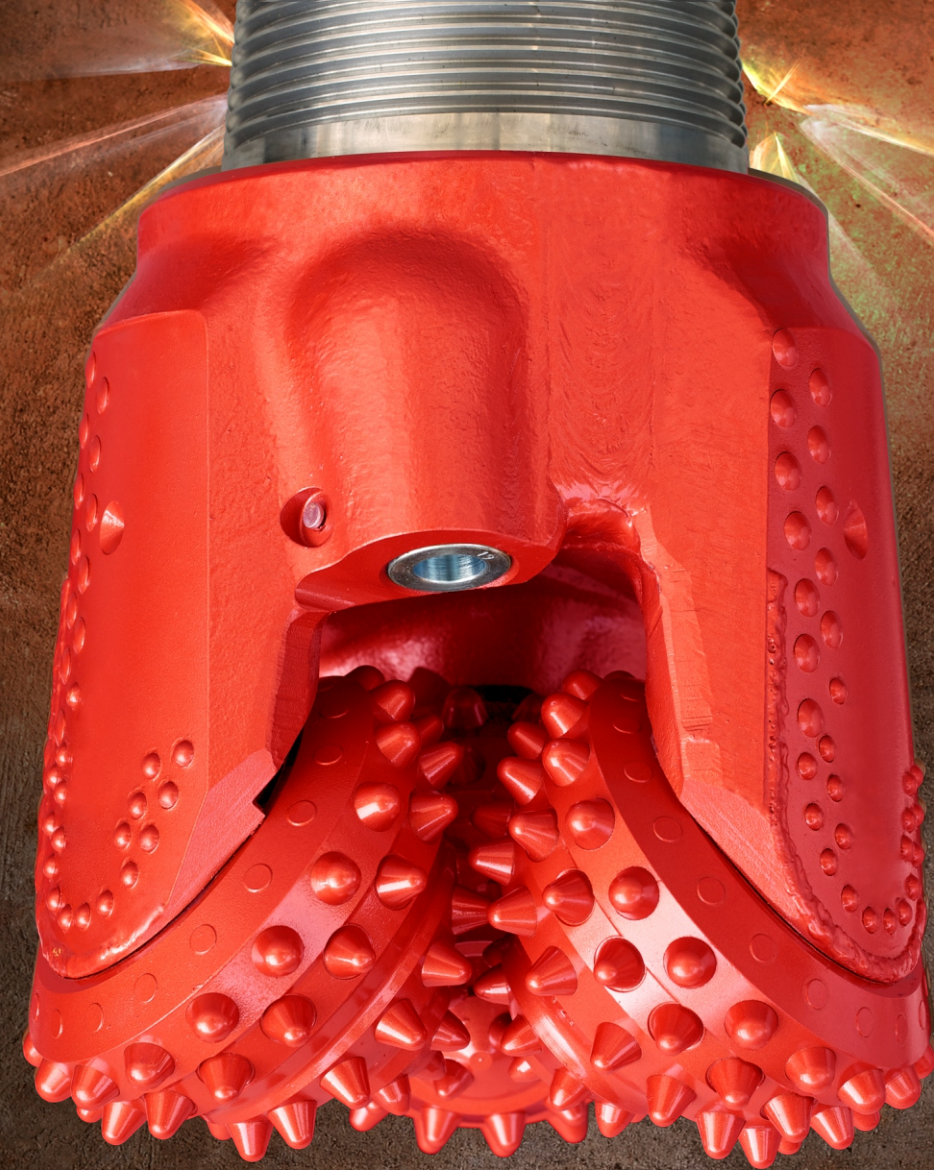




No matter what kinds of soft rock, loose-medium rock, hard rock and any other special formulations, just tell us what you need, our special tailored service is waiting for you upon your demand.



KEMAICO USA CORPORATION

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Rotary Drill Bits





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IADC classification

Product offering

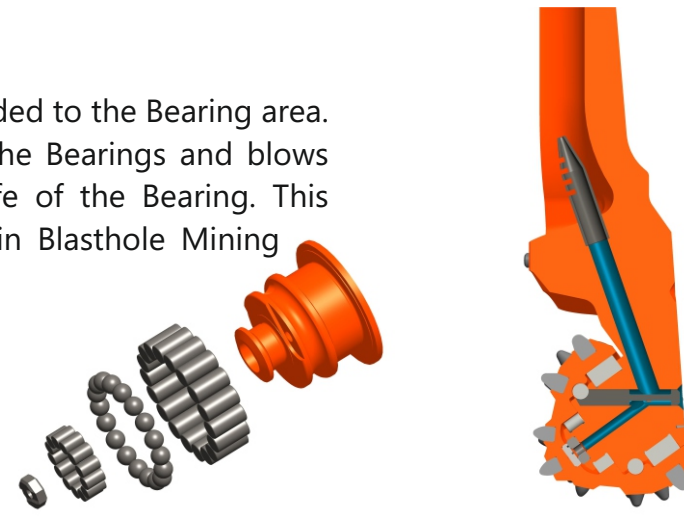
Useful Operating Information



Bearing Types....

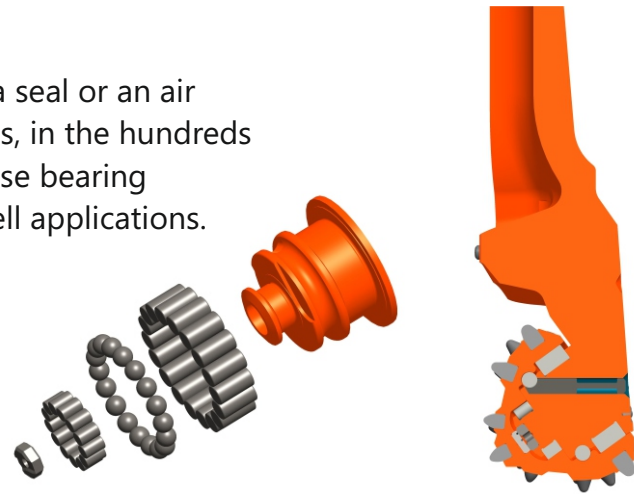
Open Air Bearing

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



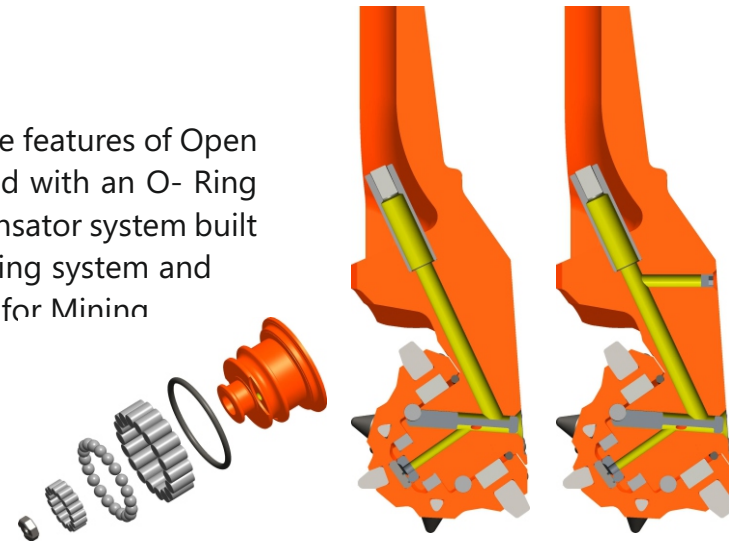
Open Fluid Bearing

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

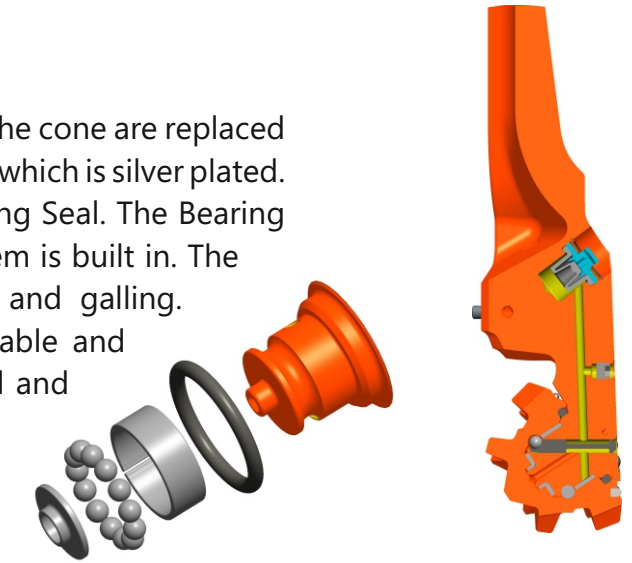
While sealed Roller Bearings have some of the features of Open to Air Bearings, the Bearing pack is protected with an O- Ring Seal and has lubrication and pressure compensator system built in. This prevents ingress of dirt into the Bearing system and leakage of grease. This configuration is used for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



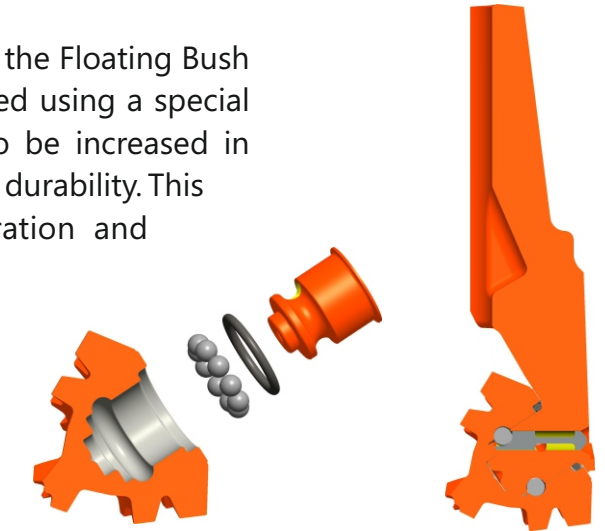
Bearing Types & Valves

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

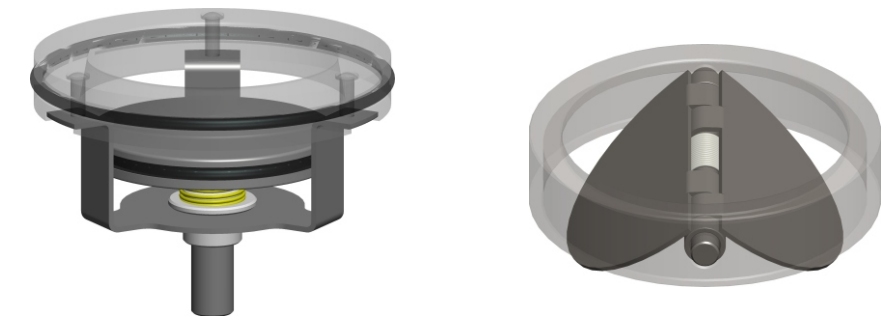


In Bearings for Small Diameter Bits instead of the Floating Bush the internal surface of the Cone is silver plated using a special process. This design enables Bearing size to be increased in relation to the diameter of the Bit enhancing its durability. This Bearing design finds application in Exploration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

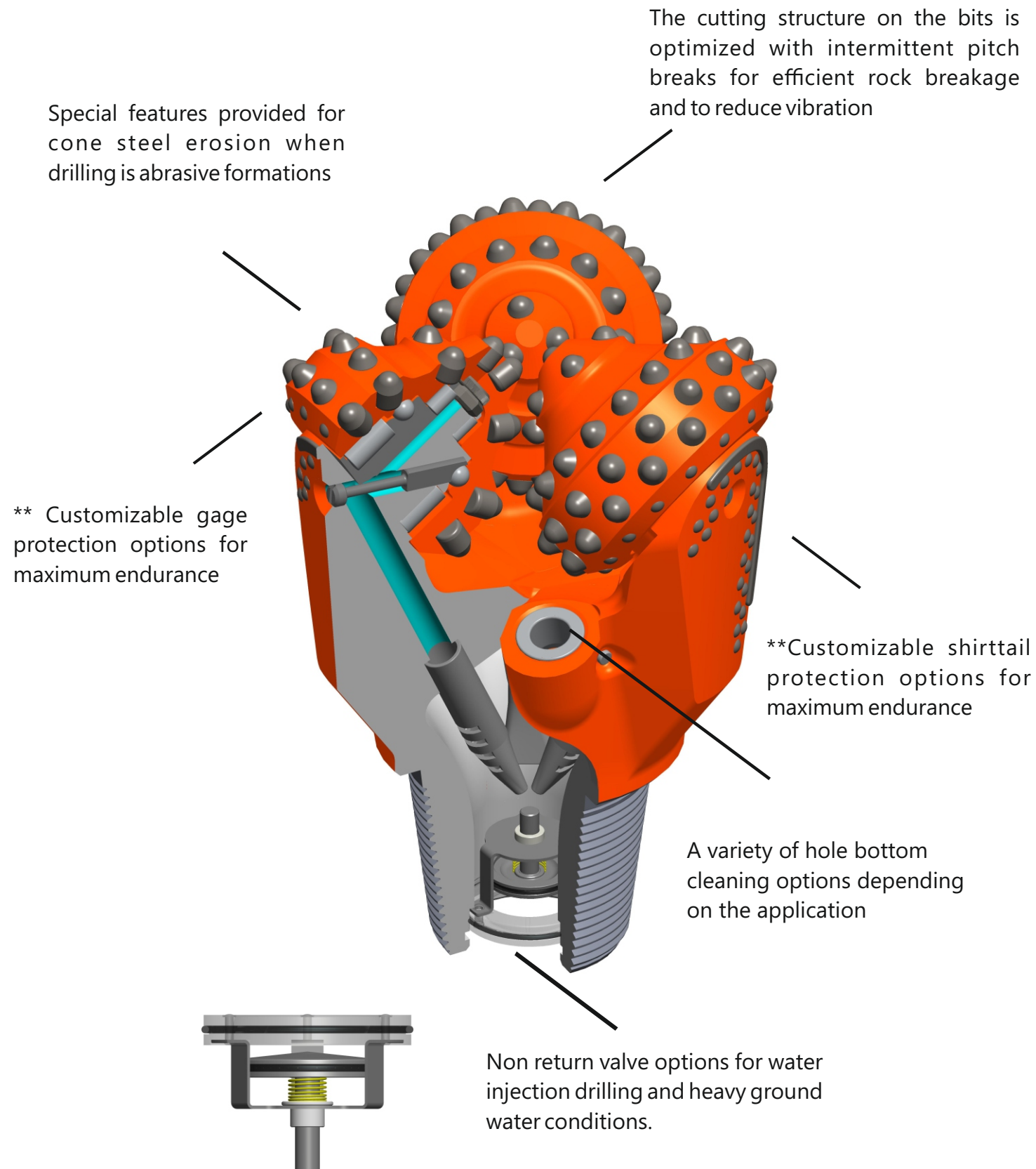


Non Return Valves

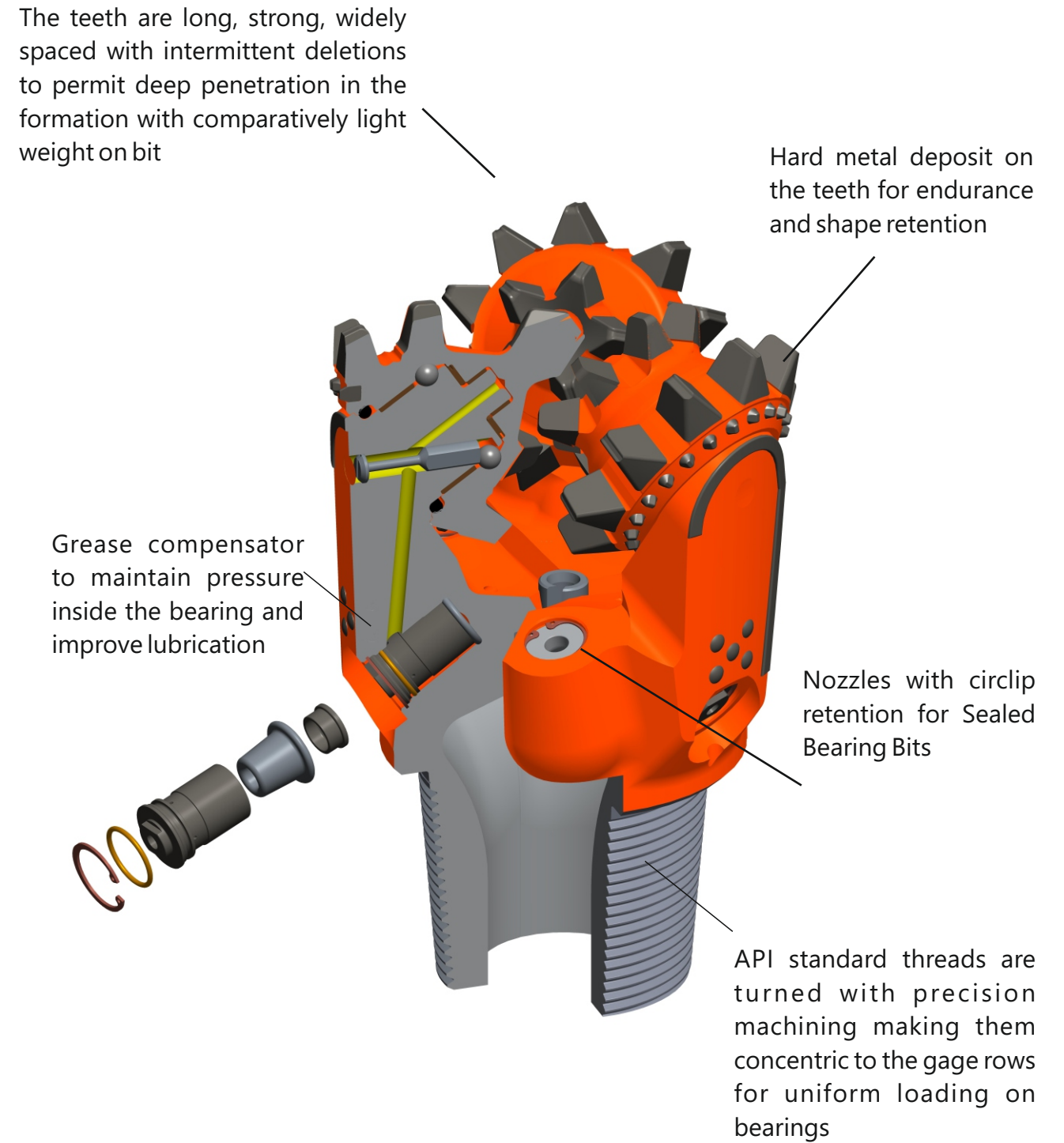
The non return valve is designed to work very effectively in heavy ground water conditions protecting both the bit's bearings as well as the pipe threads.



Air to Bearing Bit features ...

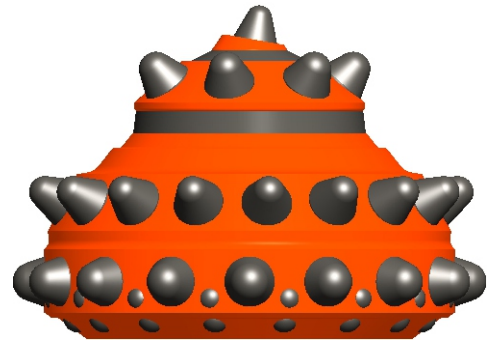


Sealed Bearing Bit features ...

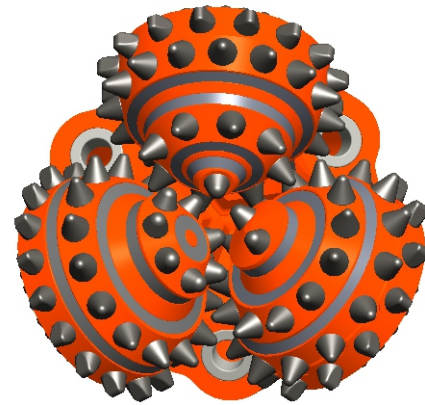


Additional product features...

Cone steel protection options



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

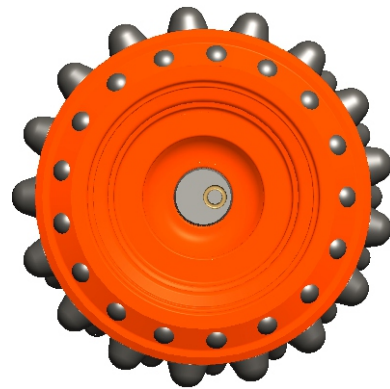


Hard metal on nose area of cones to avoid coring while drilling is very hard and abrasive formations

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

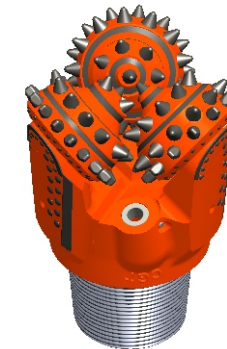
Types of Bits...TC Insert

Soft formation

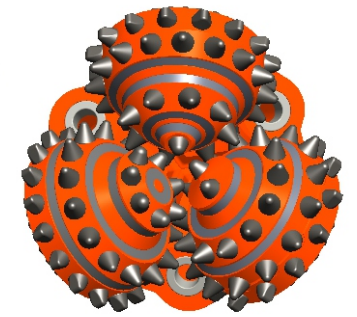
K4X series

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



K32



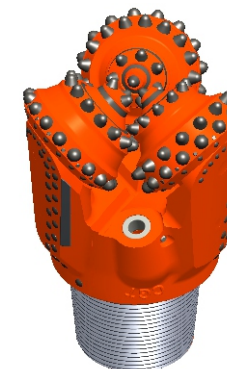
K42

Medium formation

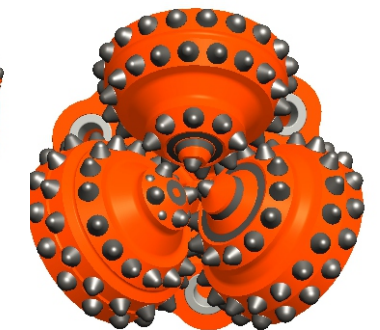
K5X & K6X series

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



K52



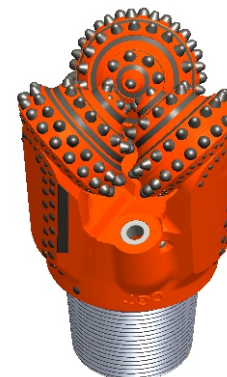
K60

Hard formation

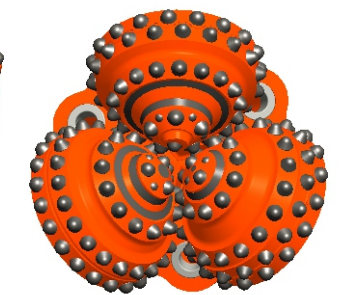
K7X series

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



K64



K70

Types of Bits....Steel Tooth

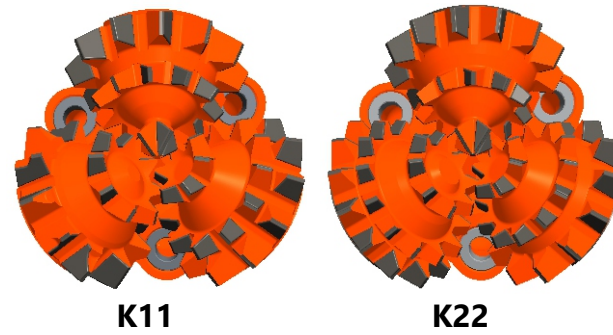
Product Line

Soft & Medium formation

K1X & K2X 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.

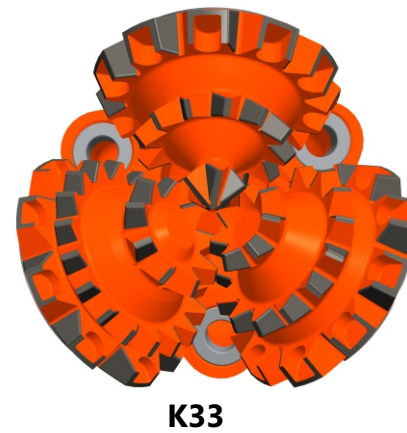


Hard formation

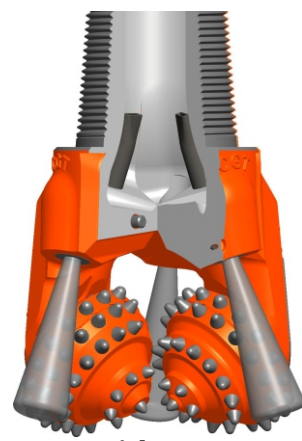
K3X series

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

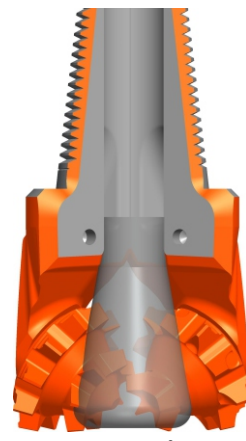
Cutting profile: These bits have higher capacity bearings, more closely spaced teeth with increased tooth angles and more gage surface for resisting wear to allow the use of heavier weights required to effectively drill hard formations



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 1/2" - 12 1/4" | ST Series 2 1/2" - 12 1/4" |

Sealed Bearing

| Roller | Journal | Plated |
|-------------------------------|-------------------------------|------------------------------|
| TC Series 7 7/8" - 12 1/4" | TC Series 3 7/8" - 12 1/4" | ----- |
| | ST Series 3 7/8" - 12 1/4" | 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

Product offering

Blasthole Bits

Open Roller Bearing Sealed Roller Bearing

| 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 | | | | | | K52 | | | | K62 | | | | K72 | | |
| 6 1/4" 159 mm | | | | | | K52 | | | | K62 | | | | K72 | | |
| 6 3/4" 172 mm | | K42 | | | | K52 | | | | K62 | | K64 | | K72 | | |
| 7 7/8" 200 mm | K32 | K42 | | | | | K53 | | | K60 | | | | K70 | | |
| | K32S | K42S | | | | | | | | | | | | | | |
| 8 1/2" 216 mm | | | | | | K50 | | | | K60 | | | | K70 | | |
| 8 5/8" 229 mm | | | | | | K50 | | | | K60 | | | | K70 | | |
| | | | | | | | | | | K60S | | | | | | |
| 9" 229 mm | K32 | K42 | | | | K50 | | | | K60 | | | | K70 | | |
| | K32 | K42S | | | | | | | | K60S | | | | | | |
| 9 7/8" 251 mm | K32 | K42 | | K44 | | K52 | | | | | | K63 | K64 | | K73 | |
| | K32S | K42S | | | | | | | | | | K63S | K64S | | | |
| 10 5/8" 270 mm | K32 | K42 | | | | | K53 | | | | | K63 | | | K73 | |
| | K32S | | | | | | | | | | | | | | | |
| 12 1/4" 311 mm | | | | | | | K53 | | | | | K64 | | | K73 | |

Sealed bearing Bits

Sealed Journal Bearing Sealed Roller Bearing

| Bit Diameter | IADC Classification | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|---------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| | 11 | 12 | 13 | 21 | 22 | 23 | 31 | 32 | 33 | 41 | 42 | 43 | 44 | 51 | 52 | 53 | 54 | 61 | 62 | 63 | 64 | 71 | 72 | 73 | |
| 6 1/2" 165 mm | | | | | | | | | | | | | | | | ✓ | | | | | | | | | |
| 6 3/4" 171 mm | ✓ | | | | | | | | | | | | | | | ✓ | | | | | | | | | |
| 7 1/2" 191 mm | | | | | | | | | | | | | | | | | ✓ | | | | | | | | |
| 7 7/8" 200 mm | ✓ | | | | | | | | | | | | | | | | ✓ | | | | | | | | |
| 8 3/4" 222 mm | ✓ | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 7/8" 251 mm | ✓ | | | | | | | | | | | | | | | | | | | | | | | | |
| | ✓ | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 1/4" 311 mm | ✓ | | | | | | | | | | | | | | | | | | | | | | | | |

Sealed bearing Bits

Sealed Journal Bearing Sealed Roller Bearing

| Bit Diameter | IADC Classification | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|---------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| | 11 | 12 | 13 | 21 | 22 | 23 | 31 | 32 | 33 | 41 | 42 | 43 | 44 | 51 | 52 | 53 | 54 | 61 | 62 | 63 | 64 | 71 | 72 | 73 | |
| 3 7/8" 99 mm | ✓ | | | | | | | | | | | | | | | ✓ | | | | | | | | | |
| 4 1/2" 114 mm | | | | ✓ | | | | | | | | | | | | | | | | | | | | | |
| 4 5/8" 117 mm | | | | ✓ | | | | | | | | | | | | | | | | | | | | | |
| 4 3/4" 121 mm | ✓ | | | ✓ | | | | | | | | | | | | ✓ | | | | | | | | | |
| 5 1/2" 140 mm | | | | | | | | | | | | | | | | ✓ | | ✓ | | | | ✓ | | | |
| 5 7/8" 149 mm | ✓ | | | | | | | | | | | | | | | ✓ | | | | | | | | | |
| 6" 152 mm | ✓ | | | | | | | | | | | | | | | ✓ | | | | | | | | | |
| 6 1/4" 159 mm | ✓ | | | | | | | | | | | | | | | ✓ | | | | | | | | | |

Water-well, Construction & Exploration Bits

| Bit Diameter | IADC Classification | | | | | | | | | |
|--------------|---------------------|-----|----|----|----|----|----|----|----|----|
| | Inches | mm. | 11 | 23 | 32 | 33 | 40 | 50 | 60 | 70 |
| 2 1/2" | 64 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 5/8" | 67 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 7/8" | 73 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 15/16" | 75 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3" | 76 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 1/8" | 80 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 1/4" | 83 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 3/8" | 86 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 1/2" | 89 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 5/8" | 92 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 3/4" | 95 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 7/8" | 99 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4" | 102 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 1/8" | 105 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 1/4" | 108 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 3/8" | 111 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 1/2" | 114 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 5/8" | 118 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 3/4" | 121 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 7/8" | 124 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5" | 127 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| Bit Diameter | IADC Classification | | | | | | | | | |
|--------------|---------------------|-----|----|----|----|----|----|----|----|----|
| | Inches | mm. | 11 | 23 | 32 | 33 | 40 | 50 | 60 | 70 |
| 5 1/8" | 130 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 1/4" | 133 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 3/8" | 137 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 1/2" | 140 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 5/8" | 143 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 3/4" | 146 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 7/8" | 149 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6" | 152 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 1/8" | 156 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 1/4" | 159 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 1/2" | 165 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 3/4" | 171 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 7" | 178 | | ✓ | | ✓ | | | | ✓ | |
| 7 5/8" | 194 | | ✓ | | ✓ | | | | ✓ | |
| 7 7/8" | 200 | | ✓ | | ✓ | | | | ✓ | |
| 8 1/2" | 216 | | ✓ | | ✓ | | | | ✓ | |
| 8 5/8" | 219 | | | | | | | | | |
| 9" | 229 | | | | | | | | | |
| 9 7/8" | 251 | | | | ✓ | | | | ✓ | |
| 10 5/4" | 270 | | | | ✓ | | | | ✓ | |
| 12 1/4" | 311 | | | | ✓ | | | | ✓ | |

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 shirttails. (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 shirttails.
- 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.

