BOART LONGYEAR™

JET GROUTING TOOLS

DOUBLE TYPE/ TRIPLE TYPE

11/2025

CONTENT

JET GROUTING DRILLING

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.

DOUBLE TUBE SYSTEM

FLUSHING HEAD (1+2)
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.
The JG Head consits of basic head and a flange to connect the drill rod.
Flushing heads are mounted to a flushing head carrier which allows the head to move up the mast extension on the rig.

ROD (3)
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) (4)
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 (5)
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 (6)
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.

AIR NOZZLE (7)
The air nozzles mounted in the valve fastener are the exit point for the low-pressure phase into the grouting zone. The compressed air reduces the spray effect, resulting in a more focused, piercing jet.

ROTARY BIT (8)
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.

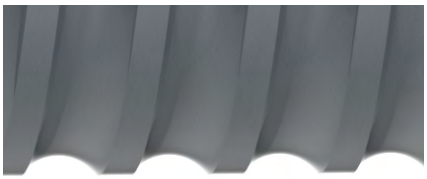
INJECTION NOZZLE (5)
The grout injection nozzles mounted in the valve fastener are the exit point for the pressure grout into the grouting zone and the air shrouded high-pressure water jet for the ground cuttings and mix. Injection nozzles are constructed with a tungsten carbide body with a threaded 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.

AIR NOZZLE (6)
The air nozzles mounted in the valve fastener are the exit point for the low-pressure phase into the grouting zone. The compressed air reduces the spray effect, resulting in a more focused, piercing jet.

ROTARY BIT (7)
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.

THREADS- JET GROUTING RODS

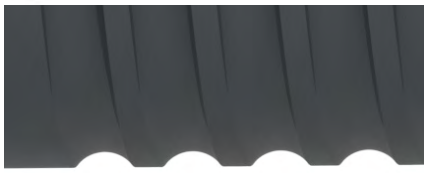
Boart Longyear offers a variety of thread types designed for jet grouting applications:



CYLINDRICAL

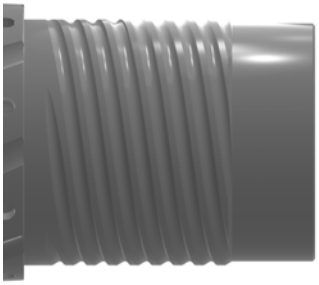
Cylindrical threads are characterized by a parallel wall design which means that the rod must be completely unscrewed prior to separating the joint.

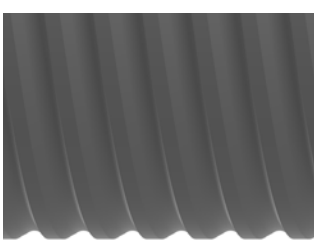
Cylindrical threads are the most common threads utilized for reusable overburden rotary-percussive casing and inner rods.



CONICAL

Conical threads are similar in thread form and appearance to cylindrical threads except that there is a 0.5° – 1.0° angle in the thread form giving the thread ends a slight conical shape. It will require fewer turns to open and separate a conical thread joint due.





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 concentration of the clamping stresses at the base of the male thread. The TWIN DRIVE™ thread form distributes the clamping load along the full length resulting in lower stresses at any given point in the thread. This means that it takes much less torque to make and break the rod joint and provides up to 40% additional tooling 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™ threads reduce stress, are easier to uncouple, have a higher loading capacity, are more leak resistant of flushing substances, and offer reduced susceptibility to corrosion.

Protected by European Patent No. 1117897 in Austria, Germany, Italy, Switzerland, United Kingdom, Korea Patent No. 10-0556271, Japan Patent No. 3961769

SEALING POSITIONS- JET GROUTING RODS

JET GROUTING ROD DOUBLE TYPE	SEALINGS ON PIN ENDS

JET GROUTING ROD TRIPLE TYPE Ø133	SEALINGS ON PIN ENDS

JET GROUTING ROD TRIPLE TYPE	SEALINGS ON BOX END MIDDLE AND INNER ROD

FLUSHING HEAD- DESIGN, DOUBLE TYPPE

HIGHLIGHTS

- Easy maintenance
- Improved lubrication
- Compact construction
  - -Slim design
  - -Reduced length
  - -less weight
- Modular concept
- Easy changeover 89 to 114
- Reduced spare parts inventory

VALVE FASTENER- MONITOR, DOUBLE TYPE

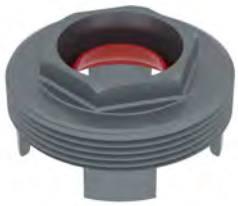
AUTOMATIC VALVE

Smaller than rod dia. Ø114.3

Larger than rod dia. Ø114.3

AIR NOZZLES

Standard type



Sealed type

DRILL BITS DESIGN

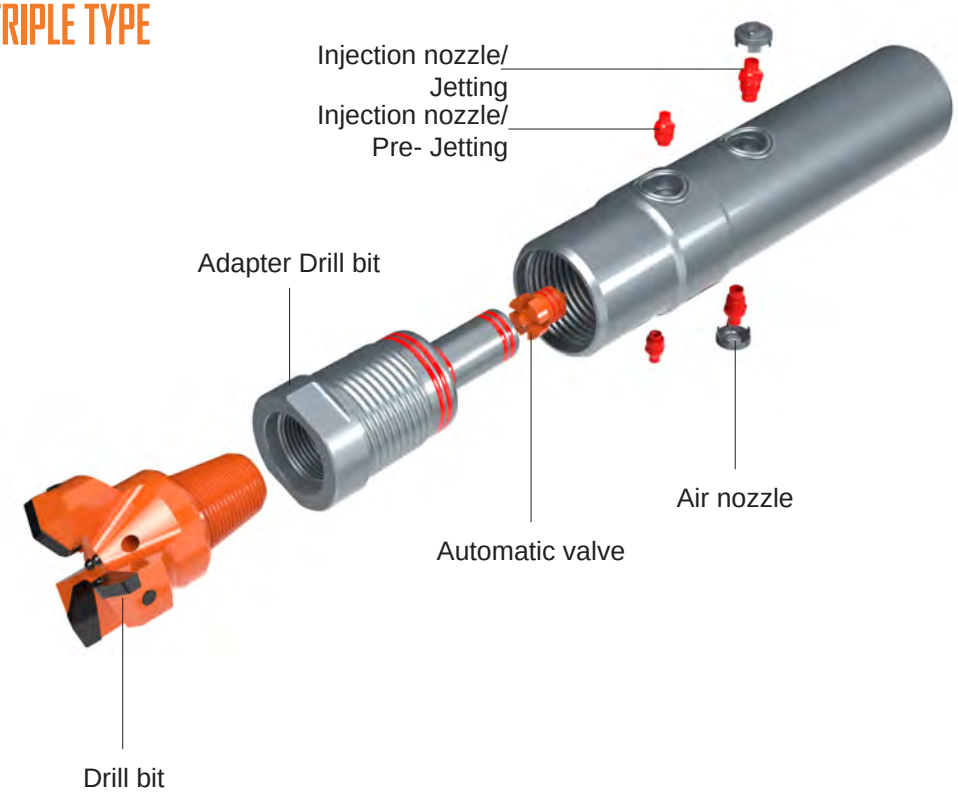
GDU- TYPE	DRAG BIT	WELDED TYPE	REAMING BIT
			
			

FLUSHING HEAD- DESIGN, TRIPLE TYPE

HIGHLIGHTS

- Easy maintenance
- Improved lubrication
- Compact construction
- Modular concept

VALVE FASTENER- MONITOR, TRIPLE TYPE



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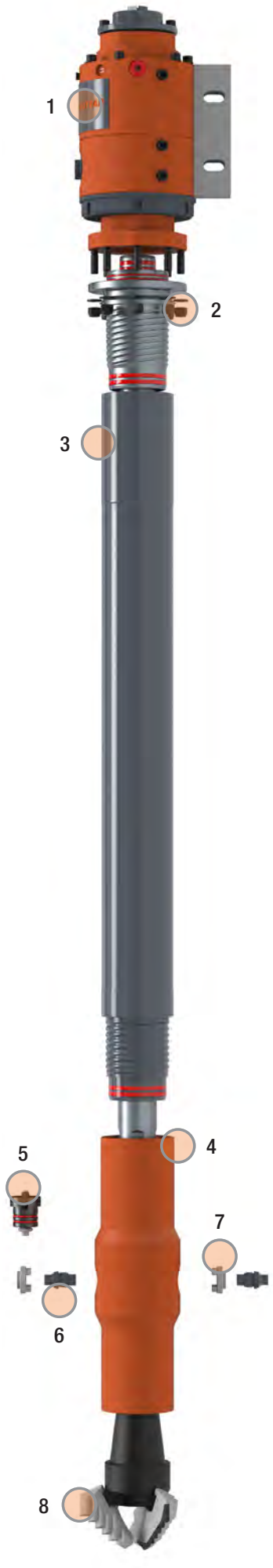
DRILLING SYSTEM- DOUBLE TYPE

Ø88.9

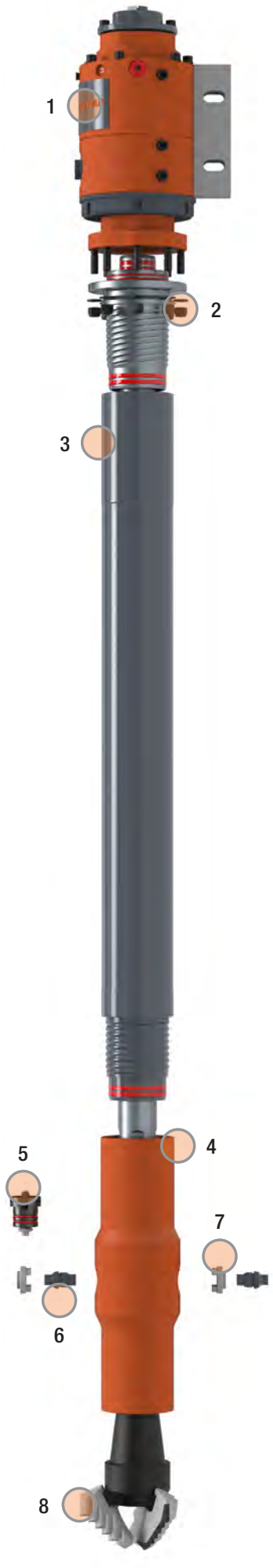
Ø88.9 CONICAL

JET GROUTING- DRILLING SYSTEM DOUBLE TYPE, Ø88.9 CONICAL RH						
DESCRIPTION	NO	QTY	PART NO.	EFFECTIVE LENGTH , DIMENSION (mm)	THREAD	NOTES
FLUSHING HEAD, COMPLETE	1 -2		23410327		Ø88.9 CONICAL, RH	
FLUSHING HEAD, BASIC TYPE	1	1	23410310			
SEAL KIT, FLUSHING HEAD- BASIC TYPE		1	23410335			
BEARING KIT, FLUSHING HEAD- BASIC TYPE		1	23410343			
FLANGE, COMPLETE	2		23410312		Ø88.9 CONICAL, RH	
SEAL KIT, FLANGE		1	23410344			
MOUNTING BRACKET		1	23410341			
ROD, JET GROUTING	3		21050167	500	Ø88.9 CONICAL, RH	
			21050124	1000		
			21050173	1500		
			21050145	2000		
			21050161	3000		
RETAINING RING		1	55010351			
SEALS, INNER TUBE		2	55030118			SPECIAL TYPE
VALVE FASTENER (MONITOR)	1		23420375		API 2 7/8 REG SHORT TYPE (BIT)	THREAD- NOZZLES M22 X1.5, M40X1.5
SEALS, MONITOR		2	55030118			SPECIAL TYPE
AUTOMATIC VALVE	5	1	23420097	ATTENTION: COMPRESSION SPRINGS ARE NOT INCLUDED/ PLEASE ORDER SEPERATELY		
SPRING KIT		1	55010367			
INJECTION NOZZLE (STANDARD ORIFICE)	6	2	23420385	Ø2.5	M22 X 1.5, RH	
			23420362	Ø3.0		
			23420297	Ø3.5		
			23420328	Ø4.0		
			23420299	Ø4.5		
			23420300	Ø5.0		
			23420307	Ø5.5		
			23420366	Ø6.0		
			ON REQUEST	SPECIAL ID		
AIR NOZZLE	7	2	23420027	ID Ø15.5	M40 X 1.5, RH	STANDARD
			23420475	ID Ø12.6		SEALED
ROTARY BIT	8		22330003	Ø127	API 2 7/8 REG SHORT TYPE	GDU- TYPE
			22330007	Ø127		DRAG BIT
			22380120	Ø150		REAMER
			22380072	Ø180		
			22380085	Ø200		



Ø88.9 TWIN DRIVE

JET GROUTING- DRILLING SYSTEM DOUBLE TYPE, Ø88.9 TWIN DRIVE RH						
DESCRIPTION	NO	QTY	PART NO.	EFFECTIVE LENGTH , DIMEN-SION (mm)	THREAD	NOTES
FLUSHING HEAD, COMPLETE	1 -2		23410333		Ø88.9 TWIN DRIVE, RH	
FLUSHING HEAD, BASIC TYPE	1	1	23410310			
SEAL KIT, FLUSHING HEAD- BASIC TYPE		1	23410335			
BEARING KIT, FLUSHING HEAD- BASIC TYPE		1	23410343			
FLANGE, COMPLETE	2		23410331		Ø88.9 TWIN DRIVE, RH	
SEAL KIT, FLANGE		1	23410345			
MOUNTING BRACKET		1	23410341			
ROD, JET GROUTING	3		21050267	500	Ø88.9 TWIN DRIVE, RH	
			21050136	1000		
			21050292	1500		
			21050176	2000		
			21050135	3000		
RETAINING RING		1	55010351			
SEALS, OUTER TUBE		1	55030220			SPECIAL TYPE
SEALS, INNER TUBE		2	55030118			SPECIAL TYPE
VALVE FASTENER (MONITOR)	1		23420360		API 2 7/8 REG SHORT TYPE (BIT)	THREAD- NOZZLES M22 X1.5, M40X1.5
SEALS, MONITOR		2	55030118			SPECIAL TYPE
AUTOMATIC VALVE	5	1	23420097	ATTENTION: COMPRESSION SPRINGS ARE NOT INCLUDED/ PLEASE ORDER SEPERATELY		
SPRING KIT		1	55010367			
INJECTION NOZZLE (STANDARD ORIFICE)	6	2	23420385	Ø2.5	M22 X 1.5, RH	
			23420362	Ø3.0		
			23420297	Ø3.5		
			23420328	Ø4.0		
			23420299	Ø4.5		
			23420300	Ø5.0		
			23420307	Ø5.5		
			23420366	Ø6.0		
			ON REQUEST	SPECIAL ID		
AIR NOZZLE	7	2	23420027	Ø15.5	M40 X 1.5, RH	STANDARD
			23420475	Ø12.6		SEALED
ROTARY BIT	8		22330003	Ø127	API 2 7/8 REG SHORT TYPE	GDU- TYPE
			22330007	Ø127		DRAG BIT
			22380120	Ø150		REAMER
			22380072	Ø180		
			22380085	Ø200		



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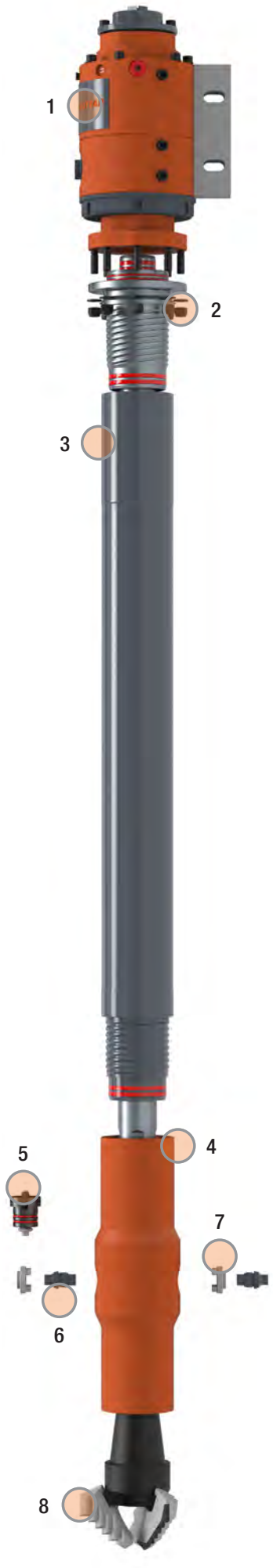
DRILLING SYSTEM- DOUBLE TYPE

Ø114.3

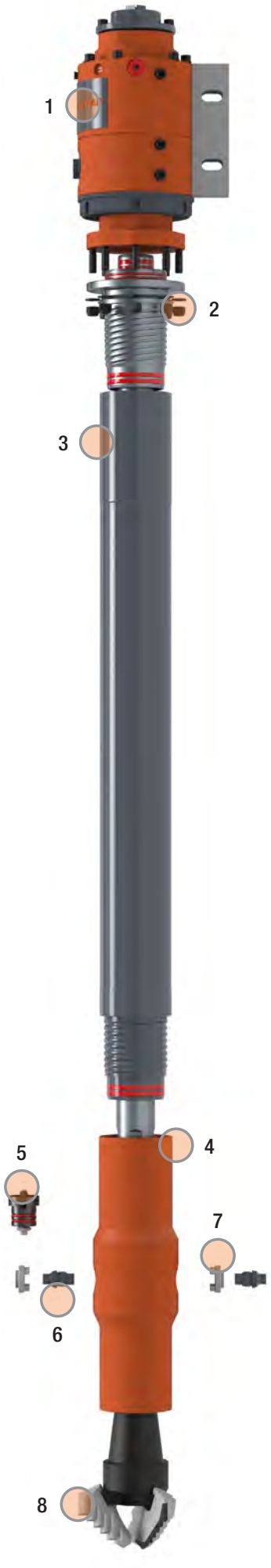
Ø114.3 CYLINDRICAL

JET GROUTING- DRILLING SYSTEM DOUBLE TYPE, Ø114.3 CYLINDRICAL RH						
DESCRIPTION	NO	QTY	PART NO.	EFFECTIVE LENGTH , DIMENSION (MM)	THREAD	NOTES
FLUSHING HEAD, COMPLETE	1 -2		23410334		Ø114.3 CYLINDRICAL, RH	
FLUSHING HEAD, BASIC TYPE	1	1	23410310			
SEAL KIT, FLUSHING HEAD- BASIC TYPE		1	23410335			
BEARING KIT, FLUSHING HEAD- BASIC TYPE		1	23410343			
FLANGE, COMPLETE	2		23410332		Ø114.3 CYLINDRICAL, RH	
SEAL KIT, FLANGE		1	23410346			
MOUNTING BRACKET		1	23410341			
ROD, JET GROUTING	3		21050584	500	Ø114.3 CYLINDRICAL, RH	
			21050516	1000		
			21050585	1500		
			21050517	2000		
			21050518	3000		
RETAINING RING		1	55010436			
SEALS, OUTER TUBE		2	55030262			SPECIAL TYPE
SEALS, INNER TUBE		2	55030261			SPECIAL TYPE
VALVE FASTENER (MONITOR)	1		23420316		API 3 1/2 REG (BIT)	THREAD- NOZZLES M24 X 1.5, M44 X 1.5, RH
AUTOMATIC VALVE	5	1	23420167	ATTENTION: COMPRESSION SPRINGS ARE NOT INCLUDED/ PLEASE ORDER SEPERATELY		
SPRING KIT		1	55010367			
INJECTION NOZZLE (STANDARD ORIFICE)	6	2	23420436	Ø2.5	M24 X 1.5, RH	
			23420439	Ø3.0		
			23420272	Ø3.5		
			23420265	Ø4.0		
			23420266	Ø4.5		
			23420331	Ø5.0		
			23420350	Ø5.5		
			23420410	Ø6.0		
			ON REQUEST	SPECIAL ID		
AIR NOZZLE	7	2	23420264	Ø19	M44 X 1.5, RH	STANDARD
			23420474	Ø16.6		SEALED
ROTARY BIT	8		22330019	Ø140	API 3 1/2 REG	GDU- TYPE
			22330021	Ø150		
			22310209	Ø165		
			22330135	Ø160		DRAG BIT
			22330134	Ø160		WELDED TYPE
			22380072	Ø200		REAMER
			22380085	Ø240		



Ø114.3 TWIN DRIVE

JET GROUTING- DRILLING SYSTEM DOUBLE TYPE, Ø114.3 TWIN DRIVE RH						
DESCRIPTION	NO	QTY	PART NO.	EFFECTIVE LENGTH , DIMENSION (MM)	THREAD	NOTES
FLUSHING HEAD, COMPLETE	1 -2		23410326		Ø114.3 TWIN DRIVE, RH	
FLUSHING HEAD, BASIC TYPE	1	1	23410310			
SEAL KIT, FLUSHING HEAD- BASIC TYPE		1	23410335			
BEARING KIT, FLUSHING HEAD- BASIC TYPE		1	23410343			
FLANGE, COMPLETE	2		23410332		Ø114.3 TWIN DRIVE, RH	
SEAL KIT, FLANGE		1	23410346			
MOUNTING BRACKET		1	23410341			
ROD, JET GROUTING	3		21050268	500	Ø114.3 TWIN DRIVE, RH	
			21050273	1000		
			21050407	1500		
			21050221	2000		
			21050222	3000		
RETAINING RING		1	55010436			
SEALS, OUTER TUBE		2	55030262			SPECIAL TYPE
SEALS, INNER TUBE		2	55030261			SPECIAL TYPE
VALVE FASTENER (MONITOR)	1		23420437		API 3 1/2 REG (BIT)	THREAD- NOZZLES M24 X 1.5, M44 X 1.5, RH
AUTOMATIC VALVE	5	1	23420167	ATTENTION: COMPRESSION SPRINGS ARE NOT INCLUDED/ PLEASE ORDER SEPERATELY		
SPRING KIT		1	55010367			
INJECTION NOZZLE (STANDARD ORIFICE)	6	2	23420436	Ø2.5	M24 X 1.5, RH	
			23420439	Ø3.0		
			23420272	Ø3.5		
			23420265	Ø4.0		
			23420266	Ø4.5		
			23420331	Ø5.0		
			23420350	Ø5.5		
			23420410	Ø6.0		
			ON REQUEST	SPECIAL ID		
AIR NOZZLE	7	2	23420264	Ø19	M44 X 1.5, RH	STANDARD
			23420474	Ø16.6		SEALED
ROTARY BIT	8		22330019	Ø140	API 3 1/2 REG	GDU- TYPE
			22330021	Ø150		
			22310209	Ø165		
			22330135	Ø160		DRAG BIT
			22330134	Ø160		WELDED TYPE
			22380072	Ø200		REAMER
			22380085	Ø240		



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DRILLING SYSTEM- TRIPLE TYPE

Ø114.3

Ø114.3 CONICAL

JET GROUTING- DRILLING SYSTEM TRIPLE TYPE, Ø114.3 CONICAL RH						
DESCRIPTION	NO	QTY	PART NO.	EFFECTIVE LENGTH , DIMENSION (MM)	THREAD	NOTES
FLUSHING HEAD, COMPLETE	1		23410371		Ø114.3 CONICAL, RH	
SEAL KIT, FLUSHING HEAD- BASIC TYPE		1	23410386			
BEARING KIT, FLUSHING HEAD- BASIC TYPE		1	23410387			
ROD, JET GROUTING	2		21050580	500	Ø114.3 CONICAL, RH	
			21050558	1000		
			21050559	2000		
			21050560	3000		
RETAINING RING		1	55010743			
SAFETY RING		1	55010742			
SEALS, MIDDLE TUBE		2	55030611			SPECIAL TYPE
SEALS, INNER TUBE		2	55030610			SPECIAL TYPE
VALVE FASTENER (MONITOR)	3		23420608		API 3 1/2 REG (BIT)	PRE- JETTING TYPE
AUTOMATIC VALVE	4	1	23420167	ATTENTION: COMPRESSION SPRINGS ARE NOT INCLUDED/ PLEASE ORDER SEPERATELY		
SPRING KIT		1	55010367			
INJECTION NOZZLE (STANDARD ORIFICE)	5	2	M24 X 1.5, RH	ID	M22 X 1.5, RH	
			23420436	Ø2.5	23420385	
			23420439	Ø3.0	23420362	
			23420272	Ø3.5	23420297	
			23420265	Ø4.0	23420328	
			23420266	Ø4.5	23420299	
			23420331	Ø5.0	23420300	
			23420350	Ø5.5	23420307	
			23420410	Ø6.0	23420366	
			ON REQUEST	SPECIAL ID	ON REQUEST	
AIR NOZZLE	6	2	23420264	Ø19	M44 X 1.5, RH	STANDARD
			23420474	Ø16.6		SEALED
ROTARY BIT	7		22330019	Ø140	API 3 1/2 REG	GDU- TYPE
			22330021	Ø150		
			22310209	Ø165		
			22330135	Ø160		DRAG BIT
			22330134	Ø160		WELDED TYPE
			22380072	Ø200		REAMER
			22380085	Ø240		

Ø114.3 TWIN DRIVE

JET GROUTING- DRILLING SYSTEM TRIPLE TYPE, Ø114.3 TWIN DRIVE RH						
DESCRIPTION	NO	QTY	PART NO.	EFFECTIVE LENGTH , DIMENSION (MM)	THREAD	NOTES
FLUSHING HEAD, COMPLETE	1		23410425		Ø114.3 TWIN DRIVE, RH	
SEAL KIT, FLUSHING HEAD- BASIC TYPE		1	23410386			
BEARING KIT, FLUSHING HEAD- BASIC TYPE		1	23410387			
ROD, JET GROUTING	2		21050716	500	Ø114.3 TWIN DRIVE, RH	EXTERNAL SEALS
			21050712	1000		
			21050714	2000		
			21050715	3000		
RETAINING RING		1	55010743			
SAFETY RING		1	55010742			
SEALS, OUTER TUBE		2	55030642			SPECIAL TYPE
SEALS, MIDDLE TUBE		2	55030670			
SEALS, INNER TUBE		2	55030669			
VALVE FASTENER (MONITOR)	3		23420608		API 3 1/2 REG (BIT)	PRE- JETTING TYPE
AUTOMATIC VALVE	4	1	23420167	ATTENTION: COMPRESSION SPRINGS ARE NOT INCLUDED/ PLEASE ORDER SEPERATELY		
SPRING KIT		1	55010367			
INJECTION NOZZLE (STANDARD ORIFICE)	5	2	M24 X 1.5, RH	ID	M22 X 1.5, RH	
			23420436	Ø2.5	23420385	
			23420439	Ø3.0	23420362	
			23420272	Ø3.5	23420297	
			23420265	Ø4.0	23420328	
			23420266	Ø4.5	23420299	
			23420331	Ø5.0	23420300	
			23420350	Ø5.5	23420307	
			23420410	Ø6.0	23420366	
			ON REQUEST	SPECIAL ID	ON REQUEST	
AIR NOZZLE	6	2	23420264	Ø19	M44 X 1.5, RH	STANDARD
			23420474	Ø16.6		SEALED
ROTARY BIT	7		22330019	Ø140	API 3 1/2 REG	GDU- TYPE
			22330021	Ø150		
			22310209	Ø165		
			22330135	Ø160		DRAG BIT
			22330134	Ø160		WELDED TYPE
			22380072	Ø200		REAMER
			22380085	Ø240		

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DRILLING SYSTEM- TRIPLE TYPE

Ø133

Ø133 CYLINDRICAL

JET GROUTING- DRILLING SYSTEM TRIPLE TYPE, Ø133 CYLINDRICAL RH						
DESCRIPTION	NO	QTY	PART NO.	EFFECTIVE LENGTH , DIMENSION (MM)	THREAD	NOTES
FLUSHING HEAD, COMPLETE	1		23410415		Ø133 CYLINDRICAL, RH	
SEAL KIT, FLUSHING HEAD- BASIC TYPE		1	23410386			
BEARING KIT, FLUSHING HEAD- BASIC TYPE		1	23410387			
ROD, JET GROUTING	2		2105	500	Ø133 CYLINDRICAL, RH	EXTERNAL SEALS
			21050682	1000		
			21050683	2000		
			21050684	3000		
RETAINING RING		1	55010743			
SAFETY RING		1	55010742			
SEALS, OUTER TUBE		2	55030660			SPECIAL TYPE
SEALS, MIDDLE TUBE		2	55030661			
SEALS, INNER TUBE		2	55030261			
VALVE FASTENER (MONITOR)	3		23420592		API 3 1/2 REG (BIT)	PRE- JETTING TYPE
AUTOMATIC VALVE	4	1	23420167	ATTENTION: COMPRESSION SPRINGS ARE NOT INCLUDED/ PLEASE ORDER SEPERATELY		
SPRING KIT		1	55010367			
INJECTION NOZZLE (STANDARD ORIFICE)	5	2	M24 X 1.5, RH	ID	M22 X 1.5, RH	
			23420436	Ø2.5	23420385	
			23420439	Ø3.0	23420362	
			23420272	Ø3.5	23420297	
			23420265	Ø4.0	23420328	
			23420266	Ø4.5	23420299	
			23420331	Ø5.0	23420300	
			23420350	Ø5.5	23420307	
			23420410	Ø6.0	23420366	
			ON REQUEST	SPECIAL ID	ON REQUEST	
AIR NOZZLE	6	2	23420264	ID Ø19	M44 X 1.5, RH	STANDARD
			23420474	ID Ø16.6		SEALED
ROTARY BIT	7		22310242	Ø165	API 3 1/2 REG	GDU- TYPE
			22310248	Ø180		
			22310209	Ø190		
			22330134	Ø160		DRAG BIT
			22330073	Ø180		
			22330074	Ø190		
			22330134	Ø160		WELDED TYPE
			22320248	Ø180		
			22320249	Ø190		
			22380098	Ø200		REAMER
			22380124	Ø240		
			22380127	Ø300		

TOOLS, ACCESSORIES

TOOLS, ACCESSORIES

FISHING TOOLS

FISHING SPEAR		
ROD OUTER Ø	CONICAL	CYLINDRICAL
88.9 MM	24720096	NA
114.3 MM	NA	24720139
133 MM	NA	24720274

FISHING BELL		
ROD OUTER Ø	CONICAL	CYLINDRICAL
88.9 MM	24720097	NA
114.3 MM	NA	24720195
133 MM	NA	24720275

MANUAL WRENCH

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

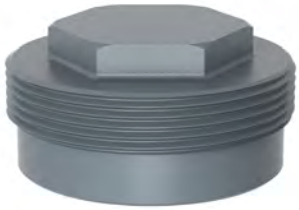
ASSEMBLING/ DISASSEMBLING JET GROUTING RODS

ASSEMBLY TOOLS (KIT)			
ROD OUTER Ø	FEATURE		PART NUMBER
88.9 MM	RETAINING RING (ROD)	DOUBLE TYPE	24890002
114.3 MM			24890010
		TRIPLE TYPE	24890043
133 MM			24890045

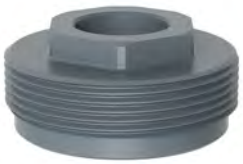
DISASSEMBLY TOOLS (KIT)			
ROD OUTER Ø	FEATURE		PART NUMBER
88.9 MM	RETAINING RING (ROD)	DOUBLE TYPE	24890005
114.3 MM			24890008
		TRIPLE TYPE	24890028
133 MM			24890046

PLUGS (MONITOR)

GROUT NOZZLE PLUG	
THREAD NOZZLE	PART NO.
M22X 1.5MM	55010711
M24X 1.5MM	55010710



AIR NOZZLE PLUG (CLOSES ALL PHASES)	
THREAD NOZZLE	PART NO.
M40X 1.5MM	23420023
M44X 1.5MM	23420270



AIR PHASE STOP-PLUG (INJECTION PHASE OPENED)	
THREAD NOZZLE	PART NO.
M40X 1.5MM	23420110
M44X 1.5MM	23420399

TOOLS, ASSEMBLING/ DISASSEMBLING FLUSHING HEAD DOUBLE TYPE

ASSEMBLY / DISASSEMBLY TOOLS		
ROD OUTER Ø	FEATURE	PART NUMBER
BASIC TYPE	HOUSING, ROTARY SHAFT SEAL, JET GROUTING FLUSHING HEAD	24890032

ASSEMBLY / DISASSEMBLY TOOLS		
ROD OUTER Ø	FEATURE	PART NO
BASIC TYPE	INNER ROD CONNECTOR, JET GROUTING FLUSHING HEAD	24890033

TOOLS, LIFTING DEVICE FLUSHING HEAD- DOUBLE AND TRIPLE TYPE

ASSEMBLY / DISASSEMBLY TOOLS		
ROD OUTER Ø	FEATURE	PART NO
BASIC TYPE- JET GROUTING DOUBLE TYPE	LIFTING DEVICE	23410366
JET GROUTING TRIPLE TYPE		

WARRANTY

Limited Warranty.

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

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

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

WARRANTY

(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.

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