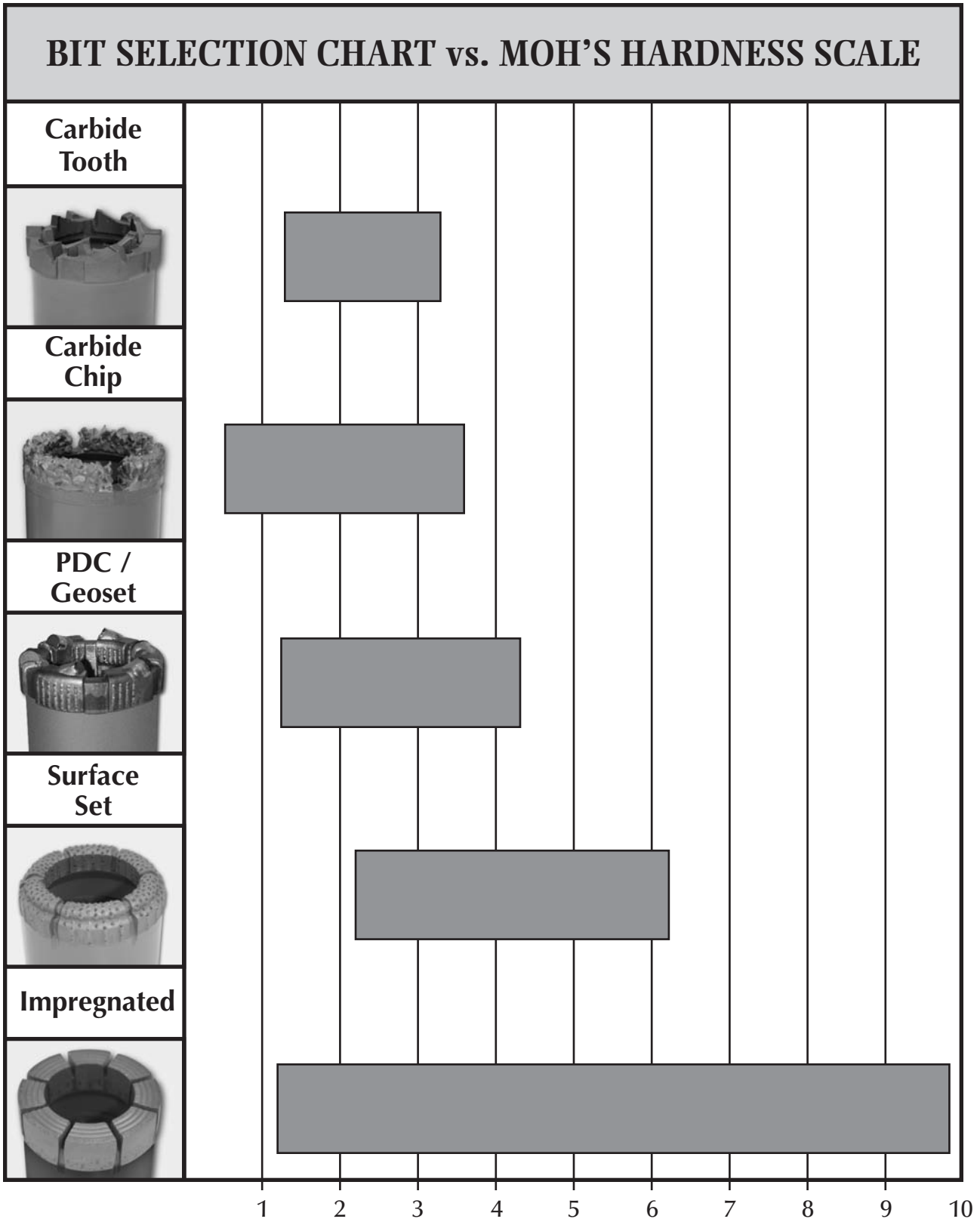
MOH'S SCALE OF HARDNESS

This scale characterizes the scratch resistance of various minerals through the ability of a harder material to scratch a softer material.

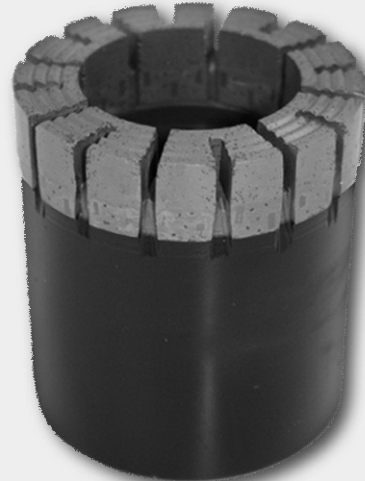
Hardness	Mineral
10	Diamond
9	Corundum
8	Topaz
7	Quartz
6	Feldspar
5	Apatite
4	Fluorite
3	Calcite
2	Gypsum
1	Talc

Mohs Hardness Scale

Note: On the Moh's scale, a pencil "lead" (graphite) has a hardness of 1; a fingernail, 2.5; copper penny, about 3.5; a knife blade, 5.5; window glass, 5.5; and a steel file, 6.5. Using these ordinary materials of known hardness can be a simple way to approximate the position of the mineral scale.



BITS - IMPREGNATED



The impregnated diamond bit is for cutting medium to ultra-hard formations. They utilize various powdered metals mixed with synthetic diamond grits and are reinforced with carbide and diamond. This allows the bit to drill all types of formations. The impregnated diamond bit can be matched to the job ranging from broken and highly abrasive to fine-grained, consolidated and ultra-hard rock. The bit resharpsens as it drills, renewing the cutting edges. New diamond layers are exposed as the matrix wears away. Several waterway designs are available for different types of formations and conditions. The impregnated bit is not designed to drill through overburden.



BITS - IMPREGNATED

Selecting an impregnated diamond bit. Where to get started.

What is the competency of the formation?

If it is fractured or broken a lower series # bit is recommended due to the abrasiveness of the rock. For a competent formation a higher series # bit is suggested where a softer matrix is utilized for proper diamond exposure and matrix erosion.

What is the torque output of the drill rig?

If a machine has low torque output then a higher series # bit ought to be used because of the higher RPM output. A lower series # bit may perform better with a high torque machine that optimizes the available RPM's.

What is the hardness of the rock?

(see Moh's scale of Hardness)

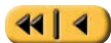
When drilling in soft rock a lower series # bit is more resistant to the abrasive conditions which extends bit life and increases penetration rates. A higher series # bit is more productive in hard rock conditions where the softer matrix wears exposing new diamonds to the rock formation.

Once these criteria have been evaluated and the bit has been selected and used, record the footage, wear pattern and penetration rates.



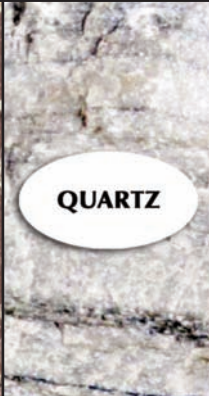


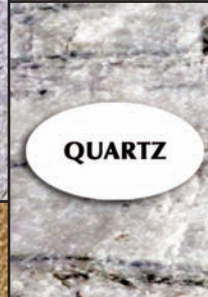


Continue to use bit if successful or re-evaluate your selection for a different bit.

Adjustments?

If penetration rate is slow try a higher series # bit.
If the bit life is short try a lower series # bit.



BITS - IMPREGNATED SELECTION GUIDE

Series 2	Series 2-6	Series 6	Series 7	Series 8	Series 10
 SILTSTONE	 SHALE	 SHALE	 RHYOLITE	 QUARTZ	 CHERT
 SCHIST	 LIMESTONE	 GNEISS		 CHERT	 QUARTZ
		 QUARTZ	 FINE GRAINED SANDSTONE	 JASPER	 SCHIST
 WEATHERED GRANITE	 SANDSTONE	 CHERT			
Fractured or Broken	Coarse Abrasive	Competent Non-Abrasive	Fine Medium Hard	Ultra Hard Non-Abrasive	Fine Grain Ultra Hard



BITS - IMPREGNATED	
Waterway Configurations	
	<p>Standard Waterways, longest life</p>
	<p>Hydra Waterways, faster penetration, reduced down pressure required</p>
	<p>Tapered Waterways, helps push cuttings to the OD and reduces pressure across bit face</p>
	<p>Face Discharge Waterways, has the benefit of reducing fluid pressure to the ID and redirects it to the face of the bit (reduces core wash)</p>



BITS - IMPREGNATED

Operating Recommendations

We recommend flexible guidelines for running impregnated diamond bits that take into account the many operating variables such as; fluid flow, rpm and weight-on-bit. This approach, in combination with formation characteristics, maximizes bit life and penetration rate.

Drilling Fluid

Formation characteristics and penetration rate will dictate proper fluid make-up and flow. With an increase in penetration rate, fluid flow should be increased to properly clean the bit. The cuttings generated by an impregnated bit abrade the metal matrix around the diamonds, which plays an important role in keeping the bit sharp. Conversely, if the cuttings are washed away too quickly, the metal matrix will not wear away fast enough to properly expose new diamond surfaces, and the bit will polish, reducing performance.

Rotation Speed

In general, impregnated diamond bits should be run at higher rotational speeds (rpm) than are similar size surface set diamond bits. Maximum bit performance is achieved by running the impregnated bit as fast as conditions allow, without vibration caused by high rotation speed.

Weight-On-Bit

Optimum weight-on-bit, combined with proper rotation speed, fluid flow and penetration rate provides for a balanced system. The least possible weight-on-bit that maintains efficient penetration rates should be used. Applying insufficient weight results in polishing the diamonds, while too much weight, over a prolonged period, may damage the bit. When the bit fails to penetrate after adjusting weight-on-bit, rpm, or fluid flow, a different bit should be selected which is designed for drilling harder rock.

Operating Observations

- Stable, smooth, vibration free rotation optimizes bit cutting efficiency. Reaming shells and stabilized core barrel outer tubes should provide improved bit performance.
- Experience indicates that optimum rotation speeds for impregnated bits in wireline applications should be 400 rpms or greater for N sized bits.
- While bit lubrication with a polymer or water soluble oil mixture is helpful, high fluid viscosity can create a cushion between the bit and formation, resulting in poor performance.



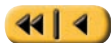
BITS - IMPREGNATED

Size	Series 2	Series 6	Series 7	Series 8	Series 10
N W/L	C36500	C36501	C36668	C36502	C36730
N W/L2	C36508	C36509	C36667	C36510	C36670
N W/L3	C36624	C36625	-	C36626	C36671
NWD - 4	C36516	C36517	-	C36518	-
NXB - NWC3	C36524	C36525	-	C36526	-
H W/L	C36595	C36596	-	C36597	-
H W/L3	C36545	C36610	-	C36611	C36656
P W/L	C36700	C36701	-	C36702	-
P W/L3	C36717	C36718	-	C36719	-



NOTE: All bits set to Reamer Shell Gage (RSG) unless noted.

The bits listed above have proven to be successful in the majority of applications and are normally kept in stock for immediate shipment



Diamond Bits



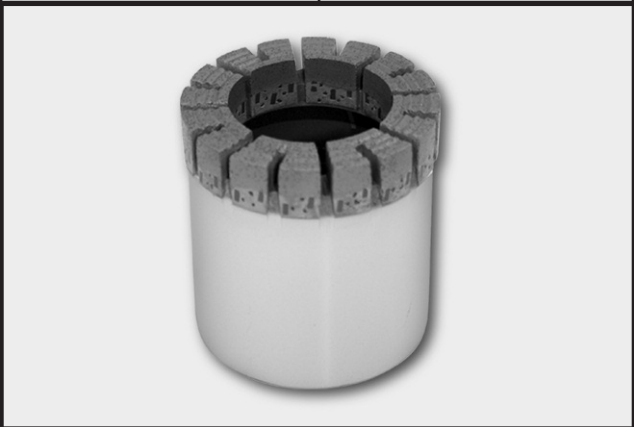
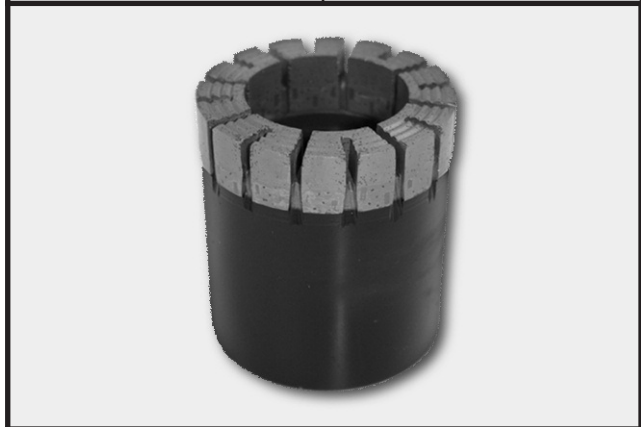
BITS - IMPREGNATED "ULTRA"

SPECIAL APPLICATION - CONSULT FACTORY

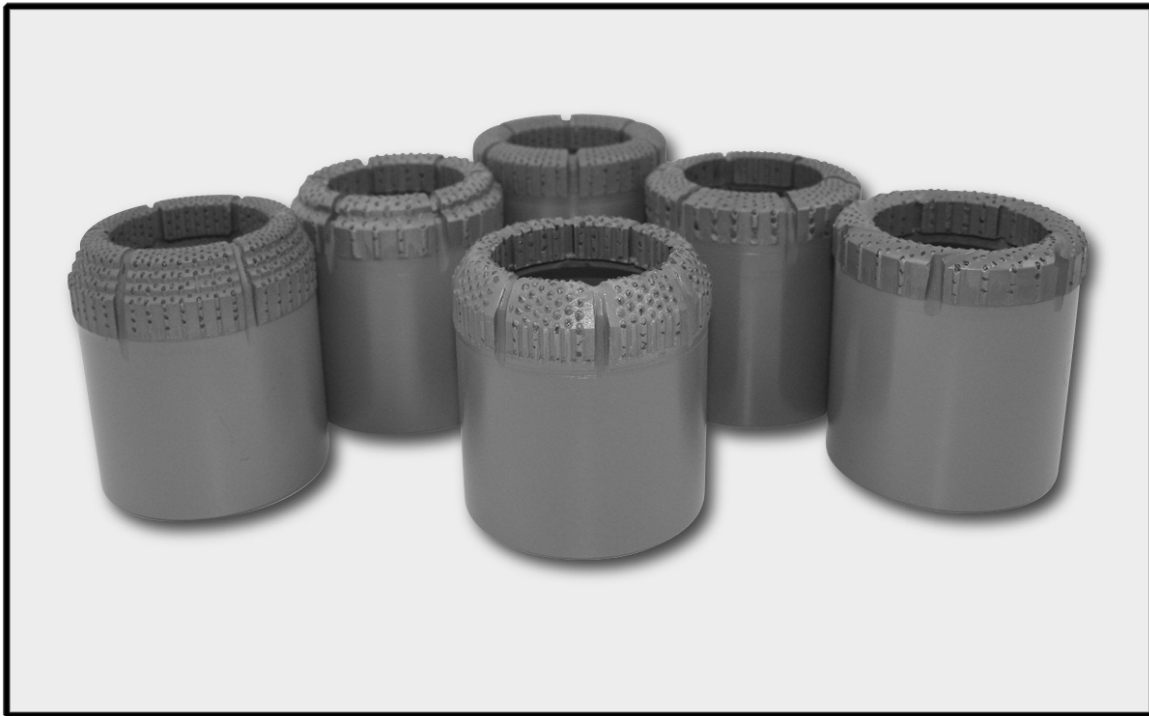
Size	Series 6	Series 8	Series 10
N W/L	C36587	C36588	C36639
N W/L2	C36589	C36590	C36640
NWD - 4	C36591	C36592	C36641
NXB - NWC3	C36593	C36594	C36642
H W/L	C36643	C36644	C36645

BITS - IMPREGNATED "HYDRA"

Size	Series 6	Series 8	Series 10
N W/L	C36571	C36572	-
N W/L2	C36555	C36556	-
NWD - 4	C36573	C36574	-
NXB - NWC3	C36575	C36576	-
H W/L	C36602	C36603	-
H W/L3	C36616	C36617	-
P W/L	C36708	C36709	-
P W/L3	C36724	C36725	-



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CME Surface Set Diamond Bits

The surface set diamond bit is for coring soft to medium hard formations where impregnated diamond bits are less effective. They are set with a single layer of natural diamonds in a tungsten carbide matrix with diamond and carbide reinforcements. They are recommended for relatively soft, unconsolidated formations and harder formations where the RPM's and bit loads required for impregnated bits are not available. The surface set bit is not ideal for ultra-hard formations and are not recommended.









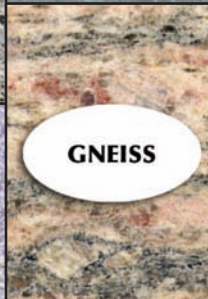
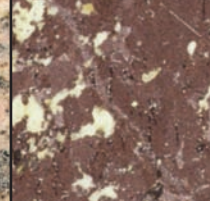




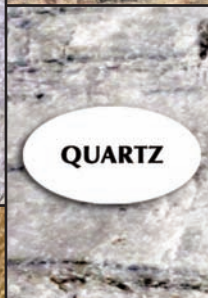



The choice of a Surface Set Bit will be dictated by the rock type. The diamond size, crown design and matrix hardness used will be determined by the hardness of the formation. The friability of the core will determine the type of fluid passages. The surface set bit provides a greater exposure of diamonds than the impregnated bit and therefore faster penetration in soft formations.

Surface Set Bits are available in 8spc, 15spc, 25spc, 40spc, & 40/60spc-step diamond sizes. (SPC=stones per carat). Other diamond sizes are available upon request.



BITS - SURFACE SET SELECTION GUIDE

← 15SPC/25SPC →
 ← 15SPC → → 25SPC/40SPC → ← Impregnated Bits →

 SILTSTONE	 SHALE	 SHALE	 RHYOLITE	 QUARTZ	 CHERT
 SCHIST	 LIMESTONE	 GNEISS	 RHYOLITE	 CHERT	 QUARTZ
 WEATHERED GRANITE	 SANDSTONE	 QUARTZ	 FINE GRAINED SANDSTONE	 JASPER	 SCHIST
Fractured or Broken	Coarse Abrasive	Competent Non-Abrasive	Fine Medium Hard	Ultra Hard Non-Abrasive	Fine Grain Ultra Hard



BITS - SURFACE SET



CME SR 8

The 8 stone per carat bit applies the advantage of diamond cutting power to drilling in exceptionally soft, friable formations.

Using natural diamonds and extra hard matrix, extended bit life is achieved in formations that tend to abraid the matrix.



CME MR 15

Designed for coring in badly fractured, soft to moderately hard formations, this bit utilizes a hard matrix and a pilot crown design which stabilizes the cutting face and minimizes hole deviation and vibration. The 15 stone per carat bit with natural diamonds uses a controlled diamond exposure for increased drilling efficiency.



CME MR 25

This bit configuration is designed for coring fractured, medium to hard formations. A hard matrix and natural diamonds, extend bit life and resists abrasion. The modified pilot crown is designed for stability and permits diamonds to be set over a comparatively regular surface to increase load per stone. This coupled with controlled diamond exposure optimizes cutting efficiency.

Reinforced waterways contribute OD and ID strength, minimizing matrix and waterway erosion while providing flushing and cooling of a predetermined diamond pad area.

BITS - SURFACE SET



CME HR 40

This bit provides excellent performance in coring medium-hard to hard broken formations. The diamonds are set in a hard matrix, balancing the need for cutting power with abrasive resistance and ductility.

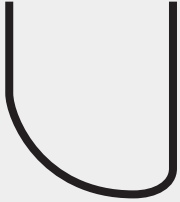
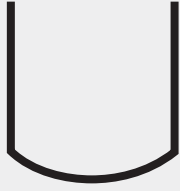
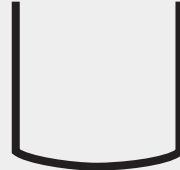
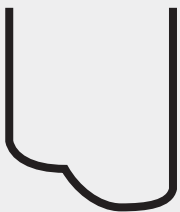
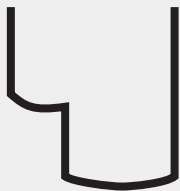
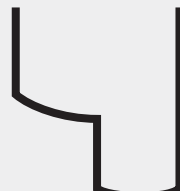
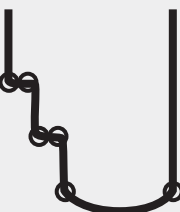
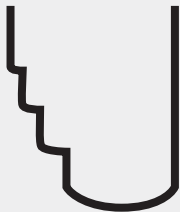
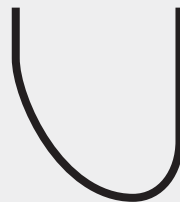
The semi-round crown provides a reduced area over which diamonds can be set. The resulting smaller crown area in contact with the formation improves cutting efficiency and increases penetration. Optimum unit loading of the diamonds keeps them cutting in hard rock.

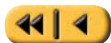


CME HR 40-60 STEP

Hard solid formations are drilling territory for this design which is set with a size blend of natural diamonds. By using a medium concentration of diamonds, cutting efficiency and penetration are optimized allowing maximum loading of the diamonds to keep them cutting. The tapered step crown design of this bit provides good stability and fast penetration. Free cutting is enhanced by this design, facilitating constant mechanical fracturing and chipping of the formation.



BITS - SURFACE SET		
Bit Profiles		
 <p>#2 A CROWN</p>	 <p>#4 W CROWN</p>	 <p>#5 FLAT W CROWN</p>
 <p>#8 MODIFIED PILOT</p>	 <p>#9 WIDE PILOT</p>	 <p>#10 NARROW PILOT</p>
 <p>#11 WIDE STEP # OF STEPS OPTIONAL</p>	 <p>#12 NARROW STEP</p>	 <p>#13 TAPERED CROWN</p>
<p>NOTE: Other crown types for special applications are available upon request.</p>		

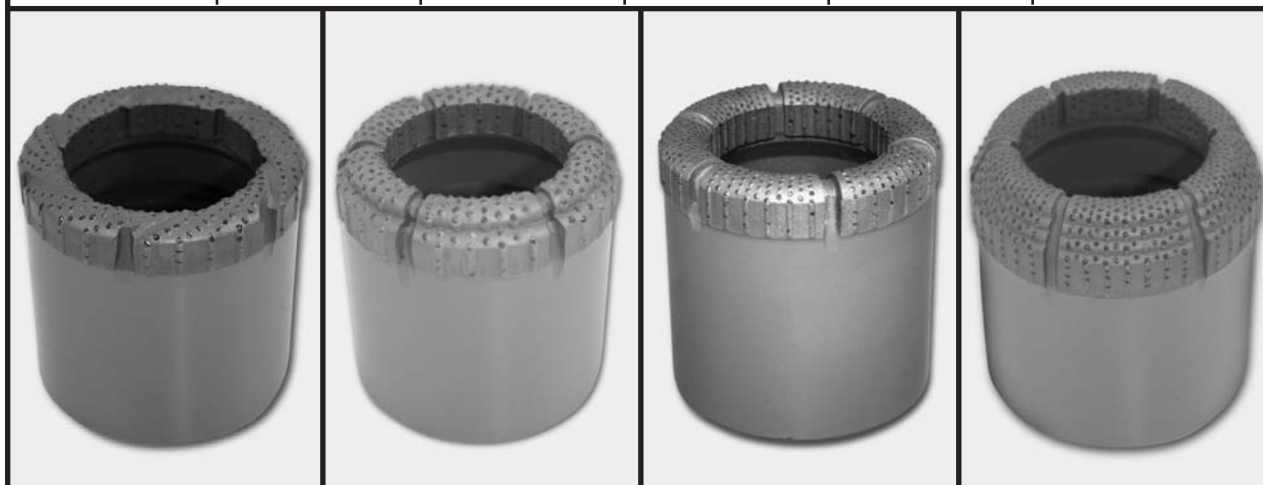


Diamond Bits



BITS - SURFACE SET

Size	SR 8	MR 15	MR 25	HR 40	HR 60/40 STEP
N W/L	C36504	C36505	C36506	C36507	C36547
N W/L2	C36655	C36513	C36514	C36515	C36546
N W/L3	C36631	C36627	C36628	C36629	C36630
NWD4	C36520	C36521	C36522	C36523	C36548
NXB	C36528	C36529	C36530	C36531	C36549
H W/L	C36608	C36598	C36599	C36600	C36601
H W/L3	C36621	C36612	C36613	C36614	C36615
P W/L	C36713	C36703	C36704	C36705	C36707
P W/L3	C36729	C36720	C36721	C36722	C36723



NOTE: All bits set to Reamer Shell Gage (RSG) unless noted. Other set sizes available upon request.

The bits listed above have proven to be successful in the majority of applications and are normally kept in stock for immediate shipment

BITS - TUNGSTEN CARBIDE

Carbide Tooth



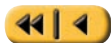
Tuff-Kut Carbide Chip



The Carbide Tooth core bit is designed to cut soft formations with very small gravel, sticky shales or clay. The tooth bit is provided in 2 styles, Full Sawtooth or Staggered Tooth. Tungsten carbide inserts are selectively placed in the carbide matrix. Waterways are designed for optimum discharge of fluid and aid in controlling matrix abrasion to maximize cutting efficiency and penetration. The carbide bits will not drill hard formations and are constructed with single layer cutting elements. The bit is also available with face discharge ports to reduce washing of the core.

The Tuff-Kut core bit is for general drilling in soft formations such as clay, sand, gypsum or soft shale. The matrix is comprised of tungsten carbide chips suspended in the metal alloy. This bit is similar to an impregnated diamond bit in that the crown is composed of several layers of cutting media. As the bit wears new layers of randomly set carbide chips are exposed. The Tuff-Kut bit is also used to clean steel fragments from existing drill holes.

An oversized bit gage is highly recommended (but not mandatory) for these bits. Oversized bits will not permit passage thru the corresponding casing. (i.e. N size bit thru NW casing)



Diamond Bits



BITS - TUNGSTEN CARBIDE

Size	Face Discharge	Face Discharge 3.125"	Stgrd Tooth	Stgrd Tooth 3.125"	Tuff-Kut	Tuff-Kut 3.125"
N W/L	C36577	C36581	C36560	C36564	C36568	-
N W/L2	C36578	C36582	C36561	C36565	C36557	-
N W/L3	C36634	C36635	C36632	C36633	C36636	C36637
NWD - 4	C36579	C36583	C36562	C36566	C36569	-
NXB	C36580	C36584	C36563	C36567	C36570	-
Size	Face Discharge 3.90"	Face Discharge 5.25"	Stgrd Tooth 3.90"	Stgrd Tooth Discharge 5.25"	Tuff-Kut 3.90"	Tuff-Kut 5.25"
H W/L	C36605	-	C36604	-	C36606	-
H W/L3	C36619	-	C36618	-	C36620	-
P W/L	-	C36711	-	C36710	-	C36712
P W/L3	-	C36727	-	C36726	-	C36728



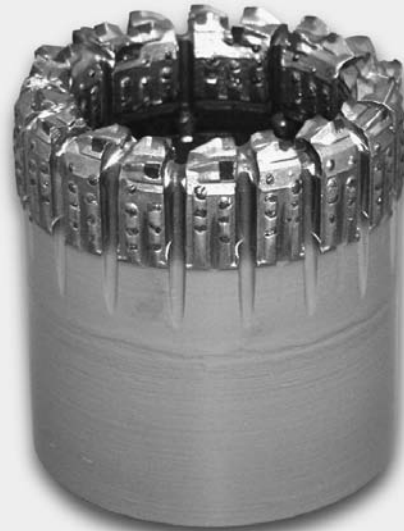
NOTE: All bits set to Reamer Shell Gage (RSG) unless noted. Other set sizes available upon request.
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BITS - PDC (Polycrystalline Diamond Compact)

PDC



Geo Set






PDC bits are for coring formations too soft and/or sticky for large stone diamond bits such as clay, shale, or sandstone to abrasive, broken siltstone or limestone. Disc shaped cutters consist of a layer of polycrystalline diamonds on a tungsten carbide base. The bit is set with 9 mm or 13 mm diameter cutters. Gage is maintained by natural diamond and hard facing. Waterways are designed for efficient cuttings removal. Oversized gage is highly recommended for these bits. PDC bits are primarily run on drills with high torque and low RPM output.

Geo Set bits are triangular shaped polycrystalline diamond cutters. These bits are designed for high performance in soft abrasive to medium hard formation. The crown design with its intermediate waterways allows for high volume cuttings removal and fast penetration.

Footnote: Attributes of these bits are fast penetration and long life.

CASING and ROD SHOES

Impregnated	Carbide Tooth	Tuff-Kut
		





Casing or wireline rod shoes are used to seat casing or wireline rod into the rock to maintain fluid control during core or rotary drilling applications.

Shoes are designed in several configurations which include: Diamond Impregnated (Standard or Heavy Duty), Surface Set, Carbide Tooth and Tuff-Kut.



CASING SHOES										
	IMPREGNATED		IMPREGNATED HD		ADVANCER IMPG HD		SAWTOOTH		TUFF-KUT	
Size	Part No.	O.D.	Part No.	O.D.	Part No.	O.D.	Part No.	O.D.	Part No.	O.D.
NW	C36542	3.615"	C36552	3.615"	C36646	3.75"	C36731	3.75"	220500	3.75"
	-	-	C36585	3.75"	-	-	-	-	-	-
HW	C36543	4.625"	C36553	4.625"	C36647	4.75"	-	-	-	-
HWT	C36551	4.625"	C36554	4.625"	C36648	4.75"			C36659	4.75"

WIRELINE ROD SHOES									
	IMPREGNATED		IMPREGNATED HD		25/35 SPC SURFACE SET		TUFF-KUT		
Size	Part No.	O.D.	Part No.	O.D.	Part No.	O.D.	Part No.	O.D.	
H W/L	C36651	3.615"	C36652	3.615"	C36653	3.615"	C36660	3.75"	

			
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NOTE: Other sizes available upon request.
 The shoes listed above are normally kept in stock for immediate shipment.
 Advancer Impregnated HD is required for the casing advancer system.

REAMER SHELL

Standard



Heavy Duty



Reamer shells connect the core bit to a core barrel. The outside surface of the reamer shell can be inset with diamonds or hard facing to maintain the gage of the hole as the O.D. of the core bit wears. The proper hole gage is critical. If the hole gage is reduced, the cuttings may not be flushed from the face of the bit. This can result in core grinding. In extreme cases, the core barrel may become difficult or even impossible to remove from the hole. Reamer shells are available in a standard or a heavy duty design.

Note: Oversized, blank, and hardfaced reamer shells are also available.



REAMER SHELLS

Size	DIAMOND	HARD FACED
N W/L	C36532	C36539
NXB	C36534	C36541
NWD-4	C36533	C36540
H W/L	C36544	C36607
P W/L	C36716	C36715



NOTE: Oversized shells are available upon request.

The Reamer Shells listed above are normally kept in stock for immediate shipment.



CROSSOVER REAMER SHELLS

Size	DIAMOND	HARDFACED
N W/L - NXB	C36536	C36538
NXB - N W/L	C36535	C36537



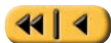
NOTE: Cross Over Shells (X-O) permit the use of a bit on one design core barrel to be used on another (i.e. NXB bit on a N W/L barrel)
Oversized shells are available upon request.
The Reamer Shells listed above are normally kept in stock for immediate shipment.



BIT SET DIMENSIONS					
CORE BARREL	BIT DIMENSIONS		CORE BARREL	BIT DIMENSIONS	
Size	O.D. RSG	I.D.	Size	O.D. RSG	I.D.
EWG,EWM*	1.485	.845	HWD-4	3.650	2.400
AWG, AWM*	1.890	1.185	HXB, HWC-3	3.650	2.400
A W/L, AV	1.890	1.062	H W/L	3.782	2.500
BWG, BWM*	2.360	1.655	H W/L3	3.782	2.406
BWD-4	2.360	1.615	P W/L	4.827	3.345
BXB, BWC-3	2.360	1.432	P W/L3	4.827	3.270
B W/L, BV	2.360	1.432	2.75 X 3.875*	3.875	2.690
NWG, NWM*	2.980	2.155	3 X 4.625	-	3.000
NWD-3, NWD-4	2.980	2.060	4 X 5.125	5.125	3.922
NXB, NWC-3	2.980	1.875	4 X 5.5*	5.495	3.970
N W/L, NV	2.980	1.875	4 X 5.75	-	3.970
N W/L2	2.980	1.995	6 X 7.125	7.125	5.922
NXE	2.980	1.995	6 X 7.75*	7.750	5.970
N W/L3	2.980	1.775	6.5 X 7.875	7.875	6.547
HWG*	3.907	3.000			

SHOE SET DIMENSIONS					
CASING	SHOE DIMENSIONS		CASING	SHOE DIMENSIONS	
Size	O.D.	I.D.	Size	O.D.	I.D.
RW*	1.485	1.185	HW/HWT*	4.625	3.975
EW*	1.875	1.495	PW*	5.650	4.852
AW*	2.345	1.900	SW*	6.790	5.937
BW*	2.965	2.370	UW*	7.800	6.905
NW*	3.615	2.992	ZW*	8.815	7.977

NOTE: * Conforms to DCDMA standards. All dimensions are in inches.



USE & CARE OF DIAMOND BITS

WHAT TO DO

WHY IT IS DONE

1. Be sure wrenches never contact the diamonds in bits and shells.
2. Use full circle grip inner & outer tube wrenches.
3. Start a hole with a used bit whenever possible in slow feed at moderate RPM's.
4. Start water circulating before putting a bit on bottom.
5. Start a new bit in an existing core hole 4-6 inches from bottom and drill it down.
6. Run a new bit in slow feed and at moderate RPM for the first few inches.
7. Tighten all drill rod joints and wick when necessary, before lowering into the hole.
8. Grease core barrels and rods.
9. Avoid grinding core.
10. Remove lost core.
11. Avoid dry blocking.
12. Never drop a bit on bottom.
13. Never start bits turning under pressure.
14. Make sure that fluid is circulating through the bit, before starting to drill.
15. When necessary to improve circulation in sticky ground, never raise the bit more than half an inch off bottom.
16. Maintain safe storage for bits and shells. They should be removed from the barrel, well oiled, and packed in a separate box.

1. Broken stones will result. Diamonds will not stand this kind of abuse.
2. Avoid damaging or egg-shaping the tubular connections of the core barrel assembly.
3. The sharp points on a new bit may be broken on a rough rock surface.
4. To remove the cuttings which have settled in the bottom of the hole.
5. The used bit it replaced may have been slightly under gage.
6. To give the diamonds time to seat themselves in the rock.
7. Wash water may escape through joints and the bit will burn in the sludge at bottom.
8. To prevent vibration and its hammering effect, which results in broken diamonds.
9. Grinding core rapidly destroys both bit and shell.
10. Running over loose core is very destructive to the bit.
11. The heat generated in dry blocking can render a bit useless.
12. Diamonds may shatter.
13. This will damage the cutting points on the diamonds.
14. Remember that time is required, particularly on deeper holes, for circulation to reach the bit.
15. Short lengths of core may fall in the hole and damage the bit.
16. Protects bits and shells from damage.