



OVERBURDEN AND CONSTRUCTION DRILLING TOOLS CATALOG



 **BOART LONGYEAR™**

TABLE OF CONTENTS

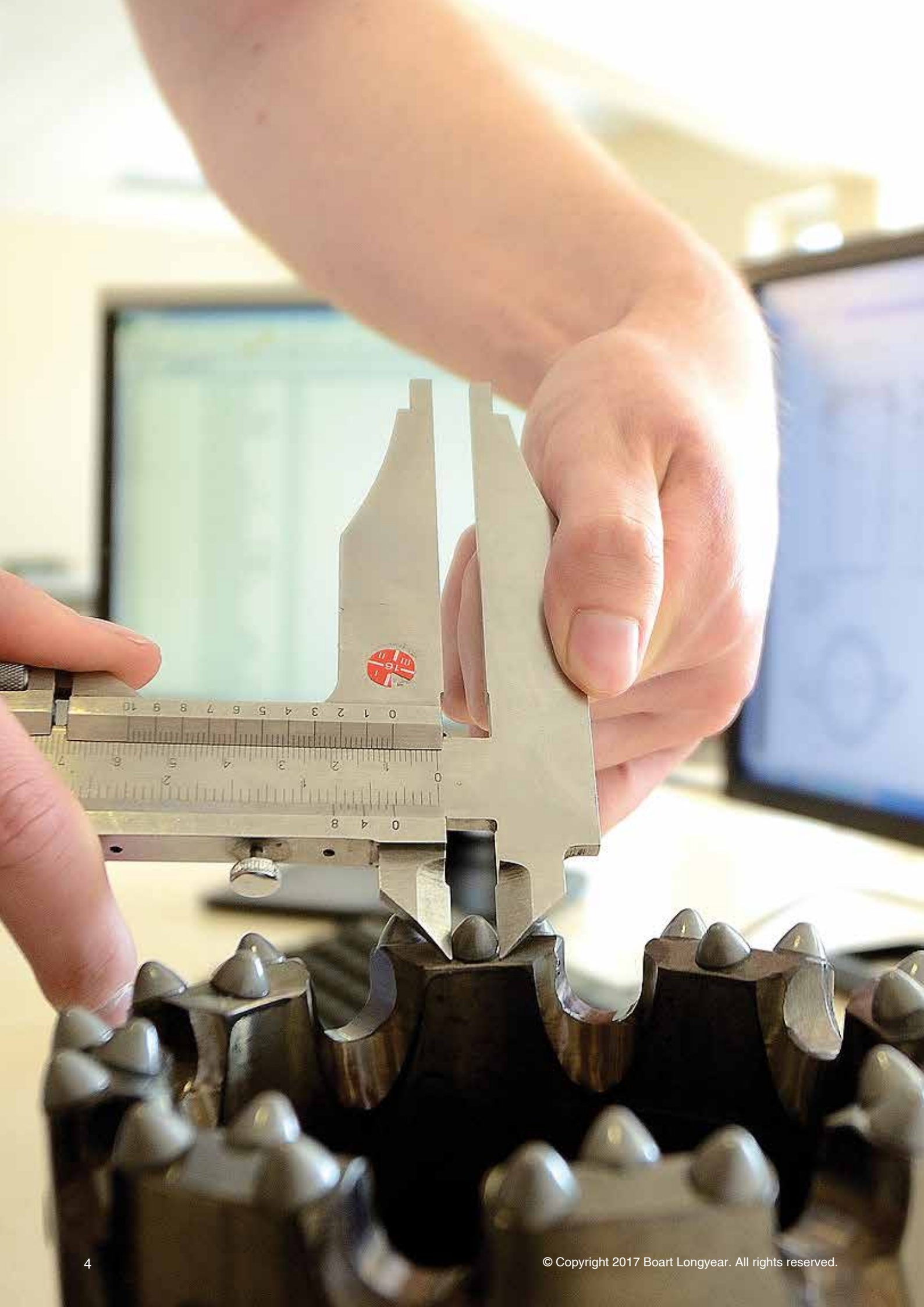
PART I: INTRODUCTION AND OVERVIEW

INTRODUCTION	5
HISTORY	6
INNOVATION	7
OVERBURDEN CASED DRILLING OVERVIEW	9
Single Head Drilling Systems Hydraulic Drifter	10
Rotary Head	12
Vibro Drilling	15
Double Head Drilling Systems	16
Casing and Rod Threads	18
Thread Specifications	19
Casing and Rod Types	20
Bit Designs	25
Tungsten Carbide Inserts	34
Flushing Heads / Single Head	35
Flushing Heads / Double Head	37
JET GROUTING SYSTEMS OVERVIEW	39
Single Tube System	40
Double Tube System	41
Triple Tube System	42
GROUND FREEZING	43
System Overview	44
Ground Freezing System	45

PART II: PART NUMBERS AND SPECIFICATIONS

OVERBURDEN CASED DRILLING SYSTEMS	47
Single Head Drilling Systems Hydraulic Drifter	48
Double Head Drilling	78
Tools & Accessories	97
TWIN DRIVE™ VIBRO	101
Duplex RHV2400	102
Duplex RHV1500	109
Single Casing System	112
JET GROUTING SYSTEMS	115
Single Tube System	116
Double Tube System	119
Triple Tube System	124
Tools and Accessories	128
PRODUCT INDEX	132
WARRANTY	144
CONTACT INFORMATION	147

INTRODUCTION	5
OVERBURDEN CASED DRILLING OVERVIEW	9
JET GROUTING SYSTEMS OVERVIEW	39
GROUND FREEZING SYSTEM OVERVIEW	43
OVERBURDEN CASED DRILLING SYSTEM	47
TWIN DRIVE™ VIBRO	101
JET GROUTING SYSTEMS	115
PRODUCT INDEX	132
WARRANTY	144
CONTACT INFORMATION	147



INTRODUCTION

History	6
Innovation	7

HISTORY

Boart Longyear began manufacturing overburden and construction drilling products in 1989 at its Burghaun facility in Germany to serve the foundation construction market.

Boart Longyear™ overburden and construction tools were quickly recognized by the industry as reliable and well-designed. From the start, our customers appreciated our use of high-quality steels, precise heat treating and thread gauging as well as the development of new tungsten carbides for the drill bit line. Our attention to detail with the overburden and construction drilling tooling product line has made Boart Longyear one of the most respected names in the industry.

Today, Boart Longyear manufactures a broad offering of overburden and construction tooling at our 5000 m² (54,000 ft²) facility in Eiterfeld, Germany.

The modern ISO9001-certified facility hosts an array of advanced manufacturing capabilities which include CNC (computer numerical control) machining, friction-welding and induction hardening equipment for our rod and casing products as well as computer controlled ovens for assembly of tungsten carbide tipped bits and tools.



HISTORIC TIMELINE

1989

1989: Boart Longyear begins production of high-quality overburden drilling products in Burghaun, Germany

1996

1996: Introduced jet grouting system for high-pressure injection for foundation construction work

1997

1997: Developed ribbed carbide injection nozzles for jet grouting tools

1998

1998: Released patented Twin Drive™ threaded products

INNOVATION

Boart Longyear has more than 127 years of experience in the drilling industry and has been an innovator from the start. Shortly after launching the overburden and construction drilling tooling product line, we quickly focused on the development and design of new tungsten materials and geometries specifically suited for overburden drilling applications. These essential materials enable us to produce casing crowns, rotary bits and percussive bits which regularly exceed published service-life specifications.

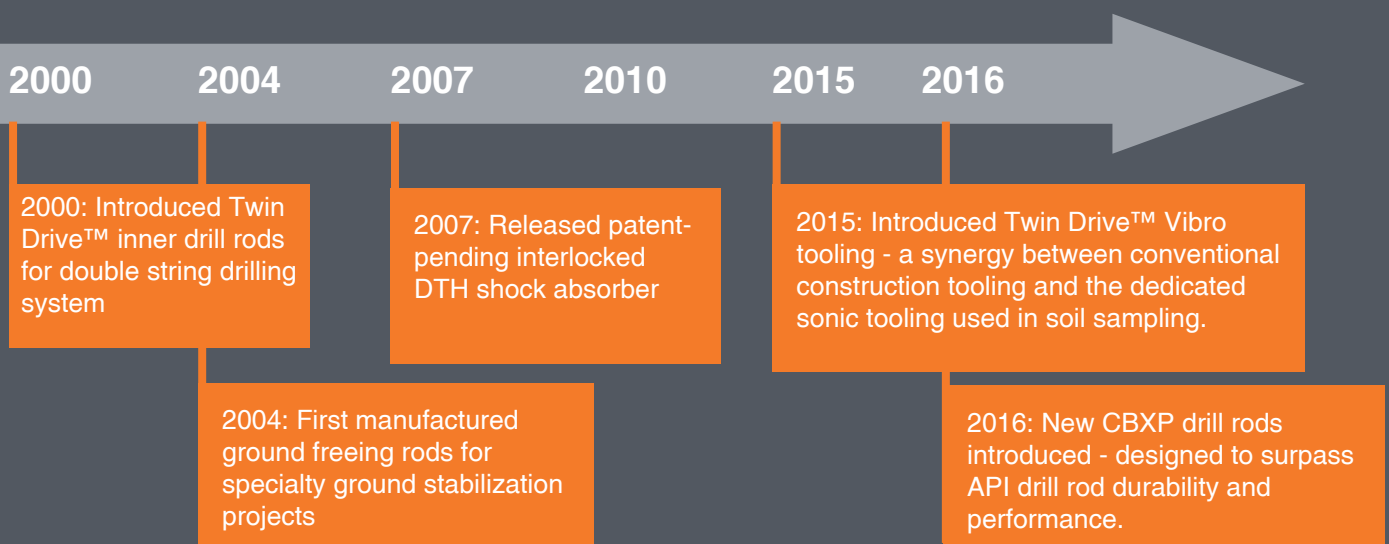
In 1996, we launched our jet grouting system to address the need for high-pressure grout injection tools for foundation construction work. The system includes an innovative automatic valve assembly for integral control of flow direction which accommodates either low-pressure flushing media or high-pressure grout. Additionally, Boart Longyear led the industry in the development of high quality lip seals to replace the conventional O-rings being used in these high-pressure applications.

In 1998, Boart Longyear developed its patented Twin Drive™ thread design for our rotary percussive tools which provided a safe and effective joint solution when using modern high-power hydraulic drifters. The Twin Drive thread offers drillers significantly lower make and break forces on rod joints and up to 40% improvement in casing and drill rod tooling life.

In 1997, Boart Longyear further improved the jet grouting system through the introduction of specialized carbide nozzle designs which provided a 'directed' grout stream and resulted in deeper penetration of the grout into the surrounding soil.

In 2000, we introduced our Twin Drive inner drill rods for dual-string drilling systems as an alternative to T38 and T45 extension drill steels. This provided drillers with a thread designed to handle strong percussive forces while reducing the annulus between casing and the inner rod. The smaller annulus results in better flushing from higher up-hole fluid velocities allowing for higher penetration rates.

European Patent No. 1117897 in Austria, Italy, Switzerland and the United Kingdom; German patent 19803304.4.



INNOVATION

In 2004, Boart Longyear introduced its ground freezing rods for specialty ground stabilization projects. Using our core competencies in steel selection, thread design and seal design, we developed a line of products which dealt extremely well with the cold temperatures faced in ground freezing applications.

In 2007, we developed the patented interlocked shock absorber for the protection of rotary heads during DTH (down-the-hole) drilling. Boart Longyear eliminated the common failure modes in shock absorbers by developing interlock members between the mating parts to absorb the rotary torque.

In 2015, we introduced Twin Drive™ Vibro tooling (a synergy between conventional construction tooling and the dedicated sonic tooling used in soil sampling) for efficient drilling with vibro drill hammers of all kinds.

We continue to drive product innovation through our engineering team in Germany as well as our global engineering organization. Our internal efforts are enhanced by collaboration with universities, raw material suppliers and a variety of technical experts. Our long history of innovation, attention to detail, and our focus on advancing overburden drilling technology enable us to deliver the most effective and efficient tools in the industry.

The CBXP Drill Rod was launched to the market in 2016 as a drill rod design that is used as an inner drill string in double-head drilling applications. The more robust design, compared to the common API (American Petroleum Institute) rod, outperforms API in durability and performance, especially when occasional percussive drilling is involved.

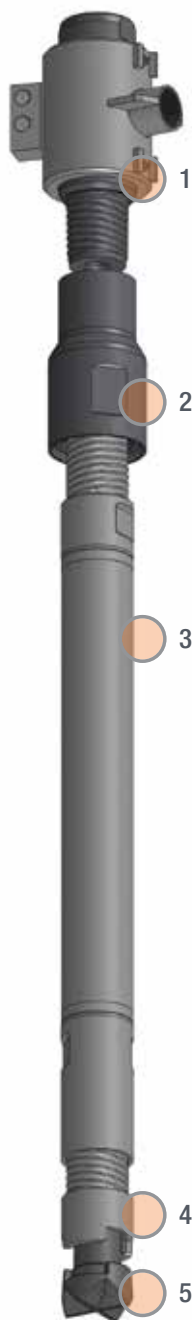


OVERBURDEN CASED DRILLING OVERVIEW

Single Head Drilling Systems Hydraulic Drifter	10
Single Head Drilling Systems Rotary Head	12
Vibro Drilling	15
Double Head Drilling Systems	16
Casing and Rod Threads	18
Thread Specifications	19
Casing and Rod Types	20
Bit Designs	24
Tungsten Carbide Inserts	34
Flushing Heads / Single Head	35
Flushing Heads / Double Head	37

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems



Drill head:	Single hydraulic drifter
Flushing:	None or external to casing
Casing:	Rotary/percussive, nipple or friction welded
Bit:	Lost bit left in hole
Typical thread direction:	Left
Diameter offering:	From 89mm (3.5") to 152.4mm (5")

GROUND CONDITIONS

Gravel, soil, sand, limited boulders and other easily-displaced ground formations

SYSTEM FEATURES

- Single casing system
- Bit options with non-return valves for use in high water areas

FLUSHING HEAD (1)

Drive drilling flushing heads allow for the introduction of flushing media into the drive drilling string. Flushing heads are selected to match the shank on the hydraulic drifter as well as the casing diameter and casing thread being utilized.

ADAPTER (2)

Adapts the different casing sizes and casing thread to the flushing head.

CASING (3)

Drive drilling systems utilize rotary percussive casing. Casing is either friction welded male/female construction or female/female casing with nipple connections.

DRIVE SHOE (4)

Drive drilling shoes mount onto the first string of casing and hold the drive drilling bit. They are offered in a variety of designs to engage with the drive drilling bit.

DRIVE BIT (5)

Drive drilling bits are designed to be lost bits which are left in the hole once the drilling depth is reached. They are available with flushing holes, one-way valves, and tungsten carbide inserts.

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems



Drill head:	Single hydraulic drifter
Flushing:	Air or water within casing
Casing:	Rotary/percussive, nipple or friction welded
Inner drill rod:	Friction welded rod or percussive drill steel
Casing crown:	Tungsten carbide ring bit
Inner bit:	Full face percussive, DTH
Typical thread direction:	Left (percussive), right (DTH)
Diameter offering:	From 89mm (3.5") to 152.4mm (5")

GROUND CONDITIONS

Gravel, sand, silt, some slate, limestone, limited boulders

SYSTEM FEATURES

- Dual string drilling system with internal flushing
- Casing can be stopped at any depth while drilling continues with inner rod
- Can be configured for single rotary head with DTH, rotary drag bit, or tri-cone
- Flexible system for a wide range of ground conditions

FLUSHING HEAD (1)

Allows for the introduction of flushing media into the duplex drilling string as well as an exit point through the ejection bell.

EJECTION BELL (2)

The ejection bell is part of the flushing head assembly.

CASING (3)

Duplex drilling systems utilize rotary percussive casing.

INNER DRILL ROD (4)

The inner drill string of duplex drill systems are either friction welded rotary percussive rods or Twin Drive™ inner drill rods.

CASING BIT (5)

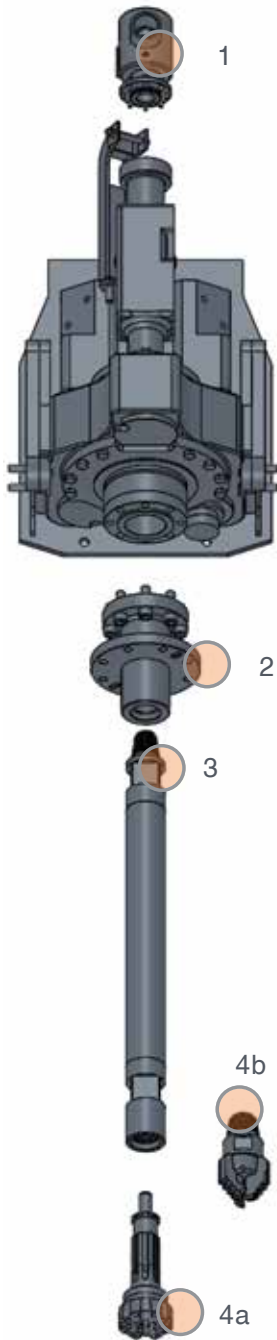
Casing bits for duplex systems are ring bits with tungsten carbide inserts.

INNER STRING BIT (6)

The inner drill string bit of duplex drilling systems typically utilizes a full face percussive bit, but can also be used with rotary bits or DTH hammers.

SINGLE HEAD DRILLING SYSTEMS – ROTARY HEAD

Single Tube System



Drill head:	Rotary
Flushing:	None or external to casing
Casing:	No casing
Bit:	DTH bits / standard rotary bits or tri-cone bits

GROUND CONDITIONS

- DTH hammer is a potential solution in medium-hard up to harder ground conditions.
- In medium-hard formation, the inner drill string can be arranged with a tri-cone or standard rotary bit.

SYSTEM FEATURES

- A flushing method for stable medium-hard ground conditions
- Flexibility to deal with many different drilling conditions

FLUSHING HEAD (1)

Duplex drilling flushing heads allow for the introduction of flushing media to the drill string. The heads are selected to match the flange or threads of the rotary head. The flushing head is typically mounted on the rear side of the rotary head when using a hollow drive shaft.

HEAD ADAPTER FLANGE (2)

The head adapter flange provides a sealed connection to the rotary head. Options are available to fit a wide range of rotary heads. The adapter flange connects to the drill string by a threaded connection and provides a conduit for flushing media.

SINGLE DRILL ROD (3)

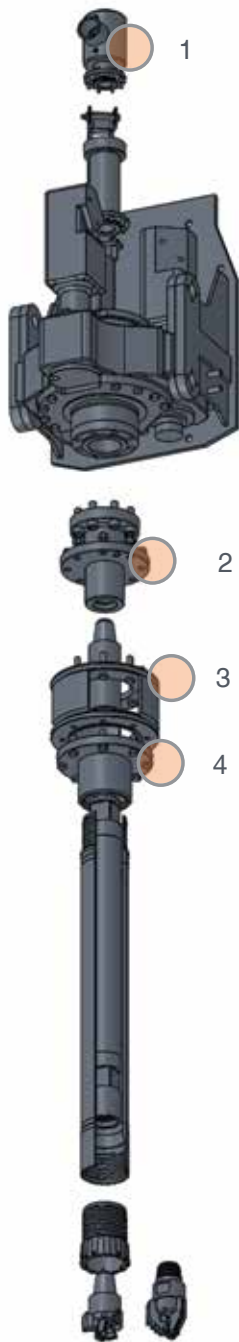
Drill rods typically use friction welded API male/female connections. When flushing only, other rod/thread options are available to minimize flow restrictions.

INNER STRING BIT (4)

If using a DTH hammer, various types of bits may be selected (4a). If the inner drill string is applied without DTH, then standard rotary (drag) bits (4b) or tri-cone bits can be used.

SINGLE HEAD DRILLING SYSTEMS – ROTARY HEAD

Duplex Tube System



Drill Head:	Rotary
Flushing:	Air or water within casing
Casing:	Rotary casing friction welded male/female
Inner drill rod:	Mainly API or CBXP thread in male/female
Inner bit:	Standard rotary bits or DTH
Casing crown:	Ring bits with tungsten carbide inserts.
Typical thread direction:	Right hand (DTH)

GROUND CONDITIONS

- DTH hammer is a potential solution in medium-hard to hard ground conditions.

SYSTEM FEATURES

- A controlled flushing method to prevent contact of the flushing with the bore hole wall
- Ability to stop driving the casing and continue drilling to depth with only the inner string

FLUSHING HEAD (1)

Duplex drilling flushing heads allow for the introduction of flushing media to the drill string. The heads are selected to match the flange or threads of the rotary head.

HEAD ADAPTER FLANGE (2)

The head adapter flange is attached by a sealed flange connection to the drive shaft of the rotary head. This adapter flange is designed to connect the ejection bell by a flange connection and the balancing rod for the inner drill string by a thread connection. The adapter flange has a center flushing hole so the flushing medium can pass through to the inner drill string.

EJECTION BELL (3)

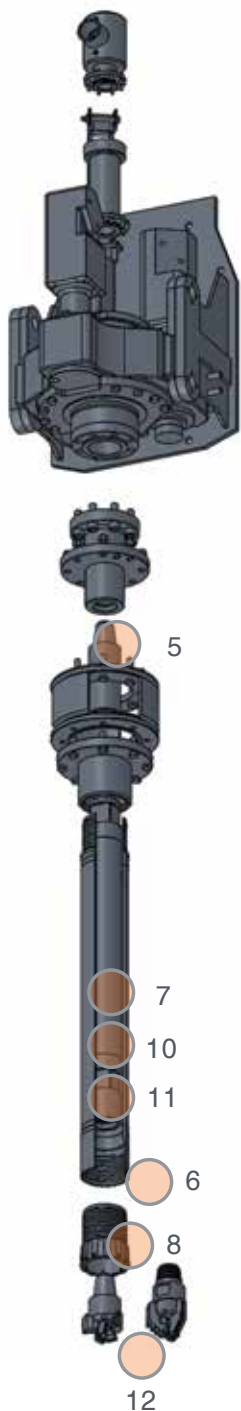
The ejection bell has a top flange connection, which fits to the adapter flange. The lower flange connection is designed to fit the casing flange. The ejection bell has a large diameter to collect and eject the flushing media.

CASING ADAPTER FLANGE (4)

The casing adapter flange is screwed on the ejection bell and connects to the outer casing which is available in various sizes.

SINGLE HEAD DRILLING SYSTEMS – ROTARY HEAD

Duplex Tube System



BALANCING ROD (5)

The balancing rod is threaded to the head adapter flange. It balances the length of the ejection bell and casing adapter of the inner drill string and is available in various lengths. The position of the inner bit can be adjusted as needed (advanced placement or retracted position of inner bit relative to the casing bit position).

CASING (6)

Duplex drilling systems utilize a rotary casing. Casing is friction welded with male/female thread design.

INNER DRILL ROD (7)

The inner drill strings of a duplex rotary drilling system are friction welded. Friction welded API male/female rods are commonly used for the inner string of a duplex rotary drilling system.

CASING BIT (8)

Ring bits with tungsten carbide inserts are used for duplex drilling system casing. The type and configuration of the carbide inserts is dependent on the ground conditions.

DTH HAMMER (10)

DTH hammers are available in different sizes and types.

DTH BALANCING ROD (11)

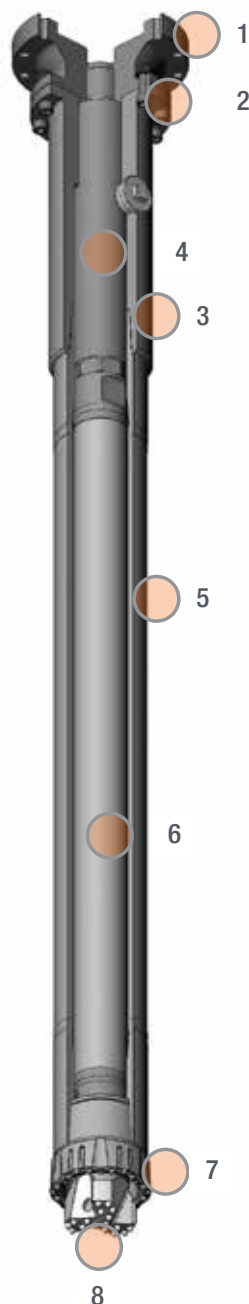
The balancing rod adjusts the length of the DTH Hammer to the casing drill string rod length.

INNER DRILL BIT (12)

The inner drill bits are available as DTH bits and different types of rotary bits.

VIBRO DRILLING

TDV Twin Drive™ Vibro Systems



Drill head:	Vibro drill heads
Flushing Medium:	Air, water or mud
Casing:	Twin Drive Vibro percussive, friction welded
Inner drill rod:	Twin Drive Vibro percussive, friction welded
Casing crown:	Ring bit with tungsten carbide inserts
Inner bit:	Full face bit with tungsten carbide inserts
Drilling direction:	Left-hand or right-hand
Diameter offering:	89mm (3.5") to 152.4mm (6")

GROUND CONDITIONS

Gravel, sand, silt, some slate, limestone, limited boulders, clay and hard rock

SYSTEM FEATURES

- Dual string system with internal flushing or single drill string
- Stop casing at any depth while drilling continues with inner rod
- Higher drilling speed and depth compared to standard percussive
- Less wear through lower torque requirements
- Flexible system for a wide range of ground conditions

FLUSHING HEAD (1)

The flushing head allows for the introduction of flushing media into the duplex vibro drilling string and exit through the ejection bell. The torque bracket is attached to the flushing head.

FLANGE (2)

RHV2400: The flange connects the casing and inner rod to the vibro drill head.

RHV1500: The flange includes the flushing body of the flushing head and is the connection of ejection bell and balancing rod to the vibro drill head.

EJECTION BELL (3)

The ejection bell is part of the flushing head assembly and includes the holes for the ejection of drilling fluids/chips.

BALANCING ROD (4)

The balancing rod equalizes the length of the ejection bell for the position of inner rod / inner drill bit relative to the casing.

CASING (5)

Duplex drilling systems utilize vibro percussive friction welded casing.

INNER DRILL ROD (6)

The inner drill string of vibro duplex drill systems are friction welded rotary percussive rods.

CASING BIT (7)

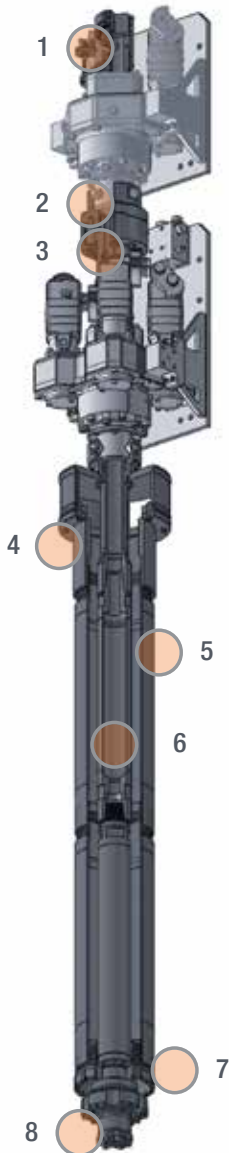
Casing bits for vibro duplex systems are ring bits with tungsten carbide inserts.

INNER STRING BIT (8)

The inner drill string bit of vibro duplex drilling systems typically utilizes a full face percussive bit.

DOUBLE HEAD DRILLING SYSTEMS

Double Head Rotary–Rotary



Drill head:	Dual rotary heads
Flushing:	Air, water, mud within casing
Casing:	Rotary, friction welded
Inner drill rod:	API, CBXP, auger drill rods
Casing crown:	Tungsten carbide ring bit
Inner bit:	DTH, rotary drag bit, tri-cone
Typical thread direction:	Left (casing), right (inner rod)
Diameter offering:	108 mm to 177.8 mm (casing diameter)

GROUND CONDITIONS

All ground conditions

SYSTEM FEATURES

- Dual-string drilling system with internal flushing
- Independent control of casing and inner string
- Control of inner bit relative to casing crown
- Low hole deviation compared to other drilling methods
- Excellent choice for deeper drilling requirements
- Highly flexible drilling system for varied ground conditions
- Can be sealed against pressurized water

DOUBLE HEAD ROTARY–ROTARY

FLUSHING HEAD (1)

The flushing head in rotary-rotary drilling systems is mounted above the upper drilling head. It is designed to fit the specific drill head in the system.

SHOCK ABSORBER (2)

The shock absorber protects the rotary head from damage due to vibrations from a DTH used with the inner drill string.

BALANCE ROD (3)

The balance rod provides the link between the top drill head and the inner drill string.

CASING FLANGE AND EJECTION BELL (4)

The casing flange connects the casing to the lower rotary head and provides an exit point for the flushing medium through the ejection bell.

CASING (5)

Dual rotary drilling systems utilize male/female friction welded double-start rotary percussive casing. Rotary percussive single and triple-start casing can also be used.

INNER DRILL ROD (6)

The inner drill string on dual rotary drill systems are typically API drill rods.

CASING BIT (7)

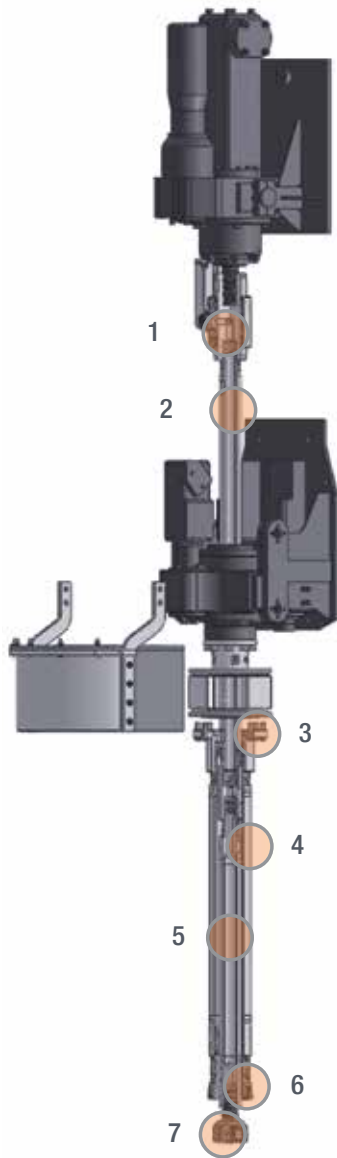
Casing bits for dual rotary systems are ring bits with tungsten carbide inserts.

INNER STRING BIT (8)

Typically a DTH hammer is used on the inner drill string of dual rotary systems. Rotary bits can also be used.

DOUBLE HEAD DRILLING SYSTEMS

Double Head Rotary–Percussive Overview



Drill head:	Rotary head (casing) and hydraulic drifter (inner string)
Flushing:	Air, water, mud within casing
Casing:	Rotary, friction welded
Inner drill rod:	Friction welded rod or percussive drill steel
Casing crown:	Tungsten carbide ring bit
Inner bit:	Full face percussive or cross blades
Typical thread direction:	Right (casing), left (inner rod)
Diameter offering:	114.3 mm to 177.8 mm (casing diameter)

GROUND CONDITIONS

All ground conditions

SYSTEM FEATURES

- Dual string drilling system with internal flushing
- Independent control of casing and inner string
- Control of inner bit relative to casing crown
- Low hole deviation compared to other drilling methods
- Highly flexible drilling system for varied ground conditions
- Can be sealed against pressurized water
- Faster than rotary/rotary drilling

DOUBLE HEAD ROTARY-PERCUSSIVE OVERVIEW

FLUSHING HEAD (1)

The flushing head in rotary percussive systems is mounted below the hydraulic drifter.

BALANCE ROD (2)

The balance rod provides the link between the drifter with flushing head and the inner drill string.

CASING FLANGE AND EJECTION BELL (3)

The casing flange connects the casing to the lower rotary head and provides an exit point for the flushing medium through the ejection bell.

CASING (4)

Male/female friction welded double-start rotary percussive casing. Rotary percussive single and triple-start casing can also be used.

INNER DRILL ROD (5)

Friction welded rotary percussive rods or Twin Drive™ inner drill rods.

CASING BIT (6)

Ring bits with tungsten carbide inserts.

INNER STRING BIT (7)

Typically utilizes a full face percussive bit with tungsten carbide inserts.

CASING AND ROD THREADS

Boart Longyear offers a variety of thread types designed for specific drilling applications.



CYLINDRICAL

Cylindrical threads are characterized by parallel walls which means the casing or rod must be completely unscrewed prior to separating the joint.

Cylindrical threads are the most common threads utilized for reusable overburden rotary percussive casing and inner rods. For rotary percussive casing, all cylindrical threads are single-start up to 88.9 mm and triple-start for larger diameters.

All standard rotary overburden casing is manufactured by Boart Longyear with a double-start cylindrical thread.



CONICAL

Conical threads are similar in thread form and appearance to cylindrical threads except there is a $0.5^\circ - 1.0^\circ$ angle resulting in a slight conical shape. It requires fewer turns to open and a separate conical thread joint. Conical threads are available only on rotary percussive casing.



TWIN DRIVE™

Our patented Twin Drive™ threads have been developed for rotary percussive casings and inner rods to handle the increased percussive power of hydraulic drifters. A typical cylindrical or conical thread form has a stress concentration at the base of the male thread. The Twin Drive thread form distributes the load along the full length resulting in lower stresses at any given point in the thread. It takes much less torque to make and break the rod joint and provides up to 40% additional life in hard ground conditions.

Twin Drive threads are available on all rotary percussive casing and rods. Boart Longyear uses the Twin Drive thread on all critical threading applications including modular flushing heads, Twin Drive inner rod systems and non-percussive applications such as geothermal and jet grouting tools.

Twin Drive threads reduce stress, are easier to uncouple, have a higher loading capacity, are leak resistant and offer reduced susceptibility to corrosion.

THREAD SPECIFICATIONS

THREAD DIRECTION

Casing and inner drill rods are offered in both left and right-hand threads. The direction of rotation required is determined by the drill system and drilling heads being utilized.

Typical Direction of Rotation

DRILLING SYSTEM	OUTER CASING	INNER ROD
Drive Drilling	Left-Hand	
Duplex Drilling	Left-Hand	Left-Hand
Double Head Rotary–Rotary	Left-Hand	Right-Hand
Double Head Rotary–Percussive	Right-Hand	Left-Hand
Jet Grouting	Right-Hand	

THREAD STARTS

The number of thread starts on a given thread varies by the size of the tooling, the application of the tooling, and the type of thread utilized.

Thread Starts – Rotary Percussive Rod/Casing

CASING DIAMETER	THREAD TYPE	IINNER ROD
51 mm-88.9 mm	Conical/Cylindrical	Single-Start
51 mm-88.9 mm	Twin Drive™	Multi-Start
101.6 mm-177.8 mm	Conical/Cylindrical	Triple-Start
101.6 mm-177.8 mm	Twin Drive™	Multi-Start

Thread Starts – Rotary Casing

CASING DIAMETER	THREAD TYPE	NO OF STARTS
114.3 mm-177.8 mm	Cylindrical	Double-Start

Thread Length

THREAD LENGTH

The thread length of overburden casing varies by casing diameter and thread type.

CASING DIAMETER	ROTARY PERCUSSIVE CONICAL	ROTARY PERCUSSIVE CYLINDRICAL	ROTARY CYLINDRICAL	TWIN DRIVE™
51 mm-63.5 mm	65 mm	65 mm		Varies
76.1 mm-88.9 mm	75 mm	75 mm		
101.6 mm-152.4 mm	100 mm	125 mm	110 mm	
177.8 mm	Varies	Varies	Varies	

CASING AND ROD TYPES

Rotary Percussive Casing



Friction welded rotary percussive casings are available in standard sizes with left-hand threads and spanner flats.

- Designed for use in drive drilling and duplex drilling systems
- Engineered to withstand the percussive forces from hydraulic drifters
- Reinforced wall thickness at thread ends to handle heavy percussive drilling
- Superior percussive power transmission due to Twin Drive™ threads
- Highest quality quench and tempered thread ends



Protected by European Patent No. 1117897 in Austria, Italy, Switzerland and the United Kingdom; German patent 19803304.4.

CASING AND ROD TYPES

Rotary Percussive Rod - Twin Drive™ Rod



Twin Drive™ drill rods are designed for use on the inner drill string of duplex and rotary percussive drilling systems. Twin Drive rods are an alternative to the T38 and T45 extension rods used in these systems. Up-hole flushing velocity may be reduced when using T38 and T45 rods due to the large annulus. Twin Drive systems are designed to minimize the area between the inner rod and casing so that up-hole flushing velocity is optimized. The larger inner diameter of the inner rod allows a higher medium flow without creating back-pressure, in addition to improved flushing. Twin Drive rods increase flushing capacity. Twin Drive drill rods (depending on size) can have an inner diameter up to 100% larger than standard percussive T45 and T51 drill rods.

Twin Drive drill rods are comprised of special hardened / nitrided alloy steel and special steel mid-bodies. Twin Drive rods have two percussion surfaces compared to the single surface typically found on standard percussive drill rods. This dual percussive surface area transmits the percussion force through the drill rod at an optimum rate while increasing the strength of the drill rod.



CASING AND ROD TYPES

Rotary Casing



All Boart Longyear™ rotary casing is intended for re-usable casing applications where it is removed after grouting. Rotary casings are designed for rotational drilling without percussion.

All sizes are available with right-hand or left-hand thread configurations. Rotary casings have a continuous flush inner diameter throughout the entire length of the casing.

Rotary casing is also available with the Twin Drive™ thread. Sizes up to 406 mm diameter are available upon request.

FRICTION WELDED ROTARY CASING

Friction welded casing has quenched and tempered pin and box ends constructed of high tensile strength steel. The threaded ends are friction welded onto a mid-body manufactured from an economical mid-grade steel. Casings are friction welded up to 152.4 mm. Larger casings are manually welded.

- Economical choice for re-usable casing
- Quench and tempered high grade rod ends for numerous make and break cycles without damage or galling of threads
- Friction welded for a superior welded connection between threaded joints and mid-body

DIRECT THREAD ROTARY CASING

Direct thread casing has the pin and box threads machined directly into an annealed mid-grade steel.

- Annealed steel construction for superior tensile strength and resistance to abrasive wear during use



CASING AND ROD TYPES

API Drill Rod



API DTH drill rods are designed for use in rotary and rotary DTH applications. These are commonly used as single rotary rods or as the inner drill string on double head rotary-rotary applications.

The rod ends of API rods are constructed of high-tensile strength quench and tempered steel. The rod ends are gas nitrided to provide additional life to the drill string. Rod ends are friction welded onto mid grade mid-body material.

API rods are manufactured in a variety of lengths and wall thickness and include internal flush designs for additional flushing capacity. Boart Longyear can manufacture alternative rod lengths and spanner flats upon request.

- Long-life thread designs utilizing high strength steel
- Friction welding for a superior welded connection between threaded joints and midbody
- Customized length and flats as required



CASING AND ROD TYPES

CBXP Drill Rods



CBXP drill rods are primarily intended for use in rotary and rotary DTH drilling applications but are also commonly used as the inner drill string on double head rotary-rotary applications or in a single head rotary duplex application. CBXP may also be used for smaller percussive drilling applications.

The rod ends of our CBXP rods are constructed of high tensile strength quench and tempered steel and are gas nitrided to provide additional life. Rod ends are friction welded onto mid grade mid-body material

CBXP rods are manufactured in a variety of lengths and wall thickness. Boart Longyear can manufacture alternative rod lengths and spanner flats upon request.

- More robust thread compared to API
- Higher torque capacity compared to API
- Transition from percussive force
- Larger flushing capacity compared to API
- Long-life thread designs with high strength steel
- Superior welded connection between threaded joints and midbody
- Customized length and flats as required



BIT DESIGNS

Casing Bits



Boart Longyear offers a large selection of casing bits to perform in a wide variety of ground conditions. Casing bits are designed for rotary percussive or rotation only drilling based on the tungsten carbide inserts utilized as well as the geometry of the bit. Customized tools for unique drilling applications are also available upon request.

CONSTRUCTION

Casing bit bodies are constructed of high strength quenched and tempered steel. The high-quality tungsten carbide inserts are induction brazed into the steel bodies ensuring a secure fit without overheating issues associated with flame brazing. Strict machining control of the carbide seats prevents premature loss of carbide inserts.

GAUGE PROTECTION

Tungsten carbide gauge protection on casing bits prevents excessive wear on the outer diameter of the bit in abrasive ground conditions. Additionally, in unconsolidated conditions where the ground is caving in on the drill string, gauge protection assists in freeing the bit and casing by providing another cutting surface.

SHRINK FIT CARBIDES

When required, Boart Longyear offers shrink fit installation of all hemispherical, ballistic, and two-step tungsten carbide inserts instead of the standard induction brazing. This very precise construction method is often utilized when drilling in extremely hard ground conditions and provides both increased button retention and longer overall life.

ADVANTAGES

- Computer controlled induction brazing of tungsten carbide inserts for superior process control and overheating prevention, common with flame brazing
- High-grade body construction with quenched and tempered steels
- Optional tungsten carbide gauge protection available for unconsolidated grounds and increased bit life in abrasive conditions
- Specialized designs for unique drilling situations such as drilling through reinforced concrete and drilling without inner bits



BIT DESIGNS

Casing Bit Designs



HEMISPHERICAL BUTTON TYPE

Hemispherical buttons are designed for percussive drilling in hard ground conditions, but can be used universally for all ground conditions when percussive drilling.



BALLISTIC BUTTON TYPE

Ballistic buttons on a casing bit works for percussive as well as some rotary drilling. Ballistic buttons offer more aggressive penetration rates in medium-hard ground conditions when percussive drilling.



BLADED TYPE

A bladed type casing bit is designed for percussive drilling in medium to hard ground conditions.



TWO-STEP BUTTON WITH GAUGE PROTECTION

Designed for rotary percussive drilling, the two-step button is a balance between the more aggressive ballistic tungsten carbide and the hemispherical button used in hard ground conditions. This bit performs well in a wide range of harder ground conditions.



BIT DESIGNS

Casing Bit Designs



SCRAPING BUTTON TYPE

The scraping button bit is designed as a good alternative for both rotary and percussive drilling. The tungsten carbide insert geometry allows for some percussive drilling while also providing an efficient cutting action for rotary drilling.



SCRAPING BUTTON WITH GAUGE PROTECTION

The scraping button type drill bit is available with gauge protection to maintain outer diameter and assists in freeing casing in unconsolidated grounds.



SCRAPING BUTTONS WITH WEAR PROTECTION FOR REINFORCED CONCRETE

Designed for drilling through reinforced concrete. The additional carbides in this bit provide additional cutting performance to get through common reinforced construction materials. This bit should only be used for rotary drilling.



SCRAPING BUTTON WITH GAUGE PROTECTION

This bit is designed exclusively for rotary drilling. The tungsten carbide design allows for efficient removal of material while in rotation. This bit can be purchased with either a variety of rotary percussive threads or double-start cylindrical threads specifically for use with rotary casing.



BIT DESIGNS

Casing Bit Designs



W-TYPE WITHOUT WEAR PROTECTION

Arrangement of small and larger ballistic carbides allow for superior percussive drilling performance when the straightness of the hole is critical. The larger center buttons minimize hole deviation while performing the primary cutting action. The outer buttons perform the secondary cutting providing efficient penetration rates.



W-TYPE WITH WEAR PROTECTION



EXTRA LOBE BIT

Lobe and eccentric designed bits allow for drilling without the use of an inner drill string. The additional carbide cutting area replaces the need for an inner drill bit. The concave or convex placement of the lobe simulates the placement of the normal inner drill string bit (advanced or following) to the casing bit.

CONCAVE



CONVEX



PLANAR



BIT DESIGNS

Casing Bit Designs



ECCENTRIC BIT



BIT WITH CUTTING BLADE

Cutting blade bits are designed for rotational drilling without an inner drill string. The cutting blade is knocked off the bit and left in the hole during anchor and grout installation.

On request, the cutting blade can be supplied with additional hard facing and additional carbide cutting inserts.



BIT DESIGNS

Inner String Bits



Boart Longyear offers a wide selection of bits for the inner drill string of overburden drilling systems for a variety of ground conditions that drillers face every day. Inner drill string bits are primarily designed for rotary percussive drilling but in some situations performs well in mixed drilling or pure rotary drilling. In addition to standard designs, Boart Longyear offers several specialty designs for unique drilling situations and can also design custom bits upon request.

CONSTRUCTION

The bit bodies are constructed of high strength quenched and tempered steel. The high-quality tungsten carbide inserts are induction brazed into the steel bodies ensuring a permanent fit without overheating issues associated with flame brazing. Strict machining control of the carbide seats prevent premature loss of carbide inserts.

GAUGE PROTECTION

Boart Longyear offers tungsten carbide gauge protection on some designs. Gauge protection will prevent excessive wear on the outer diameter of the bit in abrasive grounds.

SHRINK FIT CARBIDES

Shrink fitting installation of all hemispherical, ballistic and two-step tungsten carbide inserts instead of the standard induction brazing is available. This very precise construction method is often utilized when drilling in extremely hard ground conditions giving the bits enhanced performance.

ADVANTAGES

- Computer controlled inductive brazing of tungsten carbide inserts for superior process control and overheating prevention, common with flame brazing
- High grade body construction with quenched and tempered steels
- Optional gauge wear protection tungsten carbides available



BIT DESIGNS

Inner String Bits Design



HEMISPHERICAL BUTTON TYPE

Hemispherical buttons are designed for percussive drilling in medium to hard ground conditions. Button bits typically have faster penetration rates and longer service life than bladed style inner drill bits.



BLADED CROSS TYPE

Bladed cross type bits are designed for percussive drilling in medium to hard ground conditions. Bladed bits typically drill straighter than button style bits. In certain rock conditions cross bits tend to produce a spiraled 5-sided hole.



BLADE X-TYPE

Designed for percussive drilling in medium to hard ground conditions, X-type bits typically drill straighter than button style bits. Additionally X-type bits will tend to drill round holes in all rock conditions.



BALLISTIC BUTTON TYPE

Designed for percussive drilling as well as limited rotary drilling, ballistic buttons offer more aggressive penetration rates than hemispherical buttons in medium-hard ground conditions.



BIT DESIGNS

Inner String Bits Design



TWO-STEP BUTTON TYPE

Designed for rotary percussive drilling, the two-step button is a balance between the more aggressive ballistic button and the hemispherical button used in harder grounds. This bit can perform well in a larger range of harder ground conditions. Gauge protection inserts are standard for improved life in abrasive ground conditions.



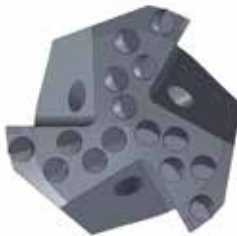
BALLISTIC BUTTON THREE-WING TYPE

The three-wing type bits are available with both ballistic and scraping button carbide styles. The carbide buttons allow for penetration through harder ground conditions with percussive drilling. The carbide tipped cutting wings provide efficient penetration when rotary drilling.



SCRAPING BUTTON ROTARY BIT – THREE-WING TYPE

The three-wing rotary bit with scraping buttons provides efficient penetration in medium-hard ground using rotary drilling. The bit may also be used when temporarily using percussive drilling. In addition, three-wing bits provide highly effective flushing.



BIT DESIGNS

Drive Drilling, Bit Designs



DRIVE DRILLING

Drive bits are used by single percussive drilling when the bit will remain in the hole. Suitable for drilling through gravel, boulders, sand, soil and other easily displaced ground formations. Drive bits are produced with carbide inserts to suit the application.

Available with standard flushing holes or non-return valves when drilling in back pressure conditions.



DRIVE SHOES

The drive shoe is mounted to the first string of casing and holds the drive drilling bit. You can engage the drive drilling bit with flat collar, twist lock (bayonet), rectangular, etc. drive shoe designs.

BIT DESIGNS

Tungsten Carbide Inserts



HEMISPHERICAL BUTTON

- For hard rock
- Dedicated for rotary percussive drilling
- Low abrasive wear



BALLISTIC BUTTON

- For medium-hard rock (mudstone, marl, sandstone) as well as loose rock
- Dedicated for rotary percussive drilling



TWO-STEP BUTTON

- For medium-hard rock (mudstone, marl, sandstone) as well as loose rock
- Best suited for rotary percussive drilling



BLADED INSERT

- For medium-hard rock (mudstone, marl, sandstone) as well as loose rock
- Dedicated for rotary drilling with temporary percussion



SCALPING INSERT

- For concrete as well as for loose rock and soft geological formations
- Best suited for rotary drilling



SCRAPING INSERT

- For loose rock as well as for soft geological formations (mudstone, marl)
- Best suited for rotary drilling with temporary percussion



SCRAPING INSERT THREE-FACE

- For loose rock as well as for soft geological formations (mudstone, marl)
- Dedicated for rotary drilling with temporary percussion

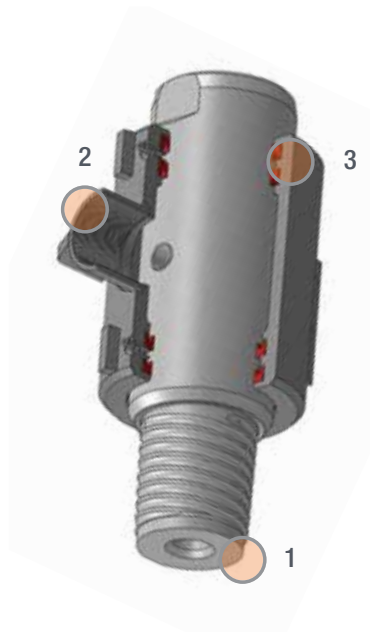
NOTE: Use appropriate eye protection, masks and ventilation when grinding drilling bits. Grinding wheels and tungsten carbide inserts contain: Tungsten Carbide; Cobalt; Tantalum; Chromium; Nickel; Aluminum and Silicon. Grinding tungsten carbide inserts releases particles containing these elements that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



WARNING

FLUSHING HEADS – SINGLE HEAD

Drive Drilling Flushing Head



Drive drilling flushing heads allow for the introduction of flushing media into the drive drilling string. Flushing heads are selected to match the shank on the hydraulic drifter as well as the casing diameter and casing thread being utilized.

Drive drilling flushing heads for alternate casing sizes and hydraulic drifter shanks are available upon request.

FLUSHING BODY (1)

The flushing body has a female thread to match with the hydraulic drifter shank and a male thread to match the casing in use.

FLUSHING RING AND SEALS (2 & 3)

The flushing ring is held stationary by the mounting bracket fixed to the drifter while the flushing body rotates. The flushing ring is the connection point for the flushing hose and has upper and lower lip seals to contain the flushing media.

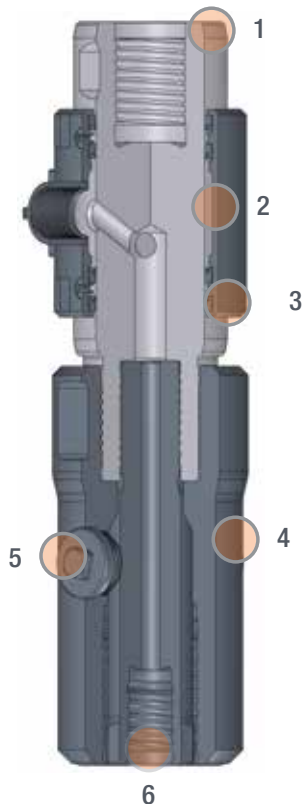


MOUNTING BRACKET

The mounting bracket, which is matched to the hydraulic drifter, keeps the flushing ring stationary on the flushing body.

FLUSHING HEADS – SINGLE HEAD

Duplex Drilling Flushing Head



Duplex drilling flushing heads allow for the introduction of flushing media into the drill string as well as an exit point through the flushing bell.

Duplex flushing heads are modular in design, to keep the same flushing body and flushing ring but allowing for change of the balance rod and ejection bell for different sizes of casing and inner rods being utilized.

FLUSHING BODY (1)

One end of the flushing body has a female thread to match with the hydraulic drifter shank on the drill. The other end of the flushing body has a female thread to match the balance rod as well as a male thread to match the flushing bell.

FLUSHING RING AND SEALS (2 & 3)

The flushing ring is held stationary by the mounting bracket fixed to the drifter while the flushing body rotates. The flushing ring is the connection point for the flushing hose and has upper and lower lip seals (3) to contain the flushing media.

FLUSHING BELL (4)

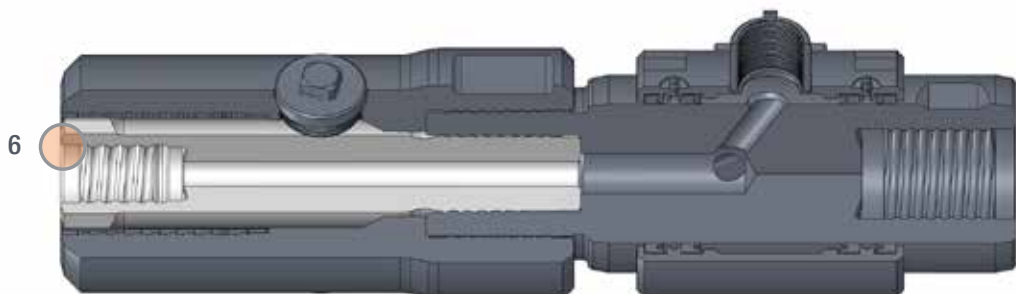
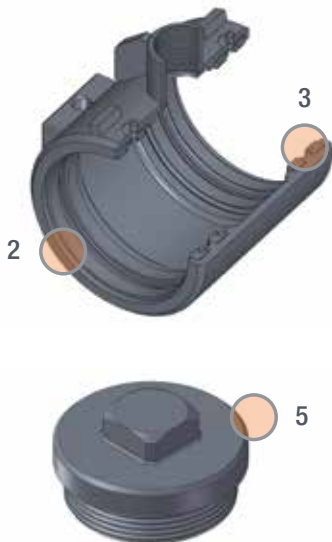
The flushing bell has either a female Twin Drive™ thread or a female rope thread to mate with the flushing body and a female thread to match the casing being used in the drill string. Flushing media exits the drill string through the flushing bell.

FLUSHING PLUG (5)

A threaded plug is provided with the flushing bell to block off the return flushing flow and force circulation via the outside of the casing through the annulus to the surface.

BALANCE ROD (6)

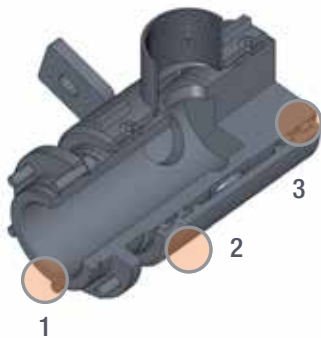
The balance rod provides the connection between the flushing body and the inner drill string. The male end of the balance rod uses the Twin Drive thread form to match with the flushing body. The female end is matched to the inner drill string being utilized.



FLUSHING HEADS – DOUBLE HEAD

Double Head Drilling Flushing Head

ROTARY-ROTARY

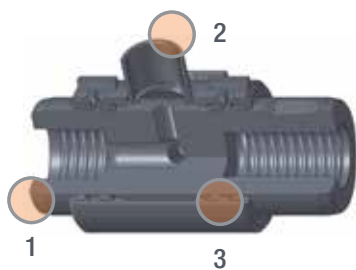


Double head drilling systems have a flushing system to introduce flushing media into the inner drill string at the upper rotary head or drifter. Flushing media exits the drilling system at the ejection bell mounted below the lower rotary head. These systems are designed for the specific drill heads on a drill, the head mounting, and the sizes of the tools being used for the job.

FLUSHING BODY (1)

The flushing body of the flushing head on a dual head drilling system mounts either on the top rotary head (on a rotary-rotary system) or below the drifter (on a rotary-percussive system). In both cases, the flushing body is matched to the specific rotary head or drifter of the drilling system.

ROTARY-PERCUSSIVE

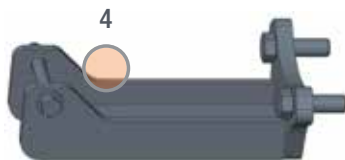


FLUSHING RING AND SEALS (2 & 3)

The flushing ring is held stationary by the mounting bracket fixed to the drifter while the flushing body rotates. The flushing ring is the connection point for the flushing hose and has upper and lower lip seals to contain the flushing media.

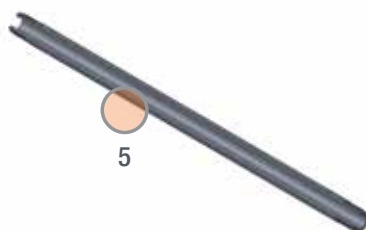
MOUNTING BRACKET (4)

The mounting bracket, which is matched to the hydraulic drifter, keeps the flushing ring stationary on the flushing body.



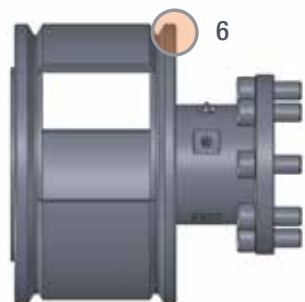
BALANCE ROD (5)

The balance rod in a double-head drilling system is used to connect the inner drill string of the system to the upper rotary head or drifter. The length and thread on the rod is specific to the drilling system being used. Length of the balance rod must be specified at the time of order.



EJECTION BELL (6)

The ejection bell in dual head drill systems is mounted directly under the lower rotary head. The ejection bell design is unique to the rotary head it is used on. Flushing media and cuttings exit the drilling system through the large opening in the ejection bell.



CASING FLANGE (7)

The casing flange is the connection point for the outer casing used in the drilling system. It is mounted directly to the ejection bell and has a thread to match the casing being used.





JET GROUTING SYSTEMS OVERVIEW

Overview	40
Single Tube System	40
Double Tube System	41
Triple Tube System	42

OVERVIEW

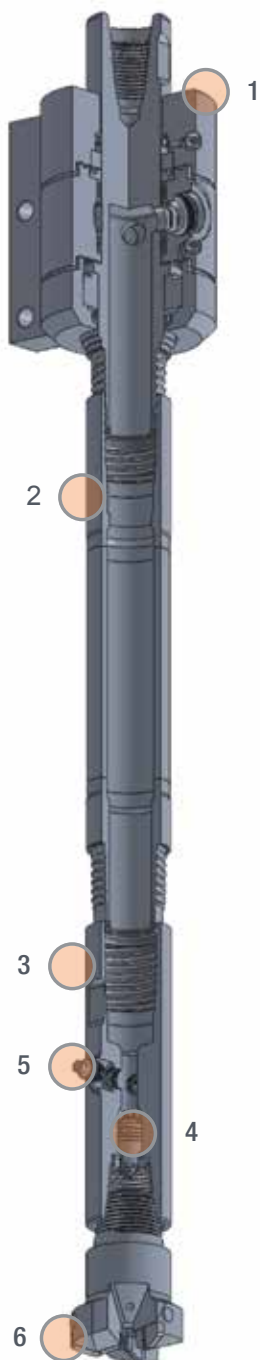
APPLICATION

Jet grouting or high-pressure Injection is a ground stabilization technique as well as a sealing method used in soil conditions ranging from loose sediment up to soft rock structures.

In the jet grouting process, a cement suspension is injected at pressures of 100-600 bar (1,450-8,700 psi) through the jet grouting tooling and into the soil in the drilled hole. The cement suspension mixes with the surrounding soil as the jet grouting tool string is slowly rotated and retracted from the hole. The result is a subsurface grout column.

Jet grouting is performed with either single, double, or triple tube jet grouting systems based on the ground conditions, the grout injection, air and/or water for the ground jetting and mixing.

SINGLE TUBE SYSTEM



FLUSHING HEAD (1)

Flushing heads for single tube jet grouting systems provide the connection point to the drill string for both the flushing media during drilling and the high-pressure grout during grout injection. Heads are mounted to a flushing head carrier which travels up the mast extension on the jet grouting rig.

ROD (2)

Single tube jet grouting rods provide the drill string for drill rotation and flushing as well as the path to the nozzles for the high-pressure grout injection. Rod ends are constructed of high strength nitrided steel and friction welded to an annealed mid-body. Rods come with special seals between rods which resist damage from abrasive grouts and multiple cycles of making and breaking rod joints.

VALVE FASTENER (MONITOR) (3)

The valve fastener (also called a monitor) mounts between the drill rod string and the drill bit. The valve fastener contains the injection nozzles as well as the automatic valve.

AUTOMATIC VALVE (4)

The automatic valve is located within the valve fastener and controls the flow of both low-pressure flushing fluids and high-pressure grouting media. During drilling operations, the spring loaded automatic valve allows for flushing fluids to pass out through the drill bit. When high-pressure grout is introduced into the drill string the automatic valve will close directing the jet grouting media out through the injection nozzles in the valve fastener. The pressure can be adjusted in front of the drilling start when the valve closes for jet grouting.

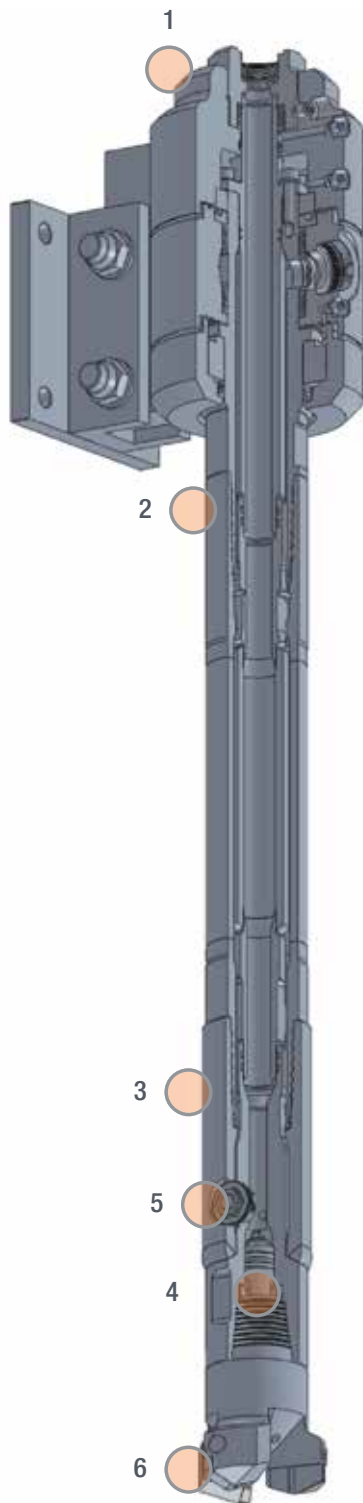
INJECTION NOZZLE (5)

The grout injection nozzles mounted in the valve fastener are the exit point for the high-pressure grout into the grouting zone. Injection nozzles are constructed with a tungsten carbide body with a threaded steel base. The nozzles are available with various sizes of a standard round injection orifice or a ribbed injection orifice. The ribbed orifice creates an injection with less turbulence by a more compact jet.

ROTARY BIT (6)

The rotary bit for a single tube jet grouting system mounts below the valve fastener. Designed for rotary drilling only in overburden, rotary bits come in a variety of winged bit designs with tungsten carbide inserts and flushing ports.

DOUBLE TUBE SYSTEM



FLUSHING HEAD (1)

Flushing heads for double tube jet grouting systems provide the connection point to the drill string for the flushing media during drilling as well as the high-pressure grout and air during grout injection. Flushing heads are mounted to a flushing head carrier which allows the head to move up the mast extension on the rig.

ROD (2)

Double tube jet grouting rods provide the drill string for drill rotation and flushing as well as the path to the nozzles for the high-pressure grout injection. Rod ends are constructed of high strength nitrided steel and friction welded to an annealed mid-body. Inner tubes in the dual tube systems are secured inside the outer rod utilizing a circlip or wire fuse connection. Rods come with special seals between rods which resist damage from abrasive grouts and multiple cycles of making and breaking rod joints.

VALVE FASTENER (MONITOR) (3)

The valve fastener (also called a monitor) mounts between the drill rod string and the drill bit. The valve fastener contains the injection nozzles as well as the automatic valve. The valve fastener channels the medium from the inner drill string and outer rod to their associated nozzles.

AUTOMATIC VALVE (4)

The automatic valve is located within the valve fastener and controls the flow of both low-pressure flushing fluids and high-pressure grouting media. During the drilling operation the spring-loaded automatic valve allows for flushing fluids to pass out through the drill bit. When high-pressure grout is introduced into the drill string the automatic valve will close directing the jet grouting media and air out through the injection nozzles in the valve fastener. The pressure can be adjusted in front of the drilling start when the valve closes for jet grouting.

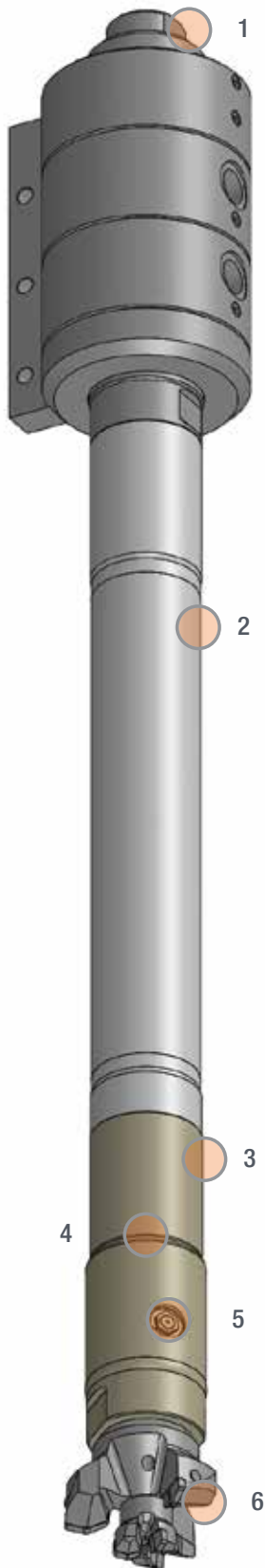
INJECTION NOZZLE (5)

The grout injection nozzles mounted in the valve fastener are the exit point for the high-pressure grout into the grouting zone. Injection nozzles are constructed with a tungsten carbide body with a threaded steel base. The nozzles are available with various sizes of a standard round injection orifice or a ribbed injection orifice. The ribbed orifice creates an injection with less turbulence from a more compact jet.

ROTARY BIT (6)

The rotary bit for a double tube jet grouting system mounts below the valve fastener. They are designed for rotary drilling only in overburden. They come in a variety of winged bit designs with tungsten carbide inserts and flushing ports.

TRIPLE TUBE SYSTEM



FLUSHING HEAD (1)

Flushing heads for triple tube jet grouting systems provide the connection point to the drill string for the flushing media during drilling. Flushing heads also manage the grout and separate water jet and air supply during grout injection. The inner rod connection is designed for high-pressure injection with 400-600 bar.

Flushing, grout, water and air for the shrouded high-pressure jet stream pass through separate channels within the system. The grout injection supply goes separately through another channel. Flushing heads are mounted to a flushing head carrier which allows the head to move up the mast extension on the rig.

ROD (2)

Triple tube jet grouting rods provide three different channels for drilling, jet-grouting and the air-curtain for the grouting. Rod ends are constructed of high strength nitrided steel and friction-welded to an annealed mid-body. Inner and middle tubes in the triple tube systems are secured inside the outer or middle rod utilizing a circlip or wire fuse connection. Rods come with special seals between rods which resist damage from abrasive grouts and multiple cycles of making and breaking rod joints.

VALVE FASTENER (MONITOR) (3)

The valve fastener (also called a monitor) mounts between the drill rod string and the drill bit. The valve fastener contains the injection nozzles as well as the automatic valve. It includes the air shrouded water jet nozzle and a separate grout nozzle. The valve fastener provides the medium from the inner drill string, middle drill string and outer rod through channels to their associated nozzles.

AUTOMATIC VALVE (4)

The automatic valve is located within the valve fastener and controls the flow of both low-pressure flushing fluids and high-pressure grouting media. During the drilling operation the spring-loaded automatic valve allows for flushing fluids to pass out through the drill bit. When high-pressure water is introduced into the drill string the automatic valve will close directing the jet grouting media and air/water out through the injection nozzles in the valve fastener. The pressure, when the valve should close for jet grouting, can be adjusted in front of the drilling start.

INJECTION NOZZLE (5)

The grout injection nozzles mounted in the valve fastener are the exit point for the pressure grout into the grouting zone and the air shrouded high-pressure water jet for the ground cuttings and mix. Injection nozzles are constructed with a tungsten carbide body with a threaded steel base. The nozzles are available with various sizes of a standard round injection orifice or a ribbed injection orifice. The ribbed orifice creates an injection with less turbulence by incorporating a more compact jet.

ROTARY BIT (6)

The rotary bit for a triple tube jet grouting system mounts below the valve fastener. They are designed for rotary drilling only in overburden. They come in a variety of winged bit designs with tungsten carbide inserts and flushing ports.

GROUND FREEZING SYSTEM OVERVIEW

Ground Freezing System

44

GROUND FREEZING SYSTEM

Ground freezing is a temporary ground support technique that is used extensively for groundwater control and ground stabilization in underground construction and deep excavation projects. The process involves circulating refrigerated liquids through a series of subsurface pipes to freeze the ground creating a solid barrier that prevents water intrusion and provides structural support for excavation.

Boart Longyear manufactures ground freezing drill rods that are installed for refrigerated liquid circulation. Freezing rod applications have some unique challenges that are not found in typical foundation construction drilling applications. Boart Longyear has conducted extensive development processes to ensure the freezing rods we provide incorporate our knowledge of construction drilling as well as unique technologies that are special to the ground freezing application.

Each ground freezing project has its own distinctive challenges which make the tooling requirements unique. Boart Longyear can design the tooling package to meet your specific needs.

PRODUCT RANGE

- Freezing rods in various diameters and lengths up to 6 m.
- Driving rods with various bit configurations including carbide tips and flushing holes with check valves
- Rotary drive flanges
- Rotary percussive freeze rod systems upon request

KEY FEATURES

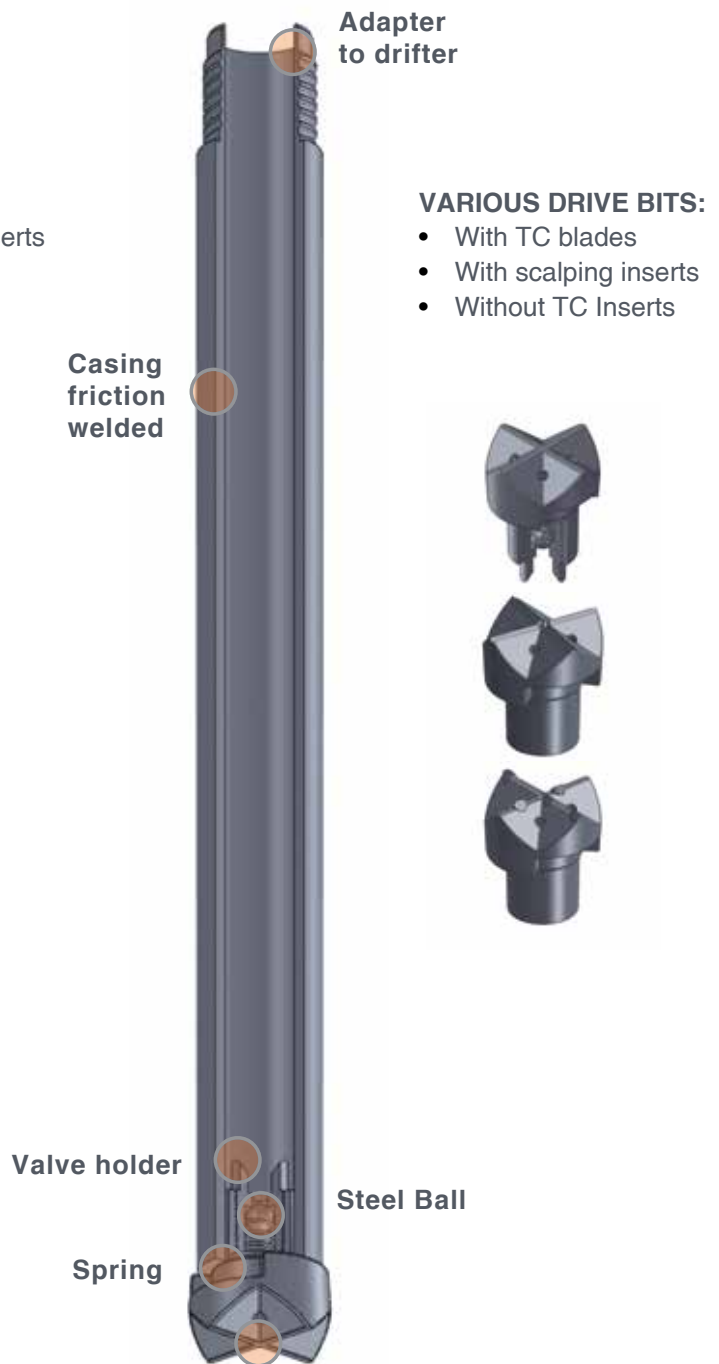
- Specially selected steel for the strength required for drilling while also remaining stable when subjected to extreme low temperatures
- Specially designed threads that maintain a tight seal in the drill string, preventing leakage of freezing fluids into the surrounding ground
- Custom designed rod seals that can withstand low temperatures as well as tolerate various greases commonly found on drilling sites
- Various configurations of driving points incorporating carbide inserts, flushing holes with check valves and percussive bits
- Economical rod designs keeping total project cost to a minimum

GROUND FREEZING SYSTEM

STANDARD SYSTEM



BACK PRESSURE SYSTEM





 **BOART LONGYEAR**™

OVERBURDEN CASED DRILLING SYSTEMS

Single Head Drilling Systems	
Hydraulic Drifter	48
Double Head Drilling	76
Tools and Accessories	92

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems

FLUSHING HEADS



Flushing Head Complete

ROCK DRILL SHANK THREAD	FLUSHING BODY DIAMETER	PART NO.
H55	100	23020300
RT70	110	23020301
BW64	120	23020302
C64	120	23020303
H90	170	23020304
C90	170	23020305
H112	170	23020306
C112	170	23020307

FLUSHING HEAD COMPONENTS



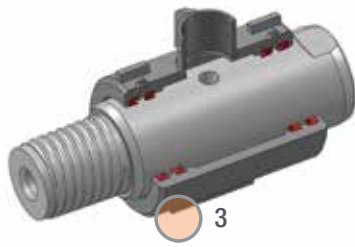
Flushing Head Component / Flushing Body (2)

ROCK DRILL SHANK THREAD	FLUSHING BODY DIAMETER	THREAD DRIVE ADAPTER	PART NO.
H55	100	101 Conical 3-Start Left-Hand Male	23040700
RT70	110		23040571
BW64	120		23040701
C64	120		23040702
H90	170	152 Conical 2-Start Left-Hand Male	23040703
C90	170		23040704
H112	170		23040705
C112	170		23040706

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

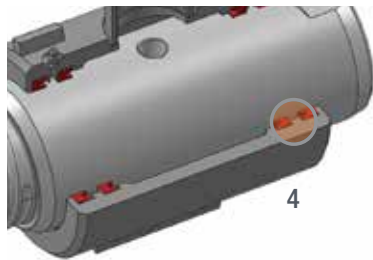
Drive Drilling Systems

FLUSHING HEAD COMPONENTS



Flushing Head Component / Flushing Ring (3)

FLUSHING HOSE CONNECTION	ROCK DRILL SHAFT Ø	PART NUMBER
G1 1/4"	100 mm	23070033
G1 1/4"	120 mm	23070035
G1 1/2"	140 mm	23070037
G2"	170 mm	23070012



Flushing Head Component / Flushing Ring Seals (4)

ROCK DRILL SHAFT Ø	PART NUMBER (QTY. 4)
100 mm	55030018
120 mm	55030019
140 mm	55030062
170 mm	55030174



Flushing Head Component / Mounting Bracket

ROCK DRILL SHAFT Ø	DRIFTER-MANUFACTURER	DRIFTER TYPE	PART NO.
Ø100	Eurodrill	HD4008/HD4010	23080044
	Krupp	HB40A/HB45A	23080086
Ø120	Eurodrill	HD4008/HD4010	23080048
	Klemm	KD1215R	23080098
	Krupp	HB40A/HB45A	23080096
Ø140	Casagrande	T10006V	23080042
	Eurodrill	HD5012	23080066
Ø170	Krupp	HB50A	23080052
		HD5012	23080070
	Eurodrill	HD8032	23080089
		HD8021	23080126
		HB50A	23080079

All third-party trademarks, including Eurodrill, Krupp, Klemm and Casagrande are the property of their respective owners.

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems

DRIVE ADAPTER



Drive Adapter (5)

THREAD DRIVE ADAPTER	CASING DIAMETER	THREAD TYPE		
		CYLINDRICAL	CONICAL	TWIN DRIVE™
101.6 Conical 3-Start Left-Hand Female	88.9	23090087	23090150	23090151
	101.6	23090088	23090152	23090153
	114.3	23090089	23090154	23090155
	133	23090090	23090156	23090157
	152.4	23090091	23090158	23090159

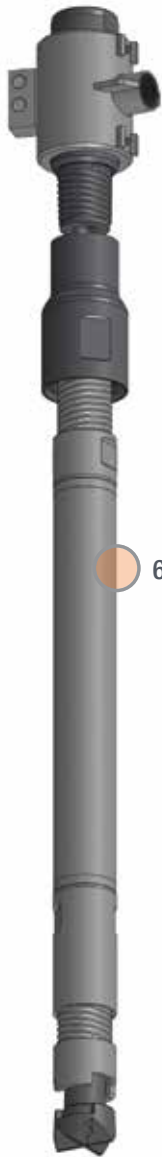
THREAD DRIVE ADAPTER	CASING DIAMETER	THREAD TYPE		
		CYLINDRICAL	CONICAL	TWIN DRIVE™
152.4 Cylindrical 2-Start Left-Hand Female	88.9	23090160	23090161	23090162
	101.6	23090163	23090164	23090165
	114.3	23090166	23090167	23090168
	133	23090169	23090170	23090171
	152.4	23090172	23090173	23090174



SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems

CASING



Casing Friction Welded (6)

CASING Ø	SPANNER FLAT	EFFECTIVE LENGTH	THREAD DIRECTION	THREAD TYPE		
				CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm ID 64 mm	SF80	500 mm	Left-Hand	21011612	21011318	21011317
		1000 mm		21010211	21010240	21010237
		1500 mm		21010214	21010241	21010388
		2000 mm		21010220	21010242	21010238
		3000 mm		21010222	21010243	21010389
		3050 mm		21010445	21010446	21010883
101.6 mm ID 75 mm	SF90	500 mm	Left-Hand	21010334	21011278	21011279
		1000 mm		21010010	21010025	21010859
		1500 mm		21010012	21010277	21010858
		2000 mm		21010018	21010026	21010670
		3000 mm		21010021	21010403	21010290
		3050 mm		21010023	21010447	21010875
114.3 mm ID 88 mm	SF105	500 mm	Left-Hand	21011613	21011024	21011281
		1000 mm		21010038	21010282	21010669
		1500 mm		21010040	21010319	21010667
		2000 mm		21010044	21010062	21010712
		3000 mm		21010046	21010306	21010713
		3050 mm		21010448	21010449	21010869
133 mm ID 108 mm	SF120	500 mm	Left-Hand	21011616	21010106	21010530
		1000 mm		21010001	21010110	21010392
		1500 mm		21010081	21010112	21010509
		2000 mm		21010085	21010114	21010383
		3000 mm		21010086	21010302	21010722
		3050 mm		21010291	21010322	21010860
152.4 mm ID 128 mm	SF140	500 mm	Left-Hand	21011619	21010686	21011291
		1000 mm		21010137	21010163	21010385
		1500 mm		21010140	21010285	21010731
		2000 mm		21010142	21010164	21010380
		3000 mm		21010143	21010280	21010728
		3050 mm		21010451	21010452	21010823

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems

CASING



Casing Box/Box

THREAD TYPE	THREAD DIRECTION	EFFECTIVE LENGTH	OUTER CASING DIAMETER				
			88.9 Ø	101.6 Ø	114.3 Ø	133 Ø	152.4 Ø
Conical	Left-Hand	900	21020169	21020021	21020053	21020086	21020118
Cylindrical		950	21020162	21020008	21020045	21020076	21020109
Conical		950	21020172	21020023	21020054		
Cylindrical		1400		21020010		21020213	21020111
Conical		1400	21020174	21020024	21020055	21020088	21020121
Cylindrical		1450	21020289	21020011	21020047	21020077	21020112
Cylindrical		1900	21020163	21020012	21020048	21020078	
Conical		1900	21020177	21020025	21020056	21020090	21020122
Cylindrical		1950	21020165	21020014	21020049	21020079	21020113
Conical		1950	21020179			21020199	
Cylindrical		2900		21020015			
Conical		2900	21020302	21020368	21020303	21020304	21020306
Cylindrical		2950	21020301	21020017	21020050	21020081	21020305
Conical		2950	21020181	21020201		21020322	

Nipple

THREAD TYPE	THREAD DIRECTION	EFFECTIVE LENGTH	OUTER CASING DIAMETER				
			88.9 Ø	101.6 Ø	114.3 Ø	133 Ø	152.4 Ø
Cylindrical	Left-Hand	50 mm	21020191	21020027	21020061	21020095	21020123
Conical		50 mm	21020193	21020031		21020198	
Cylindrical		100 mm		21020029	21020064	21020098	21020124
Conical		100 mm	21020195	21020032	21020066	21020099	21020125

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems

DRIVE SHOE



Flat Collar Drive Shoes

CASING Ø	THREAD TYPE		
	CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	22530034	22530059	22530150
101.6 mm	22530049	22530060	22530026
114.3 mm	22530062	22530061	22530105
133 mm	22530079	22530030	22530115
152.4 mm	22530063	22530064	22530151



Rotation Lock Drive Shoes

CASING Ø	THREAD TYPE		
	CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	22530006	22530007	22530033
101.6 mm	22530011	22530023	22530022
114.3 mm	22530001	22530002	22530100
133 mm	22530021	22530031	22530051
152.4 mm	22530065	22530066	22530152

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems

DRIVE BITS



Flat Collar Bit

CASING Ø				
88.9 MM	101.6 MM	114.3 MM	133 MM	152.4 MM
62080021	62080011	62080023	62080025	62080028



Rotation Lock Bit

CASING Ø				
88.9 mm	101.6 mm	114.3 mm	133 mm	152.4 mm
62080022	62080004	62080024	62080026	62080052

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Drive Drilling Systems

DRIVE BITS



Rotation Lock Bit with Flushing Holes and Cutting Blade

CASING Ø	OUTER Ø	PART NUMBER
88.9 mm	105 mm	62080006
101.6 mm	110 mm	62080012
114.3 mm	120 mm	62080029
133 mm	140 mm	62080030
152.4 mm	160 mm	62080031



Rotation Lock Bit with Flushing Holes Cross Type

CASING Ø	OUTER Ø	PART NUMBER
88.9 mm	105 mm	62080017
101.6 mm	110 mm	62080007
114.3 mm	120 mm	62080008
133 mm	140 mm	62080018
152.4 mm	160 mm	62080049

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

FLUSHING HEADS

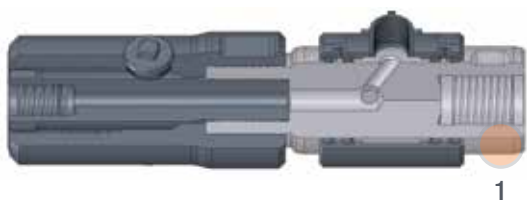


THREAD TYPE	ROCK DRILL SHANK THREAD	FLUSHING BODY SHAFT DIAMETER	OUTER CASING DIAMETER					
			88.9 Ø	101.6 Ø	114.3 Ø	133 Ø	152.4 Ø	177.8 Ø
			INNER ROD – FRICTION WELDED					
			51 Ø	63.5 Ø	76.1 Ø	88.9 Ø	101.6 Ø	114.3 Ø
Cylindrical	H55	100 mm	23010183	23010318	23010315	23010256	23010277	
Conical			23010431	23010317	23010316	23010032	23010278	
Twin Drive™			23010432	23010411	23010390	23010362	23010347	
Twin Drive™				23010418	23010397	23010376	23010369	
Cylindrical	BW64 Rope Thread	120 mm	23010160	23010319	23010165	23010156	23010023	
Conical			23010161	23010150	23010153	23010157	23010081	
Twin Drive™			23010427	23010412	23010391	23010363	23010345	
Twin Drive™				23010419	23010572	23010377	23010370	
Cylindrical	C64	120 mm	23010425	23010320	23010296	23010257	23010046	
Conical			23010426	23010321	23010314	23010258	23010276	
Twin Drive™			23010429	23010413	23010392	23010364	23010346	
Twin Drive™				23010420	23010399	23010378	23010371	
Cylindrical	H90	140 mm	23010434	23010334	23010310	23010264	23010279	23010650
Conical			23010435	23010336	23010312	23010266	23010281	23010143
Twin Drive™			23010436	23010414	23010393	23010365	23010343	23010653
Twin Drive™				23010421	23010400	23010379	23010372	23010654
Cylindrical	C90	140 mm	23010438	23010335	23010311	23010265	23010280	23010652
Conical			23010439	23010337	23010313	23010267	23010282	23010651
Twin Drive™			23010440	23010415	23010396	23010368	23010344	23010653
Twin Drive™				23010422	23010401	23010380	23010582	23010654
Cylindrical	H112	170 mm	23010442	23010338	23010306	23010268	23010178	23010656
Conical			23010443	23010340	23010308	23010269	23010283	23010655
Twin Drive™			23010444	23010416	23010394	23010366	23010225	23010657
Twin Drive™				23010423	23010573	23010381	23010374	23010658
Cylindrical	C112	170 mm	23010446	23010339	23010307	23010270	23010284	23010660
Conical			23010447	23010341	23010309	23010271	23010285	23010659
Twin Drive™			23010448	23010417	23010395	23010367	23010342	23010661
Twin Drive™				23010424	23010403	23010382	23010375	23010662

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

FLUSHING HEADS



1

Flushing Head Component / Flushing Body (1)

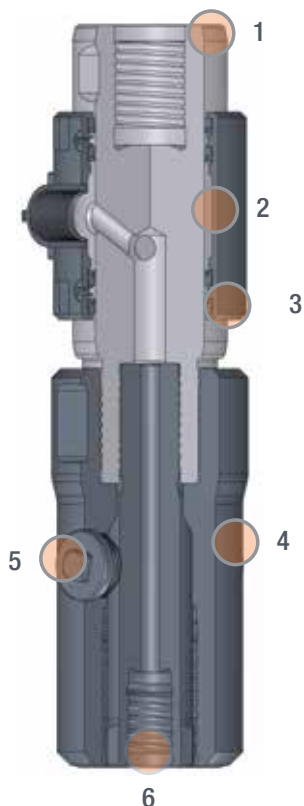
ROCK DRILL SHANK THREAD	FLUSHING BODY SHAFT DIAMETER	FLUSHING BELL THREAD	BALANCE ROD THREAD	PART NUMBER
H55	100 mm	Standard Rope Thread Male	Standard Rope Thread Female	23040124
BW64	120 mm			23040026
C64	120 mm			23040174
H90	140 mm	Twin Drive™ Male	Twin Drive™ Female	23040195
C90	140 mm			23040314
H112	170 mm			23040206
C112	170 mm			23040243

NOTE: Additional configurations are available.
Please contact your sales representative for further details.

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

FLUSHING HEADS COMPONENTS



Flushing Head Component / Flushing Ring (2)

FLUSHING HOSE CONNECTION	FLUSHING BODY SHAFT DIAMETER	PART NUMBER
G1 1/4"	100 mm	23070033
G1 1/4"	120 mm	23070035
G1 1/2"	140 mm	23070037
G2"	170 mm	23070012

Flushing Head Component / Flushing Ring Seals (3)

ROCK DRILL SHAFT Ø	PART NUMBER (QTY. 4)
100 mm	55030018
120 mm	55030019
140 mm	55030062
170 mm	55030174

Flushing Head Component / Flushing Bell (4)

Flushing Head Component / Flushing Plug (5)

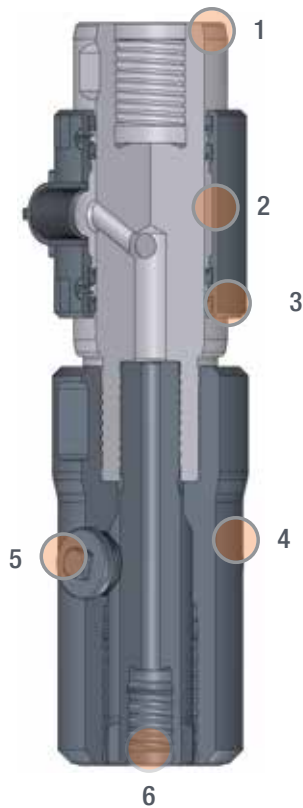
PART NUMBER
55390017

OUTER CASING Ø	FLUSHING BODY SHAFT DIAMETER	FLUSHING BODY THREAD	CASING THREAD TYPE			
			CYLINDRICAL	CONICAL	TWIN DRIVE™	
88.9 mm	100 mm	Female Left-Hand	Rope	23050037	23050058	23050146
	120 mm			23050044	23050076	23050147
	140 mm		Twin Drive™	23050148	23050150	23050152
				170 mm	23050149	23050151
101.6 mm	100 mm		Rope	23050002	23050006	23050142
	120 mm			23050046	23050077	23050143
	140 mm		Twin Drive™	23050129	23050054	23050144
				170 mm	23050130	23050096
114.3 mm	100 mm	Rope	23050009	23050011	23050138	
	120 mm		23050010	23050067	23050139	
	140 mm	Twin Drive™	23050079	23050053	23050140	
			170 mm	23050127	23050128	23050141
133 mm	100 mm	Rope	23050015	23050021	23050134	
	120 mm		23050019	23050022	23050135	
	140 mm	Twin Drive™	23050078	23050071	23050136	
			170 mm	23050126	23050109	23050137
152.4 mm	100 mm	Rope	23050025	23050029	23050133	
	120 mm		23050026	23050030	23050132	
	140 mm	Twin Drive™	23050084	23050080	23050131	
			170 mm	23050082	23050095	23050114
177.8 mm	140 mm	Twin Drive™	23050312	23050075	23050316	
	170 mm		23050315	23050313	23050314	

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

FLUSHING HEAD COMPONENTS



Flushing Head Component / Balance Rod

OUTER CASING Ø	INNER ROD Ø	FLUSHING BODY SHAFT DIAMETER	CASING THREAD TYPE			
			CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
88.9 mm	51 mm	100 mm	23060077	23060078	23060210	
		120 mm	23060077	23060078	23060210	
		140 mm	23060206	23060207	23060211	
		170 mm	23060208	23060209	23060212	
101.6 mm	63.5 mm	100 mm	23060175	23060176	23060200	23060203
		120 mm	23060175	23060176	23060200	23060203
		140 mm	23060180	23060181	23060201	23060204
		170 mm	23060178	23060179	23060202	23060205
114.3 mm	76.1 mm	100 mm	23060168	23060035	23060197	23060194
		120 mm	23060168	23060035	23060197	23060194
		140 mm	23060169	23060170	23060198	23060195
		170 mm	23060171	23060172	23060199	23060196
133 mm	88.9 mm	100 mm	23060017	23060157	23060185	23060191
		120 mm	23060017	23060157	23060185	23060191
		140 mm	23060160	23060161	23060187	23060192
		170 mm	23060158	23060162	23060186	23060193
152.4 mm	101.6 mm	100 mm	23060163	23060164	23060182	23060188
		120 mm	23060163	23060164	23060182	23060188
		140 mm	23060166	23060167	23060183	23060189
		170 mm	23060088	23060156	23060184	23060244

CASING Ø	INNER ROD Ø	FLUSHING BODY SHAFT DIAMETER	FLUSHING BODY THREAD		CASING THREAD TYPE			
					CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
177.8 mm	114.3 mm	140 mm	Female Left-Hand	Twin Drive™	23060289	23060076	23060408	23060285
		170 mm			23060290	23060283	23060409	23060128

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

INNER RODS



THREAD TYPE	THREAD DIRECTION	EFFECTIVE LENGTH	OUTER CASING DIAMETER				
			88.9 Ø	101.6 Ø	114.3 Ø	133 Ø	152.4 Ø
			INNER ROD – FRICTION WELDED				
			51 Ø	63.5 Ø	76.1 Ø	88.9 Ø	101.6 Ø
Cylindrical	Left-Hand Male/Female	1000 mm	21010124	21010172	21010184	21010211	21010010
Conical			21010498	21010483	21010485	21010240	21010025
Twin Drive™			21010887	21010881	21010874	21010237	21010859
TDN			21011122	21010814	21010718	21010723	21010729
Cylindrical		1500 mm	21010476	21010478	21010484	21010214	21010012
Conical			21010499	21010482	21010194	21010241	21010277
Twin Drive™			21010886	21010880	21010873	21010388	21010858
TDN			21011128	21010882	21010719	21010724	21010732
Cylindrical		2000 mm	21010126	21010175	21010188	21010220	21010018
Conical			21010500	21010481	21010195	21010242	21010026
Twin Drive™			21010885	21010879	21010872	21010238	21010670
TDN			21011123	21010815	21010720	21010725	21010733
Cylindrical	3000 mm	21010477	21010479	21010190	21010222	21010021	
Conical		21010501	21010480	21010486	21010243	21010403	
Twin Drive™		21010884	21010878	21010871	21010389	21010290	
TDN		21011124	21010816	21010721	21010726	21010730	
Cylindrical	3050 mm	21011331	21011325	21011319	21010445	21010023	
Conical		21011333	21011326	21011321	21010446	21010447	
Twin Drive™		21011335	21011329	21011324	21010883	21010875	
TDN		21011336	21011330	21011322	21011315	21010877	

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING



Casing Friction Welded

CASING Ø	SPANNER FLAT	EFFECTIVE LENGTH	THREAD DIRECTION	THREAD TYPE		
				CYLINDRICAL	CONICAL	TWIN DRIVE™
51 mm ID 26 mm	SF46	500 mm	Left-Hand	21010832	21011332	21011334
		1000 mm		21010124	21010498	21010887
		1500 mm		21010476	21010499	21010886
		2000 mm		21010126	21010500	21010885
		3000 mm		21010477	21010501	21010884
		3050 mm		21011331	21011333	21011335
63.5 mm ID 38 mm	SF55	500 mm	Left-Hand	21011626	21011327	21011328
		1000 mm		21010172	21010332	21010881
		1500 mm		21010478	21010659	21010880
		2000 mm		21010175	21010331	21010879
		3000 mm		21010479	21010480	21010878
		3050 mm		21011325	21011326	21011329
76.1 mm ID 50 mm	SF70	500 mm	Left-Hand	21010181	21011320	21011323
		1000 mm		21010184	21010485	21010874
		1500 mm		21010484	21010194	21010873
		2000 mm		21010188	21010195	21010872
		3000 mm		21010190	21010486	21010871
		3050 mm		21011319	21011321	21011324
88.9 mm ID 64 mm	SF80	500 mm	Left-Hand	21011612	21011318	21011317
		1000 mm		21010211	21010240	21010237
		1500 mm		21010214	21010241	21010388
		2000 mm		21010220	21010242	21010238
		3000 mm		21010222	21010243	21010389
		3050 mm		21010445	21010446	21010883
101.6 mm ID 75 mm	SF90	500 mm	Left-Hand	21010334	21011278	21011279
		1000 mm		21010010	21010025	21010859
		1500 mm		21010012	21010277	21010858
		2000 mm		21010018	21010026	21010670
		3000 mm		21010021	21010403	21010290
		3050 mm		21010023	21010447	21010875

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING

Casing Friction Welded



CASING Ø	SPANNER FLAT	EFFECTIVE LENGTH	THREAD DIRECTION	THREAD TYPE		
				CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm ID 88 mm	SF105	500 mm	Left-Hand	21011613	21011024	21011281
		1000 mm		21010038	21010282	21010669
		1500 mm		21010040	21010319	21010667
		2000 mm		21010044	21010062	21010712
		3000 mm		21010046	21010306	21010713
		3050 mm		21010448	21010449	21010869
133 mm ID 108 mm	SF120	500 mm	Left-Hand	21011616	21010106	21010530
		1000 mm		21010001	21010110	21010392
		1500 mm		21010081	21010112	21010509
		2000 mm		21010085	21010114	21010383
		3000 mm		21010086	21010302	21010722
		3050 mm		21010291	21010322	21010860
152.4 mm ID 128 mm	SF140	500 mm	Left-Hand	21011619	21010686	21011291
		1000 mm		21010137	21010163	21010385
		1500 mm		21010140	21010285	21010731
		2000 mm		21010142	21010164	21010380
		3000 mm		21010143	21010280	21010728
		3050 mm		21010451	21010452	21010823
177.8 mm ID 148 mm	SF170	500 mm	Left-Hand	21011858	21011864	21011870
		1000 mm		21011859	21011865	21010734
		1500 mm		21011860	21011866	21010735
		2000 mm		21011861	21011867	21010736
		3000 mm		21011862	21011868	21010737
		3050 mm		21011863	21011869	21011871

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

INNER PERCUSSIVE BITS



Hemispherical Button Type – Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 51 mm				
60 mm	22130157	22130158	22130376	22130504
ROD DIAMETER 63.5 mm				
70 mm	22130160	22130161	22130375	22130345
ROD DIAMETER 76.1 mm				
85 mm	22130133	22130073	22130374	22130355
ROD DIAMETER 88.9 mm				
105 mm	22130063	22130074	22130373	22130194
ROD DIAMETER 101.6 mm				
125 mm	22130067	22130078	22130182	22130328



Bladed Cross Type – Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 51 mm				
60 mm	22140070	22140135	22140211	22140285
ROD DIAMETER 63.5 mm				
70 mm	22140072	22140136	22140210	22140286
ROD DIAMETER 76.1 mm				
85 mm	22140137	22140094	22140209	22140154
ROD DIAMETER 88.9 mm				
105 mm	22140079	22140088	22140208	22140155
ROD DIAMETER 101.6 mm				
125 mm	22140083	22140090	22140207	22140156



Blade X-Type – Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 51 mm				
60 mm	22140226	22140227	22140228	22140229
ROD DIAMETER 63.5 mm				
70 mm	22140230	22140091	22140231	22140232
ROD DIAMETER 76.1 mm				
85 mm	22140233	22140234	22140235	22140236
ROD DIAMETER 88.9 mm				
105 mm	22140237	22140238	22140239	22140240
ROD DIAMETER 101.6 mm				
125 mm	22140241	22140242	22140243	22140244

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

INNER PERCUSSIVE BITS



Ballistic Button Type – Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 51 mm				
60 mm	22130299	22130507	22130508	22130509
ROD DIAMETER 63.5 mm				
70 mm	22130510	22130511	22130512	22130513
ROD DIAMETER 76.1 mm				
85 mm	22130276	22130140	22130514	22130409
ROD DIAMETER 88.9 mm				
105 mm	22130517	22130059	22130515	22130006
ROD DIAMETER 101.6 mm				
125 mm	22130335	22130219	22130516	22130203



Two-Step Button Type – Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 51 mm				
60 mm	22130518	22130519	22130520	22130521
ROD DIAMETER 63.5 mm				
70 mm	22130522	22130523	22130524	22130525
ROD DIAMETER 76.1 mm				
85 mm	22130526	22130527	22130528	22130408
ROD DIAMETER 88.9 mm				
105 mm	22130529	22130530	22130531	22130532
ROD DIAMETER 101.6 mm				
125 mm	22130533	22130534	22130535	22130536



Ballistic Button Three-Wing Type – Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 mm				
85 mm	22130541	22130542	22130543	22130544
ROD DIAMETER 88.9 mm				
105 mm	22130545	22130201	22130547	22130548
ROD DIAMETER 101.6 mm				
125 mm	22130549	22130550	22130551	22130421

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

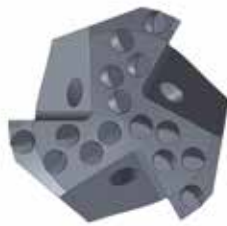
Duplex Drilling Systems

INNER PERCUSSIVE BITS



Scraping Button Rotary Bit Three-Wing Type – Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 mm				
85 mm	22130553	22130319	22130546	22130410
ROD DIAMETER 88.9 mm				
105 mm	22130692	22130144	22130552	22130554
ROD DIAMETER 101.6 mm				
125 mm	22130555	22130288	22130556	22130557



Ballistic Button Cross Type Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 88.9 MM				
105 MM	22130839	22130324	22130840	22130841
ROD DIAMETER 101.6 MM				
125 MM	22130842	22130346	22130843	22130844
ROD DIAMETER 114.3 MM				
145 MM	22130845	22130846	22130847	22130848



SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

INNER PERCUSSIVE BITS



DROP CENTER TYPE- HARD GROUND CONDITIONS, Ballistic Button Type, Left-Hand, Drop Center

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 MM				
85 MM	22130860	22130861	22130862	22130663
ROD DIAMETER 88.9 MM				
105 mm	22130863	22130864	22130865	22130866
ROD DIAMETER 101.6 MM				
125 MM	22130867	22130868	22130869	22130870



DROP CENTER TYPE- HARD GROUND CONDITIONS, Hemispherical Button Type, Left-Hand, Drop Center

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 MM				
85 MM	22130871	22130872	22130873	22130660
ROD DIAMETER 88.9 MM				
105 MM	22130874	22130875	22130876	22130877
ROD DIAMETER 101.6 MM				
125 MM	22130878	22130879	22130880	22130881



SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

INNER PERCUSSIVE BITS



DROP CENTER TYPE- HARD GROUND CONDITIONS, Ballistic / Hemispherical Button Type, Left-Hand, Drop Center

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 MM				
85 MM	22130849	22130850	22130851	22130675
ROD DIAMETER 88.9 MM				
105 MM	22130852	22130853	22130854	22130855
ROD DIAMETER 101.6 MM				
125 MM	22130856	22130857	22130858	22130859



HARD GROUND CONDITIONS Hemispherical Button Type- Shrink Fitted, Wear Protection, Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 MM				
85 MM	22130882	22130883	22130884	22130625
ROD DIAMETER 88.9 MM				
105 MM	22130885	22130886	22130887	22130888
ROD DIAMETER 101.6 MM				
125 MM	22130889	22130890	22130891	22130892

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

INNER PERCUSSIVE BITS



HARD GROUND CONDITIONS
Two-Step Button Type-
Shrink Fitted, Wear Protection, Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 MM				
85 MM	22130893	22130894	22130895	22130623
ROD DIAMETER 88.9 MM				
105 MM	22130896	22130897	22130898	22130899
ROD DIAMETER 101.6 MM				
125 MM	22130900	22130901	22130902	22130903



HARD GROUND CONDITIONS
Ballistic Button Type-
Shrink Fitted, Wear Protection, Left-Hand

OUTER DIAMETER	CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
ROD DIAMETER 76.1 MM				
85 MM	22130904	22130905	22130906	22130624
ROD DIAMETER 88.9 MM				
105 MM	22130907	22130908	22130909	22130910
ROD DIAMETER 101.6 MM				
125 MM	22130911	22130912	22130913	22130914

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOES



Hemispherical Button Type

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	95 mm	Left-Hand	22010090	22010100	22010553
	100 mm		22010091	22010101	22010554
101.6 mm	107 mm	Left-Hand	22010093	22010007	22010551
	115 mm		22010321	22010103	22010552
114.3 mm	120 mm	Left-Hand	22010111	22010114	22010451
	125 mm		22010322	22010115	22010452
133 mm	140 mm	Left-Hand	22010095	22010105	22010453
	150 mm		22010004	22010158	22010454
152.4 mm	160 mm	Left-Hand	22010096	22010106	22010267
	170 mm		22010097	22010285	22010458
177.8 mm	185 mm	Left-Hand	22011688	22010108	22010463
	190 mm		22010900	22010234	22010901



Ballistic Button Type

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	95 mm	Left-Hand	22011466	22010902	22010903
	100 mm		22010904	22010905	22010906
101.6 mm	107 mm	Left-Hand	22010018	22010538	22010907
	115 mm		22010581	22010908	22010909
114.3 mm	120 mm	Left-Hand	22010094	22010415	22010910
	125 mm		22010011	22010911	22010912
133 mm	140 mm	Left-Hand	22010414	22010023	22010913
	150 mm		22010914	22010915	22010916
152.4 mm	160 mm	Left-Hand	22010112	22010592	22010917
	170 mm		22010918	22010919	22010920
177.8 mm	185 mm	Left-Hand	22010921	22010197	22010922
	190 mm		22010923	22010924	22010925

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOES



Bladed Type

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	95 mm	Left-Hand	22020011	22020019	22020031
	100 mm		22020012	22020020	22020146
101.6 mm	107 mm	Left-Hand	22020077	22020022	22020139
	115 mm		22020114	22020023	22140145
114.3 mm	120 mm	Left-Hand	22020074	22020045	22020095
	125 mm		22020115	22020046	22020133
133 mm	140 mm	Left-Hand	22020076	22020079	22020132
	150 mm		22020116	22020101	22020134
152.4 mm	160 mm	Left-Hand	22020016	22020025	22020096
	170 mm		22020017	22020117	22020136
177.8 mm	185 mm	Left-Hand	22020220	22020027	22020137
	190 mm		22020177	22020072	22020178



Two-Step Button Type, With Gauge Protection

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	120mm	Left-Hand	22011009	22010432	22011399
	125mm		22010430	22011011	22011012
133 mm	140mm		22010558	22010476	22011013
	150mm		22011014	22011015	22011016
152.4 mm	160mm		22011017	22010510	22011018
	170mm		22011019	22011020	22011021
177.8 mm	185mm		22011022	22011023	22011024
	190mm		22011025	22011026	22011027

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOES



Scraping Button Type

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	95 mm	Left-Hand	22010926	22010927	22010928
	100 mm		22010929	22010930	22010931
101.6 mm	107 mm		22010315	22010932	22010933
	115 mm		22010934	22010935	22010936
114.3 mm	120 mm		22010677	22010937	22010938
	125 mm		22010939	22010940	22010941
133 mm	140 mm		22010355	22010319	22010942
	150 mm		22010943	22010944	22010945
152.4 mm	160 mm		22010946	22010947	22010948
	170 mm		22010949	22010950	22010951
177.8 mm	185 mm		22010952	22010953	22010954
	190 mm		22010955	22010956	22010957



Scraping Button, With Wear Protection

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	95 mm	Left-Hand, Rotary Percussive	22010567	22010958	22010959
	100 mm		22010960	22010961	22010962
101.6 mm	107 mm		22010662	22010963	22010468
	115 mm		22010964	22010965	22010966
114.3 mm	120 mm		22010329	22010817	22010967
	125 mm		22010968	22010520	22010969
133 mm	140 mm		22010358	22010399	22010472
	150 mm		22010970	22010971	22010972
152.4 mm	160 mm		22010973	22010974	22010469
	170 mm		22010975	22010976	22010977
177.8 mm	185 mm		22011690	22010978	22010979
	190 mm		22010980	22010981	22010982

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOE



Scalping Buttons, With Wear Protection For Reinforced Concrete

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	95 mm	Left-Hand, Rotary Percussive	22011084	22011085	22011086
	100 mm		22011087	22011088	22011089
101.6 mm	107 mm		22011090	22011091	22010543
	115 mm		22011092	22011093	22011094
114.3 mm	120 mm		22011095	22011096	22011097
	125 mm		22011098	22011099	22011100
133 mm	140 mm		22010506	22011101	22010505
	150 mm		22011102	22011103	22011104
152.4 mm	160 mm		22011105	22011106	22011107
	170 mm		22011108	22011109	22011110
177.8 mm	185 mm		22011111	22011112	22011113
	190 mm		22011114	22011115	22011116



Scalping Button, With Wear Protection

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	95 mm	Left-Hand, Rotary Percussive	22011273	22010984	22010985
	100 mm		22010986	22010987	22010988
101.6 mm	107 mm		22010989	22010990	22010543
	115 mm		22010991	22010992	22010993
114.3 mm	120 mm		22010994	22010248	22010634
	125 mm		22010995	22010996	22010997
133 mm	140 mm		22010456	22010998	22010999
	150 mm		22011000	22011001	22011002
152.4 mm	160 mm		22011003	22010492	22010754
	170 mm		22011004	22011005	22010760
177.8 mm	185 mm		22010788	22010672	22011006
	190 mm		22011007	22010778	22011008

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOE



W-Type, Without Wear Protection

CASING Ø	OUTER Ø	BUTTON TYPE	THREAD DIRECTION	THREAD TYPE		
				CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	120 mm	2 Step Buttons	Left-Hand Rotary Percussive	22010531	22011056	22010436
133 mm	140 mm			22011058	22010479	22011062
152.4 mm	160 mm			22011064	22010509	22010548
177.8 mm	185 mm			22011702	22011703	22011704
	190 mm	22011705	22011706	22011707		



W-Type, With Wear Protection

CASING Ø	OUTER Ø	BUTTON TYPE	THREAD DIRECTION	THREAD TYPE		
				CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	120 mm	2 Step Buttons	Left-Hand Rotary Percussive	22011067	22011069	22011070
133 mm	140 mm			22011071	22011073	22011074
152.4 mm	160 mm			22011075	22011077	22011079
177.8 mm	185 mm			22011696	22011697	22011698
	190 mm	22011699	22011700	22011701		

CASING Ø	OUTER Ø	BUTTON TYPE	THREAD DIRECTION	THREAD TYPE		
				CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	120 mm	Ballistic Button	Left-Hand Rotary Percussive	22010720	22011068	22011469
133 mm	140 mm			22010590	22011072	22010586
152.4 mm	160 mm			22010596	22011076	22011078
177.8 mm	185 mm			22011691	22011693	22010816
	190 mm	22011692	22011694	22011695		

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOES

Extra Lobe Bit

CASING Ø	OUTER Ø	CARBIDE TYPE	CROWN DESIGN	THREAD DIRECTION	THREAD TYPE		
					CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	120 mm	Scraping Buttons	Concave	Left-Hand	22011028	22011029	22090038
			Convex		22011030	22011031	22090039
			Planar		22011032	22011033	22090030
	125 mm		Concave		22011034	22011035	22090036
			Convex		22011036	22011037	22090031
			Planar		22011038	22011039	22011040
	130 mm		Concave		22011041	22011042	22011043
			Convex		22011044	22011045	22011046
			Planar		22090086	22011047	22011048
133 mm	148 mm	Concave		22090091	22011050	22011051	
		Convex		22090063	22011052	22011053	
		Planar		22090062	22011054	22011055	

CONCAVE



CONVEX



PLANAR



SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOES



Eccentric Bit

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	110 mm	Left-Hand	22020063	22020179	22020120
114.3 mm	130 mm		22020183	22020184	22020106
	140 mm		22020123	22020188	22020189
133 mm	150 mm		22020192	22020193	22020194
	155 mm		22020197	22020198	22020199
	165 mm		22020165	22020202	22020203

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL	CONICAL	TWIN DRIVE™
88.9 mm	110 mm	Right-Hand	22020180	22020181	22020182
114.3 mm	130 mm		22020185	22020186	22020187
	140 mm		22020190	22020191	22020122
133 mm	150 mm		22020195	22020196	22020090
	155 mm		22020200	22020201	22020088
	165 mm		22020204	22020205	22020206

Bit with Cutting Blade



CASING Ø	OUTER Ø	CUTTING BLADE	THREAD DIRECTION	THREAD TYPE		
				CYLINDRICAL	CONICAL	TWIN DRIVE™
101.6 mm	107 mm	22040025	Left-Hand	22011117	22011118	22011119
114.3 mm	120 mm	22040031		22010080	22011120	22011121
133 mm	140 mm	22040150		22011122	22011123	22011124
152.4 mm	160 mm	22040041		22010309	22010493	22010651

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOES



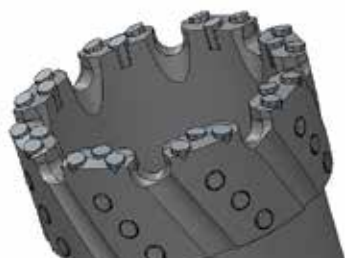
Hemispherical Inserts

CASING Ø	THREAD DIRECTION	OUTER DIA	CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	Left-Hand	125	22011670	22011671	22011672
133 mm		145	22011612	22011615	22011358
152.4 mm		165	22011613	22011616	22011468
177.8 mm		185	22011614	22011617	22011389



Ballistic Inserts

CASING Ø	THREAD DIRECTION	OUTER DIA	CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	Left-Hand	125	22011673	22011674	22011675
133 mm		145	22011618	22011621	22011385
152.4 mm		165	22011619	22011622	22011386
177.8 mm		185	22011620	22011623	22011392



Octagonal Inserts

CASING Ø	THREAD DIRECTION	OUTER DIA	CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	Left-Hand	125	22011676	22011677	22011678
133 mm		145	22011600	22011603	22011412
152.4 mm		165	22011601	22011604	22011395
177.8 mm		185	22011365	22011605	22011365



Three-Face Scraping Inserts

CASING Ø	THREAD DIRECTION	OUTER DIA	CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	Left-Hand	125	22011679	22011680	22011681
133 mm		145	22011628	22011629	22011630
152.4 mm		165	22011631	22011632	22011633
177.8 mm		185	22011634	22011635	22011636



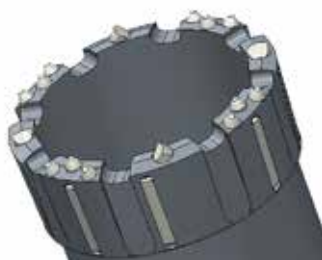
Scraping Inserts

CASING Ø	THREAD DIRECTION	OUTER DIA	CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	Left-Hand	125	22011682	22011683	22011684
133 mm		145	22011410	22011609	22011478
152.4 mm		165	22011607	22011610	22011394
177.8 mm		185	22011608	22011611	22011391

SINGLE HEAD DRILLING SYSTEMS – HYDRAULIC DRIFTER

Duplex Drilling Systems

CASING SHOES



Ballistic + Scraping Inserts

CASING Ø	THREAD DIRECTION	OUTER DIA	CYLINDRICAL	CONICAL	TWIN DRIVE™
114.3 mm	Left-Hand	125	22011685	22011686	22011687
133 mm		145	22011281	22011664	22011421
152.4 mm		165	22011665	22011666	22011431
177.8 mm		185	22011667	22011668	22011669



OVERBURDEN CASED DRILLING SYSTEMS

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Flushing Head Complete (1)

HEAD MANUFACTURER	HEAD MODEL	ROTATION DIRECTION	FLUSH CONNECTION	PART NUMBER
Eurodrill	RH800/900	Right and Left-Hand	G2"	23390072
Eurodrill	RH1000/RH1400/RH1700			23390073
Krupp	HR40			23390070
Klemm	KH9/KH13			23390074

Flushing Head Components / Flushing Body

HEAD MANUFACTURER	HEAD MODEL	PART NUMBER
Eurodrill	RH800	23390075
Eurodrill	RH1000/RH1400	23390076
Krupp	HR40	23390071
Klemm	KH9	23390077

Flushing Ring

HEAD MANUFACTURER	HEAD MODEL	PART NUMBER
Eurodrill	RH800	23070071
Eurodrill	RH1000	
Krupp	HR40	
Klemm	KH9	

Flushing Ring Seals

HEAD MANUFACTURER	HEAD MODEL	PART NUMBER (QTY. 4)
Eurodrill	RH800	55030011
Eurodrill	RH1000	
Krupp	HR40	
Klemm	KH9	

Mounting Bracket

HEAD MANUFACTURER	HEAD MODEL	PART NUMBER
Eurodrill	RH800	23080099
Eurodrill	RH1000	23080100
Krupp	HR40	23080095
Klemm	KH9	23080101

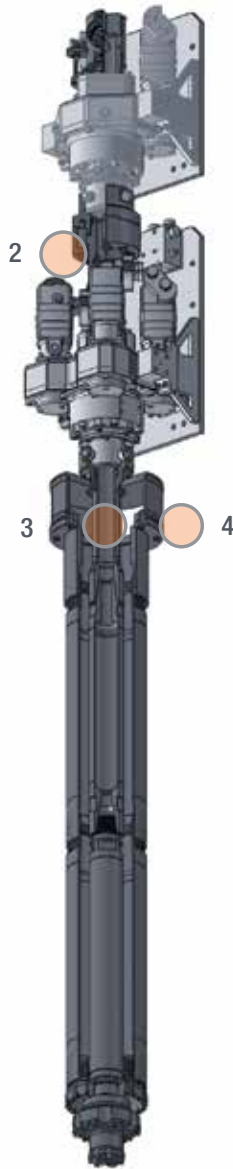


ALL CONNECTORS INCLUDE:	PART NUMBER
Hex Bolt, for Connector	55010001
Nut, for Connector	55010002

All third-party trademarks, including Eurodrill, Krupp and Klemm are the property of their respective owners.

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Shock Absorber (2)

HEAD MANUFACTURER	HEAD MODEL	ROTATION DIRECTION	OUTPUT THREAD	PART NO.
Eurodrill	RH800	Right-Hand	KW76 Male	24100198
Eurodrill	RH1000			24100161
Krupp	HR40			24100193
Klemm	KH9			24100198

Balance Rod (3)

DOUBLE HEAD DRILL SYSTEM TYPE	THREAD	THREAD DIRECTION	DIAMETER	LENGTH	PART NO.
Rotary–Rotary	Male KW76	Right-Hand	80 mm	Specify	TBD*

Ejection Bell (4)

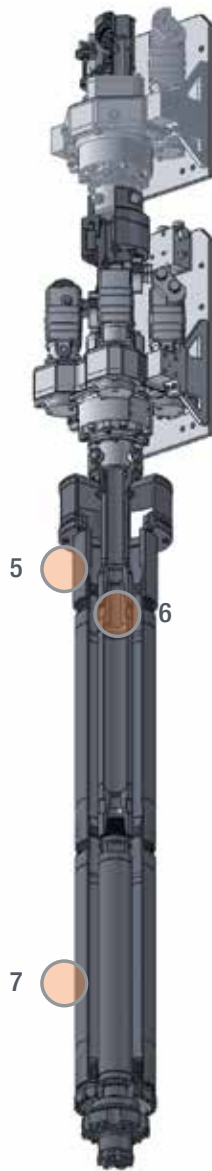
HEAD MANUFACTURER	ROTARY HEAD MODEL	SHAFT DIAMETER	PART NO.
Eurodrill	RH1000/RH1400	80 mm	24100158
Krupp	HR50/HR60		24100243
Klemm	KH13 (HDK800-ZS3)		24100106
Klemm	KH16		24100159

Spray Protection (Not Shown)

HEAD MANUFACTURER	ROTARY HEAD MODEL	PART NO.
Eurodrill	RH1000/RH1400	24100150
Krupp	HR50/HR60	24100155
Klemm	KH13 (HDK800-ZS3)	24100121
Klemm	KH16	24100245

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Casing Flange (5)

OUTER CASING Ø	THREAD DIRECTION	THREAD TYPE	
		CYLINDRICAL DOUBLE-START	CYLINDRICAL DOUBLE-START
114.3 mm	Left-Hand	24030134	24030398
133 mm		24030070	24030029
152.4 mm		24030326	24030125
177.8 mm		24030380	24030126

Balance Rod Adapter (6)

DOUBLE HEAD DRILL SYSTEM TYPE	THREAD (1) (FEMALE)	THREAD (2) (FEMALE)	THREAD DIRECTION	PART NO.
Rotary–Rotary	KW76	API 2 3/8 REG	Right-Hand	24020806
		API 3 1/2 REG		24021178
		CBX 20 P		24022100
		CBX 24 P		24021815
		CBX 26 P		24022101
		CBX 28 P		24021900
		CBX 32 P		24022102
		CBX 36 P		24022103

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Rotary Casing (7)

THREAD TYPE	THREAD END CONSTRUCTION	EFFECTIVE LENGTH	OUTER CASING DIAMETER			
			114.3 Ø	133 Ø	152.4 Ø	177.8 Ø
Cylindrical Double-Start Left-Hand	Friction Weld Double-Start	500 mm	21011058	21010268	21010387	
		1000 mm	21010049	21010090	21010146	
		1500 mm	21010497	21010091	21010148	
		2000 mm	21010052	21010092	21010293	
	Manual Weld	500 mm				21011307
		1000 mm				21010196
		1500 mm				21010197
		2000 mm				21010496
	Direct Thread	500 mm		21020543	21020544	21020545
		1000 mm		21020383	21020408	21020514
		1500 mm		21020382	21020401	21020427
		2000 mm		21020418	21020416	21020407
Cylindrical Double-Start Right-Hand	Friction Welded	500 mm	21011208	21011305	21010150	
		1000 mm	21010053	21010096	21010152	
		1500 mm	21010054	21010098	21010154	
		2000 mm	21010056	21010099	21010157	
	Welded	500 mm				21011306
		1000 mm				21010495
		1500 mm				21010201
		2000 mm				21010202
	Direct Thread	500 mm		21020436	21020115	21020410
		1000 mm		21020402	21020406	21020411
		1500 mm		21020403	21020489	21020412
		2000 mm		21020433	21020423	21020413

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Inner API Drill Rod (8)

Ø 76.1 MM (3")						
THREAD	WALL THICKNESS (WTH.) MM (IN.)	MINI- MUM ID MM (IN.)	SQUARE FLATS MM (IN.)	WEIGHT KG (LBS.) APPROX.	EFFECTIVE LENGTH MM (FT.)	PART NUMBER
API 2 3/8" REG	4.5 (0.18)	30 (1.18)	60 (2.36)	17 (37.5)	1000 (3.28)	21030314
				13 (28.7)	1500 (4.9)	21030079
				25 (55.1)	2000 (6.56)	21030240
				33 (72.8)	3000 (9.84)	21030085
				41 (90.4)	4000 (13.12)	21030315
	6.3 (0.25)	30 (1.18)	60 (2.36)	500 (1.64)	21030072	
				20 (44.1)	1000 (3.28)	21030078
				25 (55.1)	1500 (4.9)	21030080
				31 (68.3)	2000 (6.56)	21030083
				42 (92.6)	3000 (9.84)	21030090
				53 (116.8)	4000 (13.12)	21030316
	8.8 (0.35)	30 (1.18)	60 (2.36)	500 (1.64)	21030073	
				24 (52.9)	1000 (3.28)	21030204
				31 (68.3)	1500 (4.9)	21030208
				38 (83.8)	2000 (6.56)	21030203
				53 (116.8)	3000 (9.84)	21030317
				67 (147.7)	4000 (13.12)	21030094

Ø 88.9 MM (3.5")						
THREAD	WALL THICKNESS (WTH.) MM (IN.)	MINI- MUM ID MM (IN.)	SQUARE FLATS MM (IN.)	WEIGHT KG (LBS.) APPROX.	EFFECTIVE LENGTH MM (FT.)	PART NUMBER
API 2 3/8" REG	4.5 (0.18)	30 (1.18)	65 (2.56)	20 (44.1)	1000 (3.28)	21030318
				25 (55.1)	1500 (4.9)	21030636
				30 (66.1)	2000 (6.56)	21030319
				39 (86)	3000 (9.84)	21030135
				48 (105.8)	4000 (13.12)	21030320
	6.3 (0.25)	30 (1.18)	65 (2.56)	23 (50.7)	1000 (3.28)	21030263
				30 (66.1)	1500 (4.9)	21030131
				36 (79.4)	2000 (6.56)	21030133
				49 (108)	3000 (9.84)	21030136
				62 (136.7)	4000 (13.12)	21030321
				8.8 (0.35)	30 (1.18)	65 (2.56)
	37 (81.6)	1500 (4.9)	21030265			
	45 (99.2)	2000 (6.56)	21030134			
	63 (138.9)	3000 (9.84)	21030137			
	API 2 3/8" IF	6.3 (0.25)	44 (1.73)	65 (2.56)	80 (176.4)	4000 (13.12)
22 (48.5)					1000 (3.28)	21030593
28 (61.7)					1500 (4.9)	21030601
34.5 (76.1)					2000 (6.56)	21030401
47 (103.6)					3000 (9.84)	21030402
60 (132.3)	4000 (13.12)	21030637				

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Inner API Drill Rod (8)

Ø 88.9 MM (3.5")						
THREAD	WALL THICKNESS (WTH.) MM (IN.)	MINI-MUM ID MM (IN.)	SQUARE FLATS MM (IN.)	WEIGHT KG (LBS.) APPROX.	EFFECTIVE LENGTH MM (FT.)	PART NUMBER
API 2 3/8" IF	8.8 (0.35)	44 (1.73)	65 (2.56)	26 (57.3)	1000 (3.28)	21030146
				17.5 (38.6)	1500 (4.9)	21030450
				44 (97)	2000 (6.56)	21030147
				61 (134.5)	3000 (9.84)	21030451
				78.5 (173.1)	4000 (13.12)	21030638
API 2 7/8" REG	4.5 (0.18)	32 (1.26)	65 (2.56)	21 (46.3)	1000 (3.28)	21030322
				22.5 (49.6)	1500 (4.9)	21030639
				30 (66.1)	2000 (6.56)	21030323
				30 (66.1)	2000 (6.56)	21030323
				40 (88.2)	3000 (9.84)	21030324
	50 (110.2)	4000 (13.12)	21030325			
	6.3 (0.25)	32 (1.26)	65 (2.56)	24 (52.9)	1000 (3.28)	21030326
				30.5 (67.2)	1500 (4.9)	21030500
				37 (81.6)	2000 (6.56)	21030327
				50 (110.2)	3000 (9.84)	21030328
63 (138.9)				4000 (13.12)	21030329	
8.8 (0.35)	32 (1.26)	65 (2.56)	29 (63.9)	1000 (3.28)	21030330	
				1500 (4.9)	21030640	
			46 (101.4)	2000 (6.56)	21030331	
			64 (141.1)	3000 (9.84)	21030332	
			81 (178.6)	4000 (13.12)	21030333	

Ø 101.9 MM (4.0")						
THREAD	WALL THICKNESS (WTH.) MM (IN.)	MINI-MUM ID MM (IN.)	SQUARE FLATS MM (IN.)	WEIGHT KG (LBS.) APPROX.	EFFECTIVE LENGTH MM (FT.)	PART NUMBER
API 3 1/2" REG	6.3 (0.25)	38 (1.5)	90 (3.54)	25 (55.1)	1000 (3.28)	21030385
				32.5 (71.6)	1500 (4.9)	21030384
				40 (88.2)	2000 (6.56)	21030383
				55 (121.2)	3000 (9.84)	21030002
				70 (154.3)	4000 (13.12)	
	8.8 (0.35)	38 (1.5)	90 (3.54)	28.5 (62.8)	1000 (3.28)	21030609
				38.5 (84.9)	1500 (4.9)	21030610
				49 (108)	2000 (6.56)	21030611
				69 (152.1)	3000 (9.84)	
				89 (196.2)	4000 (13.12)	

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Inner API Drill Rod (8)

Ø 114.3 MM (4.5")						
THREAD	WALL THICKNESS (WTH.) MM (IN.)	MINIMUM ID MM (IN.)	SQUARE FLATS MM (IN.)	WEIGHT KG (LBS.) APPROX.	EFFECTIVE LENGTH MM (FT.)	PART NUMBER
API 3 1/2" REG	6.3	38 (1.5)	95 (3.74)	36.5 (80.5)	1000 (3.28)	21030008
				45 (99.2)	1500 (4.9)	21030010
				53 (116.8)	2000 (6.56)	21030012
				69.5 (153.2)	3000 (9.84)	21030013
				86 (189.6)	4000 (13.12)	21030337
	8.8			500 (1.64)	21030499	
				42.5 (93.7)	1000 (3.28)	21030009
				54 (119)	1500 (4.9)	21030488
				65.4 (144.2)	2000 (6.56)	21030275
				88.3 (194.7)	3000 (9.84)	21030014
				(5.5")	4000 (13.12)	21030016

Ø 139.7 MM (5.5")						
THREAD	WALL THICKNESS (WTH.) MM (IN.)	MINIMUM ID MM (IN.)	SQUARE FLATS MM (IN.)	WEIGHT KG (LBS.) APPROX.	EFFECTIVE LENGTH MM (FT.)	PART NUMBER
API 4 1/2" REG	6.3	45 (1.77)	120 (4.72)	51 (112.4)	1000 (3.28)	21030026
				61.5 (135.6)	1500 (4.9)	21030560
				72 (158.7)	2000 (6.56)	21030027
				92.5 (203.9)	3000 (9.84)	21030028
				113 (249.1)	4000 (13.12)	21030342
	8.8			58.5 (129)	1000 (3.28)	21030343
				73 (160.9)	1500 (4.9)	21030490
				87 (191.8)	2000 (6.56)	21030344
				115.5 (254.6)	3000 (9.84)	21030345
				144 (317.5)	4000 (13.12)	21030346

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Inner Drill Rod Rotary Percussive CBXP (8)

DESCRIPTION	PART NO.	OD	ID	EFFECTIVE LENGTH	WALL THICKNESS	WEIGHT
Drill Rod Rotary Percussive CBX 20 P	21030743	76.1	32	1000	8.8	18
	21030801			1500	8.8	26
	21030744			2000	8.8	32
Drill Rod Rotary Percussive CBX 24 P	21030713	88.9	40	1000	8.8	21
	21030730			1500	8.8	30
	21030714			2000	8.8	39
Drill Rod Rotary Percussive CBX 26 P	21030807	101.6	46	1000	8.8	28
	21030808			1500	8.8	38
	21030809			2000	8.8	48
Drill Rod Rotary Percussive CBX 28 P	21030721	114.3 4 1/2"	52	1000	8.8	35
	21030722			1500	8.8	47
	21030723			2000	8.8	59
Drill Rod Rotary Percussive CBX 28 P	21030727	114.3 4 1/2"	52	1000	10	39
	21030728			1500	10	51
	21030729			2000	10	63
Drill Rod Rotary Percussive CBX 32 P	21030731	133 5 1/4"	70	1000	10	31
	21030732			1500	10	46
	21030733			2000	10	61
Drill Rod Rotary Percussive CBX 36 P	21030804	152.4 6 "	85	1000	10	58
	21030805			1500	10	76
	21030806			2000	10	93

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary

INNER RODS, ROTARY BITS



GDU Type

OUTER Ø	THREAD	PART NO
85	API 2 3 /8 REG	22310143
85	CBX 20 P	22310350
105	API 2 3 /8 REG	22310156
105	CBX 24 P	22310351
125	API 2 3 /8 REG	22310232
125	CBX 26 P	22310352
145	API 3 1/2 REG	22310353
145	CBX 28 P	22310354
160	API 4 1/2 REG	22310355
160	CBX 32 P	22310356
185	API 4 1/2 REG	22310357
185	CBX 36 P	22310358



Three-Wing Type, Scraping Buttons, Wear protection

OUTER Ø	THREAD	PART NO
85	API 2 3 /8 REG	22310360
85	CBX 20 P	22310361
105	API 2 3 /8 REG	22310254
105	CBX 24 P	22310362
125	API 2 3 /8 REG	22130491
125	CBX 26 P	22310363
145	API 3 1/2 REG	22310364
145	CBX 28 P	22310365
160	API 4 1/2 REG	22310366
160	CBX 32 P	22310367
185	API 4 1/2 REG	22310368
185	CBX 36 P	22310369

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary



Three-Wing Type, 3Face Scraping Buttons, Wear protection

OUTER Ø	THREAD	PART NO
85	API 2 3 /8 REG	22310262
85	CBX 20 P	22310370
105	API 2 3 /8 REG	22310258
105	CBX 24 P	22310371
125	API 2 3 /8 REG	22310372
125	CBX 26 P	22310373
145	API 3 1/2 REG	22310256
145	CBX 28 P	22310374
160	API 4 1/2 REG	22310375
160	CBX 32 P	22310376
185	API 4 1/2 REG	22310377
185	CBX 36 P	22310378



Three-Wing Type, BallisticButtons, Wear Protection

OUTER Ø	THREAD	PART NO
85	API 2 3/8 REG	22310237
85	CBX 20 P	22310379
105	API 2 3/8 REG	22310245
105	CBX 24 P	22310380
125	API 2 3/8 REG	22130633
125	CBX 26 P	22310381
145	API 3 1/2 REG	22310234
145	CBX 28 P	22310382
160	API 4 1/2 REG	22310383
160	CBX 32 P	22310384
185	API 4 1/2 REG	22310385
185	CBX 36 P	22310386

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary

CASING SHOE



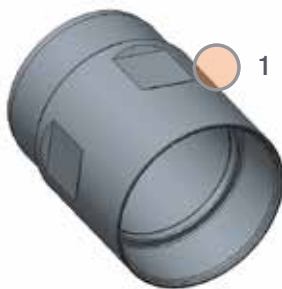
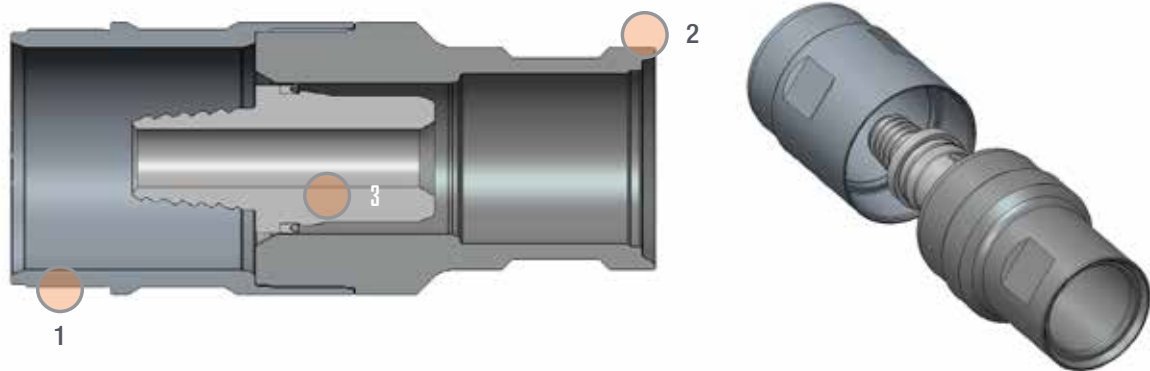
Scalping Buttons, Wear Protection

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE	
			CYLINDRICAL DOUBLE START	
114.3	120	Right-Hand DHD Drilling	22010137	
	125		22011080	
133	140		22010134	
	150		22011241	
152.4	160		22010275	
	170		22011082	
177.8	185		22010323	
	190		22011083	
114.3	120		Left-Hand DHD Drilling	22010251
	125			22011624
133	140	22010041		
	150	22011625		
152.4	160	22010062		
	170	22011626		
177.8	185	22010318		
	190	22011627		

DOUBLE HEAD DRILLING

Double Head Rotary–Rotary

GROUTING SYSTEM



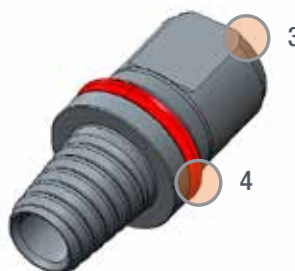
Flange Adapter (1)

THREAD (FLANGE)	INNER Ø	THREAD TYPE	
		THREAD DIRECTION	PART NUMBER
LG 181	155 mm	Right-Hand Male	24080260



Casing Adapter (2)

CASING Ø	INNER Ø	THREAD TYPE	
		THREAD DIRECTION	CYLINDRICAL DOUBLE START
114.3 mm	95 mm	Right-Hand Female	24080261
133 mm	105 mm		24080262
152.4 mm	120 mm		24080263
177.8 mm	155 mm		24080264



Grouting Piston (3)

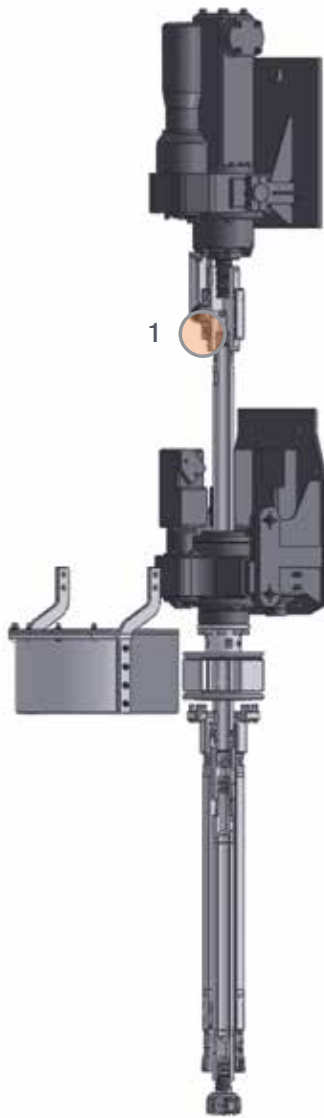
THREAD MALE	OUTER Ø	THREAD TYPE	
		THREAD DIRECTION	PART NUMBER
API 2 3/8 REG	95 mm	Right-Hand Male	24080265
API 2 3/8 REG	105 mm		24080266
API 3 1/2 REG	120 mm		24080267
API 3 1/2 REG	155 mm		24080268
CBX 21 P	95 mm		24080269
CBX 24 P	105 mm		24080229
CBX 26 P	120 mm		24080249
CBX 28 P	155 mm		24080231

Grouting Piston Component / Seals (4)

OUTER Ø	PART NUMBER (QTY. 1)
95 mm	55030535
105 mm	55030113
120 mm	55030018
155 mm	55030482

DOUBLE HEAD DRILLING

Double Head Rotary-Percussive



Flushing Head (1)

DRIFTER MANUFACTURER	DRIFTER MODEL	DRIFTER SHANK THREAD	SPINDLE THREAD	THREAD DIRECTION	SHAFT DIAMETER	PART NUMBER
Eurodrill	HD4008/HD4010	H55	KW76	Left-Hand	100 mm	23010515
	HD4008	BW64			120 mm	23010516
	HD5012	H90			140 mm	23010517
	HD5012	H92			140 mm	23010518
Krupp	HB45A	H55			100 mm	23010519
	HB45A	C64			120 mm	23010520
Klemm	KD1011	H55			100 mm	23010515
	KD1215R	RT70			120 mm	23010521

FLUSHING HEAD COMPONENTS

Flushing Body

DRIFTER SHANK THREAD	SPINDLE THREAD	ROCK DRILL SHAFT Ø	THREAD DIRECTION	ROCK DRILL MODEL	PART NUMBER
H55	KW76	100 mm	Left-Hand	HD4008	23040135
BW64 (Rope)		120 mm		HD4008	23040399
H90		140 mm		HD5012	23040395
H92		140 mm		HD5012	23040406
H55		100 mm		HB45A	23040407
C64		120 mm		HB45A	23040408
H55		100 mm		KD1011	23040135
RT70		120 mm		KD1215R	23040409

Flushing Ring

DIAMETER (MM)	THREAD	PART NUMBER
100	G 1 1/4"	23070033
120	G 1 1/4"	23070035
140	G 1 1/2"	23070037
170	G 2"	23070012

Flushing Ring Seals

PART NUMBER (QTY 4)
55030018
55030019
55030062
55030174



Mounting Bracket

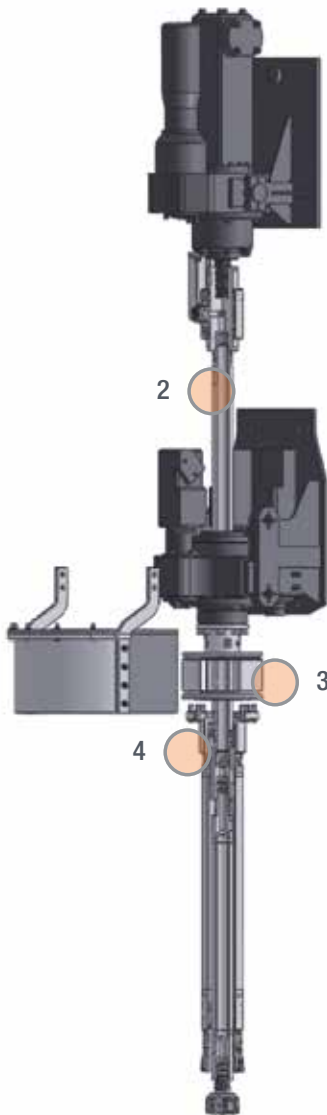
ALL CONNECTORS INCLUDE:	PART NUMBER
Hex bolt, for Connector	55010001
Nut, for Connector	55010002

	DRIFTER- MANUFACTURER	DRIFTER- TYPE	PART NUMBER
Ø100	Eurodrill	HD4008/HD4010	23080044
	Krupp	HB40A/HB45A	23080086
Ø120	Eurodrill	HD4008/HD4010	23080048
	Klemm	KD1215R	23080130
	Krupp	HB40A/HB45A	23080096
	Casagrande	T10006V	23080042
Ø140	Eurodrill	HD5012	23080066
	Krupp	HB50A	23080052
Ø170	Eurodrill	HD5012	23080070
		HD8032	23080089
		HD8021	23080126
	Krupp	HB50A	23080079

All third-party trademarks, including Eurodrill, Krupp, Klemm and Casagrande are the property of their respective owners.

DOUBLE HEAD DRILLING

Double Head Rotary–Percussive



Balance Rod (2)

DOUBLE HEAD DRILL SYSTEM TYPE	THREAD	THREAD DIRECTION	Ø	LENGTH	PART NUMBER
Rotary Percussive	KW76	Left-Hand Male	80 mm	Specify	TBD*

* Length and part number dependent on double head installation. Specify at time of order.

Ejection Bell (3)

HEAD MANUFACTURER	ROTARY HEAD MODEL	BALANCE ROD Ø	PART NUMBER
Eurodrill	RH1000/RH1400	80 mm	24100158
Krupp	HR50/HR60		24100243
Klemm	KH13 (HDK800-ZS3)		24100106
Klemm	KH16		24100159

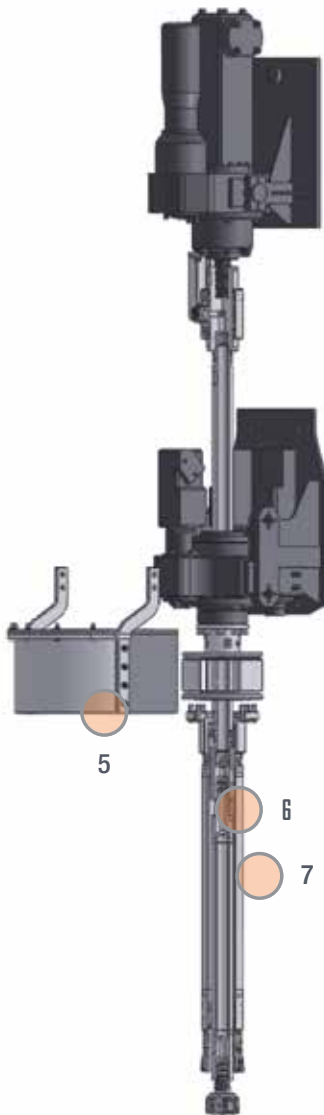
Casing Flange (4)

OUTER CASING Ø	THREAD DIRECTION	THREAD TYPE	
		CYLINDRICAL DOUBLE-START	CYLINDRICAL DOUBLE-START
114.3 mm	Left-Hand	24030134	24030398
133 mm		24030070	24030029
152.4 mm		24030326	24030125
177.8 mm		24030380	24030126
		Right-Hand	

All third-party trademarks, including Eurodrill, Krupp and Klemm are the property of their respective owners.

DOUBLE HEAD DRILLING

Double Head Rotary–Percussive



Spray Protection (5)

HEAD MANUFACTURER	ROTARY HEAD MODEL	PART NO.
Eurodrill	RH1000/RH1400	24100150
Krupp	HR50/HR60	24100155
Klemm	KH13 (HDK800-ZS3)	24100121
Klemm	KH16	24100245

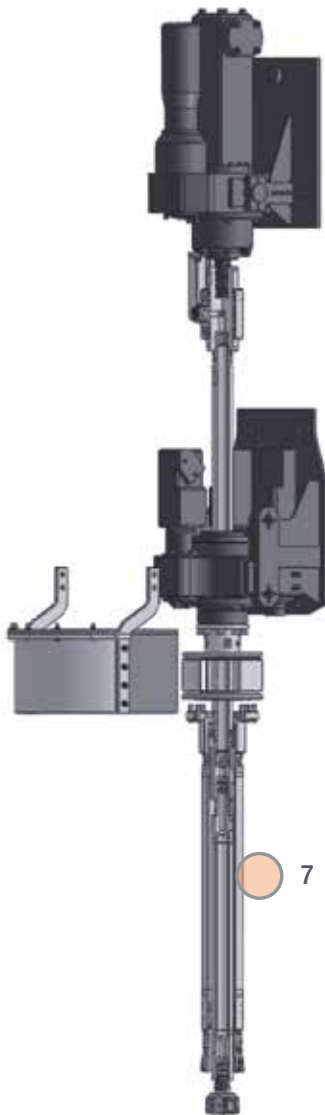
Adapter Balance Rod to Inner Rod (6)

DOUBLE HEAD DRILL SYSTEM TYPE	THREAD (1)	THREAD (2)	THREAD DIRECTION	PART NO.	
Rotary–Percussive	KW76 Female	1 3/4" T45	Female	Left-Hand	24021219
		ø 51 mm Twin Drive™			24021220
		ø 76.1mm Cylindrical			24021225
		ø 76.1 mm Twin Drive™			24021227
		ø 114.3 mm Cylindrical			24021222
		ø 101 mm Twin Drive™			24021221

DOUBLE HEAD DRILLING

Double Head Rotary-Percussive

Rotary Casing (7)



THREAD TYPE	THREAD END CONSTRUCTION	EFFECTIVE LENGTH	OUTER CASING DIAMETER			
			114.3 Ø	133 Ø	152.4 Ø	177.8 Ø
Cylindrical Double-Start Left-Hand	Friction Weld Double-Start	500 mm	21011058	21010268	21010387	
		1000 mm	21010049	21010090	21010146	
		1500 mm	21010497	21010091	21010148	
		2000 mm	21010052	21010092	21010293	
	Manual Weld	500 mm				21011307
		1000 mm				21010196
		1500 mm				21010197
		2000 mm				21010496
	Direct Thread	500 mm		21020543	21020544	21020545
		1000 mm		21020383	21020408	21020514
		1500 mm		21020382	21020401	21020427
		2000 mm		21020418	21020416	21020407
Cylindrical Double-Start Right-Hand	Friction Welded	500 mm	21011208	21011305	21010150	
		1000 mm	21010053	21010096	21010152	
		1500 mm	21010054	21010098	21010154	
		2000 mm	21010056	21010099	21010157	
	Welded	500 mm				21011306
		1000 mm				21010495
		1500 mm				21010201
		2000 mm				21010202
	Direct Thread	500 mm		21020436	21020115	21020410
		1000 mm		21020402	21020406	21020411
		1500 mm		21020403	21020489	21020412
		2000 mm		21020433	21020423	21020413

DOUBLE HEAD DRILLING

Double Head Rotary-Percussive

Inner Rod Extension (8)



THREAD TYPE	DIAMETER	THREAD DIRECTION	LENGTH	OUTER CASING DIAMETER			
				114.3 Ø	133 Ø	152.4 Ø	177.8 Ø
Twin Drive™ Male/Female Friction Welded	51 mm	Left-Hand	1000 mm		2101122		
			1500 mm		2101128		
			2000 mm		2101123		
Cylindrical Male/Female Friction Welded	76.1 mm	Left-Hand	1000 mm			21010184	
			1500 mm			21010484	
			2000 mm			21010188	
Twin Drive™ Male/Female Friction Welded	76.1 mm	Left-Hand	1000 mm			21010718	
			1500 mm			21010719	
			2000 mm			21010720	
Cylindrical Male/Female Friction Welded	114.3 mm	Left-Hand	1000 mm				21010038
			1500 mm				21010040
			2000 mm				21010044
Twin Drive™ Male/Female Friction Welded	101.6 mm	Left-Hand	1000 mm				21010729
			1500 mm				21010732
			2000 mm				21010733

INNER PERCUSSIVE BITS (9)

Hemispherical Button Type

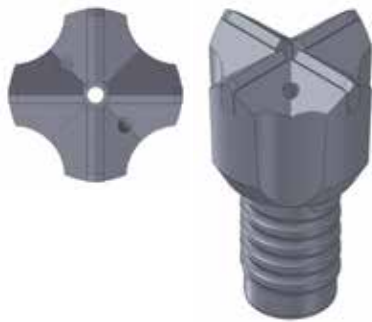


ROD Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE			
			CYLINDRICAL	CONICAL	TWIN DRIVE™	TWIN DRIVE™
51 mm	60 mm	Left-Hand, Male	22130157	22130158	22130376	22130504
63.5 mm	70 mm		22130160	22130161	22130375	22130345
76.1 mm	85 mm		22130133	22130073	22130374	22130355
88.9 mm	105 mm		22130063	22130074	22130373	22130194
101.6 mm	125 mm		22130067	22130078	22130182	22130328

DOUBLE HEAD DRILLING

Double Head Rotary–Percussive

INNER PERCUSSIVE BITS (9)



Bladed Cross Type

ROD Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE			
			CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
51 mm	60 mm	Left-Hand, Male	22140070	22140135	22140211	22140285
63.5 mm	70 mm	Left-Hand, Male	22140072	22140136	22140210	22140286
76.1 mm	85 mm	Left-Hand, Male	22140137	22140094	22140209	22140154
88.9 mm	105 mm	Left-Hand, Male	22140079	22140088	22140208	22140155
101.6 mm	125 mm	Left-Hand, Male	22140083	22140090	22140207	22140156



Bladed X-Type

ROD Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE			
			CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
51 mm	60 mm	Left-Hand, Male	22140226	22140227	22140228	22140229
63.5 mm	70 mm	Left-Hand, Male	22140230	22140091	22140231	22140232
76.1 mm	85 mm	Left-Hand, Male	22140233	22140234	22140235	22140236
88.9 mm	105 mm	Left-Hand, Male	22140237	22140238	22140239	22140240
101.6 mm	125 mm	Left-Hand, Male	22140241	22140242	22140243	22140244



Ballistical Button Type

ROD Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE			
			CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
51 mm	60 mm	Left-Hand, Male	22130299	22130507	22130508	22130509
63.5 mm	70 mm	Left-Hand, Male	22130510	22130511	22130512	22130513
76.1 mm	85 mm	Left-Hand, Male	22130276	22130140	22130514	22130409
88.9 mm	105 mm	Left-Hand, Male	22130517	22130059	22130515	22130407
101.6 mm	125 mm	Left-Hand, Male	22130335	22130219	22130516	22130203

DOUBLE HEAD DRILLING

Double Head Rotary–Percussive



Two-Step Button Type

ROD Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE			
			CYLINDRICAL	CONICAL	TWIN DRIVE™	TDN
51 mm	60 mm	Left-Hand, Male	22130518	22130519	22130520	22130521
63.5 mm	70 mm		22130522	22130523	22130524	22130525
76.1 mm	85 mm		22130526	22130527	22130528	22130408
88.9 mm	105 mm		22130529	22130530	22130531	22130532
101.6 mm	125 mm		22130533	22130534	22130535	22130536

OUTER Ø	THREAD DIRECTION	THREAD TYPE	
		1 1/2" T38	1 3/4" T45
60 mm	Left-Hand, Female	22130537	
70 mm		22130506	
85 mm		22130538	22130539
105 mm			22130370
125 mm			22130540

CASING SHOE (10)



Scalping Buttons, Wear Protection

CASING Ø	OUTER Ø	THREAD DIRECTION	THREAD TYPE	
			CYLINDRICAL DOUBLE START	
114.3 mm	120	Right-Hand DHD Drilling	22010137	
	125		22011080	
133 mm	140		22010134	
	150		22011241	
152.4 mm	160		22010275	
	170		22011082	
177.8 mm	185		22010323	
	190		22011083	
114.3 mm	120		Left-Hand DHD Drilling	22010251
	125			22011624
133 mm	140	22010041		
	150	22011625		
152.4 mm	160	22010062		
	170	22011626		
177.8 mm	185	22010318		
	190	22011627		

OVERBURDEN CASED DRILLING – TOOLS & ACCESSORIES

Tools and Accessories



Grouting Nipple

CASING Ø	HOSE CONNECTION	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL SINGLE OR TRIPLE-START	CONICAL SINGLE OR TRIPLE-START	TWIN DRIVE™
88.9 mm	G 1 1/4"	Left-Hand	24080043	24080044	24080103
101.6 mm			24080039	24080040	24080101
114.3 mm			24080003	24080037	24080088
133 mm			24080006	24080047	24080090
152.4 mm			24080049	24080050	24080091
177.8 mm			On Request	On Request	On Request

Grouting Nipple (Double Head Drilling)

CASING Ø	HOSE CONNECTION	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL DOUBLE-START	THREAD DIRECTION	CYLINDRICAL DOUBLE-START
114.3 mm	G 1 1/4"	Right-Hand	24080059	Left-Hand	24080066
133 mm			24080061		24080071
152.4 mm			24080062		24080072
177.8 mm			24080064		24080074



Grouting Head

CASING Ø	HOSE CONNECTION	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL SINGLE OR TRIPLE-START	CONICAL SINGLE OR TRIPLE-START	TWIN DRIVE™
88.9 mm	G 1 1/4"	Left-Hand	24080045	24080046	24080104
101.6 mm			24080041	24080042	24080102
114.3 mm			24080002	24080038	24080087
133 mm			24080004	24080048	24080089
152.4 mm			24080051	24080052	24080092
177.8 mm			On Request	On Request	On Request

Grouting Head (Double Head Drilling)

CASING Ø	HOSE CONNECTION	THREAD DIRECTION	THREAD TYPE		
			CYLINDRICAL DOUBLE-START	THREAD DIRECTION	CYLINDRICAL DOUBLE-START
114.3 mm	G 1 1/4"	Right-Hand	24080060	Left-Hand	24080069
133 mm			24080005		24080070
152.4 mm			24080063		24080073
177.8 mm			24080065		24080075

OVERBURDEN CASED DRILLING – TOOLS & ACCESSORIES

Tools and Accessories



Manual Wrench

ROD TYPE	FLATS	THREAD TYPE					
		88.9 MM	101.6 MM	114.3 MM	133 MM	152.4 MM	177.8 MM
ø1 1/2" T38	32 mm	24710046					
ø1 3/4" T45	38 mm			24710033	24710010	24710038	
ø51 mm	46 mm	24710011					
ø51 mm Twin Drive™	40 mm				24710142		
ø63.5 mm	55 mm		24710018				
ø76.1 mm	60 mm SQ			24710043			
ø76.1 mm Twin Drive™	65 mm					24710143	
ø76.1 mm	70 mm			24710020		24710020	
ø88.9 mm	65 mm				24710024		
ø88.9 mm	80 mm	24710025			24710025		
ø101.6 mm	90 mm		24710066		24710066		24710066
ø114.3 mm	95 mm SQ						24710101
ø114.3 mm	105 mm			24710028			24710028
ø133 mm	120 mm				24710009		
ø152.4 mm	140 mm					24710016	
ø177.8 mm	170 mm						24710129

Wrench with Safety Bow



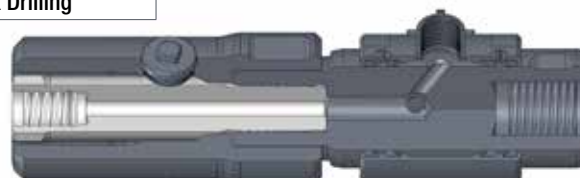
FLATS	LENGTH	PART NO.
90 mm	400 mm	24710173
160 mm	500 mm	24710169
130 mm	400 mm	24710166
100 mm	400 mm	24710164
110 mm	400 mm	24710162
170 mm	600 mm	24710158
125 mm	600 mm	24710154
100 mm	600 mm	24710153
110 mm	600 mm	24710152



Socket Wrench Octagonal

SF	PART NUMBER
75	24710134
85	24710140
90	24710131
100	24710114
120	24710139

Special Wrench for loosening Balancing rod Flushing Heads, Duplex Drilling



OVERBURDEN CASED DRILLING – TOOLS & ACCESSORIES

Tools and Accessories



Fishing Spear

Ø	CYLINDRICAL SINGLE OR TRIPLE-START	CONICAL SINGLE OR TRIPLE-START	TWIN DRIVE™	CYLINDRICAL DOUBLE-START		API 2 3/8" REG	API 3 1/2" REG	TWIN DRIVE™
				LEFT HAND	RIGHT-HAND	FEMALE	FEMALE	LEFT-HAND
51 mm	24720039	24720040	24720131					24720166
63.5 mm	24720001	24720041	24720127					
76.1 mm	24720042	24720015	24720104			24720026		24720142
88.9 mm	24720031	24720022	24720108			24720085		
101.6 mm	24720030	24720002	24720103				24720089	24720112
114.3 mm	24720005	24720006	24720106	24720081	24720067			
133 mm	24720008	24720028	24720109	24720083	24720069			
152.4 mm	24720011	24720029	24720113	24720087	24720012			
177.8 mm	24720246	24720021	24720117	24720020	24720075			

Fishing Bell

Ø	T38	T45	CYLINDRICAL SINGLE OR TRIPLE-START	CONICAL SINGLE OR TRIPLE-START	TWIN DRIVE™	CYLINDRICAL DOUBLE-START		API 2 3/8" REG	API 3 1/2" REG	TWIN DRIVE™
						LEFT HAND	RIGHT HAND	FEMALE	FEMALE	LEFT-HAND
51 mm			24720043	24720044	24720132					24720167
63.5 mm			24720047	24720048	24720128					24720130
76.1 mm			24720051	24720017	24720126			24720027		24720231
88.9 mm			24720045	24720046	24720110			24720086		
101.6 mm			24720049	24720050	24720125				24720090	24720114
114.3 mm			24720007	24720052	24720107	24720082	24720068		24720092	
133 mm			24720053	24720054	24720111	24720084	24720070			
152.4 mm			24720055	24720056	24720115	24720088	24720076			
177.8 mm			24720201		24720234	24720078	24720077			
1 1/2" rod	24720057									
1 1/2" Coupling	24720058									
Ø1 3/4" rod		61990039								
Ø1 3/4" Coupling		61990104								

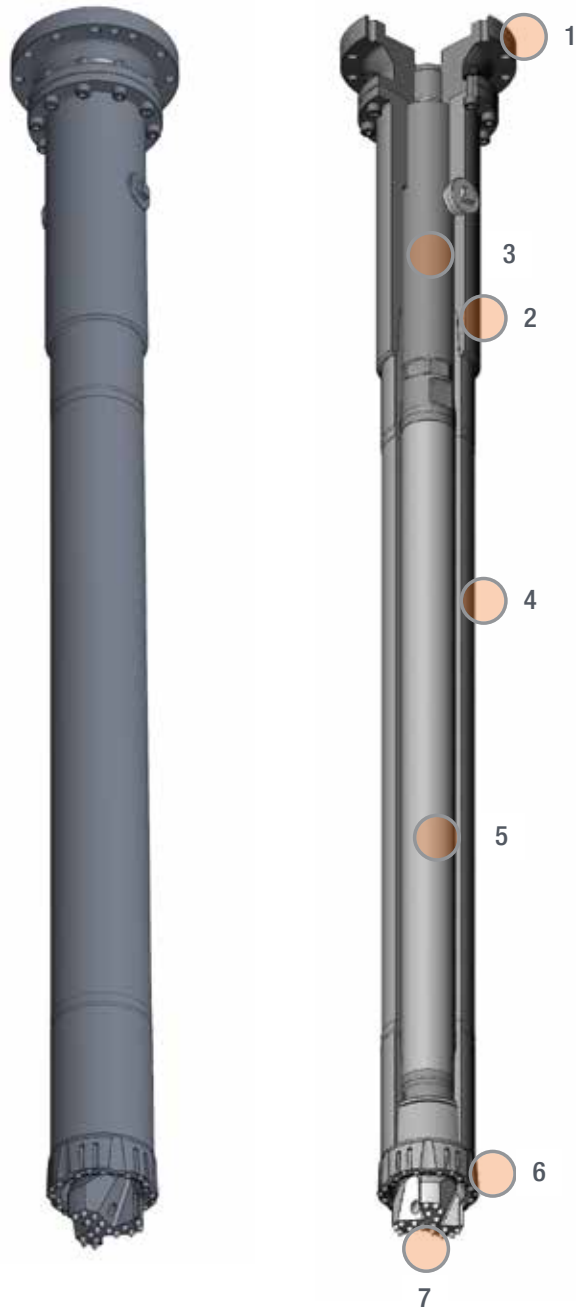


TWINDRIVE™ VIBRO

Twin Drive Vibro	96
Duplex RHV2400	97
Duplex RHV1500	104
Single Casing System	107

TWIN DRIVE™ VIBRO

Duplex System RHV 2400



Please note:

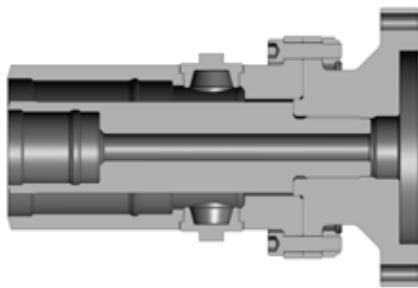
The flushing head is not offered as part of the Duplex System RHV 2400 as it is included as part of the head of the drill rig.

TWIN DRIVE™ VIBRO

Duplex System RHV 2400

Flange RHV2400, Complete (1)

DESCRIPTION	CASING	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
FLANGE RHV 2400 (DUPLIX TDV) COMPLETE length overall 425 mm	CASING TDV 114.3 ROD TDV 88.9	24030670	24030671
	CASING TDV 133 ROD TDV 88.9	24030668	24030669
	CASING TDV 152.4 ROD TDV 88.9	24030666	24030667



Flange RHV2400 (1a)

DESCRIPTION	CASING (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
FLANGE RHV 2400 (DUPLIX TDV)	114.3	24030664	24030665
	133	24030663	24030514
	152.4		



TWIN DRIVE™ VIBRO

Duplex System RHV 2400



Ejection Bell (3)

DESCRIPTION	CASING (MM)	ID (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Ejection Bell RHV 2400 (Duplex Tdv)	114.3	88	24030656	24030661
	114.3 HD	83	24030657	24030662
	133	108	24030654	24030659
	133 HD	103	24030655	24030660
	152.4	128	24030652	24030513
	152.4 HD	123	24030653	24030658

DESCRIPTION	PLUG G2"	CYLINDER BOLT	NUT
Accessories (Duplex RHV 2400)	55390017	55010089	55010048
	2 pcs.	10 pcs.	10 pcs.



Balancing Rod (2)

DESCRIPTION	ROD (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Balancing Rod RHV 2400 (Duplex TDV)	67	24030653	24030658
	88.9	24030652	24030513

Casing TDV114 (4)

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Casing TDV 114.3 Standard ID 88	1000	21011812	21011816
	1500	21011813	21011817
	2000	21011814	21011818
	3000	21011815	21011819

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LH	THREAD DIRECTION RH
Casing TDV 114.3 Heavy Duty ID 83	1000	21011850	21011854
	1500	21011851	21011855
	2000	21011852	21011856
	3000	21011853	21011857



Duplex System RHV 2400

Casing TDV133 (4)

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Casing TDV 133 Standard ID 108	1000	21011804	21011808
	1500	21011805	21011809
	2000	21011806	21011810
	3000	21011807	21011811

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LH	THREAD DIRECTION RH
Casing TDV 133 Heavy Duty ID 103	1000	21011842	21011846
	1500	21011843	21011847
	2000	21011844	21011848
	3000	21011845	21011849



Casing TDV152 (4)

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Casing TDV 152.4 Standard ID 128	1000	21011800	21011500
	1500	21011801	21011499
	2000	21011802	21011498
	3000	21011834	21011803

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LH	THREAD DIRECTION RH
Casing TDV 152.4 Heavy Duty ID 123	1000	21011835	21011838
	1500	21011836	21011839
	2000	21011837	21011840
	3000	21011525	21011841

TWIN DRIVE™ VIBRO

Duplex System RHV 2400

Rod TDV67 (5)

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Rod TDV 67 ID 40	1000	21011828	21011832
	1500	21011829	21011833
	2000	21011830	21011872
	3000	21011831	21011835

Rod TDV89 (5)

DESCRIPTION	EFFECTIVE LENGTH (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Rod TDV 88.9 ID 64	1000	21011820	21011824
	1500	21011821	21011825
	2000	21011822	21011827
	3000	21011823	21011826



Duplex System RHV 2400



Casing Bit TDV (6), Hemispherical Button Type, Wear Protection

DESCRIPTION	CASING (MM)	OUTER DIA (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Casing Bit TDV (Duplex TDV) Hemispherical	114.3	125	22011644	22011648
	114.3 HD		22011645	22011649
	133	145	22011642	22011646
	133 HD		22011643	22011647
	152.4	165	22011640	22011319
	152.4 HD		22011641	22011325



Casing Bit TDV (6), Ballistic Button Type, Wear Protection

DESCRIPTION	CASING (MM)	OUTER DIA (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Casing Bit TDV (Duplex TDV) Ballistic	114.3	125	22011654	22011660
	114.3 HD		22011655	22011661
	133	145	22011652	22011658
	133 HD		22011653	22011659
	152.4	165	22011650	22011656
	152.4 HD		22011651	22011657



Duplex System RHV 2400



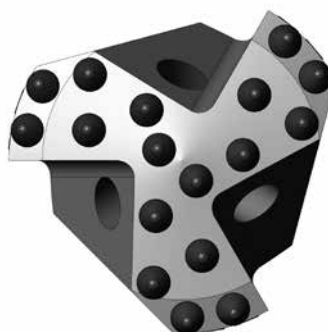
Inner Bit TDV (7), Hemispherical Button Type, Wear Protection

DESCRIPTION	ROD (MM)	OUTER DIA (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Inner Bit TDV (Duplex TDV) Hemispherical	67	85	22130804	22130810
		80	22130805	22130811
	88.9	105	22130802	22130808
		100	22130803	22130809
		125	22130800	22130806
		120	22130801	22130807



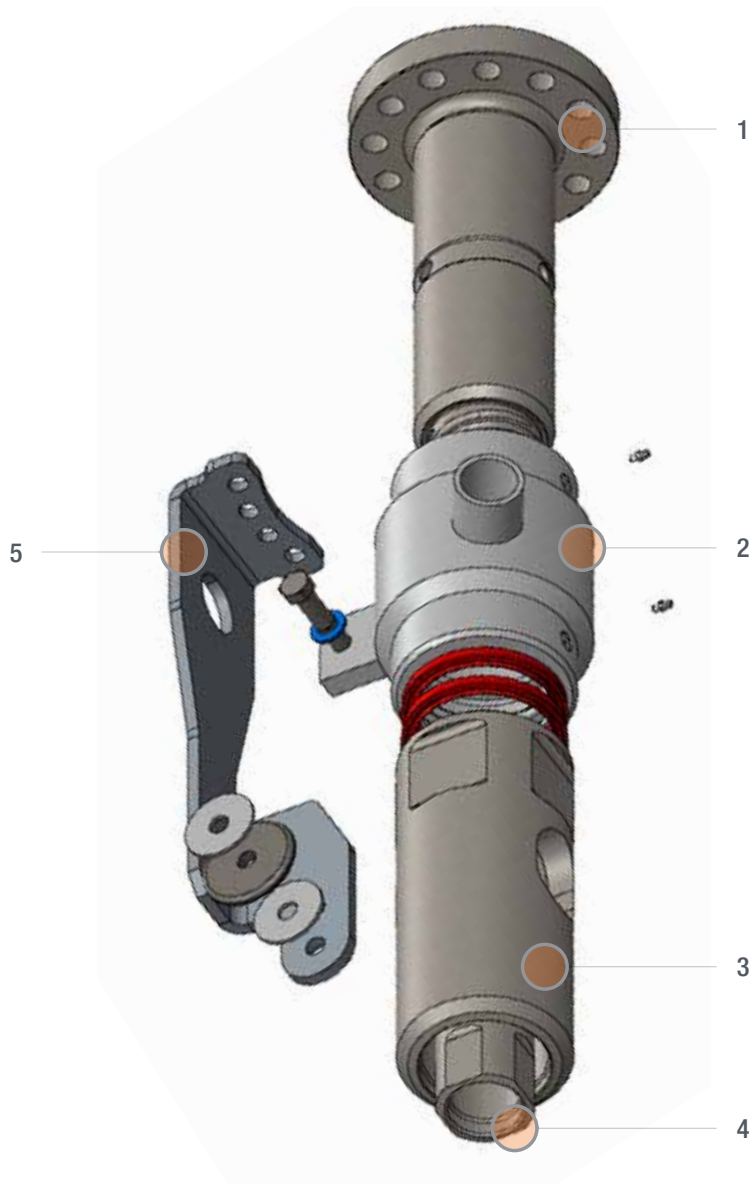
Inner Bit TDV (7), Ballistic Button Type, Wear Protection

DESCRIPTION	ROD (MM)	OUTER DIA (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
Inner Bit TDV (Duplex TDV) Ballistic	67	85	22130816	22130822
		80	22130817	22130823
	88.9	105	22130814	22130820
		100	22130815	22130821
		125	22130812	22130818
		120	22130813	22130819



TWIN DRIVE™ VIBRO

Duplex System RHV 1500



TWIN DRIVE™ VIBRO

Duplex System RHV 1500



Flange RHV1500 (1)

DESCRIPTION	THREAD DIRECTION	THREAD DIRECTION
	LH	RH
Flange Rhv 1500 (Duplex TDV)	24030650	24030651



Ejection Bell RHV1500 (3)

DESCRIPTION	CASING	ID (MM)	THREAD DIRECTION	THREAD DIRECTION
			LEFT-HAND	RIGHT-HAND
Ejection Bell RHV 1500 (Duplex TDV)	152.4	128	23050300	23050306
	152.4 HD	123	23050301	23050307
	133	108	23050302	23050308
	133 HD	103	23050303	23050309
	114.3	88	23050304	23050310
	114.3 HD	83	23050305	23050311



Balancing rod RHV1500 (4)

DESCRIPTION	ROD	THREAD DIREC-	THREAD DIREC-
		TION LH	TION RH
Balancing Rod RHV 1500 (Duplex TDV)	88.9 mm	23060404	23060406
	67 mm	23060405	23060407

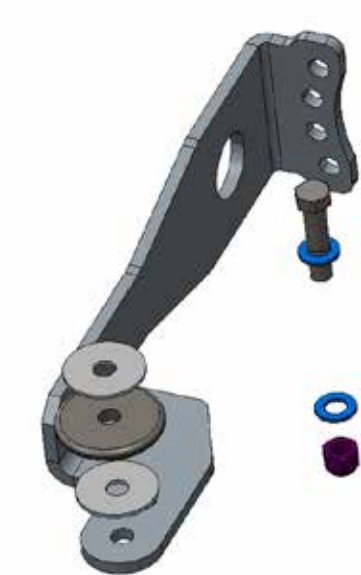
TWIN DRIVE™ VIBRO

Duplex System RHV 1500



Flushing Ring RHV1500 (2)

DESCRIPTION	PART NO.
Flushing Ring RHV 1500 Complete	23070096
Flushing Ring RHV 1500	23070097
Seal Kit	55030578



Bracket RHV1500 (5)

DESCRIPTION	PART NO.
Bracket RHV 1500 Complete	23080141

TWIN DRIVE™ VIBRO

Single Casing System

Full Face Percussive Bit, Ballistic Convex Type



Full Face Percussive Bit, Ballistic Cross Type



Full Face Percussive Bit, Ballistic Three Wing Type



Single Casing System

Full Face Percussive Bit TDV, Simplex

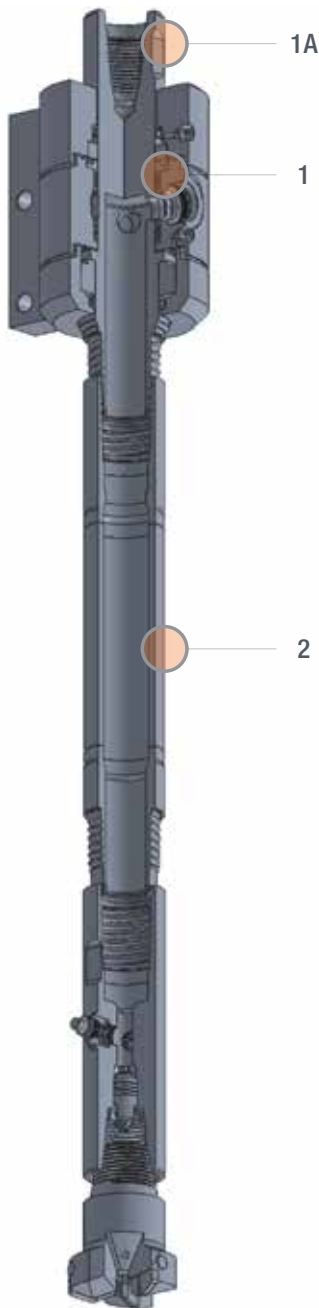
DESCRIPTION	CASING	TYPE	OUTER DIA (MM)	THREAD DIRECTION LEFT-HAND	THREAD DIRECTION RIGHT-HAND
FULL FACE PERCUSSIVE BIT TDV (SIMPLEX TDV HD)	114.3 mm	BALLISTIC CROSS TYPE	150	22130824	22130830
		BALLISTIC 3WING TYPE		22130825	22130831
		BALLISTIC CONVEX TYPE		22130826	22130832
	133 mm	BALLISTIC CROSS TYPE	170	22130827	22130833
		BALLISTIC 3WING TYPE		22130828	22130834
		BALLISTIC CONVEX TYPE		22130829	22130835
	152.4 mm	BALLISTIC CROSS TYPE	190	22130619	22130836
		BALLISTIC 3WING TYPE		22130620	22130837
		BALLISTIC CONVEX TYPE		22130621	22130838



JET GROUTING SYSTEMS

Single Tube	106
Double Tube	114
Triple Tube	118
Tools and Accessories	122

SINGLE TUBE SYSTEM



Flushing Head (1)

	ROD OUTER DIAMETER
THREAD TYPE	88.9 MM
Twin Drive™	23410286

Flushing Head Seal Kit

		ROD OUTER DIAMETER
THREAD TYPE	THREAD DIRECTION	88.9 MM
Twin Drive™	Right-Hand	55030570

Flushing Body (1A)

		ROD OUTER DIAMETER
THREAD TYPE (ROD)	THREAD TYPE (DRILL HEAD)	88.9 MM
Twin Drive™, Pin	Api 2 3/8 Reg, Box	23410290

Mounting Bracket (Not Shown)

ROD OUTER DIAMETER
88.9 MM
23080061

Jet Grouting Tube (2)

			ROD OUTER DIAMETER
LENGTH	THREAD TYPE	THREAD DIRECTION	88.9 MM
500 mm	Twin Drive™	Right-Hand	21050433
1000 mm			21050434
1500 mm			21050435
2000 mm			21050436
3000 mm			21050437

Jet Grouting Tube Spares, Seals

			ROD OUTER DIAMETER
	THREAD TYPE	QTY. SEALS	88.9 MM
Jet Grouting Tube	Twin Drive™	1	55030220

SINGLE TUBE SYSTEM



Valve Fastener (Monitor) (3)

INPUT THREAD	OUTPUT THREAD	INJECTION NOZZLE THREAD	ROD OUTER DIAMETER
Twin Drive™	API 2 7/8 REG Short, Female	M22 x 1.5mm	88.9 MM
			23420420

Valve Fastener, Spares (4)

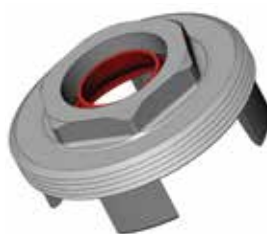
	ROD OUTER DIAMETER
	88.9 MM
Automatic Valve	23420097
Spring Kit for automatic valve (6 spring options included)	55010367

Grout Injection Nozzle (5)

NOZZLE INNER DIA.	THREAD INJECTION NOZZLE	STANDARD ORIFICE	RIBBED ORIFICE
Ø2.5	M22 x 1.5mm Ø88.9 mm	23420385	23420425
Ø3.0		23420362	23420426
Ø3.5		23420297	23420427
Ø4.0		23420328	23420428
Ø4.5		23420299	23420429
Ø5.0		23420300	23420430
Ø5.5		23420307	23420431
Ø6.0		23420366	23420432
Special ID		On Request	On Request

Air Nozzle (5)

THREAD	DIAMETER	88.9 MM
M40 x 1.5mm	Ø15.5	23420027



Air Nozzle, Sealed (5)

THREAD	DIAMETER	88.9 MM
M40 x 1.5mm	Ø12.6	23420475

SINGLE TUBE SYSTEM

Rotary Bit



Three-Wing GDU Type (6)

ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD TYPE
88.9 mm	127 mm	Standard Flushing Holes	API 2 7/8 REG - SHORT 22330003



Welded Type- Drag Bits (6)

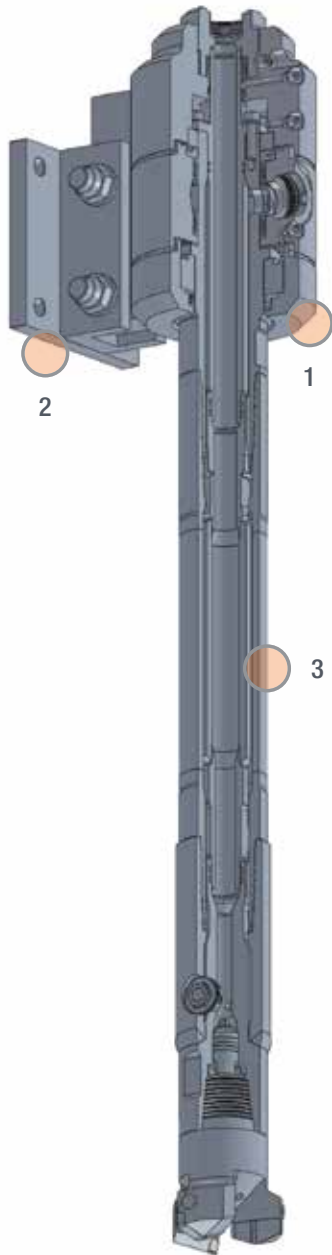
ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD TYPE
88.9 mm	127 mm	Standard Flushing Holes	API 2 7/8 REG - SHORT 22330007



Reaming Bits (6)

ROD OUTER Ø	OUTER Ø	THREAD 1 PIN (VALVE FASTENER)	THREAD 2 BOX (DRILL BIT)	PART NO.
88.9	150 mm	API 2 7/8 REG - Short	API 2 7/8 REG - Short	22380120
	180 mm	API 2 7/8 REG - Short	API 2 7/8 REG - Short	22380072
	200 mm	API 2 7/8 REG - Short	API 2 7/8 REG - Short	22380085

DOUBLE TUBE SYSTEM



Flushing Head (1)

THREAD	THREAD DIRECTION	ROD OUTER DIAMETER	
		88.9 MM	114.3 MM
Cylindrical	RIGHT HAND	23410280	23410306
Conical		23410294	
Twin Drive™		23410307	23410295

Flushing Head Seal Kit

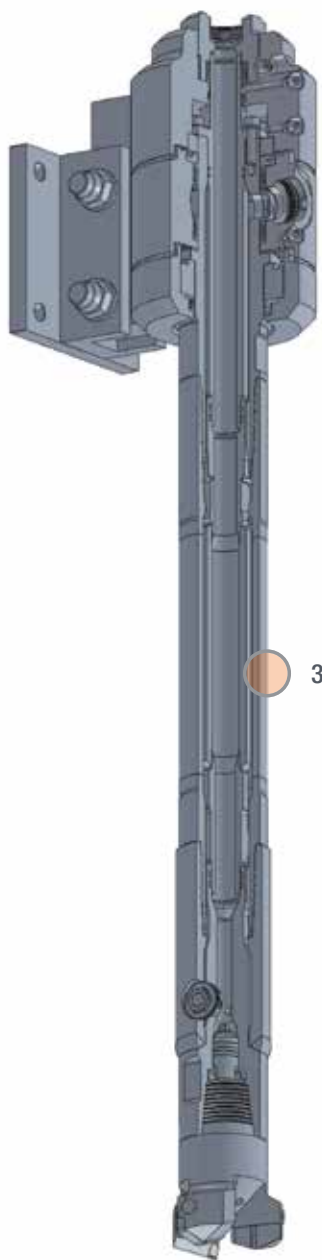
THREAD TYPE	88.9 MM	114.3 MM
Cylindrical	55030574	55030575
Conical	55030576	
Twin Drive™	55030577	55030491

Mounting Bracket (2)

ROD OUTER DIAMETER	
88.9 MM	114.3 MM
23080061	23080068

DOUBLE HEAD DRILLING

Double Head Rotary–Percussive



Jet Grouting Tube (3)

LENGTH	THREAD TYPE	THREAD DIRECTION	ROD OUTER DIAMETER	
			88.9 MM	114.3 MM
500 mm	Cylindrical	Right-Hand	21050438	21050439
	Conical		21050167	
	Twin Drive™		21050267	21050268
1000 mm	Cylindrical		21050316	21050303
	Conical		21050124	
	Twin Drive™		21050136	21050273
1500 mm	Cylindrical		21050418	21050318
	Conical		21050173	
	Twin Drive™		21050292	21050407
2000 mm	Cylindrical		21050314	21050304
	Conical		21050145	
	Twin Drive™		21050176	21050221
3000 mm	Cylindrical	21050217	21050300	
	Conical	21050161		
	Twin Drive™	21050135	21050222	

Jet Grouting Tube, Spares

	THREAD TYPE	QTY. SEALS	ROD OUTER DIAMETER	
			88.9 MM	114.3 MM
External Tube	Cylindrical	2	55030220	55030262
	Twin Drive™	1	55030220	
Inner Tube	Cylindrical	2	55030252	55030261
	Conical		55030118	
	Twin Drive™			
Retaining Ring		1	55010351	55010436



DOUBLE TUBE SYSTEM



Valve Fastener (Monitor) (3)

INPUT THREAD	OUTPUT THREAD	INJECTION NOZZLE THREAD	AIR NOZZLE THREAD	ROD OUTER DIAMETER	
				88.9 MM	114.3 MM
Cylindrical	API 2 7/8 REG – Short Female	M22 x 1.5mm	M40 x 1.5mm	23420377	
Conical				23420375	
Twin Drive™				23420360	
Cylindrical	API 3 1/2 REG Female	M24 x 1.5mm	M44 x 1.5mm		23420316
Twin Drive™					23420351

Valve Fastener, Spares

	THREAD TYPE	QTY. SEALS	ROD OUTER DIAMETER	
			88.9 MM	114.3 MM
Valve Fasteners Seals	Cylindrical			
	Conical	2	55030118	
	Twin Drive™	2	55030118	
Automatic Valve			23420097	23420167
Spring Kit for Automatic valve (6 spring options included)			55010367	

Spring Options (Automatic Valve)

COLOR	PRESSURE BAR (CLOSING AT)	PART NUMBER
Blue	7.5	55010305
Red	16	55010306
Copper	24	55010307
Green	36	55010308

Automatic Valve



DOUBLE TUBE SYSTEM



Grout Injection Nozzle (4)

NOZZLE INNER DIA.	THREAD INJECTION NOZZLE	STANDARD ORIFICE	RIBBED ORIFICE
Ø2.5	M22 x 1.5mm	23420385	23420425
Ø3.0		23420362	23420426
Ø3.5		23420297	23420427
Ø4.0		23420328	23420428
Ø4.5		23420299	23420429
Ø5.0		23420300	23420430
Ø5.5		23420307	23420431
Ø6.0		23420366	23420432
Special ID		On Request	On Request
Ø2.5		M24 x 1.5mm Ø114.3 mm	23420436
Ø3.0	23420349		23420436
Ø3.5	23420272		23420343
Ø4.0	23420265		23420363
Ø4.5	23420266		23420364
Ø5.0	23420331		23420333
Ø5.5	23420350		23420352
Ø6.0	23420410		23420365
Special ID	On Request		On Request

Standard orifice



Ribbed orifice

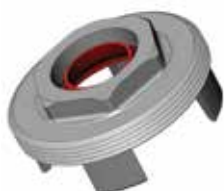


Air Nozzle (5)



THREAD	DIAMETER	ROD OUTER DIAMETER	
		88.9 MM	114.3 MM
M40 x 1.5mm	Ø15.5	23420027	
M44 x 1.5mm	Ø19		23420264

Air Nozzle, Sealed



THREAD	DIAMETER	ROD OUTER DIAMETER	
		88.9 MM	114.3 MM
M40 x 1.5mm	Ø12.6	23420475	
M44 x 1.5mm	Ø16.6		23420474

DOUBLE TUBE SYSTEM

Rotary Bits



Three-Wing, GDU Type (6)

ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD TYPE	
			API 2 7/8 REG -SHORT MALE	API 3 1/2 REG MALE
88.9 mm	127 mm	Standard Flushing Holes	22330003	
114.3 mm	140 mm			22330019
	150 mm			22330021
	165 mm			22310209



Welded Type, Drag bit (6)

ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD TYPE	
			API 2 7/8 REG -SHORT MALE	API 3 1/2 REG MALE
88.9 mm	127 mm	Standard Flushing Holes	22330007	
114.3 mm	160 mm			22330134



Welded Type (6)

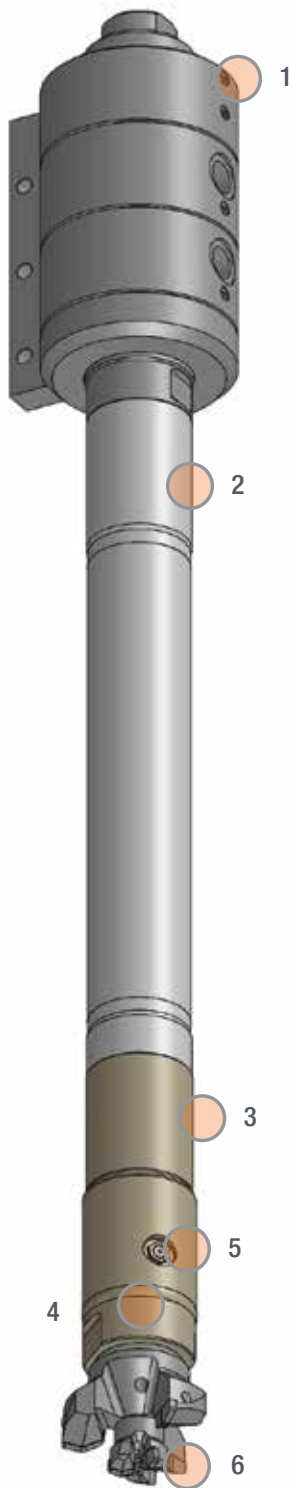
ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD TYPE
			API 3 1/2 REG MALE
114.3 mm	140 mm	Standard Flushing Holes	22320056



Reaming Bits (6)

ROD OUTER Ø	OUTER Ø	THREAD 1 PIN (VALVE FASTENER)	THREAD 2 BOX (DRILL BIT)	PART NO.
88.9 mm	150 mm	API 2 7/8 REG SHORT	API 2 7/8 REG -SHORT	22380120
	180 mm	API 2 7/8 REG SHORT	API 2 7/8 REG -SHORT	22380072
	200 mm	API 2 7/8 REG SHORT	API 2 7/8 REG -SHORT	22380085
114.3 mm	200 mm	API 3 1/2 REG	API 3 1/2 REG	22380098
	240 mm	API 3 1/2 REG	API 3 1/2 REG	22380124

TRIPLE TUBE SYSTEM



Flushing Head (1)

THREAD TYPE	THREAD DIRECTION	ROD OUTER DIAMETER		
		88.9 MM	114.3 MM	133 MM
Cylindrical	Right Hand		23410350	
Conical		23410231		
Twin Drive™		23410195	23410351	23410352

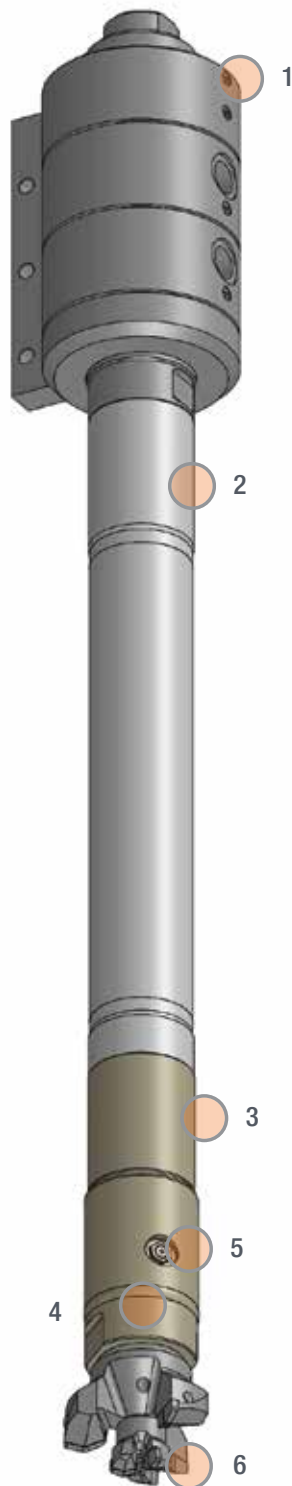
Flushing Head Seal Kit

THREAD TYPE	ROD OUTER DIAMETER		
	88.9 MM	114.3 MM	133 MM
Cylindrical		55030581	
Conical	55030579		
Twin Drive™	55030580	55030582	55030583

Mounting Bracket (not shown)

ROD OUTER DIAMETER		
88.9 MM	114.3 MM	133 MM
23080142	23080143	23080144

TRIPLE TUBE SYSTEM



Jet Grouting Tube (2)

LENGTH	THREAD TYPE	THREAD DIRECTION	88.9 MM	114.3 MM	133 MM
500	Cylindrical	Right Hand		21050607	
	Conical		21050600		
	Twin Drive™		21050605	21050612	21050613
1000	Cylindrical			21050608	
	Conical		21050601		
	Twin Drive™		21050206	21050402	21050614
1500	Cylindrical			21050609	
	Conical		21050602		
	Twin Drive™		21050606	21050403	21050615
2000	Cylindrical			21050610	
	Conical		21050603		
	Twin Drive™		21050207	21050404	21050616
3000	Cylindrical		21050611		
	Conical	21050604			
	Twin Drive™	21050208	21050405	21050617	

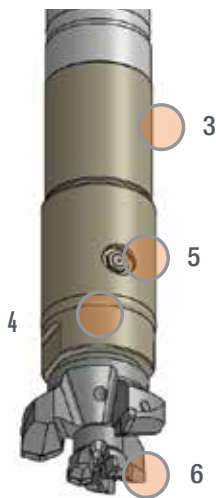
Jet Grouting Tube Spares, Seals

LENGTH	THREAD TYPE	88.9 MM		114.3 MM		133 MM	
			QTY SEALS		QTY SEALS		QTY SEALS
External Tube	Cylindrical			55030262	2		
	Conical	55030220	1				
	Twin Drive™	55030220	1	55030262	2	55030584	2
Middle Tube	Cylindrical			55030261	2		
	Conical	55030118	2				
	Twin Drive™	55030118	2	55030261	2	55030585	2
Internal Tube	Cylindrical			55030144	2		
	Conical	55030117	2				
	Twin Drive™	55030117	2	55030144	2	55030586	2

Valve Fastener (Monitor) (3)

THREAD TYPE	OUTPUT THREAD	THREAD INJECTION NOZZLE	THREAD AIR NOZZLE	88.9 MM	114.3 MM	133 MM
Conical	API 2 7/8 REG-Short Female	M22 x 1.5mm	M40 x 1.5mm	23420550		
Twin Drive™				23420551		
Cylindrical	API 3 1/2 REG Female	M24 x 1.5mm	M44 x 1.5mm		23420552	
Twin Drive™					23420553	23420554

TRIPLE TUBE SYSTEM



Automatic Valve



Injection Nozzle,
Standard orifice



Ribbed orifice



Automatic Valve (4)

	ROD OUTER DIAMETER	
	88.9 MM	114.3 MM
Automatic Valve	23420097	23420167
Spring Kit for Automatic valve (6 spring options included)	55010367	

Spring Options (Automatic Valve)

COLOR	PRESSURE BAR (CLOSING AT)	PART NUMBER
Blue	7.5	55010305
Red	16	55010306
Copper	24	55010307
Green	36	55010308

Grout Injection Nozzle (5)

NOZZLE INNER DIA.	THREAD INJECTION NOZZLE	STANDARD ORIFICE	RIBBED ORIFICE
Ø2.5	M22 x 1.5mm	23420385	23420425
Ø3.0		23420362	23420426
Ø3.5		23420297	23420427
Ø4.0		23420328	23420428
Ø4.5		23420299	23420429
Ø5.0		23420300	23420430
Ø5.5		23420307	23420431
Ø6.0		23420366	23420432
Special ID		On Request	On Request
Ø2.5		M24 x 1.5mm Ø114.3 mm Ø133 mm	23420436
Ø3.0	23420349		23420436
Ø3.5	23420272		23420343
Ø4.0	23420265		23420363
Ø4.5	23420266		23420364
Ø5.0	23420331		23420333
Ø5.5	23420350		23420352
Ø6.0	23420410		23420365
Special ID	On Request		On Request

Air Nozzle (5)

THREAD	ID	88.9 MM	114.3 MM	133 MM
M40 x 1.5mm	Ø15.5	23420027		
M44 x 1.5mm	Ø19		23420264	

Air Nozzle, Sealed

THREAD	ID SEAL	88.9 MM	114.3 MM	133 MM
M40 x 1.5mm	Ø12.6	23420475		
M44 x 1.5mm	Ø16.6		23420474	

TRIPLE TUBE SYSTEM

Rotary Bits



Three-Wing, GDU Type

ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD API 2 7/8 REG SHORT MALE	THREAD API 3 1/2 REG MALE
88.9 mm	127 mm	Standard Flushing Holes	22330003	
114.3 mm 133 mm	140 mm			22330019
	150 mm			22330021
	165 mm			22310209
	180 mm			22310242



Welded Type, Drag Bit

ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD API 2 7/8 REG SHORT MALE	THREAD API 3 1/2 REG MALE
88.9 mm	140 mm	Standard Flushing Holes	22330007	
114.3 mm 133 mm	160 mm			22330134



Welded Type

ROD OUTER Ø	OUTER Ø	FLUSHING	THREAD API 3 1/2 REG MALE
114.3 mm	140 mm	Standard Flushing Holes	22320056
133 mm	160 mm		22320250



Reaming Bits (6)

ROD OUTER Ø	OUTER Ø	THREAD 1 PIN (VALVE FASTENER)	THREAD 2 BOX (DRILL BIT)	PART NO.
88.9 mm	150 mm	API 2 7/8 REG Short	API 2 7/8 REG – Short	22380120
	180 mm			22380072
	200 mm			22380085
114.3 mm 133 mm	200 mm	API 3 1/2 REG	API 3 1/2 REG	22380098
	240 mm			22380124
	300 mm			22380127

TOOLS AND ACCESSORIES

Fishing Tools



Fishing Spear

ROD OUTER Ø	CONICAL	CYLINDRICAL	TWIN DRIVE™
88.9 mm	24720096	24720198	24720171
114.3 mm		24720139	24720196
133 mm			24720237

Fishing Bell

ROD OUTER Ø	CONICAL	CYLINDRICAL	TWIN DRIVE™
88.9 mm	24720097	24720199	24720172
114.3 mm		24720195	24720197
133 mm			24720238

Manual Wrench

SPANNER FLAT WIDTH	PART NUMBER
SF 70	24710067
SF 80	24710025
SF 100	24710107
SF 125	24710154

Assembly Tools



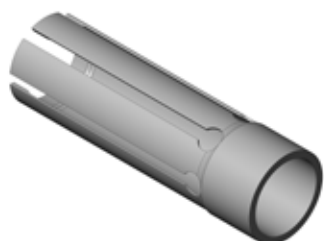
ROD OUTER Ø	FEATURE	PART NUMBER
88.9 mm	Retaining Ring (Rod)	24890002
114.3 mm		24890010
133 mm		24890018

Assembly / Dissassembly Tools



ROD OUTER Ø	FEATURE	PART NUMBER
88.9 mm	Clamping nut	24890004
114.3 mm		24890003
133 mm		24890020

Dissassembly Tools



ROD OUTER Ø	FEATURE	PART NUMBER
88.9 mm	Retaining Ring (Rod)	24890005
114.3 mm		24890009
133 mm		24890019

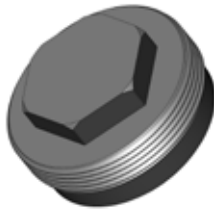
TOOLS AND ACCESSORIES

Plugs (Monitor)

Grout Nozzle Plug

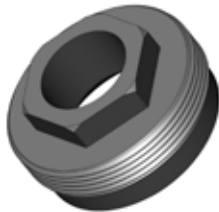
ROD OUTER Ø	M22 X 1.5 MM	M24 X 1.5 MM
88.9 mm	55010711	
114.3 mm		55010710
133 mm		

Air Nozzle Plug (Closes all phases)



ROD OUTER Ø	SYSTEM	M40 X 1.5 MM	M44 X 1.5 MM
88.9 mm	Double Tube	23420023	
88.9 mm	Triple Tube	23420023	
114.3 mm 133 mm	Triple Tube		23420270

Air Phase Stop-Plug (Injection phase opened)



ROD OUTER Ø	M22 X 1.5 MM	M24 X 1.5 MM
88.9 mm	23420110	
114.3 mm		23420399
133 mm		





PRODUCT INDEX

PRODUCT INDEX

21010001.....	51	21010124.....	61	21010241.....	51	21010452.....	51
21010001.....	62	21010126.....	60	21010241.....	60	21010452.....	62
21010010.....	51	21010126.....	61	21010241.....	61	21010476.....	60
21010010.....	60	21010137.....	51	21010242.....	51	21010476.....	61
21010010.....	61	21010137.....	62	21010242.....	60	21010477.....	60
21010012.....	51	21010140.....	51	21010242.....	61	21010477.....	61
21010012.....	60	21010140.....	62	21010243.....	51	21010478.....	60
21010012.....	61	21010142.....	51	21010243.....	60	21010478.....	61
21010018.....	51	21010142.....	62	21010243.....	61	21010479.....	60
21010018.....	60	21010143.....	51	21010268.....	81	21010479.....	61
21010018.....	61	21010143.....	62	21010268.....	93	21010480.....	60
21010021.....	51	21010146.....	81	21010277.....	51	21010480.....	61
21010021.....	60	21010146.....	93	21010277.....	60	21010481.....	60
21010021.....	61	21010148.....	81	21010277.....	61	21010482.....	60
21010023.....	51	21010148.....	93	21010280.....	51	21010483.....	60
21010023.....	60	21010150.....	81	21010280.....	62	21010484.....	60
21010023.....	61	21010150.....	93	21010282.....	51	21010484.....	61
21010025.....	51	21010152.....	81	21010282.....	62	21010484.....	94
21010025.....	60	21010152.....	93	21010285.....	51	21010485.....	60
21010025.....	61	21010154.....	81	21010285.....	62	21010485.....	61
21010026.....	51	21010154.....	93	21010290.....	51	21010486.....	60
21010026.....	60	21010157.....	81	21010290.....	60	21010486.....	61
21010026.....	61	21010157.....	93	21010290.....	61	21010495.....	81
21010038.....	51	21010163.....	51	21010291.....	51	21010495.....	93
21010038.....	62	21010163.....	62	21010291.....	61	21010496.....	81
21010038.....	94	21010164.....	51	21010293.....	82	21010496.....	93
21010040.....	51	21010164.....	62	21010293.....	93	21010497.....	81
21010040.....	62	21010172.....	60	21010302.....	51	21010497.....	93
21010040.....	94	21010172.....	61	21010302.....	62	21010498.....	60
21010044.....	51	21010175.....	60	21010306.....	51	21010498.....	61
21010044.....	62	21010175.....	61	21010306.....	62	21010499.....	60
21010044.....	94	21010181.....	61	21010306.....	61	21010499.....	61
21010046.....	51	21010184.....	60	21010319.....	51	21010499.....	61
21010046.....	62	21010184.....	61	21010319.....	62	21010500.....	60
21010049.....	81	21010184.....	94	21010322.....	51	21010500.....	61
21010049.....	93	21010188.....	60	21010322.....	62	21010501.....	60
21010052.....	81	21010188.....	61	21010331.....	61	21010501.....	61
21010052.....	93	21010188.....	94	21010332.....	61	21010509.....	51
21010053.....	81	21010190.....	60	21010332.....	62	21010509.....	62
21010053.....	93	21010190.....	61	21010333.....	61	21010530.....	51
21010054.....	81	21010190.....	61	21010334.....	61	21010530.....	62
21010054.....	93	21010194.....	60	21010334.....	62	21010659.....	61
21010056.....	81	21010194.....	61	21010380.....	51	21010667.....	51
21010056.....	93	21010195.....	60	21010380.....	62	21010667.....	62
21010062.....	51	21010195.....	61	21010383.....	51	21010669.....	51
21010062.....	62	21010196.....	81	21010383.....	62	21010669.....	62
21010081.....	51	21010196.....	93	21010385.....	51	21010670.....	51
21010081.....	62	21010197.....	81	21010385.....	62	21010670.....	60
21010085.....	51	21010197.....	93	21010387.....	81	21010670.....	61
21010085.....	62	21010197.....	61	21010387.....	93	21010670.....	61
21010086.....	51	21010201.....	81	21010388.....	51	21010686.....	51
21010086.....	62	21010201.....	93	21010388.....	60	21010686.....	62
21010090.....	81	21010202.....	81	21010388.....	61	21010712.....	51
21010090.....	93	21010202.....	93	21010389.....	51	21010712.....	62
21010091.....	81	21010211.....	51	21010389.....	60	21010713.....	51
21010091.....	93	21010211.....	60	21010389.....	61	21010713.....	62
21010092.....	81	21010211.....	61	21010392.....	51	21010718.....	60
21010092.....	93	21010214.....	51	21010392.....	62	21010718.....	94
21010096.....	81	21010214.....	60	21010403.....	51	21010719.....	60
21010096.....	93	21010214.....	61	21010403.....	60	21010719.....	94
21010098.....	81	21010220.....	51	21010445.....	51	21010720.....	60
21010098.....	93	21010220.....	60	21010445.....	60	21010720.....	94
21010099.....	81	21010220.....	61	21010445.....	61	21010721.....	60
21010099.....	93	21010222.....	51	21010445.....	62	21010721.....	61
21010106.....	51	21010222.....	60	21010446.....	51	21010722.....	51
21010106.....	62	21010222.....	61	21010446.....	60	21010722.....	62
21010110.....	51	21010237.....	51	21010446.....	61	21010723.....	60
21010110.....	62	21010237.....	60	21010447.....	51	21010724.....	60
21010112.....	51	21010237.....	61	21010447.....	60	21010725.....	60
21010112.....	62	21010238.....	51	21010447.....	61	21010726.....	60
21010114.....	51	21010238.....	60	21010448.....	51	21010726.....	61
21010114.....	62	21010238.....	61	21010448.....	62	21010728.....	62
21010114.....	62	21010240.....	51	21010449.....	51	21010729.....	60
21010124.....	60	21010240.....	60	21010449.....	62	21010729.....	94
		21010240.....	61	21010451.....	51	21010730.....	60
				21010451.....	62	21010731.....	51

PRODUCT INDEX

21010731.....	62	21011279.....	61	21011817.....	104	21020061.....	52
21010732.....	60	21011281.....	51	21011818.....	104	21020064.....	52
21010732.....	94	21011281.....	62	21011819.....	104	21020066.....	52
21010733.....	60	21011291.....	51	21011820.....	106	21020076.....	52
21010733.....	94	21011291.....	62	21011821.....	106	21020077.....	52
21010734.....	62	21011305.....	81	21011822.....	106	21020078.....	52
21010735.....	62	21011305.....	93	21011823.....	106	21020079.....	52
21010736.....	62	21011306.....	81	21011824.....	106	21020081.....	52
21010737.....	62	21011306.....	93	21011825.....	106	21020086.....	52
21010814.....	60	21011307.....	81	21011826.....	106	21020088.....	52
21010815.....	60	21011307.....	93	21011827.....	106	21020090.....	52
21010816.....	60	21011315.....	60	21011828.....	106	21020095.....	52
21010823.....	51	21011317.....	51	21011829.....	106	21020098.....	52
21010823.....	62	21011317.....	61	21011830.....	106	21020099.....	52
21010832.....	61	21011318.....	51	21011831.....	106	21020109.....	52
21010858.....	51	21011318.....	61	21011832.....	106	21020111.....	52
21010858.....	60	21011319.....	60	21011833.....	106	21020112.....	52
21010858.....	61	21011319.....	61	21011834.....	105	21020113.....	52
21010859.....	51	21011320.....	61	21011835.....	105	21020115.....	81
21010859.....	60	21011321.....	60	21011835.....	106	21020115.....	93
21010859.....	61	21011321.....	61	21011836.....	105	21020118.....	52
21010860.....	51	21011322.....	60	21011837.....	105	21020121.....	52
21010860.....	62	21011323.....	61	21011838.....	105	21020122.....	52
21010869.....	51	21011324.....	60	21011839.....	105	21020123.....	52
21010869.....	62	21011324.....	61	21011840.....	105	21020124.....	52
21010871.....	60	21011325.....	60	21011841.....	105	21020125.....	52
21010871.....	61	21011325.....	61	21011842.....	105	21020162.....	52
21010872.....	60	21011326.....	60	21011843.....	105	21020163.....	52
21010872.....	61	21011326.....	61	21011844.....	105	21020165.....	52
21010873.....	60	21011327.....	61	21011845.....	105	21020169.....	52
21010873.....	61	21011328.....	61	21011846.....	105	21020172.....	52
21010874.....	60	21011329.....	60	21011847.....	105	21020174.....	52
21010874.....	61	21011329.....	61	21011848.....	105	21020177.....	52
21010875.....	51	21011330.....	60	21011849.....	105	21020179.....	52
21010875.....	60	21011331.....	60	21011858.....	62	21020181.....	52
21010875.....	61	21011331.....	61	21011859.....	62	21020191.....	52
21010877.....	60	21011332.....	61	21011860.....	62	21020193.....	52
21010878.....	60	21011333.....	60	21011861.....	62	21020195.....	52
21010878.....	61	21011333.....	61	21011862.....	62	21020198.....	52
21010879.....	60	21011334.....	61	21011863.....	62	21020199.....	52
21010879.....	61	21011335.....	60	21011864.....	62	21020201.....	52
21010880.....	60	21011335.....	61	21011865.....	62	21020213.....	52
21010880.....	61	21011336.....	60	21011866.....	62	21020289.....	52
21010881.....	60	21011498.....	105	21011867.....	62	21020301.....	52
21010881.....	61	21011499.....	105	21011868.....	62	21020302.....	52
21010882.....	60	21011500.....	105	21011869.....	62	21020303.....	52
21010883.....	51	21011525.....	105	21011870.....	62	21020304.....	52
21010883.....	60	21011612.....	51	21011871.....	62	21020305.....	52
21010883.....	61	21011612.....	61	21011872.....	106	21020306.....	52
21010884.....	60	21011613.....	51	21020008.....	52	21020322.....	52
21010884.....	61	21011613.....	62	21020010.....	52	21020368.....	52
21010885.....	60	21011616.....	51	21020011.....	52	21020382.....	81
21010885.....	61	21011616.....	62	21020012.....	52	21020382.....	93
21010886.....	60	21011619.....	51	21020014.....	52	21020383.....	81
21010886.....	61	21011619.....	62	21020015.....	52	21020383.....	93
21010887.....	60	21011626.....	61	21020017.....	52	21020401.....	81
21010887.....	61	21011800.....	105	21020021.....	52	21020401.....	93
21011024.....	51	21011801.....	105	21020023.....	52	21020402.....	81
21011024.....	62	21011802.....	105	21020024.....	52	21020402.....	93
21011058.....	81	21011803.....	105	21020025.....	52	21020403.....	81
21011058.....	93	21011804.....	105	21020027.....	52	21020403.....	93
21011122.....	60	21011805.....	105	21020029.....	52	21020406.....	81
21011122.....	94	21011806.....	105	21020031.....	52	21020406.....	93
21011123.....	60	21011807.....	105	21020032.....	52	21020407.....	81
21011123.....	94	21011808.....	105	21020045.....	52	21020407.....	93
21011124.....	60	21011809.....	105	21020047.....	52	21020408.....	81
21011128.....	60	21011810.....	105	21020048.....	52	21020408.....	93
21011128.....	94	21011811.....	105	21020049.....	52	21020410.....	81
21011208.....	81	21011812.....	104	21020050.....	52	21020410.....	93
21011208.....	93	21011813.....	104	21020053.....	52	21020411.....	81
21011278.....	51	21011814.....	104	21020054.....	52	21020411.....	93
21011278.....	61	21011815.....	104	21020055.....	52	21020412.....	81
21011279.....	51	21011816.....	104	21020056.....	52	21020412.....	93

PRODUCT INDEX

21020413.....	81	21030325.....	83	21050268.....	120	22010234.....	69
21020413.....	93	21030326.....	83	21050273.....	120	22010248.....	72
21020416.....	81	21030327.....	83	21050292.....	120	22010251.....	88
21020416.....	93	21030328.....	83	21050300.....	120	22010251.....	96
21020418.....	81	21030329.....	83	21050303.....	120	22010267.....	69
21020418.....	93	21030330.....	83	21050304.....	120	22010275.....	88
21020423.....	81	21030331.....	83	21050314.....	120	22010275.....	96
21020423.....	93	21030332.....	83	21050316.....	120	22010285.....	69
21020427.....	81	21030333.....	83	21050318.....	120	22010309.....	75
21020427.....	93	21030337.....	84	21050402.....	125	22010315.....	71
21020433.....	81	21030342.....	84	21050403.....	125	22010318.....	88
21020433.....	93	21030343.....	84	21050404.....	125	22010318.....	96
21020436.....	81	21030344.....	84	21050405.....	125	22010319.....	71
21020436.....	93	21030345.....	84	21050407.....	120	22010321.....	69
21020489.....	81	21030346.....	84	21050418.....	120	22010322.....	69
21020489.....	93	21030383.....	83	21050433.....	116	22010323.....	88
21020514.....	81	21030384.....	83	21050434.....	116	22010323.....	96
21020514.....	93	21030385.....	83	21050435.....	116	22010329.....	71
21020543.....	81	21030401.....	82	21050436.....	116	22010355.....	71
21020543.....	93	21030402.....	82	21050437.....	116	22010358.....	71
21020544.....	81	21030450.....	83	21050438.....	120	22010399.....	71
21020544.....	93	21030451.....	83	21050439.....	120	22010414.....	69
21020545.....	81	21030488.....	84	21050600.....	125	22010415.....	69
21020545.....	93	21030490.....	84	21050601.....	125	22010430.....	70
21030002.....	83	21030499.....	84	21050602.....	125	22010432.....	70
21030008.....	84	21030500.....	83	21050603.....	125	22010436.....	73
21030009.....	84	21030560.....	84	21050604.....	125	22010451.....	69
21030010.....	84	21030593.....	82	21050605.....	125	22010452.....	69
21030012.....	84	21030601.....	82	21050606.....	125	22010453.....	69
21030013.....	84	21030609.....	83	21050607.....	125	22010454.....	69
21030014.....	84	21030610.....	83	21050608.....	125	22010456.....	72
21030016.....	84	21030611.....	83	21050609.....	125	22010458.....	69
21030026.....	84	21030636.....	82	21050610.....	125	22010463.....	69
21030027.....	84	21030637.....	82	21050611.....	125	22010468.....	71
21030028.....	84	21030638.....	83	21050612.....	125	22010469.....	71
21030072.....	82	21030639.....	83	21050613.....	125	22010472.....	71
21030073.....	82	21030640.....	83	21050614.....	125	22010476.....	70
21030078.....	82	21030713.....	85	21050615.....	125	22010479.....	73
21030079.....	82	21030714.....	85	21050616.....	125	22010492.....	72
21030080.....	82	21030721.....	85	21050617.....	125	22010493.....	75
21030083.....	82	21030722.....	85	22010004.....	69	22010505.....	72
21030085.....	82	21030723.....	85	22010007.....	69	22010506.....	72
21030090.....	82	21030727.....	85	22010011.....	69	22010509.....	73
21030094.....	82	21030728.....	85	22010018.....	69	22010510.....	70
21030130.....	82	21030729.....	85	22010023.....	69	22010520.....	71
21030131.....	82	21030730.....	85	22010041.....	88	22010531.....	73
21030133.....	82	21030731.....	85	22010041.....	96	22010538.....	69
21030134.....	82	21030732.....	85	22010062.....	88	22010543.....	72
21030135.....	82	21030733.....	85	22010062.....	96	22010543.....	72
21030136.....	82	21030743.....	85	22010080.....	75	22010548.....	73
21030137.....	82	21030744.....	85	22010090.....	69	22010551.....	69
21030139.....	82	21030801.....	85	22010091.....	69	22010552.....	69
21030146.....	83	21030804.....	85	22010093.....	69	22010553.....	69
21030147.....	83	21030805.....	85	22010094.....	69	22010554.....	69
21030203.....	82	21030806.....	85	22010095.....	69	22010558.....	70
21030204.....	82	21030807.....	85	22010096.....	69	22010567.....	71
21030208.....	82	21030808.....	85	22010097.....	69	22010581.....	69
21030240.....	82	21030809.....	85	22010100.....	69	22010586.....	73
21030263.....	82	21050124.....	120	22010101.....	69	22010590.....	73
21030265.....	82	21050135.....	120	22010103.....	69	22010592.....	69
21030275.....	84	21050136.....	120	22010105.....	69	22010596.....	73
21030314.....	82	21050145.....	120	22010106.....	69	22010634.....	72
21030315.....	82	21050161.....	120	22010108.....	69	22010651.....	75
21030316.....	82	21050167.....	120	22010111.....	69	22010662.....	71
21030317.....	82	21050173.....	120	22010112.....	69	22010672.....	72
21030318.....	82	21050176.....	120	22010114.....	69	22010677.....	71
21030319.....	82	21050206.....	125	22010115.....	69	22010720.....	73
21030320.....	82	21050207.....	125	22010134.....	88	22010754.....	72
21030321.....	82	21050208.....	125	22010134.....	96	22010760.....	72
21030322.....	83	21050217.....	120	22010137.....	88	22010778.....	72
21030323.....	83	21050221.....	120	22010137.....	96	22010788.....	72
21030323.....	83	21050222.....	120	22010158.....	69	22010816.....	73
21030324.....	83	21050267.....	120	22010197.....	69	22010817.....	71

PRODUCT INDEX

22010900.....	69	22010973.....	71	22011048.....	74	22011273.....	72
22010901.....	69	22010974.....	71	22011050.....	74	22011281.....	77
22010902.....	69	22010975.....	71	22011051.....	74	22011319.....	107
22010903.....	69	22010976.....	71	22011052.....	74	22011325.....	107
22010904.....	69	22010977.....	71	22011053.....	74	22011358.....	76
22010905.....	69	22010978.....	71	22011054.....	74	22011365.....	76
22010906.....	69	22010979.....	71	22011055.....	74	22011365.....	76
22010907.....	69	22010980.....	71	22011056.....	73	22011385.....	76
22010908.....	69	22010981.....	71	22011058.....	73	22011386.....	76
22010909.....	69	22010982.....	71	22011062.....	73	22011389.....	76
22010910.....	69	22010984.....	72	22011064.....	73	22011391.....	76
22010911.....	69	22010985.....	72	22011067.....	73	22011392.....	76
22010912.....	69	22010986.....	72	22011068.....	73	22011394.....	76
22010913.....	69	22010987.....	72	22011069.....	73	22011395.....	76
22010914.....	69	22010988.....	72	22011070.....	73	22011399.....	70
22010915.....	69	22010989.....	72	22011071.....	73	22011410.....	76
22010916.....	69	22010990.....	72	22011072.....	73	22011412.....	76
22010917.....	69	22010991.....	72	22011073.....	73	22011421.....	77
22010918.....	69	22010992.....	72	22011074.....	73	22011431.....	77
22010919.....	69	22010993.....	72	22011075.....	73	22011466.....	69
22010920.....	69	22010994.....	72	22011076.....	73	22011468.....	76
22010921.....	69	22010995.....	72	22011077.....	73	22011469.....	73
22010922.....	69	22010996.....	72	22011078.....	73	22011478.....	76
22010923.....	69	22010997.....	72	22011079.....	73	22011600.....	76
22010924.....	69	22010998.....	72	22011080.....	88	22011601.....	76
22010925.....	69	22010999.....	72	22011080.....	96	22011603.....	76
22010926.....	71	22011000.....	72	22011082.....	88	22011604.....	76
22010927.....	71	22011001.....	72	22011082.....	96	22011605.....	76
22010928.....	71	22011002.....	72	22011083.....	88	22011607.....	76
22010929.....	71	22011003.....	72	22011083.....	96	22011608.....	76
22010930.....	71	22011004.....	72	22011084.....	72	22011609.....	76
22010931.....	71	22011005.....	72	22011085.....	72	22011610.....	76
22010932.....	71	22011006.....	72	22011086.....	72	22011611.....	76
22010933.....	71	22011007.....	72	22011087.....	72	22011612.....	76
22010934.....	71	22011008.....	72	22011088.....	72	22011613.....	76
22010935.....	71	22011009.....	70	22011089.....	72	22011614.....	76
22010936.....	71	22011011.....	70	22011090.....	72	22011615.....	76
22010937.....	71	22011012.....	70	22011091.....	72	22011616.....	76
22010938.....	71	22011013.....	70	22011092.....	72	22011617.....	76
22010939.....	71	22011014.....	70	22011093.....	72	22011618.....	76
22010940.....	71	22011015.....	70	22011094.....	72	22011619.....	76
22010941.....	71	22011016.....	70	22011095.....	72	22011620.....	76
22010942.....	71	22011017.....	70	22011096.....	72	22011621.....	76
22010943.....	71	22011018.....	70	22011097.....	72	22011622.....	76
22010944.....	71	22011019.....	70	22011098.....	72	22011623.....	76
22010945.....	71	22011020.....	70	22011099.....	72	22011624.....	88
22010946.....	71	22011021.....	70	22011100.....	72	22011624.....	96
22010947.....	71	22011022.....	70	22011101.....	72	22011625.....	88
22010948.....	71	22011023.....	70	22011102.....	72	22011625.....	96
22010949.....	71	22011024.....	70	22011103.....	72	22011626.....	88
22010950.....	71	22011025.....	70	22011104.....	72	22011626.....	96
22010951.....	71	22011026.....	70	22011105.....	72	22011627.....	88
22010952.....	71	22011027.....	70	22011106.....	72	22011627.....	96
22010953.....	71	22011028.....	74	22011107.....	72	22011628.....	76
22010954.....	71	22011029.....	74	22011108.....	72	22011629.....	76
22010955.....	71	22011030.....	74	22011109.....	72	22011630.....	76
22010956.....	71	22011031.....	74	22011110.....	72	22011631.....	76
22010957.....	71	22011032.....	74	22011111.....	72	22011632.....	76
22010958.....	71	22011033.....	74	22011112.....	72	22011633.....	76
22010959.....	71	22011034.....	74	22011113.....	72	22011634.....	76
22010960.....	71	22011035.....	74	22011114.....	72	22011635.....	76
22010961.....	71	22011036.....	74	22011115.....	72	22011636.....	76
22010962.....	71	22011037.....	74	22011116.....	72	22011640.....	107
22010963.....	71	22011038.....	74	22011117.....	75	22011641.....	107
22010964.....	71	22011039.....	74	22011118.....	75	22011642.....	107
22010965.....	71	22011040.....	74	22011119.....	75	22011643.....	107
22010966.....	71	22011041.....	74	22011120.....	75	22011644.....	107
22010967.....	71	22011042.....	74	22011121.....	75	22011645.....	107
22010968.....	71	22011043.....	74	22011122.....	75	22011646.....	107
22010969.....	71	22011044.....	74	22011123.....	75	22011647.....	107
22010970.....	71	22011045.....	74	22011124.....	75	22011648.....	107
22010971.....	71	22011046.....	74	22011241.....	88	22011649.....	107
22010972.....	71	22011047.....	74	22011241.....	96	22011650.....	107

PRODUCT INDEX

22011651.....	107	22020088.....	75	22130073.....	94	22130512.....	64
22011652.....	107	22020090.....	75	22130074.....	63	22130512.....	95
22011653.....	107	22020095.....	70	22130074.....	94	22130513.....	64
22011654.....	107	22020096.....	70	22130078.....	63	22130513.....	95
22011655.....	107	22020101.....	70	22130078.....	94	22130514.....	64
22011656.....	107	22020106.....	75	22130133.....	63	22130514.....	95
22011657.....	107	22020114.....	70	22130133.....	94	22130515.....	64
22011658.....	107	22020115.....	70	22130140.....	64	22130515.....	95
22011659.....	107	22020116.....	70	22130140.....	95	22130516.....	64
22011660.....	107	22020117.....	70	22130144.....	65	22130516.....	95
22011661.....	107	22020120.....	75	22130157.....	63	22130517.....	64
22011664.....	77	22020122.....	75	22130157.....	94	22130517.....	95
22011665.....	77	22020123.....	75	22130158.....	63	22130518.....	64
22011666.....	77	22020132.....	70	22130158.....	94	22130518.....	96
22011667.....	77	22020133.....	70	22130160.....	63	22130519.....	64
22011668.....	77	22020134.....	70	22130160.....	94	22130519.....	96
22011669.....	77	22020136.....	70	22130161.....	63	22130520.....	64
22011670.....	76	22020137.....	70	22130161.....	94	22130520.....	96
22011671.....	76	22020139.....	70	22130182.....	63	22130521.....	64
22011672.....	76	22020146.....	70	22130182.....	94	22130521.....	96
22011673.....	76	22020165.....	75	22130194.....	63	22130522.....	64
22011674.....	76	22020177.....	70	22130194.....	94	22130522.....	96
22011675.....	76	22020178.....	70	22130201.....	64	22130523.....	64
22011676.....	76	22020179.....	75	22130203.....	64	22130523.....	96
22011677.....	76	22020180.....	75	22130203.....	95	22130524.....	64
22011678.....	76	22020181.....	75	22130219.....	64	22130524.....	96
22011679.....	76	22020182.....	75	22130219.....	95	22130525.....	64
22011680.....	76	22020183.....	75	22130276.....	64	22130525.....	96
22011681.....	76	22020184.....	75	22130276.....	95	22130526.....	64
22011682.....	76	22020185.....	75	22130288.....	65	22130526.....	96
22011683.....	76	22020186.....	75	22130299.....	64	22130527.....	64
22011684.....	76	22020187.....	75	22130299.....	95	22130527.....	96
22011685.....	77	22020188.....	75	22130319.....	65	22130528.....	64
22011686.....	77	22020189.....	75	22130324.....	65	22130528.....	96
22011687.....	77	22020190.....	75	22130328.....	63	22130529.....	64
22011688.....	69	22020191.....	75	22130328.....	94	22130529.....	96
22011690.....	71	22020192.....	75	22130335.....	64	22130530.....	64
22011691.....	73	22020193.....	75	22130335.....	95	22130530.....	96
22011692.....	73	22020194.....	75	22130345.....	63	22130531.....	64
22011693.....	73	22020195.....	75	22130345.....	94	22130531.....	96
22011694.....	73	22020196.....	75	22130346.....	65	22130532.....	64
22011695.....	73	22020197.....	75	22130355.....	63	22130532.....	96
22011696.....	73	22020198.....	75	22130355.....	94	22130533.....	64
22011697.....	73	22020199.....	75	22130370.....	96	22130533.....	96
22011698.....	73	22020200.....	75	22130373.....	63	22130534.....	64
22011699.....	73	22020201.....	75	22130373.....	94	22130534.....	96
22011700.....	73	22020202.....	75	22130374.....	63	22130535.....	64
22011701.....	73	22020203.....	75	22130374.....	94	22130535.....	96
22011702.....	73	22020204.....	75	22130375.....	63	22130536.....	64
22011703.....	73	22020205.....	75	22130375.....	94	22130536.....	96
22011704.....	73	22020206.....	75	22130376.....	63	22130537.....	64
22011705.....	73	22020220.....	70	22130376.....	94	22130537.....	96
22011706.....	73	22040025.....	75	22130407.....	95	22130538.....	64
22011707.....	73	22040031.....	75	22130408.....	64	22130539.....	64
22020011.....	70	22040041.....	75	22130408.....	96	22130540.....	64
22020012.....	70	22040150.....	75	22130409.....	64	22130541.....	64
22020016.....	70	22090030.....	74	22130409.....	95	22130542.....	64
22020017.....	70	22090031.....	74	22130410.....	65	22130543.....	64
22020019.....	70	22090036.....	74	22130421.....	64	22130544.....	64
22020020.....	70	22090038.....	74	22130491.....	86	22130545.....	64
22020022.....	70	22090039.....	74	22130504.....	63	22130546.....	65
22020023.....	70	22090062.....	74	22130504.....	94	22130547.....	64
22020025.....	70	22090063.....	74	22130506.....	96	22130548.....	64
22020027.....	70	22090086.....	74	22130507.....	64	22130549.....	64
22020031.....	70	22090091.....	74	22130507.....	95	22130550.....	64
22020045.....	70	22130006.....	64	22130508.....	64	22130551.....	64
22020046.....	70	22130059.....	64	22130508.....	95	22130552.....	65
22020063.....	75	22130059.....	95	22130509.....	64	22130553.....	65
22020072.....	70	22130063.....	63	22130509.....	95	22130554.....	65
22020074.....	70	22130063.....	94	22130510.....	64	22130555.....	65
22020076.....	70	22130067.....	63	22130510.....	95	22130556.....	65
22020077.....	70	22130067.....	94	22130511.....	64	22130557.....	65
22020079.....	70	22130073.....	63	22130511.....	95	22130619.....	113

PRODUCT INDEX

22130620.....	113	22130867.....	66	22140207.....	63	22310358.....	86
22130621.....	113	22130868.....	66	22140207.....	95	22310360.....	86
22130623.....	68	22130869.....	66	22140208.....	63	22310361.....	86
22130624.....	68	22130870.....	66	22140208.....	95	22310362.....	86
22130625.....	67	22130871.....	66	22140209.....	63	22310363.....	86
22130633.....	87	22130872.....	66	22140209.....	95	22310364.....	86
22130660.....	66	22130873.....	66	22140210.....	63	22310365.....	86
22130675.....	67	22130874.....	66	22140210.....	95	22310366.....	86
22130692.....	65	22130875.....	66	22140211.....	63	22310367.....	86
22130800.....	108	22130876.....	66	22140211.....	95	22310368.....	86
22130801.....	108	22130877.....	66	22140226.....	63	22310369.....	86
22130802.....	108	22130878.....	66	22140226.....	95	22310370.....	87
22130803.....	108	22130879.....	66	22140227.....	63	22310371.....	87
22130804.....	108	22130880.....	66	22140227.....	95	22310372.....	87
22130805.....	108	22130881.....	66	22140228.....	63	22310373.....	87
22130806.....	108	22130882.....	67	22140228.....	95	22310374.....	87
22130807.....	108	22130883.....	67	22140229.....	63	22310375.....	87
22130808.....	108	22130884.....	67	22140229.....	95	22310376.....	87
22130809.....	108	22130885.....	67	22140230.....	63	22310377.....	87
22130810.....	108	22130886.....	67	22140230.....	95	22310378.....	87
22130811.....	108	22130887.....	67	22140231.....	63	22310379.....	87
22130812.....	108	22130888.....	67	22140231.....	95	22310380.....	87
22130813.....	108	22130889.....	67	22140232.....	63	22310381.....	87
22130814.....	108	22130890.....	67	22140232.....	95	22310382.....	87
22130815.....	108	22130891.....	67	22140233.....	63	22310383.....	87
22130816.....	108	22130892.....	67	22140233.....	95	22310384.....	87
22130817.....	108	22130893.....	68	22140234.....	63	22310385.....	87
22130818.....	108	22130894.....	68	22140234.....	95	22310386.....	87
22130819.....	108	22130895.....	68	22140235.....	63	22320056.....	123
22130820.....	108	22130896.....	68	22140235.....	95	22320056.....	127
22130821.....	108	22130897.....	68	22140236.....	63	22320250.....	127
22130822.....	108	22130898.....	68	22140236.....	95	22330003.....	118
22130823.....	108	22130899.....	68	22140237.....	63	22330003.....	123
22130824.....	113	22130900.....	68	22140237.....	95	22330003.....	127
22130825.....	113	22130901.....	68	22140238.....	63	22330007.....	118
22130826.....	113	22130902.....	68	22140238.....	95	22330007.....	123
22130827.....	113	22130903.....	68	22140239.....	63	22330007.....	127
22130828.....	113	22130904.....	68	22140239.....	95	22330019.....	123
22130829.....	113	22130905.....	68	22140240.....	63	22330019.....	127
22130830.....	113	22130906.....	68	22140240.....	95	22330021.....	123
22130831.....	113	22130911.....	68	22140241.....	63	22330021.....	127
22130832.....	113	22130912.....	68	22140241.....	95	22330134.....	123
22130833.....	113	22130913.....	68	22140242.....	63	22330134.....	127
22130834.....	113	22130914.....	68	22140242.....	95	22380072.....	118
22130835.....	113	22140070.....	63	22140243.....	63	22380072.....	123
22130836.....	113	22140070.....	95	22140243.....	95	22380072.....	127
22130837.....	113	22140072.....	63	22140244.....	63	22380085.....	118
22130838.....	113	22140072.....	95	22140244.....	95	22380085.....	123
22130839.....	65	22140079.....	63	22140285.....	63	22380085.....	127
22130840.....	65	22140083.....	63	22140285.....	95	22380098.....	123
22130841.....	65	22140083.....	95	22140286.....	63	22380098.....	127
22130842.....	65	22140088.....	63	22140286.....	95	22380120.....	118
22130843.....	65	22140088.....	95	22310143.....	86	22380120.....	123
22130844.....	65	22140090.....	63	22310156.....	86	22380120.....	127
22130845.....	65	22140090.....	95	22310209.....	123	22380124.....	123
22130846.....	65	22140091.....	63	22310209.....	127	22380124.....	127
22130847.....	65	22140091.....	95	22310232.....	86	22380127.....	127
22130848.....	65	22140091.....	63	22310234.....	87	22530001.....	53
22130849.....	67	22140094.....	63	22310237.....	87	22530002.....	53
22130850.....	67	22140094.....	95	22310242.....	127	22530006.....	53
22130851.....	67	22140135.....	63	22310245.....	87	22530007.....	53
22130852.....	67	22140135.....	95	22310254.....	86	22530011.....	53
22130853.....	67	22140136.....	63	22310256.....	87	22530021.....	53
22130854.....	67	22140136.....	95	22310258.....	87	22530022.....	53
22130855.....	67	22140137.....	63	22310262.....	87	22530023.....	53
22130856.....	67	22140137.....	95	22310350.....	86	22530026.....	53
22130857.....	67	22140145.....	70	22310351.....	86	22530030.....	53
22130858.....	67	22140154.....	63	22310352.....	86	22530031.....	53
22130859.....	67	22140154.....	95	22310353.....	86	22530033.....	53
22130863.....	66	22140155.....	63	22310354.....	86	22530034.....	53
22130864.....	66	22140155.....	95	22310355.....	86	22530049.....	53
22130865.....	66	22140156.....	63	22310356.....	86	22530051.....	53
22130866.....	66	22140156.....	95	22310357.....	86	22530059.....	53

PRODUCT INDEX

22530060.....	53	23010340.....	56	23010515.....	90	23050054.....	58
22530061.....	53	23010341.....	56	23010516.....	90	23050058.....	58
22530062.....	53	23010342.....	56	23010517.....	90	23050067.....	58
22530063.....	53	23010343.....	56	23010518.....	90	23050071.....	58
22530064.....	53	23010344.....	56	23010519.....	90	23050075.....	58
22530065.....	53	23010345.....	56	23010520.....	90	23050076.....	58
22530066.....	53	23010346.....	56	23010521.....	90	23050077.....	58
22530079.....	53	23010347.....	56	23010572.....	56	23050078.....	58
22530100.....	53	23010362.....	56	23010573.....	56	23050079.....	58
22530105.....	53	23010363.....	56	23010582.....	56	23050080.....	58
22530115.....	53	23010364.....	56	23010650.....	56	23050082.....	58
22530150.....	53	23010365.....	56	23010651.....	56	23050084.....	58
22530151.....	53	23010366.....	56	23010652.....	56	23050095.....	58
22530152.....	53	23010367.....	56	23010653.....	56	23050096.....	58
23010023.....	56	23010368.....	56	23010653.....	56	23050109.....	58
23010032.....	56	23010369.....	56	23010654.....	56	23050114.....	58
23010046.....	56	23010370.....	56	23010654.....	56	23050126.....	58
23010081.....	56	23010371.....	56	23010655.....	56	23050127.....	58
23010143.....	56	23010372.....	56	23010656.....	56	23050128.....	58
23010150.....	56	23010374.....	56	23010657.....	56	23050129.....	58
23010153.....	56	23010375.....	56	23010658.....	56	23050130.....	58
23010156.....	56	23010376.....	56	23010659.....	56	23050131.....	58
23010157.....	56	23010377.....	56	23010660.....	56	23050132.....	58
23010160.....	56	23010378.....	56	23010661.....	56	23050133.....	58
23010161.....	56	23010379.....	56	23010662.....	56	23050134.....	58
23010165.....	56	23010380.....	56	23020300.....	48	23050135.....	58
23010178.....	56	23010381.....	56	23020301.....	48	23050136.....	58
23010183.....	56	23010382.....	56	23020302.....	48	23050137.....	58
23010225.....	56	23010390.....	56	23020303.....	48	23050138.....	58
23010256.....	56	23010391.....	56	23020304.....	48	23050139.....	58
23010257.....	56	23010392.....	56	23020305.....	48	23050140.....	58
23010258.....	56	23010393.....	56	23020306.....	48	23050141.....	58
23010264.....	56	23010394.....	56	23020307.....	48	23050142.....	58
23010265.....	56	23010395.....	56	23040026.....	57	23050143.....	58
23010266.....	56	23010396.....	56	23040124.....	57	23050144.....	58
23010267.....	56	23010397.....	56	23040135.....	90	23050145.....	58
23010268.....	56	23010399.....	56	23040135.....	90	23050146.....	58
23010269.....	56	23010400.....	56	23040174.....	57	23050147.....	58
23010270.....	56	23010401.....	56	23040195.....	57	23050148.....	58
23010271.....	56	23010403.....	56	23040206.....	57	23050149.....	58
23010276.....	56	23010411.....	56	23040243.....	57	23050150.....	58
23010277.....	56	23010412.....	56	23040314.....	57	23050151.....	58
23010278.....	56	23010413.....	56	23040395.....	90	23050152.....	58
23010279.....	56	23010414.....	56	23040399.....	90	23050153.....	58
23010280.....	56	23010415.....	56	23040406.....	90	23050300.....	110
23010281.....	56	23010416.....	56	23040407.....	90	23050301.....	110
23010282.....	56	23010417.....	56	23040408.....	90	23050302.....	110
23010283.....	56	23010418.....	56	23040409.....	90	23050303.....	110
23010284.....	56	23010419.....	56	23040571.....	48	23050304.....	110
23010285.....	56	23010420.....	56	23040700.....	48	23050305.....	110
23010296.....	56	23010421.....	56	23040701.....	48	23050306.....	110
23010306.....	56	23010422.....	56	23040702.....	48	23050307.....	110
23010307.....	56	23010423.....	56	23040703.....	48	23050308.....	110
23010308.....	56	23010424.....	56	23040704.....	48	23050309.....	110
23010309.....	56	23010425.....	56	23040705.....	48	23050310.....	110
23010310.....	56	23010426.....	56	23040706.....	48	23050311.....	110
23010311.....	56	23010427.....	56	23050002.....	58	23050312.....	58
23010312.....	56	23010429.....	56	23050006.....	58	23050313.....	58
23010313.....	56	23010431.....	56	23050009.....	58	23050314.....	58
23010314.....	56	23010432.....	56	23050010.....	58	23050315.....	58
23010315.....	56	23010434.....	56	23050011.....	58	23050316.....	58
23010316.....	56	23010435.....	56	23050015.....	58	23060017.....	59
23010317.....	56	23010436.....	56	23050019.....	58	23060017.....	59
23010318.....	56	23010438.....	56	23050021.....	58	23060035.....	59
23010319.....	56	23010439.....	56	23050022.....	58	23060035.....	59
23010320.....	56	23010440.....	56	23050025.....	58	23060076.....	59
23010321.....	56	23010442.....	56	23050026.....	58	23060077.....	59
23010334.....	56	23010443.....	56	23050029.....	58	23060077.....	59
23010335.....	56	23010444.....	56	23050030.....	58	23060078.....	59
23010336.....	56	23010446.....	56	23050037.....	58	23060078.....	59
23010337.....	56	23010447.....	56	23050044.....	58	23060088.....	59
23010338.....	56	23010448.....	56	23050046.....	58	23060128.....	59
23010339.....	56	23010515.....	90	23050053.....	58	23060156.....	59

PRODUCT INDEX

23060157.....59	23060407.....110	23090165.....50	23420350.....126
23060157.....59	23060408.....59	23090166.....50	23420351.....121
23060158.....59	23060409.....59	23090167.....50	23420352.....122
23060160.....59	23070012.....49	23090168.....50	23420352.....126
23060161.....59	23070012.....58	23090169.....50	23420360.....121
23060162.....59	23070012.....90	23090170.....50	23420362.....117
23060163.....59	23070033.....49	23090171.....50	23420362.....122
23060163.....59	23070033.....58	23090172.....50	23420362.....126
23060164.....59	23070033.....90	23090173.....50	23420363.....122
23060164.....59	23070035.....49	23090174.....50	23420363.....126
23060166.....59	23070035.....58	23390070.....78	23420364.....122
23060167.....59	23070035.....90	23390071.....78	23420364.....126
23060168.....59	23070037.....49	23390072.....78	23420365.....122
23060168.....59	23070037.....58	23390073.....78	23420365.....126
23060169.....59	23070037.....90	23390074.....78	23420366.....117
23060170.....59	23070071.....78	23390075.....78	23420366.....122
23060171.....59	23070096.....111	23390076.....78	23420366.....126
23060172.....59	23070097.....111	23390077.....78	23420375.....121
23060175.....59	23080042.....49	23410195.....124	23420377.....121
23060175.....59	23080042.....90	23410231.....124	23420385.....117
23060176.....59	23080044.....49	23410280.....119	23420385.....122
23060176.....59	23080044.....90	23410286.....116	23420385.....126
23060178.....59	23080048.....49	23410290.....116	23420399.....129
23060179.....59	23080048.....90	23410294.....119	23420410.....122
23060180.....59	23080052.....49	23410295.....119	23420410.....126
23060181.....59	23080052.....90	23410306.....119	23420420.....117
23060182.....59	23080061.....116	23410307.....119	23420425.....117
23060182.....59	23080061.....119	23410350.....124	23420425.....122
23060183.....59	23080066.....49	23410351.....124	23420425.....126
23060184.....59	23080066.....90	23410352.....124	23420426.....117
23060185.....59	23080068.....119	23420023.....129	23420426.....122
23060185.....59	23080070.....49	23420023.....129	23420426.....126
23060186.....59	23080070.....90	23420027.....117	23420427.....117
23060187.....59	23080079.....49	23420027.....122	23420427.....122
23060188.....59	23080079.....90	23420027.....126	23420427.....126
23060188.....59	23080086.....49	23420097.....117	23420428.....117
23060189.....59	23080086.....90	23420097.....126	23420428.....122
23060191.....59	23080089.....49	23420110.....129	23420428.....126
23060191.....59	23080089.....90	23420167.....126	23420429.....117
23060192.....59	23080095.....78	23420264.....122	23420429.....122
23060193.....59	23080096.....49	23420264.....126	23420429.....126
23060194.....59	23080096.....90	23420265.....122	23420430.....117
23060194.....59	23080098.....49	23420265.....126	23420430.....122
23060195.....59	23080099.....78	23420266.....122	23420430.....126
23060196.....59	23080100.....78	23420266.....126	23420431.....117
23060197.....59	23080101.....78	23420270.....129	23420431.....122
23060197.....59	23080126.....49	23420272.....122	23420431.....126
23060198.....59	23080126.....90	23420272.....126	23420432.....117
23060199.....59	23080130.....90	23420297.....117	23420432.....122
23060200.....59	23080141.....111	23420297.....122	23420432.....126
23060200.....59	23080142.....124	23420297.....126	23420436.....122
23060201.....59	23080143.....124	23420299.....117	23420436.....122
23060202.....59	23080144.....124	23420299.....122	23420436.....126
23060203.....59	23090087.....50	23420299.....126	23420436.....126
23060203.....59	23090088.....50	23420300.....117	23420439.....122
23060204.....59	23090089.....50	23420300.....122	23420439.....126
23060205.....59	23090090.....50	23420300.....126	23420474.....122
23060206.....59	23090091.....50	23420307.....117	23420474.....126
23060207.....59	23090150.....50	23420307.....122	23420475.....117
23060208.....59	23090151.....50	23420307.....126	23420475.....122
23060209.....59	23090152.....50	23420316.....121	23420475.....126
23060210.....59	23090153.....50	23420328.....117	23420550.....125
23060210.....59	23090154.....50	23420328.....122	23420551.....125
23060211.....59	23090155.....50	23420328.....126	23420552.....125
23060212.....59	23090156.....50	23420331.....122	23420553.....125
23060244.....59	23090157.....50	23420331.....126	23420554.....125
23060283.....59	23090158.....50	23420333.....122	24020806.....80
23060285.....59	23090159.....50	23420333.....126	24021178.....80
23060289.....59	23090160.....50	23420343.....122	24021219.....92
23060290.....59	23090161.....50	23420343.....126	24021220.....92
23060404.....110	23090162.....50	23420349.....122	24021221.....92
23060405.....110	23090163.....50	23420349.....126	24021222.....92
23060406.....110	23090164.....50	23420350.....122	24021225.....92

PRODUCT INDEX

24021227.....	92	24080060.....	97	24710046.....	98	24720082.....	99
24021815.....	80	24080061.....	97	24710066.....	98	24720083.....	99
24021900.....	80	24080062.....	97	24710066.....	98	24720084.....	99
24022100.....	80	24080063.....	97	24710066.....	98	24720085.....	99
24022101.....	80	24080064.....	97	24710067.....	128	24720086.....	99
24022102.....	80	24080065.....	97	24710101.....	98	24720087.....	99
24022103.....	80	24080066.....	97	24710107.....	128	24720088.....	99
24030029.....	80	24080069.....	97	24710114.....	98	24720089.....	99
24030029.....	91	24080070.....	97	24710129.....	98	24720090.....	99
24030070.....	80	24080071.....	97	24710131.....	98	24720092.....	99
24030070.....	91	24080072.....	97	24710134.....	98	24720096.....	128
24030125.....	80	24080073.....	97	24710139.....	98	24720097.....	128
24030125.....	91	24080074.....	97	24710140.....	98	24720103.....	99
24030126.....	80	24080075.....	97	24710142.....	98	24720104.....	99
24030126.....	91	24080087.....	97	24710143.....	98	24720106.....	99
24030134.....	80	24080088.....	97	24710152.....	98	24720107.....	99
24030134.....	91	24080089.....	97	24710153.....	98	24720108.....	99
24030326.....	80	24080090.....	97	24710154.....	128	24720109.....	99
24030326.....	91	24080091.....	97	24710154.....	98	24720110.....	99
24030380.....	80	24080092.....	97	24710158.....	98	24720111.....	99
24030380.....	91	24080101.....	97	24710162.....	98	24720112.....	99
24030398.....	80	24080102.....	97	24710164.....	98	24720113.....	99
24030398.....	91	24080103.....	97	24710166.....	98	24720114.....	99
24030513.....	104	24080104.....	97	24710169.....	98	24720115.....	99
24030513.....	104	24080229.....	89	24710173.....	98	24720117.....	99
24030514.....	103	24080231.....	89	24720001.....	99	24720125.....	99
24030650.....	110	24080249.....	89	24720002.....	99	24720126.....	99
24030651.....	110	24080260.....	89	24720005.....	99	24720127.....	99
24030652.....	104	24080261.....	89	24720006.....	99	24720128.....	99
24030652.....	104	24080262.....	89	24720007.....	99	24720130.....	99
24030653.....	104	24080263.....	89	24720008.....	99	24720131.....	99
24030653.....	104	24080264.....	89	24720011.....	99	24720132.....	99
24030654.....	104	24080265.....	89	24720012.....	99	24720139.....	128
24030655.....	104	24080266.....	89	24720015.....	99	24720142.....	99
24030656.....	104	24080267.....	89	24720017.....	99	24720166.....	99
24030657.....	104	24080268.....	89	24720020.....	99	24720167.....	99
24030658.....	104	24080269.....	89	24720021.....	99	24720171.....	128
24030658.....	104	24100106.....	79	24720022.....	99	24720172.....	128
24030659.....	104	24100106.....	91	24720026.....	99	24720195.....	128
24030660.....	104	24100121.....	79	24720027.....	99	24720196.....	128
24030661.....	104	24100121.....	92	24720028.....	99	24720197.....	128
24030662.....	104	24100150.....	79	24720029.....	99	24720198.....	128
24030663.....	103	24100150.....	92	24720030.....	99	24720199.....	128
24030664.....	103	24100155.....	79	24720031.....	99	24720201.....	99
24030665.....	103	24100155.....	92	24720039.....	99	24720231.....	99
24030666.....	103	24100158.....	79	24720040.....	99	24720234.....	99
24030667.....	103	24100158.....	91	24720041.....	99	24720237.....	128
24030668.....	103	24100159.....	79	24720042.....	99	24720238.....	128
24030669.....	103	24100159.....	91	24720043.....	99	24720246.....	99
24030670.....	103	24100161.....	79	24720044.....	99	24890002.....	128
24030671.....	103	24100193.....	79	24720045.....	99	24890003.....	128
24080002.....	97	24100198.....	79	24720046.....	99	24890004.....	128
24080003.....	97	24100198.....	79	24720047.....	99	24890005.....	128
24080004.....	97	24100243.....	79	24720048.....	99	24890009.....	128
24080005.....	97	24100243.....	91	24720049.....	99	24890010.....	128
24080006.....	97	24100245.....	79	24720050.....	99	24890018.....	128
24080037.....	97	24100245.....	92	24720051.....	99	24890019.....	128
24080038.....	97	24710009.....	98	24720052.....	99	24890020.....	128
24080039.....	97	24710010.....	98	24720053.....	99	55010001.....	78
24080040.....	97	24710011.....	98	24720054.....	99	55010001.....	90
24080041.....	97	24710016.....	98	24720055.....	99	55010002.....	78
24080042.....	97	24710018.....	98	24720056.....	99	55010002.....	90
24080043.....	97	24710020.....	98	24720057.....	99	55010048.....	104
24080044.....	97	24710020.....	98	24720058.....	99	55010089.....	104
24080045.....	97	24710024.....	98	24720067.....	99	55010305.....	121
24080046.....	97	24710025.....	128	24720068.....	99	55010305.....	126
24080047.....	97	24710025.....	98	24720069.....	99	55010306.....	121
24080048.....	97	24710025.....	98	24720070.....	99	55010306.....	126
24080049.....	97	24710028.....	98	24720075.....	99	55010307.....	121
24080050.....	97	24710028.....	98	24720076.....	99	55010307.....	126
24080051.....	97	24710033.....	98	24720077.....	99	55010308.....	121
24080052.....	97	24710038.....	98	24720078.....	99	55010308.....	126
24080059.....	97	24710043.....	98	24720081.....	99	55010351.....	120

PRODUCT INDEX

55010367.....	117
55010367.....	126
55010436.....	120
55010710.....	129
55010711.....	129
55030011.....	78
55030018.....	49
55030018.....	58
55030018.....	89
55030018.....	90
55030019.....	49
55030019.....	58
55030019.....	90
55030062.....	49
55030062.....	58
55030062.....	90
55030113.....	89
55030117.....	125
55030117.....	125
55030118.....	120
55030118.....	125
55030118.....	125
55030144.....	125
55030144.....	125
55030174.....	49
55030174.....	58
55030174.....	90
55030220.....	116
55030220.....	120
55030220.....	125
55030220.....	125
55030252.....	120
55030261.....	120
55030261.....	125
55030262.....	120
55030262.....	125
55030482.....	89
55030491.....	119
55030535.....	89
55030570.....	116
55030574.....	119
55030575.....	119
55030576.....	119
55030577.....	119
55030578.....	111
55030579.....	124
55030580.....	124
55030581.....	124
55030582.....	124
55030583.....	124
55030584.....	125
55030585.....	125
55030586.....	125
55390017.....	104
61990039.....	99
61990104.....	99
62080004.....	54
62080006.....	55
62080007.....	55
62080008.....	55
62080011.....	54
62080012.....	55
62080017.....	55
62080018.....	55
62080021.....	54
62080022.....	54
62080023.....	54
62080024.....	54
62080025.....	54
62080026.....	54
62080028.....	54
62080029.....	55
62080030.....	55
62080031.....	55
62080049.....	55
62080052.....	54



WARRANTY

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

WARRANTY

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.

CONTACT INFORMATION

Global Headquarters

Boart Longyear
2570 West 1700 South
Salt Lake City, Utah 84104
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





**BOART
LONGYEAR™**

**BOART
LONGYEAR**