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At CENERG GLOBAL TOOLS we offer an extensive line of Rotary Drill Bits with reliable tool life and performance that improves productivity and optimizes drilling cost.

We have a state of the art manufacturing facility in Hyderabad, India managed by a team of highly experienced Engineers. The manufacturing facility is equipped with latest CNC Machines, fully automated Heat Treatment furnaces, sophisticated Metallurgical Labs with all Inspection & Testing facilities. The production process is closely monitored and controlled at every stage of the manufacturing process with ability to produce 18,000 rotary bits per year.

Our range of Rotary Drill Bits cover Blasthole, Water Well, Construction, Oilfield, Workover, Exploration and Directional Drilling applications. The size ranges from 2 3/8" (60mm) – 12 1/4" (311mm) in Steel Tooth and Tungsten Carbide Insert Bits.

Today Customer's unique drilling challenges call for special solutions and Cenerg is well equipped to respond to these challenges and adapt its wide range of products to provide customized solutions to best suit the specific needs.





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- Sealed Roller bearing
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Bit Features / Enhancements

- Open Air to Bearing Bits
- Sealed Bearing Bits

IADC classification

Product offering

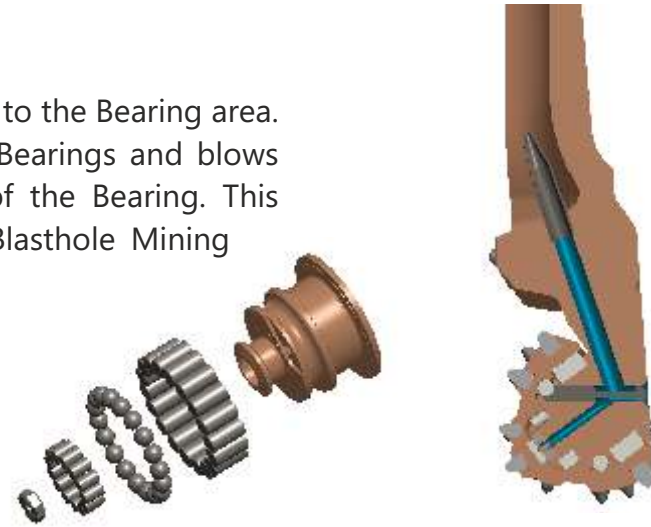
Useful Operating Information



Bearing Types....

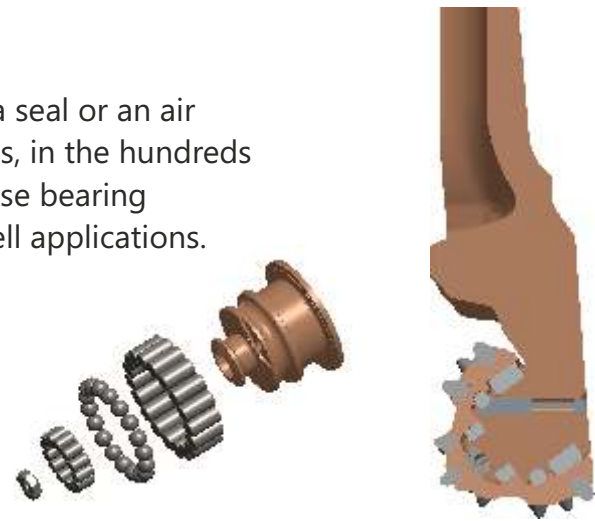
Open Air Bearing

In this configuration an air passage is provided to the Bearing area. The compressed air cools and lubricates the Bearings and blows away any drilling debris extending the life of the Bearing. This Bearing configuration is commonly used in Blasthole Mining applications



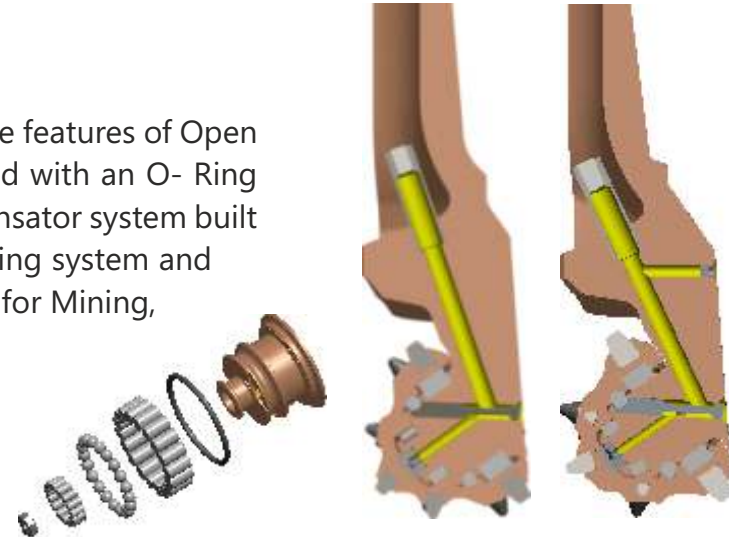
Open Fluid Bearing

The standard open roller bearings are without a seal or an air passage. They are ideal for drilling shallow holes, in the hundreds of feet with either foam or mud circulation. These bearing configurations are commonly used in Water Well applications.



Sealed Roller Bearing

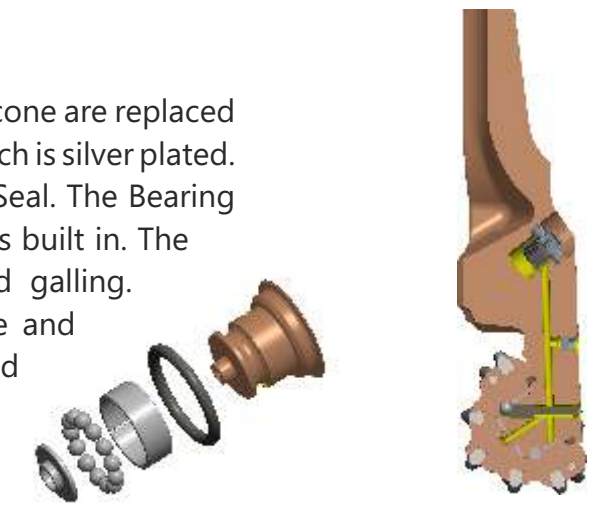
While sealed Roller Bearings have some of the features of Open to Air Bearings, the Bearing pack is protected with an O- Ring Seal and has lubrication and pressure compensator system built in. This prevents ingress of dirt into the Bearing system and leakage of grease. This configuration is used for Mining, Workover and Exploration applications



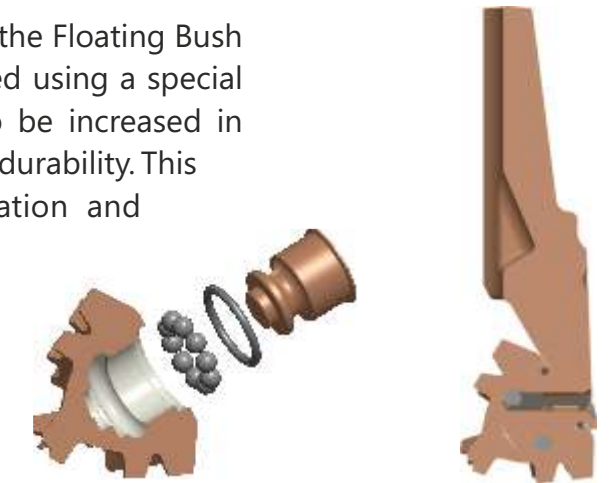
Bearing Types & Valves

Sealed Journal Bearing

In Sealed Journal Bearing the Rollers inside the cone are replaced by a Floating Bush made out of special alloys which is silver plated. The Bearing Pack is protected with an O-Ring Seal. The Bearing lubrication and pressure compensator system is built in. The Floating Bush is highly resistant to heat and galling. Consequently these Bearings are very durable and suitable for Oil & Gas as well as Horizontal and Directional Drilling applications



In Bearings for Small Diameter Bits instead of the Floating Bush the internal surface of the Cone is silver plated using a special process. This design enables Bearing size to be increased in relation to the diameter of the Bit enhancing its durability. This Bearing design finds application in Exploration and Workover and Well drilling applications

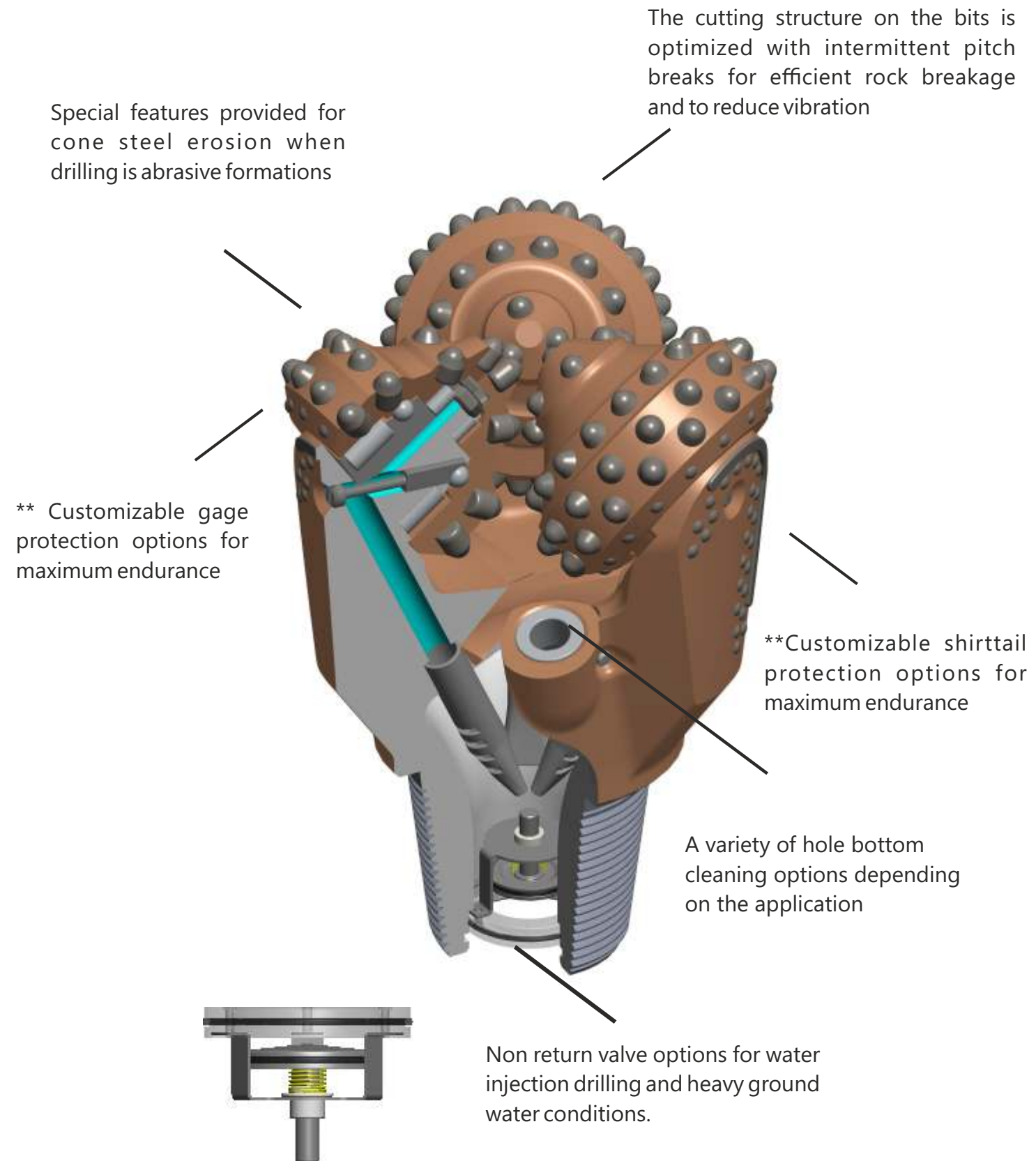


Non Return Valves

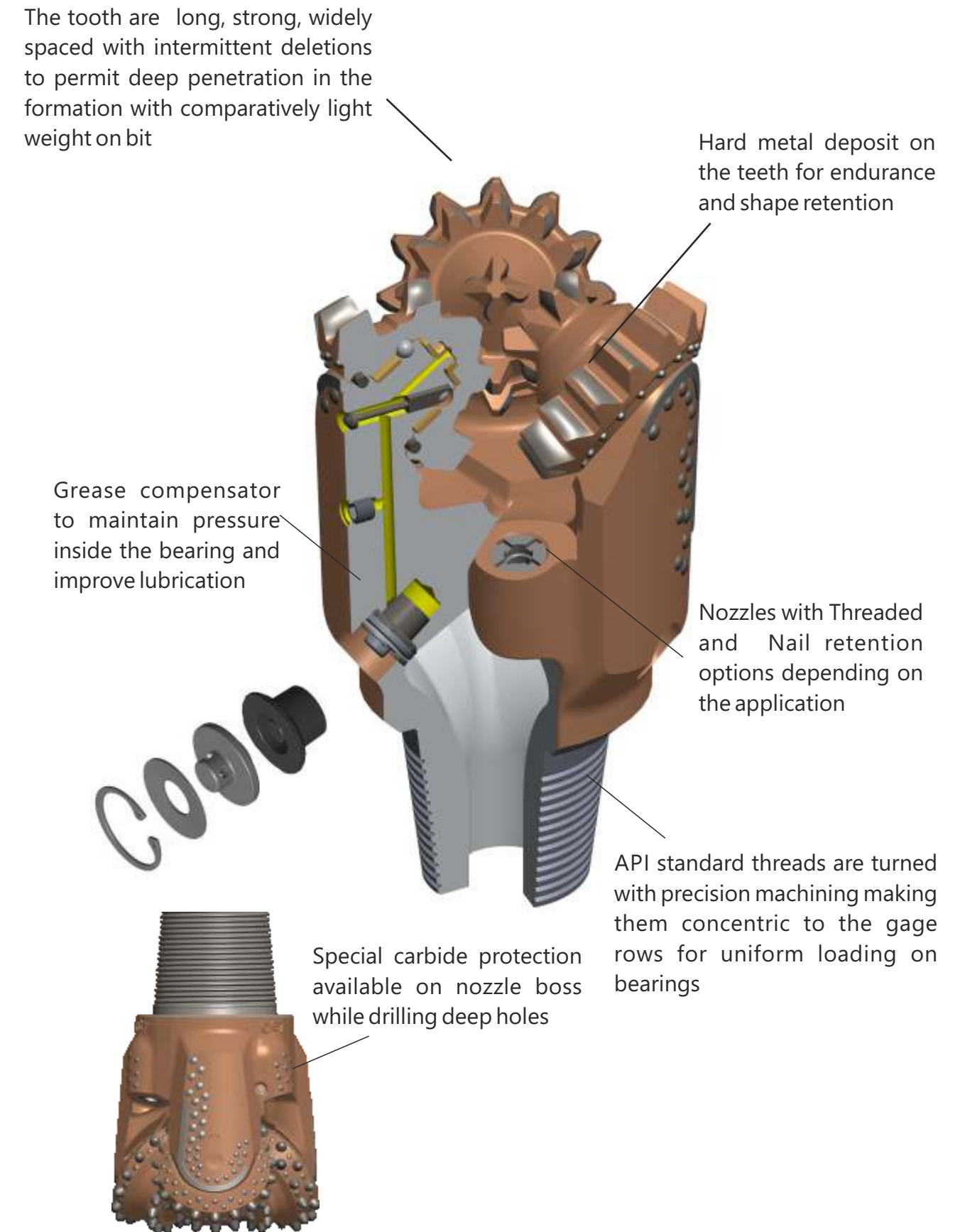
The non return valve is designed to work very effectively in heavy ground water conditions protecting both the bit's bearings as well as the pipe threads.



Air to Bearing Bit features ...



Sealed Bearing Bit features ...



Additional product features...

Cone steel protection options

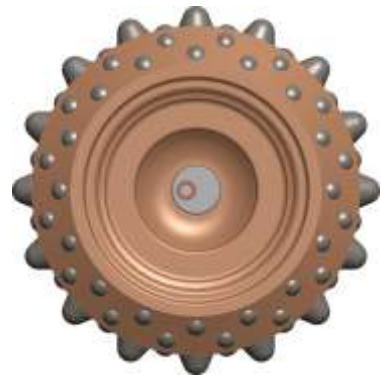


Small carbide inserts in between gage and drive rows to reduce steel wear and increase service life



Hard metal on nose area of cones to avoid coring while drilling is very hard and abrasive formations

Gage protection options



Double gage protection for very abrasive drilling conditions



Single gage protection for normal non-abrasive drilling conditions

Shirttail protection options



1/3rd shirttail protection for non abrasive drilling



2/3rd shirttail protection for medium hard and moderately abrasive drilling



Full shirttail protection for very hard and very abrasive drilling

Types of Bits...TC Insert

Soft formation

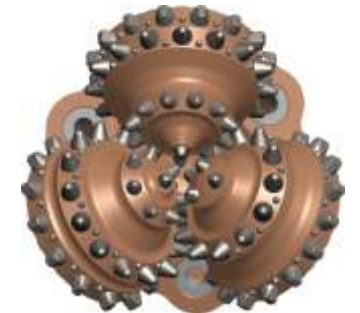
CN4X series

Application : For use in less abrasive softer formations with compressive strength ranging between 90 – 150 Mpa, such as shales, limestones, carbonates and most metamorphic formations.

Cutting profile: These bits are characterized by large diameter, widely spaced chisel or sharp conical inserts with high projection. This configuration promotes maximum penetration rates in softer formations. Smaller carbide inserts are provided on the gage and inner rows to contain shell erosion and improve performance



CN40



CN43

Medium formation

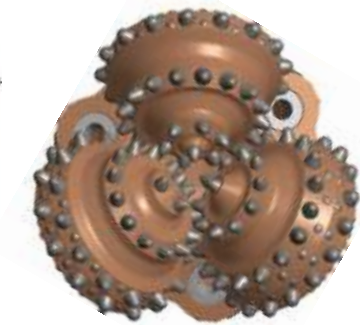
CN5X & CN6X series

Application : For use in moderately abrasive consolidated formations with compressive strength ranging between 120 – 200 Mpa such as hard limestone, quartzite, granodiorite, and medium grade metamorphic formations.

Cutting profile: These bits are characterized by moderately spaced wedge chisel or conical inserts with medium projection. This configuration promotes good penetration rates in medium hard and moderately abrasive formations. Smaller carbide inserts are provided on the gage and inner rows or hard metal is deposited in the nose area to contain shell erosion and improve performance



CN50



CN60

Hard formation

CN7X series

Application : For use in abrasive consolidated formations with compressive strength above 200 Mpa such as taconite, quartzite and banded iron formations

Cutting profile: These bits are characterized by closely spaced conical or spherical inserts with medium to low projection. This configuration promotes good penetration rates in hard, consolidated and very abrasive formations. Smaller carbide inserts are provided on the gage and inner rows or hard metal is deposited in the nose area to contain shell erosion and improve performance



CN71



CN73

Types of Bits....Steel Tooth

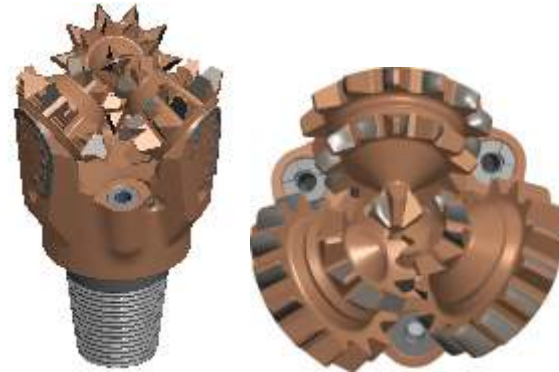
Product Line

Soft & Medium formation

CN1X & CN2X series

Application : These tooth bits are designed for optimum performance in formations of low compressive strength ranging below 70 MPA

Cutting profile: These soft formation bits are designed with long, slim, strong, widely spaced teeth with intermittent deletions to permit deep penetration in the formation with comparatively light weight on bit.



CN11

CN22

Hard formation

CN3X series

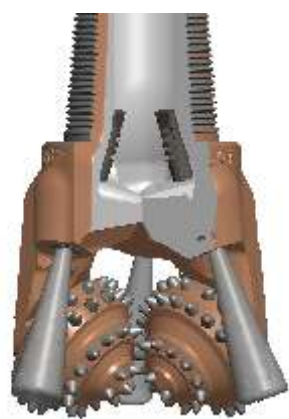
Application : These tooth bits are designed for medium to hard formations with compressive strength ranging between 70 - 100 MPA

Cutting profile: These bits have higher capacity bearings, more closely spaced teeth with increased tooth angles and more gage surface for resisting wear to allow the use of heavier weights required to effectively drill hard formations

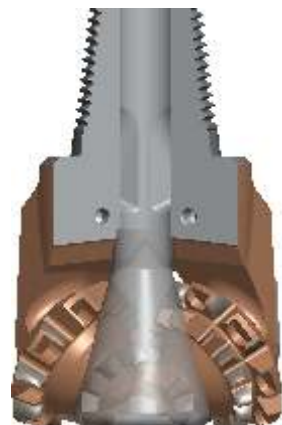


CN33

Hole bottom flushing options



Side Jet



Center jet



Combined jet

Open Bearing

Air Circulation	Fluid Circulation
TC Series 5 7/8" - 12 1/4"	TC Series 2 1/2" - 12 1/4"
ST Series 3" - 7 7/8"	ST Series 2 3/8" - 7 7/8"

Sealed Bearing

Roller	Journal	Plated
TC Series 7 7/8" - 10 5/8"	TC Series 5 1/2" - 6 1/2"	TC Series 2 1 5/16"
	ST Series 3 7/8" - 6 1/2"	ST Series 3 7/8" - 4 3/4"

Bit selection chart

Strength of Rock PSI	MPA	Soft			Medium			Hard			Rock Formation / Class
		10	20	30	40	50	60	70	80		
Lower	Lower										Limestone, Siltstone
2,000	14										Claystone, Mudstone, schist
4,000	28										Marl, Chalky Limestone
6,000	41										Soft - Medium Shales
8,000	55										Soft Marble, Dolomite
10,000	69										Consolidates Sandstone
12,000	83										Medium Shale, conglomerate
14,000	97										Tuff, Soft Schist
16,000	110										Andesite, Rhyolite
18,000	124										Quartzite (Sand & Silt)
20,000	138										Limestone, Marble
22,000	152										Monzonite, Granite
24,000	165										Gneiss
26,000	179										Diorite, Diabase
28,000	193										Hard Shale, Slate
30,000	207										Limestone, Dolomite
32,000	221										Basalt
34,000	234										Tactite, Skarn
36,000	248										Granodiorite
38,000	262										Taconite
40,000	276										Quartzite
42,000	290										Syenite
44,000	303										Gabbro
46,000	317										
48,000	331										Banded Iron
50,000	345										Taconite
52,000	359										Chert
54,000	372										Basalt (Hard)
56,000	386										Quartzite
58,000	400										
60,000	414										Amphibolite
Higher	Higher										Hornfels, Hematite Ore

Product offering

Blasthole Bits

Bit Diameter	Softest				Rock hardness								Hardest			
	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4
5 7/8" 150 mm						CN52				CN62				CN72		
6 1/4" 159 mm						CN52				CN62				CN72		
6 3/4" 172 mm		CN42				CN52				CN62	CN64			CN72		
7 7/8" 200 mm	CN40	CN42				CN50	CN53			CN60				CN70		
8 5/8" 219 mm						CN50	CN53			CN60			CN64	CN70		
9" 229 mm	CN40	CN42				CN50				CN60				CN70		
	CN40S	CN42S				CN50				CN60						
9 7/8" 251 mm	CN40	CN42	CN43			CN50				CN63	CN64			CN73		
		CN42				CN50				CN64						
		CN42S														
10 5/8" 270 mm	CN40	CN42					CN53			CN63				CN73		
12 1/4" 311 mm							CN53			CN63				CN73		

Sealed bearing Bits

Bit Diameter	Steel tooth			Tungsten carbide			
	10	20	30	40	50	60	70
2 15/16" 75 mm							
					CN52P		
3 7/8" 99 mm		CN21J					
		CN21P	CN31P				
4 1/2" 114 mm			CN31J				
4 3/4" 121 mm		CN21J	CN31J				
		CN21P	CN31P				
5 1/2" 140 mm					CN52J		
6" 152 mm					CN52J		
6 1/4" 159 mm	CN11J		CN31J				
6 1/2" 165 mm					CN54J		

Product offering

Water-well, Construction & Exploration Bits

Bit Diameter		Steel tooth			Tungsten carbide			
Inches	mm.	10	20	30	40	50	60	70
2 1/2"	64	CN11	CN23	CN32	CN33		CN52	CN72
2 5/8"	67	CN11	CN23	CN32	CN33		CN52	CN72
2 7/8"	73	CN11	CN23	CN32	CN33		CN52	CN72
2 15/16"	75		CN23	CN32	CN33		CN52	CN72
3"	76	CN11	CN23	CN32			CN52	CN72
3 1/8"	80	CN11	CN23	CN32			CN52	CN72
3 1/4"	83	CN11	CN23	CN32			CN52	CN72
3 3/8"	86	CN11	CN23	CN32			CN52	CN72
3 1/2"	89	CN11	CN23	CN32			CN52	CN72
3 5/8"	92	CN11	CN23	CN32			CN52	CN72
3 3/4"	95	CN11	CN23	CN32			CN52	CN72
3 7/8"	99	CN11	CN23	CN32	CN33		CN52	CN72
4"	102	CN11	CN23	CN32			CN52	CN72
4 1/8"	105	CN11	CN23	CN32		CN42	CN52	CN72
4 1/4"	108	CN11	CN23	CN32			CN52	CN72
4 3/8"	111	CN11	CN23	CN32			CN52	CN72
4 1/2"	114	CN11	CN23	CN32	CN33		CN52	CN72
4 5/8"	118	CN11	CN23	CN32	CN33		CN52	CN72
4 3/4"	121	CN11	CN23	CN32		CN42	CN52	CN72
4 7/8"	124	CN11	CN23	CN32			CN52	CN72
5"	127	CN11	CN23	CN32			CN52	CN72
5 1/8"	130	CN11	CN23	CN32			CN52	CN72
5 1/4"	133	CN11	CN23	CN32			CN52	CN72
5 3/8"	137	CN11	CN23	CN32	CN33		CN52	CN72
5 1/2"	140	CN11	CN23	CN32	CN33		CN52	CN72
5 5/8"	143	CN11	CN23	CN32	CN33		CN52	CN72
5 3/4"	146	CN11	CN23	CN32	CN33		CN52	CN72
5 7/8"	149	CN11	CN23	CN32	CN33		CN52	CN62
6"	152	CN11	CN23	CN32	CN33		CN52	CN62
6 1/8"	156	CN11	CN23	CN32	CN33		CN52	CN62
6 1/4"	159	CN11	CN23	CN32	CN33		CN52	CN72
6 3/8"	162	CN11	CN23	CN32	CN33		CN52	CN72
6 1/2"	165	CN11	CN23	CN32	CN33		CN52	CN72
6 3/4"	172	CN11	CN23	CN32	CN33		CN52	CN62
7"	178	CN11	CN23	CN32	CN33		CN52	CN62
7 5/8"	194	CN11	CN23	CN32	CN33		CN52	CN62

Product specifications

Blasthole Bits

Bit Diameter	Pin connection	Product weight	Flush mode
5 7/8" 150 mm	3 1/2" API REG	12 Kg	Jet
6 1/4" 159 mm	3 1/2" API REG	14.5 Kg	Jet
6 3/4" 172 mm	3 1/2" API REG	17.5 Kg	Jet
7 7/8" 200 mm	4 1/2" API REG	28 Kg	Jet
8 5/8" 219 mm	4 1/2" API REG	42 Kg	Jet
9" 229 mm	4 1/2" API REG	44 Kg	Jet
9 7/8" 251 mm	6 5/8" API REG	57 Kg	Jet
10 5/8" 270 mm	6 5/8" API REG	65 Kg	Jet

Sealed Bits

Bit Diameter	Pin connection	Product weight	Flush mode
2 15/16" 75 mm	N-rod thread	2 Kg	Center Flush
3 7/8" 99 mm	2 3/8" API REG	4 Kg	Center Flush
4 1/2" 114 mm	2 7/8" API REG	5.5 Kg	Jet flush
4 3/4" 121 mm	2 7/8" API REG	8.5 Kg	Jet flush
5 1/2" 140 mm	2 7/8" API REG	11 Kg	Jet flush
6" 152 mm	3 1/2" API REG	12 Kg	Jet flush
6 1/4" 159 mm	3 1/2" API REG	13.5 Kg	Jet flush
6 1/2" 165 mm	3 1/2" API REG	16 Kg	Jet flush

Water-well, Construction & Exploration Bits

Bit Diameter	Pin connection	Product weight	Flush mode
2 1/2" 64 mm	N-rod thread	1.7 kg	Center
2 5/8" 67 mm	N-rod thread	1.6 Kg	Center
2 7/8" 73 mm	N-rod thread	1.5 Kg	Center
2 15/16" 75 mm	N-rod thread	2 kg	Center
3" 76 mm	N-rod thread	2 kg	Center
3 1/8" 80 mm	N-rod thread	2 kg	Center
3 1/4" 83 mm	N-rod thread	2 kg	Center
3 3/8" 86 mm	N-rod thread	2 kg	Center
3 1/2" 89 mm	2 3/8" API REG	3.2 Kg	Center
3 5/8" 92 mm	2 3/8" API REG	3.2 Kg	Center
3 3/4" 95 mm	2 3/8" API REG	3.5 Kg	Center
3 7/8" 99 mm	2 3/8" API REG	4 Kg	Center
4" 102 mm	2 3/8" API REG	4 Kg	Center
4 1/8" 105 mm	2 3/8" API REG	4 Kg	Center
4 1/4" 108 mm	2 3/8" API REG	4 Kg	Center
4 3/8" 111 mm	2 3/8" API REG	4 Kg	Center
4 1/2" 114 mm	2 3/8" API REG	5.5 Kg	Center
4 5/8" 118 mm	2 3/8" API REG	6 Kg	Center

Bit Diameter	Pin connection	Product weight	Flush mode
4 3/4" 121 mm	2 7/8" API REG	8.5 kg	Center
4 7/8" 124 mm	2 7/8" API REG	8.5 kg	Center
5" 127 mm	2 7/8" API REG	8.5 kg	Center
5 1/8" 130 mm	2 7/8" API REG	10 Kg	Center
5 1/4" 133 mm	2 7/8" API REG	10 Kg	Center
5 3/8" 137 mm	2 7/8" API REG	10.5 Kg	Center
5 1/2" 140 mm	2 7/8" API REG	11 Kg	Center
5 5/8" 143 mm	3 1/2" API REG	11.5 Kg	Center
5 3/4" 146 mm	3 1/2" API REG	11.9 Kg	Center
5 7/8" 149 mm	3 1/2" API REG	12 Kg	Center / Jet
6" 152 mm	3 1/2" API REG	12 Kg	Center / Jet
6 1/8" 156 mm	3 1/2" API REG	12.5 Kg	Center / Jet
6 1/4" 159 mm	3 1/2" API REG	13.5 Kg	Center / Jet
6 3/8" 162 mm	3 1/2" API REG	16 Kg	Center / Jet
6 1/2" 165 mm	3 1/2" API REG	16 Kg	Center / Jet
6 3/4" 172 mm	3 1/2" API REG	16 Kg	Center / Jet
7" 178 mm	3 1/2" API REG	17 Kg	Center / Jet
7 5/8" 194 mm	4 1/2" API REG	24 Kg	Center / Jet

Useful Operating Information

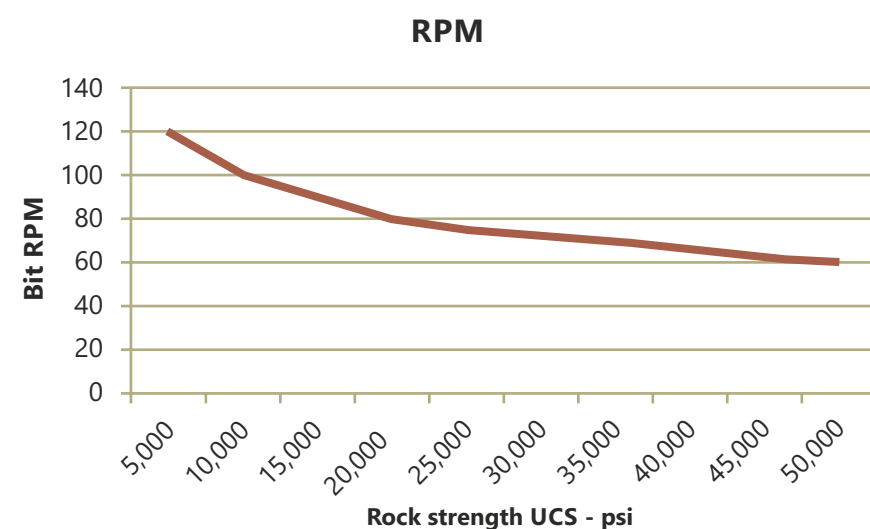
- When a new bit is installed, drill at reduced weight for a short period
- Provide adequate air to the bit to ensure trouble free bearing performance and reduced abrasion wear on cones and shirrtails. (recommended is 40 – 45 psi at the bit)
- Turn the air on before lowering the bit to collar the hole. Keep the air on until the bit is finished drilling and is out of the hole.
- Always rotate the bit when moving in or out of the hole.
- Some indications that the hole is not being properly cleaned are:
 - Increase in torque indication through higher hydraulic pressure.
 - Increase in air pressure.
 - Heavy wear and /or damage indications on shirrtails.
- Always rotate when coming out of the hole to:
 - Help in cleaning the cuttings from the hole.
 - Keeps cuttings from entering the bearings around the back face of the cone.
- Never use the hydraulic pressure on the bit for levelling the machine.
- When adding extra drill steel in wet holes, always make three or four cleaning passes to get a cleaner hole bottom.
- Bit cones should be checked periodically to be sure that all are about the same temperature. One hot cone generally indicates that the air passage to that bearing is obstructed. Clean the bit with water and continue drilling
- A bit should never be left down the hole when repairs require lowering the head assembly to the deck. This bit should be substituted by a dull bit to protect the drill pipe threads.
- Properly maintain the drill pipe and its threaded connections. A bent pipe will often cause early failure.
- Blasthole bits drill most economically when sufficient weight is applied to cause spalling of the formation. Selecting correct rotary speed is usually a matter of trial-and-error, depending upon the formation being drilled or use the factory recommended weight and rotation speeds.
- Always record footage drilled, time in the hole, RPM, WOB (weight on bit), air pressure psi, formation drilled and any unusual drilling conditions.
- After the bit is discarded it is necessary to make a comparative analysis of each bit type dulling and causes. Evaluating those findings can increase drilling efficiency while reducing drilling cost and will precisely determine what bit design features are required for the application.



Pull Down & Rotation

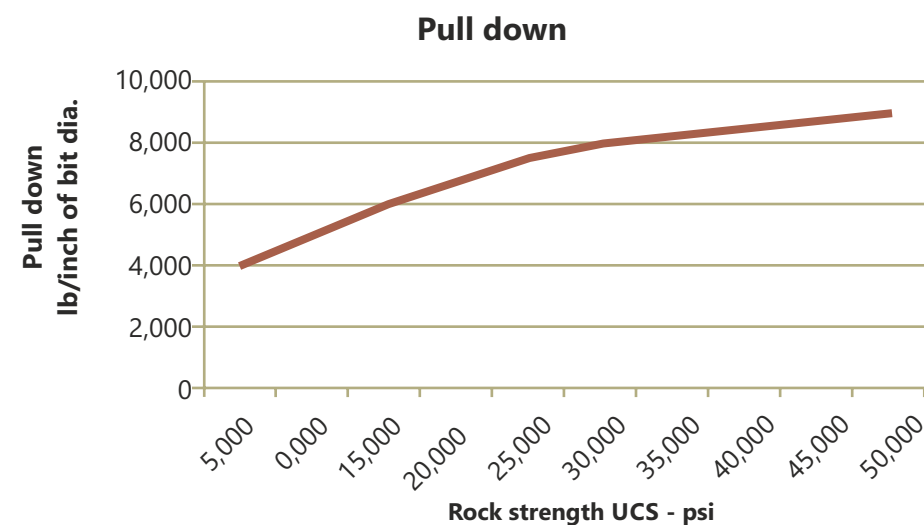
Pull down load is required to adequately push teeth into the rock to break in efficiently. It is the primary factor in rate of penetration. The unconfined compressive strength of the rock determines how much pull down is to be applied.

High UCS rocks may need time for the indenter to break it. Lower RPM is often required for efficient rock breakage.



Rotation is required to move the cutting teeth to the next rock cutting position. The faster you move the teeth to the next position, the faster you will drill. If the rock resists indentation by the teeth, there will be minimal rock breakage, and rate of penetration will not increase proportionally with higher rotation.

For softer rock high RPM is required as Soft rock responds to frequency and for harder rock low RPM is required as Hard rock responds to time



Air Requirements

In rotary blasthole drilling, delivery of air in sufficient volume and at proper pressure is very essential to assure optimum bit performance.

Right amount of air ensures efficient cuttings removal from the hole bottom to the surface. It also reduces the cutting structure wear and bearing erosive wear by means of efficient bottom hole cleaning.

The right amount of back pressure is also required to cool the bearing and to keep the bearing clean from drilling debris.

The air volume provided must be good enough to produce a bailing velocity of 5,000-7,000 ft./min. for dry cuttings; and 7,000-10,000 ft./min. for wet cuttings.

To determine volumetric requirements, and bailing velocity the simple equation may be used.

$$Q = V/183.35 (D^2 - d^2)$$

Q = cubic feet per minute of free air.

V = Annular Velocity feet / min

d = drill pipe outside diameter, inches.

D = hole diameter, inches.

183.35 = Factor for conversion

Hence to determine the bailing velocity the equations is

$$V = Q \times 183.35 / (D^2 - d^2) \text{ feet per min}$$

Nozzle selection

Nozzles should be selected so that the pressure inside the bit is 40-45 psi. The cab operating pressure inside the drills cabin could be higher, depending on the type of drill and CFM of air circulated. Typically, on compressors rated with 80-100 psi bit pressures can be 10 - 25 psi lower than the cab gauge reading.



Nozzle Selection Table

Notes

Bit Diameter	Thread connection	Nozzle size	NOZZLE SELECTION																							
			Air Pressure drop across Blast-hole bits with various nozzle size. Air volume delivered - CFM (cubic feet per minute)																							
			500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2600	2800	3000	
5"-6"	2 7/8" & 3 1/2"	8 mm	62	77																						
		10 mm	47	59	71																					
		11 mm	35	45	55	66	75																			
		12.7 mm	26	34	42	50	58	66																		
		14 mm	18	24	31	38	44	58	74																	
		8 mm	52	62	72	81																				
		10 mm	43	51	61	69	78																			
		11 mm	34	41	48	57	65	73																		
		12.7 mm	29	33	41	48	54	61																		
		14 mm	23	29	34	41	47	51	56	62	67	73	79													
6 1/4" to 7 3/8"	3 1/2"	10 mm	35	44	54	65	74	82																		
		11 mm	29	36	43	50	56	64																		
		12.7 mm	22	26	32	38	44	50	58	66	75	83														
		14 mm	21	27	33	38	44	50	56	62	68	74	81													
		16 mm			20	25	30	35	41	46	51	56	64	72	78											
		17.5 mm				22	26	30	35	40	45	51	56	61	66	72	78									
		19 mm					20	24	28	33	36	40	46	50	54	59	64	69	74	78						
		10 mm	35	45	53	61	69	76																		
		11 mm	28	36	43	51	59	66																		
		12.7 mm	20	26	32	38	44	52																		
9 7/8" to 11"	6 5/8"	14 mm	21	27	33	39	44																			
		16 mm			18	24	31	35	40	47	48	52	59	61	65	69	73	77								
		17.5 mm				21	25	30	35	40	45	50	55	59	63	67	71	75	79							
		19 mm					18	21	25	32	35	39	44	46	49	53	56	60	63	67	72	74	78			
		22 mm							21	23	27	31	31	36	39	42	45	47	50	53	54	60	64	70	76	
		25 mm										20	22	22	24	27	29	32	34	37	39	41	46	51	56	
		10 mm	18	24	29	34	40																			
		11 mm		19	24	28	34																			
		12.7 mm			20	22	26																			
		12 3/4" to 15"	6 5/8"	14 mm					20	23																
16 mm																										
17.5 mm																										
19 mm																										
22 mm																										
25 mm																										
10 mm																										
11 mm																										
12.7 mm																										
14 mm																										
16 mm																										
17.5 mm																										
19 mm																										
22 mm																										
25 mm																										

Notes section with horizontal dotted lines for writing.

