

**REV 01-DEC-04**

- **Diamond Products**
- **Core Barrels**
- **Overshots**
- **Drill Rods**
- **Water Swivels**
- **Hoisting Plugs**
- **Casing**
- **Recovery Tools**
- **Adapter Subs**
- **Conversion Kits**
- **Tools**
- **Technical Data**
- **Safety Poster**



## Diamond Products

- Impregnated Bits
- Reaming Shells
- Casing Shoes
- Casing Bits
- Bit and Shell Gauges
- Options and Specialty  
Diamond Products

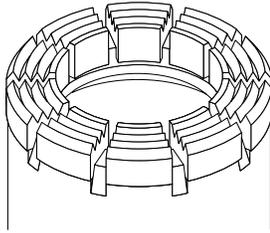
**NOTE:** Surface Set Bits are available on request.

# Impregnated Bits

## AlphaBit™

Boart Longyear introduces metal coated diamond impregnated bits - the latest in industrial diamond technology.

- Significantly outperforms the successful Series range in both drilling speed and bit life.
- Protects the diamond from oxidation and surface degradation during manufacturing.
- Inhibits the premature "pull-out" of the diamond.
- Increases the number of cutting edges exposed to the rock.
- Available in multiple standard configurations and selected on the basis of relative rock hardness and ground conditions.

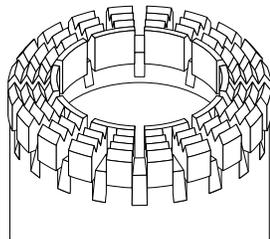


**Standard:** Designed to handle a wide variety of formations.

**Abrasive:** Recommended for broken "abrasive" drilling conditions. For harder rock with broken conditions use a higher number bit to maintain good drilling speeds.

**Competent:** Free cutting design for fast penetration in very hard "competent" rock or for use on lower powered rigs and geotechnical applications.

**Express Geometry:** Bits are supplied with additional intermediate waterways which provide increased flushing. The reduced bit face area allows for higher penetration rates with less bit weight required. Recommended when polishing occurs with standard geometry.

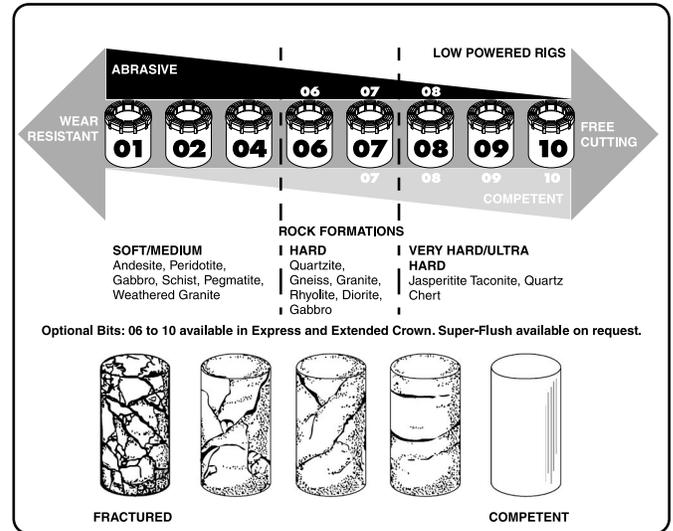


**NOTE:** "Standard Gauge" bits are defined as having a set outside diameter which is 0.56mm (0.022") smaller than "Reaming Shell Gauge". For more detailed information on "Standard Gauge vs Reaming Shell Gauge" impregnated bits, refer to the ITHT Product Manual.

PQ Impregnated Bits		
	Standard Geometry	Reaming Shell Geometry
Alpha01	*	*
Alpha01 Abrasive	*	*
Alpha02	4052474	4050296
Alpha04	*	*
Alpha06	*	*
Alpha06 Abrasive	*	*
Alpha07	*	*
Alpha07 Abrasive	*	*
Alpha07 Competent	*	*
Alpha08	*	*
Alpha08 Abrasive	*	*
Alpha08 Competent	*	*
Alpha09	*	*
Alpha09 Competent	*	*
Alpha10	*	*
Alpha10 Competent	*	*

\* Available on special request.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual or the Diamond Products Field Manual for additional operating information.

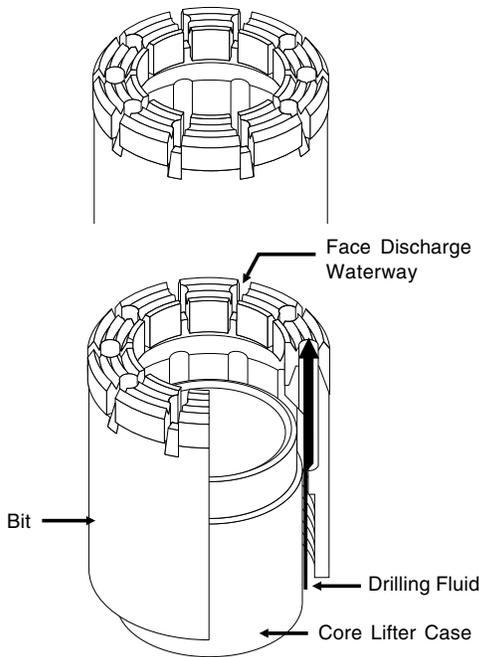


# Impregnated Bits

## AlphaBit™

Boart Longyear introduces metal coated diamond impregnated bits - the latest in industrial diamond technology.

- Significantly outperforms the successful Series range in both drilling speed and bit life.
- Protects the diamond from oxidation and surface degradation during manufacturing.
- Inhibits the premature "pull-out" of the diamond.
- Increases the number of cutting edges exposed to the rock.
- Available in multiple standard configurations and selected on the basis of relative rock hardness and ground conditions.
- Triple-tube bits are used with Boart Longyear triple-tube core barrels. The design of the face discharge waterways and core lifter case forces the drilling fluid to the bit face. Core can be recovered and inspected in a virtually undisturbed condition.



**Standard:** Designed to handle a wide variety of formations.

**Abrasive:** Recommended for broken "abrasive" drilling conditions. For harder rock with broken conditions use a higher number bit to maintain good drilling speeds.

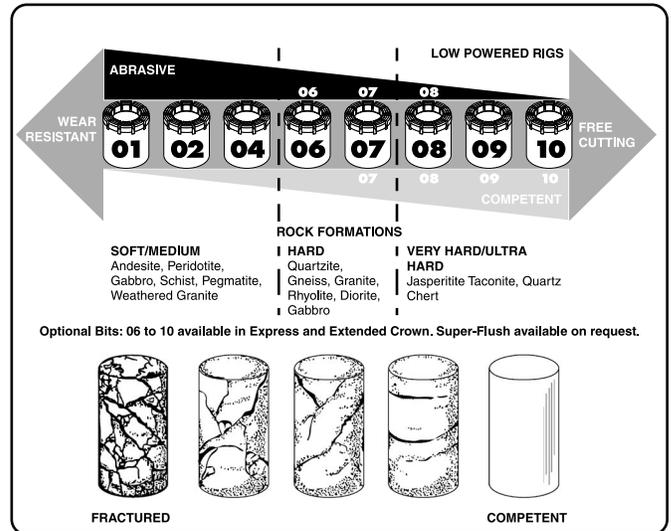
**Competent:** Free cutting design for fast penetration in very hard "competent" rock or for use on lower powered rigs and geotechnical applications.

**NOTE:** "Standard Gauge" bits are defined as having a set outside diameter which is 0.56mm (0.022") smaller than "Reaming Shell Gauge". For more detailed information on "Standard Gauge vs Reaming Shell Gauge" impregnated bits, refer to the ITHT Product Manual.

PQ3 Impregnated Bits		
	Standard Geometry	Reaming Shell Geometry
Alpha01	*	4050880
Alpha01 Abrasive	*	*
Alpha02	*	4050303
Alpha04	*	4051263
Alpha06	*	*
Alpha06 Abrasive	*	*
Alpha07	*	*
Alpha07 Abrasive	*	*
Alpha07 Competent	*	*
Alpha08	*	*
Alpha08 Abrasive	*	*
Alpha08 Competent	*	*
Alpha09	*	*
Alpha09 Competent	*	*
Alpha10	*	*
Alpha10 Competent	4052590	*

\* Available on special request.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual or the Diamond Products Field Manual for additional operating information.



# Reaming Shells

The recommended practice is to alternate two reaming shells in each hole drilled to maintain hole diameter. Upon bit changes, the reaming shell should be checked for wear with the bit and shell wear gauge. Failure to observe these recommended practices will result in either a poorly stabilized bit or an undersized hole that will require costly reaming.

Reaming Shells - Sourced from Americas	
PQ/PQ3 Standard Reaming Shell	3522862

Reaming Shells - Sourced from Australasia	
PQ/PQ3 Heavy Duty Impregnated	4102770
PQ/PQ3 Adaptor Coupling Impregnated	4103690
PQ/PQ3 Surface Set	4102395
PQ/PQ3 Adaptor Coupling Surface Set	4102435
PQ/PQ3 Rod Line Surface Set	**

Reaming Shells - Sourced from Europe	
PQ/PQ3 Impregnated	49450
PQ/PQ3 Surface Set	48797
PQ/PQ3 Premium Stabilized	**

Reaming Shells - Sourced from South Africa	
PQ Ringset	**

\*\* Available on special request.

**NOTE:** Refer to the ITH Product Manual or the Diamond Products Field Manual for additional operating information.

# Casing Shoes

## Casing Shoe

The inside diameter of the casing shoe is not set with diamonds and is flush with the inside diameter of the casing, permitting free passage of the core barrel past the casing shoe.

## Applications:

- The casing shoe is threaded to the end of the casing string for penetration through overburden.
- Assists in seating the casing into the bedrock, providing a tight seal for the drilling fluids to flow through to the surface.
- Used to ream the casing downward when advancing a casing string in an existing hole with the rod string still in place.

Casing Shoes - Sourced from Australasia	
PW Standard Impregnated	4101564
PW Heavy Duty Impregnated	**
PW Surface Set	**

Casing Advancer Shoes - Sourced from Australasia	
PW Impregnated	**
PW HD 6mm	4101911

Casing Shoes - Sourced from Europe	
PW V-Ring	8177
PW Oversize	49463

\*\* Available on special request.

**NOTE:** Refer to the ITHT Product Manual or the Diamond Products Field Manual for additional operating information.

# Casing Bits

**Casing Bit**

The inside diameter of the casing bit is set with diamonds and is smaller than the casing shoe. It will not permit the passage of the core barrel.

**Applications:**

- Used when deep or difficult overburden is encountered.
- When reaming operations are completed, the casing string is removed from the hole and a casing shoe is substituted for a casing bit before normal drilling operations recommence.

Casing Bits	
PWT V-Ring	509154

Casing Bits - Sourced from Europe	
PWT V-Ring	52742

**NOTE:** Refer to the ITHT Product Manual or the Diamond Products Field Manual for additional operating information.

# Bit and Shell Gauge

## Bit and Shell Wear Gauge

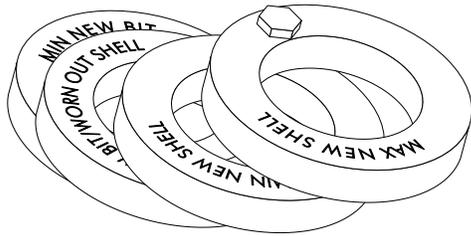
As good practice, the diameter of surface set bits and reaming shells should be measured. This will ensure that the hole size is maintained. All holes should be collared with a full gauge reaming shell. On deeper holes, two or more shells should be alternated in the hole to maintain the hole size. Reaming shells should be gauged every trip out of the hole.

The practice of gauging bits is more common with surface set bits. Impregnated bits typically maintain their gauge until totally consumed.

### Bit and Shell Gauge

PQ/PQ3 Bit and Shell Wear Gauge	102486
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**NOTE:** Refer to the ITHT Product Manual or the Diamond Products Field Manual for additional operating information.



# Options and Specialty Diamond Products

**Hard Facing**

In order to improve the protection of the blank for bits, reaming shell, or casing shoes, three spiral strips of hard tungsten carbide can be applied over the full length of the blank.

**Super Flush Waterways**

Waterways designed to 6.35mm (0.25") width to allow the improved passage of drilling fluids.

**Reinforced Waterways**

For surface set bits, matrix protection can be provided by supplying tungsten carbide inserts on the leading edge of the waterways.

**Extra Hard Matrix**

For more abrasive drilling conditions, an increased erosion resistant matrix is available for surface set bits.

**Non-Coring Bits**

Their design provides reinforcement of the center of the bit to prevent excessive wear of this critical area. Various center designs, including pencil core and crowsfoot types, are available to suit your particular needs. Water courses are carefully engineered to provide fast and complete evacuation of the cuttings produced by this type of tool, thereby increasing the penetration rates in all types of formations and increasing bit life. Other non-coring bits are available for hydroelectric grouting applications.

**Specialty Products**

Boart Longyear manufactures other special products such as polishing bits and hole openers to complete the diamond product line. Contact your Boart Longyear representative for more information.

For your specialty diamond product requirements, please contact your local Boart Longyear representative.

## Core Barrels

- **Surface**
  - PQ
  - PQ3
- **Packaging Information**
- **Assembly Instructions**

**NOTE:** All core barrels will require some assembly upon receipt of shipment. Please refer to Packaging Information and Assembly Instruction sections.



## Core Barrels - PQ

- Core Barrels
- Head Assembly
- Inner Tube Components
- Outer Tube Components
- Extended Core Barrels
- Spare Parts Kit

**NOTE:** All core barrels will require some assembly upon receipt of shipment. Please refer to Packaging Information and Assembly Instructions.

# Core Barrel - PQ

Boart Longyear now offers the Next Q® version of its PQ core barrel for use with HWT 4130 casing/PHD rod. The adapter coupling incorporates HWT/PHD threads for strength and ease of use. It consists of the head assembly (item 1), inner tube components (items 2-5), and outer tube components (items 6-11). The In-The-Hole Tools Product Manual and core barrel Safety Poster are included with all core barrels.

**How to Order:**

To order a standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.

**Options:**

There are alternatives to the standard core barrel which are indicated by a "■". To view these options refer to the head assembly, inner tube components and/or outer tube components sections.

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from the head assembly, inner tube components and/or outer tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.

Core Barrels				kg	lbs
1-13	3543865	PQ Core Barrel	1.5 m / 5 ft	—	—
1-13	3543866	PQ Core Barrel	3.0 m / 10 ft	—	—

Standard Configuration				Qty	
1	3543806	PQ Head Assembly*			1
2	26159	Inner Tube, 1.5 m / 5 ft		■	1
2	26534	Inner Tube, 3.0 m / 10 ft		■	1
3	26161	Stop Ring			1
4	26162	Fluted Core Lifter			1
5	52172	Core Lifter Case			1
6	101343	HWT/PHD Conventional Tanged Locking Coupling		■	1
7	3543808	Adapter Coupling		■	1
8	3543814	Landing Ring			1
9	3543802	Outer Tube, 1.5 m / 5 ft		■	1
9	3543801	Outer Tube, 3.0 m / 10 ft		■	1
10	44923	Inner Tube Stabilizer			1
11	26168	Thread Protector			1
12	3541994	ITHT Product Manual (not shown)			1
13	306390	Safety Poster (not shown)			1

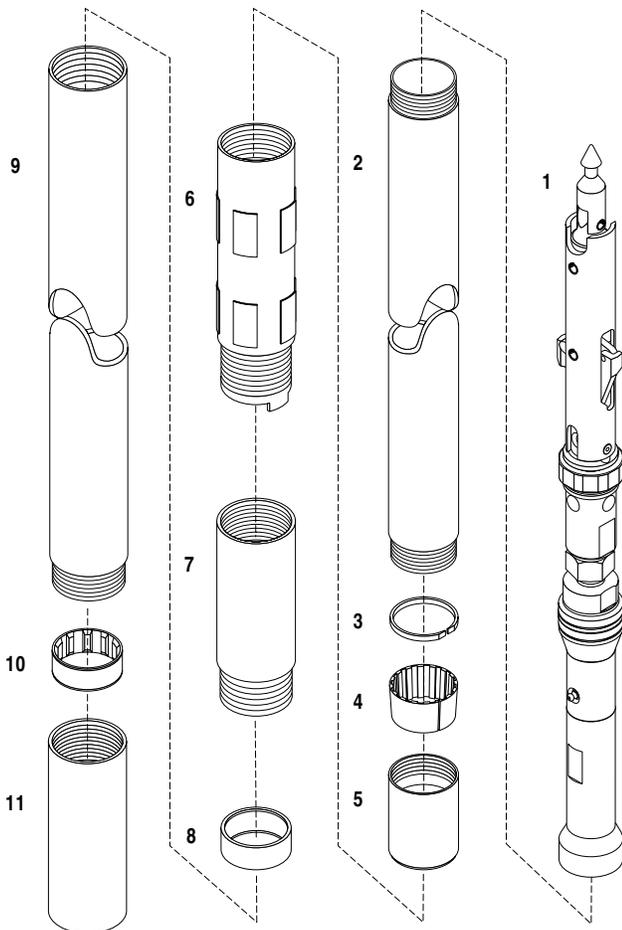
■ Additional options available.

**▲ WARNING** The adapter coupling and outer tube have HWT/PHD threads.

\* See the head assembly section for a detailed configuration and available options.

**NOTE:** Customers wishing to use up inventory of outer tubes with straight thread connection require an optional adapter coupling because the new head has a different latch to shoulder dimension than the old style. This adapter coupling will not work with the new HWT/PHD outer tubes. See outer tube component page.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



# Head Assembly - PQ



**Options:**

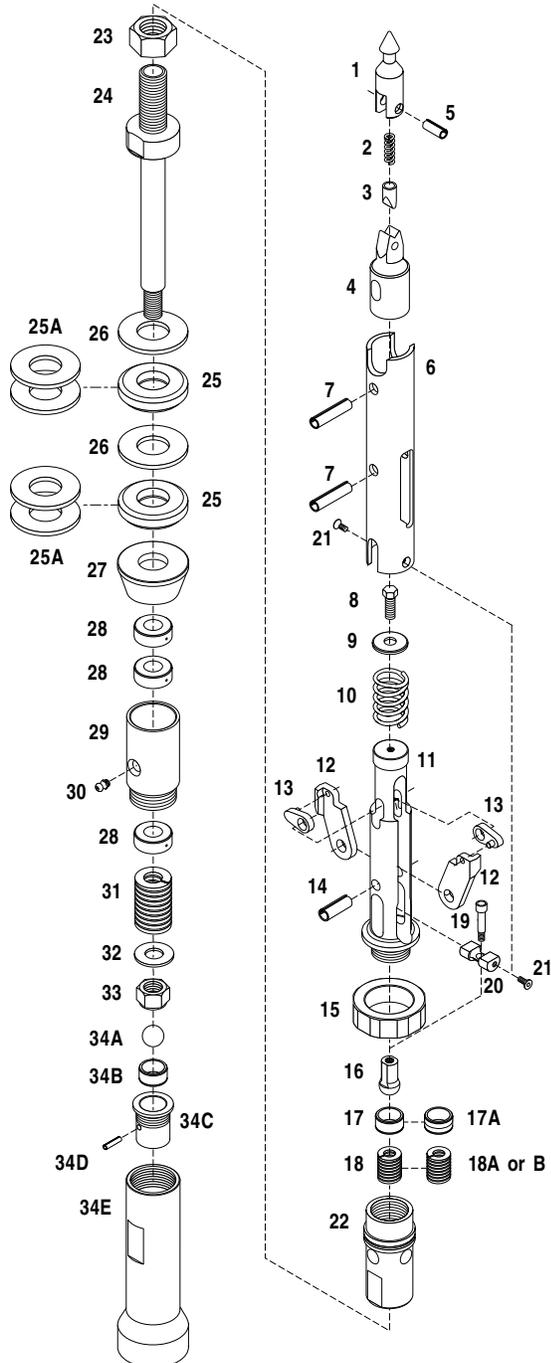
There are alternatives to the standard head assembly which are indicated by a "■". If options are ordered, the standard head assembly is supplied with the options shipped as separate items (not installed).

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from this page, and/or the options from the inner tube and outer tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.



Head Assembly			kg	lbs
1-32	3543806	PQ Head Assembly	21.0	46.0

Standard Configuration			Qty
1	42913	Spearhead Point	1
2	15141	Compression Spring	1
3	42914	Detent Plunger	1
4	3540330	Spearhead Base	1
5	42905	Spirol Pin 7/16" x 1"	1
6	3540151	Latch Retracting Case	1
7	24524	Spring Pin 1/2" x 2-3/4"	2
8	3541932	Nyloc Bolt 3/8"-16UNC x 3/4"	1
9	104953	Washer	1
10	3543619	Latch Compression Spring	1
11	3540156	Upper Latch Body	1
12	3543796	Latch (PQ)	2
13	306216	Link (HQ)	2
14	24305	Spring Pin 1/2" x 2"	1
15	3543797	Landing Shoulder	1
16	3540152	Threaded Ball, 22 mm	1
17	306131	Fluid Retention Bushing	■ 1
18	104966	Fluid Retention Spring, Light	■ 1
19	3543388	Shoulder Bolt	1
20	3540153	Dry Hole Valve Holder	1
21	3541117	Nylon Insert Machine Screw	2
22	104957	Lower Latch Body	1
23	44574	Hex Nut	1
24	3541058	Spindle, Hollow	1
25	3540308	Shut-Off Valve, Hard	■ 2
26	3540300	Valve Adjusting Washer	2
27	3540299	Washer, Tapered	1
28	24528	Thrust Bearing	3
29	3540794	Spindle Bearing	1
30	17447	Grease Fitting	1
31	3540755	Compression Spring	1
32	3544324	Washer, 1-1/4" Narrow	1
33	103062	Stover Lock Nut, 1-1/4 UNC	1
34	3543805	Inner Tube Cap Assembly (A - E)	—
34A	62374	Stainless Steel Ball, 22 mm	1
34B	3540737	Bushing	1
34C	3540745	Check Valve Body	1
34D	100865	Spring Pin	1
34E	3543804	Inner Tube Cap	1

Head Assembly Options			Qty
17A	3543378	Fluid Retention Bushing, Heavy	■ 1
18A	104971	Fluid Retention Spring, Medium	■ 1
18B	104972	Fluid Retention Spring, Heavy	■ 1
25A	3540300	Washer	■ 4

Dry Hole Valve Kit			Qty
—	3541210	Dry Hole Valve Kit	—
16	3540152	Steel Threaded Ball, 22 mm	1
17	306131	Fluid Retention Bushing	1
17A	3543378	Fluid Retention Bushing, Heavy	1
18	104966	Fluid Retention Spring, Light	1
18A	104971	Fluid Retention Spring, Medium	1
19	3543388	Shoulder Bolt	1
20	3540153	Dry Hole Valve Holder	1
21	3541117	Nylon Insert Machine Screw	2
—	3541739	Wrench - for item 19 (not shown)	1
—	3543551	Wrench - for item 21 (not shown)	1
—	3542987	Drift Tool (not shown)	1
—	3543407	Kit Bag (not shown)	1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

# Inner Tube Components - PQ

Standard inner tube components (items 1-5) can be ordered as part of the standard core barrel or as an inner tube group. To order inner tube components apart from the core barrel, please use the inner tube group numbers provided and specify any options you may require. If ordering these components as part of a core barrel, please refer to the ordering instructions below. All inner tube groups are shipped as components and are not assembled.

**Options:**

There are alternatives to the standard inner tube components which are indicated by a "■". If optional items are chosen, they will replace the standard items when the order is processed.

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from this page, and/or the options from the head assembly and outer tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.

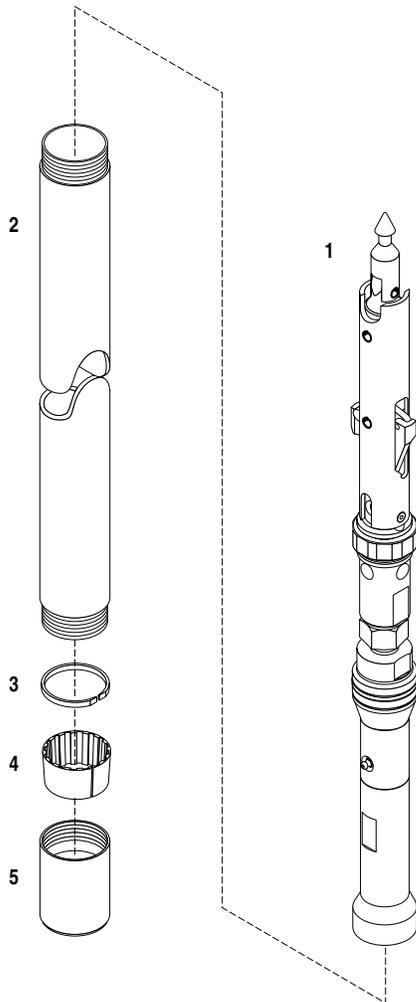
Inner Tube Group				kg	lbs
1-5	3543863	PQ Inner Tube Group	1.5 m / 5 ft	—	—
1-5	3543864	PQ Inner Tube Group	3.0 m / 10 ft	—	—

Standard Configuration				Qty	
1	3543806	PQ Head Assembly*			1
2	26159	Inner Tube, 1.5 m / 5 ft		■	1
2	26534	Inner Tube, 3.0 m / 10 ft		■	1
3	26161	Stop Ring			1
4	26162	Fluted Core Lifter			1
5	52172	Core Lifter Case			1

Optional Chrome Plating				
To order chrome plated inner tubes (full length inside diameter) use the following part numbers.				
2A	26159CP	Inner Tube CP 1.5 m / 5 ft	■	1
2A	26534CP	Inner Tube CP 3.0 m / 10 ft	■	1

\* See the head assembly section for a detailed configuration and available options.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



# Outer Tube Components - PQ

Standard outer tube components (items 6-11) are included in the standard core barrel for use with HWT 4130 casing/PHD rod.

**Options:**

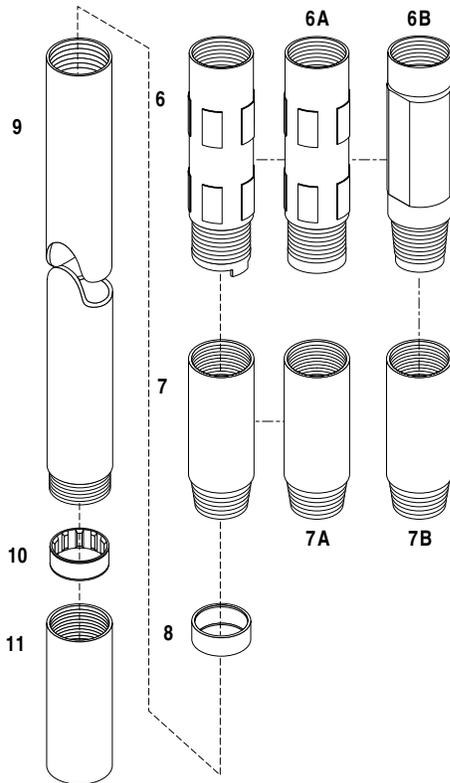
There are alternatives to standard outer tube components which are indicated by a "■". If optional items are chosen, they will replace the standard items when the order is processed.

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from this page, and/or the options from the head assembly and inner tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.



Outer Tube Components				Qty
6	101343	HWT/PHD Conventional Tanged Locking Coupling	■	1
7	3543808	Adapter Coupling	■	1
8	3543814	Landing Ring		1
9	3543802	Outer Tube, 1.5 m / 5 ft	■	1
9	3543801	Outer Tube, 3.0 m / 10 ft	■	1
10	44923	Inner Tube Stabilizer		1
11	26168	Thread Protector		1

Locking Coupling Options				Qty
6A	101105	HWT/PHD Conventional Locking Coupling	■	1
***6B	3000394	Full-Hole Locking Coupling HWT/PHD/PQ	■	

Adapter Coupling Options				Qty
**7A	3544465	Adapter Coupling	■	1
***7B	3002506	Adapter Coupling HWT/PHD/PQ	■	

Optional Chrome Plating				
To order chrome plated outer tubes (45 cm (18 in) at both ends on the outside diameter) use the following part numbers.				
9A	3543802CP	Outer Tube CP 1.5 m / 5 ft	■	1
9A	3543801CP	Outer Tube CP 3.0 m / 10 ft	■	1

\* Full hole outer tubes are supplied chrome plated 45 cm (18 in) at both ends on the outside diameter as standard.

**⚠ WARNING** The standard adapter coupling and outer tube thread connection is HWT/PHD.

\*\* Customers wishing to use up inventory of outer tubes with straight thread connection require this special adapter coupling because the new head has a different latch to shoulder dimension than the old style. **This adapter coupling will not work with the new HWT/PHD outer tubes.**

\*\*\*A special locking coupling and adapter coupling with a PQ tapered thread connection is also available.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

# Extended Core Barrels - PQ

The inner tube coupling can be used to extend core barrels from 1.5 m (5 ft) to 3.0 m, 4.5 m or 6.0 m (10 ft, 15 ft or 20 ft) lengths in consolidated ground conditions.

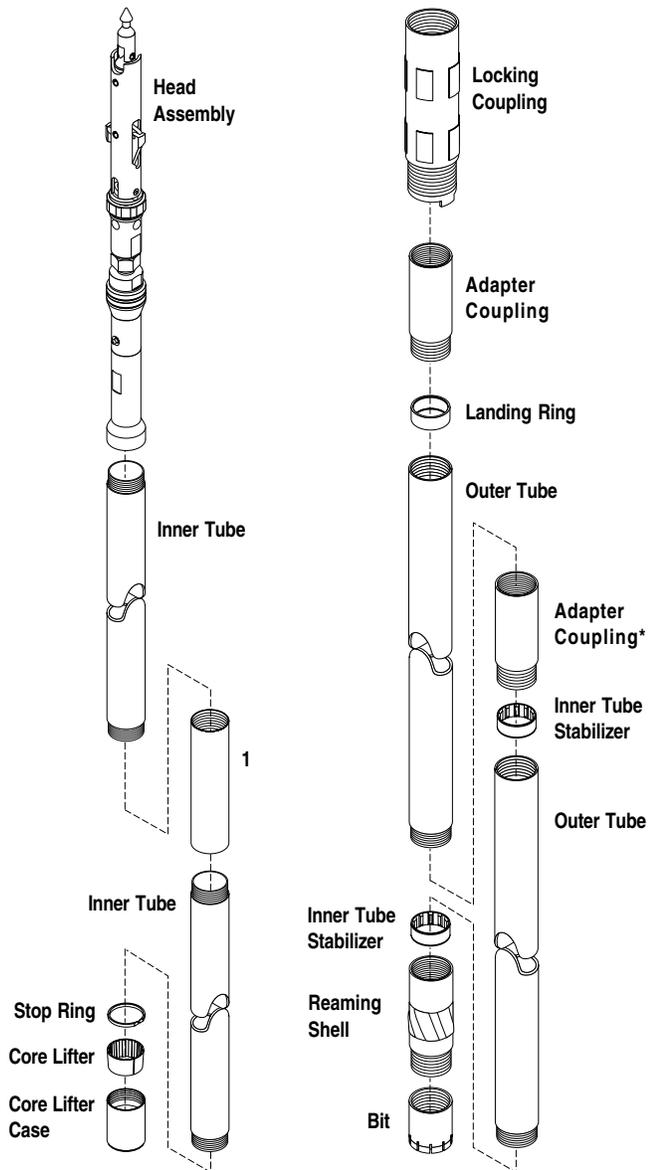
**Example:** To assemble a 6 m (20 ft) core barrel, use a 3.0 m (10 ft) core barrel assembly plus the following:

- 1-outer tube 3.0 m/10 ft
- 1-inner tube 3.0 m/10 ft
- 1-inner tube stabilizer
- 1-additional adapter coupling
- 1-inner tube coupling

Extended Core Barrels		
1	3543861	Inner Tube Coupling

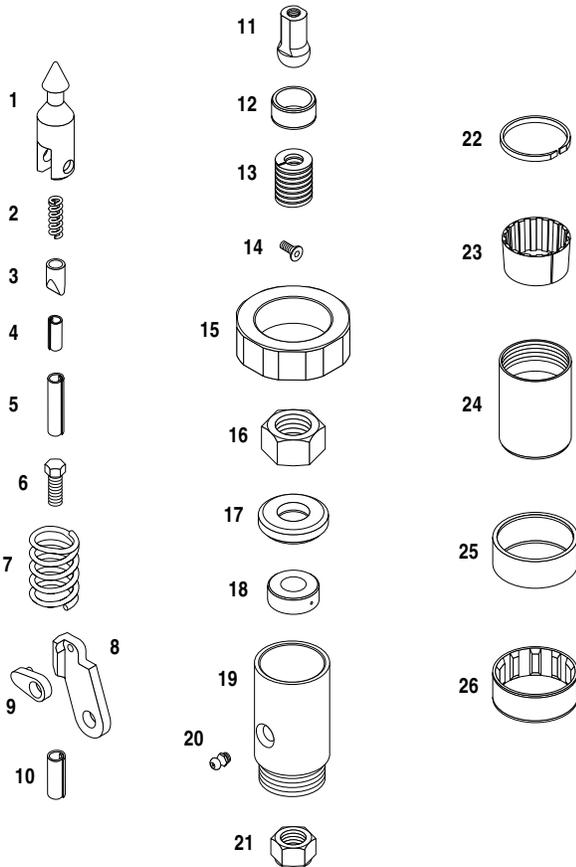
\*Additional adapter coupling is required.

**NOTE:** Refer to the ITHT Product Manual for additional operating information.



# Spare Parts Kit - PQ

Spare Parts Kits are designed to meet the average requirements for 1 000 m (3,300 ft) of drilling.



Spare Parts Kit			kg	lbs
1-27	3543862	PQ Core Barrel Spare Parts Kit	—	—

Parts				Qty
1	42913	Spearhead Point		1
2	15141	Compression Spring		1
3	42914	Detent Plunger		1
4	42905	Spirol Pin 7/16" x 1"		2
5	24524	Spring Pin 1/2" x 2-3/4"		2
6	3541932	Nyloc Bolt 3/8"-16UNC x 3/4"		2
7	3543619	Latch Compression Spring		1
8	3543796	Latch		4
9	306216	Link		4
10	24305	Spring Pin 1/2" x 2"		2
11	3540152	Steel Threaded Ball, 22 mm		1
12	306131	Fluid Retention Bushing		1
13	104966	Fluid Retention Spring, Light		1
14	3541117	Nylon Insert Machine Screw		2
15	3543797	Landing Shoulder		1
16	44574	Hex Nut		1
17	3540308	Shut-Off Valve, Hard		4
18	24528	Thrust Bearing		2
19	3540794	Spindle Bearing		1
20	17447	Grease Fitting		2
21	103062	Stover Lock Nut		1
22	26161	Stop Ring		2
23	26162	Fluted Core Lifter		20
24	52172	Core Lifter Case		4
25	3543814	Landing Ring		2
26	44923	Inner Tube Stabilizer		2
27	3542987	Drift Tool (not shown)		1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



## Core Barrels - PQ3

- **Core Barrels**
- **Head Assembly**
- **Inner Tube Components**
- **Outer Tube Components**
- **Spare Parts Kit**

**NOTE:** All core barrels will require some assembly upon receipt of shipment. Please refer to Packaging Information and Assembly Instructions.

# Core Barrel - PQ3

Boart Longyear now offers the Next Q® version of its PQ3 core barrel for use with HWT 4130 casing/PHD rod. The adapter coupling incorporates HWT/PHD threads for strength and ease of use. It consists of the head assembly (item 1), inner tube components (items 2-5), and outer tube components (items 6-11). The In-The-Hole Tools Product Manual and core barrel Safety Poster are included with all core barrels.

Triple-tube core barrels are commonly selected when drilling coal, clay bearing or highly fractured formations. A second inner tube (split lengthwise) is contained inside the standard inner tube. The core ejection piston protects the core from pressurized drilling fluid when the split inner tube, containing the core sample, is pumped out of the standard inner tube. Upon removal, one half of the split tube is lifted off to reveal the undisturbed core sample.

**How to Order:**

To order a standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.

**Options:**

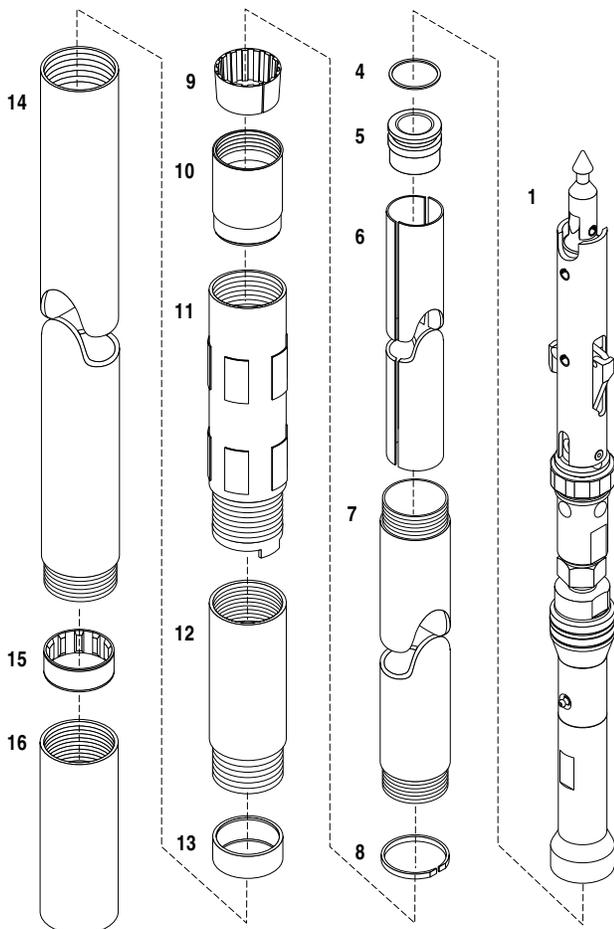
There are alternatives to the standard core barrel which are indicated by a "■". To view these options refer to the head assembly and/or outer tube components sections.

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from the head assembly and/or outer tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.



Core Barrels				kg	lbs
1-12	3543869	PQ3 Core Barrel	1.5 m / 5 ft	—	—
1-12	3543870	PQ3 Core Barrel	3.0 m / 10 ft	—	—

Standard Configuration				Qty
1	3543806	PQ Head Assembly*		1
2	26182	Pump-Out Adapter**		1
3	26662	Piston Plug**		1
4	26178	O Ring		1
5	26179	Core Ejection Piston		1
6	26180	Split Tube, 1.5 m / 5 ft		1
6	26710	Split Tube, 3.0 m / 10 ft		1
7	26159	Inner Tube, 1.5 m / 5 ft		1
7	26534	Inner Tube, 3.0 m / 10 ft		1
8	26176	Stop Ring		1
9	26177	Core Lifter, Fluted		1
10	26160	Core Lifter Case		1
11	101343	HWT/PHD Conventional Tanged Locking Coupling ■		1
12	3543808	Adapter Coupling ■		1
13	3543814	Landing Ring		1
14	3543802	Outer Tube, 1.5 m / 5 ft ■		1
14	3543801	Outer Tube, 3.0 m / 10 ft ■		1
15	44923	Inner Tube Stabilizer		1
16	26168	Thread Protector		1
17	3541994	ITHT Product Manual (not shown)		1
18	306390	Safety Poster (not shown)		1

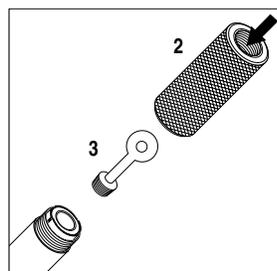
■ Additional options available.

**▲ WARNING** The adapter coupling and outer tube have HWT/PHD threads.

\* See the head assembly section for a detailed configuration and available options.

**NOTE:** Customers wishing to use up inventory of outer tubes with straight thread connection require an optional adapter coupling because the new head has a different latch to shoulder dimension than the old style. This adapter coupling will not work with the new HWT/PHD outer tubes. See outer tube component page.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



\*\* These items are required to pump the core out of the inner tube. Remove the head assembly from the inner tube, insert the piston plug and thread the pump out adapter on to the inner tube.

**Fluid pressure supplied by optional hand pump group (p/n 26738) or pump-out group (p/n 26742). See Tools section.**

# Head Assembly - PQ3



**Options:**

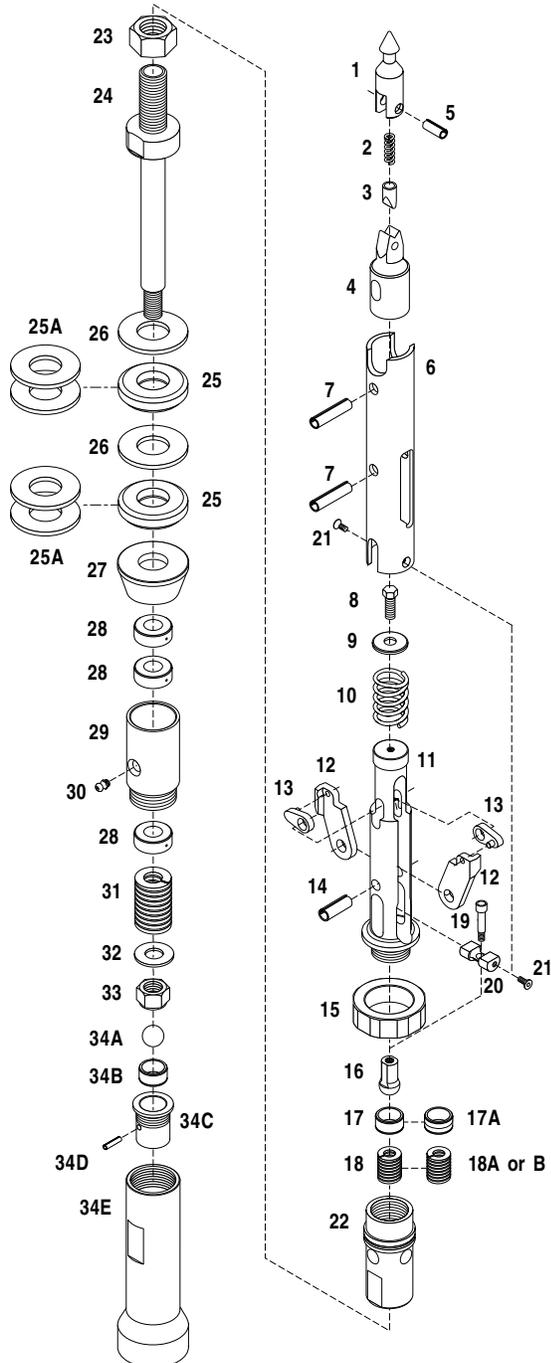
There are alternatives to the standard head assembly which are indicated by a "■". If options are ordered, the standard head assembly is supplied with the options shipped as separate items (not installed).

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from this page, and/or the options from the inner tube and outer tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.



Head Assembly			kg	lbs
1-32	3543806	PQ Head Assembly	21.0	46.0

Standard Configuration			Qty
1	42913	Spearhead Point	1
2	15141	Compression Spring	1
3	42914	Detent Plunger	1
4	3540330	Spearhead Base	1
5	42905	Spirol Pin 7/16" x 1"	1
6	3540151	Latch Retracting Case	1
7	24524	Spring Pin 1/2" x 2-3/4"	2
8	3541932	Nyloc Bolt 3/8"-16UNC x 3/4"	1
9	104953	Washer	1
10	3543619	Latch Compression Spring	1
11	3540156	Upper Latch Body	1
12	3543796	Latch (PQ)	2
13	306216	Link (HQ)	2
14	24305	Spring Pin 1/2" x 2"	1
15	3543797	Landing Shoulder	1
16	3540152	Threaded Ball, 22 mm	1
17	306131	Fluid Retention Bushing	1 ■
18	104966	Fluid Retention Spring, Light	1 ■
19	3543388	Shoulder Bolt	1
20	3540153	Dry Hole Valve Holder	1
21	3541117	Nylon Insert Machine Screw	2
22	104957	Lower Latch Body	1
23	44574	Hex Nut	1
24	3541058	Spindle, Hollow	1
25	3540308	Shut-Off Valve, Hard	2 ■
26	3540300	Valve Adjusting Washer	2
27	3540299	Washer, Tapered	1
28	24528	Thrust Bearing	3
29	3540794	Spindle Bearing	1
30	17447	Grease Fitting	1
31	3540755	Compression Spring	1
32	3544324	Washer, 1-1/4" Narrow	1
33	103062	Stover Lock Nut, 1-1/4 UNC	1
34	3543805	Inner Tube Cap Assembly (A - E)	—
34A	62374	Stainless Steel Ball, 22 mm	1
34B	3540737	Bushing	1
34C	3540745	Check Valve Body	1
34D	100865	Spring Pin	1
34E	3543804	Inner Tube Cap	1

Head Assembly Options			Qty
17A	3543378	Fluid Retention Bushing, Heavy	1 ■
18A	104971	Fluid Retention Spring, Medium	1 ■
18B	104972	Fluid Retention Spring, Heavy	1 ■
25A	3540300	Washer	4 ■

Dry Hole Valve Kit			Qty
—	3541210	Dry Hole Valve Kit	—
16	3540152	Steel Threaded Ball, 22 mm	1
17	306131	Fluid Retention Bushing	1
17A	3543378	Fluid Retention Bushing, Heavy	1
18	104966	Fluid Retention Spring, Light	1
18A	104971	Fluid Retention Spring, Medium	1
19	3543388	Shoulder Bolt	1
20	3540153	Dry Hole Valve Holder	1
21	3541117	Nylon Insert Machine Screw	2
—	3541739	Wrench - for item 19 (not shown)	1
—	3543551	Wrench - for item 21 (not shown)	1
—	3542987	Drift Tool (not shown)	1
—	3543407	Kit Bag (not shown)	1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

# Inner Tube Components - PQ3

Standard inner tube components (items 1-10) can be ordered as part of the standard core barrel or as an inner tube group. To order inner tube components apart from the core barrel, please use the inner tube group numbers provided and specify any options you may require. If ordering these components as part of a core barrel, please refer to the ordering instructions below. All inner tube groups are shipped as components and are not assembled.

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from the head assembly and outer tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.

Inner Tube Group				kg	lbs
1-10	3543867	PQ3 Inner Tube Group	1.5 m / 5 ft	—	—
1-10	3543868	PQ3 Inner Tube Group	3.0 m / 10 ft	—	—

Standard Configuration				Qty
1	3543806	PQ Head Assembly*		1
2	26182	Pump-Out Adapter**		1
3	26662	Piston Plug		1
4	26178	O Ring		1
5	26179	Core Ejection Piston**		1
6	26180	Split Tube, 1.5 m / 5 ft		1
6	26710	Split Tube, 3.0 m / 10 ft		1
7	26159	Inner Tube, 1.5 m / 5 ft		1
7	26534	Inner Tube, 3.0 m / 10 ft		1
8	26176	Stop Ring		1
9	26177	Core Lifter, Fluted		1
10	26160	Core Lifter Case		1

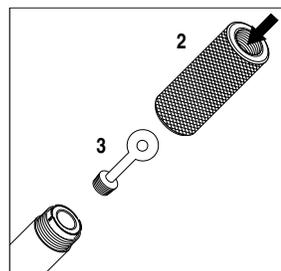
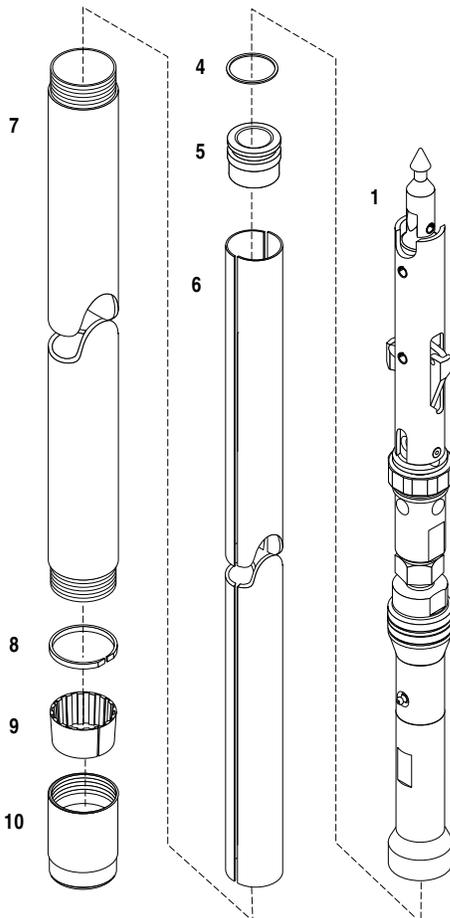
\* See the head assembly section for a detailed configuration and available options.

**NOTE:** Chrome plated inner tubes (full length inside diameter) can not be used with triple-tube core barrels.

Inner tube extensions for use with stabilized reaming shells can not be used with the triple-tube core barrel.

Triple-tube core barrels can not be extended with inner tube couplings.

Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



\*\* These items are required to pump the core out of the inner tube. Remove the head assembly from the inner tube, insert the piston plug and thread the pump out adapter on to the inner tube.

**Fluid pressure supplied by optional hand pump group (p/n 26738) or pump-out group (p/n 26742). See Tools section.**

# Outer Tube Components - PQ3

Standard outer tube components (items 11-16) are included in the standard core barrel for use with HWT 4130 casing/PHD rod.

**Options:**

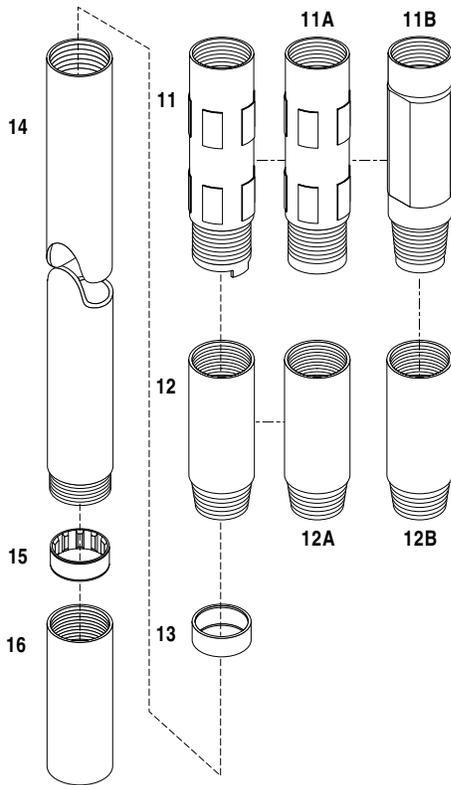
There are alternatives to standard outer tube components which are indicated by a "■". If optional items are chosen, they will replace the standard items when the order is processed.

**How to Order:**

To order a non-standard core barrel:

- Select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number.
- List all optional parts and part numbers from this page, and/or the options from the head assembly and inner tube components sections.

**NOTE:** For information on packaging and assembly, refer to the packaging and/or assembly sections.



Outer Tube Components			Qty
11	101343	HWT/PHD Conventional Tanged Locking Coupling ■	1
12	3543808	Adapter Coupling ■	1
13	26165	Landing Ring	1
14	3543802	Outer Tube, 1.5 m / 5 ft ■	1
14	3543801	Outer Tube, 3.0 m / 10 ft ■	1
15	44923	Inner Tube Stabilizer	1
16	26168	Thread Protector	1

Locking Coupling Options			Qty
11A	101105	HWT/PHD Conventional Locking Coupling ■	1
***11B	3000394	Full-Hole Locking Coupling HWT/PHD/PQ ■	1

Adapter Coupling Options			Qty
**12A	3544465	Adaper Coupling ■	1
***12B	3002506	Adaper Coupling HWT/PHD/PQ ■	1

Optional Chrome Plating			
To order chrome plated outer tubes (45 cm (18 in) at both ends on the outside diameter) use the following part numbers.			
14A	3543802CP	Outer Tube CP 1.5 m / 5 ft ■	1
14A	3543801CP	Outer Tube CP 3.0 m / 10 ft ■	1

\* Full hole outer tubes are supplied chrome plated 45 cm (18 in) at both ends on the outside diameter as standard.

**▲ WARNING** The standard adapter coupling and outer tube thread connection is HWT/PHD.

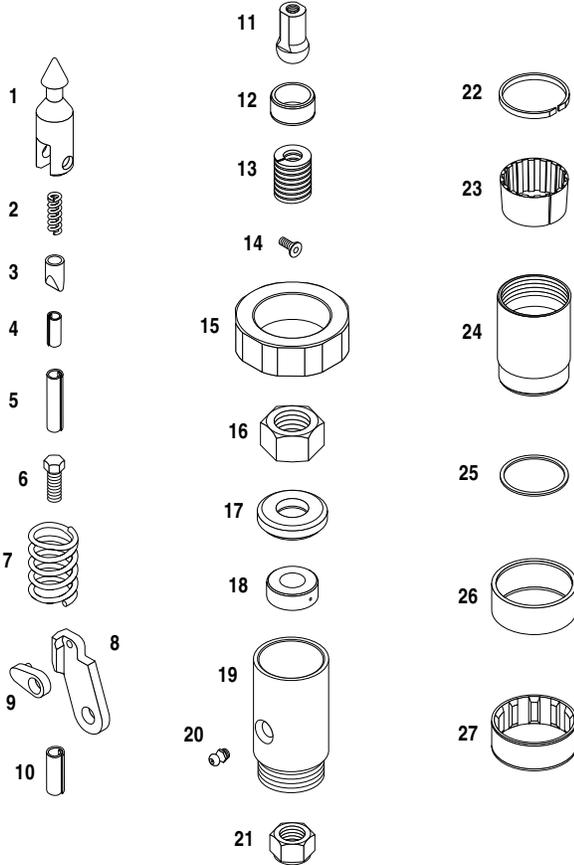
\*\* Customers wishing to use up inventory of outer tubes with straight thread connection require this special adapter coupling because the new head has a different latch to shoulder dimension than the old style. **This adapter coupling will not work with the new HWT/PHD outer tubes.**

\*\*\*A special locking coupling and adapter coupling with a PQ tapered thread connection is also available.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

# Spare Parts Kit - PQ3

Spare Parts Kits are designed to meet the average requirements for 1 000 m (3,300 ft) of drilling.



Spare Parts Kit			kg	lbs
1-28	3543971	PQ3 Core Barrel Spare Parts Kit	—	—

Parts				Qty
1	42913	Spearhead Point		1
2	15141	Compression Spring		1
3	42914	Detent Plunger		1
4	42905	Spirol Pin 7/16" x 1"		2
5	24524	Spring Pin 1/2" x 2-3/4"		2
6	3541932	Nyloc Bolt 3/8"-16UNC x 3/4"		2
7	3543619	Latch Compression Spring		1
8	3543796	Latch		4
9	306216	Link		4
10	24305	Spring Pin 1/2" x 2"		2
11	3540152	Steel Threaded Ball, 22 mm		1
12	306131	Fluid Retention Bushing		1
13	104966	Fluid Retention Spring, Light		1
14	3541117	Nylon Insert Machine Screw		2
15	3543797	Landing Shoulder		1
16	44574	Hex Nut		1
17	3540308	Shut-Off Valve, Hard		4
18	24528	Thrust Bearing		2
19	3540794	Spindle Bearing		1
20	17447	Grease Fitting		2
21	103062	Stover Lock Nut		1
22	26176	Stop Ring		2
23	26177	Fluted Core Lifter		20
24	26160	Core Lifter Case		4
25	26178	O Ring		1
26	3543814	Landing Ring		1
27	44923	Inner Tube Stabilizer		1
28	3542987	Drift Tool (not shown)		1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

# Packaging Information

## Ordering Information

Boart Longyear has developed an innovative and practical approach to selecting the best core barrel for your drilling application. This approach incorporates a standard core barrel consisting of the head assembly, inner tube components, outer tube components, the In-The-Hole Tools Product Manual and core barrel Safety Poster. To order the standard configuration core barrel, select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number from the standard core barrel page.

There are also options available for standard product which are indicated by a "■". A listing of the options available appears on the head assembly, inner tube components, and outer tube components sections. If you would like to substitute the standard product for these options, select a 1.5 m/5 ft or 3.0 m/10 ft core barrel part number from the standard core barrel page and specify all optional parts and part numbers from the head assembly, inner tube components and/or outer tube components sections.

## Packaging Information

Core barrel parts are packaged exclusively to provide the customer with the ability to assemble the core barrel with the ideal configuration to the drilling application.

The head assembly is shipped assembled with hard shut-off valves as standard products. If the options are requested for the head assembly, they are shipped as separate items (not installed) and must be installed by the end user. If options are ordered for the inner tube and outer tube components, they will replace the standard component.

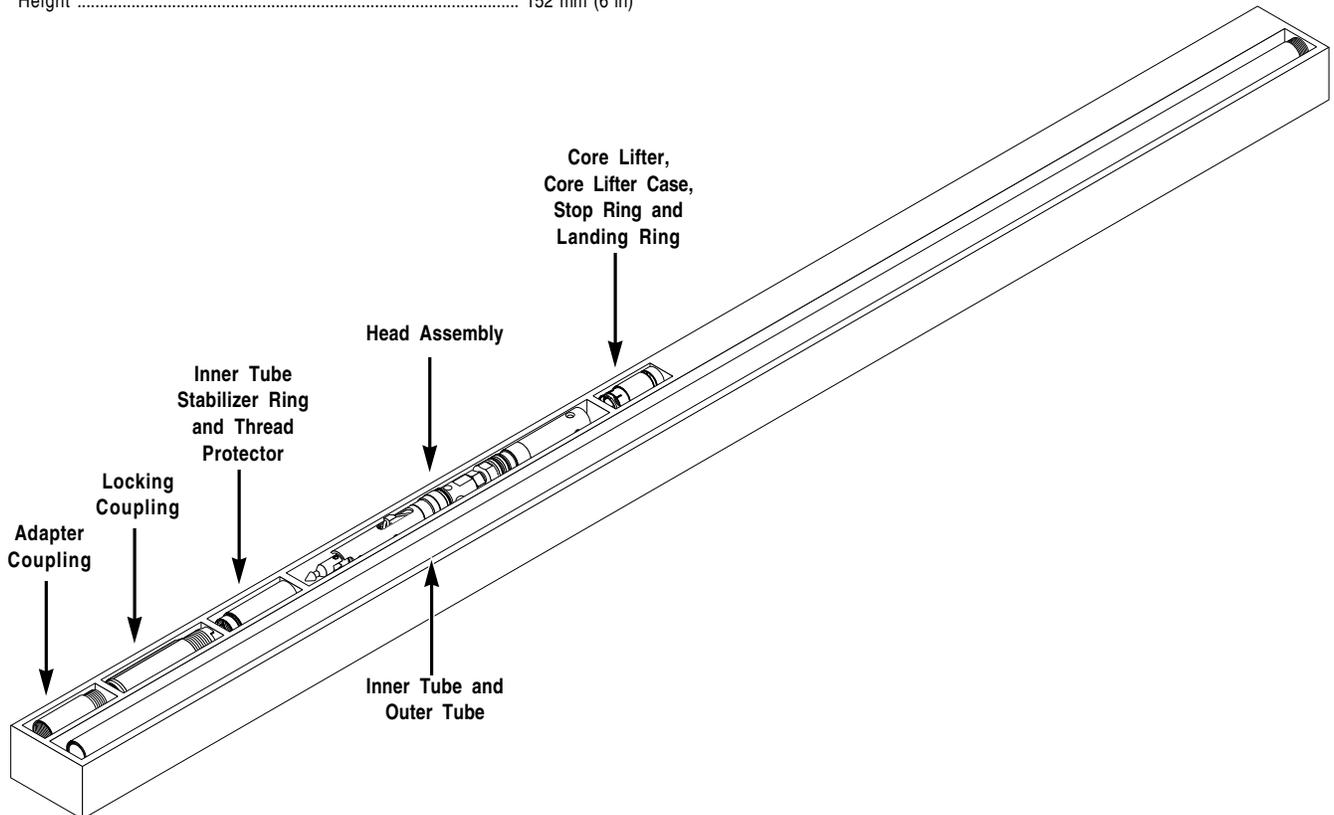
### Box Specifications (approximate)

#### 1.5 m/5 ft CORE BARREL

Length .....	1 981 mm (78 in)
Width .....	229 mm (9 in)
Height .....	152 mm (6 in)

#### 3.0 m/10 ft CORE BARREL

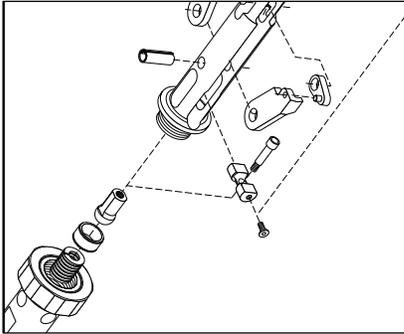
Length .....	3 505 mm (138 in)
Width .....	229 mm (9 in)
Height .....	152 mm (6 in)



**NOTE:** May not be exactly as shown, for illustration purposes only.

# Assembly Instructions

**▲ WARNING** The standard surface head assembly is supplied with the dry hole valve installed. See the ITHT Product Manual for detailed instructions on maintaining or removing.

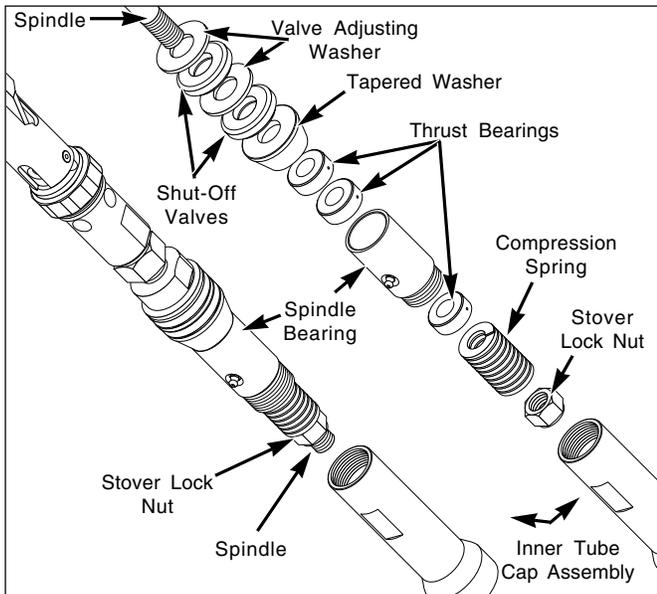


**Dry Hole Valve for Lost Circulation Conditions**

If the optional valves are ordered, remove the inner tube cap assembly to expose the stover lock nut on the end of the spindle. Remove the nut and all the components on the spindle shaft, replace the hard shut-off valves with the options and reassemble.

**NOTE:** Ensure that the thrust and hanger bearings are reinstalled the same way that they were removed in order to retain proper lubrication pathways.

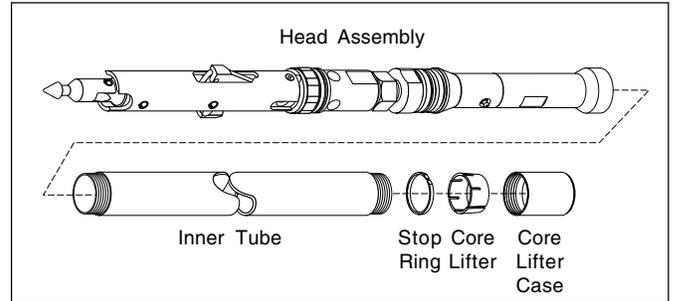
If the standard head assembly is to be used, no changes are required and it is ready to be added to the inner tube components.



Follow these instructions carefully:

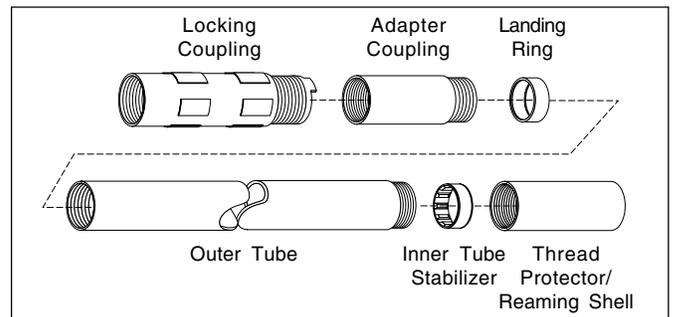
**Inner Tube Components**

- 1) Apply grease to the inside of the core lifter case and to the outside of the core lifter.
- 2) Insert the core lifter into the core lifter case from the threaded end.
- 3) Insert the stop ring into the grooved recess of the core lifter case.
- 4) Apply grease to the threaded ends of the head assembly, core lifter case and inner tube.
- 5) Thread the head assembly to one end of the inner tube and the core lifter case to the other. Use an inner tube wrench to ensure the joints are snug.



**Outer Tube Components**

- 1) Apply grease to the outside of the landing ring, the recess in the outer tube, and all threaded joints.
- 2) If the core barrel is intended for storage, insert the inner tube stabilizer into the thread protector and assemble to one end of the outer tube. If the core barrel is intended for immediate use, insert the inner tube stabilizer into a reaming shell and thread the reaming shell onto the end of the outer tube.
- 3) Insert the landing ring into the recess of the outer tube.
- 4) Thread the adapter coupling onto the other end of the outer tube.
- 5) Thread the locking coupling onto the adapter coupling.
- 6) Tighten all joints with an outer tube wrench to ensure they are snug.



**Core Barrel**

- 1) Insert the assembled inner tube components into the assembled outer tube components.
 

**NOTE: Assembly is easier if the bit end of the core barrel is lower than the locking coupling end.**
- 2) Retract the latches of the head assembly to allow them to enter the box threads of the locking coupling. The loading sleeve is recommended for loading the inner tube into the core barrel outer tube assembly or rod string.
- 3) When the landing shoulder of the head assembly is seated on the landing ring of the outer tube components, there is sufficient room for the latches to reopen. This locks the inner tube components inside the outer tube components.

**NOTE:** For complete operating instructions, refer to the ITHT Product Manual that is shipped with every core barrel. Clearly post the safety poster in your work area.

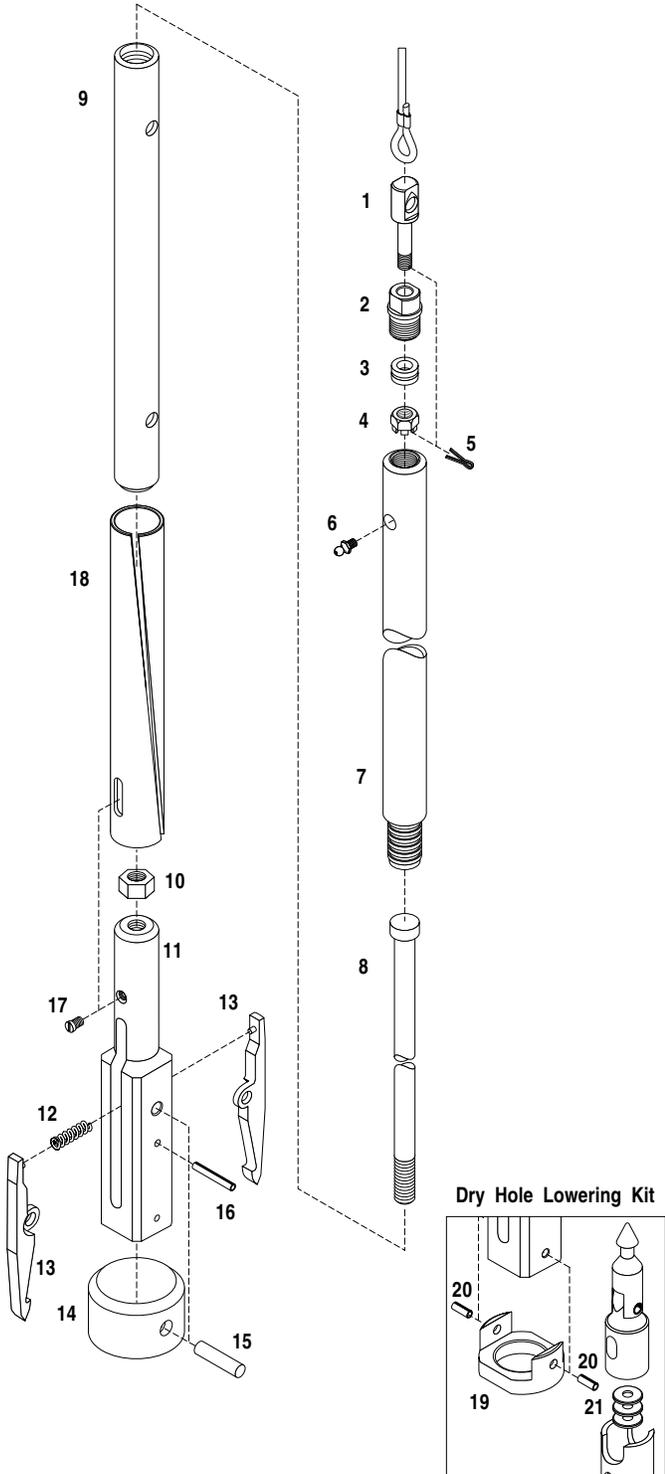
## Overshots

- **Compact Overshot**
- **Wireline Cable**
- **Spare Parts Kits**

# Compact Overshot - PQ

**Features:**

- For surface or downhole applications with PQ/PQ3 core barrels.
- Stronger lifting dogs and lifting dog compression spring.
- Threaded connection between jar staff and overshot head.
- High strength alloy steel jar staff with increased diameter and fail safe stop.
- Eye bolt machined with radius to eliminate need for thimble.
- Dry hole lowering kit available.



Assembly			kg	lbs
1-17	3543642	PQ Overshot Assembly	16.2	35.6
1-5	25984	Cable Swivel Assembly	0.4	0.8

Parts			Qty
1	25991	Eye Bolt	1
2	25990	Cable Swivel Collar	1
3	25986	Thrust Bearing	1
4	25985	Castle Nut	1
5	44615	Cotter Pin	1
6	17447	Grease Fitting	1
7	44444	Cable Swivel Body	1
8	3540516	Jar Staff	1
9	3540515	Jar Tube	1
10	44524	Hex Nut 3/4" UNC	1
11	3540518	Overshot Head	1
12	3542027	Compression Spring	1
13	3540529	Lifting Dog	2
14	3541072	Sleeve	1
15	3540213	Plain Pin	1
16	24307	Spring Pin 1/4" x 2"	1
17	44442	Set Screw	1
18	15965	Locking Sleeve	1

**NOTE:** The locking sleeve (#18) is sold as an assembled component of the overshot and is held in place by the set screw (#17) for shipping purposes. **The locking sleeve MUST BE REMOVED for normal operation or the lifting dogs will be locked open and will fail to retrieve the inner tube assembly.**

Dry Hole Lowering Kit			Qty
—	3543855	Dry Hole Lowering Kit	—
19	3543854	Dry Hole Overshot Cap	1
20	35788	Spring Pin 1/4" x 5/8"	2
21	19464	Flat Washer 1"	3

**Dry Hole Lowering**

In "dry holes", the overshot assembly is used with the locking sleeve to lower the inner tube assembly. If the dry hole lowering cap is installed on the overshot and the washers are installed under the core barrel spearhead, the locking sleeve will not release the inner tube assembly until it has latched. Otherwise, it will release upon contact with water or any form of resistance. The taper on the core barrel spearhead base forces the top end of the lifting dogs inward, allowing the locking sleeve to drop down and lock the lifting dogs open. The set screw (#17) can be used when dry hole lowering to prevent the locking sleeve from moving off the overshot.

**▲ WARNING** If the dry hole lowering cap or washers are not installed, the inner tube assembly can be released prematurely if it encounters resistance inside the rod string that resembles contact with the water table or landing shoulder, i.e. bulged/damaged rod joints.

**Releasing the Overshot Assembly**

If the inner tube assembly becomes stuck in the outer tube, the locking sleeve is used to release the overshot. The locking sleeve is guided onto the wireline cable through the guide slot and dropped to the overshot/inner tube assembly. The locking sleeve drops over the lifting dogs and locks them open to allow the overshot to be pulled off the core barrel spearhead point.

**NOTE:** Refer to the ITHT Product Manual for additional operating information.

# Wireline Cable

**Swaged Construction Wire Rope Features:**

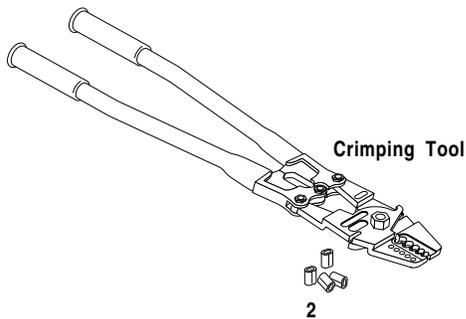
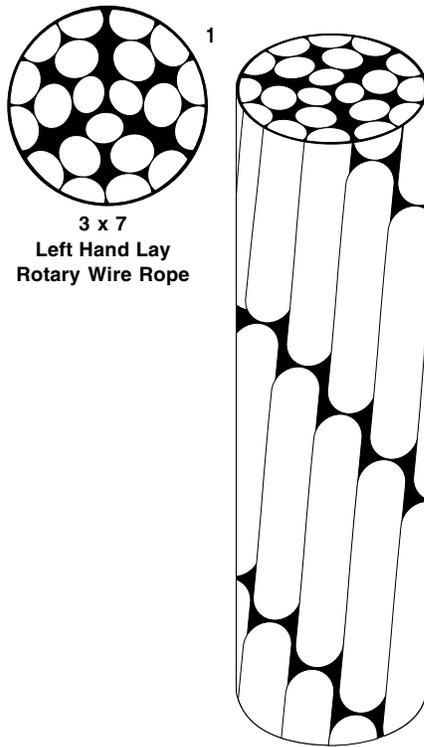
- Longer life.
- Safer to handle.
- 50% higher breaking strength than cable previously offered.
- High resistance to unraveling, resists "bird nesting".
- Compatible with 3/16" nicopress oval sleeve (p/n 030172).

**NOTE:** Swaged cable is not recommended for underground applications where minimum radius is less than 127 mm (5 inches).

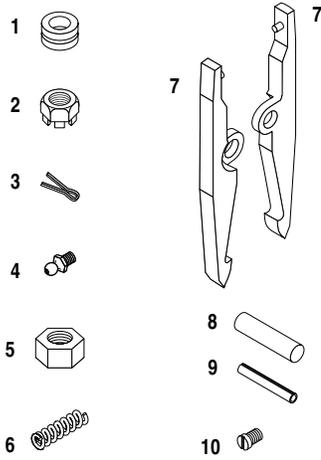
Wireline Cable		kgs/m	lbs/ft
1	3542822	Swaged 3/16" (4.8 mm)	0.134 0.090

Wireline Cable Oval Sleeve		kg	lbs
2	30172	Oval Sleeve, 3/16"	0.02 0.05

**NOTE:** For more information on the oval sleeve crimping tool, refer to the Tools section. Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



Spare Parts Kits are designed to meet the average requirements for 1 000 m (3,300 ft) of drilling.



Overshot Assembly			kg	lbs
1-10	3542589	PQ Overshot Spare Parts Kit	—	—

Parts			Qty
1	25986	Thrust Bearing	1
2	25985	Castle Nut	1
3	44615	Cotter Pin	2
4	17447	Grease Fitting	1
5	44524	Hex Nut 3/4" UNC	1
6	3542027	Compression Spring	1
7	3540529	Lifting Dog	2
8	3540528	Plain Pin	1
9	24307	Spring Pin 1/4" x 2"	1
10	44442	Set Screw	1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

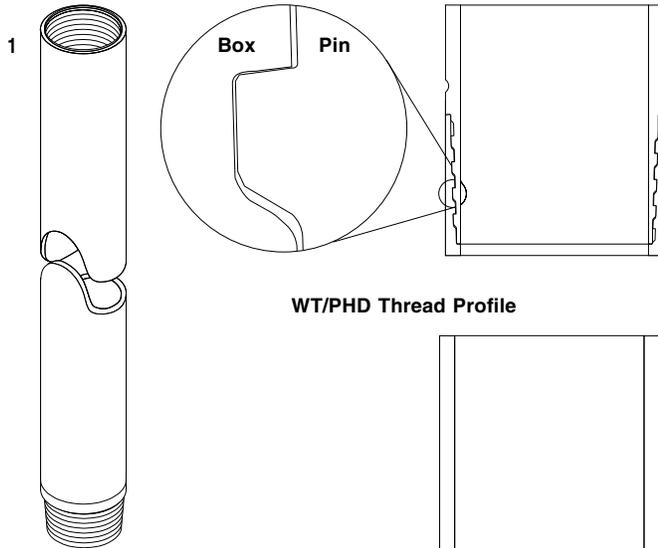
## Drill Rods

- **HWT 4130 Casing/PHD Rod**
- **Packaging Information**

# HWT 4130 Casing/PHD Rod

**Features:**

- Identified by a groove behind the pin end.
- Tapered joint with modified buttress thread form.
- Exclusive electric induction surface hardening of pin thread crest results in a hardness differential with the mating box thread surface.
- Reduced thread wear and galling.
- Extended service life.



**4130 Material**

Metric Lengths			kg	lbs
1	3541743	HWT 4130 Casing/PHD Rod, 1.5 m	27.2	60.0
1	3542314	HWT 4130 Casing/PHD Rod, 3.0 m	54.4	120.0

Imperial Lengths			kg	lbs
1	3542519	HWT 4130 Casing/PHD Rod, 2 ft	10.7	23.5
1	3540844	HWT 4130 Casing/PHD Rod, 5 ft	26.1	57.5
1	3540845	HWT 4130 Casing/PHD Rod, 10 ft	51.5	113.5

HWT casing, manufactured from 4130 chromium molybdenum alloy tubing, is a high strength product commonly used in geotechnical/hammering operations or "P" size core drilling as PHD drill rod. It is supplied with an identification groove behind the pin end.

**Drill rods MUST be pretorqued with the minimum recommended make-up torque to preload the box and pin prior to drilling. Drilling torque alone will not make-up the joint. Drilling operating torque should never exceed make-up torque.**

**⚠ WARNING** Standard casing, without the identification groove, is NOT recommended for use as drill rod.

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

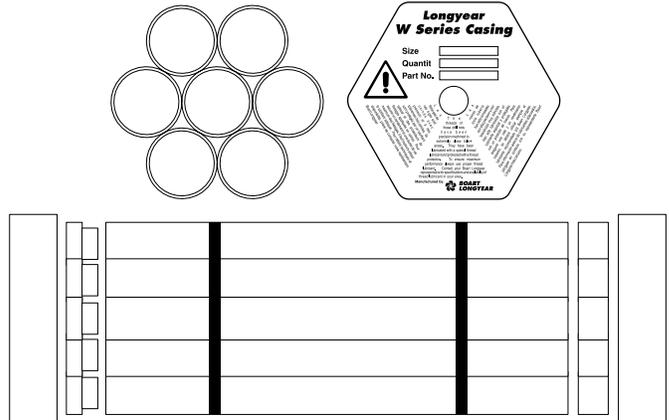
**Thread Lubrication**

- Z-50 Thread Compound (p/n 306486) is the recommended thread lubricant to reduce wear and the possibility of galling during drilling operations.

# Packaging Information

**Packing Features:**

- Casing/rod is packaged and sold in “bundles” which offer product protection during shipping and handling.
- Casing is colour coded:  
HWT standard - no paint  
HWT 4130/PHD - yellow stripe on each piece plus on bundle
- Protective plastic end caps cover box and pin threads sealing in thread lubrication. For ease of identification, casing protectors are color-coded orange.
- Heavy duty galvanized hexagon bundle end caps (p/n 41072) protect the casing ends.
- Casing box and pin threads are protected with Z-50 Thread Compound (p/n 306486) to avoid oxidation during shipping and storage. Z-50 is the recommended thread lubricant to reduce wear and the possibility of galling during drilling operations.
- Casing is coated with Krown KL73 rust inhibitor (p/n 3543544) to reduce product oxidation during shipping. When storing casing for long periods of time, it is recommended to reapply to the product surface for maximum protection.



For “HWT” casing/PHD rod, a “bundle” contains 7 pieces.

**Bundle Specifications**

**3.0 m/10 ft CASING BUNDLE**

Dimensions (L x W x H) ..... 3150 x 368.3 x 330.2 mm (124 x 14.5 x 13 in)  
 Volume ..... 0.40 m<sup>3</sup> (14 ft<sup>3</sup>)  
 Gross Weight ..... 373 kg (823 lbs)

**1.5 m/5 ft CASING BUNDLE**

Dimensions (L x W x H) ..... 1625.6 x 368.3 x 330.2 mm (64 x 14.5 x 13 in)  
 Volume ..... 0.20 m<sup>3</sup> (7 ft<sup>3</sup>)  
 Gross Weight ..... 194.1 kg (428 lbs)



# Water Swivels

- **Surface Universal Water Swivel**
- **Hose and Connections**
- **Spare Parts Kits**

# Surface Universal Water Swivel

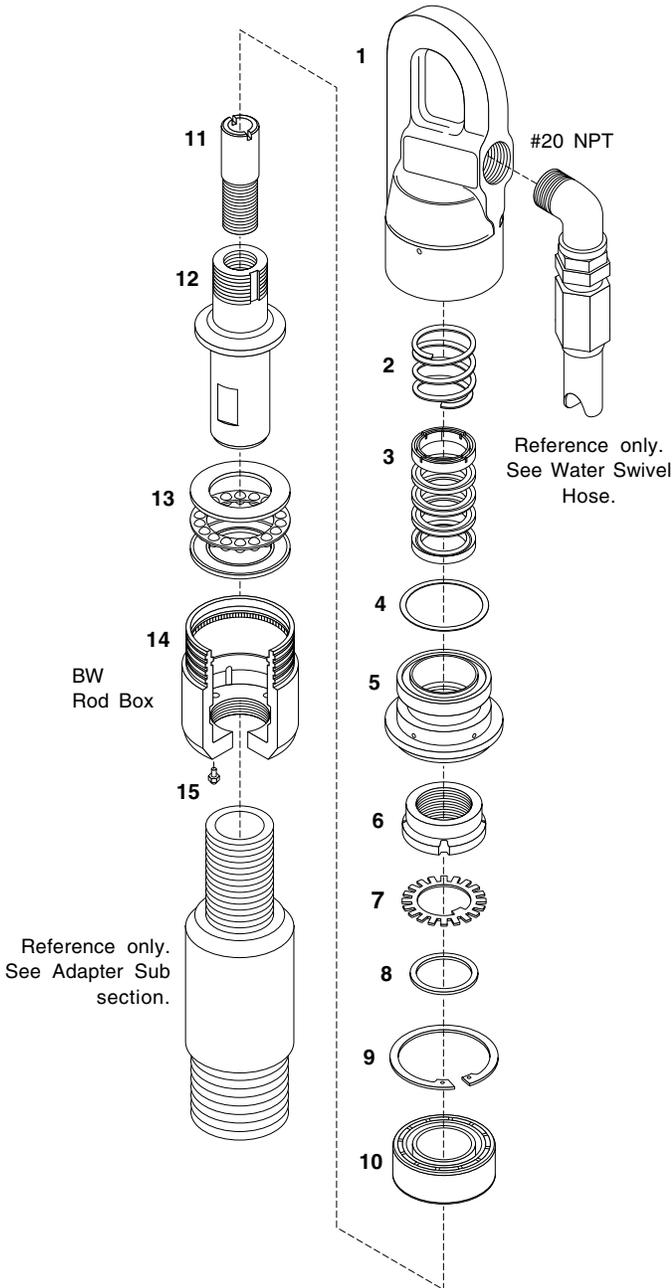
**Features:**

- Swivel cap complete with lifting bail for hoisting cable applications.
- #20 NPT hose connection.
- BW rod box spindle connection.
- Specially designed bearing lubrication keeps contaminants away and relieves excess lubrication pressure.
- Suitable for use with water or drilling mud.
- Easy servicing in the field with common tools.

Assembly			kg	lbs
1-15	67321	Universal Water Swivel Assembly	12.4	27.4

Parts				Qty
1	39169	Hoisting Cap		1
2	39168	Compression Spring		1
3	39171	Swivel Packing		1
4	29737	O Ring		1
5	39172	Packing Housing		1
6	67325	Spindle Nut		1
7	67186	Lock Washer		1
8	67322	Spacer		1
9	40965	Retaining Ring		1
10	19906	Ball Bearing		1
11	39170	Spindle Extension		1
12	67324	Spindle		1
13	67187	Ball Thrust Bearing		1
14	67631	Swivel Body		1
15	17447	Grease Fitting		1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



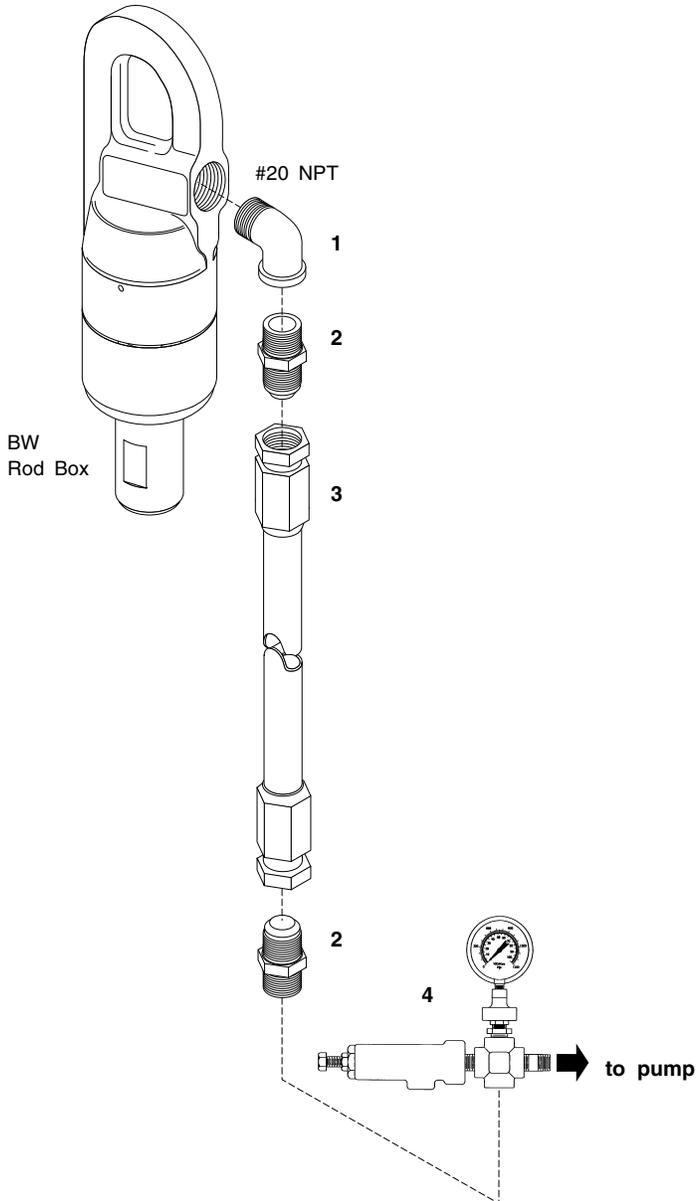
# Hose and Connections

**Features:**

- SAE 100R2 Type AT hydraulic hose.
- MASHA accepted synthetic rubber cover.
- 2000 psi maximum operating pressure.
- Industry standard #16 JIC female swivels for easy connect/disconnect.

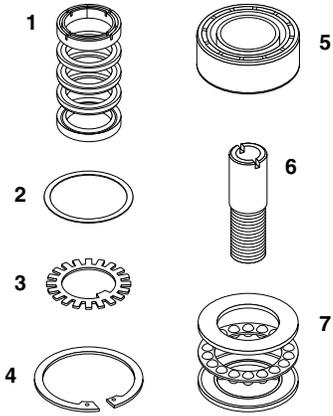
Universal Water Swivel to Pump			Qty
1	18473	#20 NPT 90° Street Elbow	1
2	35879	#20 NPT to #16 JIC-M Adapter	2
3	3542419	Water Swivel Hose, 9 m (30 ft)	1
4	18185	Discharge Assembly, #20 NPT	1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



# Spare Parts Kits

Spare Parts Kits are designed to meet the average requirements for 1 000 m (3,300 ft) of drilling.



Spare Parts Kit			kg	lbs
1-7	67628	Universal Water Swivel	—	—

Parts			Qty
1	39171	Swivel Packing	1
2	29737	O Ring	1
3	67186	Lock Washer	1
4	40965	Retaining Ring	1
5	19906	Ball Bearing	1
6	39170	Spindle Extension	1
7	67187	Ball Thrust Bearing	1

**NOTE:** Refer to the ITHT Product Manual for additional operating information.

# Hoisting Plugs

- **Hoisting Plug Assemblies**  
Heavy Duty

# Hoisting Plug - Heavy Duty



**Features:**

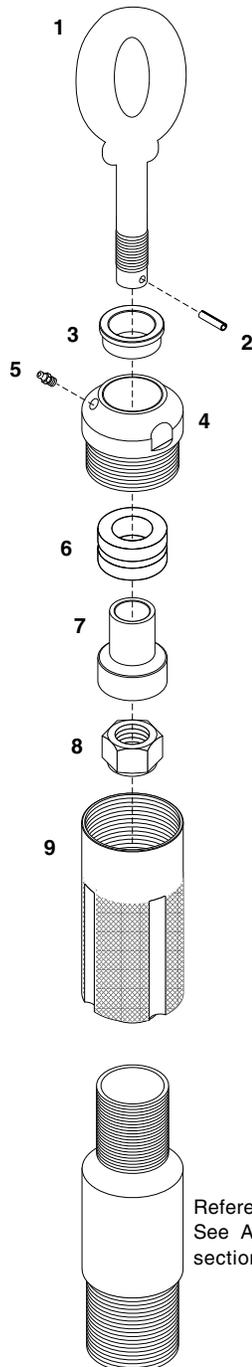
- Dependable, field proven product for surface drilling operations.
- See Tech Data for hoisting capacity.
- Designed with a 5:1 safety factor utilizing rated eye bolt.
- Optional shackle guide is recommended to eliminate jamming of certain hoist cable shackles in the eye bolt.
- 12.5 mm (0.5 in) diameter down-angled vent is incorporated into the body to eliminate side spray from pressurized drilling fluid.
- Long-life thrust roller bearing provides pivot for ease of connecting and reduces hoisting cable winding during hoisting and lowering.
- NW rod box spindle connection.

Assembly			kg	lbs
1-9	3542898	Heavy Duty Hoisting Plug Assembly	16.8	37.0

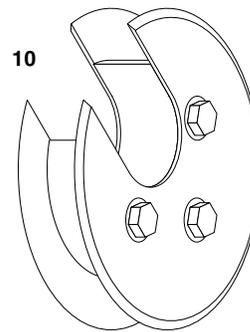
Parts				Qty
1	3542899	Eye Bolt		1
2	3542936	Spring Pin 1/4" x 2"		1
3	3542900	Wear Sleeve		1
4	3542901	Bearing Housing		1
5	17447	Hydraulic Grease Fitting		1
6	3542902	Thrust Bearing		1
7	3542903	Shaft Sleeve		1
8	3542914	Stover Lock Nut		1
9	3542904	Lower Housing		1

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

Options			Qty
10	3542907	Shackle Guide	1



Reference only.  
See Adapter Sub section.



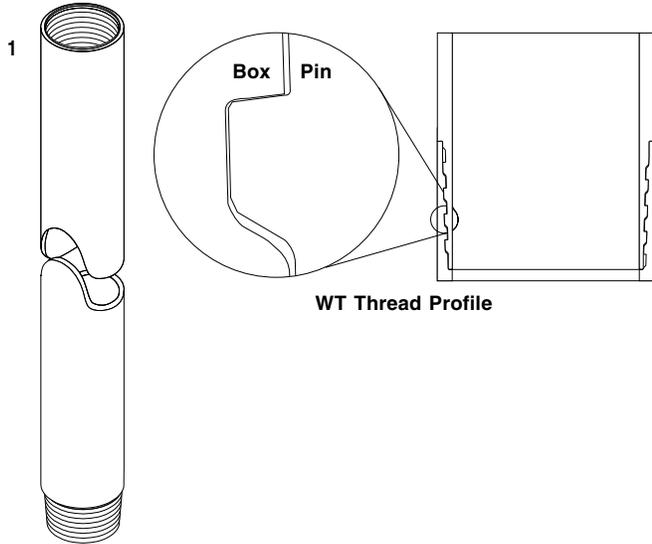
# Casing

- **PWT Casing**
- **Casing Drive Shoe**
- **Wireline Casing Advancer**
- **Packaging Information**

# Casing

**Features:**

- Tapered joint with modified buttress thread form.



Metric Lengths			kg	lbs
1	3543976	PWT Casing, 1.5 m	32.6	71.9
1	3543977	PWT Casing, 3.0 m	65.1	143.5

Imperial Lengths			kg	lbs
1	3543973	PWT Casing, 2 ft	13.1	28.8
1	3543974	PWT Casing, 5 ft	32.7	72.0
1	3543975	PWT Casing, 10 ft	65.3	144.0

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

**Thread Lubrication**

- Z-50 Thread Compound (p/n 306486) is the recommended thread lubricant to reduce wear and the possibility of galling during drilling operations.

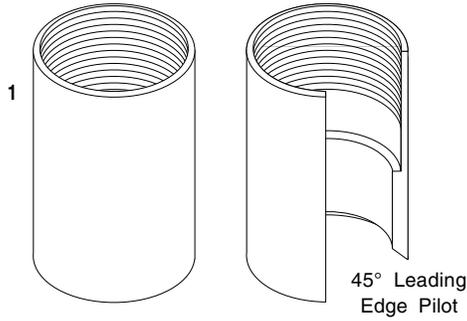
# Casing Drive Shoes

**Features:**

- Commonly used with drive hammers as a method of driving or advancing casing.
- Recommended for use with geotechnical soil sampling tools in clay, sand and other soft formations.
- Hardened surface with 45° leading edge pilot.

Casing Drive Shoe			kg	lbs
1	3543989	PWT Casing Drive Shoe	4.4	9.8

**NOTE:** Refer to the ITHT Product Manual for additional operating information.



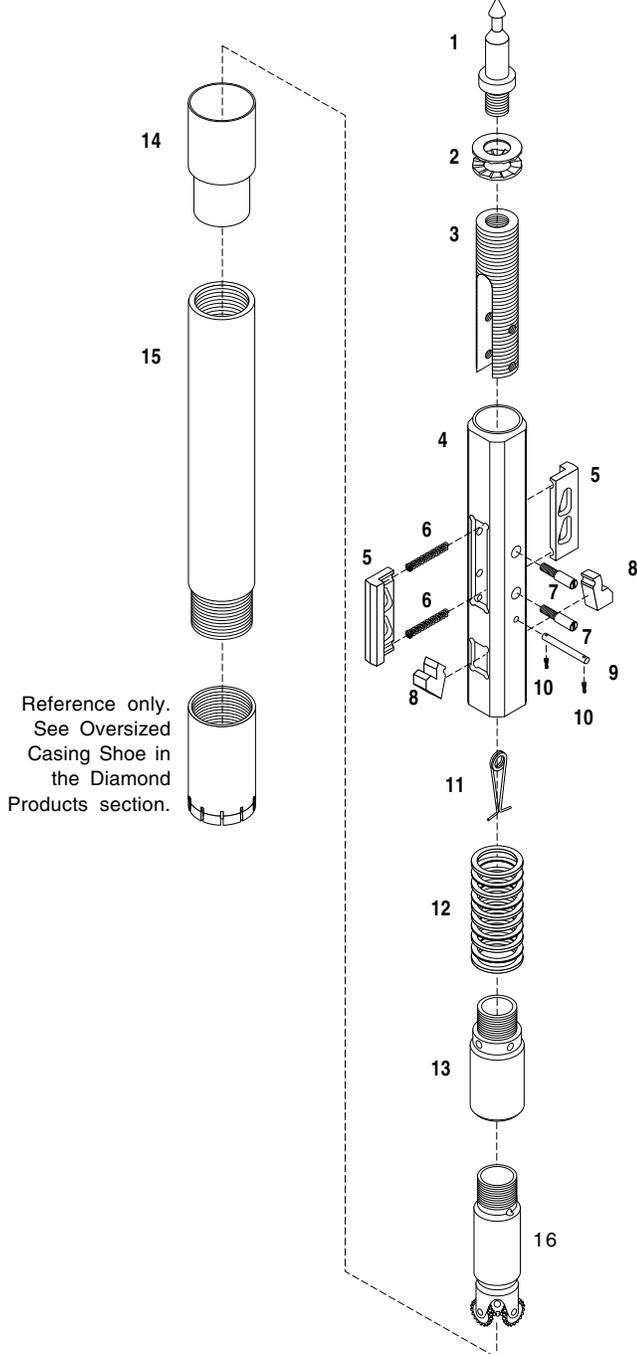
# Wireline Casing Advancer

**Features:**

- Three main components include driver, inner assembly, and inner assembly loading sleeve.
- Positive latching provides an efficient one-step method of drilling through overburden and casing off to bedrock.
- Rapid and easy removal and replacement.
- Spearhead point is compatible with PQ overshoot for lowering and retrieval.
- Driver supplied with PWT casing box connection.

**Applications**

- Soil sampling and overburden coring in conjunction with casing.
- Casing through difficult overburden or formations.



Assembly			kg	lbs
1-15	3543991	PWT Wireline Casing Advancer	—	—
1-14	3543771	Inner Assembly	—	—

Parts			Qty
1	93415	Spearhead	1
2	58040	Disk Lock Washer	1
3	58038	Release Shaft	1
4	59435	Latch Body	1
5	59438	Latch Shoe	2
6	93420	Spring	2
7	58035	Locating Pin	2
8	59436	Stop Latch Set	1
9	59437	Stop Latch Pin	1
10	44861	Split Cotter Pin	2
11	59082	Stop Latch Spring	1
12	59440	Spacer Set	1
13	59441	Bit Sub	1
14	59454	Loading Sleeve	1
15	3543990	Driver	1

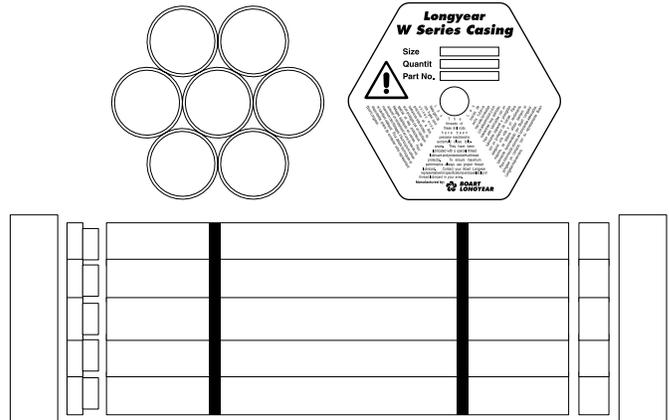
Rock Roller Bit - 120.7 mm (4-3/4") 2-7/8" API Reg Pin		
16	97132	Tri-Cone Steel Tooth (for medium hard formations)
16	97152	Tri-Cone Carbide Tungsten Button (for very hard formations)

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

# Packaging Information

**Packing Features:**

- Casing is packaged and sold in “bundles” which offer product protection during shipping and handling.
- Casing is colour coded:  
PWT standard - no paint
- Protective plastic end caps cover box and pin threads sealing in thread lubrication. For ease of identification, casing protectors are color-coded orange.
- Heavy duty galvanized hexagon bundle end caps (p/n 41072) protect the casing ends.
- Casing box and pin threads are protected with Z-50 Thread Compound (p/n 306486) to avoid oxidation during shipping and storage. Z-50 is the recommended thread lubricant to reduce wear and the possibility of galling during drilling operations.
- Casing is coated with Krown KL73 rust inhibitor (p/n 3543544) to reduce product oxidation during shipping. When storing casing for long periods of time, it is recommended to reapply to the product surface for maximum protection.



For “PWT” casing, a “bundle” contains 7 pieces.

**Bundle Specifications**

**3.0 m/10 ft CASING BUNDLE**

Dimensions (L x W x H) .....	3 150 x 457 x 406 mm (124 x 18 x 16 in)
Volume .....	0.6 m <sup>3</sup> (21 ft <sup>3</sup> )
Gross Weight .....	466 kg (1027 lbs)

**1.5 m/5 ft CASING BUNDLE**

Dimensions (L x W x H) .....	1 676 x 457 x 406 mm (66 x 18 x 16 in)
Volume .....	0.3 m <sup>3</sup> (11 ft <sup>3</sup> )
Gross Weight .....	254 kg (560 lbs)



# Recovery Tools

- Rod Recovery Taps
- Casing Recovery Taps

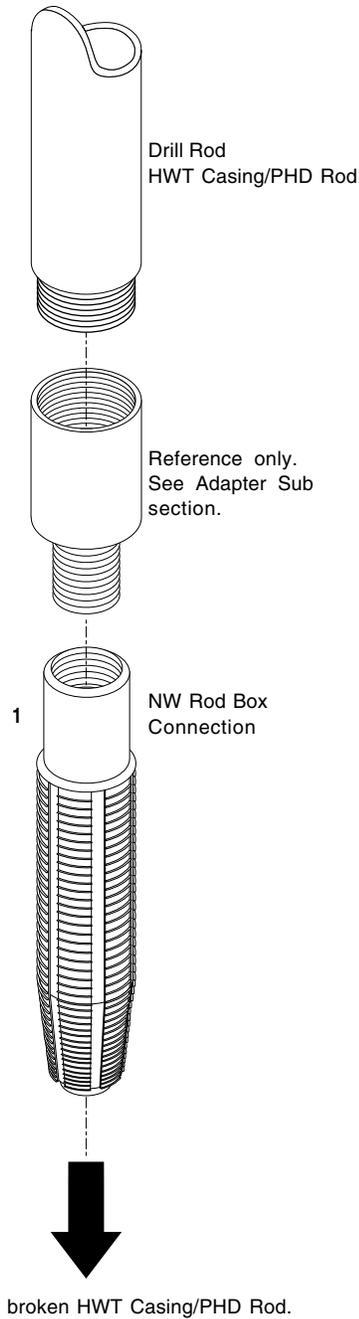
# Rod Recovery Taps

**Features:**

- Parallel wall, self-tapping thread allows for full penetration, improved recovery connection and longer tap life.
- NW rod box connection allows tap to be used for rod or casing through appropriate adapter sub connection.
- Right hand thread.
- Connection for optional pilot bit supplied as standard.

Parallel Wall Rod Recovery Tap			kg	lbs
1	3542968	HWT Casing/PHD Rod Recovery Tap	—	—

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.



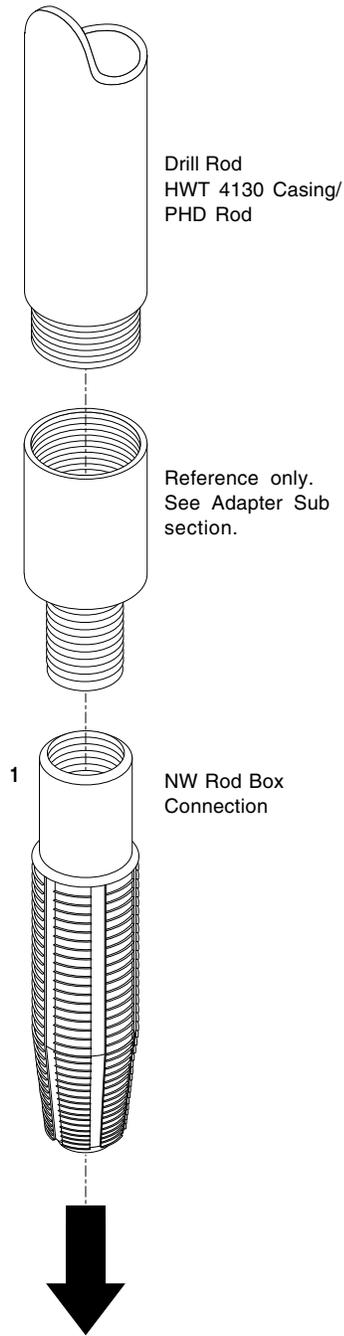
# Casing Recovery Taps

**Features:**

- Parallel wall, self-tapping thread allows for full penetration, improved recovery connection and longer tap life.
- NW rod box connection.
- Right hand thread.

Parallel Wall Casing Recovery Tap			kg	lbs
1	3543013	PWT Casing Recovery Tap	—	—

**NOTE:** Refer to the Tech Data section for technical specifications and the ITHT Product Manual for additional operating information.

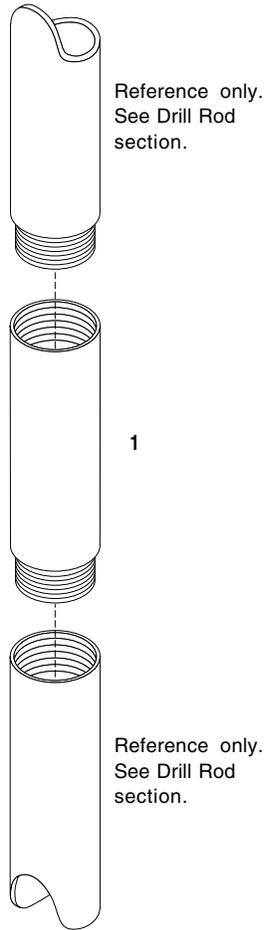




## Adapter Subs

- **Drill Rod Adapter Subs**
- **Water Swivel Adapter Subs**
- **Hoisting Plug Adapter Subs**
- **Casing Adapter Subs**
- **Recovery Tool Adapter Subs**
- **Blank End Adapter Subs**

# Drill Rod Adapter Subs



Drill Rod to Drill Rod/Locking Coupling			kg	lbs
1	101366	HWT/PHD Rod Box to PQ Rod Pin	2.1	4.6

Drill Rod to Drill Rod/Locking Coupling			kg	lbs
1	101367	PQ Rod Box to HWT/PHD Rod Pin	2.3	5.0

**NOTE:** Refer to the ITHT Product Manual for additional operating information.

# Water Swivel Adapter Subs

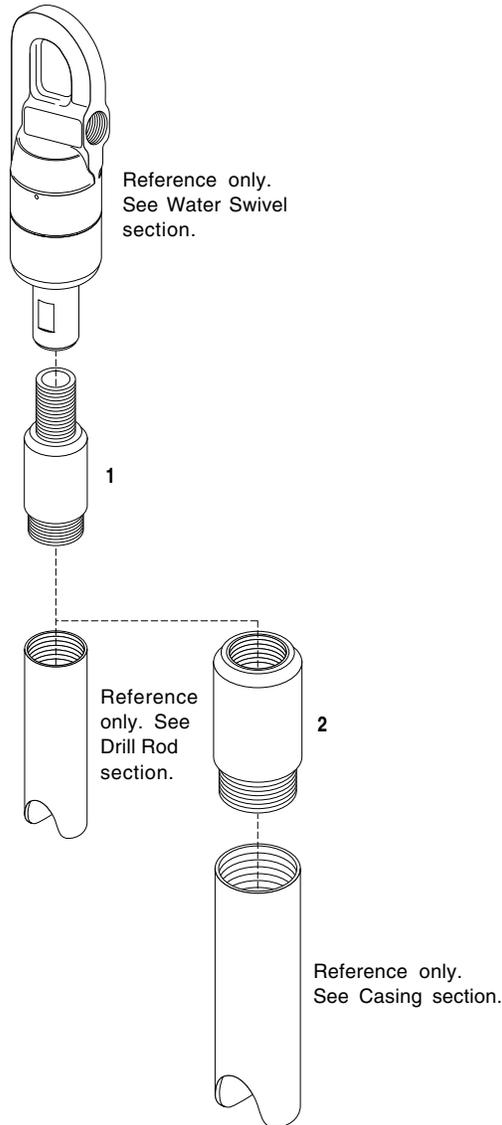
**Features:**

- The rod pin threads are electric induction hardened to ensure long life and minimize rod box thread galling, extending drill rod thread life and joint performance.

Universal Water Swivel to Drill Rod			kg	lbs
1	103008	BW Rod Pin to HWT/PHD Rod Pin	—	—

Adapter Sub to PWT Casing			kg	lbs
2	3543992	HWT/PHD Rod Box to PWT Casing Pin	9.1	20.0

**NOTE:** Refer to the ITHT Product Manual for additional operating information.



# Hoisting Plug Adapter Subs

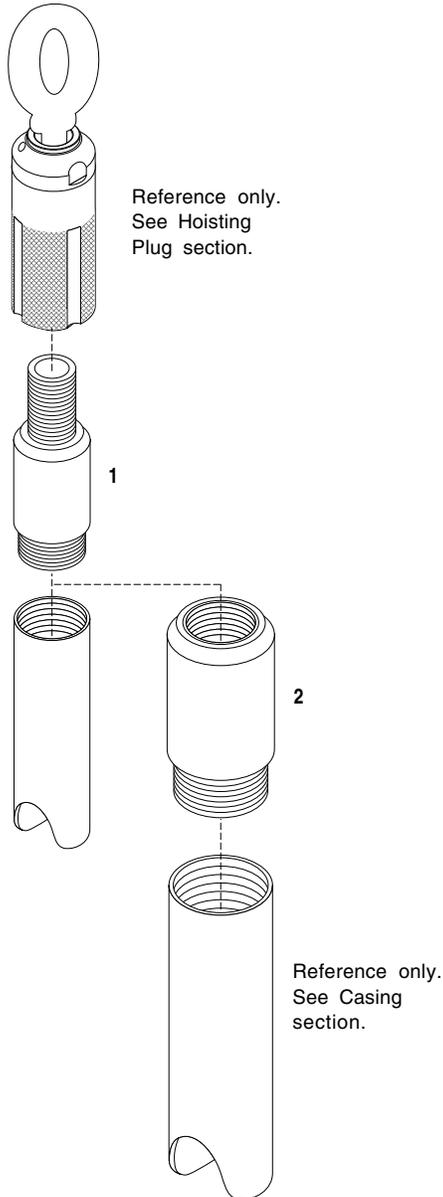
**Features:**

- The rod pin threads are electric induction hardened to ensure long life and minimize rod box thread galling, extending drill rod thread life and joint performance.

30,000 lb Hoisting Plug to Drill Rod			kg	lbs
1	102912	NW Rod Pin to HWT/PHD Rod Pin	—	—

30,000 lb Hoisting Plug to Casing			kg	lbs
2	3544177	NW Rod Pin to PWT Casing Pin	9.1	20.0

**NOTE:** Refer to the ITHT Product Manual for additional operating information.



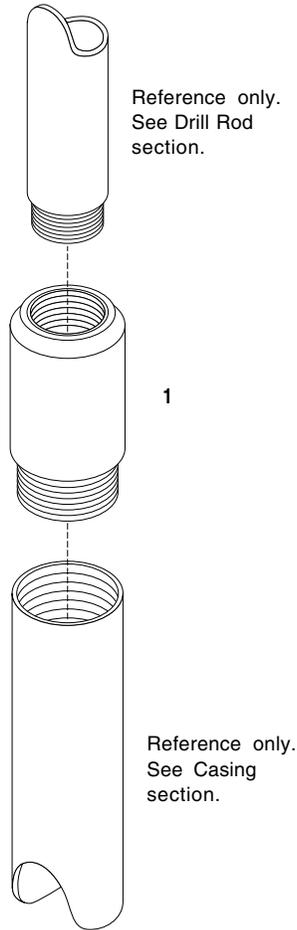
# Casing Adapter Subs

**Features:**

- The rod pin threads are electric induction hardened to ensure long life and minimize rod box thread galling, extending drill rod thread life and joint performance.

Drill Rod to PWT Casing			kg	lbs
1	3543992	HWT/PHD Rod Box to PWT Casing Pin	9.1	20.0
1	3541334	PW Casing Box to PWT Casing Pin	—	—
1	3541433	PWT Casing Box to PW Casing Pin	—	—

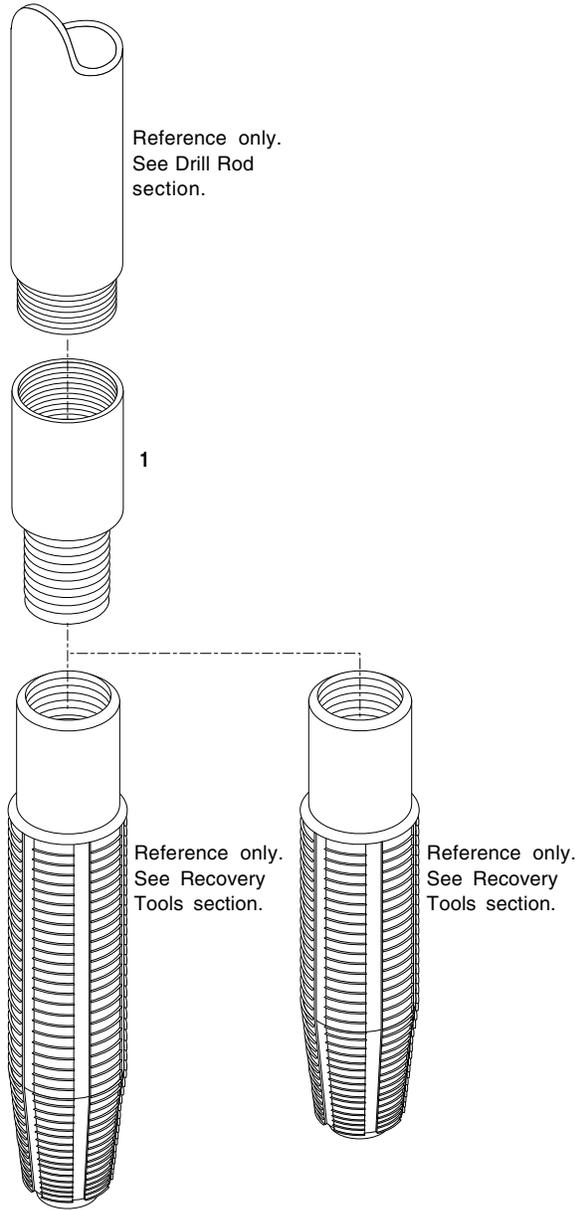
**NOTE:** Refer to the ITHT Product Manual for additional operating information.



# Recovery Tool Adapter Subs

Drill Rod to Rod/Casing Recovery Tap			kg	lbs
1	3542319	HWT/PHD Rod Box to NW Rod Pin	—	—

**NOTE:** Refer to the ITHT Product Manual for additional operating information.



# Blank End Adapter Subs

**Application:**

Blank end adapter subs enable you to manufacture your own adapter subs for your requirements. They are supplied as rod pin or rod box to either SOLID BLANK bar end or TUBING BLANK end.

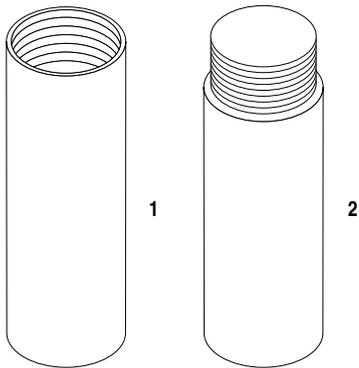
Solid bar end subs are for use with hoist plugs and water swivels ONLY. They are NOT for use as cross over subs. Thread stand off is adjusted for hand tight box/pin shoulder makeup.

**⚠ WARNING** Do not bore solid pin end subs greater than 25 mm (1 inch) to avoid shrinkage due to heat treat stresses.

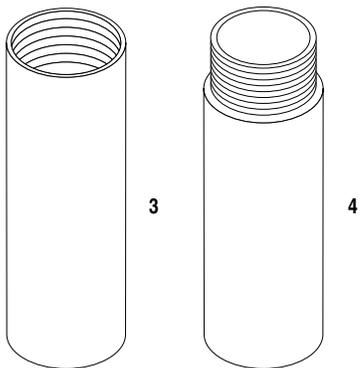
Drill Rod to Blank End Sub			kg	lbs
1	103416	HWT/PHD Rod Box to Solid Blank	—	—
1	3545166	PWT Casing Box to Solid Blank	—	—
2	103415	HWT/PHD Rod Pin to Solid Blank	14.8	32.6
2	3545167	PWT Casing Pin to Solid Blank	—	—
3	102924	HWT/PHD Rod Box to Tubing Blank	—	—
4	103054	HWT/PHD Rod Pin to Tubing Blank	—	—

**NOTE:** Refer to the ITHT Product Manual for additional operating information.

**Solid Blank Bar End Sub**



**Tubing Blank End Sub**

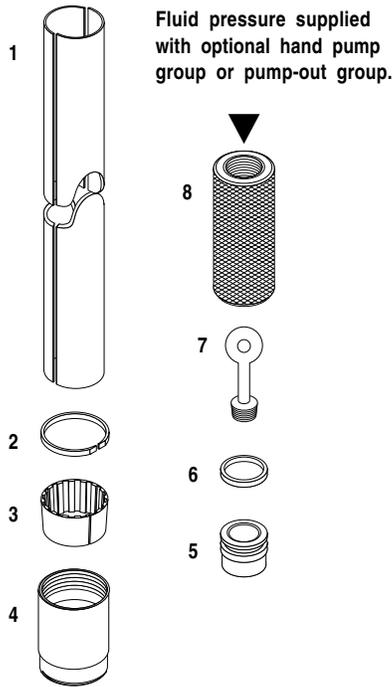




## Conversion Kits

- **Core Barrel**  
PQ to PQ3 Core Barrel

# Core Barrel Conversion Kits



Q to Q3 Core Barrel			kg	lbs
1-8	26558	PQ to PQ3 Conversion Kit, 1.5 m/5 ft	—	—
1-8	26724	PQ to PQ3 Conversion Kit, 3.0 m/10 ft	—	—

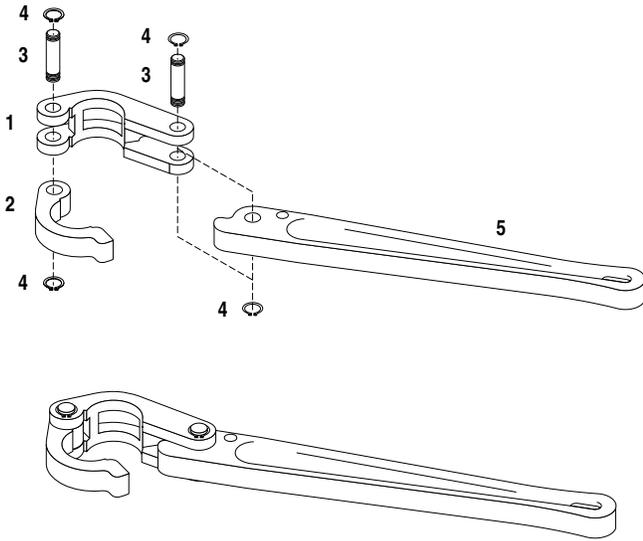
Parts			Qty
1	26180	Split Tube, 1.5 m / 5 ft	1
1	26710	Split Tube, 3.0 m / 10 ft	1
2	26176	Stop Ring	1
3	26177	Fluted Core Lifter	1
4	26160	Core Lifter Case	1
5	26179	Core Ejection Piston	1
6	26178	O Ring	1
7	26662	Piston Plug	1
8	26182	Pump-Out Adapter	1

**NOTE:** Refer to the Triple-Tube Core Barrel section for assembly information and the ITHT Product Manual for additional operating information.

## Tools

- Inner/Outer Tube Wrenches
- Pipe Wrenches
- Rod Wrenches
- Wireline Cable Tools
- Head Assembly Tool
- Triple-Tube Pump-Out Groups

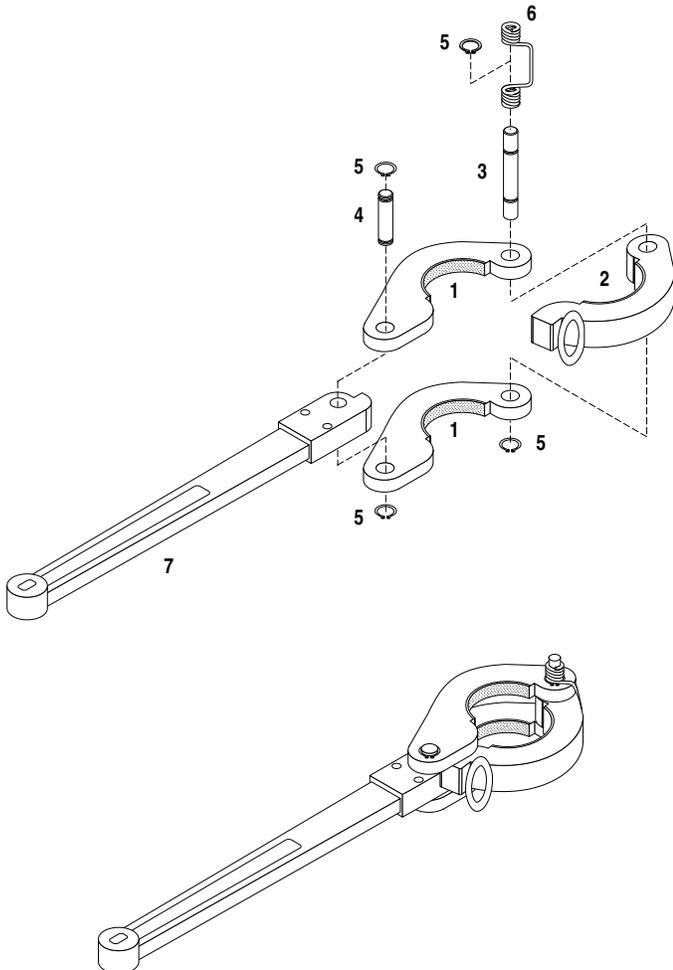
# Inner/Outer Tube Wrenches



Assembly		kg	lbs
1-5	26171	Full Grip PQ Inner Tube Wrench	3.6 7.9

Parts			Qty
1	28972	Stationary Jaw	1
2	28973	Swing Jaw	1
3	38580	Pin	2
4	38583	Retaining Ring	4
5	28259	Wrench Handle	1

**NOTE:** Refer to the ITHT Product Manual for additional operating information.

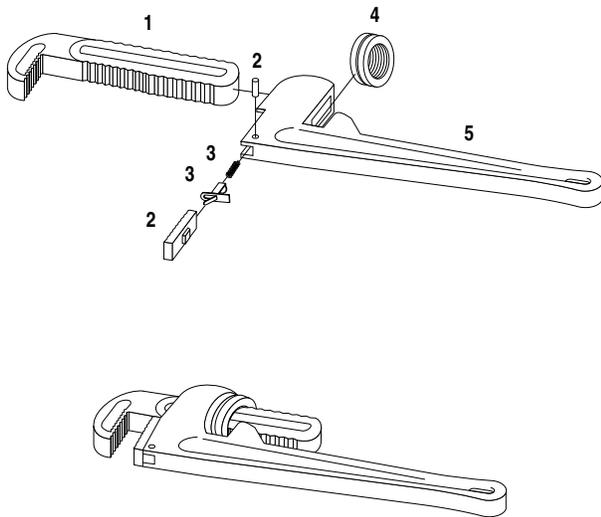


Assembly		kg	lbs
1-7	45804	Full Grip PQ Outer Tube Wrench	— —

Parts			Qty
1	45989	Stationary Jaw	2
2	45988	Swing Jaw	1
3	43485	Pin, 5/8" x 4"	1
4	43484	Pin, 5/8" x 2-3/4"	1
5	38583	Retaining Ring	4
6	43422	Spring	1
7	43483	Wrench Handle	1

**NOTE:** Refer to the Tech Data section for drill rod pretorque and the ITHT Product Manual for additional operating information.

# Pipe Wrenches



**Estimated Torque**

**45 KG (100 LB) HAND LOAD**

18" Heavy Duty Pipe Wrench .....	200 Nm (150 ft lbf)
24" Heavy Duty Pipe Wrench .....	270 Nm (200 ft lbf)
36" Heavy Duty Pipe Wrench .....	400 Nm (300 ft lbf)
48" Heavy Duty Pipe Wrench .....	540 Nm (400 ft lbf)

Assembly			kg	lbs
1-5	14942	18" Heavy Duty Pipe Wrench	2.6	5.8

Parts			Qty
1	14944	Hook Jaw	1
2	14943	Heel Jaw with Pin	1
3	200561	Coil and Spring	1
4	200562	Wrench Nut	1
5	—	Wrench Handle (included)	1

Assembly			kg	lbs
1-5	14945	24" Heavy Duty Pipe Wrench	4.3	9.4

Parts			Qty
1	14947	Hook Jaw	1
2	14946	Heel Jaw with Pin	1
3	200563	Coil and Spring	1
4	200564	Wrench Nut	1
5	—	Wrench Handle (included)	1

Assembly			kg	lbs
1-5	14948	36" Heavy Duty Pipe Wrench	8.4	18.6

Parts			Qty
1	14950	Hook Jaw	1
2	14949	Heel Jaw with Pin	1
3	200565	Coil and Spring	1
4	200566	Wrench Nut	1
5	—	Wrench Handle (included)	1

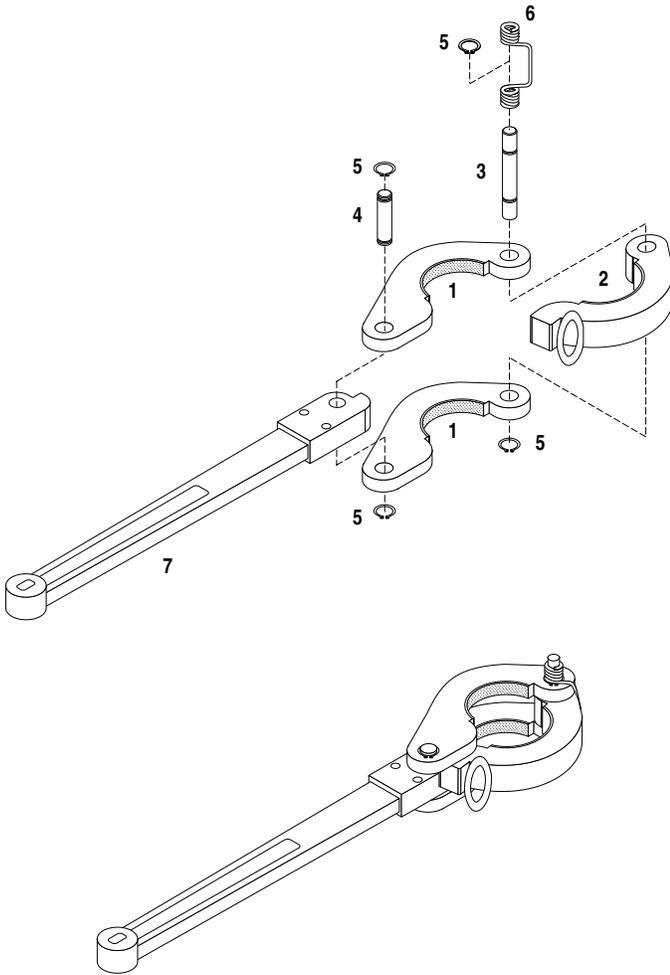
Assembly			kg	lbs
1-5	14951	48" Heavy Duty Pipe Wrench*	12.7	28.0

Parts			Qty
1	14953	Hook Jaw	1
2	14952	Heel Jaw with Pin	1
3	200567	Coil and Spring	1
4	200568	Wrench Nut	1
5	—	Wrench Handle (included)	1

\* Recommended for making up "P" size drill rod/HWT casing. It is not sufficient for deep holes, a hydraulic make and break system is recommended.

**NOTE:** Refer to the Tech Data section for drill rod pretorque and the ITHT Product Manual for additional operating information.

# Rod Wrenches



Assembly			kg	lbs
1-7	45792	HWT Casing/PHD Rod Wrench*	7.6	16.7

Parts			Qty
1	45987	Stationary Jaw	2
2	45986	Swing Jaw	1
3	43484	Pin, 5/8" x 4"	1
4	43485	Pin, 5/8" x 2-3/4"	1
5	38583	Retaining Ring	4
6	43422	Spring	1
7	43483	Wrench Handle	1

\* For making up HWT casing/PHD rod. Does not provide sufficient make-up torque for drilling.

**NOTE:** Refer to the Tech Data section for drill rod pretorque and the ITH Product Manual for additional operating information.

**Estimated Torque**

**45 KG (100 LB) HAND LOAD**

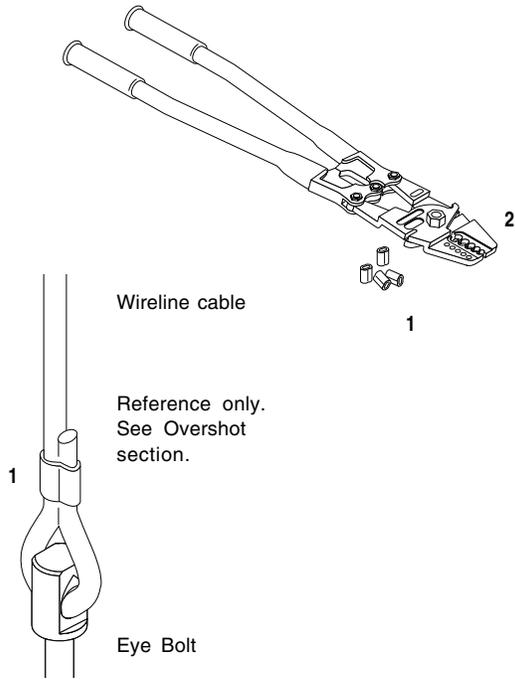
HWT Casing/PHD Rod Wrench ..... 200 Nm (150 ft lbf)

# Wireline Cable Tools

These items are used in conjunction with wireline cable. Slide an oval sleeve onto the wireline cable. Thread the cable through the overshoot eyebolt and crimp the sleeve around the cable using the crimping tool.

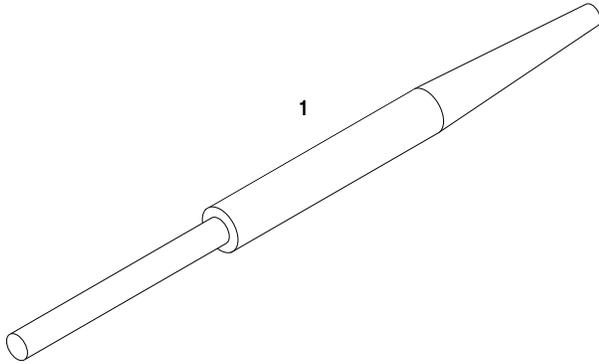
Wireline Cable Tools			kg	lbs
1	30172	Oval Sleeve, 3/16" or 11/64"	0.05	0.1
2	30171	Crimping Tool	2.1	4.6

**NOTE:** Refer to the ITHT Product Manual for additional operating information.



# Head Assembly Tool

The head assembly tool is used to drive in the spring pin when assembling links and latches with the latch retraction case.

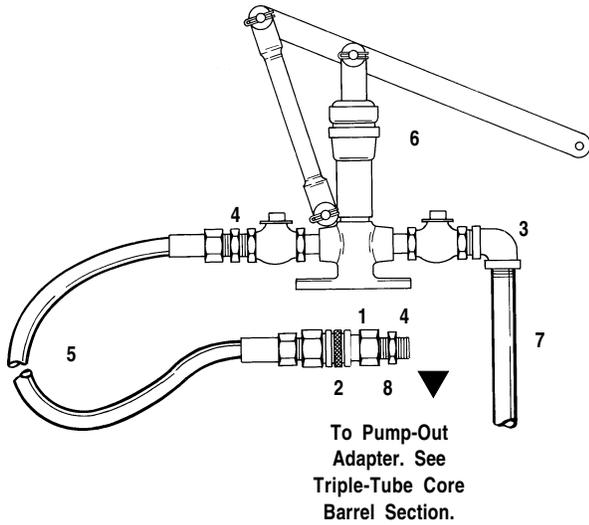


Head Assembly Tool			kg	lbs
1	3542987	Head Assembly Drift Tool	—	—

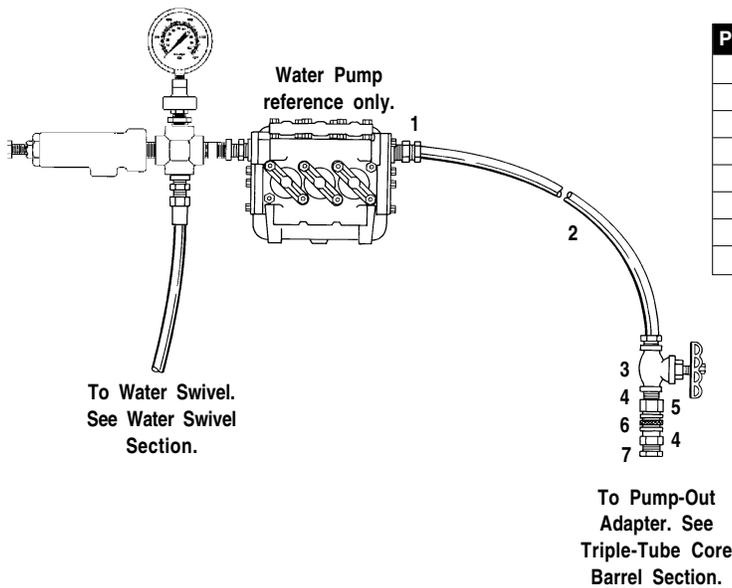
**NOTE:** Refer to the ITHT Product Manual for additional operating information.

# Triple-Tube Pump-Out Groups

Fluid pressure supplied by optional hand pump group or pump-out group is required to pump the second inner tube (split lengthwise) out of the standard inner tube.



Hand Pump-Out Group			Qty
1-8	26738	Hand Pump-Out Group consisting of:	
1	29257	Quick Coupling 1/2" NPT-F	1
2	29258	Quick Coupling 1/2" NPT-M	1
3	20829	90° Street Elbow 3/4" NPT	1
4	21413	Hex Bushing 3/4" x 1/2"	2
5	26739	Hose Assembly, 8 ft x 1/2" NPT-M	1
6	26740	Hand Pump	1
7	31746	Suction Pipe 3/4" x 24" length	1
8	17905	Close Nipple 1/2" NPT	1



Pump-Out Group			Qty
1-7	26742	Pump-Out Group consisting of:	
1	18922	Hex Bushing 1-1/4" x 1/2" NPT	1
2	26739	Hose Assembly, 8 ft x 1/2" NPT-M	1
3	26741	Globe Valve 1/2" NPT	1
4	17905	Close Nipple 1/2" NPT	2
5	29257	Quick Coupling 1/2" NPT-F	1
6	29258	Quick Coupling 1/2" NPT-M	1
7	21413	Hex Bushing 3/4" x 1/2"	1



## Technical Data

- **Nominal Dimensions**
- **Drilling Guidelines**
- **Rod Operating Specifications**

# Technical Data

### Nominal Dimensions

<b>HOLE DIAMETER (REAMING SHELL GAUGE)</b> .....	122.28/122.78 mm (4.814/4.834 in)
<b>HOLE VOLUME (REAMING SHELL GAUGE)</b> .....	11.80 L/m (0.95 gal/ft)
<b>CORE DIAMETER/BIT INSIDE DIAMETER</b>	
PQ .....	84.84/85.09 mm (3.340/3.350 in)
PQ3 .....	82.93/83.19 mm (3.265/3.275 in)
<b>BIT OUTSIDE DIAMETER</b> .....	121.92/122.43 mm (4.800/4.820 in)
<b>BIT KERF WIDTH</b>	
PQ .....	19.0 mm (0.74 in)
PQ3 .....	19.8 mm (0.78 in)
<b>LOCKING COUPLING OUTER DIAMETER</b>	
Conventional .....	122.05 mm (4.805 in)
<b>CORE BARREL OUTER TUBE</b>	
Outer Diameter .....	117.5 mm (4.62 in)
Inner Diameter .....	103.2 mm (4.06 in)
<b>CORE BARREL INNER TUBE</b>	
Outer Diameter .....	95.2 mm (3.75 in)
Inner Diameter .....	88.9 mm (3.50 in)
<b>ROD BODY (HWT 4130 Casing/PHD Rod)</b>	
Outer Diameter .....	114.3 mm (4.50 in)
Inner Diameter .....	101.6 mm (4.00 in)
<b>ROD PIN END LENGTH</b>	
HWT 4130 Casing/PHD Rod .....	44.45 mm (2.47 in)
Threads per Inch .....	2.5
<b>ROD WEIGHT (HWT 4130 Casing/PHD Rod)</b> .....	17.4 kg/m (11.7 lb/ft)
<b>ROD CONTENT VOLUME (HWT 4130 Casing/PHD Rod)</b> .....	8.1 L/m (0.65 gal/ft)
<b>ROD DISPLACEMENT VOLUME (HWT 4130 Casing/PHD Rod)</b> ..	2.17 L/m (0.17 gal/ft)
<b>ROD/HOLE ANNULUS VOLUME (HWT 4130 Casing/PHD Rod)</b> .	1.57 L/m (0.13 gal/ft)
<b>PWT CASING</b>	
Outer Diameter .....	139.7 mm (5.50 in)
Inner Diameter .....	127.0 mm (5.00 in)
Weight .....	21.4 kg/m (14.4 lb/ft)

### Drilling Guidelines

<b>RECOMMENDED FLOW</b>	
.....	68 to 87 L/min (18 to 23 gpm)
<b>BIT WEIGHT RANGE</b>	
.....	23 to 45 kN (5,000-10,000 lbf)
<b>BIT PENETRATION @ 800 rpm</b>	
Rate @ 80 r/cm (200 rpi) .....	10 cm/min (4.0 in/min)
Rate @ 100 r/cm (250 rpi) .....	8 cm/min (3.2 in/min)
<b>BIT PENETRATION @ 500 rpm</b>	
Rate @ 80 r/cm (200 rpi) .....	6 cm/min (2.5 in/min)
Rate @ 100 r/cm ( 250 rpi) .....	5 cm/min (2.0 in/min)
<b>WATER SWIVEL ROTATING LOAD RATING</b>	
Universal .....	5 000 kg (11,000 lbs)
<b>HOISTING PLUG STATIC LOAD RATING</b>	
Heavy Duty .....	5:1 = 13 500 kg (30,000 lb)
.....	3:1 = 22 600 kg (50,000 lb)
<b>WIRELINE CABLE BREAKING STRENGTH</b>	
4.8 mm (3/16 in) Swaged .....	24.5 kN (5,500 lbf)

### Rod (HWT 4130 Casing/PHD Rod) Operating Specifications

<b>RATED MAXIMUM DEPTH</b> .....	1 500 m (4,900 ft)
<b>RATED MAXIMUM DRILLING PULLBACK</b> .....	451 kN (101,000 lbf)
<b>RATED MAXIMUM DRILLING TORQUE*</b> .....	4 065 Nm (3,000 ft lbf)
<b>RECOMMENDED MINIMUM MAKE-UP TORQUE to 1 000 m (3,280 ft) depth*</b>	
.....	1 015 Nm (750 ft lbf)
<b>RECOMMENDED MINIMUM MAKE-UP TORQUE FOR DEEP HOLES*</b>	
over 1 000 m (3,280 ft) .....	3 400 Nm (2,500 ft lbf)
<b>MIDBODY MINIMUM YIELD STRENGTH</b> .....	621 MPa (90,000 psi)
<b>MIDBODY MINIMUM TENSILE STRENGTH</b> .....	724 MPa (105,000 psi)
<b>JOINT MINIMUM YIELD STRENGTH</b> .....	621 MPa (90,000 psi)
<b>JOINT MINIMUM TENSILE STRENGTH</b> .....	724 MPa (105,000 psi)
<b>MINIMUM PURE TENSION TO FAILURE**</b> .....	556 kN (125,000 lbf)
<b>MINIMUM PURE TORSION TO FAILURE**</b> .....	20 337 Nm (15,000 ft lbf)

**NOTE:** Rod capacities and failure loads were determined by independent facility. A safety factor has been applied for the above ratings (applies to new, unused Boart Longyear rods, in a straight vertical down hole, assuming compliance to ITH Product Manual and standard core drilling practices). Burst and collapse pressure ratings will be reduced under drilling loads. Operating torque should not exceed make-up torque.

\* Increase make-up torque to match operating torque as depth increases.

\*\* These failure loads are for product comparison purposes ONLY. Drilling loads should not exceed rating values.

### Pressure Ratings (per API bulletin 5C3)

<b>BURST PRESSURE - Box Shoulder</b>	
HWT 4130 Casing/PHD Rod .....	21.6 MPa (3,135 psi)
PWT Casing .....	19.0 MPa (2,760 psi)
<b>BURST PRESSURE - Midbody</b>	
HWT 4130 Casing/PHD Rod .....	62.0 MPa (9,000 psi)
PWT Casing .....	42.9 MPa (6,218 psi)
<b>COLLAPSE PRESSURE - Midbody</b>	
HWT 4130 Casing/PHD Rod .....	50.0 MPa (7,255 psi)
PWT Casing .....	28.3 MPa (4,110 psi)