TOP HAMMER DRILLING TOOLS

Percussive Products

BOART LONGYEAR™

TABLE OF CONTENTS

HARD ROCK TOOLING OVERVIEW 5
HANDHELD DRILLING 21
TUNNELING/DRIFTING/LONG HOLES DRILLING TOOLS 31
SHANK ADAPTERS 81
ACCESSORIES 99
TROUBLESHOOTING 105
CARE AND HANDLING 117
WARRANTY 123
PRODUCT INDEX 127
CONTACT INFORMATION 133

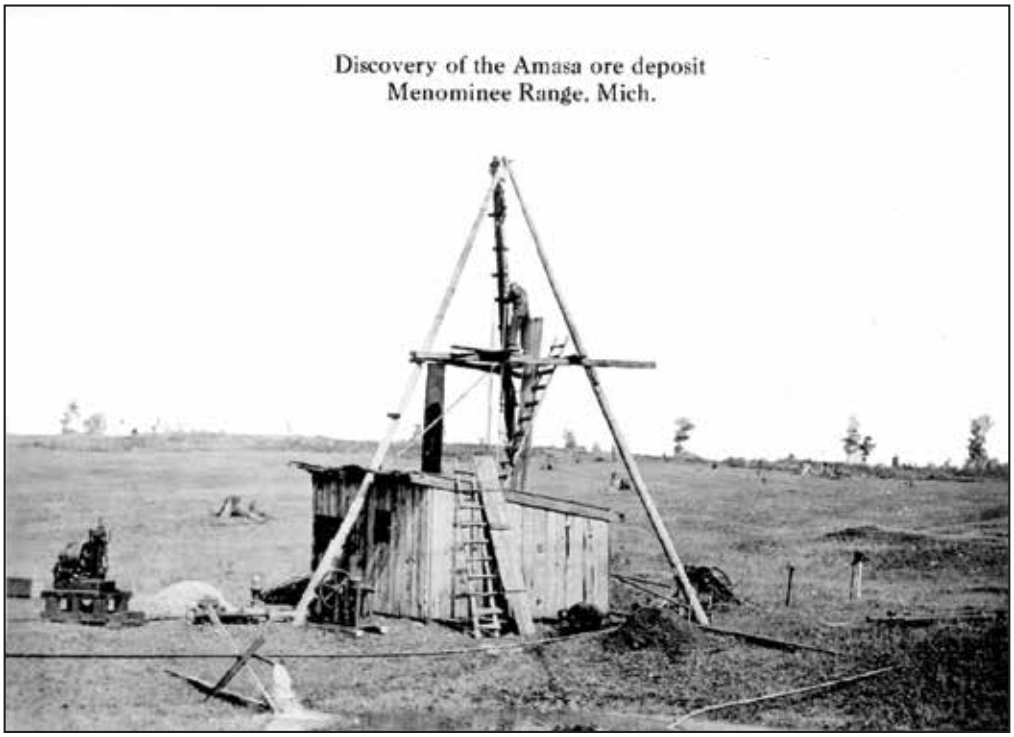
OVERVIEW

HISTORY

125 Years of Drilling Innovation

In 1888, a young graduate of the Michigan School of Mines, Edmund J. Longyear, revolutionized the mining industry on June 3, 1890, by introducing diamond drilling to the primitive pickaxe exploration of the Mesabi Iron Range in northern Minnesota. Forming a contract diamond drilling services company to serve the rapidly growing U.S. iron ore mining and steel industry, for the next twenty-one years, 1890-1911, Edmund sank thousands of drill holes along the one-hundred-mile Mesabi range.

The mining industry was booming, and new machines to simplify the labor intensive business were in demand. The Longyear name became well-known in mining circles, and before long, requests for diamond drilling equipment as well as drill contracting solidified Longyear's niche in the business. In 1912, the E.J. Longyear ("Longyear") Company released its first price list, which featured 19 drill models with drilling capabilities between 750 and 5,000 feet. Those drills were powered mainly by steam engines, which later would be replaced by internal combustion engines.



HISTORIC TIMELINE

1890 1930 1940 1950 1960 1970

1890: Edmund J. Longyear signs his first contract for drilling services.

1936: South Africa's Anglo American Corporation forms Boart Products South Africa (Pty) Limited.

1961: Longyear acquires Mississauga manufacturing plant.

1974: Longyear acquired by Anglo American in 1974.

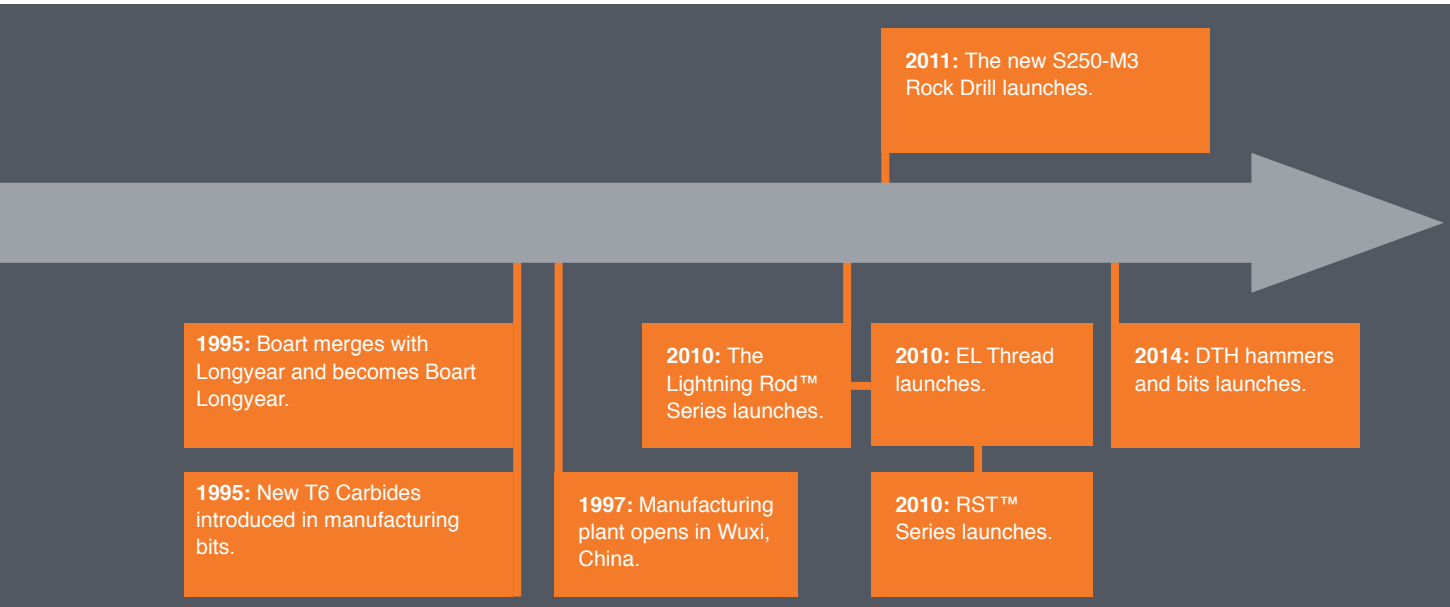
Global expansion began in 1912 and by 1932, the company had operations in Canada, Cuba, China, and Africa.

Today, focused on the success of our customers, Boart Longyear utilizes innovation to drive productivity and safety on site. The Products division designs, manufactures, and sells drilling equipment, performance tooling, and aftermarket parts and services to customers in over 100 countries. Our range of highly productive drill rigs is suited for a variety of applications, including mineral exploration, mining, energy, environmental sampling and remediation, as well as infrastructure reinforcement and development.

Boart Longyear's Drilling Services division provides drilling services for surface drilling, underground drilling, and water management. We offer first-rate experienced crews, field-developed equipment and technologies and provide drilling services ranging from diamond core, to reverse circulation, to sonic drilling in over 30 countries. And on every job around the world, our commitment to safety is unsurpassed.

As the world's leading drilling products and services provider, we understand better than most how spare parts and service availability is critical to the success of a drilling operation. Consider us your partner in keeping your projects running with lower operating costs and higher returns on your equipment investments.

As an integrated drilling services and products provider, Boart Longyear combines engineering excellence, global manufacturing facilities, and the most experienced drilling services group in the business. The result is high quality, easy to use, and safe equipment and tooling that are the most trusted and reliable in the industry.



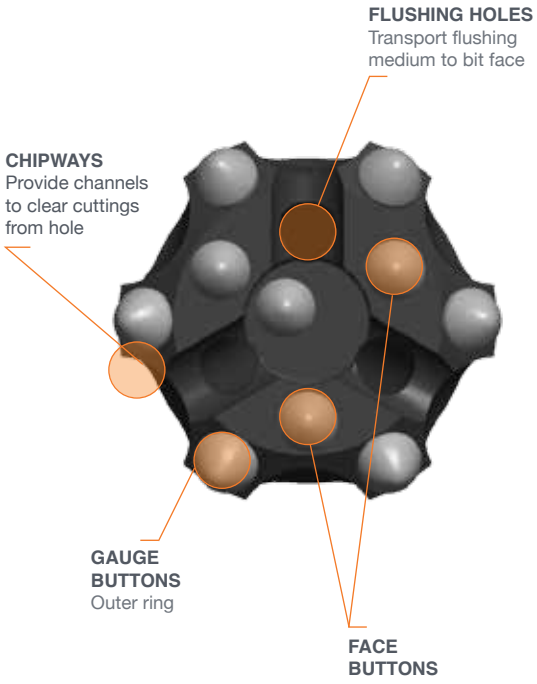
INTRODUCTION

This section provides general descriptions, guidelines, and recommendations for all of the components found in this catalog. Design descriptions and explanations are provided to assist you in selecting the correct tooling for the job.

BIT TYPES

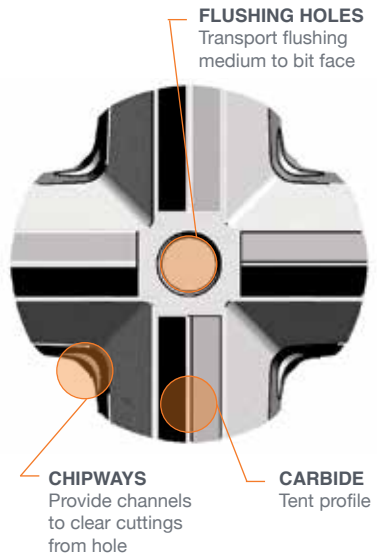
Button Bit

- Fast penetration
- More adaptable to different types of ground conditions, due to the different configurations of designs and buttons available



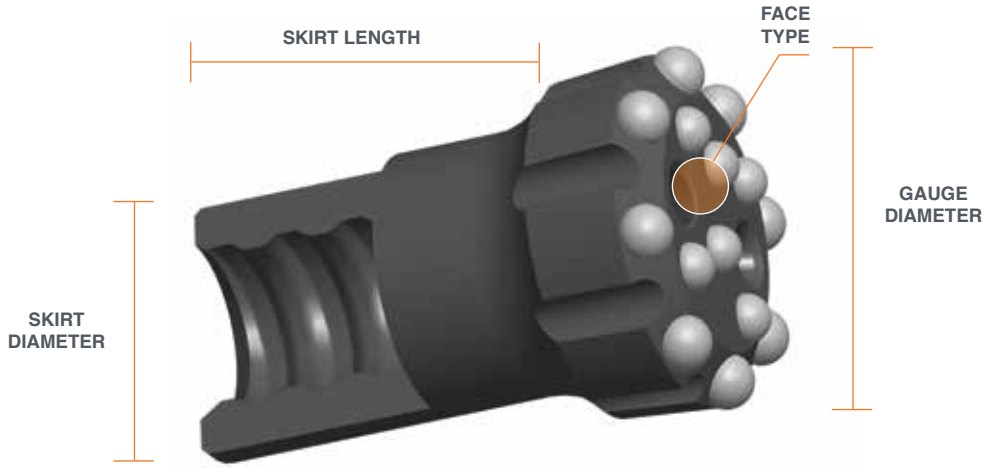
Blade Bit

- Maintains hole diameter with reduced gauge wear
- Reduces hole deviation
- Different types of carbides for different ground conditions

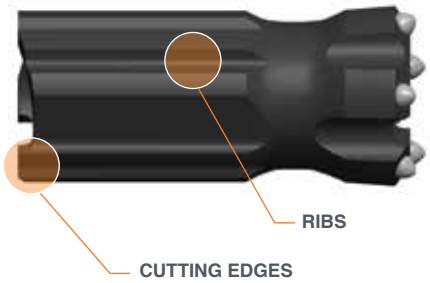


BIT TYPES

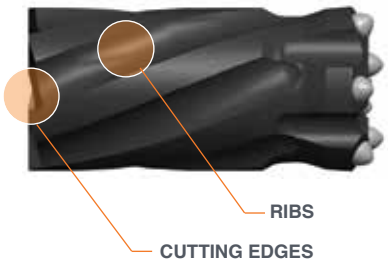
Button Bit Components



Special Skirt Designs



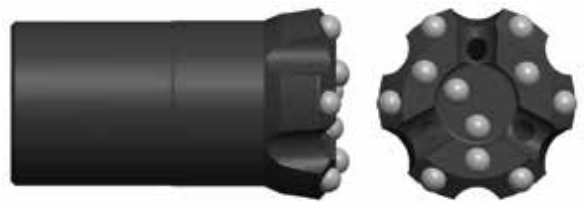
- Cutting edges in skirt for easy removal of bit in adverse hole conditions



Straightrac Bit

- Angled flute design for 360 degrees of contact, reducing the hole deviation
- Cutting edges in skirt

BIT FACE DESIGNS



BR - Button Recessed

"Drop Center" face characteristic

- Reduced hole deviation
- Broken ground conditions

BF - Button Flat

"Flat" face characteristic

- General purpose bit
- Hard to medium conditions

BC - Button Chisel

Chisel shape characteristic

- Abrasive conditions
- Fast penetration

BD - Button Dome

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

BUTTON TYPES

Hemispherical Button

- Best suited for hard ground
- 25,000 to 45,000 PSI (170 to 300 MPa)
- Abrasive to very abrasive

Parabolic Button (Semi Ballistic)

- Fast penetration
- Best suited for medium ground
- 15,000 to 25,000 PSI (100 to 170 MPa)
- Mildly abrasive ground

Conical Button

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

Ballistic Button

- Fast penetration
- Suited for all non-abrasive ground types
- Smaller contact area
- Best suited for smaller diameter bits

BLADE BIT 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.

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 than 64 mm because of the restricted circumference.

REAMING TOOLING DESIGNS

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
- Reaming 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

Button Bit Reamer - One Piece Bit - Dome

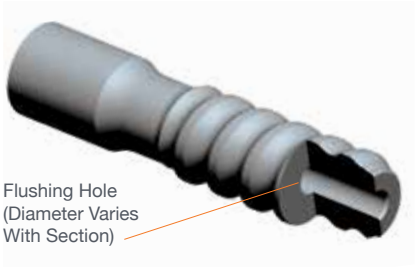
Pilot Adapter/Reamer - Two Piece System

- 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.

ROD TYPES

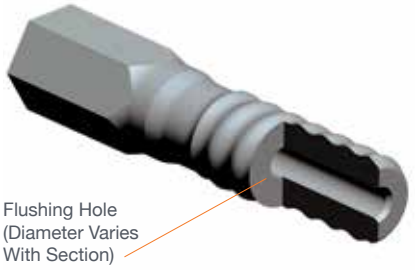
Round Rods

- 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 on external dimension



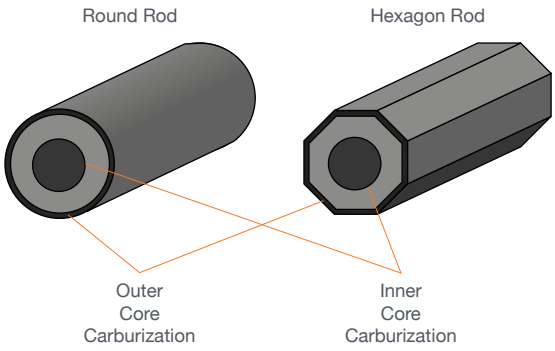
Hexagon Rods

- 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.



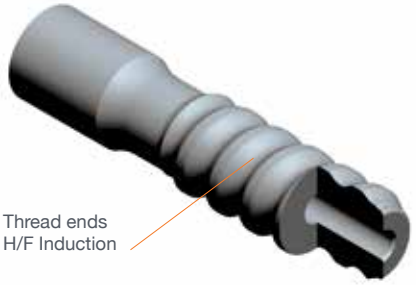
Carburization

- Entire rod is hardened providing a case over the entire rod surface both internal and external.
- Primarily used 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



THREAD TYPES

R Thread (Rope)

- Rope threads — low pitch, 12.7 mm and a small angle of profile
- Sizes: 22 mm – 38 mm
- Good wear properties
- Ideal for single pass or shorthole drilling such as underground tunneling applications that require infrequent uncoupling

HM (T) Thread

- HM thread or “T” thread — 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
- Ideal for extension drilling with multiple steel
- Greater torque capacity

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

BE Thread (Tube Rod)

- 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
- Used in extension tube drilling with multiple tube steels.
- Compatible with high-torque top hammer rockdrills for surface and underground applications

THREAD COMPATIBILITY

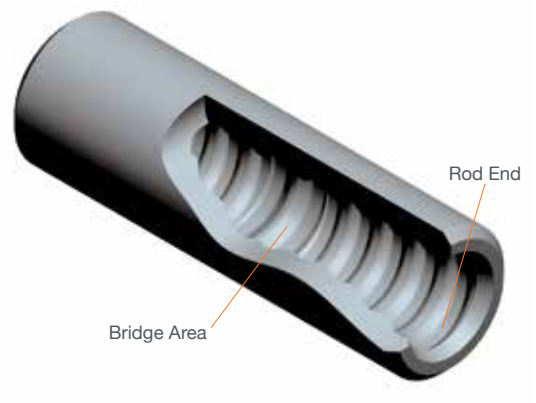
This table shows thread compatibility between manufacturers to ensure proper threading between tooling.

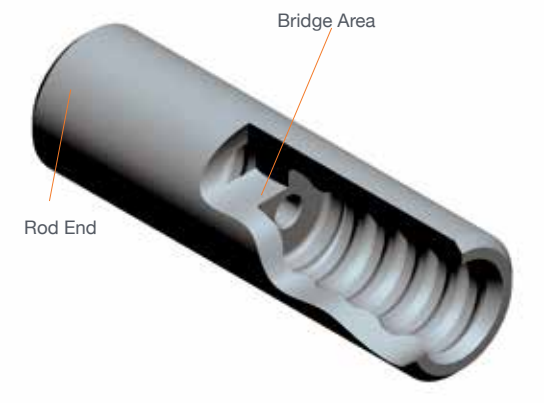
THREAD TYPE	SIZE	BOART LONGYEAR	SANDVIK	ATLAS COPCO
R	22	✓	✓	✗
	23	✓	✓	✗
	25	✓	✓	✓
	28	✓	✓	✓
	32	✓	✓	✓
	35	✓	✓	✓
	38	✓	✓	✓
HM/T*	35	✓	✓	✗
	38	✓	✓	✓
	45	✓	✓	✓
	51	✓	✓	✓
SPECIALTIES	SR28	✗	✗	✓
	SR32	✗	✗	✓
	SR35	✗	✗	✓
	a250	✗	✓	✗
	a330	✗	✓	✗
	BE58EXT/ SANDVIK 60**	✓	✓	✗
	GT60	✗	✓	✗
	T60	✗	✗	✓
	EL60	✓	✗	✗
	EL68	✓	✗	✗
TUBE DRILLING BE/ ST	58	✓	✓	✓
	68	✓	✓	✓

* T is used by Atlas Copco and Sandvik and HM is used by Boart Longyear, T and HM are fully compatible

** BE58EXT, used by Boart Longyear, and Sandvik 60 (ST58) are the bottom drive versions of the 58 system. BE58EXT and Sandvik 60 are fully compatible.

COUPLING TYPES





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 center bridge area of the coupling
- Semi-bridged couplings are most suited to high-torque machines
- Most rope and HM threaded couplings are semi-bridged
- Best energy transfer

Full-Bridge Coupling

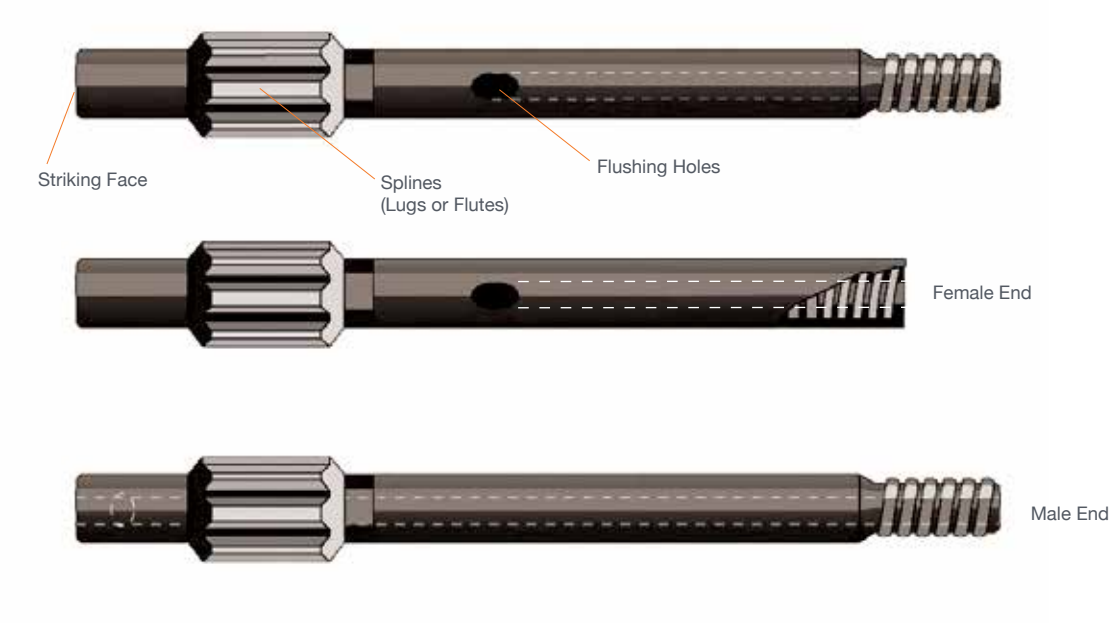
- Eliminates the potential for the coupling to creep along the threaded joints
- Typically used in surface applications
- Better uncoupling characteristics and tends to maintain tighter joints
- Less chance of jamming
- Best suited to machines equipped with independent rotation (ie., S36IR rockdrill)

Adapter Coupling

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

SHANK ADAPTERS/STRIKING BARS

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.

RST™ SERIES RODS AND BITS

Strength Defined
Boart Longyear has a long history of providing premium Rock Drill and Blast Drilling products for the most demanding conditions. This tradition continues with the introduction of the Robust Standard Thread (RST™) Series percussive rods and bits with industry leading strength and penetration rates. Boart Longyear has responded to industry demands for stronger, more versatile percussive rods and bits by developing the RST Series that incorporates a larger cross-sectional transition area as well as an increased bit skirt length. This delivers improved impact efficiency for faster penetration rates, increased rod tip-off resistance, and less hole deviation.

Superior Productivity and Design
The RST Series rods incorporate a larger cross-sectional transition area for a nearly 45% increase in bending strength. The bit skirt is also extended for improved interface, making rod tip-off events less likely and reducing cost and downtime. The design of the RST Series results in straighter and truer holes with penetration rate increases of up to 20% as compared to a competitive design offering.

Interchangeability
As an additional benefit, the RST Series design allows for interchangeability with standard rods and bits for improved flexibility in the field, unlike the competitive offerings which utilize unique thread designs.

1 LARGER CROSS-SECTIONAL TRANSITION AREA
Increased rod rigidity/strength when used in deviated applications such as scaling. This results in decreased rod tip-offs and increased productivity

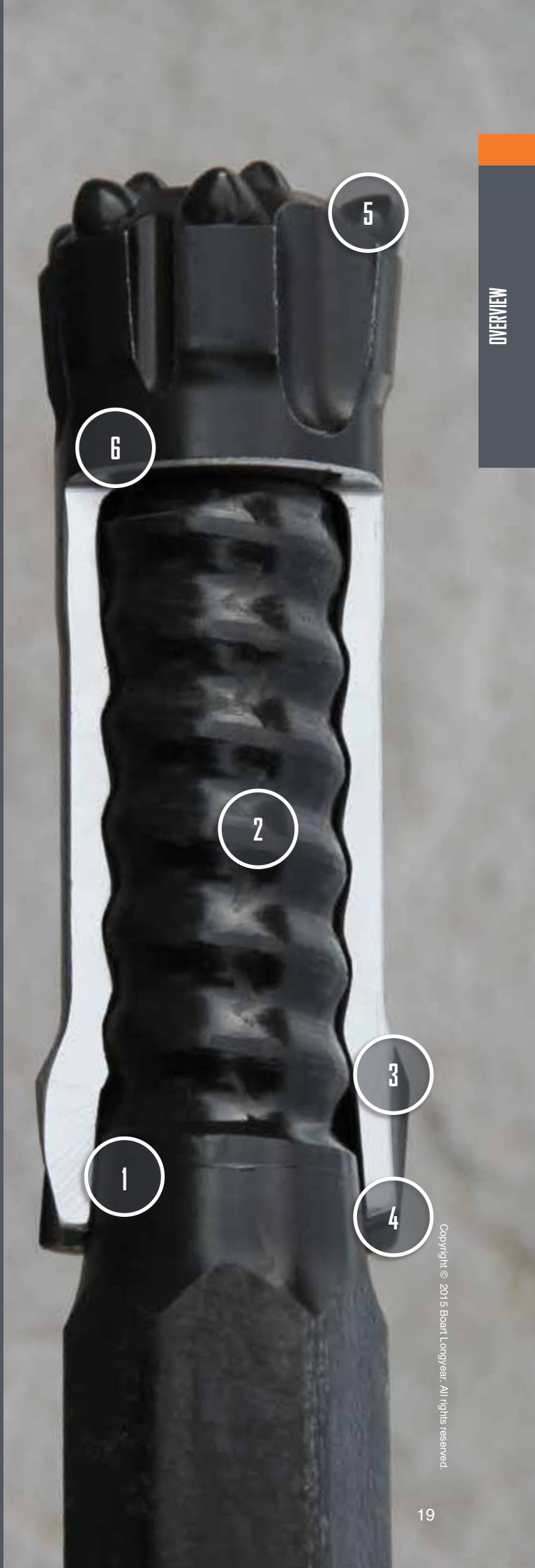
2 UNIVERSAL THREAD
Designed to be compatible with both RST™ Series R32 and existing standard R32 products

3 EXTENDED BIT SKIRT
Provides straighter holes with reduced deviation

4 RETRACT OR STRAIGHT TRACK BIT DESIGN (OPTIONAL)
Provides a cleaner, straighter hole as well as easier bit removal in varied ground conditions

5 PREMIUM TUNGSTEN CARBIDE BUTTONS
Delivers extended drilling performance and longer durability by increasing toughness and wear-resistant properties

6 PREMIUM BODY STEEL MATERIAL
Reduces face and body wear and provides uniform wear characteristics, improved button retention and efficient energy transfer



LIGHTNING ROD™ SERIES

Fast Productivity
Boart Longyear has built its reputation by providing innovative Rock Drill and Blast products for specific customer needs. The introduction of our Lightning Rod™ Series for the Surface Drill and Blast percussive market continues this tradition. In response to industry demands, the Lightning Rod Series provides a quick-change male/female rod with high-durability and air flushing. These rods are designed specifically for the surface drill and blast market by focusing on the quick-change properties of male/female configurations and fully treated end-form with a premium steel mid-body. This creates easy coupling and uncoupling, carousel storage and loading, and air flushing. The result is higher productivity and improved efficiency.

Strength Where It Counts
The Lightning Rod Series of Surface Drill and Blast Products utilizes high-strength steel coupled with high-wear resistant ends. The male and female end forms are fully treated to provide market-leading wear resistance during both the drilling process as well as coupling and uncoupling events. Galling, chipping, and surface damage are minimized. The mid-body is comprised of premium steel that has been optimized for maximum air flushing. The Lightning Rod Series also delivers optimum rod compliance for the full range of ground conditions.

Quick to Change
The design configuration of the Lightning Rod Series is a male/female layout that requires no additional coupling. This allows for faster additions or removals to the drill string. The absence of a traditional coupling and optimal geometry is designed for use in top-hammer rod carousel storage and loaders. A wide range of diameters from 33 mm to 60 mm, and lengths from 8 ft to 14 ft provides customers the right size combination for specific project needs.

1 **MALE/FEMALE END THREAD FORMS**
Eliminates conventional coupling to allow quick, automated subtractions and additions to the drill string

2 **TREATED MALE AND FEMALE ENDS**
High wear resistance and durability

3 **PREMIUM MID-BODY STEEL**
Designed for air flushing and optimal rod compliance, the mid-body's structure is strong and durable with efficient energy transfer

4 **WIDE RANGE OF SIZES AND THREAD FORMS**
Selected to cover multiple project specific needs

HANDHELD DRILLING TOOLS

7° SYSTEM RODS

Collared and Tapered Rods / H22

PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
250368	600	2'	2.2	4.8
250369	1220	4'	4.0	8.9
250373	1830	6'	5.9	13.0
250234	2440	8'	7.8	17.2
250465	3050	10'	9.7	21.3
250544	3660	12'	11.4	25.2
250537	4270	14'	13.4	29.5
250543	5480	18'	17.2	37.9
250738	6400	21'	20.0	44.0
250540	7320	24'	23.0	50.8
250541	7920	26'	24.9	54.9
250542	9450	31'	29.6	65.3

7° SYSTEM BITS

Tapered Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
050179	41	1 5/8"	4 x 9	2 x 9	2F 1G	Conical	Flat
050069	33	1 5/16"	5 x 7	2 x 7	1F 1G	Parabolic	Flat
050022	41	1 5/8"	5 x 9	2 x 8	2F 1G	Parabolic	Flat

Tapered Blade Bits

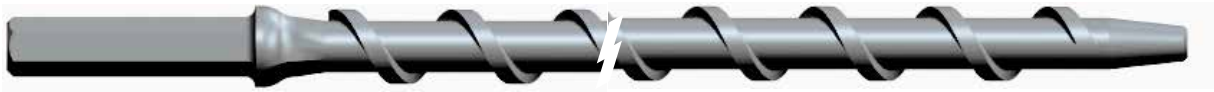
PART #	DIAMETER		FLUSHING HOLE	GAUGE CARBIDE
	MM	IN		
030040	32	1 1/4"	1F 2G	14 x 8
030041	35	1 3/8"	1F 2G	14 x 8
030084	41	1 5/8"	2G	14 x 8
030085	45	1 3/4"	2G	14 x 8

11° SYSTEM RODS

Collared and Tapered Rods / H22

PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
250183	610	2´	2.2	4.7
250185	760	2´ 5 15/16"	2.7	5.8
250160	1220	4´	4.0	8.9
250188	1370	4´ 5 15/16"	4.5	10.0
250362	1630	5´ 4 3/16"	5.4	11.9
250699	1676	5´ 6"	5.5	12.2
250161	1830	6´	5.9	13.0
250191	1980	6´ 5 15/16"	6.5	14.3
250162	2440	8´	7.8	17.1
250196	2590	8´ 5 15/16"	8.5	18.7
250163	3050	10´	9.6	21.1
250198	3200	10´ 6"	10.5	23.1
250200	3660	12´	11.4	25.2
250727	4800	15´ 9"	15.0	33.0
250516	5600	18´ 4 8/16"	17.3	38.2
250517	6400	21´	20.4	45.0

Collared and Tapered Rods – Auger / A22



PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
310010	1830	6´	8.5	18.8

11° SYSTEM BITS

Tapered Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
050114	32	1 1/4"	3 x 8	2 x 7	1F 2G	Conical	Flat
050118	34	1 11/32"	3 x 8	2 x 7	1F 2G	Conical	Flat
050222	48	1 7/8"	3 x 9	2 x 9	1F 2G	Conical	Flat
050172	34	1 11/32"	4 x 7	2 x 7	2F 1G	Conical	Flat

11° SYSTEM BITS

Tapered Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
050141	32	1 1/4"	5 x 7	2 x 7	1F 1G	Parabolic	Flat

050122	36	1 13/32"	5 x 8	2 x 7	2F 1G	Conical	Flat
050130	38	1 1/2"	5 x 9	2 x 7	2F 1G	Conical	Flat
050145	38	1 1/2"	5 x 9	2 x 7	2F 1G	Conical	Flat
050220	40	1 9/16"	5 x 9	2 x 8	2F 1G	Conical	Flat
050175	41	1 5/8"	5 x 9	2 x 8	2F 1G	Conical	Flat
050146	41	1 5/8"	5 x 9	2 x 8	2F 1G	Parabolic	Flat

050226	33	1 5/16	6 x 7	2 x 7	2F 1G	Conical	Flat

Tapered Blade Bits

PART #	DIAMETER		FLUSHING HOLE	GAUGE CARBIDE
	MM	IN		
030099	38	1 1/2"	1F 4G	7 x 8

12° SYSTEM RODS

Collared and Tapered Rods / H22

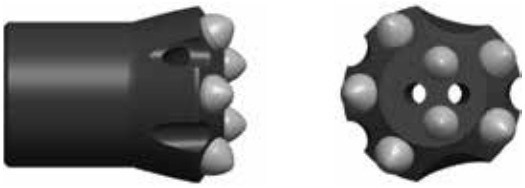
PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
250365	300	1'	1.1	2.5
250118	610	2'	2.2	4.7
250473	800	2' 7 8/16"	2.7	6.0
250440	910	3'	3.1	6.8
250119	1220	4'	4.0	8.9
250187	1370	4' 5 15/16"	4.5	9.9
250189	1520	5'	5.0	11.0
250063	1600	5' 3"	5.4	11.8
250441	1670	5' 5 12/16"	5.5	12.1
250120	1830	6'	5.9	13.0
250190	1980	6' 5 15/16"	6.5	14.3
250447	2400	7' 10 8/16"	7.6	16.8
250121	2440	8'	7.6	16.8
250195	2590	8' 5 15/16"	8.5	18.7
250122	3050	10'	9.6	21.1
250374	3200	10' 6"	9.9	21.8
250123	3660	12'	11.4	25.2
250448	4000	13' 1 8/16"	12.6	27.7
250201	4270	14'	14.0	30.8
250364	5480	18'	17.0	37.4
250387	6700	22'	21.3	47.0

Collared and Tapered Rods – Auger / A22

PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
310001	610	2'	3.3	7.2
310003	1220	4'	5.9	13.0
310005	1830	6'	8.5	18.8
310007	2440	8'	11.2	24.6
310009	3050	10'	13.8	30.4
310012	3660	12'	14.0	30.8

12° SYSTEM BITS

Tapered Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	050228	28	1 1/8"	4 x 7	1 x 7	2G	Conical	Flat
	050081	28	1 1/8"	4 x 7	1 x 7	2G	Hemispherical	Flat
	050241	37	1 15/32	6 x 8	2 x 7	2F	Parabolic	Flat
	050096	32	1 1/4"	5 x 7	2 x 7	2F 1G	Parabolic	Flat
	050181	32	1 1/4"	5 x 7	2 x 7	2F 1G	Conical	Flat
	050177	33	1 5/16"	5 x 7	2 x 7	2F 1G	Conical	Flat
	050244	35	1 3/8	5 x 8	2 x 7	2G	Parabolic	Flat
	050036	35	1 3/8"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat
	050066	38	1 1/2"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat
	050254	41	1 5/8"	5 x 9	2 x 7	1F 2G	Parabolic	Flat
	050068	45	1 3/4"	5 x 9	2 x 9	1F 2G	Hemispherical	Flat
	050242	41	1 5/8"	5 x 9	2 x 8	2F 1G	Parabolic	Flat
	050109	32	1 1/4"	6 x 7	2 x 7	2F 1G	Conical	Flat
	050111	32	1 1/4"	6 x 7	2 x 7	2F 1G	Conical	Flat
	050234	33	1 5/16"	6 x 7	2 x 7	2F 1G	Parabolic	Flat

12° SYSTEM BITS

Tapered Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
050225	37	1 15/32"	6 x 8	2 x 8	1F 1G	Parabolic	Dome

Tapered Blade Bits

PART #	DIAMETER		GAUGE CARBIDE	FLUSHING HOLE
	MM	IN		
030003	28	1 1/8"	14 X 8	1F 2G
030113	30	1 3/16"	15 X 8	1F 2G
030115	32	1 1/4"	15 X 8	1F 2G
030032	32	1 1/4"	14 X 8	1F 2G
030037	38	1 1/2"	14 X 8	1F 2G
030039	45	1 3/4"	14 X 8	1F 2G
030110	35	1 3/8"	14 X 8	4G

ROD SHANKS

Rod Shanks – R25 Thread / 22H

PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
240045	254	0' 10"	1.1	2.5
240137	310	1' 3/16"	1.2	2.7
240160	350	1' 1 12/16"	1.2	2.6
240022	610	2'	2.4	5.2
240046	800	2' 7 8/16"	3.0	6.6
240145	1220	4'	4.2	9.2
240164	1830	6'	5.9	13.0
240020	2440	8'	8.0	17.7
240095	3200	10' 6"	10.2	22.5

ROD SHANKS

Rod Shanks – R25 Thread / 25H

PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
240035	610	2'	2.9	6.4
240050	1220	4'	5.4	11.8
240037	1830	6'	7.8	17.2
240038	2440	8'	10.3	22.6
240096	3600	11' 9 12/16"	14.5	31.9

COLLARED REAMER TOOLS

Collared Reamer Rods – 6.5° / 22H

PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
260001	610	2'	2.2	4.8
260002	1220	4'	4.2	9.2
260016	1520	5'	5.5	12.2
260003	1830	6'	6.3	13.8
260021	2000	6' 6 12/16"	6.5	14.3
260004	2440	8'	8.4	18.4
260015	3050	10'	10.3	22.8

Reamer Bits – 6.5°

PART #	DIAMETER		BUTTONS		CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE		
070021	62	2 7/16"	8 x 11	2 x 10	Hemispherical	Flat
070022	76	3"	8 x 11	2 x 11	Hemispherical	Flat

NRT EXTENSION TOOLS

NRT Extension Rods / H22

PART #	LENGTH		WEIGHT	
	MM	FT /IN	KG	LB
200171	610	2'	1.9	4.2
200190	1220	4'	3.8	8.3

NRT Coupling – Semi-Bridge

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350010	35	1 3/8"	108	4 1/4"	NRT	0.4	0.9

INTEGRAL DRILLING TOOLS

Integral Drill Steels – Series 12 / H22

PART #	LENGTH		WEIGHT		BIT DIAMETER	
	MM	FT /IN	KG	LB	MM	IN
07140840-11	800	2' 7 8/16"	3.0	6.6	40	1 5/8"
07141639-11	1600	5' 3"	5.0	11.0	39	1 17/32"
07142438-11	2400	7' 10 8/16"	7.0	15.4	38	1 1/2"
07143237-11	3200	10' 6"	10.0	22.0	37	1 29/54"
07144036-11	4000	13' 1 8/16"	12.6	27.8	36	1 27/64"
07144835-11	4800	15' 9"	15.0	33.0	35	1 3/8"
07145634-11	5600	18' 4 8/16"	17.0	37.4	34	1 11/32"

Integral Drill Steels – Series 17 / H22

PART #	LENGTH		WEIGHT		BIT DIAMETER	
	MM	FT /IN	KG	LB	MM	IN
07140641-11	600	1' 11 10/16"	2.0	4.4	41	1 5/8"
07141240-11	1200	3' 11 4/16"	4.0	8.8	40	1 9/16"
07141839-11	1800	5' 10 14/16"	6.0	13.2	39	1 17/32"

TUNNELING | DRIFTING | LONGHOLE DRILLING TOOLS

R23 SYSTEM RODS

Tunneling / Drifting MM Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
220431	2440	8´	25H	R23	R32	9.9	21.7

R23 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110653	33	1 5/16"	5 x 7	2 x 7	1F 2G	Hemispherical	Flat
110477	35	1 3/8"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat
110600	38	1 1/2"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat

R25 SYSTEM RODS

Tunneling / Drifting MM Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
220179	2150	7' 10/16"	25H	R25	R32	9.0	19.8
220262	2290	7' 6 3/16"	25H	R25	R32	9.2	20.3
220219	2430	8'	25H	R25	R32	10.4	22.9
220202	2590	8' 5 15/16"	25H	R25	R32	10.7	23.6
220404	2600	8' 6 6/16"	25H	R25	R32	10.9	24.0
220420	2700	8' 10 5/16"	25H	R25	R32	11.1	24.5
220286	2800	9' 2 4/16"	25H	R25	R32	11.3	25.0
220287	2900	9' 6 3/16"	25H	R25	R32	11.6	25.6
220303	3090	10' 1 10/16"	25H	R25	R32	12.3	27.0
220309	3700	12' 1 11/16"	25H	R25	R32	14.7	32.5
220498	4000	13' 1 8/16"	25H	R25	R32	15.9	35.0

220441	2300	7' 6 9/16"	28H	R25	R32	11.6	25.6
220443	2800	9' 2 4/16"	28H	R25	R32	13.8	30.3
220138	3100	10' 2 1/16"	28H	R25	R32	15.3	33.7
220229	3200	10' 6"	28H	R25	R32	16.0	35.3
220444	3400	11' 1 14/16"	28H	R25	R32	17.0	37.5

Long Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200496	No	610	2'	25H	R25	2.2	4.8
200376	No	910	3'	25H	R25	3.2	7.1
200474	No	1000	3' 3 6/16"	25H	R25	3.7	8.1
200102	No	1220	4'	25H	R25	4.8	10.5
203009	No	1520	5'	25H	R25	5.8	12.9
200106	No	1830	6'	25H	R25	6.7	14.7
200378	No	2440	8'	25H	R25	9.3	20.5

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210139	No	800	2' 7 8/16"	25H	R25	3.9	8.5
210208	No	910	3'	25H	R25	3.9	8.6
210209	No	1220	4'	25H	R25	5.0	11.0
210200	No	1525	5'	25H	R25	6.3	14.0
210160	No	1830	6'	25H	R25	7.2	15.9

R25 SYSTEM BITS

Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	110691	33	1 5/16"	5 x 7	2 x 7	1F 3G	Parabolic	Flat
	110284	33	1 5/16"	5 x 7	2 x 7	1F 1G	Hemispherical	Flat
	110580	35	1 3/8"	5 x 9	2 x 7	1F 1G	Hemispherical	Dome
	110822	35	1 3/8"	5 x 9	2 x 7	1F 1G	Parabolic	Dome
	110930	35	1 3/8"	5 x 8	2 x 7	2G	Hemispherical	Flat
	110236	35	1 3/8"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat
	110973	38	1 1/2"	5 x 9	2 x 7	1F 2G	Ballistic / Parabolic	Flat
	110442	38	1 1/2"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat
	110423	38	1 1/2"	5 x 8	2 x 7	1F 2G	Parabolic	Flat
	110003	38	1 1/2"	5 x 9	2 x 7	1F 2G	Hemispherical	Flat
	110962	41	1 5/8"	5 x 10	2 x 9	1F 2G	Ballistic	Flat
	110169	41	1 5/8"	5 x 10	2 x 8	1F 2G	Hemispherical	Flat
	110476	45	1 3/4"	5 x 10	2 x 9	1F 2G	Hemispherical	Flat
	110821	48	1 7/8"	5 x 11	2 x 9	1F 2G	Parabolic	Flat
	110986	34	1 11/32"	5 x 8	2 x 7	1F 3G	Conical	Flat
	110749	37	1 15/32"	6 x 8	2 x 7	2F 1G	Parabolic	Flat
	110690	38	1 1/2"	6 x 8	2 x 8	2F 1G	Parabolic	Flat
	110684	48	1 7/8"	6 x 9	3 x 8	3F 1G	Hemispherical	Flat

R25 SYSTEM BITS

Blade Bits

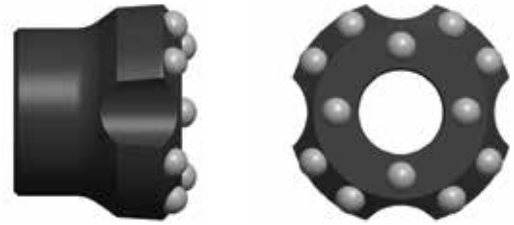
PART #	DIAMETER		GAUGE CARBIDE	FLUSHING HOLE
	MM	IN		
120208	38	1 1/2"	16 x 9	1F 4G
120213	41	1 5/8"	18 x 10	1F 4G
120225	45	1 3/4"	21 x 11	1F 4G
120258	48	1 7/8"	16 x 9	1F 4G

R25 SYSTEM REAMING TOOLS

6° Pilot Adapter

PART #	PILOT DIAMETER		PILOT LENGTH		FLUSHING HOLE	WEIGHT		THREAD
	MM	IN	MM	IN		KG	LB	
380015	26	1 1/32"	254	10	3F	1.4	3.1	R25

6° Hemispherical Buttons Reaming Bits



PART #	DIAMETER		BUTTONS		CARBIDE PROFILE	WEIGHT	
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE		KG	LB
070020	57	2 1/4	8 x 9	2 x 9	Hemispherical	1.1	2.4
070009	76	3	8 x 10	4 x 10	Hemispherical	1.3	2.8
070011	89	3 1/2	8 x 10	4 x 10	Hemispherical	1.7	3.7

R25 SYSTEM COUPLING

Semi-Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350054	33	1 5/16"	150	6	R25	0.6	1.3
350005	35	1 3/8"	150	6	R25	0.6	1.4

R28 SYSTEM RODS

Tunneling / Drifting MM Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
220296	1900	6' 2 13/16"	28H	R28	R32	9.2	20.4
220194	2480	8' 1 10/16"	28H	R28	R32	12.2	26.8
220242	2590	8' 5 15/16"	28H	R28	R32	12.7	28.0
220265	2700	8' 10 5/16"	28H	R28	R32	13.2	29.0
220198	2800	9' 2 4/16"	28H	R28	R32	14.0	30.9
220068	3090	10' 1 10/16"	28H	R28	R32	14.7	32.5
220075	3700	12' 11/16"	28H	R28	R32	18.2	40.0
220449	4300	14' 1 5/16"	28H	R28	R32	21.5	47.3

220024	4300	14' 1 5/16"	32H	R28	R38	27.8	61.2

Long Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200516	No	2060	6' 9 7/64"	28H	R28	10.8	23.9

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210151	No	686	2' 3"	28H	R28	3.8	8.4
210132	No	1520	5'	28H	R28	8.5	18.8

R28 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110527	36	1 7/16"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat
110818	37	1 15/32"	5 x 8	2 x 7	1F 2G	Hemispherical	Flat
110904	37	1 15/32"	5 x 9	2 x 7	1F 2G	Parabolic	Flat
110002	38	1 1/2"	5 x 9	2 x 7	1F 2G	Hemispherical	Flat
110611	38	1 1/2"	5 x 9	2 x 7	1F 2G	Hemispherical	Flat
110495	38	1 1/2"	5 x 9	2 x 7	1F 2G	Parabolic	Flat
110167	38	1 1/2"	5 x 9	2 x 7	1F 2G	Hemispherical	Flat
110006	41	1 5/8"	5 x 10	2 x 8	1F 2G	Hemispherical	Flat
110576	41	1 5/8"	5 x 10	2 x 8	1F 2G	Parabolic	Flat
110118	45	1 3/4"	5 x 10	2 x 9	1F 2G	Hemispherical	Flat
110323	48	1 7/8"	5 x 11	2 x 9	1F 2G	Hemispherical	Flat
110775	51	2"	5 x 11	2 x 10	1F 2G	Hemispherical	Flat
110820	51	2"	5 x 11	2 x 10	1F 2G	Parabolic	Flat

R28 SYSTEM REAMER TOOLS

6° Reamer Pilot Adapter

PART #	PILOT DIAMETER		PILOT LENGTH		FLUSHING HOLE	WEIGHT		THREAD
	MM	IN	MM	IN		KG	LB	
380003	26	1 1/32	266	10 8/16"	3F	1.6	3.5	R28

6° Reamer Buttons Bits

PART #	DIAMETER		BUTTONS		CARBIDE PROFILE	WEIGHT	
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE		KG	LB
070020	57	2 1/4"	8 x 9	2 x 9	Hemispherical	1.1	2.4
070009	76	3"	8 x 10	4 x 10	Hemispherical	1.3	2.8
070011	89	3 1/2"	8 x 10	4 x 10	Hemispherical	1.7	3.7

R28 SYSTEM COUPLINGS

Semi-Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350033	40	1 9/16"	150	6	R28	0.8	1.8

R32 SYSTEM RODS

Tunneling / Drifting MM Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
220257	3700	12' 1 11/16"	32H	R32	R32	23.5	51.9

220484	1830	6'	25H	R32	R32	23.5	51.9

220144	2480	8' 1 10/16"	32H	R32	R38	18.9	41.6
220471	2850	9' 4 3/16"	32H	R32	R38	18.3	40.4
220414	3090	10' 1 10/16"	32H	R32	R38	19.1	42.0
220483	3200	10' 6"	32H	R32	R38	20.0	44.0
220399	3400	11' 1 14/16"	32H	R32	R38	21.3	47.0
220415	3700	12' 1 11/16"	32H	R32	R38	23.5	51.9
220513	4000	13' 1 8/16"	32H	R32	R38	25.8	56.9
220096	4310	14' 1 11/16"	32H	R32	R38	27.4	60.4
220112	4915	16' 1 8/16"	32H	R32	R38	30.2	66.6

220152	3090	10' 1 10/16"	32H	R32	HM38	19.1	42
220400	3700	12' 1 11/16"	32H	R32	HM38	23.6	52.0
220095	4310	14' 1 11/16"	32H	R32	HM38	26.7	58.9
220157	4915	16' 1 8/16"	32H	R32	HM38	30.5	67.2

220271	2480	8' 1 10/16"	35H	R32	R38	18.5	40.8
220277	2700	8' 10 5/16"	35H	R32	R38	20.4	45.0
220159	3090	10' 1 10/16"	35H	R32	R38	23.1	51.0
220161	3700	12' 1 11/16"	35H	R32	R38	27.9	61.6
220100	4310	14' 1 11/16"	35H	R32	R38	32.9	72.5
220115	4915	16' 1 8/16"	35H	R32	R38	37.0	81.6
220038	5525	18' 1 8/16"	35H	R32	R38	42.4	93.5

R32 SYSTEM RODS

Tunneling / Drifting MM Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
220292	2400	7' 10 8/16"	35H	R32	HM38	18.5	40.7
220497	2700	8' 10 5/16"	35H	R32	HM38	21.0	46.3
220164	3090	10' 1 10/16"	35H	R32	HM38	24.1	53.1
220166	3700	12' 1 11/16"	35H	R32	HM38	28.2	62.2
220209	4300	14' 1 5/16"	35H	R32	HM38	32.9	72.5
220384	4500	14' 9 3/16"	35H	R32	HM38	35.4	78.0
220170	4915	16' 1 8/16"	35H	R32	HM38	37.2	81.9
220042	5520	18' 5/16"	35H	R32	HM38	42.2	93.0
220494	6135	20' 1 9/16"	35H	R32	HM38	48.0	105.9
220464	6400	21'	35H	R32	HM38	50.8	112.0

Tunneling / Drifting MF Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
300022	3100	10' 2 1/16"	35H	R32	HM38	26.5	58.4
300010	3700	12' 1 11/16"	35H	R32	HM38	30.0	66.1
300012	4310	14' 1 11/16"	35H	R32	HM38	34.5	76.1
300036	4915	16' 1 8/16"	35H	R32	HM38	39.6	87.3
300039	5525	18' 1 8/16"	35H	R32	HM38	44.7	98.5

Tunneling / Drifting RST™ MM Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
220508	3090	10' 1 10/16"	35H	R32	R38	23.8	52.5
220503	3700	12' 1 11/16"	35H	R32	R38	28.4	62.7
220507	4310	14' 1 11/16"	35H	R32	R38	34.3	75.6

220523	3090	10' 1 10/16"	35H	R32	HM38	24.2	53.2
220510	3700	12' 1 11/16"	35H	R32	HM38	27.7	61.1
220502	4310	14' 1 11/16"	35H	R32	HM38	33.8	74.5
220500	4915	16' 1 8/16"	35H	R32	HM38	38.5	84.9
220501	5525	18' 1 8/16"	35H	R32	HM38	43.3	95.5

R32 SYSTEM RODS

Long Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200476	Yes	1000	3' 3 6/16"	25H	R32	5.2	11.4

200169	No	200	0' 7 14/16"	33R	R32	1.3	2.9
200500	Yes	915	3'	33R	R32	5.2	11.4
200481	Yes	1000	3' 3 6/16"	33R	R32	5.7	12.5
200401	Yes	1220	4'	33R	R32	6.6	14.6
200483	Yes	1830	6'	33R	R32	9.9	21.8
200357	Yes	2000	6' 6 12/16"	33R	R32	10.8	23.9
200456	Yes	2440	8'	33R	R32	13.3	29.4
200484	Yes	3050	10'	33R	R32	16.7	36.9
200372	No	3660	12'	33R	R32	20.1	44.3
200259	No	4000	13' 1 8/16"	33R	R32	21.6	47.6
200034	No	4270	14'	33R	R32	23.5	51.8
200541	No	5480	17' 11 3/4"	33R	R32	28.7	63.3

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210068	No	910	3'	33R	R32	5.4	12.0
210023	No	1220	4'	33R	R32	7.3	16.0
210004	No	1525	5'	33R	R32	9.0	19.8
210005	No	1830	6'	33R	R32	10.8	23.7
210051	No	2440	8'	33R	R32	14.3	31.6
210006	No	3050	10'	33R	R32	17.9	39.5
210107	Yes	3050	10'	33R	R32	17.9	39.5
210050	No	3660	12'	33R	R32	20.7	45.5
210115	Yes	3660	12'	33R	R32	20.7	45.5

Long Hole MF Retrac Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210073	No	1220	4'	32H	R32	7.3	16.0

R32 SYSTEM RODS

Long Hole MF 54mm Guide Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
280034	No	1220	4'	35H	R32	10.8	23.8

Long Hole MF Guide Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270083	Yes	1525	5'	44T	R32	27.3	60.2
270059	Yes	3050	10'	44T	R32	24.3	53.5

Long Hole MF Drill Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270084	No	1525	5'	46R	R32	14.9	32.8

R32 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110127	57	2 1/4"	6 x 10	3 x 9	1F 1G	Hemispherical	Flat
110024	64	2 1/2"	6 x 13	3 x 10	1F 1G	Hemispherical	Flat
110188	51	2	4 x 12	2 x 9	1F 1G	Hemispherical	Chisel

R32 SYSTEM BITS

Button Bits


PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110875	43	1 11/16"	5 x 10	2 x 9	1F 2G	Hemispherical	Flat
110597	41	1 5/8"	5 x 9	2 x 8	1F 2G	Hemispherical	Flat
110545	42	1 21/32"	5 x 10	2 x 8	1F 2G	Parabolic	Flat
110176	43	1 11/16"	5 x 10	2 x 8	1F 2G	Hemispherical	Flat
110180	45	1 3/4"	5 x 11	2 x 8	1F 2G	Hemispherical	Flat
110765	45	1 3/4"	5 x 11	2 x 9	1F 2G	Hemispherical	Flat
110892	45	1 3/4"	5 x 11	2 x 9	1F 2G	Hemispherical	Flat
110285	45	1 3/4"	5 x 11	2 x 8	1F 2G	Parabolic	Flat
110368	45	1 3/4"	5 x 10	2 x 9	1F 2G	Parabolic	Flat
110772	45	1 3/4"	5 x 11	2 x 9	1F 2G	Parabolic	Flat
110179	45	1 3/4"	5 x 10	2 x 9	1F 2G	Hemispherical	Flat
110251	48	1 7/8"	5 x 11	2 x 9	1F 2G	Hemispherical	Flat
110184	48	1 7/8"	5 x 11	2 x 9	1F 2G	Hemispherical	Flat
110919	48	1 7/8"	5 x 11	2 x 9	1F 2G	Hemispherical	Flat
110609	48	1 7/8"	5 x 11	2 x 9	1F 2G	Parabolic	Flat
110988	51	2"	5 x 11	2 x 10	1F 2G	Hemispherical	Flat
110472	51	2"	5 x 11	2 x 10	1F 2G	Parabolic	Flat
110754	51	2"	5 x 12	2 x 10	1F 2G	Parabolic	Flat
110777	51	2"	5 x 12	2 x 11	1F 2G	Parabolic	Flat
110429	57	2 1/4"	6 x 11	3 x 10	1F 2G	Parabolic	Flat
110131	64	2 1/2"	6 x 12	3 x 10	1F 2G	Hemispherical	Flat
110135	76	3"	6 x 12	5 x 10	1F 2G	Hemispherical	Flat
110034	76	3"	8 x 11	6 x 11	2F	Hemispherical	Dome
110038	89	3 1/2"	8 x 11	6 x 11	2F	Hemispherical	Dome
110708	41	1 5/8"	6 x 8	2 x 8	2F 1G	Parabolic	Flat
110646	43	1 11/16"	6 x 9	2 x 8	2F 1G	Parabolic	Flat
110517	64	2 1/2"	8 x 10	4 x 10	2F 1G	Parabolic	Flat
110876	45	1 3/4"	5 x 11	2 x 8	2F 2G	Hemispherical	Flat

R32 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110770	45	1 3/4"	6 x 9	2 x 9	2F 2G	Ballistic	Flat
110615	51	2"	6 x 11	2 x 11	2F 2G	Hemispherical	Flat
110566	45	1 3/4"	6 x 9	3 x 8	3F	Hemispherical	Flat
110591	45	1 3/4"	6 x 9	3 x 8	3F	Hemispherical	Flat
110730	51	2"	6 x 10	3 x 9	3F	Parabolic	Flat
110657	57	2 1/4"	6 x 11	3 x 10	3F	Parabolic	Flat
110448	57	2 1/4"	6 x 11	3 x 10	3F	Hemispherical	Flat
110997	43	1 11/16"	6 x 9	3 x 8	3F 1G	Hemispherical	Flat
110664	45	1 3/4"	6 x 9	3 x 8	3F 1G	Parabolic	Flat
110375	45	1 3/4"	6 x 9	3 x 9	3F 1G	Hemispherical	Flat
110526	45	1 3/4"	6 x 9	3 x 8	3F 1G	Parabolic	Flat
110898	48	1 7/8"	6 x 10	3 x 8	3F 1G	Conical	Flat
110516	48	1 7/8"	6 x 9	3 x 8	3F 1G	Parabolic	Flat
110552	51	2"	6 x 10	3 x 9	3F 1G	Hemispherical	Flat
110515	51	2"	6 x 10	3 x 9	3F 1G	Parabolic	Flat
110748	54	2 1/8"	6 x 10	3 x 9	3F 1G	Hemispherical	Flat
110914	64	2 1/2"	6 x 11	3 x 10	3F 1G	Hemispherical	Flat
110778	64	2 1/2"	6 x 11	3 x 10	3F 1G	Parabolic	Flat
110799	76	3"	6 x 12	4 x 10	3F 1G	Hemispherical	Flat
110800	89	3 1/2"	6 x 14	4 x 12	3F 1G	Hemispherical	Flat
110996	43	1 11/16"	6 x 9	3 x 8	3F 2G	Hemispherical	Flat

Blade Bits

PART #	DIAMETER		GAUGE CARBIDE	FLUSHING HOLE
	MM	IN		
120329	41	1 5/8"	16 x 9	1F 4G
120223	43	1 11/16"	18 x 10	1F 4G
120255	45	1 3/4"	21 x 11	1F 4G
120045	45	1 3/4"	21 x 11	1F 4G
120304	51	2"	22 x 12	1F 4G
120051	51	2"	26 x 12	1F 4G

R32 SYSTEM BITS

Retrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
130098	51	2"	6 x 10	3 x 9	3F 1RF	Hemispherical	Flat
130048	54	2 1/8"	6 x 10	3 x 10	3F 1RF	Parabolic	Flat
130056	64	2 1/2"	6 x 13	3 x 10	3F 1RF	Hemispherical	Flat

Straightrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
140028	51	2"	6 x 10	3 x 9	3F	Hemispherical	Flat
140137	51	2"	6 x 10	3 x 9	3F	Parabolic	Flat
140029	57	2 1/2"	6 x 11	3 x 9	3F	Hemispherical	Flat
140074	51	2"	6 x 9	3 x 9	3F 1G	Hemispherical	Flat
140030	64	2 1/2"	6 x 11	3 x 10	3F 1G	Hemispherical	Flat

RST™ Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110953	43	1 11/16"	5 x 10	2 x 9	1F 2G	Hemispherical	Flat
110958	45	1 3/4"	5 x 10	2 x 9	1F 2G	Hemispherical	Flat
110960	51	2"	6 x 11	2 x 11	2F 2G	Hemispherical	Flat
110956	45	1 3/4"	6 x 10	3 x 8	3F 1G	Parabolic	Flat
110959	48	1 7/8"	6 x 10	3 x 8	3F 1G	Parabolic	Flat
110961	51	2"	6 x 10	3 x 9	3F 1G	Parabolic	Flat

RST™ Straightrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
140196	45	1 3/4"	6 x 10	3 x 8	3F 1G	Hemispherical	Flat
140197	45	1 3/4"	6 x 10	3 x 8	3F 1G	Parabolic	Flat
140208	45	1 3/4"	6 x 10	3 x 8	3F 1G	Parabolic	Flat

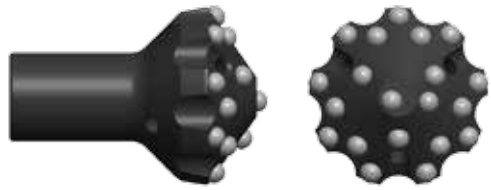
R32 SYSTEM REAMER TOOLS

Pilot Reamer Bits

PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
	MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
090032	89	3 1/2"	45	1 3/4"	8 x 10	9 x 10	2F	Hemispherical	4.0	8.9
090029	102	4"	41	1 5/8"	8 x 12	6x12 / 3x10	2F	Hemispherical	4.2	9.1

PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
	MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
090008	102	4"	43	1 11/16"	8 x 12	6x12 / 4x10 / 2x9	3F	Hemispherical	3.4	7.5

Dome Pilot Reamer Bits

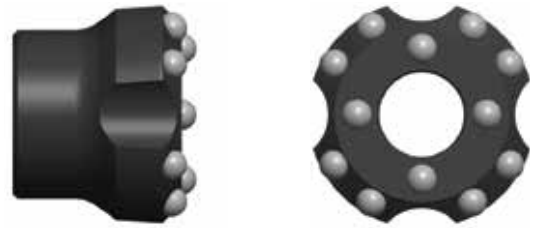


PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
	MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
090030	102	4"	23	7/8"	9 x 12	11 x 12	2F	Hemispherical	4.0	8.9

6° Pilot Adapter

PART #	PILOT DIAMETER		PILOT LENGTH		FLUSHING HOLE	WEIGHT		THREAD
	MM	IN	MM	IN		KG	LB	
380003	26	1 1/32"	266	10 8/16	3F	1.6	3.5	R28

6° Reamer Buttons Bits



PART #	DIAMETER		BUTTONS		CARBIDE PROFILE	WEIGHT	
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE		KG	LB
070020	57	2 1/4"	8 x 9	2 x 9	Hemispherical	1.1	2.4
070009	76	3"	8 x 10	4 x 10	Hemispherical	1.3	2.8
070011	89	3 1/2"	8 x 10	4 x 10	Hemispherical	1.7	3.7

R32 SYSTEM REAMER TOOLS

12° Pilot Adapter

PART #	PILOT DIAMETER		FLUSHING HOLE	WEIGHT		THREAD
	MM	IN		KG	LB	
380007	40	1 9/16"	254	2.8	6.2	R32
380017	40	1 9/16"	185	1.9	4.1	R32

12° Reamer Buttons Bits

PART #	DIAMETER		BUTTONS		CARBIDE PROFILE	WEIGHT	
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE		KG	LB
070030	102	4"	8 x 10	4 x 10	Hemispherical	2.4	5.3
070032	102	4"	8 x 12	6 x 12	Hemispherical	2.4	5.3
070028	127	5"	10 x 12	8 x 12	Hemispherical	3.8	8.4
070034	127	5"	10 x 12	8 x 12	Hemispherical	2.5	5.4

R32 SYSTEM COUPLINGS

Semi-Bridge Coupling

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350011	44	1 23/32"	150	6"	R32	1.1	2.4

Full Bridge Coupling

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350050	45	1 3/4"	168	6 3/5"	R32	1.3	2.8

R35 SYSTEM RODS

Tunneling / Drifting MM Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
220365	4300	14' 1 5/16"	35H	R35	R38	33.9	74.7
220476	4915	16' 1 8/16"	35H	R35	R38	37.8	83.3
220515	5525	18' 1 8/16"	35H	R35	R38	43.6	96.1

220275	4300	14' 1 5/16"	35H	R35	HM38	32.9	72.5
220306	4915	16' 1 8/16"	35H	R35	HM38	37.9	83.6
220426	5525	18' 1 8/16"	35H	R35	HM38	42.5	93.8

220477	4300	14' 1 5/16"	39R	R35	R38	33.5	73.8
220480	4915	16' 1 8/16"	39R	R35	R38	38.6	85.0
220514	6100	20' 3/16"	39R	R35	R38	48.9	107.7

220506	4600	15' 1 2/16"	39R	R35	HM38	36.5	80.5
220453	4915	16' 1 8/16"	39R	R35	HM38	38.7	85.3
220455	5525	18' 1 8/16"	39R	R35	HM38	44.6	98.4
220781	6400	21'	39R	R35	HM38	51.1	112.7

Tunneling / Drifting MF Rods

PART #	LENGTH		ROD CROSS SECTION	THREAD		WEIGHT	
	MM	FT/IN		BIT END	ROD END	KG	LB
300050	4300	14' 1 5/16"	39R	R35	HM38	36.1	79.6
300042	4915	16' 1 8/16"	39R	R35	HM38	40.8	89.9

R35 SYSTEM BITS

Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	110621	41	1 5/8"	5 x 10	2 x 8	1F 2G	Hemispherical	Flat
	110577	48	1 7/8"	6 x 9	3 x 8	3F 1G	Parabolic	Flat
	110738	48	1 7/8"	6 x 10	3 x 8	3F 1G	Parabolic	Flat
	110522	51	2"	6 x 10	3 x 9	3F 1G	Parabolic	Flat
	110523	51	2"	6 x 10	3 x 9	3F 1G	Hemispherical	Flat
	110654	51	2"	6 x 10	3 x 9	3F 1G	Parabolic	Flat
	110739	48	1 7/8"	6 x 10	3 x 9	3F 1G	Hemispherical	Flat
	110955	48	1 7/8"	6 x 10	3 x 8	3F 1G	Parabolic	Flat
	110908	51	2"	6 x 10	3 x 9	3F 2G	Hemispherical	Flat
	110909	51	2"	6 x 10	3 x 9	3F 2G	Parabolic	Flat
	110980	57	2 1/4"	6 x 10	3 x 9	1F 1G	Hemispherical	Flat

R35 SYSTEM REAMER TOOLS

Pilot Reamer Bits

	PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
		MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
	090018	102	4"	43	1 11/16"	8 x 12	6 x 12 / 4 x 10 / 2 x 9	3F 2R	Hemispherical	5.0	11.0

R35 SYSTEM REAMER TOOLS

Dome Pilot Reamer Bit

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
090031	102	4"	9 x 12	11 x 12	3F 1R	Hemispherical	3.6	8.0

12° Pilot Adapter

PART #	PILOT DIAMETER		PILOT LENGTH		FLUSHING HOLE	WEIGHT		THREAD
	MM	IN	MM	IN		KG	LB	
380007	40	1 9/16"	254	10	3F	2.8	6.2	R32
380017	40	1 9/16"	185	7 5/16"	3F	1.9	4.1	R32

12° Reamer Buttons Bits

PART #	DIAMETER		BUTTONS		CARBIDE PROFILE	WEIGHT	
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE		KG	LB
070030	102	4"	8 x 12	4 x 12	Hemispherical	2.4	5.3
070032	102	4"	8 x 12	6 x 12	Hemispherical	2.4	5.3
070028	127	5"	10 x 12	8 x 12	Hemispherical	3.8	8.4
070034	127	5"	10 x 12	8 x 12	Hemispherical	2.5	5.4

R35 SYSTEM COUPLING

Full Bridge Coupling

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350059	49	1 15/16"	175	6 8/9"	R35	2.0	4.4

HM35 (T35) SYSTEM RODS

Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210202	Yes	1830	6'	39R	R38	14.0	30.8

HM35 (T35) SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110964	54	2 1/8"	6 x 10	3 x 9	3F 1G	Hemispherical	Flat
110965	57	2 1/4"	6 x 10	3 x 9	3F 1G	Hemispherical	Flat

R38 SYSTEM RODS

Long Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200087	Yes	900	2' 11 7/16"	39R	R38	7.3	16.0
200411	Yes	1220	4'	39R	R38	9.1	20.0
200506	Yes	1830	6'	39R	R38	14.0	30.8
200377	Yes	3050	10'	39R	R38	23.8	52.4
200515	No	3660	12'	39R	R38	28.7	63.2

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210024	Yes	1220	4'	39R	R38	10.6	23.4
210134	Yes	1830	6'	39R	R38	16.0	35.3

Long Hole MF Lightning Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210185	Yes	2440	8'	39R	R38	21.1	46.4
210187	Yes	3660	12'	39R	R38	30.5	67.2
210188	No	4270	14'	39R	R38	36.1	79.6

R38 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110129	64	2 1/2"	6 x 12	3 x 10	1F 2G	Hemispherical	Flat
110291	102	4"	8 x 14	7 x 12	2F 2G	Hemispherical	Flat

R38 SYSTEM BITS

Straightrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
140190	64	2 1/2"	8 x 9	5 x 9	4F 1G	Hemispherical	Recess
140191	76	3"	8 x 11	5 x 11	4F 1G	Hemispherical	Recess
140193	61	2 3/8"	8 x 9	5 x 9	4F 1G	Hemispherical	Recess
140205	66	2 5/8"	8 x 9	5 x 9	4F 1G	Parabolic	Recess

R38 SYSTEM REAMER TOOLS

Pilot Reamer Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
990067	127	5"	8 x 14	6 x 14 / 3 x 10	2F	Hemispherical	5.8	12.9

R38 SYSTEM COUPLING

Semi-Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350029	55	2 3/16"	170	6 2/3"	R38	1.8	4.0

Full Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350041	55	2 3/16"	175	6 8/9"	R38	2.0	4.4

HM38 (T38) SYSTEM RODS

Long Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200416	No	250	9 13/16"	39R	HM38	1.7	3.8
200493	Yes	1830	6'	39R	HM38	14.0	30.8
200447	Yes	3050	10´	39R	HM38	23.4	51.5
200485	Yes	3050	10'	39R	HM38	22.5	49.5
200375	No	3660	12'	39R	HM38	27.4	60.3
200383	Yes	4000	13' 1 8/16"	39R	HM38	30.1	66.4
200524	No	4880	16' 2/16"	39R	HM38	38.6	85.1
200509	No	5490	18' 2/16"	39R	HM38	43.7	96.4

Long Hole MM Induction Hardened Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200316	Yes	3050	10'	39R	HM38	24.2	53.4
200365	No	3050	10'	39R	HM38	24.2	53.4
200366	No	3660	12'	39R	HM38	27.1	59.8
200367	No	4270	14'	39R	HM38	31.6	69.7
200417	No	4880	16' 2/16"	39R	HM38	36.1	79.7

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210064	No	910	3'	39R	HM38	8.4	18.5
210029	Yes	1220	4'	39R	HM38	11.0	24.3
210044	No	1220	4'	39R	HM38	11.2	24.6
210093	Yes	1220	4´	39R	HM38	10.5	23.0
210030	No	1520	5'	39R	HM38	13.4	29.5
210031	No	1830	6'	39R	HM38	15.8	34.9
210106	Yes	1830	6'	39R	HM38	15.9	35.1
210045	No	2440	8'	39R	HM38	21.1	46.4
210175	No	2950	9' 8 2/16"	39R	HM38	24.9	54.8
210032	No	3050	10'	39R	HM38	26.3	58.1
210110	Yes	3050	10'	39R	HM38	25.7	56.7
210033	No	3660	12´	39R	HM38	30.4	67.0
210046	No	3660	12'	39R	HM38	31.6	69.6
210112	No	4270	14'	39R	HM38	36.1	79.6

53

HM38 (T38) SYSTEM RODS

Long Hole MF Lightning Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210189	No	2440	8'	39R	HM38	21.1	46.4
210190	No	3050	10'	39R	HM38	26.3	58.1
210191	Yes	3660	12'	39R	HM38	31.6	69.6
210192	Yes	4270	14'	39R	HM38	36.1	79.6

Long Hole MF Retrac Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210072	No	1220	4'	38H	HM38	11.9	26.2
210122	No	1520	5'	38H	HM38	13.3	29.3
210201	No	1830	6´	38H	HM38	14.7	32.4

210230	No	1220	4'	39R	HM38	9.7	21.3
210231	No	1520	5'	39R	HM38	9.7	21.3

Long Hole MF / 61mm / Spiral Guides Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
280007	No	1220	4'	39R	HM38	12.2	27.0
280009	No	1830	6'	39R	HM38	17.2	37.9

Long Hole MF / 64mm / Guides Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
280032	No	1220	4'	38H	HM38	11.8	26.0

HM38 (T38) SYSTEM RODS

Long Hole MF Guide Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270012	Yes	1220	4'	55T	HM38	16.3	35.9
270082	Yes	1525	5'	55T	HM38	15.6	34.4
270013	Yes	1830	6'	55T	HM38	18.4	40.5

HM38 (T38) SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110022	64	2 1/2"	6 x 12	3 x 10	1F 2G	Hemispherical	Flat
110384	64	2 1/2"	6 x 12	3 x 10	1F 2G	Parabolic	Flat

110674	64	2 1/2"	6 x 12	3 x 11	3F	Hemispherical	Flat

110549	63	2 8/16"	8 x 10	4 x 9	3G	Parabolic	Flat

110912	54	2 1/8"	6 x 11	3 x 10	3F 1G	Parabolic	Flat
110809	64	2 1/2"	6 x 11	3 x 10	3F 1G	Parabolic	Flat
110363	64	2 1/2"	6 x 11	3 x 10	3F 1G	Hemispherical	Flat

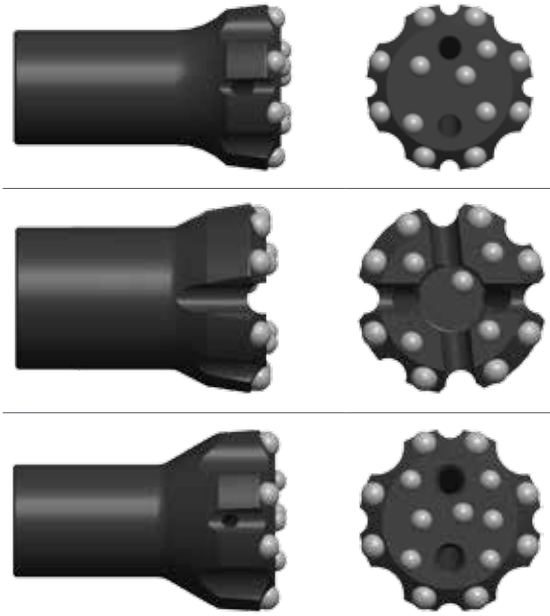
110718	64	2 1/2"	6 x 11	4 x 10	3F	Hemispherical	Recess
110719	64	2 1/2"	6 x 11	4 x 10	3F	Parabolic	Recess
110656	70	2 3/4"	6 x 13	3 x 11 / 1 x 10	3F	Hemispherical	Recess
110720	76	3"	6 x 11	4 x 11	3F	Hemispherical	Recess

110203	76	3"	8 x 11	4 x 11	2F 1G	Hemispherical	Flat
110830	76	3"	8 x 12	4 x 11	2F 1G	Hemispherical	Flat
110712	76	3"	8 x 12	4 x 12	2F 1G	Hemispherical	Flat
110793	76	3"	8 x 11	4 x 11	2F 1G	Parabolic	Flat
110849	76	3"	8 x 11	4 x 11	2F 1G	Parabolic	Flat
110805	80	3 1/8"	8 x 11	4 x 11	2F 1G	Hemispherical	Flat

HM38 (T38) SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110814	89	3 1/2"	8 x 12	5 x 11	2F 2G	Hemispherical	Flat
110741	102	4"	8 x 14	5 x 12	2F	Hemispherical	Recess
110288	102	4"	8 x 14	7 x 12	2F 2G	Hemispherical	Flat
110634	102	4"	8 x 14	7 x 12	2F 2G	Parabolic	Flat



Blade Bits

PART #	DIAMETER		GAUGE CARBIDE	FLUSHING HOLE
	MM	IN		
120058	64	2 1/2"	26 x 12	1F 4G
120067	76	3"	26 x 16	1F 4G
120349	64	2 1/2"	26 x 12	1F 2G
120348	76	3"	26 x 16	1F 2G

Retrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
130049	64	2 1/2"	5 x 11	4 x 10	2F	Hemispherical	Recess
130059	64	2 1/2"	5 x 11	4 x 10	2F	Parabolic	Recess
130057	64	2 1/2"	6 x 13	3 x 10	3F 1RF	Hemispherical	Flat

HM38 (T38) SYSTEM BITS

Retrac Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	130011	76	3"	6 x 12	3 x 12	3F	Hemispherical	Flat
	130079	76	3"	6 x 13	3 x 11 / 1 x 10	3F 3RF	Hemispherical	Recess
	130074	89	3 1/2"	6 x 12	5 x 12	3F	Hemispherical	Recess

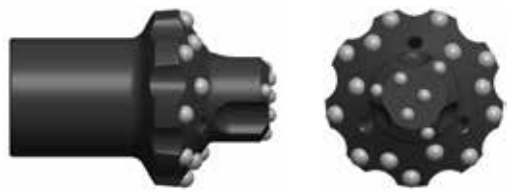
Straightrac Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	140052	64	2 1/2"	6 x 10	3 x 10 / 1 x 9	3F 1G	Hemispherical	Recess
	140060	64	2 1/2"	6 x 10	3 x 10 / 1 x 9	3F 1G	Parabolic	Recess
	140031	64	2 1/2"	6 x 11	3 x 10	3F 1G	Hemispherical	Flat
	140035	76	3"	6 x 11	3 x 11 / 2 x 10	3F 1G	Hemispherical	Recess
	140097	64	2 1/2"	8 x 9	5 x 9	4F 1G	Hemispherical	Recess
	140115	64	2 1/2"	8 x 9	5 x 9	4F 1G	Parabolic	Recess
	140136	76	3"	8 x 11	5 x 11	4F 1G	Hemispherical	Recess
	140077	76	3"	8 x 11	5 x 11	4F 1G	Parabolic	Recess

HM38 (T38) SYSTEM REAMER TOOLS

Pilot Reamer Bits

PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
	MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
090028	89	3 1/2"	48	1 7/8"	8 x 10	9 x 10	2F	Hemispherical	3.7	8.1
090019	102	4"	48	1 7/8"	8 x 12	6x12 / 3x10	2F	Hemispherical	5.3	11.6
090026	115	4 1/2"	48	1 7/8"	8 x 12	6x12 / 3x10	2F	Hemispherical	5.8	12.7
090021	127	5"	48	1 7/8"	8 x 14	6x14 / 3x10	2F	Hemispherical	5.8	12.9



090035	152	6"	76	3"	9 x 16	6x16 / 6x12	3F	Hemispherical	15.0	33.1
090024	152	6"	89	3 1/2"	9 x 16	6x16 / 6x12	3F	Hemispherical	15.0	33.1

HM38 (T38) SYSTEM COUPLING

Semi-Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350002	55	2 3/16"	191	7 1/2"	HM38	1.8	4.0

Full Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350045	55	2 3/16"	187	7 3/8"	HM38	2.1	4.6

HM45 (T45) SYSTEM RODS

Long Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200379	No	2000	6' 6 12/16"	46R	HM45	21.2	46.7
200320	Yes	3050	10'	46R	HM45	32.7	72.0
200468	No	3050	10'	46R	HM45	32.7	72.0
200486	No	3660	12'	46R	HM45	39.7	87.5
200455	No	5480	17' 11 12/16"	46R	HM45	60.0	132.3

Long Hole MM Induction Hardened Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200463	No	610	2'	46R	HM45	6.1	13.5
200438	No	1220	4'	46R	HM45	12.9	28.4
200427	No	1830	6'	46R	HM45	19.8	43.6
200361	No	3050	10'	46R	HM45	33.1	72.9
200362	No	3660	12'	46R	HM45	39.7	87.5
200386	No	4270	14'	46R	HM45	46.3	102.1
200418	No	4730	15' 6 4/16"	46R	HM45	51.3	113.0
200464	No	4880	16' 2/16"	46R	HM45	53.5	117.9
200397	No	6100	20' 3/16"	46R	HM45	68.1	150.0

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210080	No	910	3'	46R	HM45	11.8	26.0
210048	No	1220	4'	46R	HM45	15.0	33.0
210035	No	1520	5'	46R	HM45	18.5	40.8
210126	No	1830	6'	46R	HM45	22.5	49.6
210091	No	2440	8'	46R	HM45	28.0	61.7
210037	No	3050	10'	46R	HM45	37.5	82.6
210118	Yes	3050	10'	46R	HM45	34.7	76.6
210038	No	3660	12'	46R	HM45	42.5	93.6
210108	Yes	3660	12'	46R	HM45	42.5	93.6
210177	No	3660	12'	46R	HM45	42.5	93.6
210213	No	3660	12'	46R	HM45	41.8	92.1
210082	No	4270	14'	46R	HM45	49.1	108.3

HM45 (T45) SYSTEM RODS

Long Hole MF Lightning Rods

PART #	WRENCH FLATS	LENGTH MM	LENGTH FT/IN	ROD CROSS SECTION	THREAD	WEIGHT KG	WEIGHT LB
210193	Yes	3050	10'	46R	HM45	35.3	77.8
210194	No	3660	12'	46R	HM45	42.1	92.8
210195	No	4270	14'	46R	HM45	48.9	107.8
210226	No	5490	18' $^{2}/_{16}$"	46R	HM45	62.5	137.7

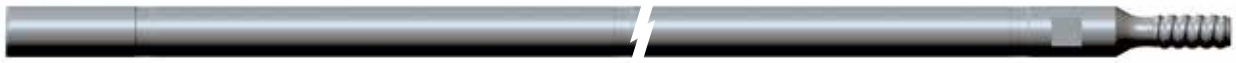
Long Hole MF Retrac Rods

PART #	WRENCH FLATS	LENGTH MM	LENGTH FT/IN	ROD CROSS SECTION	THREAD	WEIGHT KG	WEIGHT LB
210205	No	1830	6'	46R	HM45	22.1	48.8

Long Hole MF / 76mm / Guides Rods

PART #	WRENCH FLATS	LENGTH MM	LENGTH FT/IN	ROD CROSS SECTION	THREAD	WEIGHT KG	WEIGHT LB
280033	No	1220	4'	46R	HM45	17.3	38.2

Long Hole MF Guide Tubes



PART #	WRENCH FLATS	LENGTH MM	LENGTH FT/IN	ROD CROSS SECTION	THREAD	WEIGHT KG	WEIGHT LB
270022	Yes	1220	4'	66T	HM45	20.9	46.0
270081	Yes	1525	5'	66T	HM45	28.6	63.0
270052	Yes	1830	6'	66T	HM45	33.8	74.6

Long Hole MF Drill Tubes

PART #	WRENCH FLATS	LENGTH MM	LENGTH FT/IN	ROD CROSS SECTION	THREAD	WEIGHT KG	WEIGHT LB
270069	Yes	1220	4'	66T	HM45	24.5	53.9
270035	Yes	1525	5'	66T	HM45	29.7	65.6
270033	Yes	1830	6'	66T	HM45	34.6	76.3

HM45 (T45) SYSTEM BITS

Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
 	110948	76	3"	6 x 14	4 x 12	2F	Ballistic	Flat
 	110412	76	3"	6 x 12	4 x 10	3F 1G	Hemispherical	Flat
	110790	76	3"	6 x 12	4 x 11	3F 1G	Hemispherical	Flat
 	110833	85	3 3/8"	6 x 13	4 x 13	2F 2G	Ballistic	Flat
	110834	85	3 3/8"	6 x 13	4 x 13	2F 2G	Parabolic	Flat
 	110766	89	3 1/2"	8 x 12	5 x 11	2F 2G	Hemispherical	Flat
 	110137	89	3 1/2"	6 x 14	5 x 12	1F 2G	Hemispherical	Flat
 	110722	76	3"	6 x 11	4 x 11	3F	Hemispherical	Recess
	110723	76	3"	6 x 11	4 x 11	3F	Parabolic	Recess
	110895	76	3"	6 x 12	4 X 11	3F	Parabolic	Recess
 	110509	102	4"	9 x 12	7 x 12	3F	Hemispherical	Flat
 	110216	76	3"	6 x 11	3 x 11 / 2 x 10	3F	Hemispherical	Recess
	110661	89	3 1/2"	6 x 12	5 x 12	3F	Hemispherical	Recess
 	110204	76	3"	8 X 11	4 X 11	2F 1G	Hemispherical	Flat
	110713	76	3"	8 X 12	4 X 12	2F 1G	Hemispherical	Flat

HM45 (T45) SYSTEM BITS

Button Bits

		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		110853	89	3 1/2"	8 x 11	6 x 11	4F 1G	Parabolic	Recess
		110942	76	3"	8 X 12	4 X 12	2F 2G	Parabolic	Flat
		110716	89	3 1/2"	8 X 14	4 X 14	2F 2G	Hemispherical	Flat
		110724	102	4"	8 x 14	5 x 12	2F	Hemispherical	Recess
		110725	102	4"	8 x 14	5 x 12	2F	Parabolic	Recess
		110842	89	3 1/2"	8 x 12	6 x 12	2F	Parabolic	Flat
		110924	115	4 1/2"	8 x 14	6 x 14	4F	Hemispherical	Recess

Blade Bits

		PART #	DIAMETER		GAUGE CARBIDE	FLUSHING HOLE
			MM	IN		
		120307	76	3"	26 x 16	1F 4G

HM45 (T45) SYSTEM BITS

Retrac Button Bits

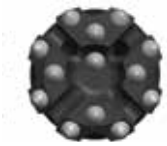
		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		130058	76	3"	6 x 13	3 x 11 / 1 x 10	3F	Hemispherical	Recess
		130105	76	3"	6 x 11	4 x 11	3F	Parabolic	Recess
		130012	76	3"	6 x 13	3 x 11 / 1 x 10	3F 3RF	Hemispherical	Recess
		130080	89	3 1/2"	6 x 12	5 x 12	3F	Hemispherical	Recess
		130136	89	3 1/2"	6 x 12	5 x 12	3F	Parabolic	Recess
		130081	102	4"	8 x 14	5 x 12	3F	Hemispherical	Recess
		130071	89	3 1/2"	9 x 11	6 X 11	3F	Parabolic	Flat

Straightrac Button Bits

		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		140039	76	3"	6 x 11	3 x 11 / 2 x 10	3F	Hemispherical	Recess
		140203	76	3"	6 x 11	3 x 11 / 2 x 10	3F	Hemispherical	Recess

HM45 (T45) SYSTEM

Straightrac Button Bits

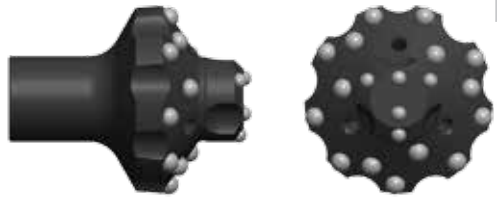
		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		140221	76	3"	6 x 11	3 x 11 / 2 x 10	3F 2RF	Hemispherical	Recess
		140132	70	2 3/4"	8 x 10	5 x 10	4F	Hemispherical	Recess
		140160	70	2 3/4"	8 x 10	5 x 10	4F	Parabolic	Recess
		140114	76	3"	8 x 11	5 x 11	4F 1G	Parabolic	Recess
		140109	76	3"	8 x 11	5 x 11	4F 1G	Hemispherical	Recess
		140071	89	3 1/2"	8 x 11	6 x 11	4F 1G	Hemispherical	Recess
		140072	89	3 1/2"	8 x 11	6 x 11	4F 1G	Parabolic	Recess
		140125	102	4"	8 x 14	6 x 12	4F 1G	Hemispherical	Recess
		140163	102	4"	8 x 14	6 x 12	4F 1G	Parabolic	Recess
		140169	89	3 1/2	8 x 14	6 x 12	2F	Parabolic	Flat
		140178	89	3 1/2"	9 x 11	6 x 11	3F 1G	Hemispherical	Flat
		140218	89	3 1/2"	9 x 12	6 x 11 / 2 x 10	3F 2RF	Hemispherical / Parabolic	Recess
		140176	76	3"	9 x 10	8 x 10	3F 1RF	Parabolic	Recess

HM45 (T45) SYSTEM REAMER TOOLS

Pilot Reamer Bits

PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
	MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
090027	115	4 1/2	48	1 7/8"	8 x 12	6 x 12 / 3x10	2F	Hemispherical	5.5	12.2
090025	127	5	48	1 7/8"	8 x 14	6 x 14 / 3x10	2F	Hemispherical	5.7	12.5

090034	152	6	76	3"	9 x 16	6x16 / 6x12	3F	Hemispherical	14.7	32.5
090023	152	6	89	3 1/2"	9 x 16	7x16 / 6x12	3F	Hemispherical	14.7	32.5



990059	152	6	70	2 3/4	9 x 16	6x16 / 5x12	3F	Hemispherical	14.7	32.5

HM45 (T45) SYSTEM COUPLING

Semi-Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350012	66	2 5/8"	210	8 1/4"	HM45	3.3	7.3
350034	63	2 1/2"	210	8 1/4"	HM45	2.7	6.0

Full Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350046	66	2 5/8"	213	8 2/5"	HM45	3.4	7.6

HM51 (T51) SYSTEM RODS

Long Hole MM Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
200398	No	910	3'	52R	HM51	13.7	30.3
200487	No	3660	12'	52R	HM51	49.8	109.8

Long Hole MM Induction Hardened Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
203008	No	610	2'	52R	HM51	8.4	18.4
200363	No	3660	12'	52R	HM51	49.8	109.8
200422	No	4270	14'	52R	HM51	58.3	128.5
200364	No	6100	20' 3/16"	52R	HM51	83.5	184.1
200404	No	7320	24' 3/16"	52R	HM51	104.6	230.7

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210040	No	1525	5'	52R	HM51	24.0	52.9
210154	No	1830	6'	52R	HM51	26.7	58.9
210042	No	3660	12'	52R	HM51	52.6	116.1
210083	No	4270	14'	52R	HM51	61.1	134.7
210043	No	6100	20' 3/16"	52R	HM51	86.7	191.1

Long Hole MF Lightning Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210218	Yes	3000	9' 10 2/16"	52R	HM51	44.9	98.9
210196	Yes	3660	12'	52R	HM51	52.6	115.9
210197	Yes	4270	14'	52R	HM51	61.1	134.7
210227	No	5490	18' 2/16"	52R	HM51	77.8	171.4
210222	No	6100	20' 3/16"	52R	HM51	86.7	191.1

HM51 (T51) SYSTEM RODS

Long Hole MF Guide Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270018	Yes	1830	6'	76T	HM51	43.0	94.9
270019	Yes	3660	12'	76T	HM51	82.0	180.8

Long Hole FF Guide Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270085	Yes	3660	12´	76T	HM51	84.3	185.8

HM51 (T51) SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110663	89	3 1/2"	6 X 12	5 X 12	3F	Hemispherical	Recess
110662	89	3 1/2"	6 X 12	5 X 12	3F	Parabolic	Recess
110219	89	3 1/2"	6 X 14	5 X 12	1F 2G	Hemispherical	Flat
110438	89	3 1/2"	6 x 14	5 X 12	1F 2G	Parabolic	Flat
110703	102	4"	8 X 14	5 X 12	2F	Hemispherical	Recess
110726	102	4"	8 X 14	5 X 12	2F	Parabolic	Recess
110701	115	4 1/2"	8 X 14	6 X 14	4F	Hemispherical	Recess
110699	127	5"	8 x 14	7 x 14	4F	Hemispherical	Recess
110923	140	5 1/2"	8 x 16	7 x 16	4F	Hemispherical	Recess

HM51 (T51) SYSTEM BITS

Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	110360	89	3 1/2"	8 x 12	6 x 12	2F 1G	Hemispherical	Flat
	110437	102	4"	8 x 14	7 x 12	2F 2G	Parabolic	Flat
	110141	102	4"	8 x 14	7 x 12	2F 2G	Hemispherical	Flat
	110950	115	4 1/2"	8 x 14	8 x 14	4F 1G	Hemispherical	Recess
	110737	89	3 1/2"	9 X 12	8 X 11	3F	Parabolic	Recess
	110511	115	4 1/2"	9 x 13	8 x 13	3F	Parabolic	Flat
	110510	115	4 1/2"	9 x 13	8 x 13	3F	Hemispherical	Flat

Retrac Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	130101	89	3 1/2"	6 X 12	5 X 12	3F	Hemispherical	Recess
	130107	89	3 1/2"	6 X 12	5 X 12	3F	Parabolic	Recess
	130082	102	4"	8 X 14	5 X 12	2F	Hemispherical	Recess
	130083	115	4 1/2"	8 X 14	6 X 14	4F	Hemispherical	Recess

HM51 (T51) SYSTEM BITS

Retrac Button Bits

		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		130008	102	4"	8 x 14	7 x 12	2F	Hemispherical	Flat
		130100	102	4"	8 x 14	7 x 12	2F	Parabolic	Flat
		130084	127	5"	8 X 14	7 X 14	4F	Hemispherical	Recess
		130055	115	4 1/2"	9 x 13	9 x 13	3F	Hemispherical	Recess
		130054	127	5"	9 x 14	9 x 14	3F	Hemispherical	Recess

Straightrac Button Bits

		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		140212	83	3 1/4"	8 x 11	6 x 11	4F 1G	Parabolic	Recess
		140095	89	3 1/2"	8 x 11	6 x 11	4F 1G	Parabolic	Recess
		140045	102	4"	6 x 16	3 x 14 / 2 x 12	3F	Hemispherical	Recess
		140098	102	4"	6 x 16	3 x 14 / 2 x 12	3F	Parabolic	Recess
		140042	115	4 1/2"	9 x 14	6 x 14	3F	Hemispherical	Flat

HM51 (T51) SYSTEM COUPLING

Semi-Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350013	72	2 13/16"	235	9 1/4"	HM51	4.9	10.8
350014	76	3"	235	9 1/4"	HM51	5.0	11.0

Full Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350048	76	3"	251	9 7/8"	HM51	5.6	12.3

BE58 SYSTEM RODS

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210089	No	4270	14'	60R	BE58	83.3	183.6

Long Hole MF Drill Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270051	No	1830	6'	76T	BE58	42.4	93.6

BE58 SYSTEM BITS

Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	110270	102	4"	8 x 14	7 x 12	2F 2G	Hemispherical	Flat
	110937	102	4"	8 x 14	6 x 14	2F	Hemispherical	Flat
	110272	115	4 1/2"	8 x 14	8 x 12	2F 2G	Hemispherical	Flat
	110727	89	3 1/2"	9 x 12	6 x 12	3F	Hemispherical	Flat

BE58 SYSTEM BITS

Retrac Button Bits

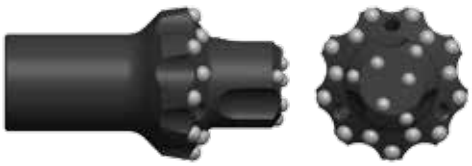
	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	130102	102	4"	9 x 12	11 x 12	2F	Parabolic	Flat
	130088	102	4"	9 x 12	7 x 12	3F	Parabolic	Flat

Straightrac Button Bits

	PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
		MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
	140189	89	3 1/2"	8 x 12	4 x 12 / 1 x 11	4F	Parabolic	Recess
	140187	89	3 1/2"	9 x 12	8 x 11	3F	Hemispherical	Recess

BE58 SYSTEM BITS

Pilot Reamer Bits

	PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
		MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
	990063	127	5"	76	3"	9 x 14	6x14 / 6x12	3F	Hemispherical	8.5	18.7
	990058	152	6"	80	3 1/8"	9 x 16	6x16 / 6x12	3F	Hemispherical	11.8	25.9
	990060	203	8"	135	5 5/16"	18 x 14	13 x 14	3F	Hemispherical	22.7	50.1

EL60 SYSTEM RODS

Long Hole MM Induction Hardened Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
203011	No	910	3'	60R	EL60	16.6	36.5
200529	No	3660	12'	60R	EL60	70.2	154.7
200530	No	4270	14'	60R	EL60	81.3	179.2
200543	No	6100	20' 3/16"	60R	EL60	116.3	256.3

Long Hole MF Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210164	No	4270	14'	60R	EL60	83.7	184.6
210180	No	6100	20' 3/16"	60R	EL60	113.4	250.0

Long Hole MF Lightning Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210214	No	1220	4'	60R	EL60	25.8	56.9
210219	No	1800	5' 10 14/16"	60R	EL60	36.4	80.2
210198	No	3660	12'	60R	EL60	72.2	159.2
210199	No	4270	14'	60R	EL60	83.7	184.6
210221	No	6100	20' 3/16"	60R	EL60	113.4	250.0

Long Hole MF Lightning Drill Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270086	No	4270	14'	87T	EL60	106.4	234.5

EL60 SYSTEM BITS

Button Bits

		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		110900	92	3 5/8"	8 x 13	5 x 12	2F	Hemispherical	Recess
		110887	102	4"	8 x 14	5 x 12	2F	Hemispherical	Recess
		110993	102	4"	8 x 14	6 x 12	2F	Hemispherical	Flat
		110888	115	4 1/2"	8 x 14	6 x 14	4F	Hemispherical	Recess
		110994	115	4 1/2"	8 x 14	6 x 14	4F	Hemispherical	Flat
		110889	127	5"	8 x 14	7 x 14	4F	Hemispherical	Recess
		110918	127	5"	8 x 16	7 x 14	4F	Hemispherical	Recess
		110890	140	5 1/2"	8 x 16	7 x 16	4F	Hemispherical	Recess

Retrac Button Bits

		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		130114	102	4"	8 x 14	5 x 12	2F	Hemispherical	Recess
		130115	115	4 1/2"	8 x 14	6 x 14	4F	Hemispherical	Recess
		130113	127	5"	8 x 14	7 x 14	4F	Hemispherical	Recess
		130120	127	5"	8 x 16	7 x 14	4F	Hemispherical	Recess
		130116	140	5 1/2"	8 x 16	7 x 16	4F	Hemispherical	Recess

EL60 SYSTEM BITS

Retrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
130137	152	6"	9 x 16	6 x 16 / 4 x 14	3F	Hemispherical	Recess

EL60 SYSTEM COUPLING

Semi-Bridge Coupling

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350057	83	3 1/4"	280	6 5/8	EL60	5.9	12.9

BE68 SYSTEM RODS

Long Hole MF Drill Tubes

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
270004	No	1525	5'	87T	BE68	44.2	97.5
270064	No	1830	6'	87T	BE68	49.4	108.8

BE68 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110927	102	4"	8 x 14	6 x 12	4F	Hemispherical / Parabolic	Recess
110280	127	5"	8 x 14	9 x 12	2F 2G	Hemispherical	Flat
110612	102	4"	9 x 12	7 x 12	3F	Hemispherical	Flat
110951	105	4 1/8"	9 x 14	7 x 14	3F	Hemispherical	Flat

BE68 SYSTEM REAMER TOOLS

Straightrac Button Bits

		PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
			MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
		140195	102	4"	8 x 14	6 x 12	4F	Hemispherical / Parabolic	Recess
		140174	115	4 1/2"	9 x 14	6 x 14	3F	Hemispherical	Flat
		140049	102	4"	9 x 12	7 x 12	3F	Hemispherical	Flat
		140089	102	4"	9 x 12	7 x 12	3F	Parabolic	Flat
		140202	105	4 1/8"	9 x 14	7 x 14	3F	Hemispherical	Flat

Pilot Reamer Bits

		PART #	DIAMETER		PILOT DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	WEIGHT	
			MM	IN	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			KG	LB
		990064	127	5"	90	3 9/16"	9 x 14	3x14 / 6x12	3F	Hemispherical	9.7	21.3
		090047	152	6"	89	3 1/2"	9 x 16	6x16 / 6x12	3F	Hemispherical	13.5	29.8
		990061	203	8"	135	5 5/16"	18 x 14	13 x 14	3F	Hemispherical	23.1	50.9

EL68 SYSTEM RODS

Long Hole MM Induction Hardened Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
203003	No	1000	3' 3 6/16"	70R	EL68	34.7	76.5
200428	No	1830	6'	70R	EL68	47.4	104.6
200426	No	3660	12'	70R	EL68	98.2	216.5
200431	No	4270	14'	70R	EL68	114.6	252.6
200424	No	6100	20' 3/16"	70R	EL68	164.2	361.9

Long Hole MF Lightning Rods

PART #	WRENCH FLATS	LENGTH		ROD CROSS SECTION	THREAD	WEIGHT	
		MM	FT/IN			KG	LB
210216	No	1220	4'	70R	EL68	37.9	83.4
210203	No	3660	12'	70R	EL68	103.8	228.8
210204	No	4270	14'	70R	EL68	120.3	265.2
210220	No	6100	20' 3/16"	70R	EL68	168.3	371.0

EL68 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110943	108	4 1/4"	8 x 16	6 x 16	2F	Parabolic	Flat
110675	115	4 1/2"	8 x 14	6 x 14	4F	Hemispherical	Recess
110676	115	4 1/2"	8 x 14	6 x 14	4F	Parabolic	Recess
110677	127	5"	8 x 14	7 x 14	4F	Hemispherical	Recess
110678	127	5"	8 x 14	7 x 14	4F	Parabolic	Recess
110679	140	5 1/2"	8 x 16	7 x 16	4F	Hemispherical	Recess
110681	152	6"	8 x 16	7 x 16	4F	Hemispherical	Recess
110682	152	6"	8 x 16	7 x 16	4F	Parabolic	Recess
110599	105	4 1/8"	9 x 12	7 x 12	3F	Hemispherical	Flat

CA Patent Nos 2,221,018; 2,303,710; SE Patent Nos 521,458; 521,790; US Patent No. 6,196,598

EL68 SYSTEM BITS

Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
110940	152	6"	9 x 16	9 x 16	3F	Ballistic	Flat
110969	152	6"	9 x 16	9 x 16	3F	Hemispherical	Flat

Retrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
130070	127	5"	8 x 14	7 x 14	4F	Hemispherical	Recess
130134	140	5 1/2"	8 x 16	7 x 16	4F	Hemispherical	Recess
130135	152	6"	8 x 16	7 x 16	4F	Hemispherical	Recess

Straightrac Button Bits

PART #	DIAMETER		BUTTONS		FLUSHING HOLE	CARBIDE PROFILE	FACE PROFILE
	MM	IN	GAUGE NO/ SIZE	FRONT NO/ SIZE			
140217	152	6"	9 x 16	9 x 16	3F	Hemispherical	Flat

EL68 SYSTEM COUPLING

Semi-Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350051	96	3 3/4"	330	13	EL68	9.9	21.8

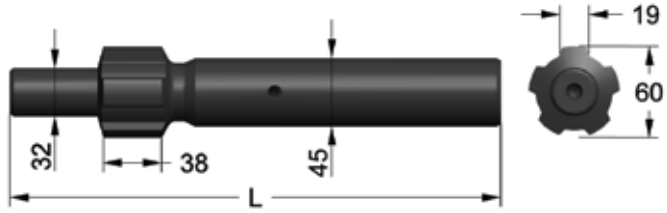
Full Bridge Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
350052	96	3 3/4"	356	14	EL68	11.4	25.1

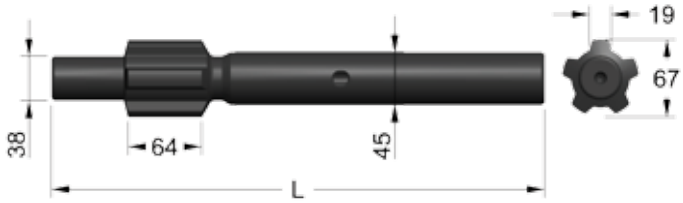
SHANK ADAPTERS

SHANK ADAPTERS

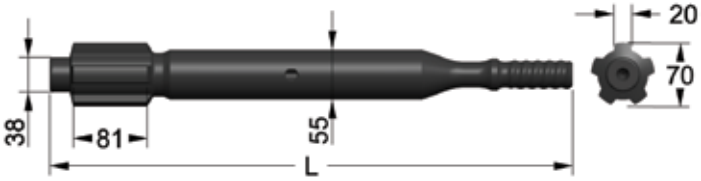
Intended for use with Boart Longyear Drills



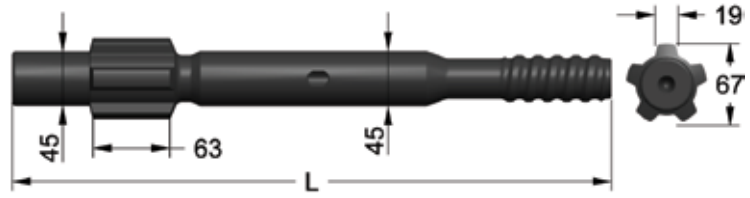
PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450074	HE65	R32F	324	32	45	38



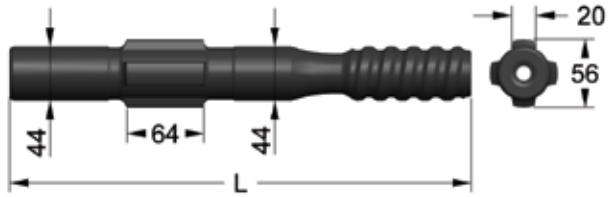
450078	HE150	R32F	428	38	45	64



450653	HD155	R32	575	38	55	81
450652	HD155	R38	575	38	55	81
450500	HD155	HM38	575	38	55	81
450565	HD155	HM45	575	38	55	81



450777	S140	HM38	495	45	45	63
450778	S140	HM45	495	45	45	63

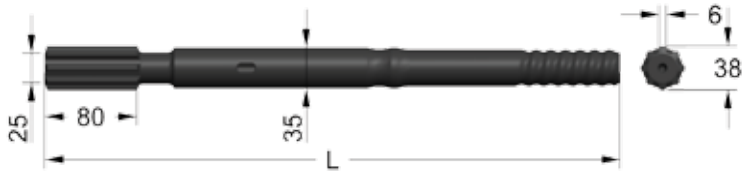


450212	S36IR	R32	380	44	44	64
450037	S36IR	R38	380	44	44	64
450010	S36IR	HM45	380	44	44	64
450266	S36IR	HM38	380	44	44	64

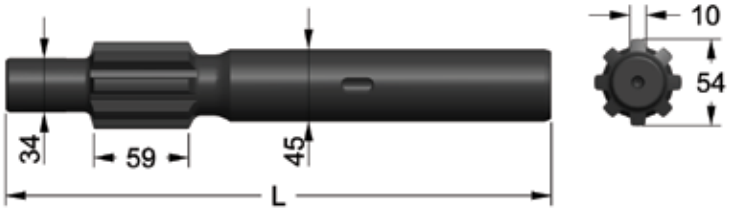
SHANK ADAPTERS

Intended for use with Atlas Copco Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450853	COP 1132	R32	410	25	35	79
450914	COP 1132	R35	410	25	35	79



450854	COP 1132	R32	500	25	35	80



450089	COP 1032	R32F	340	34	45	59

450094	COP 1238ME	R32	575	34	38	74
450251	COP 1238ME	R38	575	34	38	74
450284	COP 1238ME	HM38	575	34	38	74

450150	COP 1238ME	R38	476	34	38	74
450286	COP 1238ME	HM38	476	34	38	74

450423	COP 1238ME	R38	486	34	38	74

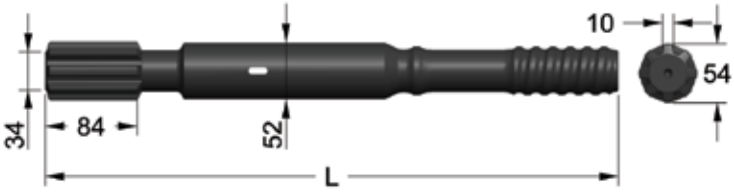
SHANK ADAPTERS

Intended for use with Atlas Copco Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450092	COP 1238ME	R32	500	34	38	74
450282	COP 1238ME	HM38	500	34	38	74

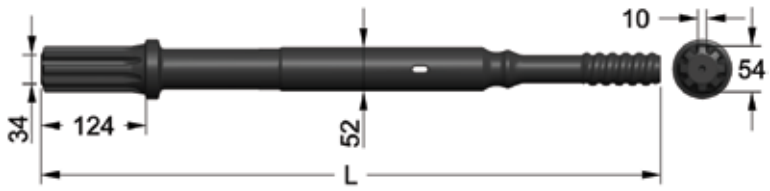
450524	COP 1238ME	HM38	575	34	45	74
450632	COP 1238ME	HM45	575	34	45	74

450889	COP 1838	HM38	525	34	52	84



450713	COP 1838ME	HM45	525	34	52	84
450539	COP 1838ME	HM51	525	34	52	84

450605	COP 1838ME	HM38	730	34	60	116
450607	COP 1838ME	HM45	730	34	60	116



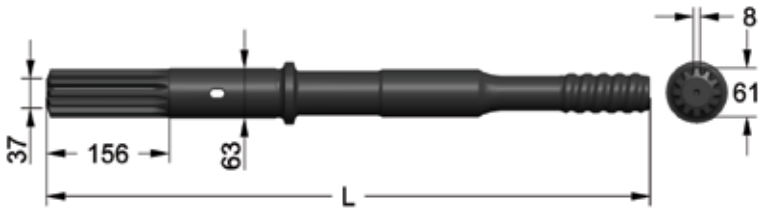
450857	COP 1838MU	HM38	730	34	52	124
450856	COP 1838MU	HM45	730	34	52	124

SHANK ADAPTERS

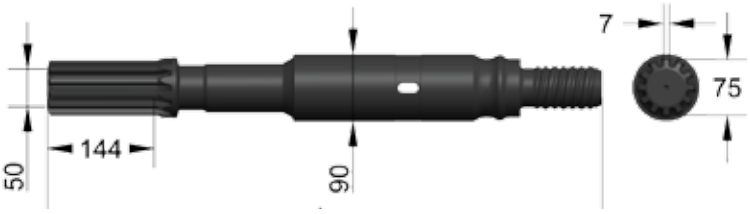
Intended for use with Atlas Copco Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450614	COP 1838T	R32	435	36	38	84
450631	COP 1838T	R32	525	36	38	84
450469	COP 1838T	R38	435	36	38	84
450550	COP 1838T	HM38	435	36	38	84
450551	COP 1838T	HM38	525	36	38	84

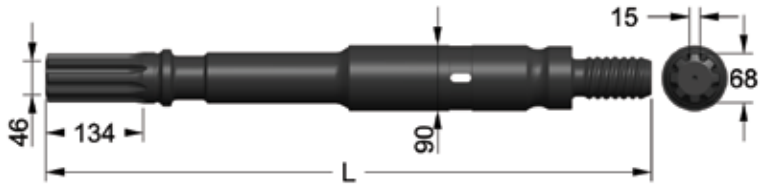
450548	COP 1840ME	HM45	565	35	52	126
450634	COP 1840ME	HM51	565	35	52	126



450858	COP 2160	HM51	770	37	63	156



450916	COP 3060	BE58	745	50	90	144



450863	COP 4050	BE58	834	46	90	134
450826	COP 4050	BE68	834	46	90	134

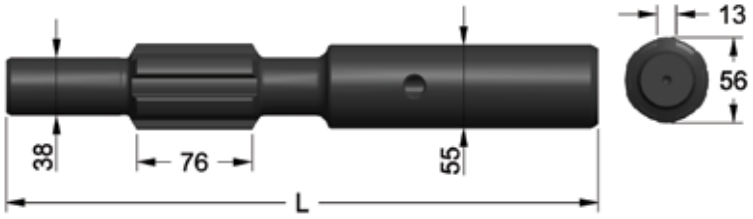
450878	COP 4050	EL60	700	52	70	109

SHANK ADAPTERS

Intended for use with Atlas Copco Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450909	COP 4050	BE58	834	46	90	113

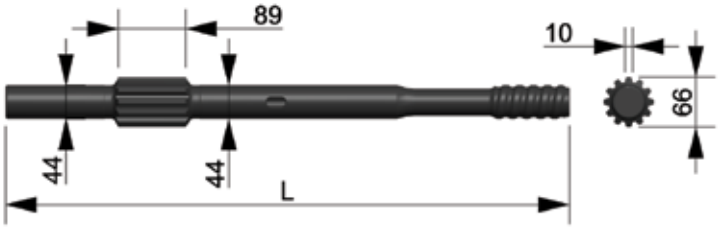
Intended for use with Cannon Drills



PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450855	JH2	R32F	390	38	55	76
450454	JH2	HM38F	390	38	55	76

Intended for use with Caterpillar / Gardner Denver Drills

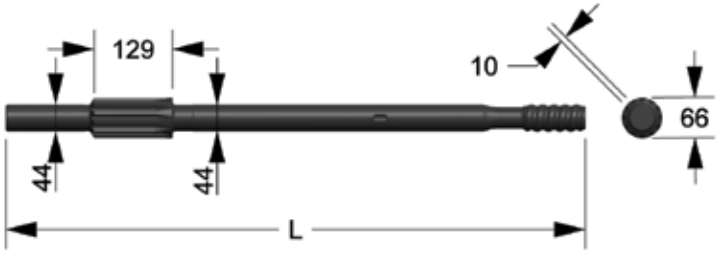
PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450895	HPR1	HM38	787	38	44	97

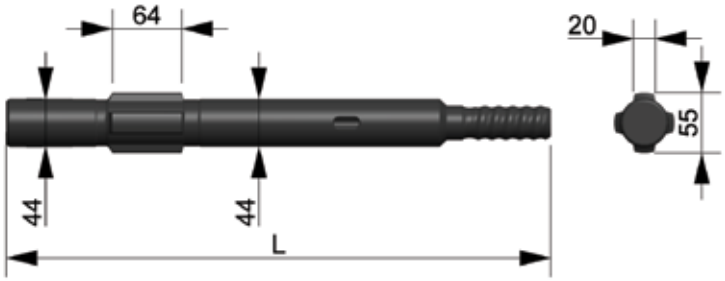


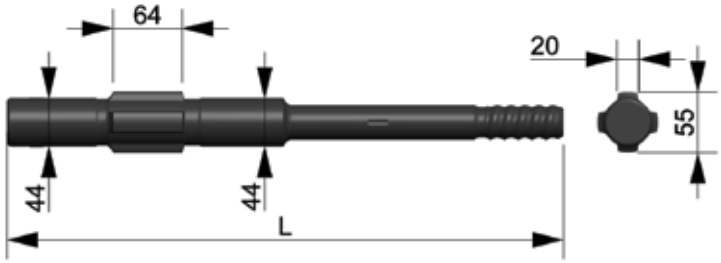
450667	HPR1H	HM38	744	44	44	89
450629	HPR1H	HM45	744	44	44	89

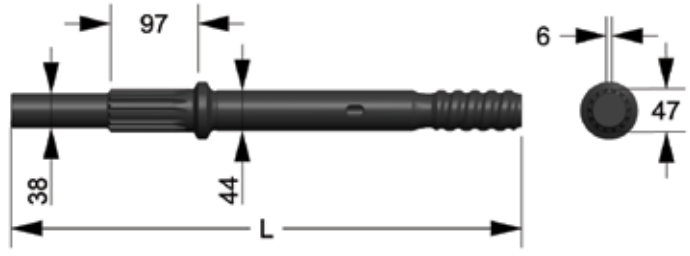
SHANK ADAPTERS

Intended for use with Caterpillar / Gardner Denver Drills





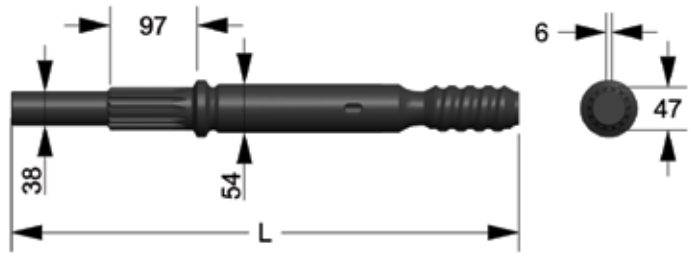




PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450896	HPR1HRP	HM45	953	44	44	129
450002	PR1000	R32	499	44	44	64
450014	PR1000	R32	510	44	44	64
450643	HPR3818	R38	559	38	38	70
450644	HPR3818	HM38	559	38	38	70
450899	HPR3818B	HM45	563	38	44	97

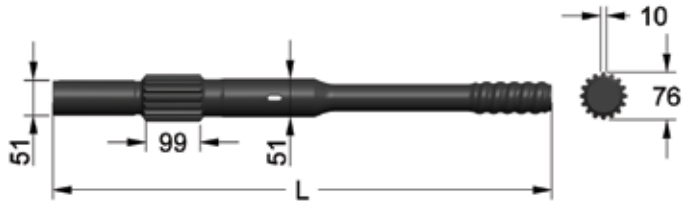
SHANK ADAPTERS

Intended for use with Caterpillar / Gardner Denver Drills

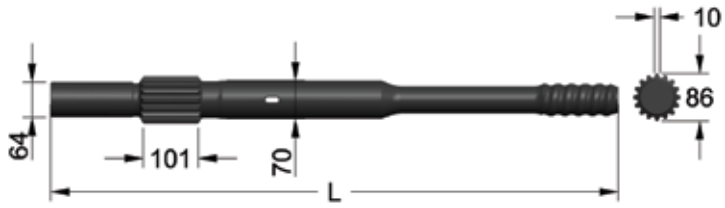


PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450902	HPR3818B	HM51	563	38	54	97

450825	HPR5123	HM45	770	51	51	89
450824	HPR5123	HM51	770	51	51	89
450861	HPR5123	EL60	770	51	51	89



450646	HPR5128	HM45	914	51	51	99
450638	HPR5128	HM51	914	51	51	99

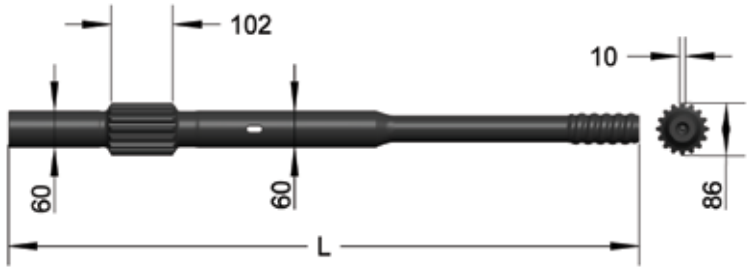


450640	HPR6832	HM51	1041	64	70	101
450785	HPR6832	EL60	1041	64	70	101
450582	HPR6832	EL68	1041	64	70	101

450818	HPR4519	HM38	770	44	44	89
450760	HPR4519	HM45	770	44	44	89

SHANK ADAPTERS

Intended for use with Caterpillar / Gardner Denver Drills

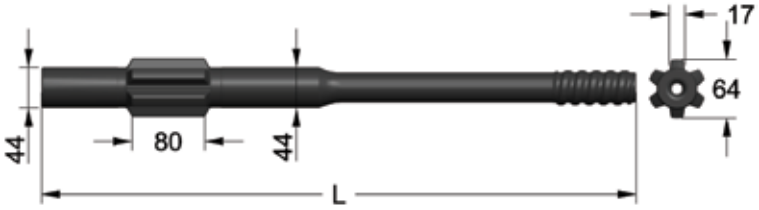


PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450890	HPR6030	HM51	1041	60	60	102
450891	HPR6030	EL60	1041	60	60	102

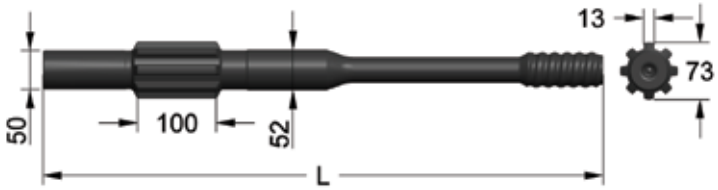
Intended for use with Furukawa Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450771	HD90	R32	515	32	40	54

450752	HD210	R38	409	41	40	75
450761	HD210	HM38	409	41	40	75



450459	HD300	R38	655	44	44	80
450442	HD300	HM38	655	44	44	80
450443	HD300	HM45	654	44	44	80



450745	HD500	HM45	711	50	52	100
450477	HD500	HM51	710	50	52	100

SHANK ADAPTERS

Intended for use with Furukawa Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450487	HD609	HM38	690	36	45	75
450525	HD609	HM45	690	36	45	75

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450576	HD612	HM45	710	42	51	92

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450842	HD709	HM38	622	44	45	93
450793	HD709	HM45	622	44	45	93

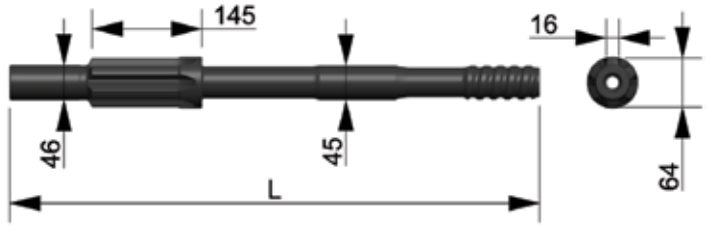
PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450743	HD712	HM45	780	50	51	123

PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450795	HD712	HM45	790	50	51	100
450801	HD712	HM51	790	50	51	100

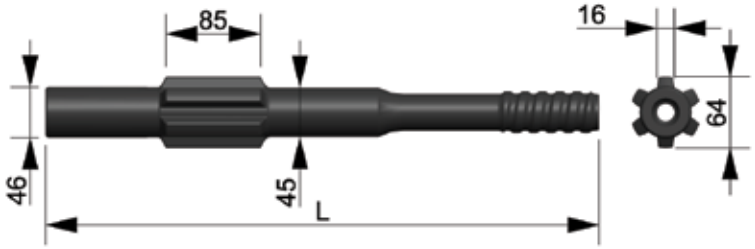
PART #	ROCK DRILL	THREAD	LENGTH MM	STRIKE FACE MM	FRONTHEAD MM	SPLINE MM
450823	HD715	HM51	882	58	58	164

SHANK ADAPTERS

Intended for use with Ingersoll Rand Drills



PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450468	YH65	HM45	700	46	45	145



PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450460	YH65	HM38	500	46	45	85
450375	YH65	HM45	500	46	45	85

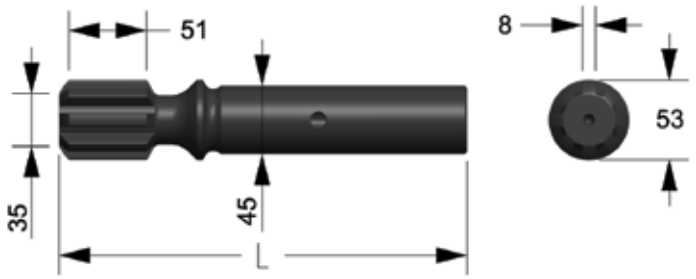
Intended for use with Montabert Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450314	HC40	R38	390	38	38	58

PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450455	HC40	R32	447	38	38	58
450438	HC40	HM38	447	38	38	58

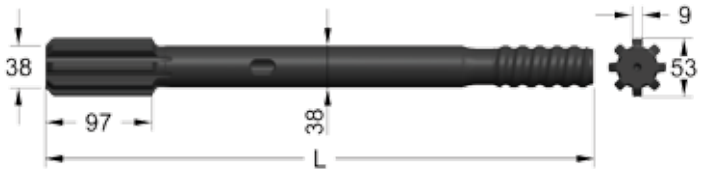
SHANK ADAPTERS

Intended for use with Montabert Drills



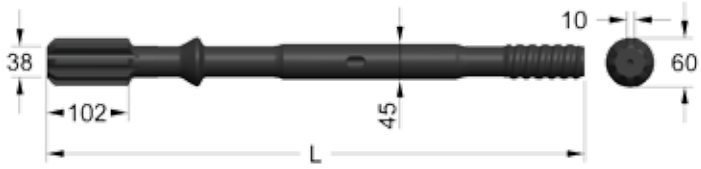
PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450862	HC50	R32F	270	35	45	51

450485	HC80	R32	440	38	38	97
450586	HC80	HM38	447	38	38	97



450172	HC80 H	HM38	500	38	38	97

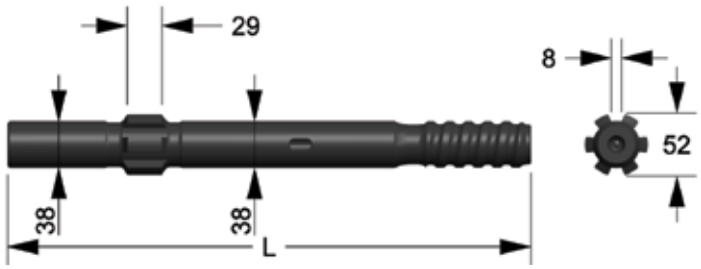
450613	HC120	HM38	490	39	45	97
450612	HC120	HM45	490	39	45	97



450753	HC120	HM45	670	38	45	102

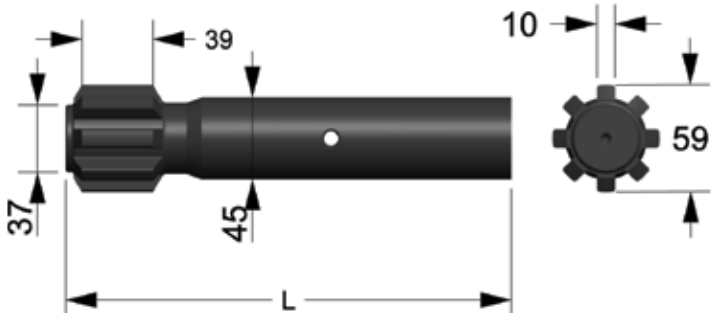
SHANK ADAPTERS

Intended for use with PW Drills

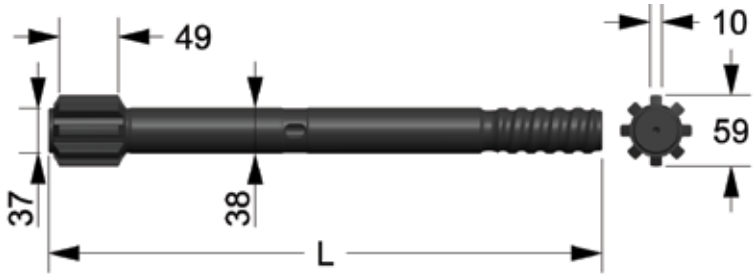


PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450839	131	HM38	432	38	38	29

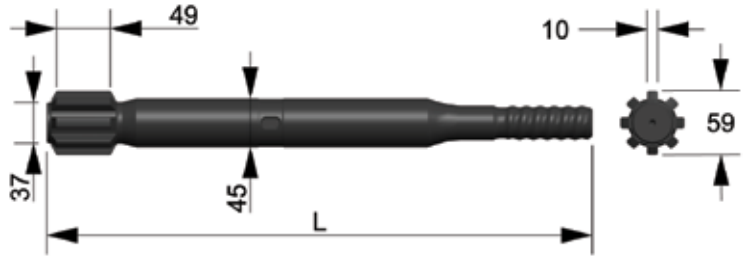
Intended for use with Sandvik / Tam Rock Drills



PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450475	HL300	R32F	245	37	45	39



450408	HL500	R32	460	37	38	49
450407	HL500	R38	460	37	38	49
450405	HL500	HM38	460	37	38	49



450594	HL550	R32	500	37	45	49
450871	HL550	HM35	460	37	45	49
450466	HL550	R38	500	37	45	49
450445	HL550	HM38	500	37	45	49

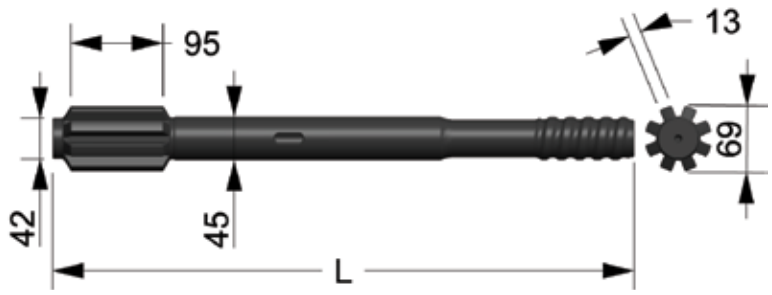
SHANK ADAPTERS

Intended for use with Sandvik / Tam Rock Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450382	HL600	HM38	600	40	45	75
450383	HL600	HM45	600	40	45	75

450533	HL600	HM51	650	40	52	75

450427	HL600	R32	525	40	45	75
450430	HL600	HM45	525	40	45	75
450636	HL600	HM38	525	40	45	75



450870	HL650	HM38	600	42	45	95
450868	HL650	HM45	600	42	45	95

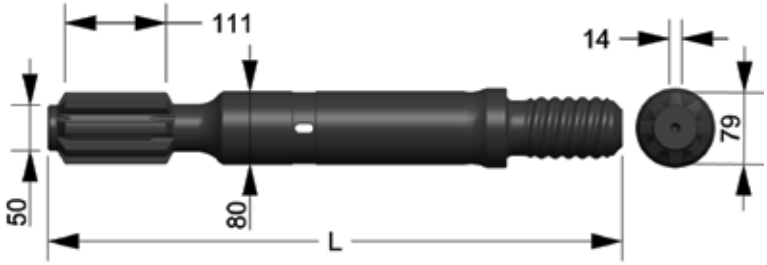
450700	HL700	HM38	600	42	52	95
450603	HL700	HM45	600	42	52	95
450575	HL700	HM51	600	42	52	95

SHANK ADAPTERS

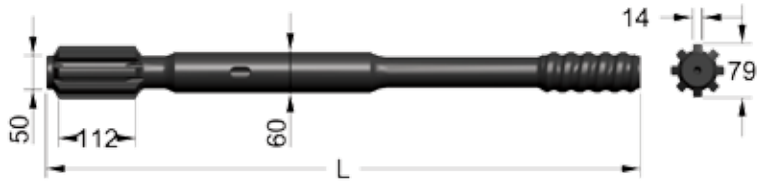
Intended for use with Sandvik / Tam Rock Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450380	HL1000	HM45	670	50	52	75
450111	HL1000	HM51	670	50	52	75

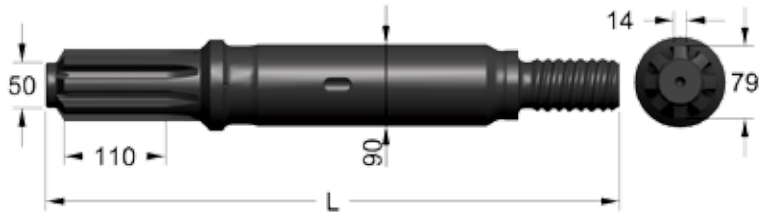
PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450412	HL1000	BE58	624	50	80	75
450591	HL1000	BE68	639	50	80	75



PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450671	HL1500	BE68	632	50	80	111
450783	HL1500	BE58	614	50	80	111



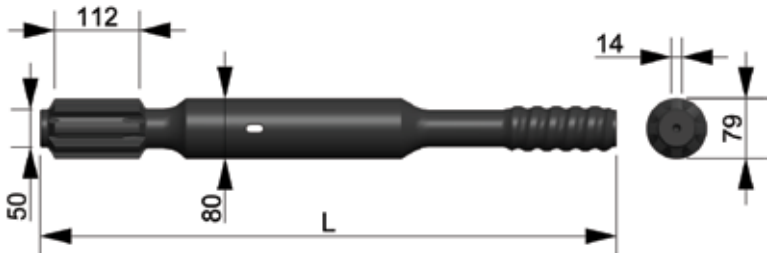
PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450781	HL1500	EL60	870	50	60	112



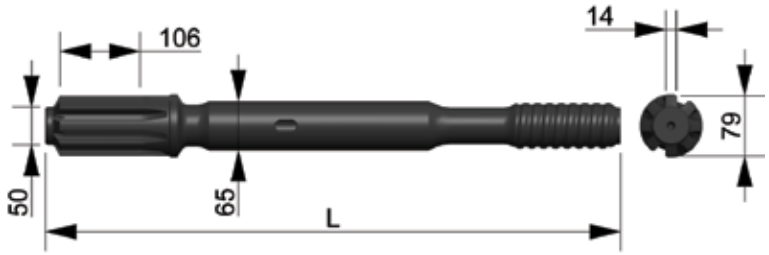
PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450835	HL1500	BE58	625	50	90	110

SHANK ADAPTERS

Intended for use with Sandvik / Tam Rock Drills

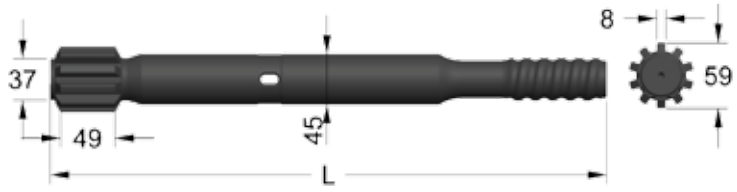


PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450841	HL1560	HM51	760	50	80	112
450840	HL1560	EL60	760	50	80	112

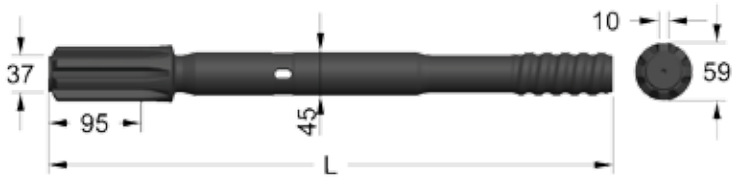


450873	HL1560	HM51	760	50	65	106
450846	HL1560	EL60	760	50	65	106

450852	HLX5	R38	500	37	45	49
450851	HLX5	HM38	500	37	45	49



450816	HLX5	HM38	575	37	45	49



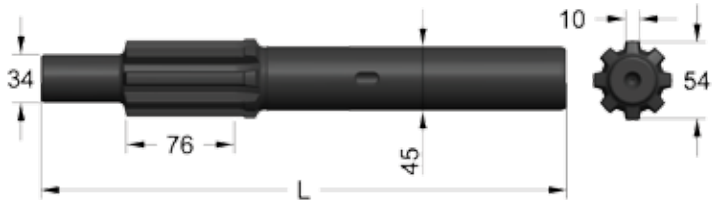
450836	HLX5	HM45	575	37	45	95

SHANK ADAPTERS

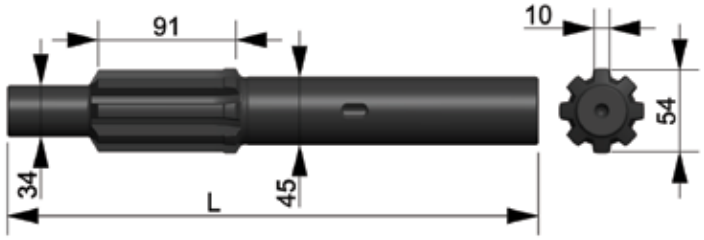
450827	HLX5	HM38	519	37	45	49

Intended for use with SCM Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM



450747	HYD200	R28F	370	34	45	79



450335	HYD200	R32F	350	34	45	91

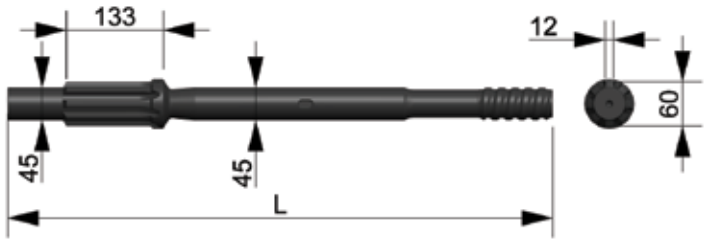
Intended for use with SVK Drills

PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM

450879	RD520	R38	525	37	45	70
450872	RD520	HM38	525	37	45	70

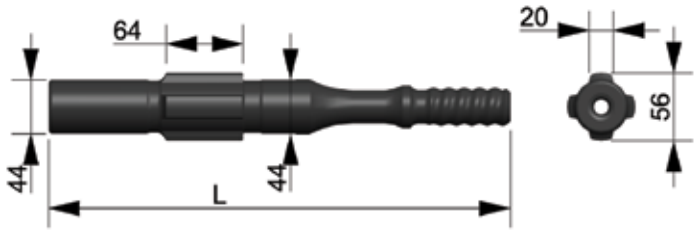
SHANK ADAPTERS

Intended for use with Toyo Drills



PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450763	TH921	HM45	750	45	45	133

Intended for use with UDR Drills



PART #	ROCK DRILL	THREAD	LENGTH MM	FACE MM	FRONTHEAD MM	SPLINE MM
450013	UDR475	R32	380	44	44	64

ACCESSORIES

ACCESSORIES

Adapter Couplings

PART #	DIAMETER		LENGTH		THREAD	WEIGHT	
	MM	IN	MM	IN		KG	LB
360029	45	1 3/4"	168	6 5/8"	R32 / R25	1.5	3.2
360030	45	1 3/4"	168	6 5/8"	R32 / R28	1.3	2.9
360017	55	2 3/16"	171	6 3/4"	R38 / R32	2.2	4.7
360008	66	2 5/8"	205	8 1/16	R38 / HM45	3.6	7.9
360018	55	2 3/16"	178	7	HM38 / R32	2.2	4.8
360031	55	2 3/16"	181	7 1/8"	HM38 / R38	2.0	4.5
360014	66	2 5/8"	210	8 3/4"	HM45 / HM38	3.5	7.7
360035	83	3 1/4"	276	10 7/8"	HM51 / HM45	5.4	11.9
360045	83	3 3/4"	276	10 7/8"	EL60 / HM51	8.7	19.1
360039	96	3 3/4"	305	12	EL68 / HM51	12.7	28.0

Male / Female Bit Adapters

PART #	MALE THREAD	FEMALE THREAD	LENGTH	
			MM	IN
370038	R28	R32	222	8 3/4"
370022	R32	R25	200	7 7/8"
370035	R32	R28	203	8"
370052	R32	R35	241	9 1/2"
370037	R32	HM38	222	8 3/4"
370009	HM38	R32	292	11 1/2"
370031	HM38	HM45	292	11 1/2"
370008	R38	R32	235	9 1/4"
370014	HM45	HM38	254	10"
370045	HM45	R32	222	8 3/4"
370049	HM45	HM51	285	11 1/4"
370015	HM51	HM45	305	12"
370050	HM51	EL60	336	13 1/4"
370051	EL60	EL68	393	15 1/2"
370047	BE68	HM51	289	11 3/8"

Spiral Male / Female Bit Adapters

PART #	MALE THREAD	FEMALE THREAD	LENGTH	
			MM	IN
400012	HM38	HM38	324	12 3/4"
400015	HM45	HM45	343	13 1/2"

ACCESSORIES

Male / Female Adapter Guides

PART #	THREAD	SIZE	LENGTH	
			MM	IN
400021	HM38	64mm	700	27 9/16"
400022	HM45	76mm	708	27 7/8"
400023	HM45	89mm	708	27 7/8"
400025	HM51	89mm	724	28 1/2"

Split Set Drivers

PART #	THREAD	WEIGHT	
		KG	LB
560017	R38	250	9 13/16"
560001	CLR	250	9 13/16"
560082	CLR	330	13"
560014	11*	190	7 1/2"
560079	12*	200	7 7/8"
560040	R28	190	7 1/2"
560083	R38	762	30"
560081	CLR	330	13"
560085	CLR	1175	46 1/4"
560015	11*	190	7 1/2"
560080	12*	200	7 7/8"
560016	R25	190	7 1/2"
560092	R25	191	7 1/2"
560026	R32	450	17 11/16"

ACCESSORIES

Driver Nuts

PART #	THREAD	DRIVER NUT TYPE	LENGTH	
			MM	IN
560069	CLR	7/8 Hex	124	4 7/8"
560063	CLR	7/8 Hex	416	16 3/8"

560054	CLR	30 Square	229	9"
560052	CLR	30 Square	336	13 1/4"
560019	CLR	30 Square	610	24"
560021	CLR	30 Square	900	35 7/16"
560023	CLR	30 Square	1520	59 13/16"

560078	R25F	30 Square	280	11"
560036	R38F	29 Square	250	9 13/16"

Spear - Female End

PART #	THREAD
620004	R32
620007	HM45
620008	HM51
62022	EL60
62023	EL68

Spear - Male End

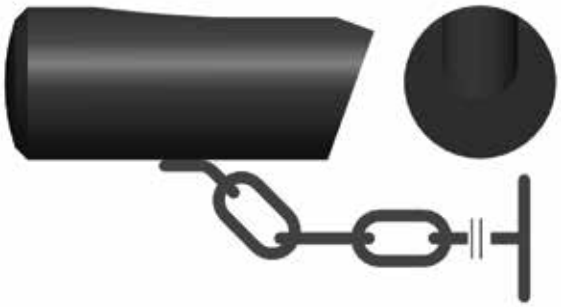
PART #	THREAD
620006	HM38
620016	BE58
620015	BE68

ACCESSORIES

Bell Taps

PART #	THREAD
630010	R25
630004	R32
630006	HM38
630007	HM45
630008	HM51
630013	EL60
620013	EL68

Knock Off Blocks



PART #	THREAD
660001	H22
660003	H22RMG

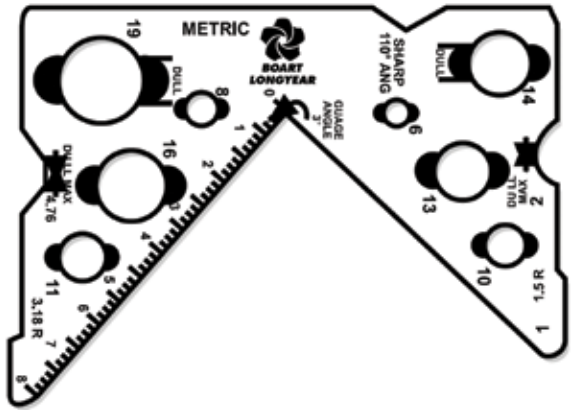
Reaming Shell Adapters

PART #	THREAD	SIZE
380019	TPR	11°
690001	TPR	12°

ACCESSORIES

Bit Resharpening Gauge

	PART #
	3542857

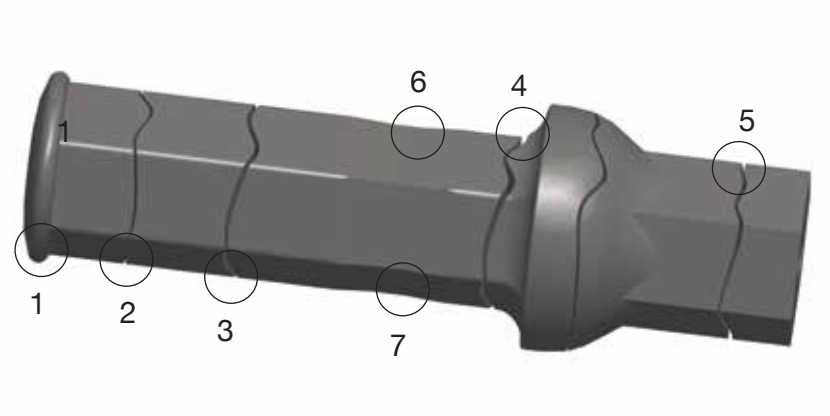


H22 Chuck Gauge

	PART #
	5600005

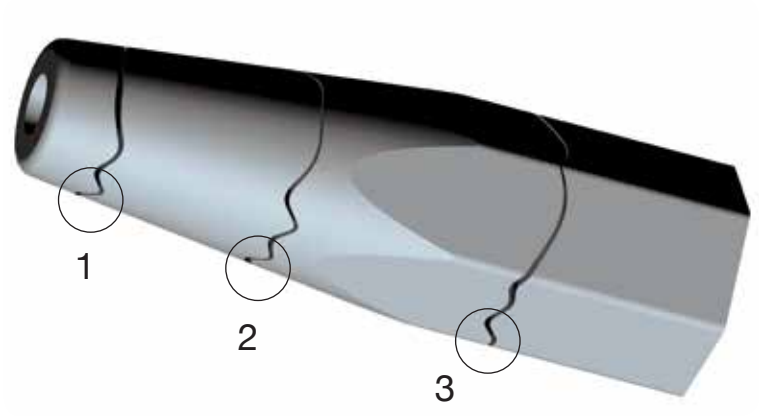
TROUBLESHOOTING

COLLARED AND TAPERED RODS



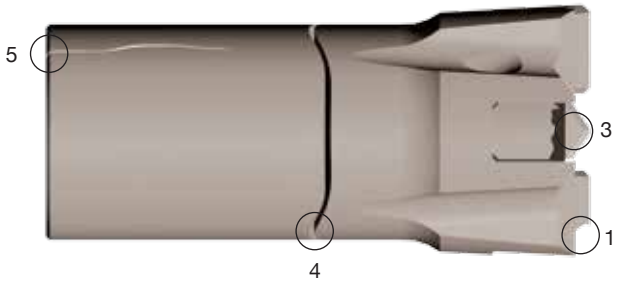
FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Mushrooming of striking end	i) Worn chuck bushing	i) Replace worn bushing
	ii) Dished piston	ii) Replace worn piston
	iii) Worn tappet or tappet bushing	iii) Replace tappet and/or bushing
POSITION - 2 Failure at beginning of shank end	i) Worn chuck 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 Broken in bar	i) Normally associated with rod alignment	i) Keep rod alignment as close as possible
POSITION - 6 Shank wear or coke bottle wear	i) Worn chuck bushing	i) Replace worn bushing

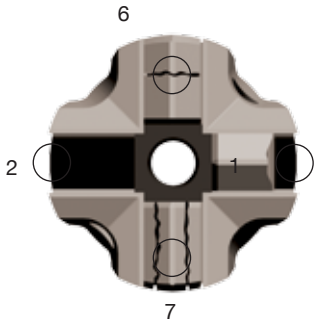
COLLARED AND TAPERED RODS



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 within 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 within 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

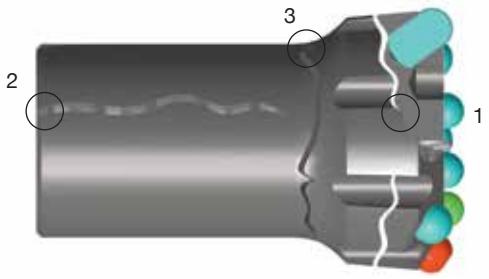
BLADE BITS

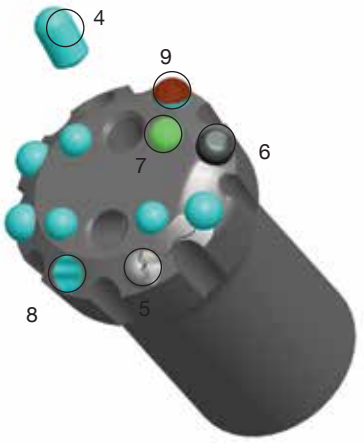




FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Insert corner fractured	i) Pinching in the hole by drilling into hole that was drilled with a smaller bit	i) Colour code bits by size to reduce opportunity for negative gauge clearance. Drill with the bit with the largest gauge thread reducing to 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) Review drilling practice, resharpening
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
POSITION - 5 Skirt split	i) Improper or worn taper	i) Utilizing a taper gauge check taper angle
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 BITS





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 bottom of the hole
POSITION - 3 Wring off	i) High rotation torque applied to stuck bit	i) Apply minimal amount of hammer pressure to free bit before increasing rotation pressures
	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

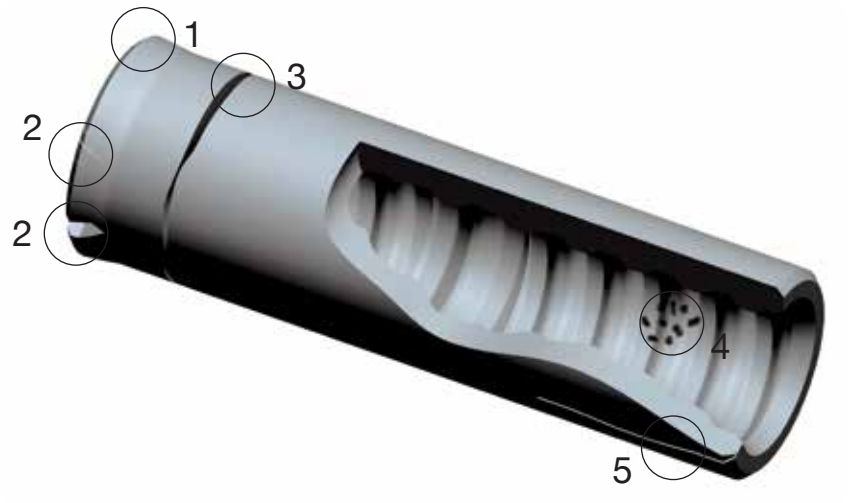
BUTTON BITS

FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 4 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) Excessive 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 - 5 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 sharpening guide before continuing use
	ii) Drilling into metal	ii) Even new buttons will break when encountering foreign material like stuck steel, bits, rebar 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 rotating 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 BITS

FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 6 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 rotations 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 - 7 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
POSITION - 8 Button wear 1/3 diameter	i) Normal button wear	i) Resharpen button and restore to original profile
POSITION - 9 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

COUPLINGS



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 when the wear flats appear 1/3 dull or discard 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 compromised
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

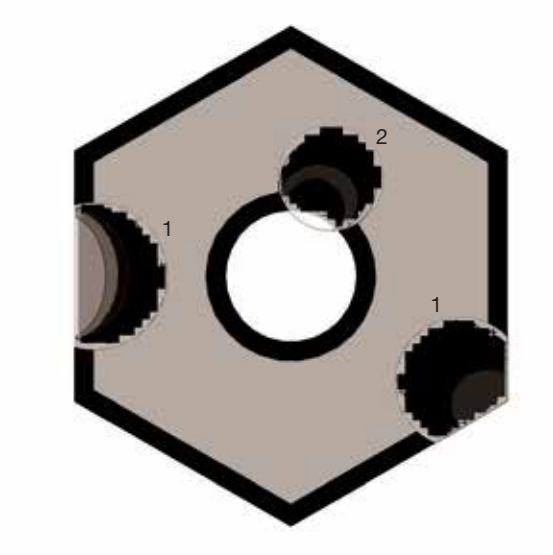
SHANK ADAPTERS

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 ADAPTERS

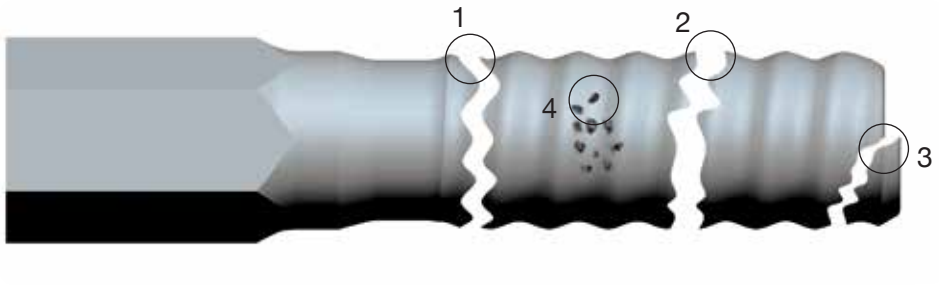
FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 9 Failure in main body of threads	i) Mismatched threads	i) Use only certified original Boart Longyear component from authorized or licensed manufacturers
	ii) Lack of lubrication	ii) Grease rockdrill regularly
	iii) Too much play in coupling. Shank 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 grease.
POSITION - 10 Failure close to bottom of thread	i) Excessive 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) Shank Adapter dropped into coupling	iii) 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

DRILL STEELS



FAILURE	PROBABLE CAUSE	RECOMMENDED ACTION
POSITION - 1 Characterized 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 Characterized 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

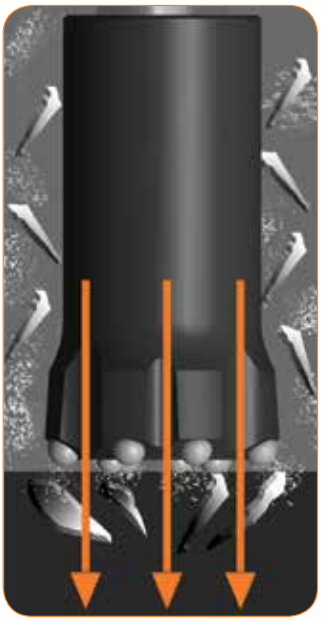
DRILL STEELS



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) Monitor 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

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.

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. 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. Consider bit replacement.

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.

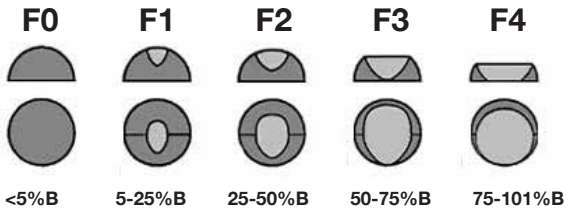
Over Drilling

The detrimental effects of over drilling bits may not be immediately apparent. However, 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. Premature button bit insert failures are reduced substantially when over drilling is eliminated and proper sharpening is performed.

PRODUCT SERVICING

Product Servicing - Button Bits

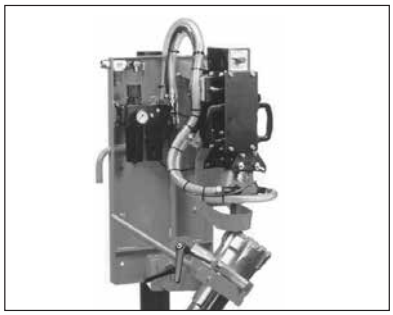
Large wear flats or the presence of snakeskin on the surfaces of buttons can lead to button failure. Similarly if the protrusion of the buttons above the level of the steel becomes reduced, penetration rates will drop and wear flats will develop rapidly. Under these conditions it is necessary to redress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



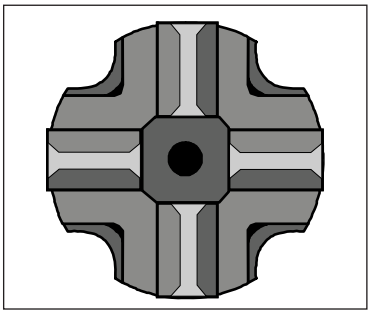
Product Servicing - Blade Bits

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.

RECOMMENDATIONS

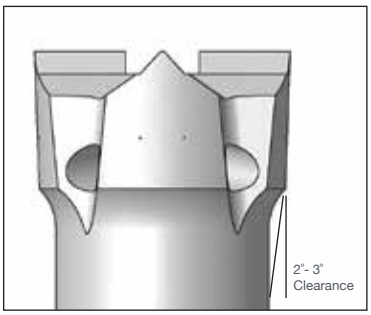
Inspect the Bit Fequently

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.



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.



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.

⚠ WARNING

NOTE: Use appropriate eye protection, masks and ventilation when grinding drilling bits. Grinding wheels and tungsten carbide inserts contain: Tungsten Carbide; Cobalt; Tantalum; Chromium; Nickel; Aluminum and Silicon. Grinding tungsten carbide inserts releases particles containing these elements that can irritate skin, eye, nose, throat and can result in lung damage.

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 that the capital equipment manufactured by it is free from defects in materials and workmanship 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, Purchaser must: (i) contact Boart Longyear and request authorization to return any goods claimed to be defective promptly upon Purchaser's discovery of the alleged defect, (ii) upon receipt of an approved authorization code from Boart Longyear, return any goods claimed to be defective under the foregoing warranty, at Purchaser's expense, to the facility designated by Boart Longyear, and (iii) 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 confirmed to be non-conforming as a result of Boart Longyear's examination and according to Boart Longyear's warranty as set forth herein. All removal and installation of goods shall be at Purchaser's expense; provided, however, Boart Longyear will reimburse the Customer for an amount equal to the reasonable expenses incurred by the Customer and attributable to the removal and shipment of any defective goods. 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.

PRODUCT INDEX

PRODUCT INDEX

PRODUCT INDEX

PRODUCT INDEX

PRODUCT INDEX

CONTACT INFORMATION

Global Headquarters
Boart Longyear
10808 South River Front Parkway, Suite 400
South Jordan, Utah 84095
United States of America
info@boartlongyear.com
Tel: +1 801 972 6430

Europe
Boart Longyear
12 Avenue des Morgines
CH1213 Petit-Lancy, Geneva
Switzerland
Tel: +41-22-709-0800

Asia Pacific
Boart Longyear
26 Butler Boulevard
Adelaide, 5950
Australia
Tel: +61 8 8375 8375

Latin America
Boart Longyear
Portal Riesco
Av. El Salto 4001, Huechuraba
Santiago, Chile 858 0641
Tel: +56 2 2595 33 00

Canada
Boart Longyear
2442 South Sheridan Way
Mississauga, Ontario
Canada L5J 2M7
Tel: +1 905 822-7922

www.BoartLongyear.com • ASX: BLY

September 2015 Edition