GLOBAL PRODUCT CATALOGUE

PERCUSSIVE TOOLING

January 2009

BOART LONGYEAR™

www.boartlongyear.com

TABLE OF CONTENTS

ABOUT OUR PRODUCTS

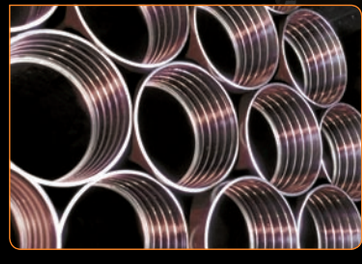
Boart Longyear is the industry's only integrated drilling services and products provider, combining 24-hour engineering excellence, global manufacturing facilities and the most experienced drilling services group in the business. Our customers rely on our unique ability to develop, field test, and deliver any combination of drilling consumables, capital equipment, and expertise direct to any corner of the world.

Exploration Drilling Products

Boart Longyear is globally recognized as the leader in exploration drilling technology. From the rig to the drill string to the record-breaking Stage3 diamond coring bit at the bottom of the hole, our customers trust us to deliver the most innovative, advanced, and complete solution available.

DIAMOND PRODUCTS
- Surface set bits
- Impregnated bits
- Reamers
- Casing shoes
- PCD bits
- Carbon bits

WIRELINE COMPONENTS
- Core barrel assemblies
- Water swivels and hoisting plugs
- Subs and adaptors
- Overshots and recovery tools
- Wrenches



RODS AND CASING
- Q® and Patented RQ® Drill Threads
- Coring Rod
- Casing

RC CONSUMABLES
- Rod
- Swivels
- Swivel Accessories
- Subs

EXPLORATION DRILL RIGS
- Surface core drills
- Underground core drills
- Multi-purpose drills
- Reverse circulation drills

ABOUT OUR PRODUCTS

In addition to our exploration drilling technology, Boart Longyear also engineers and manufactures world-class drill rigs and consumables for construction, overburden and percussive drilling.

Construction Drill Rigs

- DeltaBase® Site investigation and sampling drills
- DeltaBase® Multi-purpose drills
- DeltaBase® Foundation and construction drills

Construction Drilling Consumables

- DeltaTools™ rods and casing
- DeltaTools™ Bits and casing shoes
- DeltaTools™ Jet grouting tools

Percussive

- Production drill rigs
- Rock drills and breakers
- HRT consumables
  - Threaded bits, rods, couplings, and shank adaptors
  - Tapered bits and rods
  - Integral drill steel
  - Down the hole hammer bits

Aftermarket Support

- Genuine spare parts
- Spare parts kits
- First-aid drill repair boxes
- Maintenance programs

* DELTABASE is a trademark of Boart Longyear, registered in Germany.

THIS PAGE LEFT INTENTIONALLY BLANK

SAFETY

SAFETY

Safety Identification and Safeguards

Hazard Signal Words
Hazard signal words are used throughout this catalogue. They appear in the narrow left-hand column of numerous pages and, with their additional text description, are intended to alert the reader to the existance and relative degree of hazard.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury and death.

DANGER indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Safety Identification and Safeguards

⚠ WARNING

Keep clear of rotating rods. Never wear loose clothing that could become entangled.

Ensure rods and subs are in good condition and properly connected.

When handling drill rods: making, breaking or stacking, keep your hands clear from the pin and box design ends to avoid bodily harm from pinching or severing.

Drill rods have limited capacity in terms of fatigue or rotation strength.

Minimize rotation loads by minimizing rig misalignment and hole deviation.

When working underground, ensure that work areas are safe. Follow local protocols for scaling and other activities that ensure the work environment is healthy and safe.

SAFETY

Safety Identification and Safeguards

⚠ WARNING

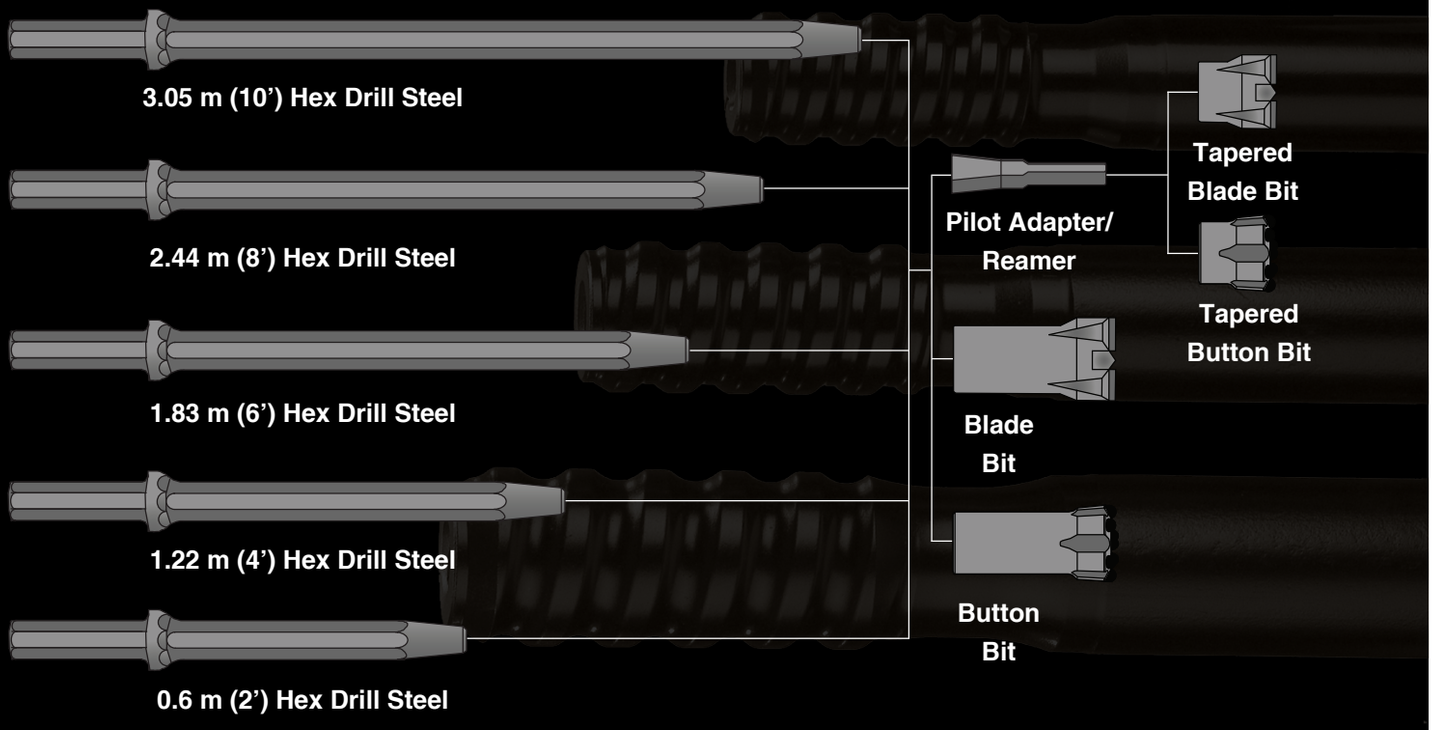
Read and understand all safety instructions carefully before operating equipment. Failure to follow these instructions may result in serious personal injury or death.

- Keep clear of rotating equipment. Never wear any loose clothing which could become tangled in the machine.
- Keep guards installed and maintained in good working order.
- Always keep the work area clean.
- Avoid dangerous working environments.
- Do not operate equipment while under the influence of drugs, alcohol or medication.
- Keep visitors a safe distance away from the work area.
- Wear personal protective equipment such as a hard hat, safety glasses and steel toed work boots.
- Always wear hearing protection when operation equipment with noise levels are at or above 85 dBA. Double hearing protection may be necessary when operating percussive drills.
- Read and understand the operations manual and labels affixed to the machine.
- Use only Boart Longyear replacement parts. Failure to do so could cause severe damage to the machine or the operator, and may void your warranty.
- Use only qualified service technicians. Failure to do so could cause severe damage to the machine or the operator, and may void your warranty.
- Ensure that the drill and accessories fully comply with applicable local safety and health regulations.
- Do not exceed rated capacity of any piece of equipment.
- Never rotate the drill rods with a rod joint located behind or above the chuck.
- Do not change or alter the drill, its components, optional equipment or accessories without prior approval from Boart Longyear.
- Unauthorized alteration may void the warranty, render the equipment unsafe or result in decreased performance.
- Before operating any controls, be certain you know what function they control and the ramifications of that function.
- Before operating any hoist, ensure the rope is free and clear to travel.
- When hoisting/lowering rods, make sure the hoisting cable is in complete tension before releasing the chuck.
- For additional information on training or start up, contact your Boart Longyear representative.

OVERVIEW

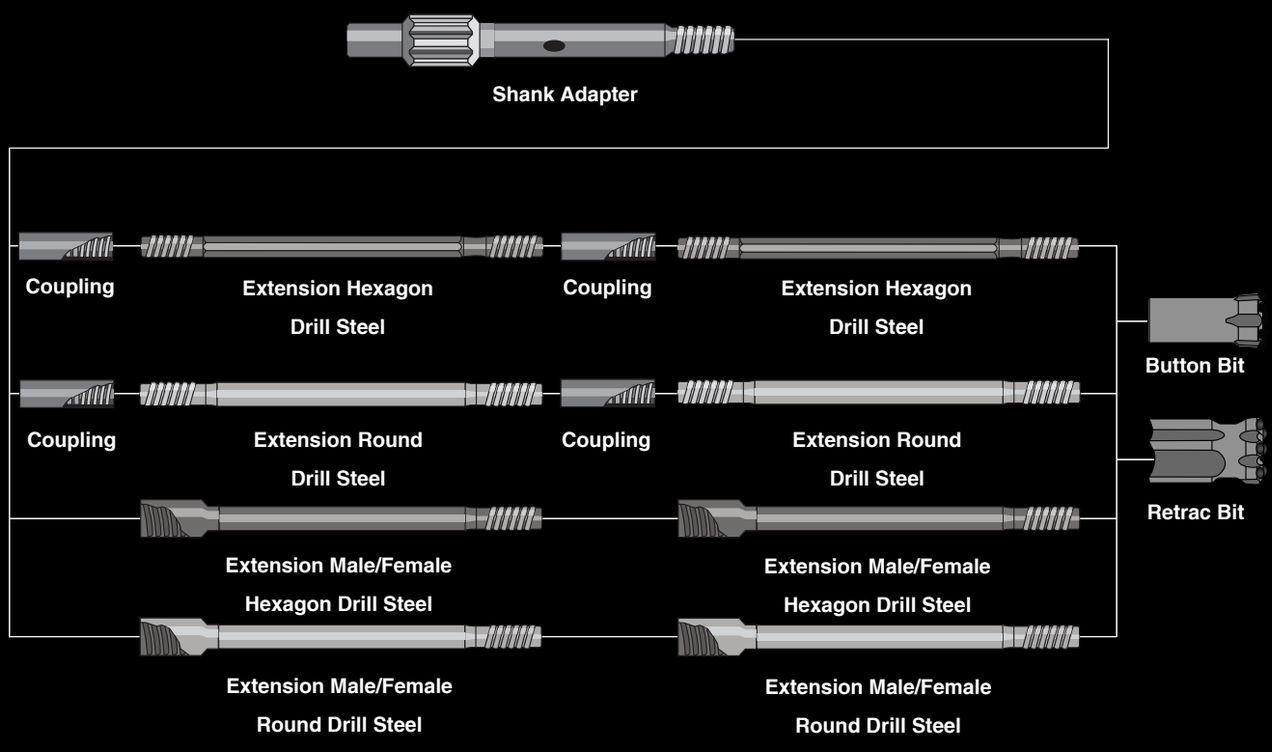
SYSTEM SET-UP

Handheld (Shorthole) Drill String



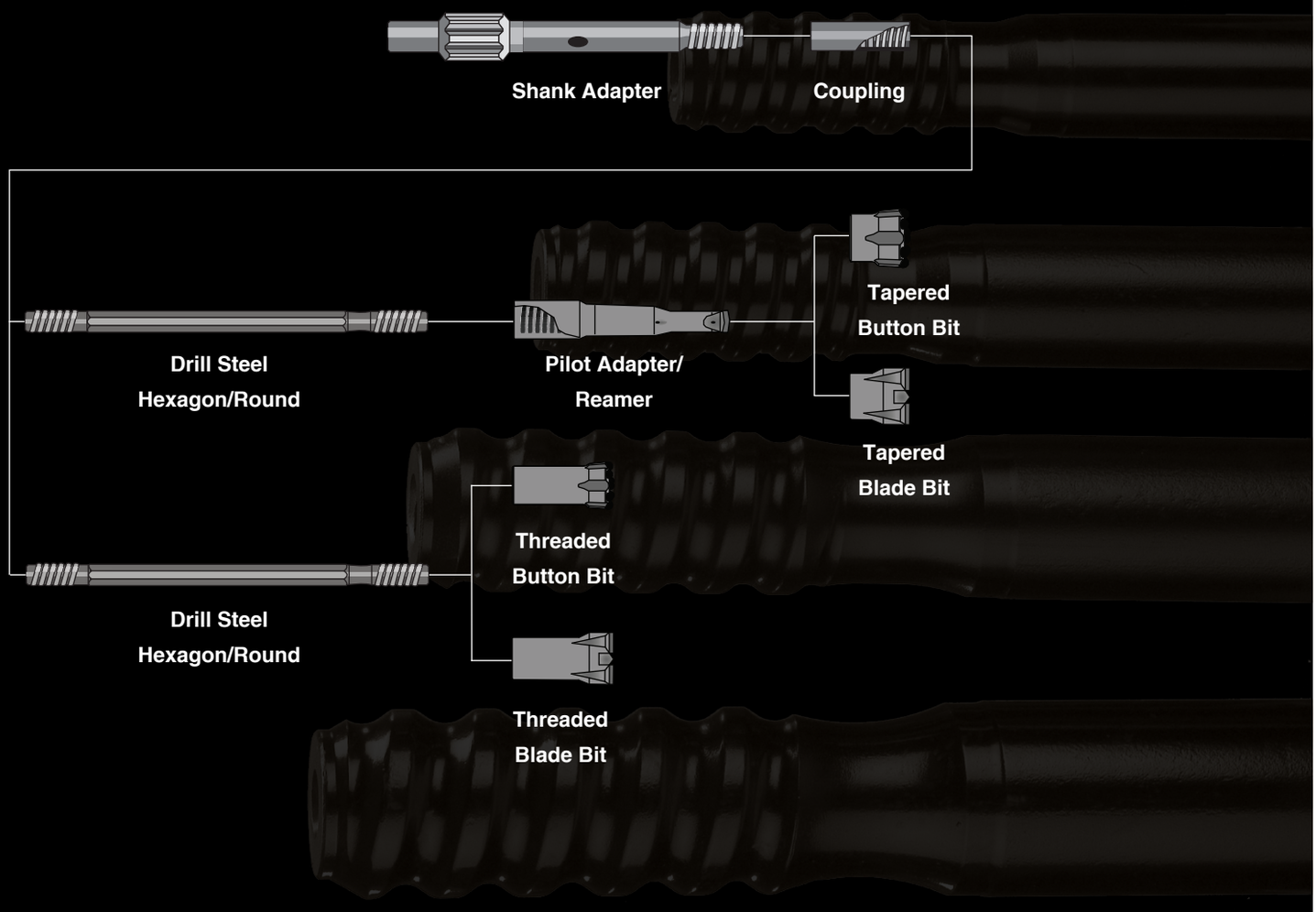
SYSTEM SET-UP

Production Drill String



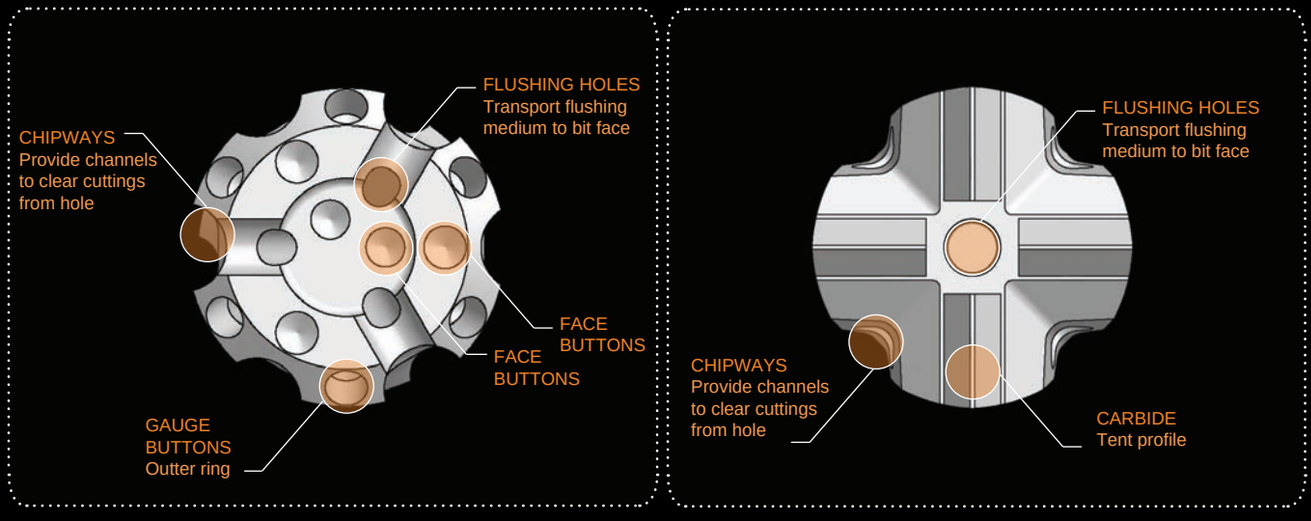
SYSTEM SET-UP

Tunneling/Ground Support Drill String



BITS

Main Design Distinction



Button Interference Fit

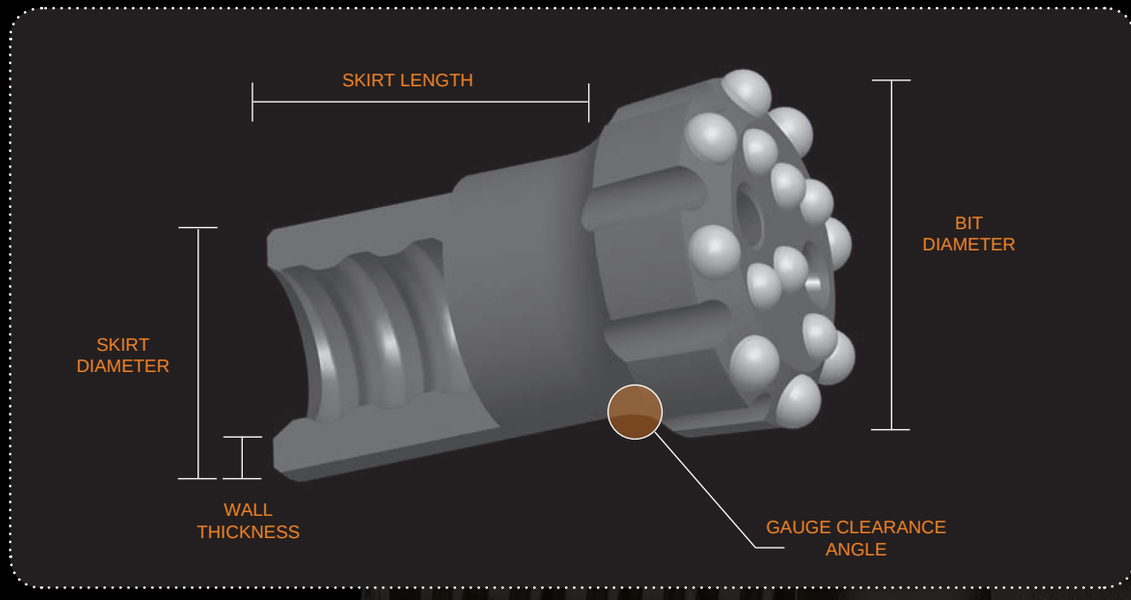
- Fast penetration required
- Straightness is not critical
- Productivity would be adversely affected by short service intervals using blade bits
- Low service is essential
- Medium to hard ground
- Moderately abrasive

110 Blade Brazed

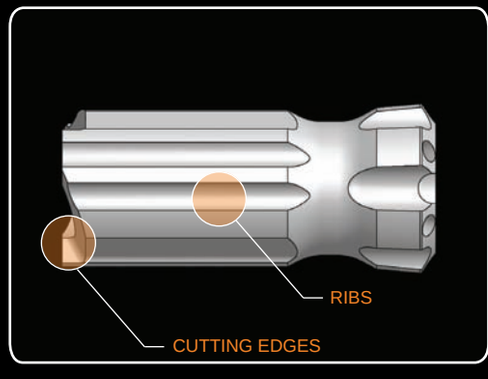
- Slow penetration acceptable
- Straightness is critical
- Productivity not adversely affected by inherent short service interval of blade bits
- Maintains hole diameter with reduced gauge wear

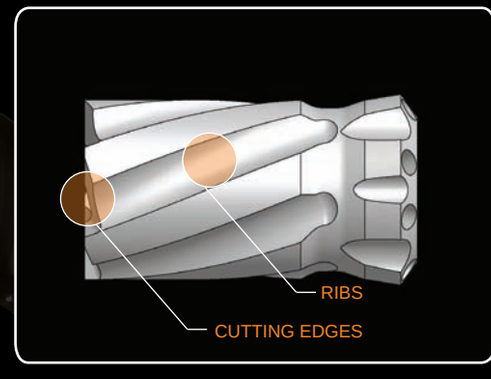
BITS

Button Bit Components



Button Bit Skirt Designs





Retrac Bit

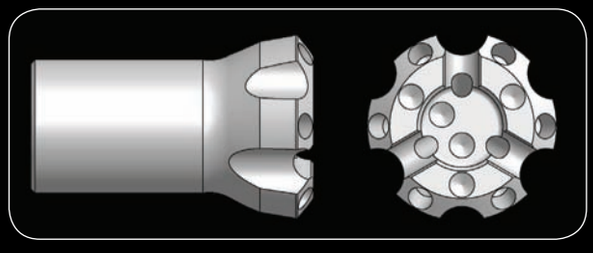
- Long skirt body
- Cutting edges designed into skirt
- Design to provide easy removal and completion of bit in adverse hole conditions

Straightrac Bit

- Angled flute design
- Long skirt body maintains 360 degrees of contact while in the hole
- Tested and proven to provide straight holes in adverse ground conditions

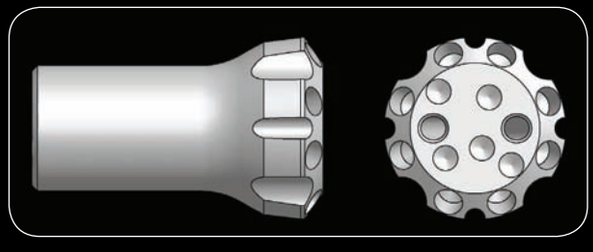
BITS

Button Bit Face Designs



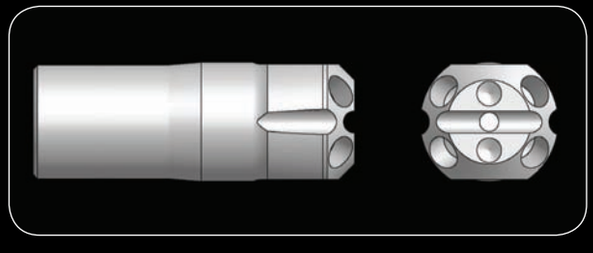
BR - Button Recessed

"Drop Centre" face characteristic
- Straight hole application
- Broken ground conditions



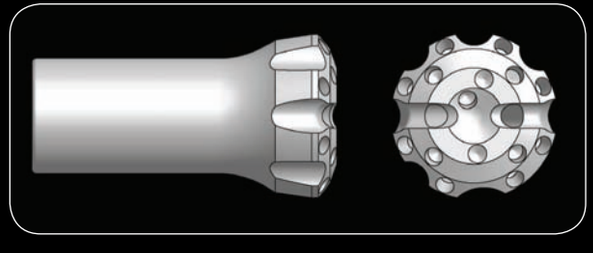
BF - Button Flat

"Flat" face characteristic
- General purpose bit
- Hard to medium conditions



BC - Button Chisel

Chisel shape characteristic
- Abrasive applications
- Fast penetration - commonly used in tunneling



BD - Button Dome

- Clearly defined raised face profiles
- Primary reaming applications in soft ground

BITS

Button Bit Insert Types

Hemispherical Button

(Height 0.5 Ø)

- Application Strength - universal button
- Best suited to hard ground
- 25,000 to 45,000 PSI (170 to 300 MPa)
- Abrasive to very abrasive

Ballistic Button

(Height 0.75 Ø)

- Application Strength - fast penetration
- Best suited to soft ground
- 10,000 to 20,000 PSI (70 to 140 MPa)
- Non abrasive ground

Parabolic Button (semi ballistic)

(Height 0.6 Ø)

- Application Strength - fast penetration
- Best suited to medium ground
- 15,000 to 25,000 PSI (100 to 170 MPa)
- Mildly abrasive ground

Conical Button

(Height 0.65 Ø)

- Application Strength – fast penetration
- Suited for all non-abrasive ground types
- Smaller contact area
- Best suited for smaller diameter bits

NOTE:
Generally, the larger the number of gauge buttons the better overall performance, especially in hard rock.

NUMBER OF BUTTONS		
33 mm - 45 mm	45 mm - 51 mm	51+ mm
3 - 6 buttons	4 - 6 buttons	6 - 10 buttons

SIZE OF BUTTONS		
Hard Rock	Medium Rock	Soft Rock
Larger Ø	Smaller Ø	Smaller Ø

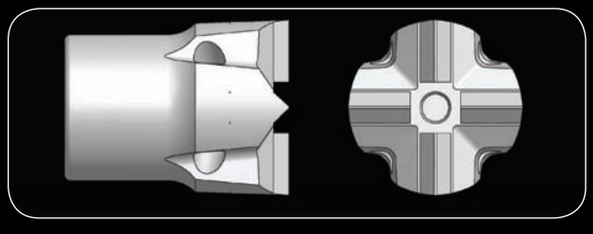
BITS

Blade Bit Face Designs

Blade bit designs are limited to cross and "X" type face configurations.
- 32 mm to 57 mm are restricted to a cross configuration.
- 57 mm or larger usually have an 'X' configuration.

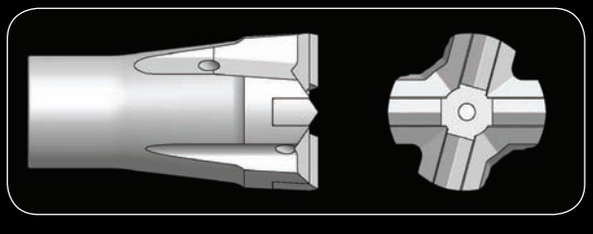
In special circumstances, blade bits are preferred.
- Blade bits tend to resist gauge wear better than button bits.
- Hole accuracy is required and very hard, abrasive ground is encountered.

Generally, blade bits are not as productive and yield higher drilling costs than button bits. In addition, blade bits generally require more frequent sharpening than button bits because of the less wear resistant carbide grades.



Cross Bits

- Easier to sharpen than X-bits, inset angles are equal on all four sides
- Bits 64 mm and less are easier to sharpen than button bits of the same size
- In certain rock conditions, cross bits tend to produce a spiraled five sided hole (especially in diameters larger than 64 mm)



"X" Bits

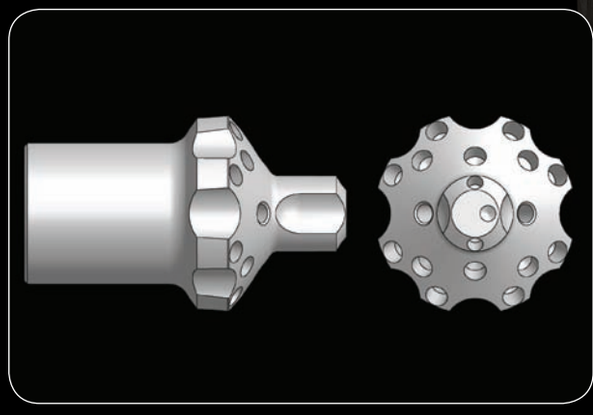
- X-bits tend to drill round holes in all rock conditions
- The steel support in the narrow parts of the X becomes inadequate in X-bits smaller then 64 mm because of the restricted circumference

BITS

Reaming Bits or Hole Openers

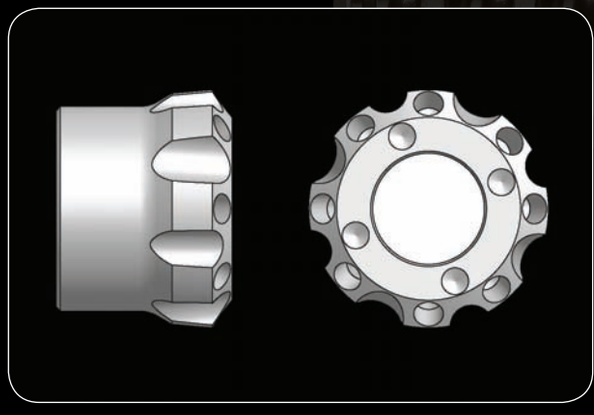
Description
- Pilot holes are drilled to depth and then reamed out to a larger diameter in a second pass
- Required when hole diameter exceeds the capabilities of the rockdrill and drilling tools available

Applications
- Large diameter service holes from level to level for drainage, electrical cable or pipe lines
- Routinely used to ream cut holes for development rounds and for long hole blasting of drop raises



Button Bit Reamer

One piece bit
Has an integral pilot on the face of the reamer



Pilot Adapter/Reamer

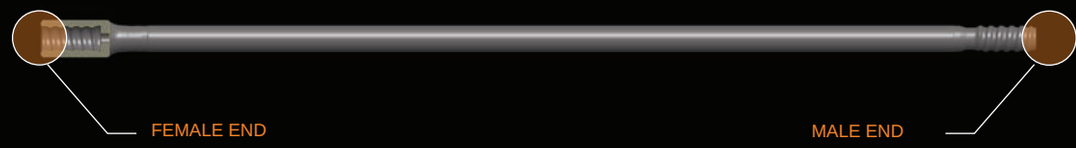
Two piece system
The reaming assembly is made of a 6° tapered pilot adapter that threads on the lead steel with a taper socket reaming bit fitted on the pilot

Bit Selection Guide

ROCK TYPE	DUCTILITY	BREAK ABILITY	WEAR ABILITY	CONTROL ABILITY	THREADED BIT INSERT	THREADED BIT STYLE	TAPER BIT STYLE
Talc	High	Low	Low	High	Blade	2 - Prong	2 - Prong
Shale	High	Low	Medium	Medium	Ballistic Parabolic	BF Small BR Large	Button 1 Pass Blade Multi
Limestone	Medium	High	Low	High	Ballistic Parabolic	BF Small BR Large	Button 1 Pass Blade Multi
Sandstone	Medium	High	High	Medium	Parabolic	BF Small BR Large	Button 1 Pass Blade Multi
Marble	Low	Medium	Low	High	Hemi	BF	Blade - Multi
Gniess	Low	Medium	High	High	Hemi	BF	Blade
Feldspar	Low	Medium	Low	High	Hemi	BF	Blade
Granite	Low	Low	Medium	High	Hemi	BF	Blade
Diorite	Low	Low	Low	High	Hemi Tent	BF X-Cross	Blade
Quartzite	Low	Low	High	High	Hemi Tent	BF X-Cross	Blade

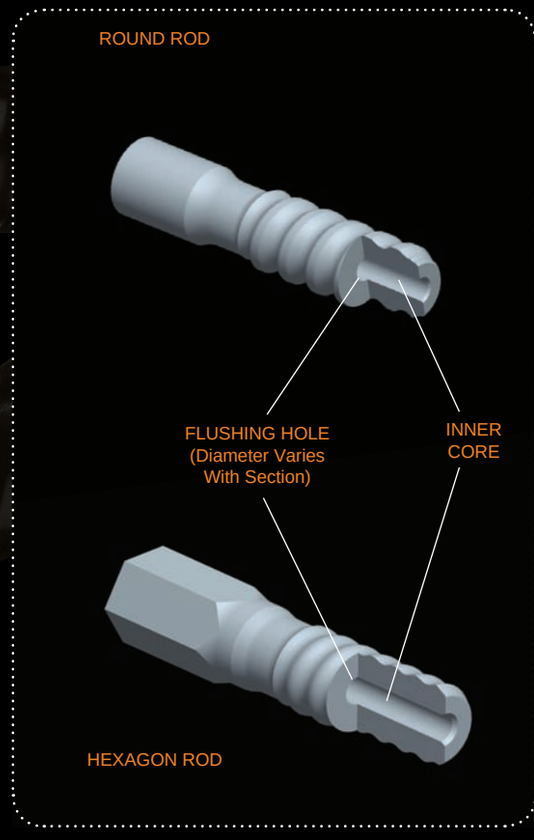
RODS

Rod Components



Round Rods

- Normally used in extension drilling applications
- Generally lighter than hexagonal rods of an equivalent size
- Available in large x-sectional diameters
- Diameter of rod is based off external dimension

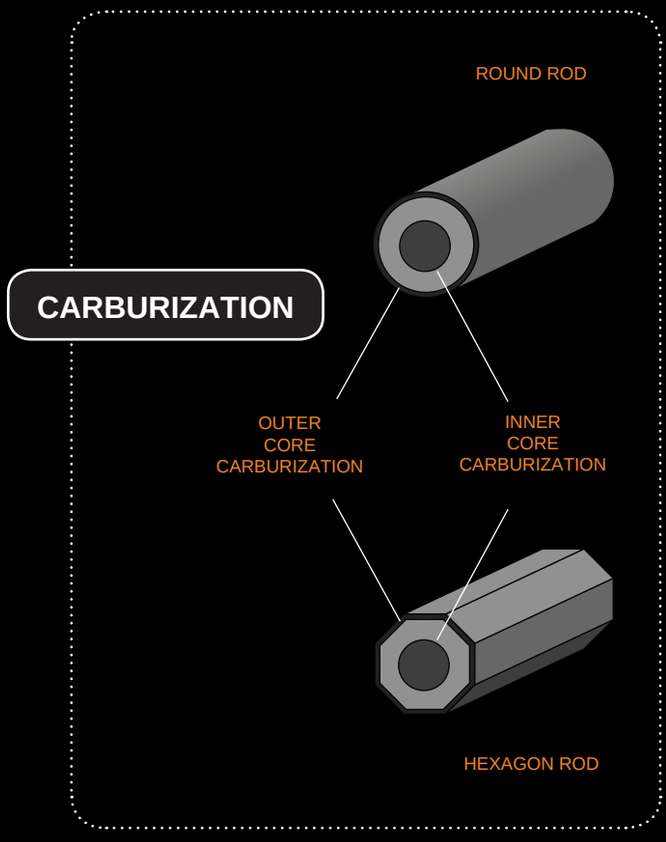


Hexagon Rods

- The cross sectional dimension of material is measured across the flat
- Cross sections are more rigid, heavier & transfer energy more efficiently
- Reduces the annulus in the drill hole for better flushing
- Smaller space combined with the corners of the steel create turbulence in the hole
- keeps the heavier cuttings moving, especially with horizontal holes
- The rigidity of the cross section makes it possible to use a larger thread

RODS

Drill String Heat Treatment



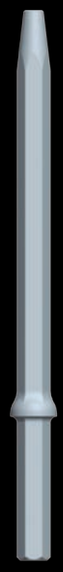
Carburization

- Entire rod is hardened providing a case over the entire rod surface both internal and external
- Used primarily in underground applications and where water is used as a flushing medium

High Frequency (H/F) Induction

- Only the thread ends of the rod are hardened
- Primarily used in surface drilling applications where air is the primary flushing medium

RODS



Handheld (Shorthole) steel

This provides a hexagonal chuck section to provide leverage for the rotation chuck bushing. It usually has a forged collar to maintain the proper shank striking face position in the rockdrill, and a tapered bit end. Tapered steel lengths are measured from the collar to the bit end.

STANDARD LENGTHS OF TAPERED STEEL					
0.6 m	1.2 m	1.8 m	2.4 m	3.0 m	3.6 m

Holes are usually drilled in 0.6 m increments to accommodate the airleg feed length. The drilled steel is extracted and followed with a slightly smaller diameter bit on the next steel length in the sequence.

Extension steel

With the longer steel tending to be larger in diameter. Conventional extension steel is characterized by a duplicate thread on each end of the steel. Hexagonal and round cross sections are available. Round cross sections are more prevalent.

STANDARD LENGTHS OF EXTENSION STEEL					
1.2 m	1.8 m	2.4 m	3.1 m	3.7 m	6.1 m

RODS

Tunneling Steel

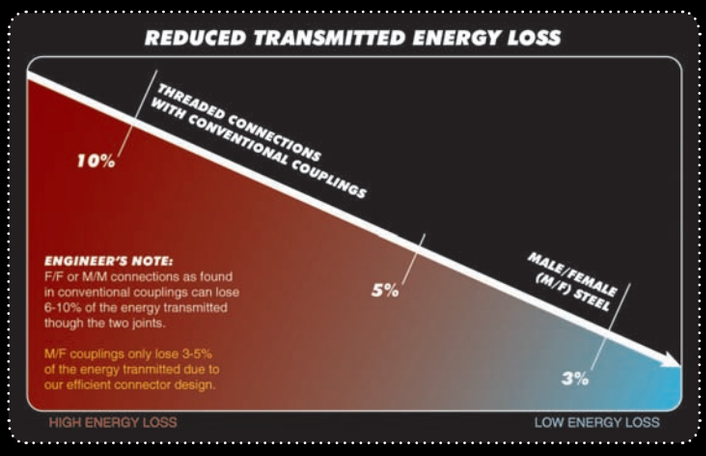
It is common practice to bump up the drive end of drifting steel for added strength at the rockdrill end to accommodate larger diameter and shank adapters. Drill steel is available in many standard lengths to match the drill feeds on a multitude of available drifting jumbos. Please contact your Boart Longyear Sales Representative for further information.
Since the coupling does not enter the hole, a bit diameter closer to the steel diameter can be used. This enhances flushing and hole accuracy.

STANDARD LENGTHS OF TUNNELING STEEL									
Hex	2.1 ft	2.6 ft	2.7 ft	3.1 ft	3.2 ft	3.7 ft	4.3 ft	4.9 ft	5.5 ft
Round	2.4 ft	4.3 ft	4.9 ft						

STANDARD STEEL DIAMETERS					
Hex	25 mm	28 mm	32 mm	35 mm	38 mm
Round	29 mm	33 mm	46 mm	52 mm	70 mm

Male/Female (M/F) Steel

An alternative to couplings is to include the female part of the threaded connection as an integral part of the drill steel.
Like most developments, it has its advantages and disadvantages. Male/Female drill steel provides more rigid connections and is easier to uncouple and handle. The service life also tends to be better than with separate couplings. This is fortunate because the coupling end cannot be replaced.
The advantages of drilling with M/F steel include: easy handling, quicker uncoupling, tighter connections and the potential to drill straighter holes.



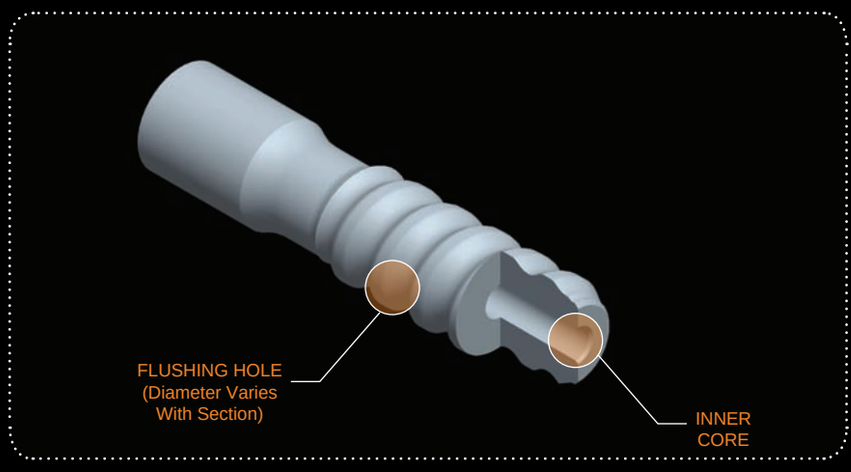
RODS

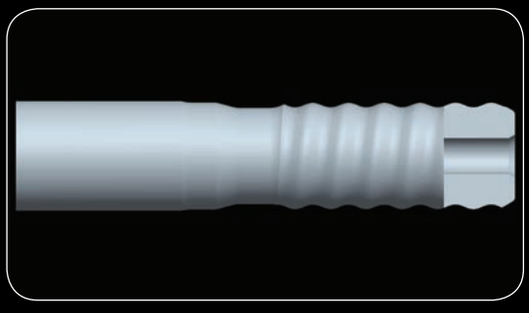
Rod Selection Guide

DIAMETER Ø	DRIVE END THREAD	MATCHING ROD SECTION	BIT END THREAD	TYPICAL BIT FACE DESIGN
33 - 35 mm (1-5/16” - 1-3/8”)	R32	Hex 25	R25	B/F 5/2
35 - 41 mm (1-3/8” - 1-5/8”)	R32	Hex 28	R28	B/F 5/2
41 - 45 mm (1-5/8” - 1-3/4”)	R32 R38	Hex 25 or 32 Rd 33	R32	B/F 5/2 B/F 6/3
45 - 51 mm (1-3/4” - 2.0”)	R32 or R38 HM38	Hex 32 or 35 Rd 33	R32	B/F 5/2 B/F 6/3
51 - 64 mm (2.0” - 2-1/2”)	R38 HM38	Hex 32 or 35 Rd 39	R32	B/F 6/3 B/F 5/2
64 - 76 mm (2-1/2” - 3.0”)	HM38 HM45	Hex 32 or 35 Rd 39 or 46	HM38 HM45	B/F 6/3 B/F 7/5
76 -102 mm (3.0” - 4.0”)	HM45 HM51	Rd 46 Rd 52	HM45 HM51	B/F or B/R 9/8, 9/9
102 - 127 mm (4.0” - 5.0”)	HM51 EL60	Rd 52 or 60	HM51 EL60	B/F or B/R 9/8, 9/9
115 - 152 mm (4-1/2” - 6.0”)	EL68	Rd 70	EL68	B/F or B/R 9/9

THREADS

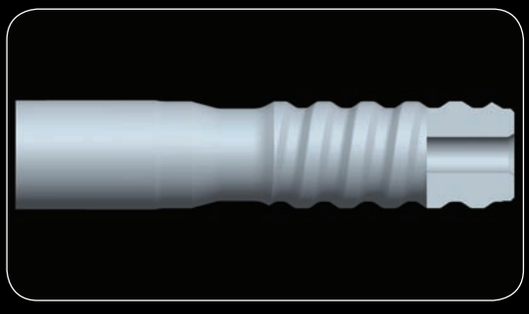
Thread Components





Rope Thread

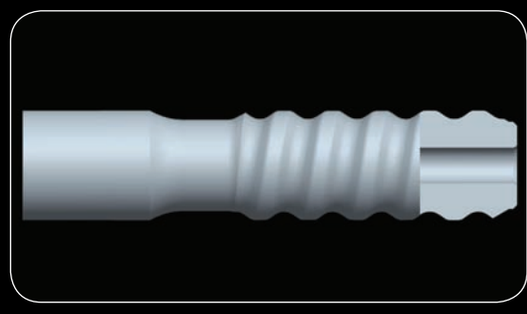
- Rope threads have a low pitch, 12.7 mm and a small angle of profile
- Sizes: 22 mm – 38 mm
- Good wear properties but poor uncoupling
- Ideal for single pass or shorthole drilling such as underground tunneling applications, that require infrequent uncoupling
- Rope thread larger than R32 is not recommended for extension drilling, especially with high powered drills that have high rotational torque as they will be difficult to uncouple



HM Thread

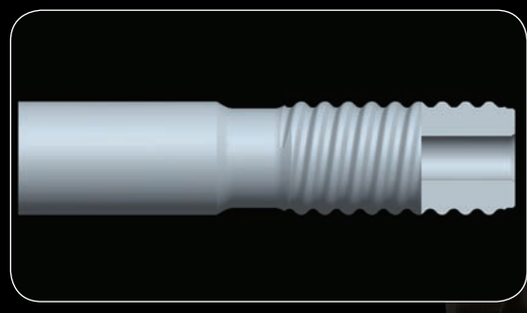
- HM thread or “T” thread has a larger pitch and a larger angle of profile than the Rope thread
- Sizes 38 mm, 45 mm and 51 mm
- Excellent wear properties and good coupling qualities
- It is ideal for extension drilling with multiple steel
- Compatible with heavy high torque rockdrills for surface and underground applications

THREADS



EL Thread

- Similar angle of profile to the HM thread
- Designed for a 60 mm and 70 mm diameter extension steel for use with the new generation high powered rockdrills
- Excellent wear resistance and a pitch angle that uncouples easily
- Vital component of the LASEROD® Straight Hole Drilling System

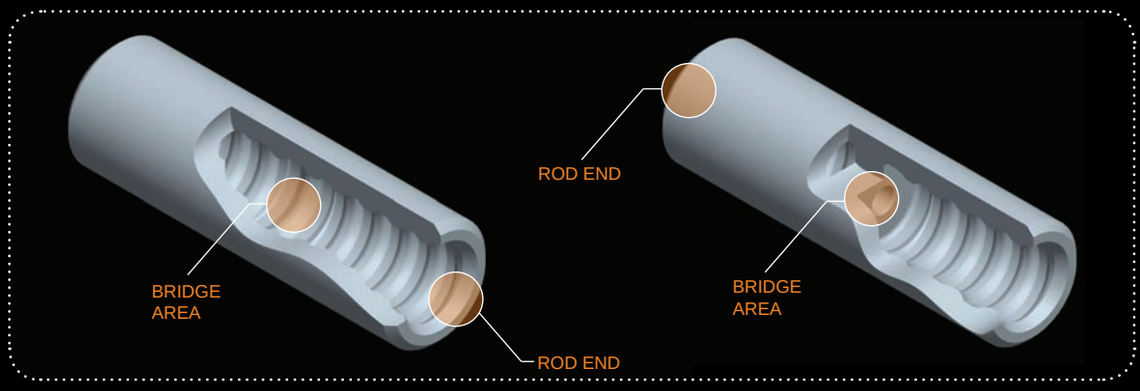


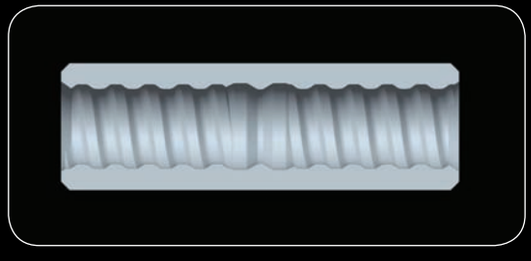
BE Thread

- Thread is a shoulder drive system (available in bottom drive as well). The shoulders on the pin and box butt together to transmit the energy
- Excellent wear properties and good coupling qualities
- This thread is used in extension tube drilling with multiple tube steels
- Compatible with high torque top hammer rockdrills for surface and underground applications

COUPLINGS

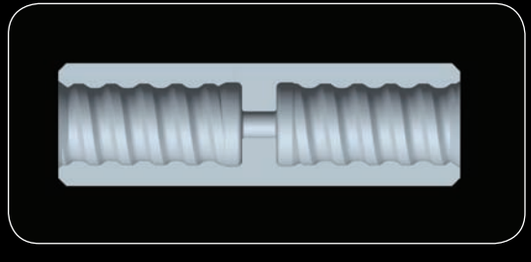
Coupling Components





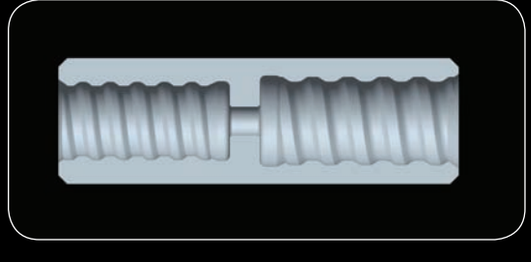
Semi-Bridge Coupling

- Small non-threaded bridge in the center
- Steel cannot thread past bridge area
- Smaller diameter steel end portions fit together in the centre bridge area of the coupling
- Semi-bridged couplings are most suited to high torque machines
- Most rope and HM threaded couplings are semi-bridged



Full-Bridge Coupling

- Eliminates the potential for the coupling to creep along the threaded joints
- Typically used in surface applications
- Better uncoupling characteristics and tend to maintain tighter joints
- Less chance of jamming
- Best suited to machines equipped with independent rotation (ie., S36IR rockdrill)



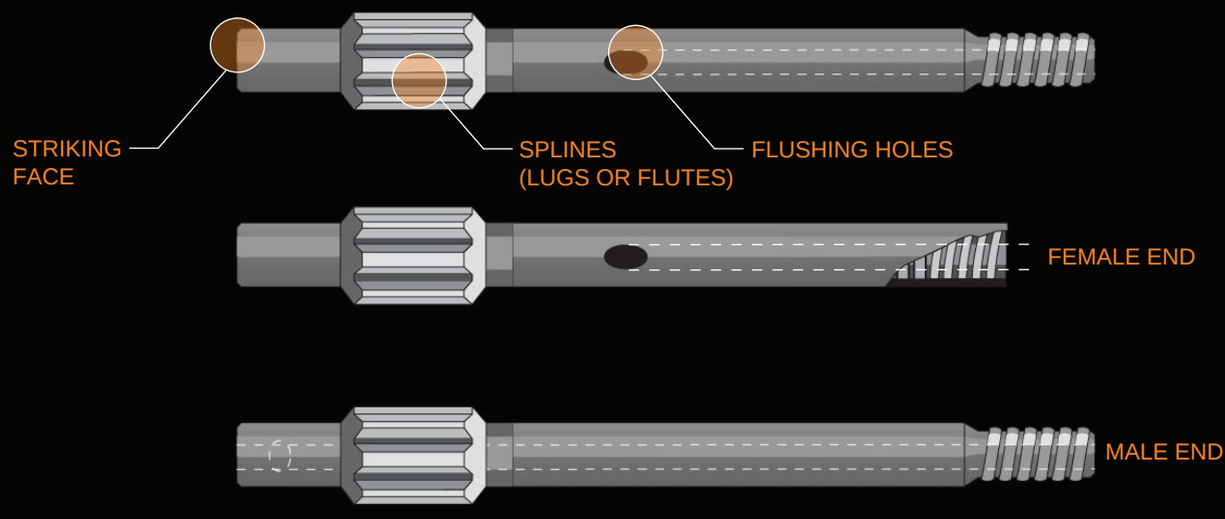
Adapter Coupling

- Used when changing from one thread type, or size, to another and are typically required only in special circumstances

SHANK ADAPTERS

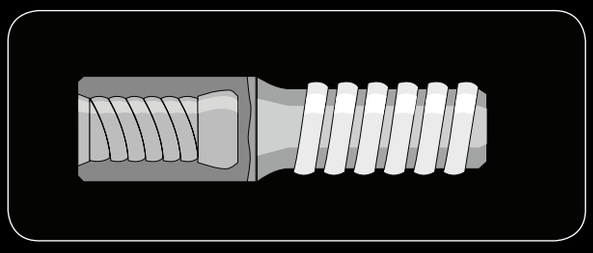
Shank Components

Hydraulic and Pneumatic Shanks



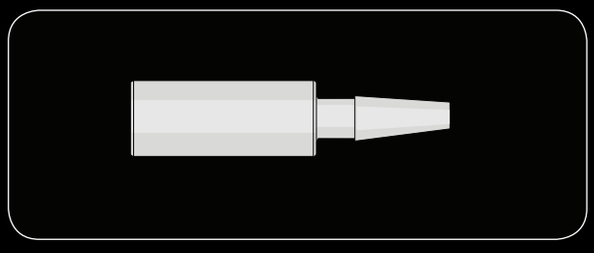
- Male shank adapters are generally better suited for drifting, tunneling & extension applications where high bending stresses are present
- Female shank adapters are used when the drilling space is limited and the total feed length is important (i.e., underground roof bolting)
- Two flushing options: internal or external:
  - Internal flushing uses a water tube that fits through the centre of the drill and into an o-ring seal in the end of the shank, to transfer flushing into the drill string
  - External flushing, holes or a slot are required in the side of the shank adapter. These line up between seals inside the front head or water box of the rockdrill when the shank is installed. Flushing medium is supplied directly to this device and is introduced into the drill string through the shank
  - External flushing is considered superior to internal flushing, as greater volumes of flushing agent can be delivered with less risk of leakage and hammer damage from water
- The shanks for hydraulic drills and some pneumatic drills have external or front head flushing. Hydraulic shanks generally have at least 5 to 14-spline configuration
- Pneumatic shanks tend to have internal or through flushing and can generally be identified by their lugs or 4-spline configuration

ACCESSORIES



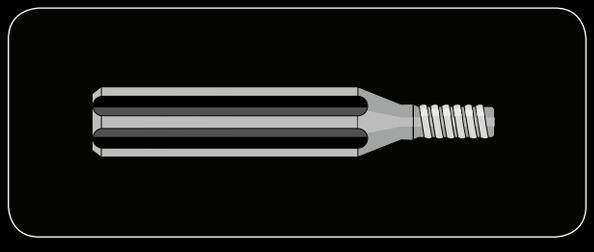
Bit Adapter

- Conversion from thread to thread



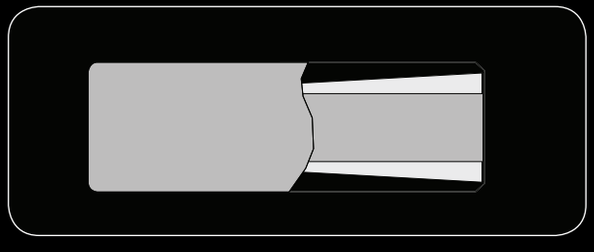
Gauge Taper

- Tapered tool for checking dimensions



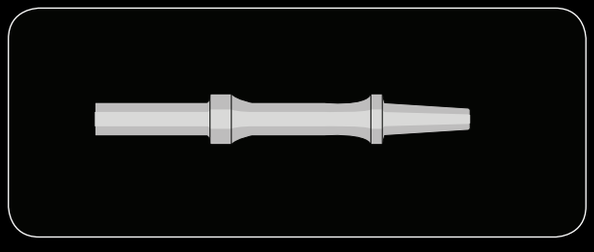
Guide Adapter

- Stabilize drill string
- Helps reduce hole deviation



Bell Tap

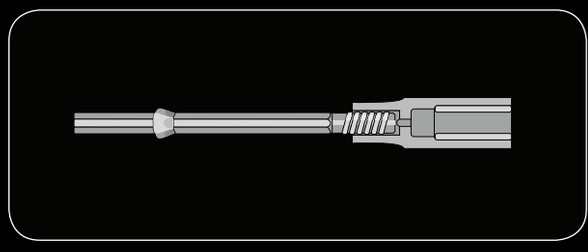
- Tool for retrieval of rods
- Fits over OD of rod



Driver Dolly

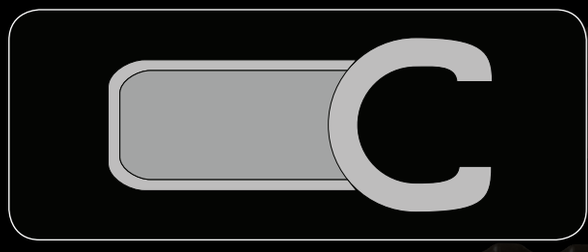
- Used for roof bolting applications

ACCESSORIES



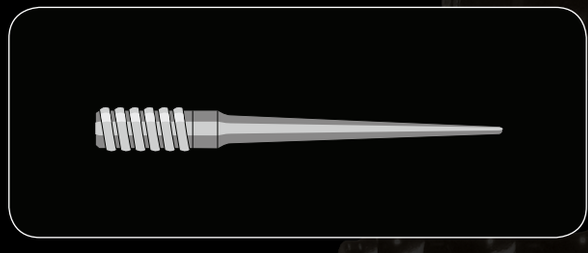
Cheater Dolly Assembly

- Mainly used for roof bolting applications
- Provides extra reach



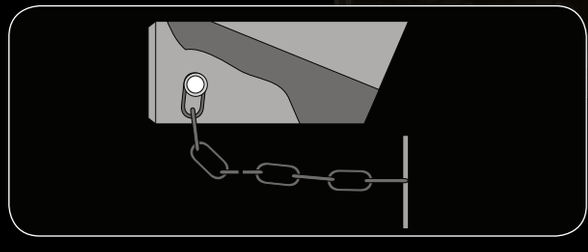
Thread Wear Gauge

- Tool to measure the gauge wear of the thread



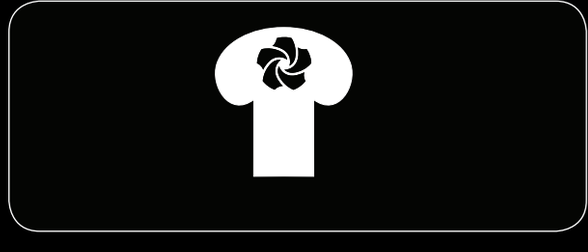
Spear

- Tool used for rod retrieval



Knock Off Block

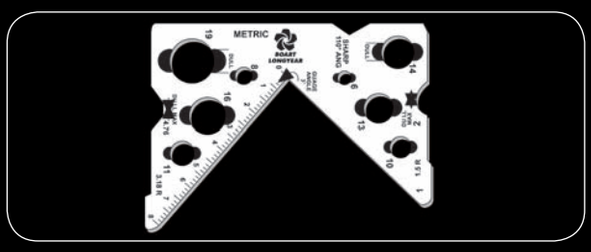
- Quick bit removal for collar and taper applications



Gauge H22 Chuck

- Chuck wear tool

ACCESSORIES OVERVIEW



Bit Gauge

- **Tool to measure the gauge wear of the bit**

THIS PAGE LEFT INTENTIONALLY BLANK

DRILLING GUIDELINES

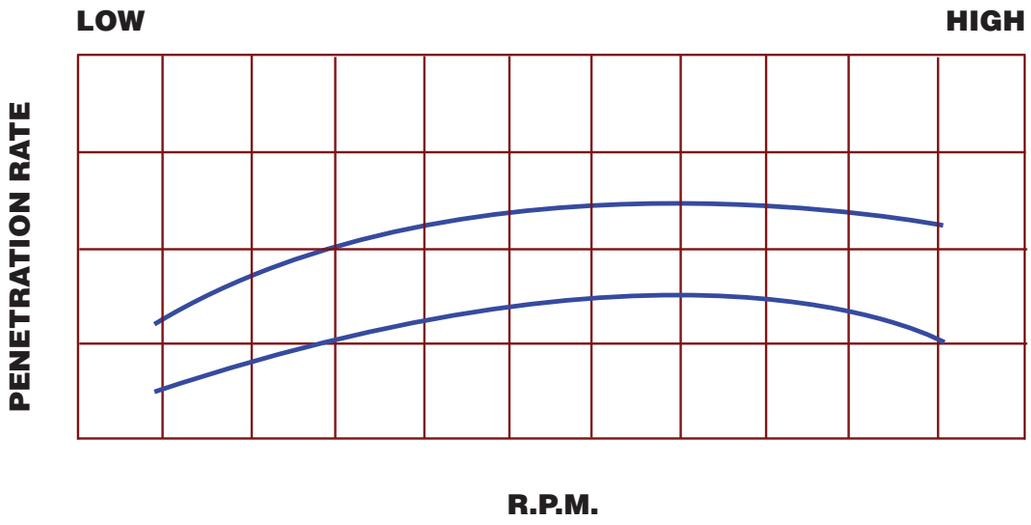
DRILLING GUIDELINES

Rotation Speed

The bit rotation must be tuned for the rock conditions to ensure that the bit inserts are indexed to excavate the entire hole bottom effectively with the minimum number of percussive blows.

The ability to control rotation is governed by the type of drill employed:

- Most pneumatic drills have a rotation mechanism built right into the drill via a rifle bar and ratchet ring. With this style, the rotation is directly linked to the impact mechanism. Therefore, the more blows produced, the faster the rotation.
- For all hydraulic rockdrills and some pneumatic rockdrills, the rotation is independent of the percussive mechanism (for example: the Boart Longyear® S36 IR rockdrill). Rotation is provided via an independent rotation motor which powers the drill chuck.
- Ideally, contact is never made on the same point from blow to blow. In order for this to occur, the speed of rotation of the contact point must be tuned to the ground conditions. The chart below shows a relationship between penetration rate and rotation speed for two different feed pressure settings..
- Excessive rpm increases the rate of bit gauge wear because it requires more revolutions and more rubbing for the distance advanced. Wear on the bit circumference or gauge is caused by rubbing against the hole wall during drilling.
- Inadequate rotation, characterized by jerky and erratic rotation, will lead to excessive body wear at the bit face and uneven wear around the inserts.



DRILLING GUIDELINES

Rotation Speed

The table below may be used as a starting point for establishing bit rotation speed. Generally, the larger the bit used and the harder the rock composition, the slower the rotation required. For blade bits, the normal rotation speed engaged varies between 80 and 160 rpms. Different ground conditions may require different rpm settings. Continue “fine-tuning” the rpm until maximum performance and service life are achieved.

BIT SIZE	BUTTON SIZE	BLOWS PER MINUTE	SUGGESTED RPM
35 mm (1-3/8”)	9	3000	260
38 mm (1-1/2”)	8	3000	220
41 mm (1-5/8”)	8	3000	220
45 mm (1-3/4”)	10	3000	220
48 mm (1-7/8”)	10	3000	210
51 mm (2.0”)	11	3000	200
51 mm (2.0”)	12	3000	200
54 mm (2-1/8”)	12	3000	205
57 mm (2-1/4”)	11	3000	190
57 mm (2-1/4”)	12	3000	190
64 mm (2-1/2”)	11	3000	180
64 mm (2-1/2”)	12	3000	180
70 mm (2-3/4”)	11	3000	160
70 mm (2-3/4”)	12	3000	130
76 mm (3.0”)	11	3000	120
76 mm (3.0”)	12	3000	120
76 mm (3.0”)	13	3000	120
89 mm (3-1/2”)	13	3000	115
102 mm (4.0”)	14	3000	95
102 mm (4.0”)	14	3000	95
115 mm (4-1/2”)	13	3000	80
115 mm (4-1/2”)	14	3000	80
115 mm (4-1/2”)	16	3000	80
127 mm (5.0”)	14	3000	65
127 mm (5.0”)	16	3000	60

(Based on operation of Boart Longyear’s S36 IR rockdrill)

DRILLING GUIDELINES

Feed Pressure

The feed pressure must be tuned to the rock condition to ensure that the bit is firmly seated and in constant contact with the hole bottom. Feed pressure is one of the most important controls that influence not only penetration rate but bit life, and the service life of all other associated components (i.e., drill steel, couplings, etc.)

Dynamics of Feed Pressure

Zone 'A' indicates low feed pressure

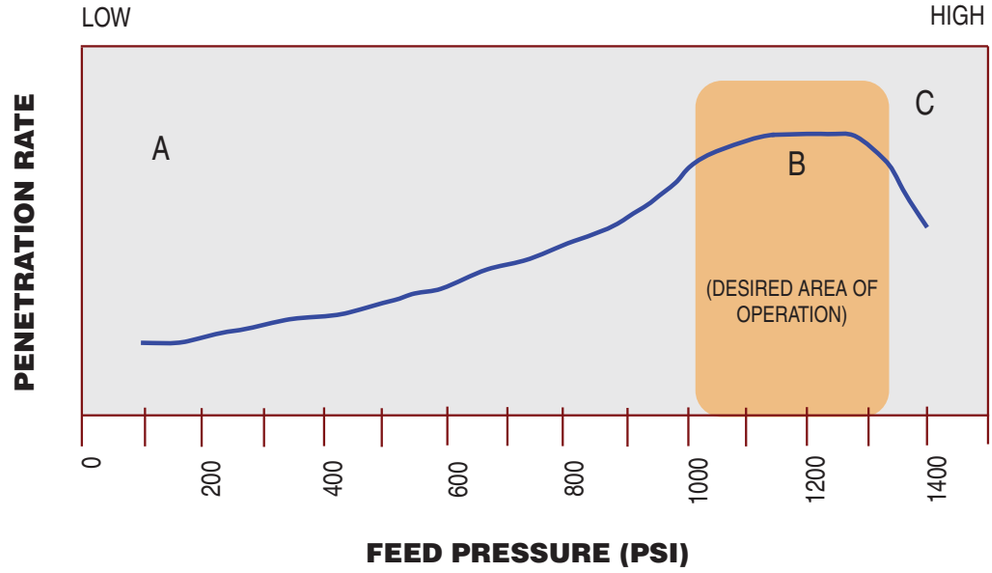
- The bit is not tight to the rock and will cause excessive bouncing and vibration due to the un-utilized energy being reflected back up the drill string.
- A loose joint will suffer excessive friction between the thread mating surfaces and will result in reduced penetration rates, high heat generation in all components of the string, rapid thread wear, galling, metal fatigue and buttons that may loosen and "pop-out".
- The high heat will turn the drill string component blue in color.

Zone 'B' is the desired area of operation

- The operating system and products have been matched to the application and rock conditions.
- Smooth drilling is experienced, resulting in minimum stress on the drill string components.

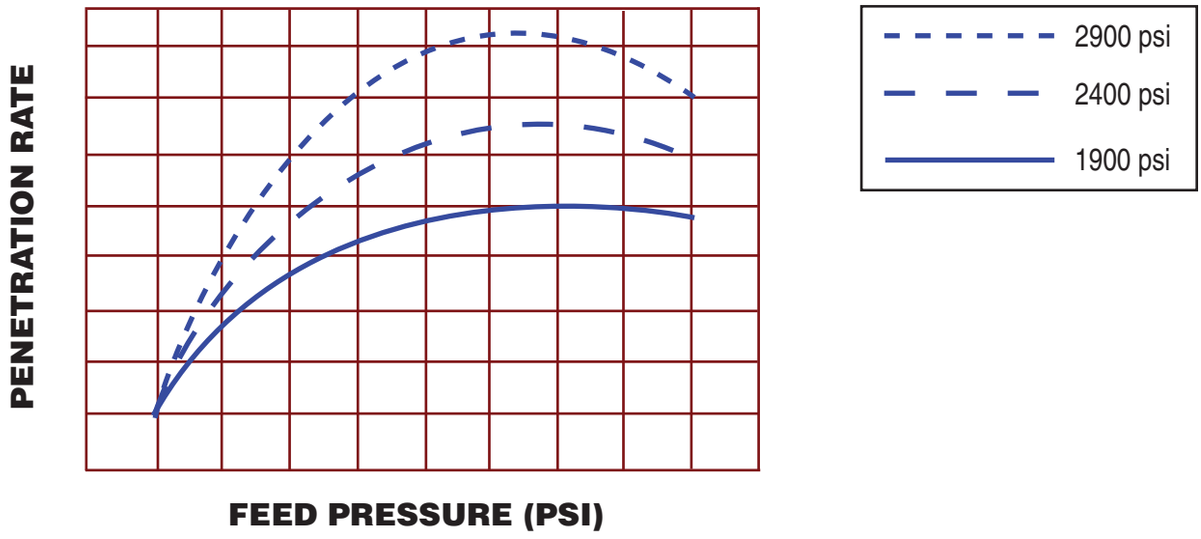
Zone 'C' is the region of excessive feed pressure

- Jerky (irregular) rotation and bending of the drill steel may be noticeable.
- The risk of jamming the drill string in the hole and drill steel breakage increases dramatically with excessive feed pressure.



Hammer Pressure (Percussion)

Maximum hammer pressure is limited to the manufacturers recommendations, ground conditions, application and the drill string being used. When the hammer pressure is increased from a low level, the penetration rate increases incrementally, to a point where further increases in the hammer pressure will not increase the penetration rate.
Any excessive energy produced can not be utilized by the drill string and therefore becomes destructive. Normally, the hammer pressure is set below this point because the excess energy is purely destructive to the drill string and machine components.
In recent years, more powerful rockdrills have been developed (ie. Boart Longyear S36 IR rockdrill). Subsequently, when the drill is operating at these parameters, over one and one-half million foot lbs or two million Joules of energy are being delivered through the drill string every minute. Given the tremendous amount of energy contained within the drilling system it is imperative that proper drilling practices are followed.



DRILLING GUIDELINES

Flushing Volume

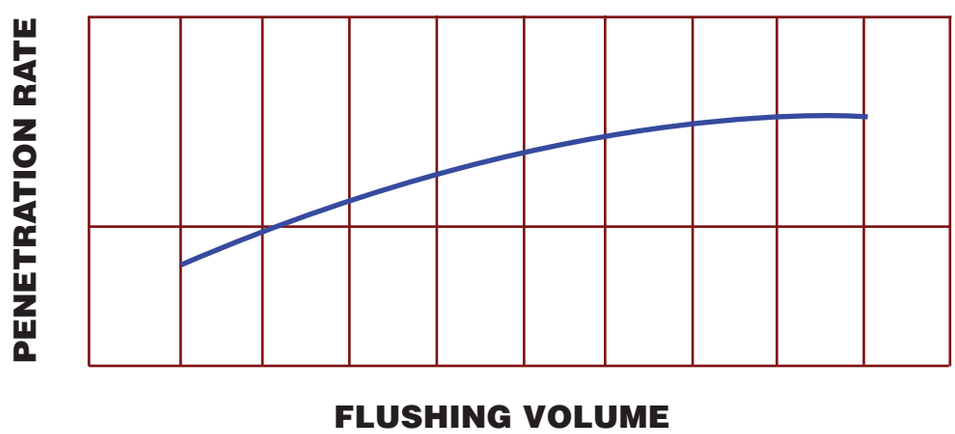
The primary function of flushing is to evacuate the cuttings from the hole. The potential hole depth and hole diameter combination is partially governed by the ability to evacuate the rock chips out of the drill hole. Without adequate flushing the drill string will jam as the rock chips build up around it in the hole. The flushing of rock chips clears the hole bottom, enabling the bit to impact virgin material.

The rock chips that are produced during drilling are carried by the flushing medium from the bit face up through the annulus available between the hole wall and the drill string.

Air and water are the most common flushing agents used

- Underground and in other confined spaces water flushing is mandated.
- Surface drilling dry air flushing is considered to be superior and may prolong equipment life in certain circumstances.
- Drilling deep or large diameter holes, foaming agents are sometimes employed. These agents generate a foam that suspends the rock chips and assists in carrying them out of the hole.

The maximum volume of flushing agent that can be delivered to the bit face, is governed by the flushing hole diameter in the hollow drill steel. To achieve maximum penetration rates and bit life, it is essential to have adequate water or air flushing velocity to accelerate the broken rock from the bit face and out of the hole. This will prevent recrushing of the rock at the bit face, jamming of the drill string and optimize penetration rates.



Flushing Volume

The data in these tables, for reference only, is highly variable depending on the drilling conditions and the mass of the rock being drilled.

WATER FLUSHING VOLUME		MINIMUM REQUIRED LPM (GPM)	BEST LPM (GPM)
BIT SIZE mm (in)	ROD SIZE mm (in)		
38 (1-1/2)	29 (1-1/8)	14.02 (3.70)	28.42 (7.51)
45 (1-3/4)	32 (1-1/4)	23.27 (6.14)	47.17 (12.47)
45 (1-3/4)	35 (1-3/8)	18.60 (4.91)	37.70 (9.97)
48 (1-7/8)	38 (1-1/2)	19.99 (5.28)	40.53 (10.71)
51 (2.0)	38 (1-1/2)	26.90 (7.10)	54.52 (14.41)
51 (2.0)	45 (1-3/4)	13.39 (3.53)	27.14 (7.18)
54 (2-1/8)	38 (1-1/2)	34.22 (9.03)	69.37 (18.34)
54 (2-1/8)	45 (1-3/4)	20.71 (5.47)	41.99 (11.10)
57 (2 1/4)	38 (1-1/2)	41.96 (11.07)	85.06 (22.49)
57 (2-1/4)	45 (1-3/4)	28.46 (7.51)	57.68 (15.25)
64 (2-1/2)	45 (1-3/4)	48.15 (12.70)	97.59 (25.80)
70 (2-3/4)	45 (1-3/4)	66.84 (17.64)	135.48 (35.82)
76 (3.0)	51 (2.0)	73.81 (19.48)	149.62 (39.55)
89 (3-1/2)	38 (1-1/2)	150.58 (39.73)	305.22 (80.69)
102 (4.0)	45 (1-3/4)	194.79 (51.40)	394.85 (104.39)
115 (4-1/2)	45 (1-3/4)	260.38 (68.70)	527.79 (139.53)
127 (5.0)	45 (1-3/4)	327.89 (86.52)	664.64 (175.71)
140 (5-1/2)	51 (2.0)	395.19 (104.28)	801.06 (211.78)
152 (6.0)	51 (2.0)	476.65 (125.77)	966.18 (255.43)

AIR FLUSHING VOLUME		MINIMUM REQUIRED m^3/min (CFM)	BEST m^3/min (CFM)
BIT SIZE mm (in)	ROD SIZE mm (in)		
51 (2.0)	29 (1-1/8)	1.26 (44.64)	2.95 (104.15)
57 (2-1/4)	32 (1-1/4)	1.60 (56.43)	3.73 (131.67)
57 (2-1/4)	35 (1-3/8)	1.45 (51.33)	3.39 (119.77)
64 (2-1/2)	38 (1-1/2)	1.90 (67.26)	4.44 (156.94)
70 (2-3/4)	38 (1-1/2)	2.48 (87.65)	5.79 (204.51)
73 (2-7/8)	45 (1-3/4)	2.37 (83.79)	5.54 (195.52)
79 (3-1/8)	38 (1-1/2)	3.45 (121.66)	8.04 (283.87)
83 (3-1/4)	45 (1-3/4)	3.49 (123.36)	8.15 (287.83)
76 (3.0)	38 (1-1/2)	3.11 (109.87)	7.26 (256.35)
98 (3-7/8)	45 (1-3/4)	5.44 (192.21)	12.70 (448.50)
102 (4.0)	45 (1-3/4)	6.02 (212.50)	14.04 (495.84)
111 (4-3/8)	45 (1-3/4)	7.39 (261.12)	17.26 (609.28)
115 (4-1/2)	51 (2.0)	7.63 (269.44)	17.81 (628.69)
115 (4-1/2)	70 (2-3/4)	5.98 (211.13)	13.95 (492.64)
127 (5.0)	45 (1-3/4)	10.13 (357.70)	23.64 (834.63)
127 (5.0)	70 (2-3/4)	8.06 (284.78)	18.82 (664.49)
130 (5-1/8)	51 (2.0)	10.27 (362.64)	23.97 (846.17)
133 (5-1/4)	51 (2.0)	10.84 (382.65)	25.29 (892.86)
140 (5-1/2)	45 (1-3/4)	12.62 (445.73)	29.46 (1040.27)
140 (5-1/2)	70 (2-3/4)	10.56 (372.81)	24.64 (869.90)
143 (5-5/8)	45 (1-3/4)	13.23 (467.26)	30.88 (1090.27)
146 (5-3/4)	51 (2.0)	13.44 (474.64)	31.37 (1107.49)
152 (6.0)	64 (2-1/8)	13.65 (482.07)	31.86 (1124.83)
152 (6.0)	70 (2-3/4)	13.07 (461.68)	30.51(1077.25)

DRILLING GUIDELINES

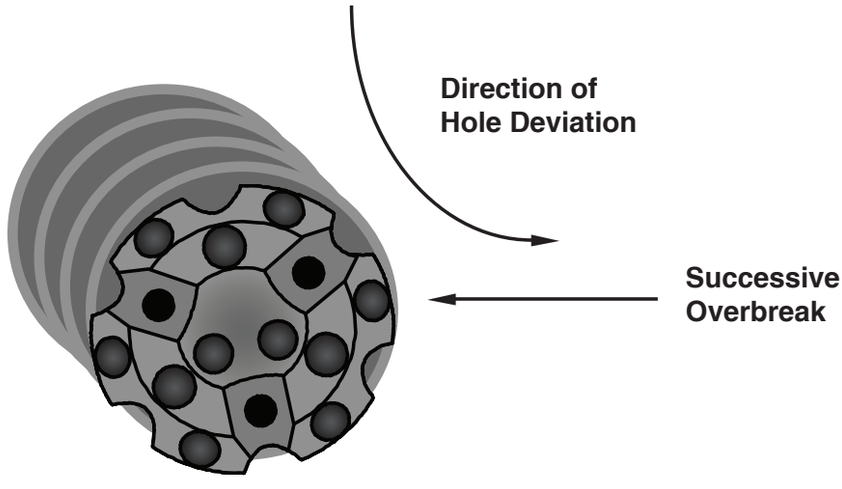
Hole Deviation

How it happens:
- Improper set up
- Misalignment problems
- Collaring errors
- Excessive feed pressures
- Geological conditions

With top hammer drilling, the control of the drill bit direction during drilling is limited. Drilling accessories such as retrac bits and guide devices can be employed to control deviation to some extent. To visualize how hole deviation occurs, some fundamental influencing factors need to be noted.

1. Radial crushing occurs with each successive hammer blow at every gauge carbide contact point on the hole bottom. Rotation continuously indexes the carbide to cover the entire circumference and thus a hole diameter larger than the bit is produced. This is necessary to prevent jamming the bit in the hole.

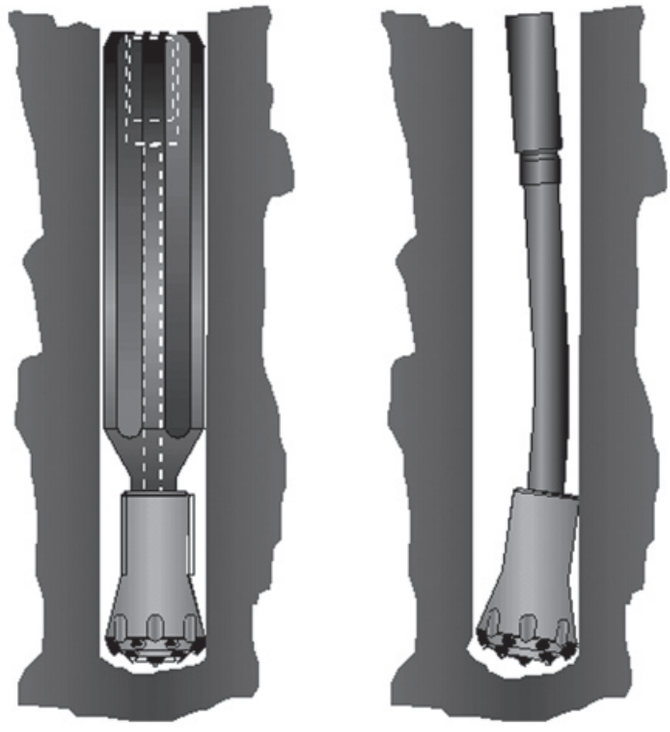
2. If a bit would rotate on a central axis the direction of advance would not change. More frequently, with normal rotation the bit gears itself against the hole wall. If continuously forced towards the same side of the hole wall, gouging and overbreak will consistently occur in that direction. If a blast hole diverges one degree from its intended direction, the actual toe burden on an 18 metre (60') hole is forty seven percent greater than the designed value.



Hole Deviation

Horizontal Holes
On long horizontal holes the sagging in the centre of the string tends to point the bit upward. As well, the downward force of the drill string weight causes the bit to pivot on the lower carbide during rotation. With counter clockwise rotation, used in percussive drilling, the bit is continuously forced to the left side of the hole. Deviation tends to be to the left and up. This phenomenon has less impact as holes approach vertical either in up or down hole drilling.
Counter Measure: placing stabilizers behind the bit and every 2 to 3 drill steel intervals.

Overfeeding
Similar to horizontal holes, when excessive feed pressure is applied the string yields and bends, thus the bit is tilted off centre.
Counter Measure: using no more feed pressure than needed to keep the drill string tight against the rock face. Using guide adapters behind the bit and at every 4 or 5 drill steel intervals.



On holes 10 m and longer, bit direction may be influenced by drill feed stability, feed pressures, bit action, steel flexibility and threaded joint integrity as well as by the improper set up factors that contribute to deviation. In this scenario the downward force of the drill string weight and feed pressure causes the bit to pivot on the gauge carbide during rotation. This continuously forces the bit to one side of the hole, and deviation results.
Counter Measure: Use guide devices close behind the bit or using straight hole drilling systems such as Boart Longyear's LASEROD® Straight Hole Drilling system, Tube Drilling systems or Down the Hole drilling systems

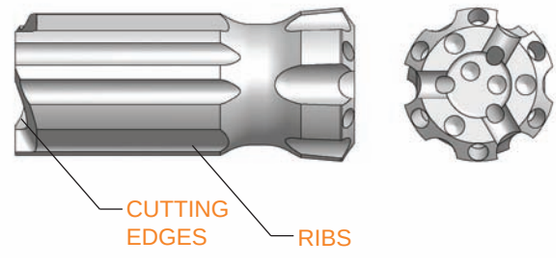
Ground Conditions
Some rock structures tend to fracture more on the horizontal than on the vertical plane. This would aggravate the deviation tendency. Also, with successive layers of hard and soft material, the tendency is for the bit to turn into the layers when the intersecting angle is large. At a sharp angle the bit may tend to follow the bands.
Counter Measure: Maintain optimum feed pressure and use guide devices directly following the bit and at suitable intervals on the string.

DRILLING GUIDELINES

Hole Deviation

Controlling Deviation – Product Selection

No hard evidence has been recorded that would support claims of straighter holes with any particular bit face design. However it is widely accepted that blade bits tend to deviate less than button bits. This is a reasonable expectation because blade bits have longer shoulders and tend to produce less clearance on the gauge than button bits. Both of these features limit the gearing effect previously described and minimize deviation.



Also, sharp bits are generally believed to deviate less than dull bits. Again, this is a reasonable expectation. A retrac bit designed with a long skirt body can be employed as well as guide adapters depending on the drilling conditions. The general rule of thumb is to select the largest cross section of drill steel practical, for the hole being drilled. Hex steel may be a worthy consideration because it is more resistant to bending stress than round steel.

Seventy-five percent of deviation problems result from poor drilling practices. Therefore, an evaluation of drilling habits to locate potential problems is recommended.

Recommended drilling practices include:

- Setting up accurately and on line. Laser line-up tools can improve set up accuracy.
- Use reliable and accurate angle finding instruments and setup at the proper angles.
- Collar carefully and check angles again once the bit is seated in solid rock and adjust if required.
- Drill two to three feet then check angle again and adjust if required
- If deviation persists place a guide adapter directly behind the bit when starting the holes. The outside diameter of the guide adapter should be 2 mm to 4 mm smaller than the bit diameter. Add guide adapters after every 2 to 3 drill steel intervals.

HANDHELD DRILLING

4.46° SYSTEM PART NUMBERS

BITS, BUTTON PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
050176	BIT BTN PO 033 22x4*46 BF5/2 C	33	1 19/64"	4.46	Flat	5 x 7	2 x 7	2F 2G	Conical	0.30	0.66
050013	BIT BTN PO 036 22x4*46 BF4/2 H	36	1 13/32"	4.46	Flat	4 x 8	2 x 7	1F 1G	Hemispherical	0.39	0.86
050034	BIT BTN PO 036 22x4*46 BF5/2 P	36	1 13/32"	4.46	Flat	5 x 8	2 x 8	1F 1G	Parabolic	0.39	0.86
050028	BIT BTN PO 041 22x4*46 BF4/2 H	41	1 5/8"	4.46	Flat	4 x 8	2 x 8	1F 1G	Hemispherical	0.43	0.95
050180	BIT BTN PO 043 22x4*46 BF6/2 C	43	1 11/16"	4.46	Flat	6 x 8	2 x 8	2F 1G	Conical	0.40	0.88

PACKAGE SPECIFICATIONS

Package includes 10 bits.

RODS, COLLARED TAPERED 22 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			METRIC (kg)	IMPERIAL (lb)
250144	ROD CLR TPR 0500 22H 108X4*46	500	1' - 7 11/16"	4.46	22H	1.88	4.14
250228	ROD CLR TPR 0800 22H 108X4*46	800	2' - 7 1/2"	4.46	22H	2.87	6.33
250147	ROD CLR TPR 2000 22H 108X4*46	2000	6' - 6 3/4"	4.46	22H	6.45	14.22
250150	ROD CLR TPR 3000 22H 108X4*46	3000	9' - 10 1/8"	4.46	22H	9.45	20.83
250463	ROD CLR TPR 4000 22H 108X4*46	4000	13' - 1 1/2"	4.46	22H	12.60	27.78

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

BITS, BUTTON PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
050199	BIT BTN PO 032 22X6° BF4/1 P	32	1 1/4"	6	Flat	4 x 8	1 x 7	1F 1G	Parabolic	0.40	0.88
050147	BIT BTN PO 034 22X6° BF4/1 P	34	1 21/64"	6	Flat	4 x 8	1 x 7	1F 1G	Parabolic	0.25	0.55
050148	BIT BTN PO 036 22X6° BF4/2 P	36	1 13/32"	6	Flat	4 x 8	2 x 8	1F 1G	Parabolic	0.40	0.88
050149	BIT BTN PO 038 22X6° BF4/2 CP	38	1 1/2"	6	Flat	4 x 9 C	2 x 8 P	1F 1G	Con/Para	0.35	0.77
050150	BIT BTN PO 040 22X6° BF4/2 CP	40	1 9/16"	6	Flat	4 x 9 C	2 x 8 P	1F 1G	Con/Para	0.40	0.88

PACKAGE SPECIFICATIONS

Package includes 10 bits.

6.5° SYSTEM PART NUMBERS

RODS, REAMING 22 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			METRIC (kg)	IMPERIAL (lb)
260001	ROD CLR RMG 0610 22H 108X6.5*	610	2'	6.5	22H	2.19	4.83
260002	ROD CLR RMG 1220 22H 108X6.5*	1220	4'	6.5	22H	4.17	9.19
260003	ROD CLR RMG 1830 22H 108X6.5*	1830	6'	6.5	22H	6.26	13.80
260021	ROD CLR RMG 2000 22H 108X6.5*	2000	6' - 6 ¾"	6.5	22H	6.49	14.31
260004	ROD CLR RMG 2440 22H 108X6.5*	2440	8'	6.5	22H	8.35	18.41

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

7° SYSTEM PART NUMBERS

BITS, BUTTON PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
050153	BIT BTN PO 032 22X7* BF5/2 P	32	1 1/4"	7	Flat	5 x 7	2 x 7	1F 1G	Parabolic	0.25	0.55
050069	BIT BTN PO 033 22X7* BF5/2 P	33	1 19/64"	7	Flat	5 x 7	2 x 7	1F 1G	Parabolic	0.30	0.66
050155	BIT BTN PO 034 22X7* BF5/2 P	34	1 21/64"	7	Flat	5 x 7	2 x 7	1F 1G	Parabolic	0.30	0.66
050240	BIT BTN PO 035 22X7* BD6/3 P	35	1 3/8"	7	Dome	6 x 8	2 x 7	2F	Parabolic	0.32	0.71
050079	BIT BTN PO 035 22X7* BF4/2 H	35	1 3/8"	7	Flat	4 x 7	2 x 7	1F 1G	Hemispherical	0.30	0.66

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, BLADE PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	GAUGE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)					METRIC (kg)	IMPERIAL (lb)
030040	BIT BLD PO 032 22X7* CRS G10	32	1 1/4"	7	11 x 8	1F 2G	Tent	0.30	0.66
030072	BIT BLD PO 033 22X7* CRS G10	33	1 19/64"	7	12 x 8	1F 2G	Tent	0.32	0.71
030041	BIT BLD PO 035 22X7* CRS G10	35	1 3/8"	7	13 x 8	1F 2G	Tent	0.32	0.71
030043	BIT BLD PO 038 22X7* CRS G10	38	1 1/2"	7	14 x 8	1F 2G	Tent	0.36	0.79
030084	BIT BLD PO 041 22X7* MUD H8	41	1 5/8"	7	15 x 8	2G	Tent	0.45	1.00
030085	BIT BLD PO 045 22X7* MUD G10	45	1 3/4"	7	17 x 8	2G	Tent	0.47	1.04

PACKAGE SPECIFICATIONS

Package includes 10 bits.

RODS, 22 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
250368	ROD CLR TPR 0600 22H 108X7*	600	1' - 11 5/8"	7	22H	2.16	4.76
250369	ROD CLR TPR 1220 22H 108X7*	1220	4'	7	22H	4.07	8.97
250373	ROD CLR TPR 1830 22H 108X7*	1830	6'	7	22H	5.90	13.01
250623	ROD CLR TPR 2400 22H 108X7*	2400	8'	7	22H	7.65	16.87
250158	ROD CLR TPR 2800 22H 108X7*	2800	9' - 2 1/4"	7	22H	8.94	19.71
250465	ROD CLR TPR 3050 22H 108X7*	3050	10'	7	22H	9.70	21.38
250544	ROD CLR TPR 3660 22H 108X7*	3660	12'	7	22H	11.43	25.20
250537	ROD CLR TPR 4270 22H 108X7*	4270	14'	7	22H	13.40	29.54
250543	ROD CLR TPR 5480 22H 108X7*	5480	17' - 11 3/4"	7	22H	17.20	37.92
250539	ROD CLR TPR 6400 22H 108X7*	6400	21'	7	22H	19.92	43.92
250540	ROD CLR TPR 7320 22H 108X7*	7320	24'	7	22H	22.73	50.11
250541	ROD CLR TPR 7920 22H 108X7*	7920	25' - 11 13/16"	7	22H	24.56	54.15

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

7° SYSTEM PART NUMBERS

BITS, BUTTON PUSH-ON 25 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
050137	BIT BTN PO 041 25X7° BF3/2 CP	41	1 5/8"	7	Flat	3 x 9	2 x 8	IF IG	Con/Para	0.41	0.90
050179	BIT BTN PO 041 25X7° BF4/2 C	41	1 5/8"	7	Flat	4 x 9	2 x 9	2F 1G	Conical	0.45	1.00

PACKAGE SPECIFICATIONS

Package includes 10 bits.

RODS, 25 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			METRIC (kg)	IMPERIAL (lb)
250456	ROD CLR TPR 1830 25H 108X7°	1830	6'	7	25H	7.65	16.87

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

11° SYSTEM PART NUMBERS

BITS, BUTTON PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
050114	BIT BTN PO 032 22X11* BF3/2 C	32	1 1/4"	11	Flat	3 x 8	2 x 7	1F 2G	Conical	0.19	0.42
050116	BIT BTN PO 032 22X11* BF4/1 PH	32	1 1/4"	11	Flat	4 x 8 P	1 x 7 H	1F 1G	Para/Hemi	0.20	0.44
050141	BIT BTN PO 032 22X11* BF5/2 P	32	1 1/4"	11	Flat	5 x 7	2 x 7	1F 1G	Parabolic	0.21	0.46
050118	BIT BTN PO 034 22X11* BF3/2 C	34	1 21/64"	11	Flat	3 x 8	2 x 7	1F 2G	Conical	0.19	0.42
050172	BIT BTN PO 034 22X11* BF4/2 C	34	1 21/64"	11	Flat	4 x 7	2 x 7	2F 1G	Conical	0.22	0.49
050182	BIT BTN PO 034 22X11* BF4/2 C	34	1 21/64"	11	Flat	4 x 7	2 x 7	2F 1G	Conical	0.22	0.49
050215	BIT BTN PO 034 22X11* BF4/2 C	34	1 21/64"	11	Flat	4 x 7	2 x 7	2F 1G	Conical	0.22	0.49
050202	BIT BTN PO 035 22X11* BF5/2 P	35	1 3/8"	11	Flat	5 x 9	2 x 7	1F 1G	Parabolic	0.24	0.53
050238	BIT BTN PO 035 22X11* BF6/2 P	35	1 3/8"	11	Flat	6 x 8	2 x 7	2F	Parabolic	0.29	0.64
050121	BIT BTN PO 036 22X11* BF3/2 C	36	1 13/32"	11	Flat	3 x 9	2 x 7	1F 1G	Conical	0.20	0.44
050122	BIT BTN PO 036 22X11* BF5/2 C	36	1 13/32"	11	Flat	5 x 8	2 x 7	2F 1G	Conical	0.25	0.55
050173	BIT BTN PO 036 22X11* BF5/2 C	36	1 13/32"	11	Flat	5 x 8	2 x 7	2F 1G	Conical	0.25	0.55
050237	BIT BTN PO 036 22X11* BF4/2 C	36	1 13/32"	11	Flat	4 x 9	2 x 8	2F 1G	Conical	0.25	0.55
050200	BIT BTN PO 038 22X11* BF5/2 C	38	1 1/2"	11	Flat	5 x 9	2 x 7	2F 1G	Conical	0.35	0.77
050125	BIT BTN PO 038 22X11* BF3/2 C	38	1 1/2"	11	Flat	3 x 9	2 x 8	1F 1G	Conical	0.25	0.77
050145	BIT BTN PO 038 22X11* BF5/2 C	38	1 1/2"	11	Flat	5 x 9	2 x 7	2F 1G	Conical	0.28	0.62
050220	BIT BTN PO 040 22X11* BF5/2 C	40	1 9/16"	11	Flat	5 x 9	2 x 8	2F 2G	Conical	0.28	0.62
050133	BIT BTN PO 041 22X11* BF3/2 C	41	1 5/8"	11	Flat	3 x 9	2 x 9	1F 1G	Conical	0.26	0.57
050175	BIT BTN PO 041 22X11* BF5/2 C	41	1 5/8"	11	Flat	5 x 9	2 x 8	2F 1G	Conical	0.30	0.66
050146	BIT BTN PO 041 22X11* BF5/2 P	41	1 5/8"	11	Flat	5 x 9	2 x 8	2F 1G	Parabolic	0.33	0.73
050222	BIT BTN PO 048 22X11* BF3/2 C	48	1 7/8"	11	Flat	3 x 9	2 x 9	1F 2G	Conical	0.30	0.66

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, BLADE PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	GAUGE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)					METRIC (kg)	IMPERIAL (lb)
030066	BIT BLD PO 035 22X11* TWA G10	35	1 3/8"	11	12 x 8	4G	Tent	0.19	0.42
030099	BIT BLD PO 038 22X11* TWA H9	38	1 1/2"	11	14 x 8	1F 4G	Tent	0.22	0.49
040038	BIT CSL PO 040 22X11* G10	40	1 9/16"	11	40 x 10	1G	Chisel	0.40	0.88

PACKAGE SPECIFICATIONS

Package includes 10 bits.

11° SYSTEM PART NUMBERS

RODS, 22 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			METRIC (kg)	IMPERIAL (lb)
250183	ROD CLR TPR 0610 22H 108X11*	610	2'	11	22H	2.26	4.98
250185	ROD CLR TPR 0760 22H 108X11*	760	2' - 5 15/16"	11	22H	2.72	6.00
250472	ROD CLR TPR 0800 22H 108X11*	800	2' - 7 1/2"	11	22H	2.84	6.26
250160	ROD CLR TPR 1220 22H 108X11*	1220	4'	11	22H	4.12	9.08
250188	ROD CLR TPR 1370 22H 108X11*	1370	4' - 5 15/16"	11	22H	4.58	10.10
250474	ROD CLR TPR 1600 22H 108X11*	1600	5' - 3"	11	22H	5.28	11.64
250362	ROD CLR TPR 1630 22H 108X11*	1630	5' - 4 3/16"	11	22H	5.37	11.84
250699	ROD CLR TPR 1676 22H 108X11*	1676	5' - 6"	11	22H	5.51	12.51
250161	ROD CLR TPR 1830 22H 108X11*	1830	6'	11	22H	5.98	13.18
250191	ROD CLR TPR 1980 22H 108X11*	1980	6' - 5 15/16"	11	22H	6.44	14.20
250475	ROD CLR TPR 2400 22H 108X11*	2400	7' - 10 1/2"	11	22H	7.72	17.02
250162	ROD CLR TPR 2440 22H 108X11*	2440	8'	11	22H	7.84	17.28
250196	ROD CLR TPR 2590 22H 108X11*	2590	8' - 6"	11	22H	8.30	18.30
250163	ROD CLR TPR 3050 22H 108X11*	3050	10'	11	22H	9.70	21.38
250198	ROD CLR TPR 3200 22H 108X11*	3200	10' - 6"	11	22H	10.16	22.40
250200	ROD CLR TPR 3660 22H 108X11*	3660	12'	11	22H	11.56	25.49

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

11° SYSTEM PART NUMBERS

RODS, RUBBER COLLAR 22 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			METRIC (kg)	IMPERIAL (lb)
250718	ROD CLR TPR 0600 22H RC159	600	1' - 11 5/8"	11	22H	1.83	4.03
250483	ROD CLR TPR 0800 22H RC159	800	2' - 7 1/2"	11	22H	2.43	5.36
250653	ROD CLR TPR 0840 22H RC159	840	2' - 9 1/16"	11	22H	2.53	5.58
250484	ROD CLR TPR 0900 22H RC159	900	2' - 11 7/16"	11	22H	2.73	6.02
250657	ROD CLR TPR 1140 22H RC159	1140	3' - 8 7/8"	11	22H	3.44	7.58
250485	ROD CLR TPR 1200 22H RC159	1200	3' - 11 1/4"	11	22H	3.64	8.02
250486	ROD CLR TPR 1300 22H RC159	1300	4' - 3 3/16"	11	22H	3.94	8.69
250488	ROD CLR TPR 1400 22H RC159	1400	4' - 6 11/16"	11	22H	4.24	9.35
250659	ROD CLR TPR 1440 22H RC159	1440	4' - 8 11/16"	11	22H	4.34	9.57
250489	ROD CLR TPR 1500 22H RC159	1500	4' - 11 1/16"	11	22H	4.55	10.03
250661	ROD CLR TPR 1740 22H RC159	1740	5' - 8 1/2"	11	22H	5.25	11.57
250491	ROD CLR TPR 1800 22H RC159	1800	5' - 10 7/8"	11	22H	5.45	12.02
250492	ROD CLR TPR 2000 22H RC159	2000	6' - 6 3/4"	11	22H	6.06	11.36
250493	ROD CLR TPR 2200 22H RC159	2200	7' - 2 5/8"	11	22H	6.66	14.68
250494	ROD CLR TPR 2400 22H RC159	2400	7' - 10 1/2"	11	22H	7.26	16.01
250495	ROD CLR TPR 2600 22H RC159	2600	8' - 6 3/8"	11	22H	7.87	17.35
250496	ROD CLR TPR 2800 22H RC159	2800	9' - 2 1/4"	11	22H	8.54	18.83
250497	ROD CLR TPR 3000 22H RC159	3000	9' - 10 1/8"	11	22H	9.08	20.02
250675	ROD CLR TPR 3200 22H RC159	3200	10' - 6"	11	22H	9.68	21.34
250498	ROD CLR TPR 3400 22H RC159	3400	11' - 1 7/8"	11	22H	10.28	22.66
250499	ROD CLR TPR 3800 22H RC159	3800	12' - 5 5/8"	11	22H	11.50	25.35
250679	ROD CLR TPR 4200 22H RC159	4200	13' - 9 3/8"	11	22H	12.70	28.00

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

11° SYSTEM PART NUMBERS

BITS, BUTTON PUSH-ON 25 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
050129	BIT BTN PO 038 25X11* BF5/2 C	38	1 ½"	11	Flat	5 x 9	2 x 7	2F 1G	Conical	0.40	0.88
050221	BIT BTN PO 040 25X11* BF5/2 C	40	1 9/16"	11	Flat	5 x 9	2 x 8	2F 2G	Conical	0.35	0.77
050136	BIT BTN PO 041 25X11* BF5/2 C	41	1 5/8"	11	Flat	5 x 9	2 x 8	2F 1G	Conical	0.41	0.90

PACKAGE SPECIFICATIONS

Package includes 10 bits.

RODS, RUBBER COLLAR 25 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
250531	ROD CLR TPR 0900 25H RC159	900	2' - 11 7/16"	11	25H	3.74	8.25
250500	ROD CLR TPR 1500 25H RC159	1500	4' - 11 1/16"	11	25H	6.07	13.38
250501	ROD CLR TPR 1800 25H RC159	1800	5' - 10 7/8"	11	25H	7.23	15.94
250665	ROD CLR TPR 2000 25H RC159	2000	6' - 6 3/4"	11	25H	8.01	17.66
250502	ROD CLR TPR 2200 25H RC159	2200	7' - 2 5/8"	11	25H	8.79	19.38
250303	ROD CLR TPR 2400 25H RC159	2400	7' - 10 ½"	11	25H	9.56	21.08
250503	ROD CLR TPR 2600 25H RC159	2600	8' - 6 3/8"	11	25H	10.34	22.80
250532	ROD CLR TPR 2800 25H RC159	2800	9' - 2 1/4"	11	25H	11.11	24.49
250673	ROD CLR TPR 3000 25H RC159	3000	9' - 10 1/8"	11	25H	11.89	26.21
250311	ROD CLR TPR 3200 25H RC159	3200	10' - 6"	11	25H	12.67	27.93
250504	ROD CLR TPR 3400 25H RC159	3400	11' - 1 7/8"	11	25H	13.44	29.63
250315	ROD CLR TPR 3600 25H RC159	3600	11' - 9 3/4"	11	25H	14.22	31.35
250505	ROD CLR TPR 3800 25H RC159	3800	12' - 5 5/8"	11	25H	14.99	33.05
250506	ROD CLR TPR 4200 25H RC159	4200	13' - 9 3/8"	11	25H	16.55	36.49

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

12° SYSTEM PART NUMBERS

BITS, BUTTON PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
050081	BIT BTN PO 028 22X12° BF4/1 H	28	1 3/32"	12	Flat	4 x 7	1 x 7	2G	Hemispherical	0.23	0.51
050096	BIT BTN PO 032 22X12° BF5/2 P	32	1 1/4"	12	Flat	5 x 7	2 x 7	2F 1G	Parabolic	0.22	0.49
050181	BIT BTN PO 032 22X12° BF5/2 C	32	1 1/4"	12	Flat	5 x 7	2 x 7	2F 1G	Conical	0.22	0.49
050109	BIT BTN PO 032 22X12° BF6/2 C	32	1 1/4"	12	Flat	6 x 7	2 x 7	2F 1G	Conical	0.31	0.68
050111	BIT BTN PO 032 22X12° BF6/2 C	32	1 1/4"	12	Flat	6 x 7	2 x 7	2F 1G	Conical	0.23	0.51
050177	BIT BTN PO 033 22X12° BF5/2 C	33	1 19/64"	12	Flat	5 x 7	2 x 7	2F 1G	Conical	0.23	0.51
050208	BIT BTN PO 033 22X12° BD6/2 P	33	1 19/64"	12	Flat	6 x 7	2 x 7	1F 1G	Parabolic	0.28	0.62
050159	BIT BTN PO 033 22X12° BF 5/2 C	33	1 19/64"	12	Flat	5 x 7	2 x 7	2F 2G	Conical	0.31	0.68
050067	BIT BTN PO 033 22X12° BF5/2 P	33	1 19/64"	12	Flat	5 x 7	2 x 7	1F 1G	Parabolic	0.31	0.68
050234	BIT BTN PO 033 22X12° BF6/2 P	33	1 19/64"	12	Flat	6 x 7	2 x 7	2F 1G	Parabolic	0.30	0.66
050161	BIT BTN PO 035 22X12° BF5/2 C	35	1 3/8"	12	Flat	5 x 8	2 x 7	2F 2G	Conical	0.35	0.77
050036	BIT BTN PO 035 22X12° BF5/2 H	35	1 3/8"	12	Flat	5 x 8	2 x 7	1F 2G	Hemispherical	0.36	0.79
050225	BIT BTN PO 037 22X12° BF6/2 P	37	1 29/64"	12	Flat	6 x 8	2 x 8	1F 1G	Parabolic	0.44	0.97
050066	BIT BTN PO 038 22X12° BF5/2 H	38	1 1/2"	12	Flat	5 x 8	2 x 7	1F 2G	Hemispherical	0.50	1.10
050128	BIT BTN PO 038 22X12° BF3/1 C	38	1 1/2"	12	Flat	3 x 9	1 x 9	1F 1G	Conical	0.30	0.66

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, BLADE PUSH-ON 22 mm

ITEM	DESCRIPTION	DIAMETER		TAPER ANGLE	GAUGE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)					METRIC (kg)	IMPERIAL (lb)
030003	BIT BLD PO 028 22X12° CRS G10	28	1 3/32"	12	9 x 8	1F 2G	Tent	0.24	0.53
030079	BIT BLD PO 029 22X12° CRS H9	29	1 9/64"	12	10 x 8	1F 2G	Tent	0.26	0.57
030113	BIT BLD PO 030 22X12° CRS H9	30	1 11/64"	12	10 x 8	1F 2G	Tent	0.28	0.62
030114	BIT BLD PO 030 22X12° CRS H9	30	1 11/64"	12	11 x 8	1F 2G	Tent	0.30	0.66
030115	BIT BLD PO 032 22X12° CRS H9	32	1 1/4"	12	11 x 8	1F 2G	Tent	0.31	0.68
030032	BIT BLD PO 032 22X12° CRS G10	32	1 1/4"	12	11 x 8	1F 2G	Tent	0.31	0.68
030035	BIT BLD PO 035 22X12° CRS G10	35	1 3/8"	12	13 x 8	1F 2G	Tent	0.34	0.75
030110	BIT BLD PO 035 22X12° CRS MUD	35	1 3/8"	12	13 x 8	4G	Tent	0.30	0.66
030037	BIT BLD PO 038 22X12° CRS G10	38	1 1/2"	12	14 x 8	1F 2G	Tent	0.36	0.79
030039	BIT BLD PO 045 22X12° CRS G10	45	1 3/4"	12	17 x 8	1F 2G	Tent	0.46	1.01

PACKAGE SPECIFICATIONS

Package includes 10 bits.

12° SYSTEM PART NUMBERS

RODS, 22 mm

ITEM	DESCRIPTION	LENGTH		TAPER ANGLE	ROD CROSS SECTION	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			METRIC (kg)	IMPERIAL (lb)
250118	ROD CLR TPR 0610 22H 108X12*	610	2'	12	22H	2.26	4.98
250473	ROD CLR TPR 0800 22H 108X12*	800	2' - 7 ½"	12	22H	2.84	6.26
250119	ROD CLR TPR 1220 22H 108X12*	1220	4'	12	22H	4.12	9.08
250063	ROD CLR TPR 1600 22H 108X12*	1600	5' - 3"	12	22H	5.28	11.64
250120	ROD CLR TPR 1830 22H 108X12*	1830	6'	12	22H	5.98	13.18
250190	ROD CLR TPR 1980 22H 108X12*	1980	6' - 5 15/16"	12	22H	6.44	14.20
250447	ROD CLR TPR 2400 22H 108X12*	2400	7' - 10 ½"	12	22H	7.72	17.02
250121	ROD CLR TPR 2440 22H 108X12*	2440	8'	12	22H	7.84	17.28
250195	ROD CLR TPR 2590 22H 108X12*	2590	8' - 6"	12	22H	8.30	18.30
250122	ROD CLR TPR 3050 22H 108X12*	3050	10'	12	22H	9.70	21.38
250374	ROD CLR TPR 3200 22H 108X12*	3200	10' - 6"	12	22H	10.16	22.40
250123	ROD CLR TPR 3660 22H 108X12*	3660	12'	12	22H	11.56	25.49
250448	ROD CLR TPR 4000 22H 108X12*	4000	13' - 1 ½"	12	22H	12.60	27.78
250201	ROD CLR TPR 4270 22H 108X12*	4270	14'	12	22H	13.42	29.59
250386	ROD CLR TPR 6400 22H 108X12*	6400	21'	12	22H	19.92	43.92

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

PRODUCTION AND TUNNELING

R23 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110653	BIT BTN THD 033 R23 BF5/2 H	33	1 19/64"	R23	Flat	5 x 7	2 x 7	1F 2G	Hemispherical	0.32	0.71
110477	BIT BTN THD 035 R23 BF5/2 H	35	1 3/8"	R23	Flat	5 x 8	2 x 7	1F 2G	Hemispherical	0.39	0.86
110600	BIT BTN THD 038 R23 BF5/2 H	38	1 1/2"	R23	Flat	5 x 9	2 x 7	1F 2G	Hemispherical	0.42	0.93

PACKAGE SPECIFICATIONS

Package includes 10 bits.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END	METRIC (kg)	IMPERIAL (lb)
210167	ROD EXT M/F 0610 22H R23 C	610	2'	Male/Female	22H	R23	R23	2.00	4.41

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

RODS, TUNNELING/DRIFTING/GROUND SUPPORT

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END	METRIC (kg)	IMPERIAL (lb)
220440	ROD TUN M/M 2630 R23 25H R32 C	2630	7' - 7 9/16"	Male/Male	25H	R23	R32	10.57	23.30
220431	ROD TUN M/M 2440 R23 25H R32 C	2440	8'- 1/16"	Male/Male	25H	R23	R32	9.85	21.72

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

R25 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110284	BIT BTN THD 033 R25 BF5/2 H	33	1 19/64"	R25	Flat	5 x 7	2 x 7	1F 1G	Hemispherical	0.32	0.71
110236	BIT BTN THD 035 R25 BF5/2 H	35	1 3/8"	R25	Flat	5 x 8	2 x 7	1F 2G	Hemispherical	0.50	1.10
110580	BIT BTN THD 035 R25 BF5/2 H	35	1 3/8"	R25	Flat	5 x 9	2 x 7	1F 1G	Hemispherical	0.34	0.75
110930	BIT BTN THD 035 R25 BF5/2 H	35	1 3/8"	R25	Flat	5 x 8	2 x 7	2G	Hemispherical	0.37	0.82
110822	BIT BTN THD 035 R25 BF5/2 P	35	1 3/8"	R25	Flat	5 x 9	2 x 7	1F 1G	Parabolic	0.34	0.75
110164	BIT BTN THD 035 R25 FF5/2 H	35	1 3/8"	R25	Flat	5 x 8	2 x 7	2G	Hemispherical	0.34	0.75
110749	BIT BTN THD 037 R25 BF6/2 H	37	1 29/64"	R25	Flat	6 x 8	2 x 7	2F 1G	Hemispherical	0.45	0.99
110424	BIT BTN THD 038 R25 BC4/2 H	38	1 1/2"	R25	Chisel	4 x 8	2 x 8	2F	Hemispherical	0.61	1.34
110003	BIT BTN THD 038 R25 BF5/2 H	38	1 1/2"	R25	Flat	5 x 9	2 x 7	1F 1G	Hemispherical	0.54	1.19
110442	BIT BTN THD 038 R25 BF5/2 H	38	1 1/2"	R25	Flat	5 x 8	2 x 7	1F 2G	Hemispherical	0.50	1.10
110423	BIT BTN THD 038 R25 BF5/2 P	38	1 1/2"	R25	Flat	5 x 8	2 x 7	1F 2G	Parabolic	0.50	1.10
110690	BIT BTN THD 038 R25 BF6/2 P	38	1 1/2"	R25	Flat	6 x 8	2 x 8	2F 1G	Parabolic	0.43	0.95
110169	BIT BTN THD 041 R25 BF5/2 H	41	1 5/8"	R25	Flat	5 x 10	2 x 8	1F 2G	Hemispherical	0.58	1.28
110476	BIT BTN THD 045 R25 BF5/2 H	45	1 3/4"	R25	Flat	5 x 10	2 x 9	1F 2G	Hemispherical	0.65	1.43
110747	BIT BTN THD 045 R25 BF6/2 B	45	1 3/4"	R25	Flat	6 x 9	2 x 9	2F 2G	Ballistic	0.73	1.61

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, BLADE

ITEM	DESCRIPTION	DIAMETER		THREAD	GAUGE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)					METRIC (kg)	IMPERIAL (lb)
120364	BIT BLD THD 033 R25 CRS H9	33	1 19/64"	R25	11 x 10	1F 4G	Tent	0.36	0.79
120207	BIT BLD THD 035 R25 G10	35	1 3/8"	R25	12 x 9	1F 4G	Tent	0.51	1.12
120208	BIT BLD THD 038 R25 G10	38	1 1/2"	R25	14 x 9	1F 4G	Tent	0.62	1.37
120213	BIT BLD THD 041 R25 G10	41	1 5/8"	R25	15 x 10	1F 4G	Tent	0.80	1.76
120225	BIT BLD THD 045 R25	45	1 3/4"	R25	17 x 11	1F 4G	Tent	0.80	1.76
120258	BIT BLD THD 048 R25 G10	48	1 7/8"	R25	18 x 9	1F 4G	Tent	0.91	2.01

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, PILOT ADAPTER

ITEM	DESCRIPTION	PILOT DIAMETER		LENGTH		THREAD	TAPER DEGREE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
380015	REM ADAPT PILOT TPR R25F 6*	26	1 1/64"	254	9 63/64"	R25F	6	1.39	3.06

PACKAGE SPECIFICATIONS

Packaged 1 per box.

R25 SYSTEM PART NUMBERS

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END	METRIC (kg)	IMPERIAL (lb)
210139	ROD EXT M/F 0800 25H R25 C	800	2' - 7 ½"	Male/Female	25H	R25	R25	3.87	8.53
210160	ROD EXT M/F 1830 25H R25 C	1830	6'	Male/Female	25H	R25	R25	7.22	15.92
200496	ROD EXT M/M 0610 25H R25 C	610	2'	Male/Male	25H	R25	R25	2.17	4.78
200376	ROD EXT M/M 0910 25H R25 C	910	3' - 11 13/16"	Male/Male	25H	R25	R25	3.45	7.61
200471	ROD EXT M/M 1000 22H R25 C	1000	3' - 3 3/8"	Male/Male	22H	R25	R25	3.01	6.64
200474	ROD EXT M/M 1000 25H R25 C	1000	3' - 3 3/8"	Male/Male	25H	R25	R25	3.68	8.11
200102	ROD EXT M/M 1220 25H R25 C	1220	4'	Male/Male	25H	R25	R25	4.75	10.47
200106	ROD EXT M/M 1830 25H R25 C	1830	6'	Male/Male	25H	R25	R25	7.01	15.45

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

RODS, TUNNELING/DRIFTING/GROUND SUPPORT

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
220219	ROD TUN M/M 2430 R25 25H R32 C	2430	8'	Male/Male	25H	R25	R32	Carburized	9.43	20.79
220279	ROD TUN M/M 2590 R25 25H R32 C	2590	8' - 6"	Male/Male	25H	R25	R32	Carburized	10.05	22.16
220404	ROD TUN M/M 2600 R25 25H R32 C	2600	8' - 6 3/8"	Male/Male	25H	R25	R32	Carburized	10.09	22.24
220420	ROD TUN M/M 2700 R25 25H R32 C	2700	8' - 10 5/16"	Male/Male	25H	R25	R32	Carburized	10.48	23.10
220443	ROD TUN M/M 2800 R25 28H R32 C	2800	9' - 2 5/16"	Male/Male	28H	R28	R32	Carburized	14.14	31.17
220287	ROD TUN M/M 2900 R25 25H R32 C	2900	9' - 6 3/16"	Male/Male	25H	R25	R32	Carburized	11.25	24.80
220303	ROD TUN M/M 3090 R25 25H R32 C	3090	10' - 1 11/16"	Male/Male	25H	R25	R32	Carburized	11.99	26.43
220138	ROD TUN M/M 3100 R25 28H R32 C	3100	10' - 2 1/16"	Male/Male	28H	R28	R32	Carburized	15.66	34.52

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350054	COUPLING R25 S/B 033 150	33	1 19/64"	150	5 57/64"	R25	Semi-Bridge	0.61	1.34
350005	COUPLING R25 S/B 035 150	35	1 3/8"	150	5 57/64"	R25	Semi-Bridge	0.64	1.41

PACKAGE SPECIFICATIONS

Packaged 1 per box.

R28 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110527	BIT BTN THD 036 R28 BF5/2 H	36	1 13/32"	R28	Flat	5 x 8	2 x 7	1F 2G	Hemispherical	0.48	1.06
110818	BIT BTN THD 037 R28 BF5/2 H	37	1 29/64"	R28	Flat	5 x 8	2 x 7	1F 2G	Hemispherical	0.48	1.06
110002	BIT BTN THD 038 R28 BF5/2 H	38	1 1/2"	R28	Flat	5 x 9	2 x 7	1F 2G	Hemispherical	0.50	1.10
110495	BIT BTN THD 038 R28 BF5/2 P	38	1 1/2"	R28	Flat	5 x 9	2 x 7	1F 2G	Parabolic	0.50	1.10
110167	BIT BTN THD 038 R28 BF5/2H	38	1 1/2"	R28	Flat	5 x 9	2 x 7	1F 2G	Hemispherical	0.50	1.10
110006	BIT BTN THD 041 R28 BF5/2 H	41	1 5/8"	R28	Flat	5 x 10	2 x 8	1F 2G	Hemispherical	0.63	1.39
110171	BIT BTN THD 041 R28 BF5/2H	41	1 5/8"	R28	Flat	5 x 10	2 x 8	1F 2G	Hemispherical	0.63	1.39
110118	BIT BTN THD 045 R28 BF5/2 H	45	1 3/4"	R28	Flat	5 x 10	2 x 9	1F 2G	Hemispherical	0.73	1.61

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, PILOT ADAPTER

ITEM	DESCRIPTION	PILOT DIAMETER		LENGTH		THREAD	TAPER DEGREE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
380003	REM ADAPT PILOT TPR R28F 6*	26	1 1/64"	241	9 31/64"	R28F	6	1.59	3.51
380005	REM ADAPT PILOT TPR R28F 12*	35	1 3/8"	267	10 1/2"	R28F	12	2.45	5.40

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END	METRIC (kg)	IMPERIAL (lb)
200516	ROD EXT M/M 2060 28H R28 C	2060	6' - 9 1/8"	Male/Male	28H	R28	R28	10.05	22.16

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

R28 SYSTEM PART NUMBERS

RODS, TUNNELING/DRIFTING/GROUND SUPPORT

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
220194	ROD TUN M/M 2480 R28 28H R32 C	2480	8' - 1 5/8"	Male/Male	28H	R28	R32	Carburized	12.16	26.81
220242	ROD TUN M/M 2590 R28 28H R32 C	2590	8' - 6"	Male/Male	28H	R28	R32	Carburized	12.70	28.00
220198	ROD TUN M/M 2800 R28 28H R32 C	2800	9' - 2 1/4"	Male/Male	28H	R28	R32	Carburized	14.00	30.86
220448	ROD TUN M/M 3050 R28 28H R38 C	3050	10'	Male/Male	28H	R28	R38	Carburized	15.37	33.89
220075	ROD TUN M/M 3700 R28 28H R32 C	3700	12' - 1 11/16"	Male/Male	28H	R28	R32	Carburized	18.15	40.01
220449	ROD TUN M/M 4300 R28 28H R32 C	4300	14' - 1 5/16"	Male/Male	28H	R28	R32	Carburized	21.45	47.29
220252	ROD TUN M/M 4300 R28 32H HM38 C	4300	14' - 1 5/16"	Male/Male	32H	R28	HM38	Carburized	26.89	59.28

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350033	COUPLING R28 S/B 040 150	40	1 9/16"	150	5 57/64"	R28	Semi-Bridge	1.07	2.36

PACKAGE SPECIFICATIONS

Packaged 1 per box.

R32 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110597	BIT BTN THD 041 R32 BF5/2 H	41	1 5/8"	R32	Flat	5 x 9	2 x 8	1F 2G	Hemispherical	0.61	1.34
110708	BIT BTN THD 041 R32 BF6/2 P	41	1 5/8"	R32	Flat	6 x 8	2 x 8	2F 1G	Parabolic	0.61	1.34
110176	BIT BTN THD 043 R32 BF5/2 H	43	1 11/16"	R32	Flat	5 x 10	2 x 8	1F 2G	Hemispherical	0.66	1.46
110875	BIT BTN THD 043 R32 BF5/2 H	43	1 11/16"	R32	Flat	5 x 10	2 x 9	1F 2G	Hemispherical	0.70	1.54
110770	BIT BTN THD 045 R32 BF6/2 B	45	1 3/4"	R32	Flat	6 x 9	2 x 9	2F 2G	Ballistic	0.80	1.76
110618	BIT BTN THD 045 R32 BF4/2 P	45	1 3/4"	R32	Flat	4 x 9	2 x 9	2F	Parabolic	0.67	1.48
110180	BIT BTN THD 045 R32 BF5/2 H	45	1 3/4"	R32	Flat	5 x 11	2 x 8	1F 2G	Hemispherical	0.74	1.63
110765	BIT BTN THD 045 R32 BF5/2 H	45	1 3/4"	R32	Flat	5 x 11	2 x 9	1F 2G	Hemispherical	0.74	1.63
110892	BIT BTN THD 045 R32 BF5/2 H	45	1 3/4"	R32	Flat	5 x 11	2 x 9	1F 2G	Hemispherical	0.74	1.63
110368	BIT BTN THD 045 R32 BF5/2 P	45	1 3/4"	R32	Flat	5 x 10	2 x 9	1F 2G	Parabolic	0.74	1.63
110179	BIT BTN THD 045 R32 BF5/2 H	45	1 3/4"	R32	Flat	5 x 10	2 x 9	1F 2G	Hemispherical	0.70	1.54
110591	BIT BTN THD 045 R32 BF6/3 H	45	1 3/4"	R32	Flat	6 x 9	3 x 8	3F	Hemispherical	0.72	1.59
110566	BIT BTN THD 045 R32 BF6/3 H	45	1 3/4"	R32	Flat	6 x 9	3 x 8	3F 1G	Hemispherical	0.79	1.74
110526	BIT BTN THD 045 R32 BF6/3 P	45	1 3/4"	R32	Flat	6 x 9	3 x 8	3F 1G	Parabolic	0.77	1.70
110664	BIT BTN THD 045 R32 BF6/3 P	45	1 3/4"	R32	Flat	6 x 9	3 x 8	3F	Parabolic	0.79	1.74
110913	BIT BTN THD 045 R32 BF6/3 P	45	1 3/4"	R32	Flat	6 x 9	3 x 8	3F 1G	Parabolic	0.79	1.74
110910	BIT BTN THD 045 R32 BF4/2 H	45	1 3/4"	R32	Flat	4 x 10	2 x 9	2G	Hemispherical	0.79	1.74
110746	BIT BTN THD 045 R32 BF6/3 H	45	1 3/4"	R32	Flat	6 x 9	3 x 8	3F 1G	Hemispherical	0.70	1.54
110903	BIT BTN THD 045 R32 BF6/3 H	45	1 3/4"	R32	Flat	6 x 10	3 x 8	3F 1G	Hemispherical	0.80	1.76
110648	BIT BTN THD 045 R32 BF6/3 P	45	1 3/4"	R32	Flat	6 x 10	3 x 8	3F 1G	Parabolic	0.80	1.76
110791	BIT BTN THD 045 R32 BF6/3 P	48	1 7/8"	R32	Flat	5 x 11	2 x 9	1F 2G	Hemispherical	0.92	2.03
110184	BIT BTN THD 048 R32 BF5/2 H	48	1 7/8"	R32	Flat	5 x 11	2 x 9	1F 2G	Hemispherical	0.88	1.94
110251	BIT BTN THD 048 R32 BF5/2 H	48	1 7/8"	R32	Flat	5 x 11	2 x 10	1F 2G	Hemispherical	0.92	2.03
110769	BIT BTN THD 048 R32 BF5/2 H	48	1 7/8"	R32	Flat	5 x 11	2 x 9	1F 2G	Hemispherical	0.92	2.03
110919	BIT BTN THD 048 R32 BF5/2 H	48	1 7/8"	R32	Flat	6 x 10	3 x 8	3F 1G	Conical	0.93	2.05
110898	BIT BTN THD 048 R32 BF6/3 C	48	1 7/8"	R32	Flat	6 x 9	3 x 8	3F 1G	Hemispherical	0.90	1.98
110568	BIT BTN THD 048 R32 BF6/3 H	50	1 61/64"	R32	Flat	5 x 11	2 x 10	1F 2G	Hemispherical	0.88	1.94
110071	BIT BTN THD 050 R32 BF5/2 H	51	2"	R32	Flat	5 x 11	2 x 10	1F 2G	Hemispherical	0.95	2.10
110187	BIT BTN THD 051 R32 BF5/2 H	51	2"	R32	Flat	5 x 11	2 x 10	1F 2G	Parabolic	0.98	2.16
110472	BIT BTN THD 051 R32 BF5/2 P	51	2"	R32	Flat	6 x 11	2 x 11	2F 2G	Hemispherical	1.03	2.27
110615	BIT BTN THD 051 R32 BF6/2 H	51	2"	R32	Flat	6 x 11	2 x 9	1F 2G	Hemispherical	1.03	2.27
110915	BIT BTN THD 051 R32 BF6/2 H	51	2"	R32	Flat	6 x 10	3 x 10	3F	Conical	1.03	2.27
110917	BIT BTN THD 051 R32 BF6/3 C	51	2"	R32	Flat	6 x 10	3 x 9	3F 1G	Hemispherical	1.00	2.20
110552	BIT BTN THD 051 R32 BF6/3 H	51	2"	R32	Flat	6 x 10	3 x 9	3F	Parabolic	0.96	2.12
110730	BIT BTN THD 051 R32 BF6/3 P	54	2 1/8"	R32	Flat	6 x 9	3 x 8	3F 1G	Parabolic	0.76	1.68
110019	BIT BTN THD 054 R32 BF6/2 H	54	2 1/8"	R32	Flat	6 x 11	2 x 10	1F 2G	Hemispherical	1.02	2.25
110748	BIT BTN THD 054 R32 BF6/3 H	54	2 1/8"	R32	Flat	6 x 10	3 x 9	3F 1G	Hemispherical	1.01	2.23
110448	BIT BTN THD 057 R32 BF6/3 H	57	2 1/4"	R32	Flat	6 x 11	3 x 10	3F	Hemispherical	1.30	2.87
110429	BIT BTN THD 057 R32 BF6/3 P	57	2 1/4"	R32	Flat	6 x 11	3 x 10	1F 2G	Parabolic	1.33	2.93
110024	BIT BTN THD 064 R32 BF6/3 H	64	2 1/2"	R32	Flat	6 x 13	3 x 10	1F 2G	Hemispherical	1.45	3.20
110131	BIT BTN THD 064 R32 BF6/3 H	64	2 1/2"	R32	Flat	6 x 12	3 x 10	1F 2G	Hemispherical	1.77	3.90
110427	BIT BTN THD 064 R32 BF6/3 H	64	2 1/2"	R32	Flat	6 x 11	3 x 10	3F 1G	Hemispherical	1.77	3.90
110517	BIT BTN THD 064 R32 BF8/4 P	64	2 1/2"	R32	Flat	8 x 10	4 x 10	2F 1G	Parabolic	1.47	3.24
110034	BIT BTN THD 076 R32 BD8/6 H	76	3"	R32	Dome	8 x 11	6 x 11	2F	Hemispherical	2.30	5.07
110799	BIT BTN THD 076 R32 BF6/4 H	76	3"	R32	Flat	6 x 12	4 x 10	3F 1G	Hemispherical	2.80	6.17
110038	BIT BTN THD 089 R32 BD8/8 H	89	3 1/2"	R32	Dome	8 x 11	6 x 11, 2 x 10	2F	Hemispherical	3.24	7.14
110800	BIT BTN THD 089 R32 BF6/4 H	89	3 1/2"	R32	Flat	6 x 14	4 x 12	3F 1G	Hemispherical	3.24	7.14

PACKAGE SPECIFICATIONS

Package includes 10 bits.

R32 SYSTEM PART NUMBERS

BITS, BLADE

ITEM	DESCRIPTION	DIAMETER		THREAD	GAUGE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)					METRIC (kg)	IMPERIAL (lb)
120317	BIT BLD THD 035 R32 CRS H9	35	1 3/8"	R32	12 x 10	1F 2G	Tent	0.80	1.76
120045	BIT BLD THD 045 R32 CRS G10	45	1 3/4"	R32	17 x 11	1F 4G	Tent	0.90	1.98
120009	BIT BLD THD 048 R32 CRS H12	48	1 7/8"	R32	17 x 12	1F 4G	Tent	1.00	2.20
120051	BIT BLD THD 051 R32 CRS G10	51	2"	R32	18 x 12	1F 3G	Tent	2.18	4.81
120233	BIT BLD THD 051 R32 CRS G10	51	2"	R32	19 x 12	1F 4G	Tent	1.23	2.71
120353	BIT BLD THD 052 R32 CRS H8	51	2"	R32	18 x 12	1F 4G	Tent	1.25	2.76
120234	BIT BLD THD 054 R32 CRS G10	54	2 1/8"	R32	21 x 12	1F 4G	Tent	2.47	5.45
120267	BIT BLD THD 064 R32 'X' G10	64	2 1/2"	R32	24 x 12	1F 4G	Tent	1.95	4.30

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, STRAIGHTRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
140028	BIT BTN STR 051 R32 BF6/3 H	51	2"	R32	Flat	6 x 10	3 x 9	3F	Hemispherical	1.09	2.40
140074	BIT BTN STR 051 R32 BF6/3 H	51	2"	R32	Flat	6 x 9	3 x 9	3F 1G	Hemispherical	1.08	2.38
140137	BIT BTN STR 051 R32 BF6/3 P	51	2"	R32	Flat	6 x 10	3 x 9	3F	Parabolic	1.10	2.43

PACKAGE SPECIFICATIONS

Packaged 1 per box.

BITS, RETRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (in)								METRIC (kg)	IMPERIAL (lb)
130098	BIT BTN RET 051 R32 BF6/3 H RF	51	2"	R32	Flat	6 x 10	3 x 9	3F 1RV	Hemispherical	Reverse Flush	1.41	3.11
130048	BIT BTN RET 054 R32 BF6/3 P RF	54	2 1/8"	R32	Flat	6 x 10	3 x 10	3F 1RV	Parabolic	Reverse Flush	1.54	3.40
130056	BIT BTN RET 064 R32 BF6/3 H RF	64	2 1/2"	R32	Flat	6 x 13	3 x 10	3F 1RV	Hemispherical	Reverse Flush	3.18	7.01

PACKAGE SPECIFICATIONS

Packaged 1 per box.

BITS, REAMING EQUIPMENT

ITEM	DESCRIPTION	DIAMETER		THREAD	PILOT DIAMETER		GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (in)		METRIC (mm)	IMPERIAL (in)					METRIC (kg)	IMPERIAL (lb)
090032	BIT BTN PILOT 089 R32 045 H	89	3 1/2"	R32	45	1 49/64"	8 x 10	9 x 10	2F		4.04	8.91
090030	BIT BTN PILOT 102 R32 023 H	102	4"	R32	23	57/64"	9 x 12	11 x 12	3F 1RV	Reverse Flush	3.52	7.76
090029	BIT BTN PILOT 102 R32 041 H	102	4"	R32	41	1 5/8"	8 x 12	6 x 12, 3 x 10	2F		5.53	12.19
090008	BIT BTN PILOT 102 R32 043 H	102	4"	R32	43	1 11/16"	8 x 12	6 x 12, 4 x 10, 2 x 9	3F		3.35	7.39

PACKAGE SPECIFICATIONS

Packaged 1 per box.

R32 SYSTEM PART NUMBERS

BITS, PILOT ADAPTER

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TAPER DEGREE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
380004	REM ADAPT PILOT TPR R32F 6*	26	1 1/64"	270	10 5/8"	R32F	6	1.54	3.40
380007	REM ADAPT PILOT TPR R32F 12*	40	1 9/16"	257	10 11/64"	R32F	12	2.45	5.40
380017	REM ADAPT PILOT TPR R32F 12*	40	1 9/16"	188	7 25/64"	R32F	12	1.86	4.10

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
210023	ROD EXT M/F 1220 33R R32 C	1220	4'	Male/Female	33R	R32	R32	Carburized	7.26	16.00
210004	ROD EXT M/F 1525 33R R32 C	1525	5'	Male/Female	33R	R32	R32	Carburized	8.96	19.75
210005	ROD EXT M/F 1830 33R R32 C	1830	6'	Male/Female	33R	R32	R32	Carburized	10.75	23.70
210051	ROD EXT M/F 2440 33R R32 C	2440	8'	Male/Female	33R	R32	R32	Carburized	14.33	31.59
210107	ROD EXT M/F 3050 33R R32 2WF C	3050	10'	Male/Female	33R	R32	R32	Wrench Flats / Carburized	17.91	39.48
210006	ROD EXT M/F 3050 33R R32 C	3050	10'	Male/Female	33R	R32	R32	Carburized	17.92	39.51
210050	ROD EXT M/F 3660 33R R32 C	3660	12'	Male/Female	33R	R32	R32	Carburized	20.65	45.53
210159	ROD EXT M/F 4270 33R R32 C	4270	14'	Male/Female	33R	R32	R32	Carburized	24.02	52.95
200500	ROD EXT M/M 0915 33R R32 WF C	915	3'	Male/Male	33R	R32	R32	Wrench Flats / Carburized	5.18	11.42
200476	ROD EXT M/M 1000 25H R32 C	1000	3' - 3 3/8"	Male/Male	25H	R32	R32	Carburized	4.05	8.93
200481	ROD EXT M/M 1000 33R R32 WF C	1000	3' - 3 3/8"	Male/Male	33R	R32	R32	Wrench Flats / Carburized	5.67	12.50
200330	ROD EXT M/M 1220 32H R32 C	1220	4'	Male/Male	32H	R32	R32	Carburized	7.16	15.79
200401	ROD EXT M/M 1220 33R R32 WF C	1220	4'	Male/Male	33R	R32	R32	Wrench Flats / Carburized	6.60	14.55
200482	ROD EXT M/M 1520 33R R32 WF C	1520	5'	Male/Male	33R	R32	R32	Wrench Flats / Carburized	8.27	18.23
200483	ROD EXT M/M 1830 33R R32 WF C	1830	6'	Male/Male	33R	R32	R32	Wrench Flats / Carburized	9.90	21.83
200357	ROD EXT M/M 2000 33R R32 WF C	2000	6' - 6 3/4"	Male/Male	33R	R32	R32	Wrench Flats / Carburized	10.82	23.85
200456	ROD EXT M/M 2440 33R R32 WF C	2440	8'	Male/Male	33R	R32	R32	Wrench Flats / Carburized	13.33	29.39
200484	ROD EXT M/M 3050 33R R32 WF C	3050	10'	Male/Male	33R	R32	R32	Wrench Flats / Carburized	16.73	36.88
200372	ROD EXT M/M 3660 33R R32 C	3660	12'	Male/Male	33R	R32	R32	Carburized	20.11	44.33
200034	ROD EXT M/M 4270 33R R32 C	4270	14'	Male/Male	33R	R32	R32	Carburized	23.49	51.79
200541	ROD EXT M/M 5480 33R R32D C	5480	18'	Male/Male	33R	R32	R32	Carburized	30.00	66.14

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

R32 SYSTEM PART NUMBERS

RODS, TUNNELING/DRIFTING/GROUND SUPPORT

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
300022	ROD TUN M/F 3100 R32 35H HM38	3100	10' - 2 1/16"	Male/Female	35H	R32	HM38	Carburized	26.50	58.42
300010	ROD TUN M/F 3700 R32 35H HM38	3700	12' - 1 11/16"	Male/Female	35H	R32	HM38	Carburized	30.00	66.14
300012	ROD TUN M/F 4310 R32 35H HM38	4310	14' - 1 11/16"	Male/Female	35H	R32	HM38	Carburized	34.50	76.10
300036	ROD TUN M/F 4915 R32 35H HM38	4915	16' - 1 1/2"	Male/Female	35H	R32	HM38	Carburized	39.59	87.28
220271	ROD TUN M/M 2480 R32 35H R38 C	2480	8' - 1 5/8"	Male/Male	35H	R32	R38	Carburized	18.51	40.81
220277	ROD TUN M/M 2700 R32 35H R38 C	2700	8' - 10 5/16"	Male/Male	35H	R32	R38	Carburized	20.41	45.00
220414	ROD TUN M/M 3090 R32 32H R38 C	3090	10' - 1 11/16"	Male/Male	32H	R32	R38	Carburized	19.05	42.00
220164	ROD TUN M/M 3090 R32 35H HM38C	3090	10' - 1 11/16"	Male/Male	35H	R32	HM38	Carburized	24.10	53.13
220159	ROD TUN M/M 3090 R32 35H R38 C	3090	10' - 1 11/16"	Male/Male	35H	R32	R38	Carburized	23.13	51.00
220483	ROD TUN M/M 3200 R32 32H R38 C	3200	10' - 6"	Male/Male	32H	R32	R38	Carburized	19.95	43.98
220399	ROD TUN M/M 3400 R32 32H R38 C	3400	11' - 1 7/8"	Male/Male	32H	R32	R38	Carburized	21.33	47.02
220400	ROD TUN M/M 3700 R32 32H HM38C	3700	12' - 1 11/16"	Male/Male	32H	R32	HM38	Carburized	23.58	51.98
220257	ROD TUN M/M 3700 R32 32H R32 C	3700	12' - 1 11/16"	Male/Male	32H	R32	R32	Carburized	21.83	48.13
220415	ROD TUN M/M 3700 R32 32H R38 C	3700	12' - 1 11/16"	Male/Male	32H	R32	R38	Carburized	23.54	51.90
220166	ROD TUN M/M 3700 R32 35H HM38C	3700	12' - 1 11/16"	Male/Male	35H	R32	HM38	Carburized	28.21	62.19
220161	ROD TUN M/M 3700 R32 35H R38 C	3700	12' - 1 11/16"	Male/Male	35H	R32	R38	Carburized	27.93	61.58
220416	ROD TUN M/M 4310 R32 32H HM38C	4310	14' - 1 11/16"	Male/Male	32H	R32	HM38	Carburized	26.89	59.28
220209	ROD TUN M/M 4310 R32 35H HM38	4310	14' - 1 11/16"	Male/Male	35H	R32	HM38	Carburized	32.88	72.49
220095	ROD TUN M/M 4310 R32 32H HM38C	4310	14' - 1 11/16"	Male/Male	32H	R32	HM38	Carburized	26.72	58.91
220096	ROD TUN M/M 4310 R32 32H R38 C	4310	14' - 1 11/16"	Male/Male	32H	R32	R38	Carburized	27.40	60.41
220100	ROD TUN M/M 4310 R32 35H R38 C	4310	14' - 1 11/16"	Male/Male	35H	R32	R38	Carburized	32.88	72.49
220157	ROD TUN M/M 4915 R32 32H HM38C	4915	16' - 1 1/2"	Male/Male	32H	R32	HM38	Carburized	30.50	67.24
220112	ROD TUN M/M 4915 R32 32H R38 C	4915	16' - 1 1/2"	Male/Male	32H	R32	R38	Carburized	30.20	66.58
220170	ROD TUN M/M 4915 R32 35H HM38	4915	16' - 1 1/2"	Male/Male	35H	R32	HM38	Carburized	37.15	81.90
220115	ROD TUN M/M 4915 R32 35H R38 C	4915	16' - 1 1/2"	Male/Male	35H	R32	R38	Carburized	37.03	81.64
220042	ROD TUN M/M 5520 R32 35H HM38	5520	18' - 1 5/16"	Male/Male	35H	R32	HM38	Carburized	42.17	92.97
220211	ROD TUN M/M 5525 R32 35H HM38	5525	18' - 1/4"	Male/Male	35H	R32	HM38	Carburized	43.08	94.98
220038	ROD TUN M/M 5525 R32 35H R38 C	5525	18' - 1/4"	Male/Male	35H	R32	R38	Carburized	42.40	93.98

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

GUIDE ROD

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
280034	ROD GUIDE 054 1220 35H R32 C	1200	3' - 11 1/4"	Male/Female	35H	R32	R32	Carburized	10.78	23.77

PACKAGE SPECIFICATIONS

Packaged 1 per box.

R32 SYSTEM PART NUMBERS

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350011	COUPLING R32 S/B 044 150	44	1 23/32"	150	5 57/64"	R32	Semi-Bridge	1.07	2.36
350050	COUPLING R32 F/B 045 168	45	1 3/4"	168	6 39/64"	R32	Full Bridge	1.26	2.78

PACKAGE SPECIFICATIONS

Packaged 1 per box.

ADAPTER COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
360029	COUPLING ADAPT F/B R32 R25	45	1 3/4"	168	6 39/64"	R32/R25	Full Bridge	1.47	3.24

PACKAGE SPECIFICATIONS

Packaged 1 per box.

R35 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110540	BIT BTN THD 048 R35 BF5/2 H	48	1 7/8"	R35	Flat	5 x 11	2 x 9	1F 3G	Hemispherical	0.93	2.05
110739	BIT BTN THD 048 R35 BF6/3 H	48	1 7/8"	R35	Flat	6 x 10	3 x 8	3F 1G	Hemispherical	0.93	2.05
110738	BIT BTN THD 048 R35 BF6/3 P	48	1 7/8"	R35	Flat	6 x 10	3 x 8	3F 1G	Parabolic	0.92	2.03
110523	BIT BTN THD 051 R35 BF6/3 H	51	2"	R35	Flat	6 x 10	3 x 9	3F 1G	Hemispherical	1.04	2.29
110522	BIT BTN THD 051 R35 BF6/3 P	51	2"	R35	Flat	6 x 10	3 x 9	3F 1G	Parabolic	1.03	2.27

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, PILOT ADAPTER

ITEM	DESCRIPTION	PILOT DIAMETER		LENGTH		THREAD	TAPER DEGREE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
380016	REM ADAPT PILOT TPR R35F 12*	40	1 9/16"	188	7 25/64"	R35F	12	2.45	5.40

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, TUNNELING/DRIFTING/GROUND SUPPORT

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
300050	ROD TUN M/F 4310 R35 39R HM38C	4310	14' - 1 11/16"	Male/Female	39R	R35	HM38	Carburized	35.60	78.48
300042	ROD TUN M/F 4915 R35 39R HM38C	4915	16' - 1 1/2"	Male/Female	39R	R35	HM38	Carburized	39.52	87.13
220275	ROD TUN M/M 4310 R35 35H HM38	4310	14' - 1 11/16"	Male/Male	35H	R35	HM38	Carburized	33.00	72.75
220365	ROD TUN M/M 4310 R35 35H R38 C	4310	14' - 1 11/16"	Male/Male	35H	R35	R38	Carburized	33.00	72.75
220480	ROD TUN M/M 4915 R35 39R R38	4915	16' - 1 1/2"	Male/Male	39R	R35	R38	Carburized	38.50	84.88
220426	ROD TUN M/M 5525 R35 35H HM38	5525	18' - 1/4"	Male/Male	35H	R35	HM38	Carburized	42.40	93.48

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

R38 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110129	BIT BTN THD 064 R38 BF6/3 H	64	2 ½"	R38	Flat	6 x 12	3 x 10	1F 2G	Hemispherical	1.99	4.39
110601	BIT BTN THD 064 R38 BF8/4 P	64	2 ½"	R38	Flat	8 x 10	4 x 9	3G	Parabolic	1.85	4.08
110207	BIT BTN THD 076 R38 BF6/5 H	76	3"	R38	Flat	6 x 12	5 x 10	1F 2G	Hemispherical	2.50	5.51

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, STRAIGHTRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
140190	BIT BTN STR 064 R38 BR8/4/1 H	64	2 ½"	R38	Recessed	8 x 9	5 x 9	4F 1G	Hemispherical	2.36	5.20
140191	BIT BTN STR 076 R38 BR8/4/1 H	76	3"	R38	Recessed	8 x 11	5 x 11	4F 1G	Hemispherical	3.27	7.21

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
200411	ROD EXT M/M 1220 39R R38 WF C	1220	4'	Male/Male	39R	R38	R38	Wrench Flats / Carburized	9.08	20.02
200506	ROD EXT M/M 1830 39R R38 WF C	1830	6'	Male/Male	39R	R38	R38	Wrench Flats / Carburized	13.99	30.84
200413	ROD EXT M/M 2440 39R R38 WF C	2440	8'	Male/Male	39R	R38	R38	Wrench Flats / Carburized	18.89	41.65
200377	ROD EXT M/M 3050 39R R38 WF C	3050	10'	Male/Male	39R	R38	R38	Wrench Flats / Carburized	23.77	52.40

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

R38 SYSTEM PART NUMBERS

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350029	COUPLING R38 S/B 055 170	55	2 5/32"	170	6 11/16"	R38	Semi-Bridge	1.83	4.03
350041	COUPLING R38 F/B 055 175	55	2 5/32"	175	6 7/8"	R38	Full-Bridge	1.98	4.37

PACKAGE SPECIFICATIONS

Packaged 1 per box.

ADAPTER COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
360017	COUPLING ADAPT F/B R38 R32	55	2 5/32"	171	6 23/32"	R38/R32	Full-Bridge	2.15	4.74

PACKAGE SPECIFICATIONS

Packaged 1 per box.

HM38 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110674	BIT BTN THD 064 HM38 BF6/3 H	64	2 ½"	HM38	Flat	6 x 12	3 x 11	3F 2G	Hemispherical	1.95	4.30
110022	BIT BTN THD 064 HM38 BF6/3 H	64	2 ½"	HM38	Flat	6 x 12	3 x 10	1F 2G	Hemispherical	1.92	4.23
110199	BIT BTN THD 064 HM38 BF8/4 H	64	2 ½"	HM38	Flat	8 x 10	4 x 10	2F	Hemispherical	1.93	4.25
110718	BIT BTN THD 064 HM38 BR6/3/1 H	64	2 ½"	HM38	Recessed	6 x 11	4 x 10	3F	Hemispherical	1.85	4.08
110719	BIT BTN THD 064 HM38 BR6/3/1 P	64	2 ½"	HM38	Recessed	6 x 11	4 x 10	3F	Parabolic	1.85	4.08
110363	BIT BTN THD 064 HM38 BF6/3 H	64	2 ½"	HM38	Flat	6 x 11	3 x 10	3F 1G	Hemispherical	1.90	4.19
110656	BIT BTN THD 070 HM38 BR6/3/1 H	70	2 ¾"	HM38	Recessed	6 x 13	3 x 11, 1 x 10	3F	Hemispherical	1.94	4.28
110411	BIT BTN THD 076 HM38 BF6/4 H	76	3"	HM38	Flat	6 x 12	4 x 10	3F 2G	Hemispherical	2.23	4.29
110891	BIT BTN THD 076 HM38 BF7/4 H	76	3"	HM38	Flat	7 x 13	4 x 12	3F	Hemispherical	2.20	4.85
110830	BIT BTN THD 076 HM38 BF8/4 H	76	3"	HM38	Flat	8 x 12	4 x 11	2F 1G	Hemispherical	2.20	4.85
110203	BIT BTN THD 076 HM38 BF8/4 H	76	3"	HM38	Flat	8 x 11	4 x 11	2F	Hemispherical	2.53	5.58
110712	BIT BTN THD 076 HM38 BF8/4 H	76	3"	HM38	Flat	8 x 12	4 x 12	2F 1G	Hemispherical	2.62	5.78
110733	BIT BTN THD 076 HM38 BF8/4 P	76	3"	HM38	Flat	8 x 11	4 x 11	2F	Parabolic	2.53	5.58
110793	BIT BTN THD 076 HM38 BF8/4 P	76	3"	HM38	Flat	8 x 11	4 x 11	2F 1G	Parabolic	2.50	5.51
110215	BIT BTN THD 076 HM38 BR6/3/2 H	76	3"	HM38	Recessed	6 x 11	3 x 11, 2 x 10	3F	Hemispherical	2.62	5.78
110290	BIT BTN THD 089 HM38 BF6/5 H	89	3 ½"	HM38	Flat	6 x 14	5 x 12	1F 2G	Hemispherical	3.40	7.50
110814	BIT BTN THD 089 HM38 BF8/5 H	89	3 ½"	HM38	Flat	8 x 12	5 x 11	2F 2G	Hemispherical	3.27	7.21
110357	BIT BTN THD 089 HM38 BF6/5 P	89	3 ½"	HM38	Flat	6 x 14	5 x 12	1F 2G	Parabolic	3.37	7.43
110288	BIT BTN THD 102 HM38 BF8/7 H	102	4"	HM38	Flat	8 x 14	7 x 12	2F 2G	Hemispherical	4.50	9.92

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, BLADE

ITEM	DESCRIPTION	DIAMETER		THREAD	GAUGE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)					METRIC (kg)	IMPERIAL (lb)
120058	BIT BLD THD 064 HM38 CRS G10	64	2 ½"	HM38	24 x 12	1F 4G	Tent	3.59	7.91
120193	BIT BLD THD 064 HM38 'X' G10	64	2 ½"	HM38	24 x 15	1F 2G	Tent	3.59	7.91
120067	BIT BLD THD 076 HM38 CRS G10	76	3"	HM38	28 x 16	1F 4G	Tent	5.40	11.90
120068	BIT BLD THD 076 HM38 'X' G10	76	3"	HM38	27 x 16	1F 4G	Tent	5.40	11.90

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, RETRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (in)								METRIC (kg)	IMPERIAL (lb)
130057	BIT BTN RET 064 HM38 BF6/3 H RF	64	2 ½"	HM38	Flat	6 x 13	3 x 10	3F 1RV	Hemispherical	Reverse Flush	2.37	5.22
130049	BIT BTN RET 064 HM38 BR5/3/1 H	64	2 ½"	HM38	Recessed	5 x 11	4 x 10	2F	Hemispherical		3.13	6.90
130059	BIT BTN RET 064 HM38 BR5/3/1 P	64	2 ½"	HM38	Recessed	5 x 11	4 x 10	2F	Parabolic		2.41	5.31
130079	BIT BTN RET 076 HM38 BR6/3/1 H RF	76	3"	HM38	Recessed	6 x 13	3 x 11, 1 x 10	3F 3RV	Hemispherical	Reverse Flush	3.38	7.45
130074	BIT BTN RET 089 HM38 BR6/3/2 H	89	3 ½"	HM38	Recessed	6 x 12	5 x 12	3F	Hemispherical		9.54	21.03

PACKAGE SPECIFICATIONS

Packaged 1 per box.

HM38 SYSTEM PART NUMBERS

BITS, STRAIGHTRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
140031	BIT BTN STR 064 HM38 BF6/3 H	64	2 ½"	HM38	Flat	6 x 11	3 x 10	3F 1G	Hemispherical	2.29	5.05
140052	BIT BTN STR 064 HM38 BR6/3/1 H	64	2 ½"	HM38	Recessed	6 x 10	3 x 10, 1 x 9	3F 1G	Hemispherical	2.26	4.98
140097	BIT BTN STR 064 HM38 BR8/4/1 H	64	2 ½"	HM38	Recessed	8 x 9	5 x 9	4F 1G	Hemispherical	2.18	4.81
140115	BIT BTN STR 064 HM38 BR8/4/1 P	64	2 ½"	HM38	Recessed	8 x 9	5 x 9	4F 1G	Parabolic	2.17	4.78
140035	BIT BTN STR 076 HM38 BR6/3/2 H	76	3"	HM38	Recessed	6 x 11	3 x 11, 2 x 10	3F 1G	Hemispherical	3.40	7.50
140077	BIT BTN STR 076 HM38 BR8/4/1 P	76	3"	HM38	Recessed	8 x 11	5 x 11	4F 1G	Parabolic	3.39	7.47

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
210044	ROD EXT M/F 1220 39R HM38 C	1220	4'	Male/Female	39R	HM38	HM38	Carburized	11.16	24.60
210029	ROD EXT M/F 1220 39R HM38 WF C	1220	4'	Male/Female	39R	HM38	HM38	Wrench Flats / Carburized	11.00	24.25
210093	ROD EXT M/F 1220 39R HM38 WF C	1220	4'	Male/Female	39R	HM38	HM38	Wrench Flats / Carburized	10.45	23.04
210030	ROD EXT M/F 1520 39R HM38 C	1520	5'	Male/Female	39R	HM38	HM38	Carburized	13.36	29.45
210031	ROD EXT M/F 1830 39R HM38 C	1830	6'	Male/Female	39R	HM38	HM38	Carburized	15.81	34.86
210106	ROD EXT M/F 1830 39R HM38 WF C	1830	6'	Male/Female	39R	HM38	HM38	Wrench Flats / Carburized	15.90	35.05
210032	ROD EXT M/F 3050 39R HM38 C	3050	10'	Male/Female	39R	HM38	HM38	Carburized	26.34	58.07
210046	ROD EXT M/F 3660 39R HM38 C	3660	12'	Male/Female	39R	HM38	HM38	Carburized	31.57	69.60
210033	ROD EXT M/F 3660 39R HM38 C	3660	12'	Male/Female	39R	HM38	HM38	Carburized	30.41	67.04
210112	ROD EXT M/F 4270 39R HM38 C	4270	14'	Male/Female	39R	HM38	HM38	Carburized	36.12	79.63
200493	ROD EXT M/M 1830 39R HM38 WF C	1830	6'	Male/Male	39R	HM38	HM38	Wrench Flats / Carburized	13.99	30.84
200479	ROD EXT M/M 3050 32H HM38 C	3050	10'	Male/Male	32H	HM38	HM38	Carburized	19.05	42.00
200365	ROD EXT M/M 3050 39R HM38 I	3050	10'	Male/Male	39R	HM38	HM38	Induction Hardened	24.22	53.40
200485	ROD EXT M/M 3050 39R HM38 WF C	3050	10'	Male/Male	39R	HM38	HM38	Wrench Flats / Carburized	22.45	49.49
200316	ROD EXT M/M 3050 39R HM38 WF I	3050	10'	Male/Male	39R	HM38	HM38	Wrench Flats / Induction Hardened	24.22	53.40
200366	ROD EXT M/M 3660 39R HM38 C	3660	12'	Male/Male	39R	HM38	HM38	Carburized	27.11	59.77
200375	ROD EXT M/M 3660 39R HM38 C	3660	12'	Male/Male	39R	HM38	HM38	Carburized	27.36	60.32
200367	ROD EXT M/M 4270 39R HM38 I	4270	14'	Male/Male	39R	HM38	HM38	Induction Hardened	31.62	69.71
200417	ROD EXT M/M 4880 39R HM38 I	4880	16'	Male/Male	39R	HM38	HM38	Induction Hardened	36.14	79.67
203000	ROD EXT M/M 4880 39R HM38T C	4880	16'	Male/Male	39R	HM38	HM38	Tandem / Carburized	38.80	85.54
203002	ROD EXT M/M 5490 39R HM38T C	5490	18'	Male/Male	39R	HM38	HM38	Tandem / Carburized	44.00	97.00

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

HM38 SYSTEM PART NUMBERS

GUIDE ROD

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
280032	ROD GUIDE 064 1220 38H HM38 C	1200	3' - 11 ¼"	Male/Female	38H	HM38	HM38	Carburized	11.78	25.97

PACKAGE SPECIFICATIONS

Packaged 1 per box.

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350045	COUPLING HM38 F/B 055 187	55	2 5/32"	187	7 23/64"	HM38	Full-Bridge	2.10	4.63
350002	COUPLING HM38 S/B 055 191	55	2 5/32"	191	7 33/64"	HM38	Semi-Bridge	1.81	4.00

PACKAGE SPECIFICATIONS

Packaged 1 per box.

ADAPTER COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
360018	COUPLING ADAPT F/B HM38 R32	55	2 5/32"	178	7"	HM38/R32	Full-Bridge	2.18	4.81
360031	COUPLING ADAPT F/B HM38 R38	55	2 5/32"	181	7 1/8"	HM38/R38	Full-Bridge	2.02	4.45

PACKAGE SPECIFICATIONS

Packaged 1 per box.

HM45 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110243	BIT BTN THD 070 HM45 BR6/3/1 H	70	2 ¾"	HM45	Recessed	6 x 11	3 x 11, 1 x 10	3F	Hemispherical	2.54	5.60
110790	BIT BTN THD 076 HM45 BF6/4 H	76	3"	HM45	Flat	6 x 12	4 x 11	3F 1G	Hemispherical	2.40	5.29
110204	BIT BTN THD 076 HM45 BF8/4 H	76	3"	HM45	Flat	8 x 11	4 x 11	2F 1G	Hemispherical	2.65	5.84
110713	BIT BTN THD 076 HM45 BF8/4 H	76	3"	HM45	Flat	8 x 12	4 x 12	2F 1G	Hemispherical	2.51	5.53
110216	BIT BTN THD 076 HM45 BR6/3/2 H	76	3"	HM45	Recessed	6 x 12	5 x 12	3F	Hemispherical	2.69	5.93
110722	BIT BTN THD 076 HM45 BR6/3/1 H	76	3"	HM45	Recessed	6 x 11	4 x 11	3F	Hemispherical	2.69	5.93
110723	BIT BTN THD 076 HM45 BR6/3/1 P	76	3"	HM45	Recessed	6 x 11	4 x 11	3F	Parabolic	2.69	5.93
110716	BIT BTN THD 089 HM45 BF8/4 H	89	3 ½"	HM45	Flat	8 x 14	4 x 14	2F 2G	Hemispherical	3.37	7.43
110766	BIT BTN THD 089 HM45 BF8/5 H	89	3 ½"	HM45	Flat	8 x 12	5 x 11	2F 2G	Hemispherical	3.50	7.72
110661	BIT BTN THD 089 HM45 BR6/3/2 H	89	3 ½"	HM45	Recessed	6 x 12	5 x 12	3F	Hemispherical	3.69	8.14
110786	BIT BTN THD 089 HM45 BF6/4 H	89	3 ½"	HM45	Flat	6 x 14	4 x 12	3F 1G	Hemispherical	3.26	7.19
110842	BIT BTN THD 089 HM45 BF8/6 P	89	3 ½"	HM45	Flat	8 x 12	6 x 12	2F	Parabolic	3.30	7.28
110724	BIT BTN THD 102 HM45 BR8/4/1 H	102	4"	HM45	Recessed	8 x 14	5 x 12	2F	Hemispherical	5.17	11.40
110725	BIT BTN THD 102 HM45 BR8/4/1 P	102	4"	HM45	Recessed	8 x 14	5 x 12	2F	Parabolic	5.62	12.39

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, BLADE

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
120307	BIT BLD THD 076 HM45 CRS G10	76	3"	HM45	28 x 16	1F 4G	Tent	3.29	Hemispherical	1.95	4.30
120100	BIT BLD THD 076 HM45 XBIT G10	76	3"	HM45	17 x 16	1F 2G	Tent	3.29	Hemispherical	1.92	4.23

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, RETRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (in)								METRIC (kg)	IMPERIAL (lb)
130058	BIT BTN RET 076 HM45 BR6/3/1 H	76	3"	HM45	Recessed	6 x 13	3 x 11, 1 x 10	3F	Hemispherical		3.46	7.63
130012	BIT BTN RET 076 HM45 BR6/3/1 H RF	76	3"	HM45	Recessed	6 x 13	3 x 11, 1 x 10	3F 3RV	Hemispherical	Reverse Flush	3.38	7.45
130080	BIT BTN RET 089 HM45 BR6/3/2 H	89	3 ½"	HM45	Recessed	6 x 12	5 x 12	3F	Hemispherical		5.40	11.90
130081	BIT BTN RET 102 HM45 BR8/4/1 H	102	4"	HM45	Recessed	8 x 14	5 x 12	3F	Hemispherical		8.30	18.30

PACKAGE SPECIFICATIONS

Packaged 1 per box.

HM45 SYSTEM PART NUMBERS

BITS, STRAIGHTRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (in)								METRIC (kg)	IMPERIAL (lb)
140132	BIT BTN STR 070 HM45 BR8/4/1 H	70	2 ¾"	HM45	Recessed	8 x 10	5 x 10	4F	Hemispherical		2.80	6.17
140039	BIT BTN STR 076 HM45 BR6/3/2 H	76	3"	HM45	Recessed	6 x 11	3 x 11, 2 x 10	3F	Hemispherical		3.17	6.99
140109	BIT BTN STR 076 HM45 BR8/4/1 H	76	3"	HM45	Recessed	8 x 11	5 x 11	4F 1G	Hemispherical		3.29	7.25
140114	BIT BTN STR 076 HM45 BR8/4/1 P	76	3"	HM45	Recessed	8 x 11	5 x 11	4F 1G	Parabolic		3.32	7.32
140176	BIT BTN STR 076 HM45 BR9/6/2 P	76	3"	HM45	Recessed	9 x 10	8 x 10	3F 1RF	Parabolic	Reverse Flush	2.46	5.42
140071	BIT BTN STR 089 HM45 BR8/4/2 H	89	3 ½"	HM45	Recessed	8 x 11	6 x 11	4F 1G	Hemispherical		4.99	11.00

PACKAGE SPECIFICATIONS

Packaged 1 per box.

BITS, PILOT REAMER

ITEM	DESCRIPTION	DIAMETER		THREAD	PILOT DIAMETER		GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	WEIGHT	
		METRIC (mm)	IMPERIAL (in)		METRIC (mm)	IMPERIAL (in)				METRIC (kg)	IMPERIAL (lb)
090027	BIT BTN PILOT 115 HM45 048 H	115	4 ½"	HM45	48	1 ⅞	8 x 12	2 x 12, 3 x 10	2F	5.54	12.21
090025	BIT BTN PILOT 127 HM45 048 H	127	5"	HM45	48	1 ⅞	8 x 14	2 x 14, 3 x 10	2F	5.66	12.48
090023	BIT BTN PILOT 152 HM45 089 H	152	6"	HM45	89	3 ½	9 x 16	6 x 16, 6 x 12	3F	14.72	33.45

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
210048	ROD EXT M/F 1220 46R HM45 C	1220	4'	Male/Female	46R	HM45	HM45	Carburized	14.99	33.05
210035	ROD EXT M/F 1520 46R HM45 C	1520	5'	Male/Female	46R	HM45	HM45	Carburized	18.49	40.76
210126	ROD EXT M/F 1830 46R HM45 C	1830	6'	Male/Female	46R	HM45	HM45	Carburized	22.48	49.56
210118	ROD EXT M/F 3050 46R HM45 2WF	3050	10'	Male/Female	46R	HM45	HM45	Wrench Flats / Carburized	34.74	76.59
210038	ROD EXT M/F 3660 46R HM45 C	3660	12'	Male/Female	46R	HM45	HM45	Carburized	42.46	93.61
210082	ROD EXT M/F 4270 46R HM45 C	4270	14'	Male/Female	46R	HM45	HM45	Carburized	49.11	108.27
200468	ROD EXT M/M 3050 46R HM45 C	3050	10'	Male/Male	46R	HM45	HM45	Carburized	32.65	71.98
200361	ROD EXT M/M 3050 46R HM45 I	3050	10'	Male/Male	46R	HM45	HM45	Induction Hardened	33.07	72.91
200486	ROD EXT M/M 3660 46R HM45 C	3660	12'	Male/Male	46R	HM45	HM45	Carburized	39.69	87.50
200362	ROD EXT M/M 3660 46R HM45 I	3660	12'	Male/Male	46R	HM45	HM45	Induction Hardened	39.68	87.48
200321	ROD EXT M/M 3660 46R HM45 WF I	3660	12'	Male/Male	46R	HM45	HM45	Wrench Flats / Induction Hardened	39.54	87.17
200386	ROD EXT M/M 4270 46R HM45 I	4270	14'	Male/Male	46R	HM45	HM45	Induction Hardened	46.29	102.05
200418	ROD EXT M/M 4730 46R HM45 I	4730	15' - 6 ¼"	Male/Male	46R	HM45	HM45	Induction Hardened	51.25	112.99
200464	ROD EXT M/M 4880 46R HM45 I	4880	16'	Male/Male	46R	HM45	HM45	Induction Hardened	53.49	117.93
200397	ROD EXT M/M 6100 46R HM45 I	6100	20'	Male/Male	46R	HM45	HM45	Induction Hardened	66.13	145.79

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

HM45 SYSTEM PART NUMBERS

GUIDE ROD

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
280033	ROD GUIDE 076 1220 46R HM45 C	1200	3' - 11 1/4"	Male/Female	46R	HM45	HM45	Carburized	17.31	38.16

PACKAGE SPECIFICATIONS

Packaged 1 per box.

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350034	COUPLING HM45 S/B 063 210	63	2 15/32"	210	8 17/64"	HM45	Semi-Bridge	2.74	6.04
350012	COUPLING HM45 S/B 066 210	66	2 19/32"	210	8 17/64"	HM45	Semi-Bridge	3.27	7.21
350046	COUPLING HM45 F/B 066 213	66	2 19/32"	213	8 3/8"	HM45	Full-Bridge	3.43	7.56

PACKAGE SPECIFICATIONS

Packaged 1 per box.

ADAPTER COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
360014	COUPLING ADAPT F/B HM45 HM38	76	3"	235	9 1/4"	HM45/HM38	Full-Bridge	5.41	11.93

PACKAGE SPECIFICATIONS

Packaged 1 per box.

HM51 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110219	BIT BTN THD 089 HM51 BF6/5 H	89	3 ½"	HM51	Flat	6 x 14	5 x 12	1F 2G	Hemispherical	4.07	8.97
110663	BIT BTN THD 089 HM51 BR6/3/2 H	89	3 ½"	HM51	Recessed	6 x 12	5 x 12	3F	Hemispherical	4.40	9.70
110421	BIT BTN THD 089 HM51 BR6/3/2 H	89	3 ½"	HM51	Recessed	6 x 14	5 x 12	3F	Hemispherical	4.56	10.05
110360	BIT BTN THD 089 HM51 BF8/6 H	89	3 ½"	HM51	Flat	8 x 12	6 x 12	2F 1G	Hemispherical	4.22	9.30
110501	BIT BTN THD 089 HM51 BF9/7 H	89	3 ½"	HM51	Flat	9 x 12	7 x 12	3F 1G	Hemispherical	6.15	13.56
110226	BIT BTN THD 102 HM51 BR6/3/2 H	102	4"	HM51	Recessed	6 x 16	3 x 14, 2 x 12	3F	Hemispherical	4.81	10.60
110703	BIT BTN THD 102 HM51 BR8/4/1 H	102	4"	HM51	Recessed	8 x 14	5 x 12	3F	Hemispherical	5.13	11.31
110500	BIT BTN THD 115 HM51 BF9/6 H	115	4 ½"	HM51	Flat	9 x 14	6 x 14	3F 1G	Hemispherical	7.10	15.65
110701	BIT BTN THD 115 HM51 BR8/4/2 H	115	4 ½"	HM51	Recessed	8 x 14	6 x 14	4F	Hemispherical	6.24	13.76
110699	BIT BTN THD 127 HM51 BR8/4/3 H	127	5"	HM51	Recessed	8 x 14	7 x 14	4F	Hemispherical	7.14	15.74
110923	BIT BTN THD 140 HM51 BR8/4/3 H	140	5 ½"	HM51	Recessed	8 x 16	7 x 16	4F	Hemispherical	10.90	24.03

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, RETRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
130101	BIT BTN RET 089 HM51 BR6/3/2 H	89	3 ½"	HM51	Recessed	6 x 12	5 x 12	3F	Hemispherical	4.87	10.74
130107	BIT BTN RET 089 HM51 BR6/3/2 P	89	3 ½"	HM51	Recessed	6 x 12	5 x 12	3F	Parabolic	5.45	12.02
130082	BIT BTN RET 102 HM51 BR8/4/1 H	102	4"	HM51	Recessed	8 x 14	5 x 12	2F	Hemispherical	8.54	18.83

PACKAGE SPECIFICATIONS

Packaged 1 per box.

BITS, STRAIGHTRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
140024	BIT BTN STR 089 HM51 BF6/4 H	89	3 ½"	HM51	Flat	6 x 14	4 x 12	3F	Hemispherical	4.68	10.32
140149	BIT BTN STR 089 HM51 BF8/6 H	89	3 ½"	HM51	Flat	8 x 12	6 x 12	2F	Hemispherical	4.60	10.14
140095	BIT BTN STR 089 HM51 BR8/4/2 P	89	3 ½"	HM51	Recessed	8 x 11	6 x 11	4F 1G	Parabolic	4.97	10.96
140033	BIT BTN STR 102 HM51 BF9/7 H	102	4"	HM51	Flat	9 x 12	7 x 12	3F	Hemispherical	8.36	18.43

PACKAGE SPECIFICATIONS

Packaged 1 per box.

HM51 SYSTEM PART NUMBERS

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
210042	ROD EXT M/F 3660 52R HM51 C	3660	12’	Male/Female	52R	HM51	HM51	Carburized	52.64	116.05
210083	ROD EXT M/F 4270 52R HM51 C	4270	14’	Male/Female	52R	HM51	HM51	Carburized	61.08	134.66
200487	ROD EXT M/M 3660 52R HM51 C	3660	12’	Male/Male	52R	HM51	HM51	Carburized	49.80	109.79
200363	ROD EXT M/M 3660 52R HM51 I	3660	12’	Male/Male	52R	HM51	HM51	Induction Hardened	49.80	109.79
200422	ROD EXT M/M 4270 52R HM51 I	4270	14’	Male/Male	52R	HM51	HM51	Induction Hardened	58.28	128.49
200364	ROD EXT M/M 6100 52R HM51 I	6100	20’	Male/Male	52R	HM51	HM51	Induction Hardened	83.49	184.06
200404	ROD EXT M/M 7320 52R HM51 I	7320	24’	Male/Male	52R	HM51	HM51	Induction Hardened	100.42	221.39

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350013	COUPLING HM51 S/B 072 235	72	2 53/64”	235	9 1/4”	HM51	Semi-Bridge	4.90	10.80
350014	COUPLING HM51 S/B 076 235	76	3”	235	9 1/4”	HM51	Semi-Bridge	4.98	10.80
350048	COUPLING HM51 F/B 076 251	76	3”	251	9 7/8”	HM51	Full-Bridge	5.58	12.30

PACKAGE SPECIFICATIONS

Packaged 1 per box.

ADAPTER COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
360035	COUPLING ADAPT F/B HM51 HM45	76	3”	235	9 1/4”	HM51/HM45	Full-Bridge	5.41	11.93

PACKAGE SPECIFICATIONS

Packaged 1 per box.

BE58 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110727	BIT BTN THD 089 BE58 BF9/6 H	89	3 ½"	BE58	Flat	9 x 12	6 x 12	3F	Hemispherical	4.13	9.11
110270	BIT BTN THD 102 BE58 FF8/7 H	102	4"	BE58	Flat	8 x 14	7 x 12	2F 2G	Hemispherical	4.85	10.69

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, STRAIGHTRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
140189	BIT BTN STR 089 BE58 BR8/4/1 P	89	3 ½"	BE58	Recessed	8 x 12	4 x 12, 1 x 11	4F	Parabolic	4.34	9.57
140187	BIT BTN STR 089 BE58 BR9/6/2 H	89	3 ½"	BE58	Recessed	9 x 12	6 x 11, 2 x 11	3F	Hemispherical	4.34	9.57

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
210089	ROD EXT M/F 4270 60R BE58EX C	4270	14'	Male/Female	60R	BE58	BE58	Bottom Drive	83.27	183.58

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

EL60 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110888	BIT BTN THD 115 EL60 BR8/4/2 H	115	4 ½"	EL60	Recessed	8 x 14	6 x 14	4F	Hemispherical	9.98	22.00
110889	BIT BTN THD 127 EL60 BR8/4/3 H	127	5"	EL60	Recessed	8 x 14	7 x 14	4F	Hemispherical	11.34	25.00

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, RETRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
130114	BIT BTN RET 102 EL60 BR8/5 H	102	4"	EL60	Recessed	8 x 14	5 x 12	2F	Hemispherical	6.53	14.40
130115	BIT BTN RET 115 EL60 BR8/6 H	115	4 ½"	EL60	Recessed	8 x 14	7 x 14	4F	Hemispherical	10.50	23.15

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		OTHER	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
200530	ROD EXT M/M 4270 60R EL60 I	4270	14'	Male/Male	60R	EL60	EL60	Induction Hardened	81.29	179.21
200543	ROD EXT M/M 6100 60R EL60 I	6100	20'	Male/Male	60R	EL60	EL60	Induction Hardened	116.26	256.31

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350057	COUPLING EL60 S/B 083 168	83	3 17/64"	279	10 63/64"	EL60	Semi-Bridge	5.85	12.90

PACKAGE SPECIFICATIONS

Packaged 1 per box.

ADAPTER COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
360045	COUPLING ADAPT F/B EL60 HM51	83	3 17/64"	276	10 5/64"	EL60/HM51	Full-Bridge	8.65	19.07

PACKAGE SPECIFICATIONS

Packaged 1 per box.

EL68 SYSTEM PART NUMBERS

BITS, BUTTON

ITEM	*DESCRIPTION*	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
110943	BIT BTN THD 108 EL68 BF8/6 B	108	4 ¼"	EL68	Flat	8 x 16	6 x 16	2F	Ballistic	8.50	18.74
110675	BIT BTN THD 115 EL68 BR8/4/2 H	115	4 ½"	EL68	Recessed	8 x 14	6 x 14	4F	Hemispherical	10.43	23.00
110705	BIT BTN THD 127 EL68 BF8/7 H	127	5"	EL68	Flat	8 x 14	7 x 14	2F	Hemispherical	11.34	25.00
110677	BIT BTN THD 127 EL68 BR8/4/3 H	127	5"	EL68	Recessed	8 x 14	7 x 14	4F	Hemispherical	10.83	23.88
110706	BIT BTN THD 140 EL68 BF8/7 H	140	5 ½"	EL68	Flat	8 x 16	7 x 16	2F	Hemispherical	12.31	27.14
110679	BIT BTN THD 140 EL68 BR8/4/3 H	140	5 ½"	EL68	Recessed	8 x 16	7 x 16	4F	Hemispherical	11.85	26.12
110681	BIT BTN THD 152 EL68 BR8/4/3 H	152	6"	EL68	Recessed	8 x 16	7 x 16	4F	Hemispherical	14.06	31.00

PACKAGE SPECIFICATIONS

Package includes 10 bits.

BITS, RETRAC

ITEM	DESCRIPTION	DIAMETER		THREAD	FACE PROFILE	GAUGE CARBIDE	FACE CARBIDE	FLUSHING HOLES	CARBIDE PROFILE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)							METRIC (kg)	IMPERIAL (lb)
130070	BIT BTN RET 127 EL68 BR8/4/3 H	127	5"	EL68	Recessed	8 x 14	7 x 14	4F	Hemispherical	13.18	29.06

PACKAGE SPECIFICATIONS

Packaged 1 per box.

RODS, PRODUCTION

ITEM	DESCRIPTION	LENGTH		ROD ENDS	ROD CROSS SECTION	THREAD		ROD ENDS	WEIGHT	
		METRIC (mm)	IMPERIAL (ft)			BIT END	ROD END		METRIC (kg)	IMPERIAL (lb)
203003	ROD EXT M/M 1000 70R EL68 I	1000	3' - 3 3/8"	Male/Male	70R	EL68	EL68	Induction Hardened	26.30	57.98
200426	ROD EXT M/M 3660 70R EL68 I	3660	12'	Male/Male	70R	EL68	EL68	Induction Hardened	98.19	216.47
200424	ROD EXT M/M 6100 70R EL68 I	6100	20'	Male/Male	70R	EL68	EL68	Induction Hardened	164.16	361.91

BUNDLE SPECIFICATIONS

Various bundle sizes available. Please speak with your sales representative.

COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
350051	COUPLING EL68 S/B 096 330	96	3 49/64"	330	12 63/64"	EL68	Semi-Bridge	9.66	21.30
350052	COUPLING EL68 F/B 096 356	96	3 49/64"	356	14 1/64"	EL68	Full-Bridge	11.37	25.07

PACKAGE SPECIFICATIONS

Packaged 1 per box.

EL68 SYSTEM PART NUMBERS

ADAPTER COUPLINGS

ITEM	DESCRIPTION	DIAMETER		LENGTH		THREAD	TYPE	WEIGHT	
		METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)			METRIC (kg)	IMPERIAL (lb)
360039	COUPLING ADAPT F/B EL68 HM51	96	3 49/64"	305	12"	EL68/HM51	Full-Bridge	5.41	11.93

PACKAGE SPECIFICATIONS

Packaged 1 per box.

SHANK ADAPTERS

SHANK ADAPTER PART NUMBERS

BLY

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450270	SHK BL HD150 HM38 045/495	HD125/HD150	HM38	38	1 ½"	45	1 ¾"	495	19 ½"	Sep FI	5.71	12.59
450012	SHK BL HD150 R38 045/495	HD125/HD151	R38	38	1 ½"	45	1 ¾"	495	19 ½"	Sep FI	5.72	12.61
450500	SHK BL HD155 HM38 055/575	HD155	HM38	38	1 ½"	55	2 5/32"	575	22 5/8"	Sep FI	8.71	19.20
450565	SHK BL HD155 HM45 055/575	HD155	HM45	38	1 ½"	55	2 5/32"	575	22 5/8"	Sep FI	8.95	19.73
450652	SHK BL HD155 R38 055/575	HD155	R38	38	1 ½"	55	2 5/32"	575	22 5/8"	Sep FI	8.71	19.20
450125	SHK BL HD65 R32 045/445	HD65	R32	32	1 ¼"	45	1 ¾"	445	17 ½"	Sep FI	4.20	9.26
450691	SHK BL HD65 R32F 045/324	HD65	R32F	32	1 ¼"	45	1 ¾"	324	12 ¾"	Sep FI	3.47	7.65
450131	SHK BL HE150 HM38 045/572	HE125/HE150	HM38	38	1 ½"	45	1 ¾"	572	22 ½"	Sep FI	6.38	14.07
450077	SHK BL HE150 R32 045/572	HE125/HE150	R32	38	1 ½"	45	1 ¾"	572	22 ½"	Sep FI	6.10	13.45
450078	SHK BL HE150 R32F 045/428	HE125/HE150	R32F	38	1 ½"	45	1 ¾"	428	16 55/64"	Sep FI	5.00	11.02
450345	SHK BL HE150 R38 045/572	HE125/HE150	R38	38	1 ½"	45	1 ¾"	572	22 ½"	Sep FI	6.40	14.11
450344	SHK BL HE65 R32 045/483	HE65	R32	32	1 ¼"	45	1 ¾"	483	19"	Sep FI	4.66	10.27
450074	SHK BL HE65 R32F 045/324	HE65	R32F	32	1 ¼"	45	1 ¾"	324	12 ¾"	Sep FI	3.47	7.65
450777	SHK BL S140 HM38 045/495	S140	HM38	45	1 ¾"	45	1 ¾"	495	19 ½"	Sep FI	5.75	12.68
450778	SHK BL S140 HM45 045/495	S140	HM45	45	1 ¾"	45	1 ¾"	495	19 ½"	Sep FI	5.90	13.01
450266	SHK BL S36IR HM38 045/381	S36IR	HM38	45	1 ¾"	45	1 ¾"	381	15"	14	3.70	8.16
450010	SHK BL S36IR HM45 045/381	S36IR	HM45	45	1 ¾"	45	1 ¾"	381	15"	14	4.18	9.22
450212	SHK BL S36IR R32 045/381	S36IR	R32	45	1 ¾"	45	1 ¾"	381	15"	14	3.49	7.69
450037	SHK BL S36IR R38 045/381	S36IR	R38	45	1 ¾"	45	1 ¾"	381	15"	14	3.79	8.36

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

CANNON

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450454	SHK CAN JH2 HM38F 055/390	JH2	HM38F	38	1 ½"	55	2 5/32"	390	15 23/64"	Sep Fl	5.03	11.09

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

ATLAS COPCO

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450721	SHK COP 1432 R32F 055/340	1432	R32F	34	1 21/64"	55	2 5/32"	340	13 25/64"	Sep Fl	4.76	10.49
450660	SHK COP 1432 R38(F) 055/340	1432	R38F	34	1 21/64"	55	2 5/32"	340	13 25/64"	Sep Fl	4.38	9.66
450089	SHK COP 1032HD R32F 045/340	1032HD	R32F	25	31/32"	45	1 3/4"	340	13 25/64"	Sep Fl	3.52	7.76
450286	SHK COP 1238ME HM38 038/476	1238ME	HM38	34	1 21/64"	38	1 1/2"	476	18 3/4"	Sep Fl	4.26	9.39
450282	SHK COP 1238ME HM38 038/500	1238ME	HM38	34	1 21/64"	38	1 1/2"	500	19 5/8"	Sep Fl	4.40	9.70
450284	SHK COP 1238ME HM38 038/575	1238ME	HM38	34	1 21/64"	38	1 1/2"	575	22 5/8"	Sep Fl	4.84	10.67
450632	SHK COP 1238ME HM45 045/575	1238ME	HM45	34	1 21/64"	45	1 3/4"	575	22 5/8"	Sep Fl	5.67	12.50
450155	SHK COP 1238ME HM45 045/575	1238ME	HM45	34	1 21/64"	45	1 3/4"	575	22 5/8"	Sep Fl	6.25	13.78
450809	SHK COP 1238ME R25F 038/485	1238ME	R25F	34	1 21/64"	38	1 1/2"	485	19 1/8"	Sep Fl	4.04	8.91
450092	SHK COP 1238ME R32 038/500	1238ME	R32	34	1 21/64"	38	1 1/2"	500	19 5/8"	Sep Fl	4.20	9.26
450094	SHK COP 1238ME R32 038/575	1238ME	R32	34	1 21/64"	38	1 1/2"	575	22 5/8"	Sep Fl	4.69	10.34
450150	SHK COP 1238ME R38 038/476	1238ME	R38	34	1 21/64"	38	1 1/2"	476	18 3/4"	Sep Fl	4.26	9.39
450423	SHK COP 1238ME R38 038/486	1238ME	R38	34	1 21/64"	38	1 1/2"	486	19 1/8"	Sep Fl	4.42	9.74
450450	SHK COP 1550/1838 HM45 052/540	1550/1838	HM45	34	1 21/64"	52	2 3/64"	540	21 1/4"	Sep Fl	6.58	14.51
450569	SHK COP 1838ME HM38 052/525	1838ME	HM38	34	1 21/64"	52	2 3/64"	525	20 5/8"	Sep Fl	6.35	14.00
450713	SHK COP 1838ME HM45 052/525	1838ME	HM45	34	1 21/64"	52	2 3/64"	525	20 5/8"	Sep Fl	6.35	14.00
450570	SHK COP 1838ME HM45 052/525	1838ME	HM45	34	1 21/64"	52	2 3/64"	525	20 5/8"	Sep Fl	6.35	14.00
450605	SHK COP 1838MEX HM38 060/730	1838MEX	HM38	34	1 21/64"	60	2 23/64"	730	28 3/4"	Sep Fl	7.93	17.48
450607	SHK COP 1838MEX HM45 060/730	1838MEX	HM45	34	1 21/64"	60	2 23/64"	730	28 3/4"	Sep Fl	7.93	17.48
450550	SHK COP 1838T HM38 038/435	1838T	HM38	36	1 13/32"	38	1 1/2"	435	17 1/8"	Sep Fl	3.86	8.51
450551	SHK COP 1838T HM38 038/525	1838T	HM38	36	1 13/32"	38	1 1/2"	525	20 5/8"	Sep Fl	4.32	9.52
450614	SHK COP 1838T R32 038/435	1838T	R32	36	1 13/32"	38	1 1/2"	435	17 1/8"	Sep Fl	3.81	8.40
450631	SHK COP 1838T R32 038/525	1838T	R32	36	1 13/32"	38	1 1/2"	525	20 5/8"	Sep Fl	4.04	8.91
450469	SHK COP 1838T R38 038/435	1838T	R38	36	1 13/32"	38	1 1/2"	435	17 1/8"	Sep Fl	3.81	8.40
450810	SHK COP 1838T R38 038/455	1838T	R38	36	1 13/32"	38	1 1/2"	455	17 29/32"	Sep Fl	4.00	8.82
450791	SHK COP 1838T R38 038/525	1838T	R38	36	1 13/32"	38	1 1/2"	525	20 5/8"	Sep Fl	4.20	9.26

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

FURUKAWA

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450492	SHK FUR HCR609 HM38 045/619	HCR609	HM38	35.7	1 13/32"	45	1 3/4"	619	27 3/8"	Sep Fl	6.10	13.45
450555	SHK FUR HCR609 HM38 045/690	HCR609	HM38	35.7	1 13/32"	45	1 3/4"	690	27 5/32"	Sep Fl	6.88	15.17
450761	SHK FUR HD210 HM38 040/409	HD210	HM38	41	1 5/8"	40	1 9/16"	409	16 7/64"	Sep Fl	4.10	9.04
450442	SHK FUR HD300 HM38 044/655 16	HD300	HM38	44	1 23/32"	44	1 23/32"	654	25 3/4"	Sep Fl	5.89	12.99
450443	SHK FUR HD300 HM45 044/654 16	HD300	HM45	44	1 23/32"	44	1 23/32"	654	25 3/4"	Sep Fl	6.51	14.35
450745	SHK FUR HD500 HM45 18/711	HD500	HM45	50	1 61/64"	52	2 3/64"	711	28"	Sep Fl	8.73	19.25
450525	SHK FUR HD609 HM45 045/690	HD609	HM45	35.7	1 13/32"	45	1 3/4"	690	27 5/32"	Sep Fl	6.41	14.13
450486	SHK FUR HD612 HM45 051/670	HD612	HM45	41.7	1 41/64"	51	2"	670	26 3/8"	Sep Fl	8.88	19.58
450576	SHK FUR HD612 HM45 051/710	HD612	HM45	41.7	1 41/64"	51	2"	710	28"	Sep Fl	9.46	20.86
450562	SHK FUR HD615 HM51 058/880	HD615	HM51	48	1 7/8"	58	2 9/32"	880	34 5/8"	Sep Fl	13.97	30.80
450724	SHK FUR HD712 HM45 051/590	HD712	HM45	50	1 61/64"	51	2"	590	23 1/4"	Sep Fl	8.30	18.30
450795	SHK FUR HD712 HM45 051/790	HD712	HM45	50	1 61/64"	51	2"	790	31 3/32"	Sep Fl	9.39	20.70
450823	SHK FUR HD715RP HM51 057/882	HD715RP	HM51	58	2 9/32"	57	2 1/4"	882	34 23/32"	Sep Fl	15.87	34.99
450534	SHK FUR HD90 R38 040/500	HD90	R38	32	1 1/4"	40	1 9/16"	500	19 5/8"	Sep Fl	4.36	9.61

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

GARDNER DENVER

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450326	SHK GD HPR1 HM38 044/597	HPR1	HM38	38	1 ½"	44	1 23/32"	597	23 1/4"	Sep Fl	6.55	14.44
450667	SHK GD HPR1H HM38 044/745	HPR1H	HM38	44	1 23/32"	44	1 23/32"	745	29 21/64"	Sep Fl	8.80	19.40
450629	SHK GD HPR1H HM45 044/745	HPR1H	HM45	44	1 23/32"	44	1 23/32"	745	29 21/64"	Sep Fl	8.80	19.40
450582	SHK GD HPR2 EL68 070/1041	HPR2	EL68	64	2 ½"	70	2 ¾"	1041	41"	Sep Fl	24.19	53.33
450638	SHK GD HPR2 HM51 051/914	HPR2	HM51	51	2"	51	2"	914	36"	Sep Fl	13.38	29.50
450640	SHK GD HPR2 HM51 070/1041	HPR2	HM51	64	2 ½"	70	2 ¾"	1041	41"	Sep Fl	22.88	50.44
450818	SHK GD HPR45 HM38 044/770	HPR45	HM38	44	1 23/32"	44	1 23/32"	770	30 5/16"	Sep Fl	9.07	20.00
450760	SHK GD HPR45 HM45 044/770	HPR45	HM45	44	1 23/32"	44	1 23/32"	770	30 5/16"	Sep Fl	9.07	20.00
450825	SHK GD HPR51 HM45 051/770	HPR51	HM45	51	2"	51	2"	770	30 5/16"	Sep Fl	11.88	16.19
450824	SHK GD HPR51 HM51 051/770	HPR51	HM51	51	2"	51	2"	770	30 5/16"	Sep Fl	12.20	16.90
450644	SHK GD HPRHC HM38 038/560	HPRHC	HM38	38	1 ½"	38	1 ½"	560	22 3/64"	Sep Fl	5.28	11.64
450645	SHK GD HPRHC HM38 038/700	HPRHC	HM38	38	1 ½"	38	1 ½"	700	27 9/16"	Sep Fl	6.24	13.76
450643	SHK GD HPRHC R38 038/560	HPRHC	R38	38	1 ½"	38	1 ½"	560	22 3/64"	Sep Fl	5.28	11.64
450774	SHK GD HPRHCU HM38 038/641	HPRHCU	HM38	38	1 ½"	38	1 ½"	641	25 1/4"	Sep Fl	7.77	17.13
450014	SHK GD PR1000 R32 032/510	PR1000	R32	44	1 23/32"	32	1 1/4"	510	20 5/64"	Sep Fl	4.63	10.21
450002	SHK GD PR1000 R32 044/499	PR1000	R32	44	1 23/32"	44	1 23/32"	499	19 11/16"	Sep Fl	5.22	11.51
450269	SHK GD PR66 HM38 044/711	PR66	HM38	44	1 23/32"	44	1 23/32"	711	28"	Sep Fl	6.22	13.71

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

INGERSOLL RAND

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450495	SHK IR YH50 HM38 038/440 16	YH50	HM38	40	1 9/16"	38	1 1/2"	440	17 5/16"	16	3.90	8.60
450460	SHK IR YH65 HM38 045/500 19	YH65	HM38	46	1 51/64"	45	1 3/4"	500	19 5/8"	19	5.15	11.35
450375	SHK IR YH65 HM45 045/500 19	YH65	HM45	46	1 51/64"	45	1 3/4"	500	19 5/8"	19	5.61	12.37
450468	SHK IR YH65RP HM45 045/700 19	YH65RP	HM45	46	1 51/64"	45	1 3/4"	700	27 9/16"	19	9.23	20.35
450467	SHK IR YH65RP HM38 045/700 19	YH65RP	HM38	46	1 51/64"	45	1 3/4"	700	27 9/16"	19	7.98	17.59
450735	SHK IR YH80A HM45 051/495 19	YH80A	HM45	46	1 51/64"	51	2"	495	19 1/2"	19	6.52	14.37
450813	SHK IR YH80A HM51 051/495 19	YH80A	HM51	46	1 51/64"	51	2"	495	19 1/2"	19	6.38	14.07
450399	SHK IR YH95RP HM51 051/840 25	YH95RP	HM51	53	2 55/64"	51	2"	840	33"	25	10.61	23.39
450568	SHK IR YH110 HM51 055/727	YH110	HM51	53	2 55/64"	55	2 5/32"	727	28 5/8"	Sep Fl	10.43	23.00
450832	SHK IR URD475 HM38 44/381 14	URD475	HM38	44	1 23/32"	44	1 23/32"	381	15"	14	3.59	7.91

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

MONTABERT

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450354	SHK MON H100 HM38 044/537 14	H100	HM38	44	1 23/32"	44	1 23/32"	537	21 9/64"	14	5.69	12.54
450613	SHK MON HC120 HM38 045/490	HC120	HM38	38	1 1/2"	45	1 3/4"	490	19 1/4"	Sep Fl	4.99	11.00
450612	SHK MON HC120 HM45 045/490	HC120	HM45	38	1 1/2"	45	1 3/4"	490	19 1/4"	Sep Fl	5.19	11.44
450678	SHK MON HC120R HM45 051/770	HC120R	HM45	38	1 1/2"	51	2"	770	30 5/16"	Sep Fl	10.44	23.02
450782	SHK MONT HC200A EL60 060/1016	HC200A	EL60	51	2"	60	2 23/64"	1016	40"	Sep Fl	19.01	41.91
450438	SHK MON HC40 HM38 038/447	HC40	HM38	38	1 1/2"	38	1 1/2"	447	17 5/8"	Sep Fl	4.13	9.11
450749	SHK MON HC40 R28F 038/255	HC40	R28F	38	1 1/2"	38	1 1/2"	255	10 1/32"	Sep Fl	2.11	4.65
450455	SHK MON HC40 R32 038/447	HC40	R32	38	1 1/2"	38	1 1/2"	447	17 5/8"	Sep Fl	4.08	8.99
450314	SHK MON HC40 R38 038/390	HC40	R38	38	1 1/2"	38	1 1/2"	390	15 23/64"	Sep Fl	3.36	7.41
450586	SHK MON HC80 HM38 038/448	HC80	HM38	38	1 1/2"	38	1 1/2"	448	17 5/8"	Sep Fl	4.01	8.84
450172	SHK MON HC80 HM38 038/500	HC80	HM38	38	1 1/2"	38	1 1/2"	500	19 5/8"	Sep Fl	4.32	9.52
450485	SHK MON HC80 R32 038/440	HC80	R32	38	1 1/2"	38	1 1/2"	440	17 5/16"	Sep Fl	4.13	9.11
450110	SHK MON HC80 R38 038/440	HC80	R38	38	1 1/2"	38	1 1/2"	440	17 5/16"	Sep Fl	4.20	9.26

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

TAMROCK

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450412	SHK TAM HL1000 BE58 080/624	HL1000	BE58	50	1 61/64"	80	3 9/64"	624	24 9/16"	Sep Fl	17.37	38.29
450111	SHK TAM HL1000 HM51 052/670	HL1000	HM51	50	1 61/64"	52	2 3/64"	670	26 3/8"	Sep Fl	10.74	23.68
450783	SHK TAM HL1500 BE58 080/614	HL1500	BE58	50	1 61/64"	80	3 9/64"	614	24 11/64"	Sep Fl	16.94	37.35
450671	SHK TAM HL1500 BE68T 080/632	HL1500	BE68T	50	1 61/64"	80	3 9/64"	632	24 57/64"	Sep Fl	17.77	39.18
450654	SHK TAM HL300 R32 032/400	HL300	R32	37	1 29/64"	32	1 1/4"	400	15 3/4"	Sep Fl	2.55	5.62
450475	SHK TAM HL300S R32F 045/245	HL300S	R32F	37	1 29/64"	45	1 3/4"	245	9 21/32"	Sep Fl	2.73	6.02
450406	SHK TAM HL500 HM38 038/550	HL500	HM38	37	1 29/64"	38	1 1/2"	550	21 5/8"	Sep Fl	4.77	10.52
450537	SHK TAM HL500 HM45 045/550	HL500	HM45	37	1 29/64"	45	1 3/4"	550	21 5/8"	Sep Fl	5.76	12.70
450662	SHK TAM HL500 R38 038/500	HL500	R38	37	1 29/64"	38	1 1/2"	500	19 5/8"	Sep Fl	5.12	11.29
450405	SHK TAM HL500S HM38 038/460	HL500S	HM38	37	1 29/64"	38	1 1/2"	460	18 7/64"	Sep Fl	4.22	9.30
450408	SHK TAM HL500S R32 038/460	HL500S	R32	37	1 29/64"	38	1 1/2"	460	18 7/64"	Sep Fl	4.10	9.04
450470	SHK TAM HL500S R32F 045/350	HL500S	R32F	37	1 29/64"	45	1 3/4"	350	32 5/32"	Sep Fl	4.10	9.04
450407	SHK TAM HL500S R38 038/460	HL500S	R38	37	1 29/64"	38	1 1/2"	460	18 7/64"	Sep Fl	4.26	9.39
450690	SHK TAM HL500S R38 038/460	HL500S	R38	37	1 29/64"	38	1 1/2"	460	18 7/64"	Sep Fl	4.26	9.39
450031	SHK TAM HL538 R38 038/450	HL538	R38	38	1 1/2"	38	1 1/2"	460	18 7/64"	Sep Fl	4.01	8.84
450445	SHK TAM HL550 HM38 045/500	HL550	HM38	37	1 29/64"	45	1 3/4"	500	19 5/8"	Sep Fl	5.31	11.71
450466	SHK TAM HL550 R38 045/500	HL550	R38	37	1 29/64"	45	1 3/4"	500	19 5/8"	Sep Fl	5.47	12.06
450382	SHK TAM HL600 HM38 045/600	HL600	HM38	39	1 17/32"	45	1 3/4"	600	23 5/8"	Sep Fl	6.25	13.78
450383	SHK TAM HL600 HM45 045/600	HL600	HM45	39	1 17/32"	45	1 3/4"	600	23 5/8"	Sep Fl	6.53	14.40
450636	SHK TAM HL600S HM38 045/525	HL600S	HM38	39	1 17/32"	45	1 3/4"	525	20 5/8"	Sep Fl	5.86	12.92
450430	SHK TAM HL600S HM45 045/525	HL600S	HM45	39	1 17/32"	45	1 3/4"	525	20 5/8"	Sep Fl	6.12	13.49
450427	SHK TAM HL600S R32 045/525	HL600S	R32	39	1 17/32"	45	1 3/4"	525	20 5/8"	Sep Fl	5.70	12.57
450700	SHK TAM HL700 HM38 052/600	HL700	HM38	42	1 41/64"	52	2 3/64"	600	23 5/8"	Sep Fl	7.94	17.50
450603	SHK TAM HL700 HM45 052/600	HL700	HM45	42	1 41/64"	52	2 3/64"	600	23 5/8"	Sep Fl	8.05	17.75
450575	SHK TAM HL700 HM51 052/600	HL700	HM51	42	1 41/64"	52	2 3/64"	600	23 5/8"	Sep Fl	8.16	17.99
450189	SHK TAM HL859 HM38 052/500	HL859	HM38	47	1 27/32"	52	2 3/64"	500	19 5/8"	Sep Fl	5.53	12.19
450728	SHK TAM HLX5 HM38 045/500	HLX5	HM38	37	1 29/64"	45	1 3/4"	500	19 5/8"	Sep Fl	5.20	11.46
450827	SHK TAM HLX5 HM38 045/519	HLX5	HM38	37	1 29/64"	45	1 3/4"	519	20 15/32"	Sep Fl	5.30	11.68
450816	SHK TAM HLX5 HM38 045/575	HLX5	HM38	37	1 29/64"	45	1 3/4"	575	22 5/8"	Sep Fl	6.02	13.27
450811	SHK TAM HLX5 HM45 045/575	HLX5	HM45	37	1 29/64"	45	1 3/4"	575	22 5/8"	Sep Fl	6.02	13.27
450734	SHK TAM HLX5 R38 045/500	HLX5	R38	37	1 29/64"	45	1 3/4"	500	19 5/8"	Sep Fl	5.20	11.46
450205	SHK TAM L400 R32 032/381 10	L400	R32	32	1 1/4"	32	1 1/4"	381	15"	10	2.15	4.74

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

SHANK ADAPTER PART NUMBERS

TOYO

ITEM	DESCRIPTION	ROCK DRILL	THREAD	STRIKE FACE		FRONTHEAD		LENGTH		Flushing Tube	WEIGHT	
				METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	IMPERIAL (in)	METRIC (mm)	METRIC (kg)	IMPERIAL (lb)
450489	SHK TOYO TH501 HM38 045/565 12	TH501	HM38	44	1 23/32"	45	1 3/4"	565	22 1/4"	12	5.47	12.06
450799	SHK TOYO TH501 HM45 045/565 12	TH501	HM45	44	1 23/32"	45	1 3/4"	565	22 1/4"	12	5.47	12.06
450763	SHK TOYO TH921 HM45 045/750	TH921	HM45	45	1 3/4"	45	1 3/4"	750	29 9/16"	Sep Fl	9.20	20.29

SHANK BUNDLE SPECIFICATIONS

Items are packaged individually

ACCESSORIES

ACCESSORIES PART NUMBERS

BIT ADAPTER

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
370008	BIT ADAPT M/F R38 R32	235	9 1/4"
370009	BIT ADAPT M/F HM38 R32	292	11 31/64"
370010	BIT ADAPT M/F R32(M) R38(F)	241	9 31/64"
370014	BIT ADAPT M/F HM45 HM38	260	10 15/64"
370015	BIT ADAPT M/F HM51(M)HM45(F)	305	12"
370022	BIT ADAPT M/F R32 R25	200	7 55/64"
370031	BIT ADAPT M/F HM38 HM45	292	11 31/64"
370037	BIT ADAPT M/F R32 HM38	222	8 47/64"
370038	BIT ADAPT M/F R28 R32	254	10"
370045	BIT ADAPT M/F HM45 R32	222	8 47/64"

GUIDE ADAPTER

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
400021	**GUIDE HM38 GRV 064 0700**	**698**	**27 15/32"**
400023	**GUIDE HM45 GRV 089 0708**	**708**	**27 55/64"**

SPLIT SET DRIVER

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
560017	DRIVER SS 025 R38F 250	254	10"
560001	DRIVER SS 027 CLR 250	368	14 31/64"
560014	DRIVER SS 027 11* 190	190	7 15/32"
560040	DRIVER SS 027 R28F 190	190	7 15/32"
560027	DRIVER SS 027 CLR 330	330	13"
560015	DRIVER SS 032 11* 190	190	7 15/32"
560016	DRIVER SS 032 R25F 190	190	7 15/32"
560019	DRIVER NUT 30S CLR 610	680	26 49/64"
560023	DRIVER NUT 30S CLR 1520	1594	62 3/4"

SPEAR

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
620004	SPEAR R32	222	8 47/64"
620006	SPEAR HM38	289	11 3/8"
620007	SPEAR HM45	292	11 31/64"
620008	SPEAR HM51	308	12 1/8"
620015	SPEAR BE68	355	13 31/32"
620016	SPEAR BE58	330	13"

ACCESSORIES PART NUMBERS

BELL TAP

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
630004	BELL TAP R32	216	8 1/2"
630006	BELL TAP HM38	225	8 27/32"
630007	BELL TAP HM45	254	10"
630008	BELL TAP HM51	318	12 33/64"
630013	BELL TAP EL60	324	12 3/4"

KNOCK OFF BLOCK

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
660001	KOB K-1 H22	109	4 9/32"
660002	KOB K-1 H25	123	4 53/64"
660003	KOB K-6 H22 RMG	109	4 9/32"

GAUGE H22 CHUCK

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
SC3720	GAUGE, CHUCK WEAR	NA	NA

REAMING SHELL ADAPTER

ITEM	DESCRIPTION	LENGTH	
		METRIC (mm)	IMPERIAL (in)
380019	REM ADAPT PILOT TPR 11*6* 30	115	4 33/64"
690001	REM ADAPT PILOT TPR PO 22X12*	102	4 1/64"

THIS PAGE LEFT INTENTIONALLY BLANK

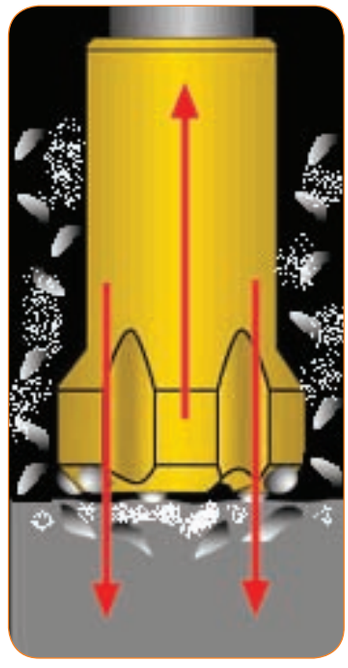
CARE AND HANDLING

CARE AND HANDLING

Bit Wear Overview

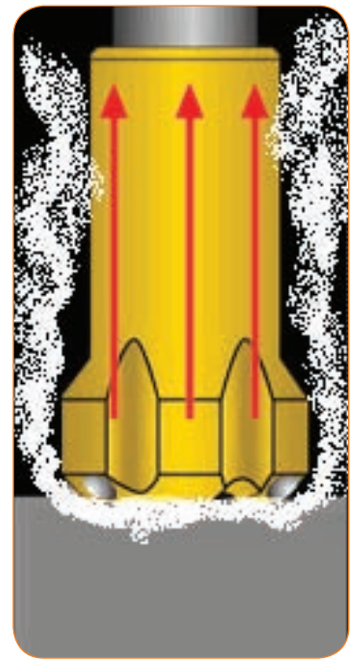
SHARP BIT

The percussive energy transferred into the rock is optimized, large rock chips are produced and the penetration rate is maximized.



FLATS DEVELOPING

The energy utilization is less effective after flats develop. Button penetration is decreased, more material is pulverized and smaller rock chips are produced. Less percussive energy is transferred into the rock and the unused energy is reflected back up the drill string, dissipating as heat and vibration. Bits should be sharpened before the wear flat widths reach 1/3 of the button diameter. Drilling with the wear flat wider than 1/3 of the button diameter increases the risk of shattering the carbide.



EXCESSIVE WEAR

At this point button penetration is typically at its lowest. Much of the material in contact with the buttons is pulverized beneath the wear flats. The steel bit face is making contact with the hole bottom. Fewer and smaller rock chips are produced and much of the energy is reflected back up the drill string. This sacrifices the life of the drill string components and increases the wear and tear on your drill rig components. Additional crushing and pulverizing of the drill cuttings trapped between the bit matrix and the hole bottom occurs, further reducing penetration.

CARE AND HANDLING

Bit Wear Patterns

GAUGE WEAR

In some materials such as hard sand stone and quartzite, the wear tends to be greater on the bit circumference. Most of the wear is on the outside buttons on the periphery, creating a tendency for bits to round off on the circumference. Thus, when the buttons are sharpened, the diameter across the gauge buttons will be less than the diameter of the bit shoulders and the bit will tend to bind in the hole. The bit shoulder circumference will have to be ground down to restore adequate clearance and avoid this binding in the holes. The bit face will also, most likely, require grinding to restore button protrusion.

BODY WASH

When drilling in non-abrasive materials, where carbide wear is minimal, extended drilling intervals are possible. This allows for prolonged chip removal around the bits and will wear away the bit body to a greater extent than the buttons. Similar wear occurs in fractured and loose materials where excessive agitation and grinding of the materials is required for hole cleaning and to keep the hole open during retraction. To prevent tearing out buttons and button shear under these conditions, the protrusion should be reduced by scheduling grinding intervals to grind down the buttons.

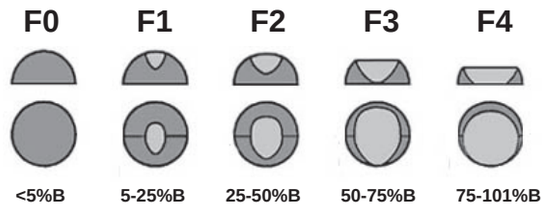
OVER DRILLING

The detrimental effects of over drilling bits may not be immediately apparent. However, an often neglected reality is that running dull bits not only slows down the drilling rates but escalates drilling costs by reducing life on the drilling tool components, the rock drills and the drill rig components. Overdrilling is also unquestionably responsible for over 90% of all premature button failures. It is a well-documented fact that premature button bit insert failures are reduced substantially when over drilling is eliminated and proper sharpening is performed.

CARE AND HANDLING

Product Servicing - Button Bits

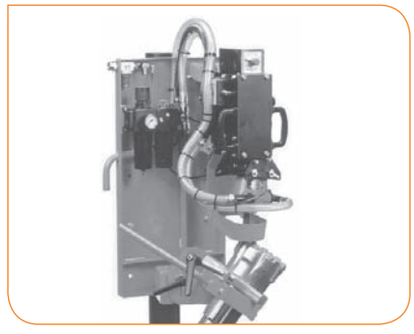
Large wear flats or the presence of snakeskin on the surfaces of buttons can lead to button failure. Similarly if the protrusion of the buttons above the level of the steel becomes reduced, penetration rates will drop and wear flats will develop rapidly. Under these conditions it is necessary to redress the bit to restore it, as near as possible, to its original geometry.



(Where B = Button Diameter)

Button Reshaping

If button protrusion is adequate, satisfactory resharpening can be achieved by use of a performed diamond faced tool. Sharpening is effected by holding the tool firmly against the button and orbiting the machine in a circle to achieve a uniform surface finish. Diamond faced tools are designed to cut carbide and not steel. It is therefore essential that ample protrusion of the button exists before the diamond tools are used. Where button protrusion is low, steel must be removed from the head before redressing of the button is attempted.



Steel Removal

Cylindrical tools of cubic boron nitride are available to remove an annular ring of steel from around the buttons prior to redressing them. This operation should be repeated with each sharpening, to maintain optimum protrusion and penetration rate during drilling. Alternative methods employed for steel removal are shot blasting and electrical de-plating.

Parabolic Bits

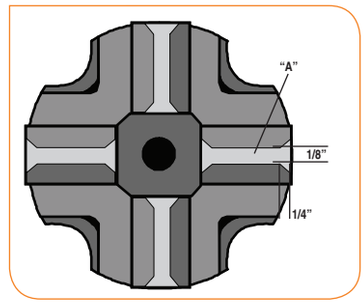
To maintain the parabolic configuration, parabolic cup grinding pins are available. However, most operators tend to let their parabolic bits wear dull and then resharpen to the hemispherical shape. The fundamental rule in button bit servicing is to restore the bits to the original shape and the buttons to the original profile and protrusion.

CARE AND HANDLING

Product Servicing - Blade Bits

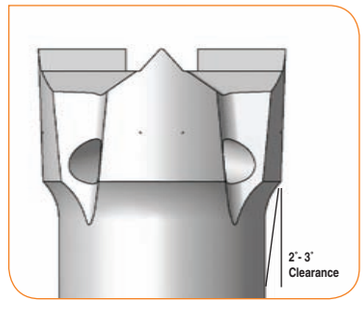
Tungsten carbide blade bits are precision tools, manufactured from high-quality material and engineered to provide the best results during the most difficult drilling conditions. Tungsten carbide is resistant to shock and wear, and for maximum results should be properly used and maintained. When sharpening bits, the idea is to restore them as closely as possible to their original 'tent' shape.

Inspect the Bit Frequently



Frequent inspection of a bit is necessary to prevent overdrilling. "A" indicates the worn edges of a used bit. Bits must be sharpened when the flat is wider than 1/8". When measuring the wear flat, take the measurement 1/4" from the outside of the bit. The point of greatest wear is usually the outside corners of the inserts. When this corner wear exceeds 3/16" the bit must be sharpened even though maximum flats may not have developed.

Check the Gauge or Clearance Angle



To ensure easy penetration with minimum gauge loss, check the gauge angle when sharpening bits. Depending on the bit diameter and type of rock being drilled this angle should be 2° - 3°. A condition of anti-taper gauge will develop if the gauge or clearance angle becomes negative and the outside insert corner wear is excessive. This will cause the bit to "pinch" in the hole resulting in carbide insert fractures.

Gauge Grind Protruding Inserts

Drilling in abrasive rock will result in the steel wearing faster than the inserts. The protruding inserts, lacking sufficient steel support, can easily break while drilling and also when retracting the bit from the hole. To prevent this from occurring, gauge grind all protruding inserts flush with the steel body.

CARE AND HANDLING

Blade Bit Sharpening

Silicon carbide grinding wheels are coded according to grit size, hardness, density, and bond variants. When resharpening blade bits, it is essential that the correct grade of wheel is used. If the wheel is too “hard”, overheating of the carbide takes place causing cracking and rapid destruction of the insert. A soft wheel will wear out rapidly and produce a lot of grinding debris.

Typical Code: - C-46-J5-V6
C - Green Silicon Carbide (only acceptable type)
46 - Grit size (sieve meshes per inch). The higher the number, the finer the grit.
J - Hardness code (A softest, Z hardest)
5 - Structure number (low number = more dense and higher number = more porous)
V - Vitrified bond
6 - Manufacturers code for bond modification

Overheating during grinding causes:
- Surface oxidation of the carbide inserts
- Micro-cracks in the surface of the carbide inserts
- High stresses in the surface of the inserts, which may cause cracks when drilling commences
- Macro-cracks in the carbide inserts

Possible causes of overheating are:
- Pressure of insert against grinding wheel too high
- Inadequate coolant
- Grinding wheel grade too fine or too hard
- “Closing up” of grinding wheel surface which may be due to: bond too strong, inadequate feed pressure, clogging with steel/braze alloy/carbide
- Prolonged contact with grinding wheel (this isolates the carbide insert surface from coolant).

Indications of overheating include:
- Glazed or shining appearance of ground surface (when the carbide insert has been ground correctly it should have a uniform matt-grey appearance).
- Browning or blueing of steel surface.
- Micro-cracks in surface of the carbide insert (usually these are easier to see after the bit has drilled a few meters).
- Macro-cracks in insert.

WARNING

NOTE: Use appropriate eye protection, masks and ventilation when grinding drilling bits. Grinding wheels and tungsten carbide inserts contain: Tungsten Carbide (12070-12-1); Cobalt (7740-48-4); Tantalum (12070-06-3); Chromium (11130-49-7); Nickel; Aluminum and Silicon. Grinding tungsten carbide inserts release particles containing these elements that can irritate skin, eye, nose, throat and can result in lung damage.

CARE AND HANDLING

Bit Service Life

With proper care and handling procedures being adhered to, the following chart provides a rough estimate of the number of regrinds one can expect while drilling. It is important to note that a bit may not appear to have any visible wear once they reach these estimates but, should still be serviced. By doing so, all fatigue microfractures (snakeskin) are removed from the carbide surface.

PRODUCT	ABRASIVE ROCK	NON-ABRASIVE ROCK
Tapered Bits		
No. of Regrinds	5	10
Regrind Interval	12 m (40’)	18 m (60’)
Service Life Drilled	76 m (250’)	152 m (500’)
Threaded Blade Bit		
No. of Regrinds	6	12
Regrind Interval	12 m (40’)	18 m (60’)
Service Life Drilled	91 m (300’)	244 m (800’)
Threaded Button Bit (< 57 mm)		
No. of Regrinds	3	4
Regrind Interval	18 m (60’)	24 m (80’)
Service Life Drilled	84 m (275’)	130 m (275’)
Threaded Button Bit (> 57 mm)		
No. of Regrinds	4	6
Regrind Interval	18 m (60’)	30 m (100’)
Service Life Drilled	99 m (325’)	221 m (725’)
Down-the-Hole Bits		
No. of Regrinds	8	12
Regrind Interval	30 m (100’)	46 m (150’)
Service Life Drilled	244 m (800’)	550 m (1800’)

CARE AND HANDLING

Drill Steel Service Life

If following proper drill steel rotation guidelines, the life of a drill steel is equal to the number of holes drilled times the drill steel length.

Rock Conditions

Favorable	Normal	Rough
600	300	150

Service Life in No. of Holes

When drilling deep holes with multiple drill steels, the following formula can be used to calculate average drill steel life.

$$\frac{\text{Rod Feet}}{\text{Hole Feet}} = \frac{N\,(L+D)}{2D}$$

D = Hole Depth
N = Number of Rods in String
K = $\frac{D+1}{2}$

L = Rod Length
Rod Feet = Hole Feet x K

Coupling Service Life

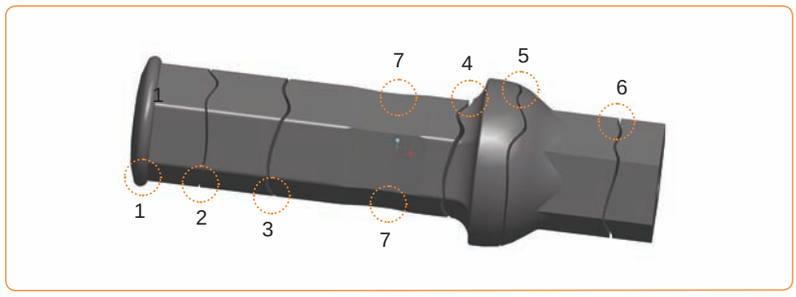
The coupling service life is equal to that of a single thread drill steel.

Shank Adapter Service Life

A shank adapters service life can range between 915-1524 m (3000-5000 ft).

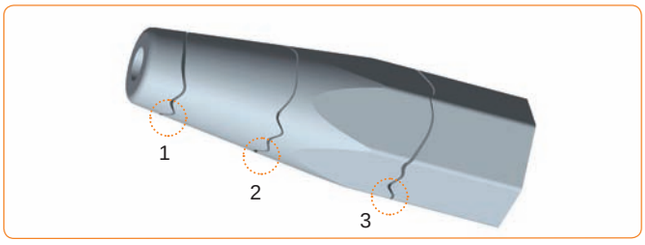
TROUBLE SHOOTING

Collared and Tapered Rod Failures
Shank Ends Forged



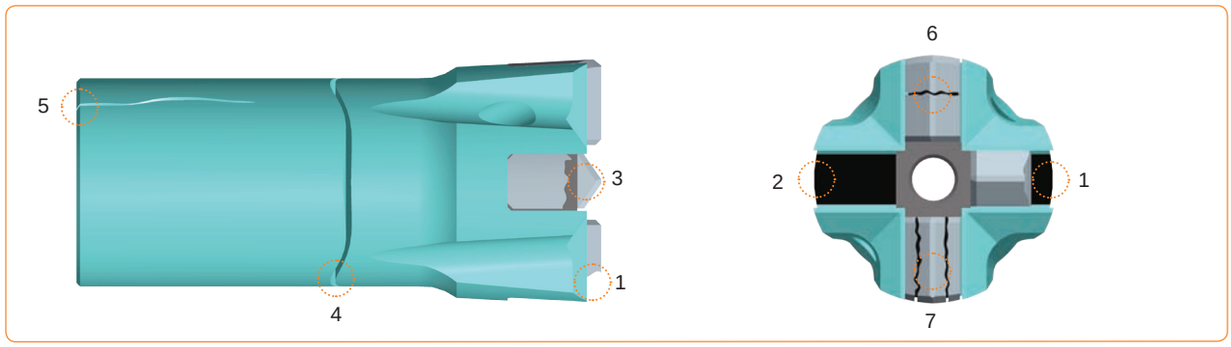
FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Mushrooming of striking end	i) Worn chuck bushing	i) Replace worn bushing
	ii) Dished piston	ii) Replace worn piston
	iii) Worn tapppet or tappet bushing	iii) Replace tappet and/or bushing
	iv) Insufficient hardness, heat treatment not to specification	iv) Forward for anaylysis
POSITION - 2 Failure at beginning of shank end	i) Worn chuck bushing	i) Replace worn bushing
POSITION - 3	i) High polish generated by chuck bushing. Lack of lubrication or excessive flushing water pressure	i) Check operation pressures - lubrication, water and air pressure
	ii) Worn bushing	ii) Replace worn bushing
POSITION - 4 Breakage at beginning of collar radius	i) Poor chuck bushing radius causing indentation of the collar	i) Replace worn bushing
	ii) Overheating due to lack of lubrication	ii) Proper lubrication
	iii) Misalignment due to excessive play in bushing	iii) Replace worn bushing
POSITION - 5 Failure in collar	i) Poor forging practice giving distorted water hole	i) Forward for analysis
POSITION - 6 Broken in bar	i) Normally associated with rod alignment	i) Keep rod alignment as close as possible
	ii) Insufficient hardness, heat treatment not to specification	ii) Forward for analysis
POSITION - 7 Shank wear or coke bottle wear	i) Worn chuck bushing	i) Replace worn bushing
	ii) Insufficient hardness, heat treatment not to specification	ii) Forward for analysis

Collared and Tapered Rod Failures
Socket Ends



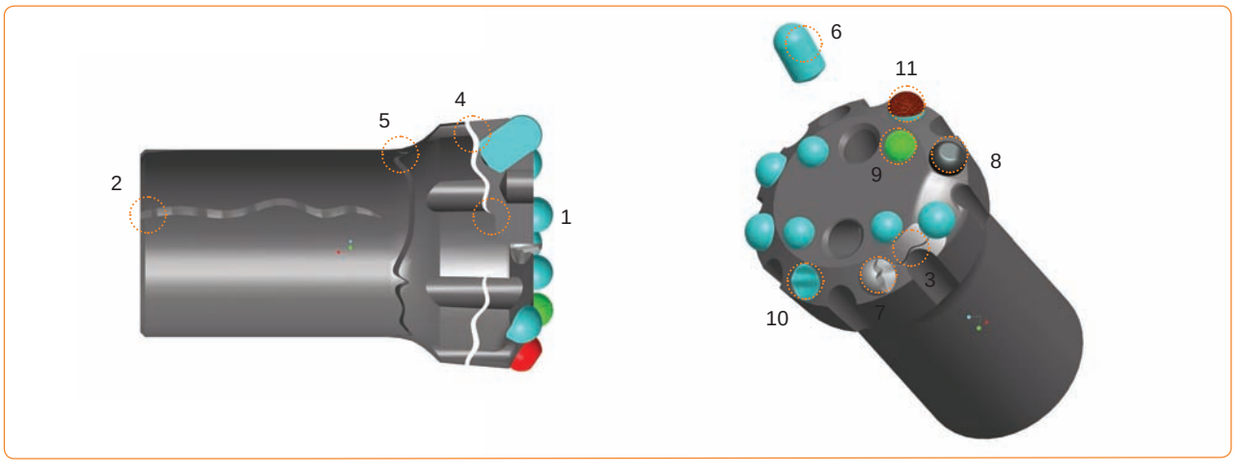
FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Breakage at beginning of taper radius	i) Worn bit socket	i) Discard bit
	ii) Improper reconditioning of rod taper	ii) Replace or recondition drill steel
	iii) Using a damaged bit with a ridge or lip withing the socket	iii) Discard bit or ream out ridge
POSITION - 2 Breakage at end of taper radius	i) Worn bit socket	i) Discard bit
	ii) Improper reconditioning of rod taper	ii) Replace or recondition drill steel
	iii) Using a damaged bit with a ridge or lip withing the socket	iii) Discard bit or ream out ridge
POSITION - 3 Breakage at bar	i) Normally associated with rod alignment	i) Keep rod alignment as close as possible
	ii) Insufficient hardness, heat treatment not to specification	ii) Send for analysis

Blade Bit Failures



FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Insert corner fractured	i) Pinching in the hole by drilling into hole that was drilled with a smaller bit	i) Colour code bits by size to reduce opportunity for negative gauge clearance. Drill with the bit with the largest gauge thread reducing to smaller.
	ii) Overdrilling - excessive gauge wear	ii) Resharpening bit when corner wear is no greater than 4.76 mm (3/16”)
	iii) Improper bit sharpening	iii) Resharpen bit to its’ original shape. Follow proper bit sharpening procedures
POSITION - 2 Insert detached from slot	i) Braze failure - fatigue of braze material	i) Forward for analysis
POSITION - 3 Insert shattered	i) Overdrilling - excessive gauge wear	i) Resharpen bit when wear flat no greater than 3.175 mm (1/8”)
	ii) Incorrect grade of carbide	ii) Utilize heavy duty grade
	iii) Overheating bit when resharpening	iii) Resharpening bit to its’ original shape. Follow proper bit sharpening procedures
	iv) Insufficient flushing	iv) Increase flushing pressure
POSITION - 4 Skirt wring off	i) Improper or worn taper	i) Utilizing a taper gauge, check taper angle
	ii) Drilling with broken taper	ii) Remove drill steel from circuit and refurbish
	iii) Insufficient skirt hardness	iii) Forward for analysis
POSITION - 5 Skirt split	i) Improper or worn taper	i) Utilizing a taper gauge check taper angle
	ii) Insufficient skirt hardness	ii) Forward for analysis
POSITION - 6 Traverse crack	i) Carbide grade too hard	i) Select bit with a softer, more tough grade of carbide
POSITION - 7 Longitudinal cracks	i) Overdrilling - excessive flat	i) Resharpen bit when wear flat no greater than 3.175 mm (1/8”)

Button Bit Failures



FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Body wash	i) Inadequate bailing	i) Check to ensure that maximum available flushing is employed. If bailing appears to be inadequate, try cleaning holes thoroughly after drilling each steel length. Continued drilling with poor bailing will wear bit bodies excessively
	ii) Drilling and excessive hole cleaning in loose and fractured material	ii) Do not use new bits in these applications. Use bits approaching the end of their usable life. Bits with missing buttons unsuitable for regular drilling can still be suitable for soft or broken ground conditions
POSITION - 2 Split skirt	i) Bit loose on rod	i) Do not engage percussion until bit is seated on rod
	ii) Hammering on bit to break connection	ii) Loosen bit while seated firmly on face or at botton of the hole
POSITION - 3 Steel crack between buttons	i) Interference between buttons too big	i) Forward for analysis
POSITION - 4 Steel crack between button socket base	i) Interference between buttons too big ii) No copper shim	i) Forward for analysis
POSITION - 5 Wring off	i) High rotation torque applied to stuck bit	i) Apply minimal amount of hammer pressure to free bit before increaseing rotation presures
	ii) Corrosion	ii) Inspect thread socket for pitting and rust
	iii) Breaking connection by hammering on bit	iii) Loosen bit while seated firmly on face or at bottom of the hole
	iv) Machining marks in thread undercut	iv) Forward for analysis

Button Bit Failures (cont'd)

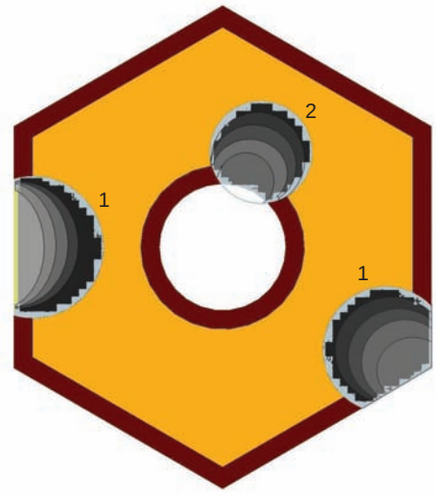
FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 6 Lost gauge button	i) Dry firing	i) Do not engage full percussion unless the bits are seated firmly against solid material. Use reduced percussion when collaring on uneven surfaces if the bits hang up in the hole and when ratting the drill string to loosen connections
	ii) Exessive bit body reduction through erosion from poor flushing or excessive bit body grinding	ii) Ensure the drill cuttings are adequately bailed. Avoid drilling in broken and fractured material where excessive hole cleaning or back drilling is required. Remove only the amount of body required to restore proper button protrusion while grinding
	iii) Scaling with bit	iii) Use proper scaling tools
	iv) Interference too low when button fitted	iv) Forward for analysis
POSITION - 7 Shattered buttons	i) Overdrilling	i) 90% of all button failures are the direct result of continuing to drill with excessive wear flats on the buttons! Remove and service bits once the wear flat on any button reaches 1/3 of the face button diameter. Restore the button profile and protrusion as recommended in the bit shapening guide before continuing use
	ii) Drilling into metal	ii) Even new buttons will break when encountering foreign material like stuck steel, bits, re-bar or any other metals trapped in the rock
	iii) Forceful rotation in undersize holes, in broken material or through voids in the rock	iii) Check that bit diameters are smaller than the hole before attempting to clean or deepen a hole under these conditions. Do not force bits if jamming occurs. Retract until rotation freely then advance slowly with moderate rotation. If this fails, use a scrapped bit or grind down the gauge buttons of the bit to reduce the diameter sufficiently to pass or remove the obstruction
	iv) Snake skin fatigue from extended drilling in non-abrasive material	iv) Over drilling in soft non-abrasive material leaves a shiny surface on the buttons. Under magnification, a network of microscopic cracks can typically be found. Regularly inspect the bits and re-profile the buttons to remove these cracks from the surface of the carbides once the skin on the carbides starts to show

Button Bit Failures (cont'd)

FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 8 Sheared buttons above or below the bit body	i) Forceful rotation against intrusions, in broken material or through voids in the rock	i) Jerky rotation and stalling indicates obstructions in the hole. Do not force bits if this occurs. Retract the string until free rotation is restored. Then advance slowly with moderate roations until obstacle is passed or removed. If this fails, use scrapped bits, a smaller diameter bit or grind down the gauge buttons of the bit to reduce the diameter sufficiently to pass or remove the obstruction
	ii) Poor collaring	ii) First, ensure mast is secure. Start collar then full pressure once bit is embedded 300 mm (12.0") in the rock
	iii) Excessive button protrusion through incorrect sharpening	iii) Protrusions greater than 3/4 of the button diameter will not provide sufficient support to resist the tensile forces that the buttons may encounter
	iv) Deformation of the upper portion of the button hole. Possible overheating of the bits through improper use	iv) The bit body temperature during drilling can reach 200° C (392° F) reducing retention force significantly
POSITION - 9 Split button	i) Overdrilling	i) 90% of all button failures are the direct result of continuing to drill with excessive wear flats on the buttons. Remove and service bits once the wear flat on any button reaches 1/3 of the face button diameter. Restore the button profile and protrusion as recommended in the bit sharpening guide before continuing use
	ii) Interference too high when button fitted	ii) Forward for analysis
POSITION - 10 Button wear 1/3 diameter	i) Normal button wear	i) Resharpen button and restore to original profile
POSITION - 11 Snake skin, shiny-polished appearance	i) When drilling in non-abrasive rock, microfractures develop in carbide	i) Resharpen bits frequently even if no visible wear is evident

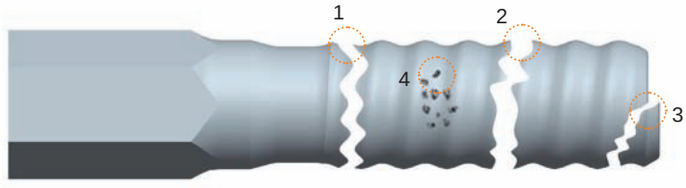
Drill Steel Failures

Fatigue failure is the inevitable consequence in drill steel subjected to repeated compressive load cycles. As the level of stress per load cycle increases so does the number of cycles required to exceed the material fatigue limit decrease. The optimum goal for drill steel design is that the fatigue limits of the material should exceed the wear life. Under normal drilling conditions then, drill steel should wear out without failure. However, when subjected to unusual stress levels due to misuse, or the fatigue limit is reduced through damage to the steel surfaces failures can occur. In nearly all failure cases the metal fatigue fracture is initiated at the point of the damaged surface and spreads. A catastrophic failure of the remaining steel cross section then follows. In extreme cases of bending or excessive stress, catastrophic failure can also occur without evidence of any fatigue stress.



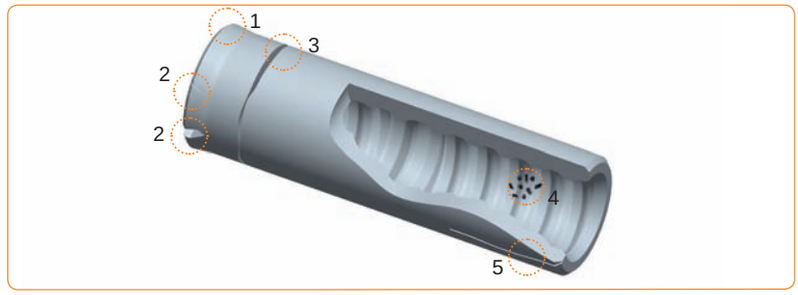
FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Characterised by a fatigue rose origination from the outer surface. Surface layer of steel compromised by a nick or dent.	i) Surface damage caused by worn out centralizer bushings or steel bushings	i) Replace centralizer if diameter is 5 mm (1/2”) larger than the drill steel
	ii) Using a hammer on a stuck steel	ii) Use a rod wrench to twist the stuck steel to loosen
	iii) Improper care and handling	iii) Store rods in a rod rack when retracting drill string. Do not drop rods
POSITION - 2 Characterised by a fatigue rose originated in the bore	i) Corrosion	i) Evaluate proper storage practices are being followed
	ii) Corrosion caused by brine and other corrosive flushing agents	ii) Change out components more frequently or neutralize flushing agent
	iii) Improper corrosion treatment during manufacturing	iii) Forward for analysis
	iv) internal defect in steel	iv) Forward for analysis

Drill Steel Failures



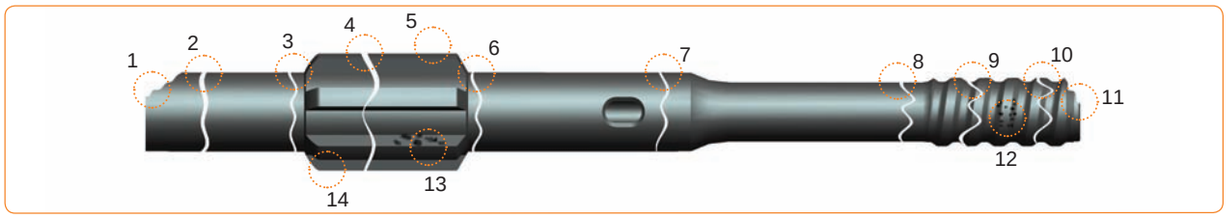
FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Failure occurs where coupling ends or above the thread radius. Typically a sudden failure	i) Wandering or drifting hole	i) Employ straight hole drilling devices or systems
	ii) Worn threads and/or coupling. Migrating coupling (bridge worn out)	ii) Replace worn components. Do not put a worn coupling on a new rod. Change out your couplings with new rods
	iii) Bending due to overfeeding	iii) Montitor feed force and tune to rock conditions
	iv) Bending due to misalignment	iv) Utilize alignment tools to monitor hole orientation once the hole has been collared. Replace wear pads on feed
	v) Excessive rotation during rod retraction	v) Adjust drilling pressures
	vi) Heavy rotational loads caused by drilling with a dull bit and increased reflected stress	vi) Resharpen bits when the wear flats appear 1/3 dull or discard when carbide profile height is compromised
	vii) Drilling in voids, seams and/or broken conditions	vii) Adjust drilling pressures and tune to rock conditions
	viii) Continued percussion when drill steel jams in void or seam	viii) Use drill with anti-jam features. Reduce feed and percussion pressure
POSITION - 2 Fatigue through high surface tensile or shear stress, occurring 1/3 the way into the threads	i) Worn threads or surface galling	i) Replace worn components
	ii) Surface layer of thread damaged by a nick or dent caused by improper care and handling	ii) Store rods in a rod rack when retracting drill string. Do not drop rods
POSITION - 3 Chip broken off end of drill steel	i) Too much play in coupling. Drill steels improperly joined in coupling as a result of a thread or bridge wear	i) Replace worn components
	ii) Hammering end of steel on coupling	ii) Use a breakout plate to loosen joints
POSITION - 4 Galling in the threads and excessive heat (color change to blue)	i) Unused energy from percussive blow being reflected backwards to the drilling machine	i) Adjust drilling pressures and tune to rock conditions
	ii) Drilling with dull bits	ii) Resharpen bits when the wear flats appear 1/3 dull or discard when carbide profile height is compromised

Coupling Failures



FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Mushrooming of end	i) Hammering on the centralizer	i) Utilize a breakout plate
POSITION - 2 Coupling end is chipped, cracked and/or flared	i) Drill rod not firmly seated into the coupling from mismatch of threads	i) It is important to standardize on single source supplier for components to ensure proper thread tolerance. Do not “mix & match”
	ii) Mixing old thread components with new	ii) Install new couplings with new drill steels
	iii) Misalignment of feed	iii) Service affected equipment
	iv) Previous overheating of coupling	iv) The maximum running temperature for couplings is 182° C (276° F)
	v) Improper heat treatment	v) Forward for analysis
	vi) Dropping steel when retracting on upholes	vi) Use rockdrill with shank thread engaged to lower steel
	vii) Starting percussion or rotation with end of the shank resting against the end of the coupling	vii) Do not engage percussion or rotation if shank thread end is not aligned inside coupling
POSITION - 3 Failure across thread section	i) Hole deviation or misalignment of the feed in relation to the hole direction	i) Employ straight hole drilling devices
	ii) Low feed pressure	ii) Monitor feed force and tune to conditions
	iii) Heavy rotational loads from drilling with dull bits	iii) Resharpen bits wehn the wear flats appear 1/3 dull or dicard when carbide profile height is compromised
	iv) Surface layer of steel compromised by a nick or dent	iv) Avoid hammering on connection. Use a breakout plate to loosen joints. Employ proper care and handling
POSITION - 4 Pitting or galling in the threads	i) Unused blow energy being reflected and absorbed	ii) Adjust percussion and feed pressures to rock conditions
	ii) Drilling with dull bits	ii) Resharpen bits when the wear flats appear 1/3 dull or discard when carbide profile height is compormised
POSITION - 5 Split coupling	i) Drilling with worn threads	i) Replace couplings more frequently
	ii) Excessive feed pressure	ii) Monitor feed force and tune to conditions

Shank Adapter Failures



FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Impact marks, chipped corners, mushroomed end	i) Misalignment due to worn bushings	i) Replace worn components
	ii) Damaged piston	ii) Replace worn components
POSITION - 2 Failure approx. 25 mm (1.0”) from strike face	i) Worn chuck driver	i) Replace worn components
	ii) Fatigue starting at water seal recess	ii) Forward for analysis
POSITION - 3 Failure at top of splines	i) Lack of lubrication	i) Grease rockdrill regularly
	ii) Excessive feed force	ii) Monitor coupling temperatures and adjust feed pressure according to recommendations
	iii) Worn chuck driver or front bushing	iii) Replace worn components
POSITION - 4 Failure across splines	i) Worn chuck driver	i) Replace worn components
	ii) Heavy rotational torque	ii) Adjust drilling pressures
	iii) Lack of lubrication	iii) Grease rockdrill regularly
	iv) Overdrilling bits excessive wear flats and insufficient button protrusion	iv) Resharpen bits when the wear flats appear 1/3 dull or discard when carbide profile height is compromised. Inspect bits and select only bits with adequate protrusion and proper button profile for most cost effective drilling.
	v) Inadequate feed force	v) Monitor coupling temperatures and adjust feed pressure according to recommendations
POSITION - 5 Wear on bottom of spline shoulder	i) Excessive rotation while retracting string	i) Adjust drilling pressures
POSITION - 6 Failure at bottom of splines	i) Excessive rotation while retracting string	i) Adjust drilling pressures
POSITION - 7 Failure at fronthead	i) Misalignment from worn front bushing	i) Replace worn components
	ii) Lack of lubrication	ii) Grease rockdrill regularly
POSITION - 8 Failure above threads	i) Misalignment of drill feed while drilling	i) Utilize alignment tools to monitor hole orientation once the hole has been collared. Replace wear pads on feed
	ii) Hole deviation	ii) Employ straight hold drilling devices or systems
	iii) Excessive feed force	iii) Monitor coupling temperatures and adjust feed pressure according to recommendations

Shank Adapter Failures (cont'd)

FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 9 Failure in main body of threads	i) Mismatched threads	i) Use only certified original Boart Longyear component from authorized or licensed manufacturers
	ii) Lack of lubrication	ii) Grease rockdrill regularly
	iii) Too much play in coupling. Shank Adapter improperly joined in coupling as a result of a thread wear	iii) Replace worn components. Do not put a worn coupling on a new rod. Change out couplings with new shank adapters
	iv) Excessive rattling	iv) Avoid extensive rattling. Boart Longyear threads are designed for easy uncoupling. If connectors do not loosen freely, inspect the threads. Probably causes of tightly threaded connections are: (1) dull bits; (2) worn or tight-fitting threads on steel or couplings; (3) incorrect or tight-fitting threads; and (4) insufficient or ineffective thread trease.
POSITION - 10 Failure close to bottom of thread	i) Exessive percussive pressure	i) Monitor coupling temperature during drilling; adjust percussive pressures
	ii) Broken drill steel	ii) Replace drill steel
	iii) Worn coupling	iii) Replace worn components. Do not put a worn coupling on a new rod. Change out your couplings with new rods
POSITION - 11 Chipped thread end	i) Shank Adapter not properly coupled to drill steel	i) Replace damaged or worn couplings
	ii) Broken drill steel	ii) Replace drill steel
	iii) Drill steel end not square	iii) Forward for analysis
	iv) Shank Adapter dropped into coupling	iv) Inspect feed for misalignment
POSITION - 12 Pitting and galling on threads	i) Overdrilling bit. Excessive wear flats and insufficient butt protrusion	i) Resharpen bits when the wear flats appear 1/3 dull or discard when carbide profile height is compromised. Inspect bits and select only bits with adequate protrusion and proper button profile for most cost effective drilling
	ii) Lack of lubrication	ii) Grease rockdrill regularly
	iii) Inadequate feed force	iii) Monitor coupling temperatures and adjust feed pressure according to recommendations
POSITION - 13 Pitting and galling on splines	i) Lack of lubrication	i) Grease rockdrill regularly
	ii) Excessive rotation in soft or broken ground	ii) Adjust drilling pressures
POSITION - 14 Excessive wear on top of spline shoulder	i) Excessive feed force	i) Monitor coupling temperatures and adjust feed pressure according to recommendations
	ii) Lack of lubrication	ii) Grease rockdrill regularly

WARRANTY

Limited Warranty.

(a) Consumables. Boart Longyear warrants for a period of one (1) year after the date of shipment of the consumable products manufactured by it, or the performance of related services, under the Contract, that such consumable products are free from defects in materials and workmanship and such services are performed in a professional and workmanlike manner; provided, however, with respect to consumable products purchased through an authorized Boart Longyear distributor, the warranty period shall commence on the date of purchase by the end-user.

(b) Capital Equipment. Boart Longyear warrants for a period equal to the lesser of (i) one (1) year after the date of shipment, or (ii) the initial 1,000 operating hours. Boart Longyear warrants for a period of six (6) months after the performance of related services that such services are performed in a professional and workmanlike manner.

(c) General Terms. Boart Longyear further warrants that, to the extent applicable, as of the date of shipment or performance, all goods manufactured by it and services performed shall conform to the written specifications agreed between the parties. THIS IS BOART LONGYEAR'S ONLY WARRANTY. BOART LONGYEAR MAKES NO OTHER WARRANTY, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. As a condition to Boart Longyear's warranty obligations, any goods claimed to be defective under the foregoing warranty must be returned to the facility designated by Boart Longyear, which return shall be made promptly upon Purchaser's discovery of the alleged defect. With respect to consumable products purchased through an authorized Boart Longyear distributor, the party making the warranty claim must also deliver to Boart Longyear reasonable evidence of the date of purchase. Boart Longyear shall perform its examination of the goods so returned by Purchaser and shall report the results of its examination to Purchaser within thirty (30) days following its receipt of such goods from Purchaser, or, if longer time is required to complete such examination, within such time as would be required through the exercise of reasonable diligence. As a further condition to Boart Longyear's obligations hereunder for breach of warranty, Purchaser shall offer its reasonable cooperation and assist Boart Longyear in the course of Boart Longyear's review of any warranty claim. If requested by Purchaser, Boart Longyear will promptly repair or replace at Boart Longyear's expense. Goods that are non-conforming according to Boart Longyear's warranty as set forth herein. All removal and installation of goods shall be at Purchaser's expense. Boart Longyear reserves the right to reimburse Purchaser for an amount equal to the purchase price of any defective goods in lieu of providing repaired or replacement goods. Anything contained herein to the contrary notwithstanding, in no event shall Boart Longyear be liable for breach of warranty or otherwise in any manner whatsoever for: (i) normal wear and tear; (ii) corrosion, abrasion or erosion; (iii) any goods, components, parts, software or services which, following delivery or performance by Boart Longyear, has been subjected to accident, abuse, misapplication, modification, improper repair, alteration, improper installation or maintenance, neglect, or excessive operating conditions; (iv) defects resulting from Purchaser's specifications or designs or those of its contractors or subcontractors other than Boart Longyear; (v) defects associated with consumable parts or materials, the lifetime of which is shorter than the warranty period set forth in this Section; (vi) defects associated with Purchaser's specifications or designs or those of its contractors or subcontractors other than Boart Longyear; (vii) defects resulting from the manufacture, distribution, promotion or sale of Purchaser's own products; or (viii) accessories of any kind used by the Purchaser which are not manufactured by or approved by Boart Longyear.

(d) Sourced Goods. If the defective parts or components are not manufactured by Boart Longyear, the guarantee of the manufacturer of those defective parts or components is accepted by the Purchaser and is the only guarantee given to the Purchaser in respect of the defective parts or components. Boart Longyear agrees to assign to the Purchaser on request made by the Purchaser the benefit of any warranty or entitlement to the defective parts or components that the manufacturer has granted to Boart Longyear under any contract or by implication or operation of law to the extent that the benefit of any warranty or entitlement is assignable.

(e) Limitation on Liability. Except as provided for herein, in no event will Boart Longyear be liable for any indirect, incidental, special, consequential, punitive or similar damages including, but not limited to, lost profits, loss of data or business interruption losses. In no event will the total, aggregate liability of Boart Longyear under the Contract exceed the value of the Contract under which liability is claimed. The liability limitations shall apply even if Boart Longyear has been notified of the possibility or likelihood of such damages occurring and regardless of the form of action, whether in contract, negligence, strict liability, tort, products liability or otherwise. The parties agree that these limits of liability shall survive and continue in full force and effect despite any termination or expiration of any Contract. Any action by Purchaser against Boart Longyear must be commenced within one year after the cause of action has accrued. No employee or agent of Boart Longyear is authorized to make any warranty other than that which is specifically set forth herein. The provisions in any specification, brochure or chart issued by Boart Longyear are descriptive only and are not warranties.

GLOBAL PRODUCT CATALOGUE

PERCUSSIVE TOOLS

Boart Longyear
Global Headquarters
2640 West 1700 South
Salt Lake City
Utah USA 84104
info@boartlongyear.com

Tel: +1 801 972 6430
Fax: +1 801 977 3374

Boart Longyear Canada
1111 Main St. West
North Bay, Ontario
Canada P1B 8H6
info@boartlongyear.com

Tel: +1 705 474 2800
Fax: +1 705 474 2373

Boart Longyear Asia Pacific
919-929 Marion Road
Mitchell Park
South Australia 5043
info_aus@boartlongyear.com

Tel: +61 8 8375 8375
Fax: +61 8 8377 0539

Boart Longyear
Latin America
Las Dalias 2900 (Macul)
Santiago, 6900959, Chile
info@boartlongyear.com

Tel: +56 2 520 7900
Fax: +56 2 755 0722

Boart Longyear Europe
Columbusweg 8
5928 LC Venlo
The Netherlands
infoEU@boartlongyear.com

Tel: +31 077 850 58 50
Fax: +31 077 850 58 51

Boart Longyear
Sub-Saharan Africa
Cycad House, Constantia Office Park
Cnr 14th Avenue and Hendrik Potgieter
Weltevreden Park, 1709
Gauteng, South Africa
infosa@boartlongyear.com

Tel: +27 11 767 9300
Fax: +27 11 767 9301

BOART LONGYEAR™

www.boartlongyear.com