BD Drill

ROTARY DRILLING TOOLS

www.bddrill.com.au / www.bddrill.ca

BD Drill

Black Diamond Drilling Services Australia Pty Ltd

Rotary Drilling Tools

RECOMMENDED SAFETY PROCEDURES

The mining industry continues to demand even higher levels of safety and productivity. In order to meet these requirements, we work continuously to develop even safer products and to produce comprehensive manuals enabling safer and effective use of our products.

IT'S ALL ABOUT EVERYONE'S HEALTH

Helping you to ensure a safer workplace and healthier workforce is of the utmost importance to us. The well-being of any person coming into contact with our equipment is paramount. Therefore, we strive to identify and assess potential risk factors that could threaten the health of you and your employees.
All the products in our catalogue are designed to meet safety requirements.

DRESS RIGHT FROM HEAD TO TOE

You must wear appropriate personal protective equipment (PPE) at all times. This is what we strongly recommend, to help avoid injury:

- Safety helmet
- Hearing protection
- Safety glasses
- Protective high visibility clothing
- Respiratory protection
- Safety boots
- Any site-specific PPE as required

BE AWARE OF ALL SAFETY PROCEDURES

We ask that you start by obeying all instructions given. Never work under an unsupported rood or close to potential pinch point locations. Beware of the potential hazards of a loose roof and ribs and scale down roof ribs prior to bolting. It is important to bolt early in the mining process – as soon is safely and practically possible.
Safe work procedures should incorporate inspection before the machine operates and also through regular monitoring based upon mining conditions, safety and management systems. Workers should be provided with safety information, instruction and training on transportation, installation, operational care and disposal of drilling tools.

MAKE A RISK ANALYSIS BEFORE YOU START

Pay attention to safety when planning all of your work. Before you start, always take your time to go through all operations. Identify any potential risks and take appropriate measures to avoid them. If necessary, seek expert advice on how to help minimize risks. Finally, make sure that you have the right resources to perform all tasks in the safest manner possible.

Please check www.safeworkaustralia.gov.au or www.canada.ca/en/services/jobs/workplace/health-safety.html for more information.

IADC Codes – Rotary Rock Bits

International Association of Drilling Contractors

IADC Codes make it easier for drillers to describe what kind of rock bit they are looking for to the supplier. Black Diamond follows the IADC bit classification system in which the first three digits classify the bit according to the formation is is designed to drill and the bearing/seal design used.

Example 5-4-5-R:

First Digit

a. 1,2 and 3 designate STEEL TOOTH BITS with 1 for soft, 2 for medium and 3 for hard formations
b. 4, 5, 6, 7 and 8 designate TUNGSTEN CARBIDE INSERT BITS for varying formation hardness with 4 being the softest and 8 being the hardest.

Second Digit

1, 2, 3 and 4 are further breakdown of formation with 1 being the softest and 4 the hardest.

Third Digit

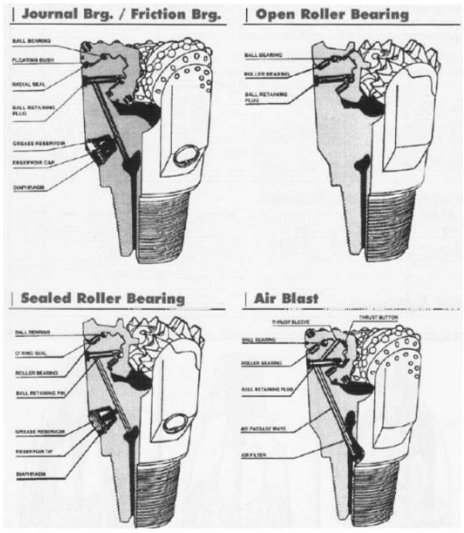
This digit will classify the bit according to bearing/seal type (see information on different bearing types) and special gauge wear protection as follows:
1. Standard open bearing roller bit/2. Standard open bearing roller bit, air-cooled
3. Standard open bearing roller bit with gauge protection which is defined as carbide inserts in the heel of the cone
4. Sealed roller bearing bit/5. Sealed roller bearing bit with gauge protection
6. Journal sealed bearing bit/7. Journal sealed bearing bit with gauge protection

Fourth Digit

The following letter codes are used in the fourth digit position to indicate additional features:
A-Air Application / R-Reinforced Welds / C-Center Jet / S-Standard Steel Tooth / D-Deviation Control / X-Chisel insert / E-Extended Jet / Y-Conical Insert / G-Extra Gauge Protection / Z-Other Insert Shape / J-Jet Deflection

Bearing Types

There are primarily four (4) types of bearing used in tricone drilling bits:
1.) STANDARD OPEN BEARING ROLLER BIT: On these bits the cones will spin freely. This type of bit has a front row of ball bearings and a back row of roller bearings.
2.) STANDARD OPEN BEARING ROLLER BIT FOR AIR DRILLING: Cones are similar to #1, but have air injection directly to the cones to cool the bearings. Air flows into the cone through the passage ways inside the pin. (Not for mud applications)
3.) SEALED BEARING ROLLER BITS: These bits have an O-Ring seal with a grease reservoir for bearing cooling. The seal acts as a barrier against mud and cuttings to protect the bearings.
4.) JOURNAL BEARING ROLLER BITS: These bits are strictly oil/grease cooled worth nose bearings, O-Ring seal and a race for maximum performance.



Please check https://www.iadc.org/drillbits/ for more information

Product Features

Fast Penetration

The cutting structures are designed to perform efficiently and increase the bit life of a variety of insert shapes.

Carbide

Multiple grade selection for different rows of inserts based on function.

INTERIOR ROW INSERTS

Interior row inserts are critical for high bit life and sustained penetration rates. We select the best inserts for your application specific products.

GAGE ROW INSERTS

We offer a range of gage row insert shapes suited to all drilling applications. Insert selection is optimised for all bits in our product range.

Optimised nozzle orientation

Nozzle size and orientation are optimised for efficient evacuation of cuttings.

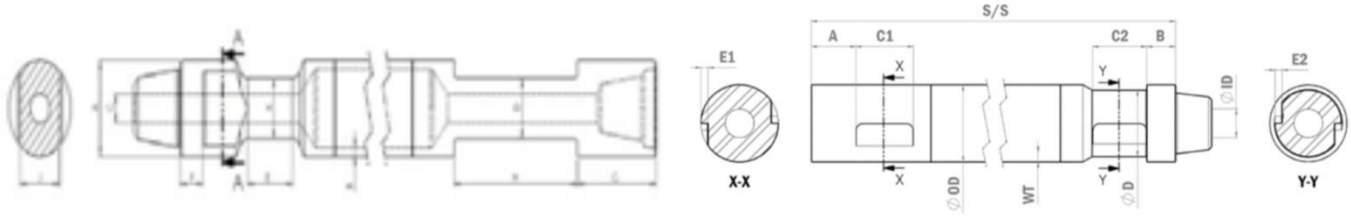
BACKFLOW VALVES

Backflow valves act as a check valve limiting ingress of water and cuttings to the bit body. This increases the bearing life and reduces the incidence of bearing failure.

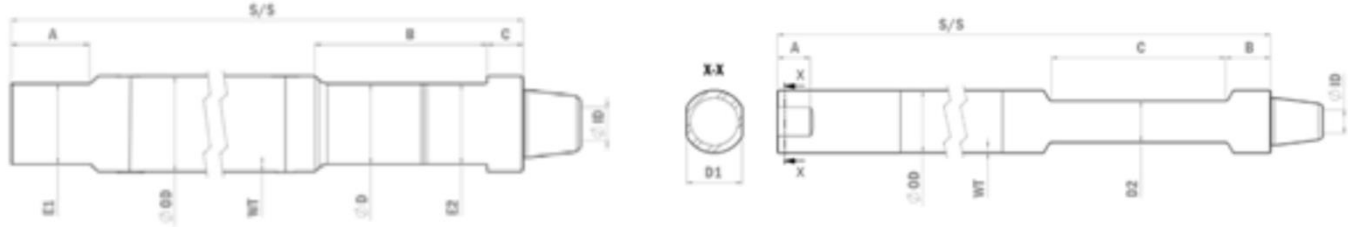
Rotary Drill String

Rotary Drill String	
1	Shock Sub
2	Saver Sub/Top Sub
3	Drill pipe
4	Starter pipe
5	Bit Sub
6	Roller Stabilizer
7	Rotary Deck Bush

CAT(REEDRILL, SKS, SKF, MD) CAT(BUCYRUS)



ATLAS COPCO(PIT-VIPER) Sandvik Driltech(T25KW/D25/40/50/75/90)



Rotary Drilling Pipe

Pipe type	Connection type	Thread type	OD	Should to Should(SS) Length	Flats	Wall Thickness
SKS/SKF	BOX-PIN		7”		127	
PIT VIPER	PIN-PIN	API or Beco	7-5/8”	6ft/25ft/30ft/35ft/40ft…	140	1” or 3/4”
DRILLTECH	BOX-BOX		8”		165	

Bit Sub/Saver Sub/Spindle Sub

Pipe type	Connection type	Thread type	OD	Should to Should(SS) Length	Flats
SKS/SKF	BOX-PIN		7”		127
PIT VIPER	PIN-PIN	API or Beco	7-5/8”	17”/19”/37”/42”	140
DRILLTECH	BOX-BOX		8”		165

BLACK DIAMOND DRILLING SERVICES AUSTRALIA
World-class drilling equipment and tools

CLOUDBREAK PIT VIPER 271

7” (178mm) Drill String / Min OD 165mm / 146mm Spanner Flats

Spindle Sub	
Part #	SUB-PREG568BBEC0412-178/SSL800
Pin Thread	6 5/8” API
Box Thread	4 1/2” BECO
Shoulder	800mm
Weight	146kg

Saver Sub	
Part #	SUB-PBBEC0412-178/SS400
Pin Thread	4 1/2” API
Box Thread	4 1/2” BECO
Shoulder	400mm
Weight	67kg

Drill Pipe x 2	
Part #	ROD-ROT-178/25FT/25.4 BECO412
Pin Thread	4 1/2” BECO
Box Thread	4 1/2” BECO
Shoulder	7620mm
Weight	785kg

Extension Sub	
Part #	SUB-PBEC0412BREG412-178/SS1800
Pin Thread	4 1/2” BECO
Box Thread	4 1/2” API
Shoulder	1800mm
Weight	315kg

Lifting Bail	
Part #	TOOL-LBAIL-BECO 412-AL
Box Thread	4 1/2 BECO
Part #	TOOL-LBAIL-REG658-AL
Box Thread	6 5/8 API
Part #	TOOL-LBAIL-REG412-AL
Box Thread	4 1/2” API

Bit Basket
RIG-BBASKET-PV271-ROT203
RIG-BBASKET-PV271-ROT229

Deck Bushes
3250D Triple Race
DBUSH -TR-PV271-178/325
3250D Light Weight
DBUSH -TR-PV271-178/325

Bit Sub (9 7/8” Rotary)	
Part #	SUB-P421B658REG-178/SS1800
Pin Thread	4 1/2” API
Box Thread	6 5/8” API
Shoulder	1200mm
Weight	230kg

Bit Sub (9” Rotary)	
Part #	SUB-PB412REG-178/SS1200
Pin Thread	4 1/2” API
Box Thread	4 1/2” API
Shoulder	1200mm
Weight	220kg

IADC435

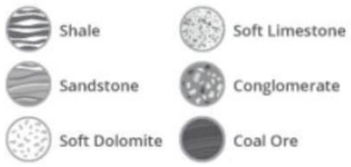
Bit Description

Bit Size (mm)	IADC Code	Pin Connection	Weight (Kg)
200/216/229/251/270/311	435	4 1/2” & 6 5/8” API REG	34/38/50/65/74/104

IADC: 435 – TCI sealed roller bearing bit with gauge protection for soft formations with low compressive strength and high drillability.

Compressive Strength:

- 65-85 MPA
- 9,000-12,000 PSI



Ground Description:

Long intervals of very soft poorly compacted shales, dolomites, sandstones, clays, salts and limestones.

Product Specification	Technical
Bearing Type	**Operating Suggestions**
Roller-Ball-Roller-Thrust Button/Sealed Bearing	Weight on Bit: 9,880-39,500
Circulation Type	Rotary Speed: 80 – 110 RPM
Jet Air	Air Back Pressure: 0.2 – 0.4
Cutting Structure	
Inner and Nose Rows: Ogive	Gage Row: Chisel
Gage Level Protection: Round	Hardmetal and wear resistant carbide on shirttail lip and lug

Based on the IADC Bit Classification System located in the IADC Drilling Manual, 11th Ed. – Redesigned, 2007

IADC545

Bit Description

Bit Size (mm)	IADC Code	Pin Connection	Weight (Kg)
200/216/229/251/270/311	545	4 1/2” & 6 5/8” API REG	34/38/50/65/74/104

IADC: 545 – TCI sealed roller bearing bit with gauge protection for soft to medium formations with low compressive strength.

Compressive Strength:

- 155 - 193 MPA
- 22,500 – 28,000 PSI

Ground Description:

Medium hard and abrasive rocks such as sandstone with streaks of quartz, hard limestone or chert, hematite ores, hard well compacted abrasive rock such as: sandstones with quartz binder, dolomites, quartzite shales, magma and metamorphic coarse-grained rocks

Product Specification	Technical
Bearing Type	**Operating Suggestions**
Roller-Ball-Roller-Thrust Button/Sealed Bearing	Weight on Bit: 18,000 – 45,000
Circulation Type	Rotary Speed: 80 – 110 RPM
Jet Air	Air Back Pressure: 0.2 – 0.4
Cutting Structure	
Inner and Nose Rows: Conical	Gage Row: Off-set Chisel
Gage Level Protection: Round	Hardmetal and wear resistant carbide on shirttail lip and lug

Based on the IADC Bit Classification System located in the IADC Drilling Manual, 11th Ed. – Redesigned, 2007

IADC615

Bit Description

Bit Size (mm)	IADC Code	Pin Connection	Weight (Kg)
229	615	6 5/8” API REG	65

IADC: 615 – TCI sealed roller bearing bit with gauge protection for medium hard formations with high compressive strength.

Compressive Strength:

- 85 - 100 MPA
- 12,000 – 14,500 PSI

Ground Description:

Hard, well compacted rocks such as: hard silica limestones, quartzite streaks, pyrite ores, hematite ores, magnetite ores, chromium ores, phosphorite ores and granites

Product Specification	Technical
Bearing Type	**Operating Suggestions**
Roller-Ball-Roller-Thrust Button/Sealed Bearing	Weight on Bit: 19,750 – 49,380
Circulation Type	Rotary Speed: 80 – 110 RPM
Jet Air	Air Back Pressure: 0.2 – 0.4
Cutting Structure	
Inner and Nose Rows: Conical	Gage Row: Chisel
Gage Level Protection: Round	Hardmetal on lug; Wear resistant carbide on shirttail lip and lug

Based on the IADC Bit Classification System located in the IADC Drilling Manual, 11th Ed. – Redesigned, 2007

IADC635

Bit Description

Bit Size (mm)	IADC Code	Pin Connection	Weight (Kg)
200/216/229/251/270/311	635	4 1/2” & 6 5/8” API REG	34/38/50/65/74/104

IADC: 635 – TCI sealed roller bearing bit with gauge protection for medium hard formations with high compressive strength.

Compressive Strength:

- 85 - 100 MPA
- 12,000 – 14,500 PSI

Ground Description:

Hard, well compacted rocks such as: hard silica limestones, quartzite streaks, pyrite ores, hematite ores, magnetite ores, chromium ores, phosphorite ores and granites

Product Specification	Technical
Bearing Type	**Operating Suggestions**
Roller-Ball-Roller-Thrust Button/Sealed Bearing	Weight on Bit: 19,750 – 49,380
Circulation Type	Rotary Speed: 80 – 110 RPM
Jet Air	Air Back Pressure: 0.2 – 0.4
Cutting Structure	
Inner and Nose Rows: Conical	Gage Row: Chisel
Gage Level Protection: Round	Hardmetal on lug; Wear resistant carbide on shirttail lip and lug

Based on the IADC Bit Classification System located in the IADC Drilling Manual, 11th Ed. – Redesigned, 2007

IADC645A

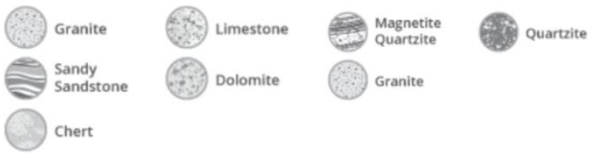
Bit Description

Bit Size (mm)	IADC Code	Pin Connection	Weight (Kg)
200/216/229/251/270/311	654A	4 1/2” & 6 5/8” API REG	34/38/50/65/74/104

IADC: 645 – TCI sealed roller bearing bit with gauge protection for medium hard formations with high compressive strength.

Compressive Strength:

- 85 - 100 MPA
- 12,000 – 14,500 PSI



Ground Description:

Hard, well compacted rocks such as: hard silica limestones, quartzite streaks, pyrite ores, hematite ores, magnetite ores, chromium ores, phosphorite ores, magnetite and granites

Product Specification	Technical
Bearing Type	**Operating Suggestions**
Roller-Ball-Roller-Thrust Button/Sealed Bearing	Weight on Bit: 19,750 – 49,380
Circulation Type	Rotary Speed: 80 – 110 RPM
Jet Air	Air Back Pressure: 0.2 – 0.4
Cutting Structure	
Inner and Nose Rows: Conical	Gage Row: Conical
Gage Level Protection: Conical	Hardmetal on lug; Wear resistant carbide on shirttail lip and lug

Based on the IADC Bit Classification System located in the IADC Drilling Manual, 11th Ed. – Redesigned, 2007

IADC735

Bit Description

Bit Size (mm)	IADC Code	Pin Connection	Weight (Kg)
200/216/229/251/270/311	735	4 1/2” & 6 5/8” API REG	34/38/50/65/74/104

IADC: 735 – TCI sealed roller bearing bit with gauge protection for hard semi-abrasive and abrasive formations.

Compressive Strength:

- 155 - 192 MPA
- 22,500 – 28,000 PSI

Ground Description:

Hard, well compacted rocks such as: hard silica limestones, quartzite streaks, pyrite ores, hematite ores, magnetite ores, chromium ores, phosphorite ores and granites

Product Specification	Technical
Bearing Type	**Operating Suggestions**
Roller-Ball-Roller-Thrust Button/Sealed Bearing	Weight on Bit: 15,750 – 39,380
Circulation Type	Rotary Speed: 80 – 110 RPM
Jet Air	Air Back Pressure: 0.2 – 0.4
Cutting Structure	
Inner and Nose Rows: Conical	Gage Row: Chisel
Gage Level Protection: Flat-top	Hardmetal and wear resistant carbide on shirttail lip and lug

Based on the IADC Bit Classification System located in the IADC Drilling Manual, 11th Ed. – Redesigned, 2007

IADC845

Bit Description

Bit Size (mm)	IADC Code	Pin Connection	Weight (Kg)
200/216/229/251/270/311	845	4 1/2” & 6 5/8” API REG	34/38/50/65/74/104

IADC: 845 – TCI sealed roller bearing bit with gauge protection for extremely hard and abrasive formations.

Compressive Strength:

- 155 - 193 MPA
- 22,500 – 28,000 PSI

Ground Description:

Hard, well compacted rocks such as: hard silica limestones, quartzite streaks, pyrite ores, hematite ores, magnetite ores, chromium ores, phosphorite ores and granites

Product Specification	Technical
Bearing Type	**Operating Suggestions**
Roller-Ball-Roller-Thrust Button/Sealed Bearing	Weight on Bit: 9,880 – 39,500
Circulation Type	Rotary Speed: 80 – 110 RPM
Jet Air	Air Back Pressure: 0.2 – 0.4
Cutting Structure	
Inner and Nose Rows: Ovoid	Gage Row: Conical
Gage Level Protection: Flat-top	Hardmetal and wear resistant carbide on shirttail lip and lug

Based on the IADC Bit Classification System located in the IADC Drilling Manual, 11th Ed. – Redesigned, 2007

GUIDE FOR BEST PERFORMANCE

- When a new bit is installed, drill bit at reduced weight for a short break-in period. Use the 1/3 – 2/3 rule: 1/3rd of normal weight and RPM for 1/3 first hole, 2/3rd of normal weight and RPM for the next 1/3rd of the hole. Use normal drilling parameters to finish the hole.
- Provide adequate air to the bit to ensure trouble free bearing performance and reduced abrasion wear on cones and shirttails.
- 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.
- Always rotate when coming out of the hole.

• Blasthole bits drill most effectively 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.
• Never use the hydraulic down pressure on the bit to aid in levelling the machine.
• When adding extra drill steel in wet holes, always make three or four cleaning passes to get the bottom of the hole as clean as possible.
• After the bit is discarded it is necessary to make a comparative analysis of each bit type dulling and causes.