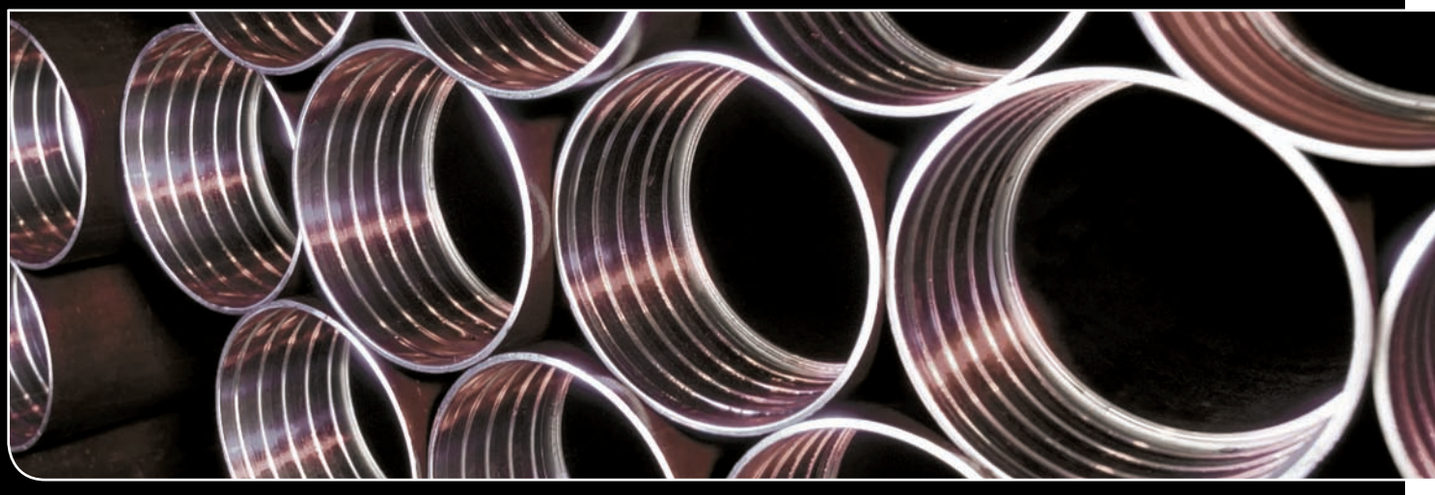


GLOBAL PRODUCT CATALOGUE

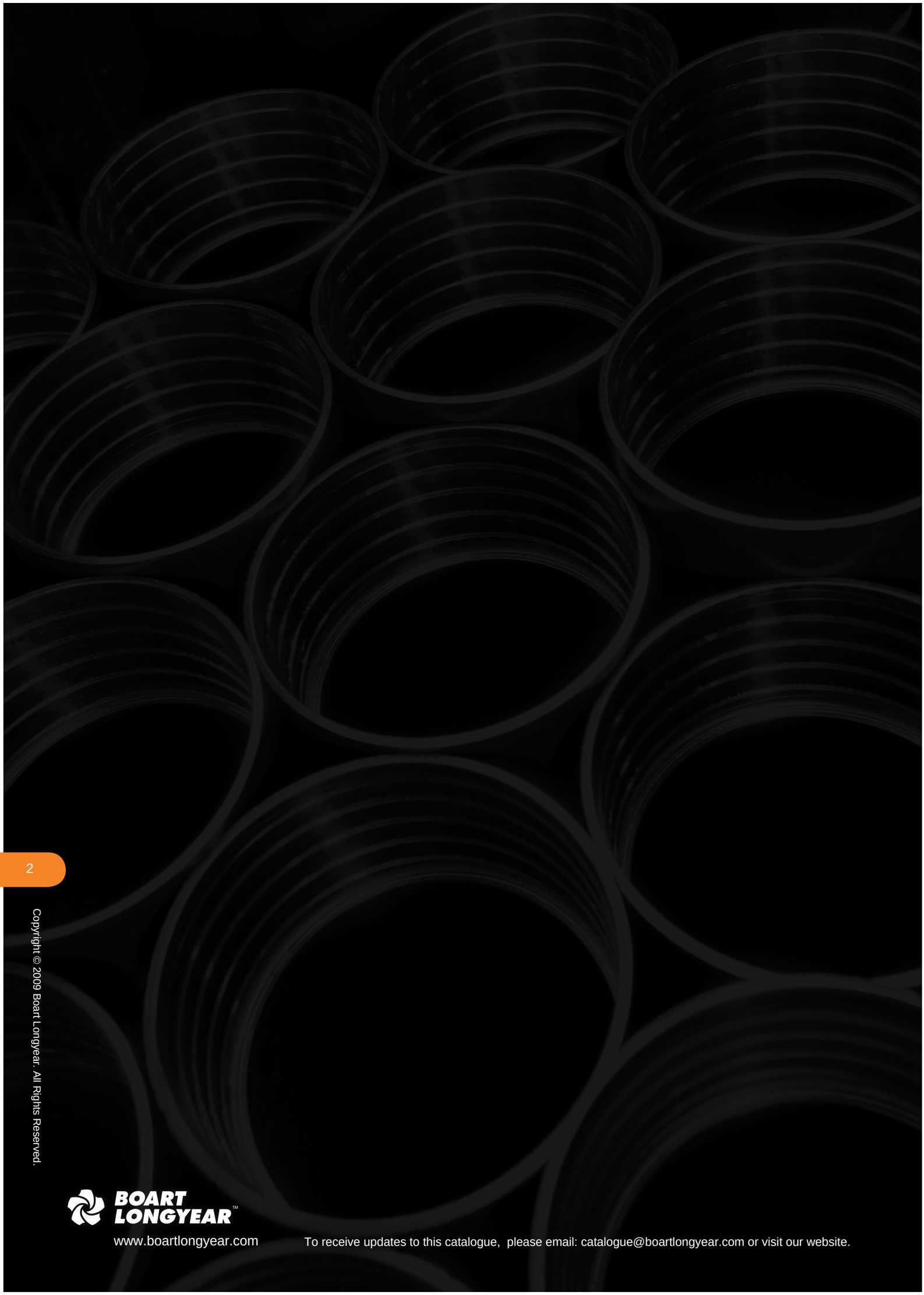
CORING RODS AND CASING

March 2009

BOART LONGYEAR™

www.boartlongyear.com

®



BOART LONGYEAR™

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ABOUT OUR PRODUCTS

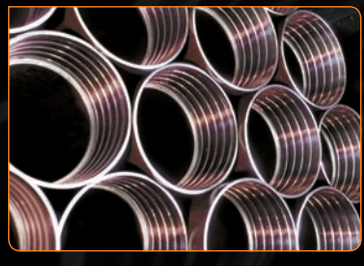
Boart Longyear is the industry's only integrated drilling services and products provider, combining 24-hour engineering excellence, global manufacturing facilities and the most experienced drilling services group in the business. Our customers rely on our unique ability to develop, field test, and deliver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

Exploration Drilling Products

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

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

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



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

RC CONSUMABLES
- **Rod**
- **Swivels**
- **Swivel Accessories**
- **Subs**

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

ABOUT OUR PRODUCTS

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

Construction Drill Rigs

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

Construction Drilling Consumables

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

Percussive

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

Aftermarket Support

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

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

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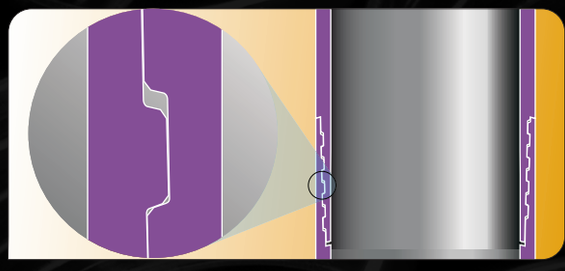
ROD OVERVIEW

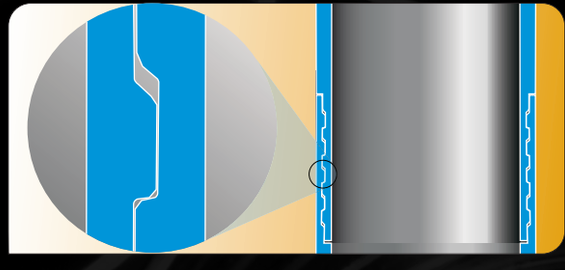
ROD THREAD OVERVIEW

Wireline Drill Rod Threads



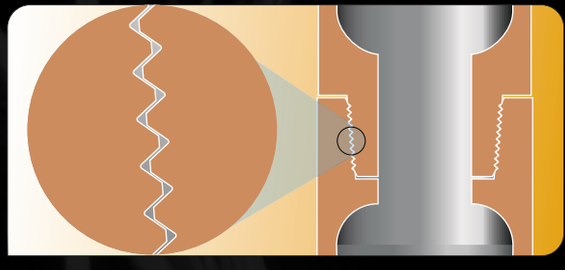
Q® THREAD
Leading industry thread
Easy make and break

RQ® THREAD
Patented upgrade over Q® rod
Maximum depth capacity
Increased strength and wear life



HD THREAD
Large diameter drilling
Robust thread

Conventional Drill Rod Threads



WJ THREAD
Industry-standard DCDMA thread
Reliable friction welded construction

V-WALL™ OVERVIEW

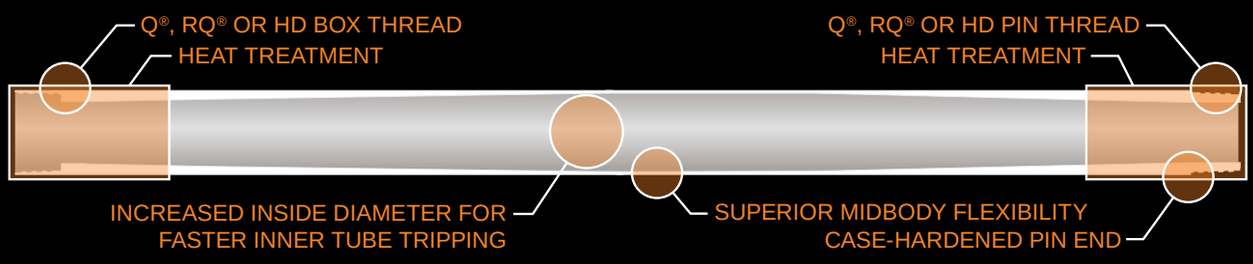
The V-Wall is an internally-upset rod available with our genuine Q® thread, the high load-efficiency RQ® thread or HD thread. In addition, all V-Wall rods undergo a unique combination of heat treatment processes for performance in demanding applications.

With up to 30% less weight in your drill string, you'll be able to manage more coring rods – increasing your existing drill's depth capacity. For example, a drill rated for 2500 m will be able to manage a 3250 m drill string using V-Wall.

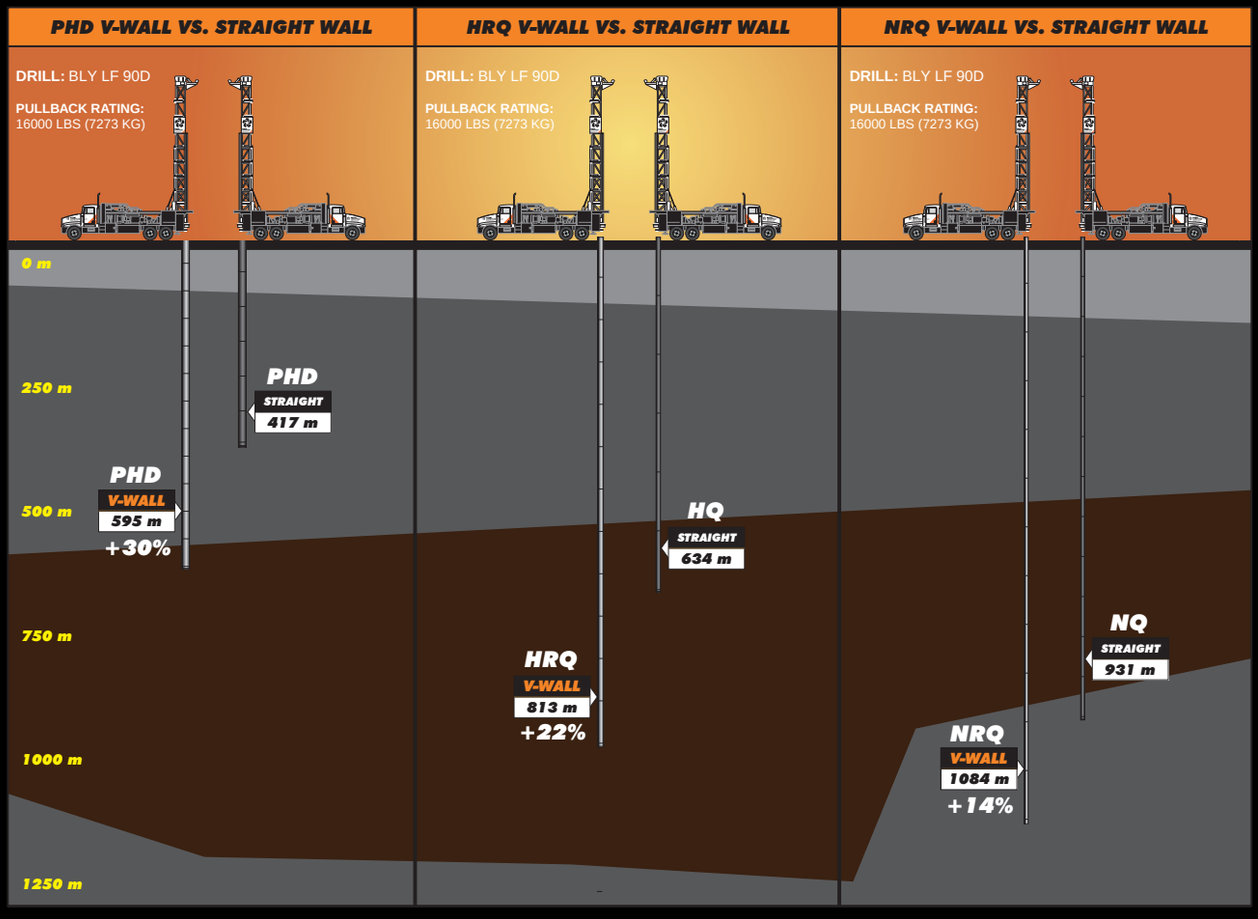
The mid-body also benefits from the internally-upset process and provides flexibility for wedging and steering in deviated hole applications.

Annular clearance between the core barrel and the interior wall of the rod has increased which enables an increase in core barrel descent speed.

V-WALL™ ROD DESIGN

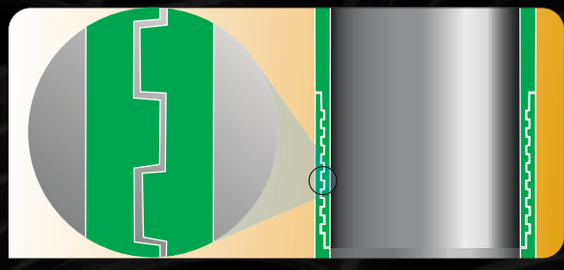


V-WALL™ PULL-BACK ADVANTAGE



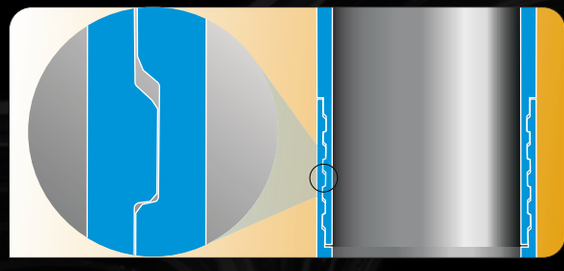
CASING THREAD OVERVIEW

Casing Threads



W THREAD

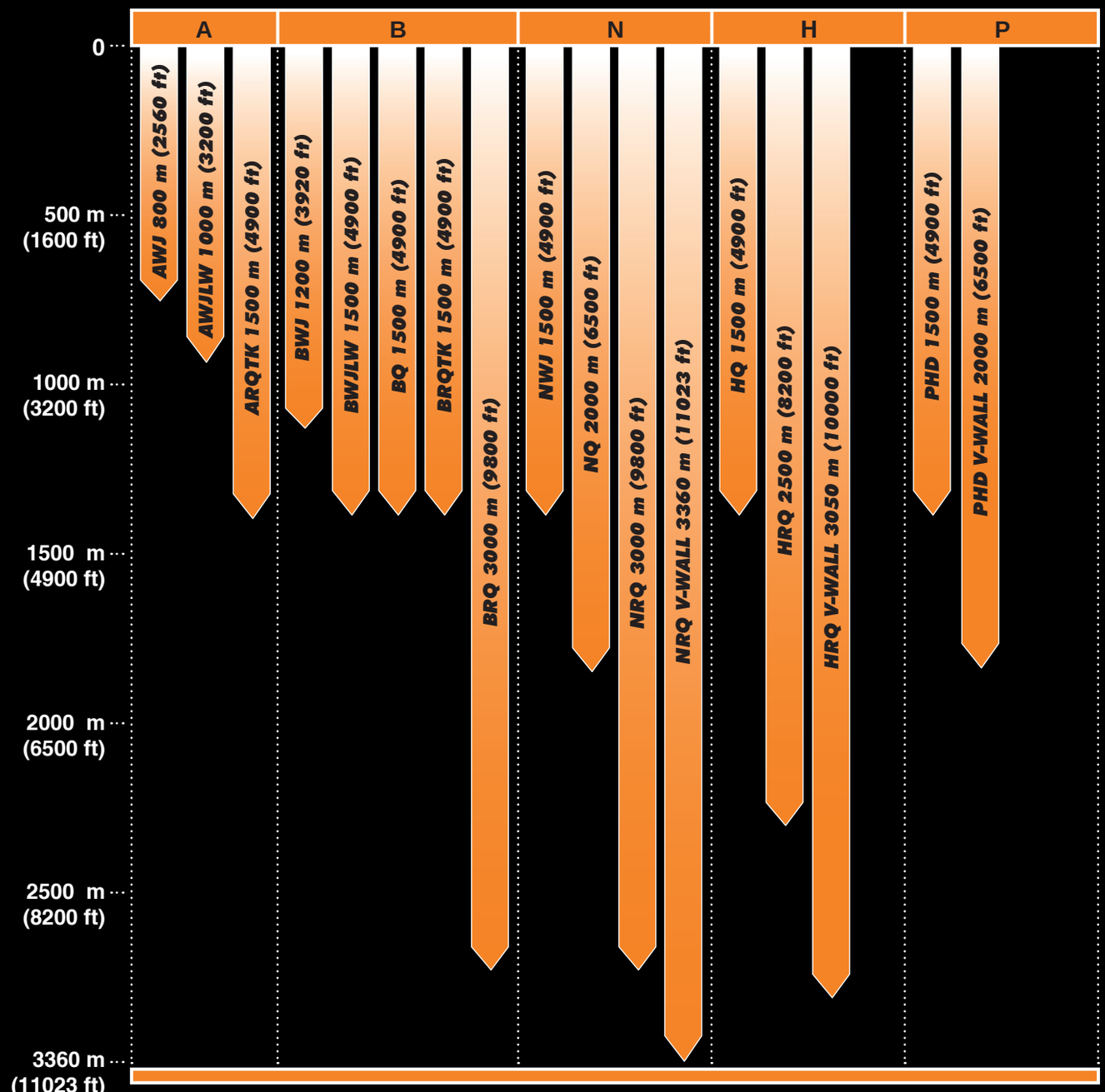
Industry-standard DCDMA thread



WT THREAD

Premium over W Casing
Easy make and break
HD thread

DRILL ROD JOINT DEPTH CAPACITY



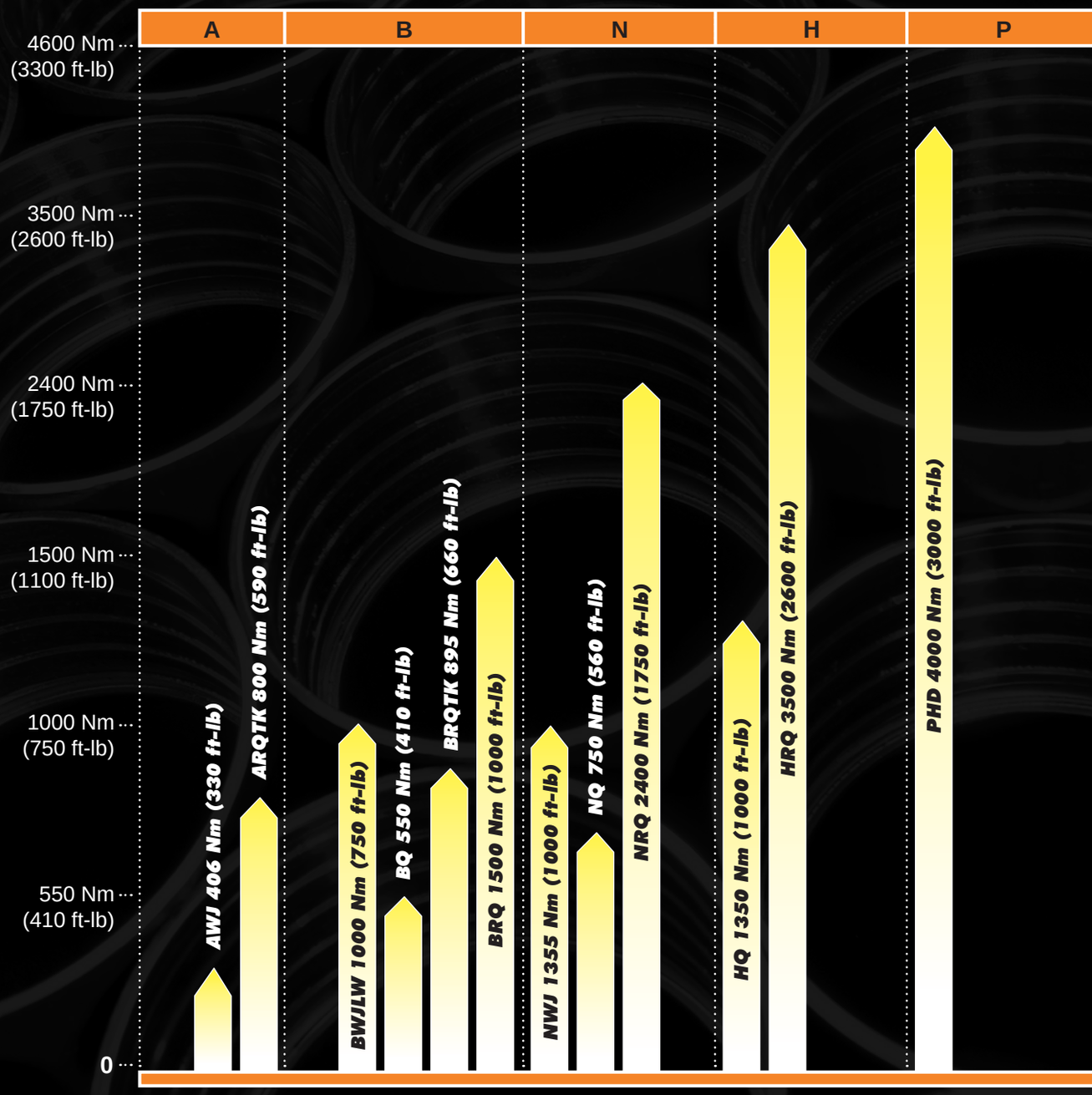
⚠ WARNING

Rod capabilities and failure loads were determined by an independent facility. A safety factor has been applied for the above ratings (applies to new, unused Boart Longyear rods used in a straight vertical hole, assuming compliance to wireline drill rod care and handling manual and standard core drilling practices).

This is a measure of how much load a joint can carry, as compared to the midbody (e.g. 30% provides a third of the strength). Inversely, this is a measure of how much more stress is created in the joint by a load, as compared to the midbody (e.g. 30% creates three times the stress under a load).

- Depth capacity is limited by drill rig capacity.
- Depth capacity decreases with wear. For example, derate by at least 50% for box shoulder thickness worn to 50% of original.
- Increase make-up torque to match operating torque as depth increases. Operating torque should not exceed make-up torque.
- Load efficiency is an excellent indicator of load capacity and fatigue strength. Choose a high efficiency joint in deep or deviated holes.

DRILL ROD JOINT MAX TORQUE RATING



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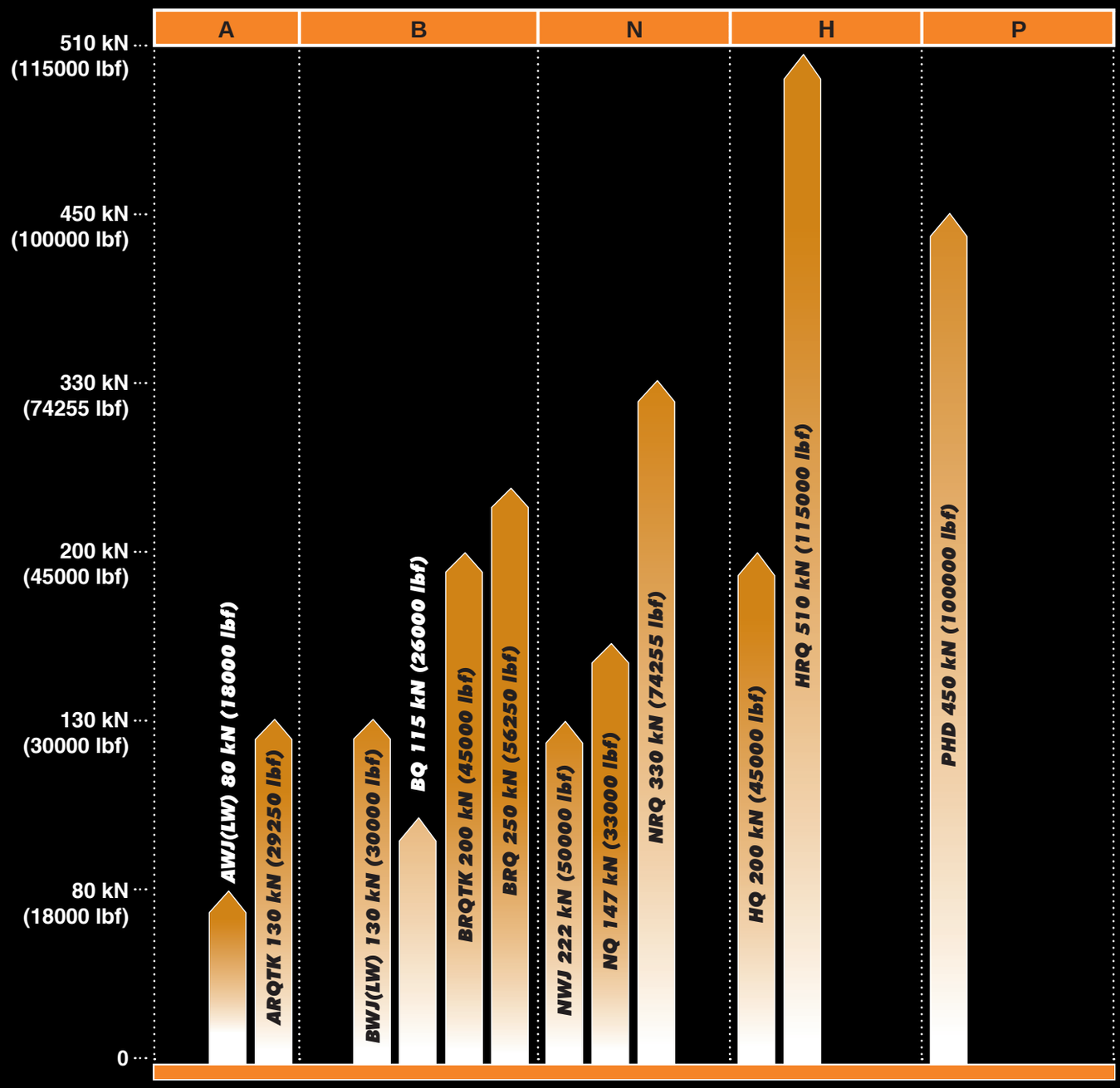
DRILL ROD JOINT MAX PULLBACK RATING



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SAFETY

SAFETY

Safety Identification and Safeguards

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

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

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

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

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

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

Safety Identification and Safeguards

⚠ WARNING

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

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

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

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

Minimize rotation loads by minimizing rig misalignment and hole deviation.

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

SAFETY

Safety Identification and Safeguards

⚠ WARNING

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

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

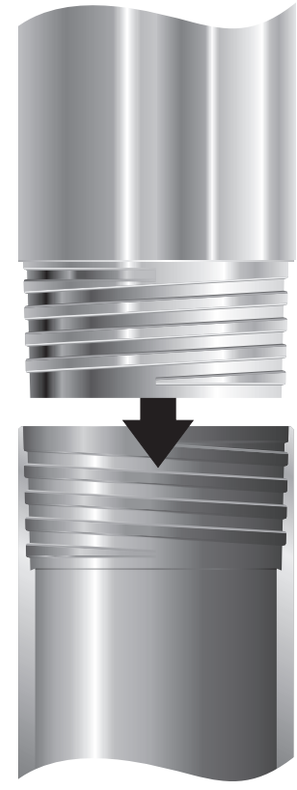




APPLICATION

MAKING AND BREAKING DRILL STRING

Stabbing

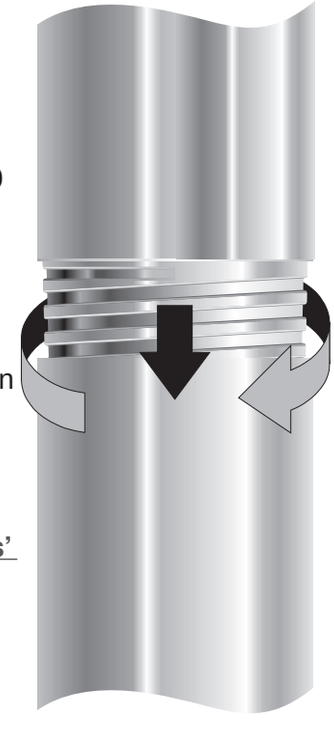


Wireline drill rods and casing provide very little radial clearance when first inserting a pin end into a box end (stabbing). If the pin end is not aligned, it will stab into the box end shoulder causing permanent damage regardless of design or heat treatment. This damage will create leakage ranging from negligible to significant, depending on the degree of damage (see fluid seal). Severe stabs can compromise the fit of the joint and potentially cause fatigue failures.

Once the face of the pin end shoulder is even with the face of the box end shoulder, the pin end should be lowered slowly into the box until the stab flank of the pin thread mates against the stab flank of the box thread. If the pin is not in true vertical alignment over the box or if the joint has insufficient taper to allow the first turn of pin thread to clear the first turn of box thread, the pin thread crest may wedge or 'jam' against the box thread crest or begin to cross-thread. Rotating the connection counter-clockwise ¼ to ½ turn will correct the misalignment.

Once successfully lowered, rotate the stabbing rod by hand to ensure proper thread engagement (see make-up). It is recommended that a stabbing guide be utilized (e.g. Boart Longyear hoist plug and water swivel adapter subs have a bull nose lead-in feature to prevent stabbing damage).

Make-Up



Wireline rods and casing make-up by slowly rotating the pin clockwise into the box (right hand threads). On most drills, this must be done at a very low rotation (e.g. 10 RPM or less) to avoid applying extraneous torque due to the inertia of the drill head. For example, a 45 kg (100 lb) drill head rotating at 100 RPM can apply an extra 1350 Nm (1000 ft-lb) or more of inertial torque when the joint is closed abruptly.

If the stand-off gap is outside specification or if the joint does not close after applying a small amount of make-up torque, break-out the joint, clean and inspect both threads. This is an indication of excessive wear, excessive foreign material, or thread deformation due to overloading during making or breaking. It may also indicate that the product is from a different manufacturer.

DANGER

Due to the significant safety risk, Boart Longyear drill rods should never be mixed with another manufacturers' rods. Doing so may cause catastrophic equipment failure, leading to bodily injury or death. In addition, mixing rods will void the Boart Longyear warranty.

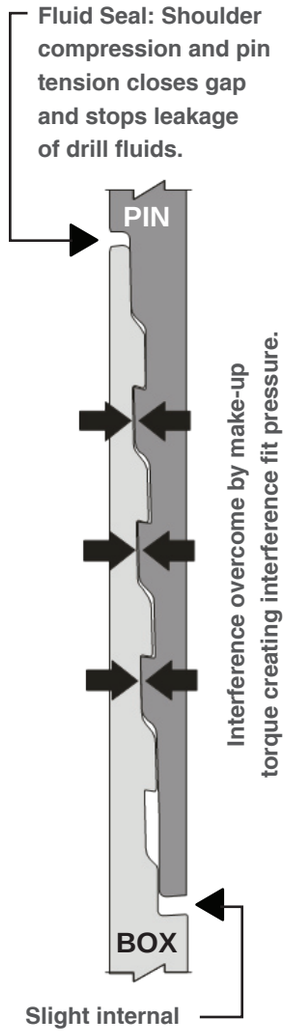
Make-Up Torque (Pre-Loading)

After the stand-off gap is closed, additional make-up is required to sufficiently pre-load the joint. While a large wrench may be sufficient on smaller sized rod strings or less demanding applications (check torque rating on catalogue 'Rod Wrenches' page), make-up applied with the drill head or other power make-up devices is often required. This is to ensure the box shoulder does not become unloaded during drilling allowing leakage, fretting or premature fatigue failures. Joints will not self make-up sufficiently during drilling alone as the joint has additional frictional resistance to make-up under drilling loads.

Joints with insufficient make-up will begin to leak as the pullback load increases and the box shoulder relaxes. Another visual sign of insufficient make-up is pitting-wear in the joints due to fretting (see glossary) and in extreme cases, fatigue failures.

ROD TYPE	MINIMUM MAKE-UP TORQUE	
	[NM]	[FT-LBS]
ARQTK	340	250
BQ	405	300
BRQ		
BRQTK		
NQ	600	442
NRQ		
NRQTK		
HQ	1010	750
HRQ		
PHD	1010	750

As a rule of thumb, the make-up torque on each joint should be adjusted to match the drilling torque it is expected to see. Additional make-up is required to maintain box shoulder compression under excessive pullback or bending loads. However, note that excessive make-up reduces the available load capacity and fatigue strength.



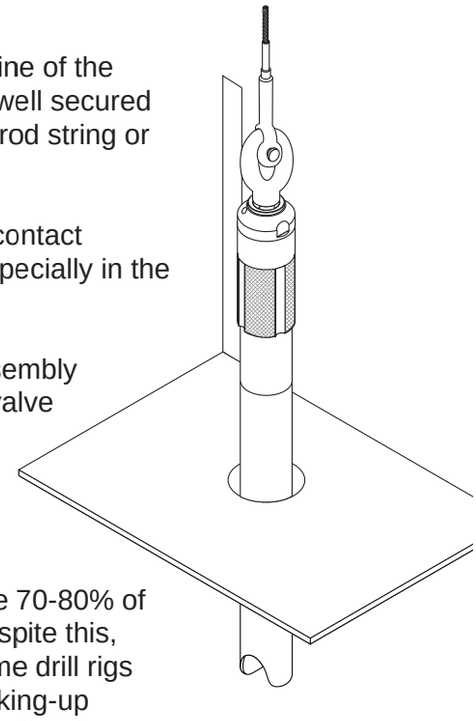
⚠ WARNING

Note: A common practice, in standard applications, is to apply 20% more make-up than drilling torque, however this takes away from the remaining load capacity and is not recommended for demanding applications.

The pin end is engineered to be slightly shorter than the box end to allow pre-loading of the box shoulder and elastic response to drilling loads. This is evident by a gap at the internal torque shoulder. Under extraordinary make-up or drilling torque, the pin and box will be sufficiently loaded to close this gap and engage the internal torque shoulder providing additional torque capacity.

MAKING AND BREAKING DRILL STRING

Lowering/Inserting



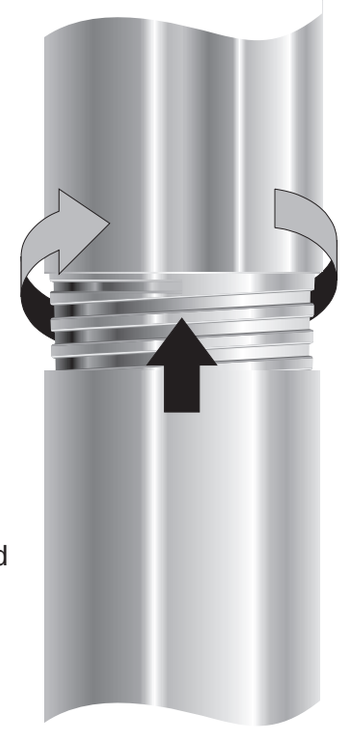
The drill drive and hoist sheave must be aligned with the center line of the hole to prevent undue bending and drag. The drill must also be well secured to the casing, ground or work face to ensure it does not load the rod string or become misaligned.

Adjust hollow spindle drive chucks or feed rollers to ensure that contact pressure is not permanently deforming or bending midbodies, especially in the case of light weight rod strings.

In down-holes always lower the rod string with the inner tube assembly latched in position. The inner tube assembly will act as a check valve in case the rod string is accidentally dropped.

Break-Out

Theory and laboratory tests show that break-out torque should be 70-80% of the greater of make-up or drilling torque applied to each joint. Despite this, breaking-out may be problematic due to adhesion wear or as some drill rigs do not have the same load capacity in breaking as they do in making-up or drilling. Additionally, during drilling the joints may be subject to vibration and loss of thread compound reducing the frictional resistance and allowing incremental make-up. Note that a poor choice of compound will contribute to this effect as well. This may result in a break-out torque requirement that exceeds the original make-up applied. This can be overcome utilizing the same effect by applying a slight percussive blow to the side of the box with a rubber mallet or similar non-damaging tool. Do not use a metal hammer or similarly hard objects. They will affect material properties in the impacted area and potentially cause fatigue failures and may void the Boart Longyear warranty.



On down hole applications of significant depth, prior to breaking-out, ensure that the drill rig foot-clamp is holding the rod string weight and that any tension across the joint (between the drill head and foot clamp) has been relieved. This eliminates undue thread wear and a potential safety hazard on deep holes; the pin should not ‘jump’ out of the box on break-out.

Once the threads have disengaged, the pin can be slowly lifted. Cleaning and re-lubricating is recommended to maximize wear life.

Fluid Seal

Conventional and wireline drill rods and casing utilize steel-on-steel interfaces as a fluid seal. Make-up torque is required to load the box end shoulder face against the pin external shoulder face to develop the necessary contact pressure at the interface. Given the high elastic modulus of steel, the performance of these seals is very limited despite seal face geometry or heat treatment. As a result, the fluid seal is very sensitive to damage on either seal face.

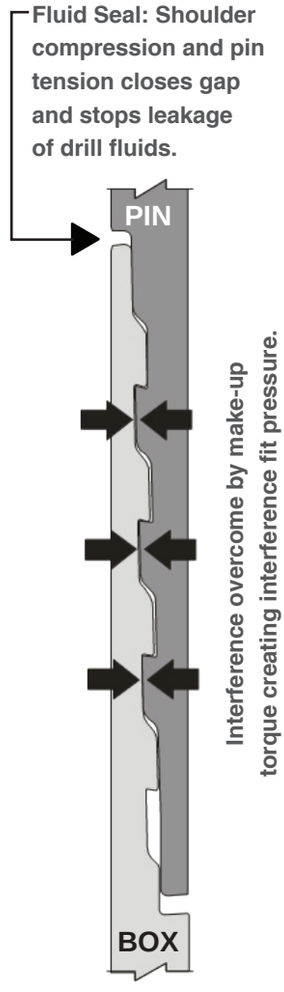
Note: Chucking on or applying wrenches to the external shoulder will cause leakage (see Stabbing).

The sealing performance of a rod string in a down hole can be evaluated with a pressure test:

- Drop an inner tube assembly adjusted to zero-bit-gap such that the weight of the column of fluid above the inner tube will create a seal between the core lifter case and the bit.
- Run the fluid supply pump until maximum pressure is achieved and then close the valve between the rod string and pump.
- Monitor the fluid pressure gauge and record any drop in pressure over a time interval. The amount of flow loss can be calculated using standard pressure vessel formula.

While no drop in pressure should occur on a new string, only a complete loss of pressure in less than one minute is significant.

EXAMPLE:
An 1800 m (5900 ft) string of NQ rod that loses 14 MPa (2000 psi) in one minute is only losing 7 lpm (1.6 gpm) where the minimum recommended flow for an NQ bit is 30 lmp (8 gpm).



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RODS

RODS: Q® THREAD OVERVIEW

Q® rods are the undisputed, worldwide choice for wireline coring drill rods. With 40 years invested into our proprietary Q® wireline drill rod, Boart Longyear has met the market demand through innovative engineering and state-of-the-art manufacturing techniques.

Features

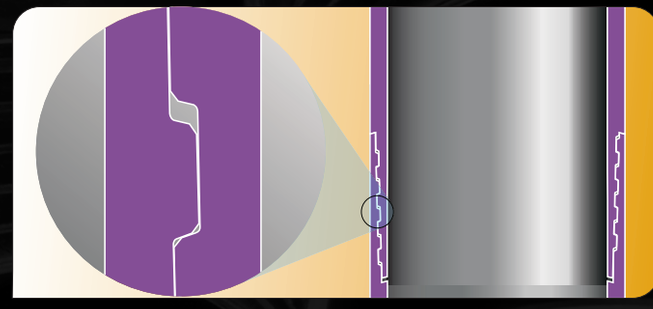
TUBING
- High quality alloy steel tubing
- Consistent concentricity, straightness and heat treatment
- All tubing available in DCDMA sizes

THREAD
- Tapered, course threads (3 threads per inch) provides easy make and break
- Load efficiency of 30% provides sufficient strength for average applications

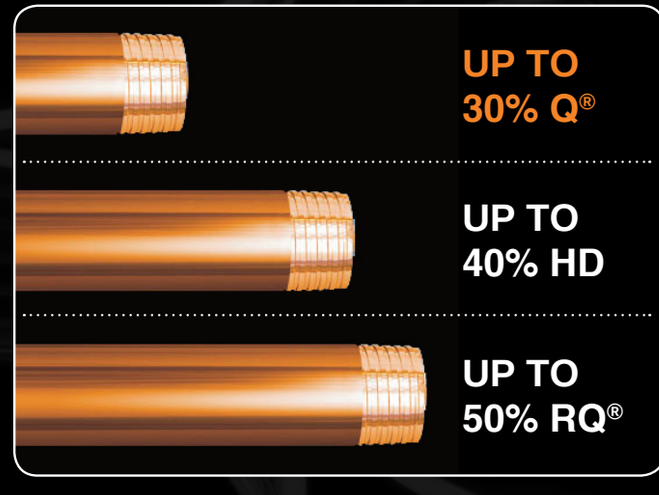
THRU-WALL HEAT TREATMENT
- Provides 140% material strength
- Heat treated box threads significantly increases thread wear life

CASE HARDENING
- Boart Longyear is the only manufacturer in the industry to case-harden threads
- Significant research, development and field testing has resulted in a hardening process that is unmatched in the marketplace
- Pin thread crest is hardened to nominal 55 HRc to eliminate damaging 'adhesion' wear
- Eliminates the transfer of wear material back and forth which is what happens between threads of equal hardness, leading to large scale galling and joint seizing

Q® THREAD PROFILE



JOINT LOAD EFFICIENCY



DANGER Due to the significant safety risk, Boart Longyear drill rods should never be mixed with another manufacturers' rods. Doing so may cause catastrophic equipment failure, leading to bodily injury or death. In addition, mixing rods will void the Boart Longyear warranty.

Q® is a Boart Longyear proprietary product and as such retains all of the quality, features, and fit associated with the Boart Longyear Q (registered) global manufacturing standards.

RODS: Q® THREAD PART NUMBERS

BQ

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREADS PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
3548208	ROD, BQ 3.0 m ENHANCED	55.60	46.10	18.00	8.5	44.45	167.00
3548206	ROD, BQ 1.5 m ENHANCED						
51579	ROD, BQ 1.0 m						

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3548209	ROD, BQ 10’ ENHANCED	2.19	1.81	42.00	3.0	1.75	13.00
3548207	ROD, BQ 5’ ENHANCED						
51555	ROD, BQ 2’						
51554	ROD, BQ 1’						

BQ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3150 x 292 x 254 mm (124 x 11.5 x 10 in)
Volume..... 0.23 m^3 (8 ft^3)
Gross Weight..... 283 kg (625 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1600 x 292 x 254 mm (63 x 11.5 x 10 in)
Volume..... 0.11 m^3 (4 ft^3)
Gross Weight..... 149 kg (329 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 53 bundles (1007 rods)
40 ft container load of 3.0 m/10 ft rods holds 68 bundles (1292 rods)

NQ

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
3548212	ROD, NQ 3.0 m ENHANCED	69.90	60.30	23.40	8.5	44.45	286.00
3548210	ROD, NQ 1.5 m ENHANCED						
51585	ROD, NQ 1.0 m						

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3548213	ROD, NQ 10’ ENHANCED	2.75	2.38	52.40	3.0	1.75	23.00
3548211	ROD, NQ 5’ ENHANCED						
51563	ROD, NQ 2’						
51562	ROD, NQ 1’						

NQ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3124 x 368 x 330 mm (123 x 14.5 x 13 in)
Volume..... 0.3681 m^3 (13 ft^3)
Gross Weight..... 453 kg (1000 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1600 x 368 x 330 mm (63 x 14.5 x 13 in)
Volume..... 0.1982 m^3 (7 ft^3)
Gross Weight..... 239 kg (526 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 32 bundles (608 rods)
40 ft container load of 3.0 m/10 ft rods holds 45 bundles (855 rods)

RODS: Q® THREAD PART NUMBERS

HQ

METRIC

ITEM	DESCRIPTION
3548216	ROD, HQ 3.0 m ENHANCED
3548214	ROD, HQ 1.5 m ENHANCED
51591	ROD, HQ 1.0 m

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
88.90	77.80	34.50	8.5	44.45	475.00

IMPERIAL

ITEM	DESCRIPTION
3548217	ROD, HQ 10’ ENHANCED
3548215	ROD, HQ 5’ ENHANCED
51569	ROD, HQ 2’
51568	ROD, HQ 1’

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3.50	3.06	76.90	3.0	1.75	38.00

HQ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3048 x 470 x 406.4 mm (120 x 18.5 x 16 in)
Volume..... 0.60 m^3 (21 ft^3)
Gross Weight..... 682 kg (1,505 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1588 x 470 x 406.4 mm (62.5 x 18.5 x 16 in)
Volume..... 0.31 m^3 (11 ft^3)
Gross Weight..... 346 kg (764 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 20 bundles (380 rods)
40 ft container load of 3.0 m/10 ft rods holds 30 bundles (570 rods)

V-WALL™ ROD OPTION

The V-Wall™ Rod is an internally-upset rod available with our genuine Q® thread, the high load-efficiency patented RQ® thread or HD thread. In addition, all V-Wall rods undergo our unique combination of heat treatment processes for performance in demanding applications.

METRIC

ITEM	DESCRIPTION	OD (mm)	BODY ID (mm)	JOINT ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
40959	ROD, NQ 3.0M V-WALL	69.90	62.00	60.30	20.42	8.5	44.45	296.70
40960	ROD, HQ 3.0M V-WALL	88.90	81.00	77.80	27.22	8.5	44.45	505.80

IMPERIAL

ITEM	DESCRIPTION	OD (in)	BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
27750	ROD, NQ 10' V-WALL	2.75	2.44	2.38	45.0	3.0	1.75	23.90
27758	ROD, HQ 10' V-WALL	3.50	3.19	3.06	60.0	3.0	1.75	40.70

V-WALL™ ROD BUNDLE SPECIFICATIONS

NQ/NRQ 3.0 m/10 ft ROD BUNDLE (19 RODS)

Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (13.0 ft^3)
Gross Weight..... 394 kg (869 lb)

CONTAINER SHIPMENTS:

20 ft container load of 3.0 m/10 ft rods holds 32 bundles (608 rods)
40 ft container load of 3.0 m/10 ft rods holds 50 bundles (950 rods)

HQ/HRQ 3.0 m/10 ft ROD BUNDLE (19 RODS)

Dimensions (L x W x H)..... 3.2 x 0.5 x 0.4 m (10.3 x 1.5 x 1.3 ft)
Volume..... 0.6 m^3 (21.2 ft^3)
Gross Weight..... 540 kg (1,191 lb)

CONTAINER SHIPMENTS:

20 ft container load of 3.0 m/10 ft rods holds 20 bundles (380 rods)
40 ft container load of 3.0 m/10 ft rods holds 38 bundles (722 rods)

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RODS: RQ® THREAD OVERVIEW

The patented RQ® rods feature a combination of exclusive heat treatments and innovative engineering to provide the ultimate in performance and longevity. RQ® drill rods expand your drilling capabilities and lower your total drill rod cost per meter/foot in deep, deviated and demanding wireline coring applications.

Features

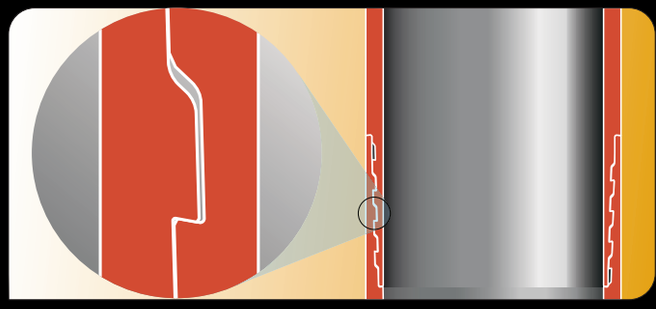
TUBING
- High quality alloy steel tubing
- Consistent concentricity, straightness and heat treatment
- All tubing available in DCDMA sizes

THREAD DESIGN
- Course RQ® threads (3 threads per inch) with increased taper, provide easier make and break as well as anti jamming
- Finer RQ®TK threads provide high performance for Thin Kerf wireline systems
- Load efficiency of 50% provides ultimate strength for demanding applications

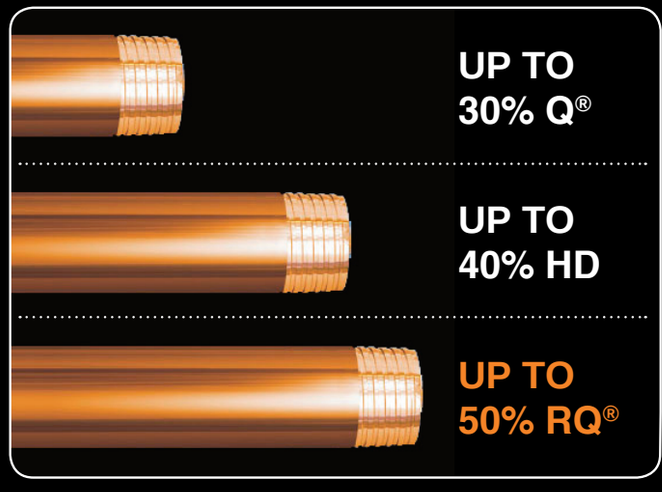
THRU-WALL HEAT TREATMENT
- Provides 175% material strength
- Heat treated box threads significantly increases thread wear life

CASE HARDENING
- Boart Longyear is the only manufacturer in the industry to case-harden threads
- Significant research, development and field testing has resulted in a hardening process that is unmatched in the marketplace
- Pin thread crest is hardened to eliminate damaging 'adhesion' wear
- Eliminates the transfer of wear material back and forth which is what happens between threads of equal hardness, leading to large scale galling and joint seizing

RQ® THREAD PROFILE



JOINT LOAD EFFICIENCY



DANGER Due to the significant safety risk, Boart Longyear drill rods should never be mixed with another manufacturers' rods. Doing so may cause catastrophic equipment failure, leading to bodily injury or death. In addition, mixing rods will void the Boart Longyear warranty.

RQ® is a Boart Longyear proprietary product and as such retains all of the quality, features, and fit associated with the Boart Longyear RQ (registered) global manufacturing standards.

RODS: RQ® THREAD PART NUMBERS

The RQ®TK rods utilize a reduced wall thickness to allow for the larger size tools and core samples obtained with the corresponding Q®TK wireline systems. Note: RQ®TK rods are not compatible with our standard RQ® coring rods.

ARQTK

METRIC

ITEM	DESCRIPTION
3540968	ARQTK 3.0 m ROD
104977	ARQTK 1.5 m ROD

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
44.70	37.50	10.70	6.4	38.53	109.80

IMPERIAL

ITEM	DESCRIPTION
3540970	ARQTK 10’ ROD
3540971	ARQTK 5’ ROD
3540972	ARQTK 2’ ROD
3541568	ARQTK 1’ ROD

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
1.76	1.48	24.00	4.0	1.52	8.80

ARQTK BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.2 x 0.2 m (10.3 x 0.8 x 0.7 ft)
Volume..... 0.2 m^3 (7.1 ft^3)
Gross Weight..... 213 kg (470 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.2 x 0.2 m (5.3 x 0.8 x 0.7 ft)
Volume..... 0.1 m^3 (3.5 ft^3)
Gross Weight..... 111 kg (246 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 70 bundles (1330 rods)
40 ft container load of 3.0 m/10 ft rods holds 90 bundles (1710 rods)

RODS: RQ® THREAD PART NUMBERS

BRQTK

METRIC

ITEM	DESCRIPTION
306227	BRQTK 3.0 m ROD
3540867	BRQTK 1.5 m ROD

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
55.80	48.40	14.30	7.30	40.64	183.50

IMPERIAL

ITEM	DESCRIPTION
3541174	BRQTK 10’ ROD
3541379	BRQTK 5’ ROD
3541343	BRQTK 2’ ROD
3545303	BRQTK 1’ ROD

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
2.20	1.91	32.00	3.50	1.60	14.82

BRQTK BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 0.8 ft)
Volume..... 0.2 m^3 (8.1 ft^3)
Gross Weight..... 283 kg (625 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 0.8 ft)
Volume..... 0.1 m^3 (3.5 ft^3)
Gross Weight..... 149 kg (329 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 53 bundles (1007 rods)
40 ft container load of 3.0 m/10 ft rods holds 68 bundles (1292 rods)

BRQ

METRIC

ITEM	DESCRIPTION
306238	BRQ 3.0 m ROD
3541308	BRQ 1.5 m ROD
3543582	BRQ 1.0 m ROD

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
55.60	46.10	18.00	8.50	41.91	167.00

IMPERIAL

ITEM	DESCRIPTION
3541555	BRQ 10’ ROD
3541378	BRQ 5’ ROD
3541340	BRQ 2’ ROD
3545301	BRQ 1’ ROD

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
2.19	1.81	42	3.00	1.65	13.00

BRQ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 0.8 ft)
Volume..... 0.2 m^3 (8.1 ft^3)
Gross Weight..... 283 kg (625 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 0.8 ft)
Volume..... 0.1 m^3 (3.5 ft^3)
Gross Weight..... 149 kg (329 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 33 bundles (1007 rods)
40 ft container load of 3.0 m/10 ft rods holds 68 bundles (1292 rods)

RODS: RQ® THREAD PART NUMBERS

NRQ

METRIC

ITEM	DESCRIPTION
104741	NRQ 3.0 m ROD
3541309	NRQ 1.5 m ROD
3001150	NRQ 1.0 m ROD

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
69.90	60.30	23.40	8.5	41.91	286.00

IMPERIAL

ITEM	DESCRIPTION
3541556	NRQ 10’ ROD
3541380	NRQ 5’ ROD
3541341	NRQ 2’ ROD
3542459	NRQ 1’ ROD

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
2.75	2.38	52.40	3.0	1.65	23.00

NRQ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (13.0 ft^3)
Gross Weight..... 453 kg (1000 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.4 x 0.3 m (5.3 x 1.2 x 1.1 ft)
Volume..... 0.2 m^3 (7.0 ft^3)
Gross Weight..... 239 kg (526 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 32 bundles (608 rods)
40 ft container load of 3.0 m/10 ft rods holds 45 bundles (855 rods)

HRQ

METRIC

ITEM	DESCRIPTION
306243	HRQ 3.0 m ROD
3541310	HRQ 1.5 m ROD
3001217	HRQ 1.0 m ROD

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
88.90	77.80	34.50	8.50	41.91	475.00

IMPERIAL

ITEM	DESCRIPTION
3541558	HRQ 10’ ROD
3541381	HRQ 5’ ROD
3541342	HRQ 2’ ROD
3545071	HRQ 1’ ROD

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3.50	3.06	76.90	3.00	1.65	38.00

HRQ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.5 x 0.4 m (10.3 x 1.5 x 1.3 ft)
Volume..... 0.6 m^3 (21.2 ft^3)
Gross Weight..... 682 kg (1,505 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.5 x 0.4 m (5.3 x 1.5 x 1.3 ft)
Volume..... 0.3 m^3 (10.9 ft^3)
Gross Weight..... 346 kg (764 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 20 bundles (380 rods)
40 ft container load of 3.0 m/10 ft rods holds 30 bundles (570 rods)

V-WALL™ ROD OPTION

The V-Wall™ is an internally-upset rod available with our genuine Q® thread, the high load-efficiency patented RQ® thread or HD thread. In addition, all V-Wall™ rods undergo our unique combination of heat treatment processes for performance in demanding applications.

METRIC

ITEM	DESCRIPTION	OD (mm)	BODY ID (mm)	JOINT ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
3544312	ROD, NRQ 3.0M V-WALL	69.90	62.00	60.30	20.42	8.5	41.91	296.70
3544311	ROD, HRQ 3.0M V-WALL	88.90	81.00	77.80	27.22	8.5	41.91	505.80

IMPERIAL

ITEM	DESCRIPTION	OD (in)	BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3544310	ROD, NRQ 10' V-WALL	2.75	2.44	2.38	45.0	3.0	1.65	23.90
3544309	ROD, HRQ 10' V-WALL	3.50	3.19	3.06	60.0	3.0	1.65	40.70

V-WALL™ ROD BUNDLE SPECIFICATIONS

NQ/NRQ 3.0 m/10 ft ROD BUNDLE (19 RODS)

Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (13.0 ft^3)
Gross Weight..... 394 kg (869 lb)

CONTAINER SHIPMENTS:

20 ft container load of 3.0 m/10 ft rods holds 32 bundles (608 rods)
40 ft container load of 3.0 m/10 ft rods holds 50 bundles (950 rods)

HQ/HRQ 3.0 m/10 ft ROD BUNDLE (19 RODS)

Dimensions (L x W x H)..... 3.2 x 0.5 x 0.4 m (10.3 x 1.5 x 1.3 ft)
Volume..... 0.6 m^3 (21.2 ft^3)
Gross Weight..... 540 kg (1,191 lb)

CONTAINER SHIPMENTS:

20 ft container load of 3.0 m/10 ft rods holds 20 bundles (380 rods)
40 ft container load of 3.0 m/10 ft rods holds 38 bundles (722 rods)

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RODS: HD THREAD OVERVIEW

HD threads are designed for reliability in large size core drilling, the HD drill rod offers a robust, coarse thread profile for heavy duty wireline applications.

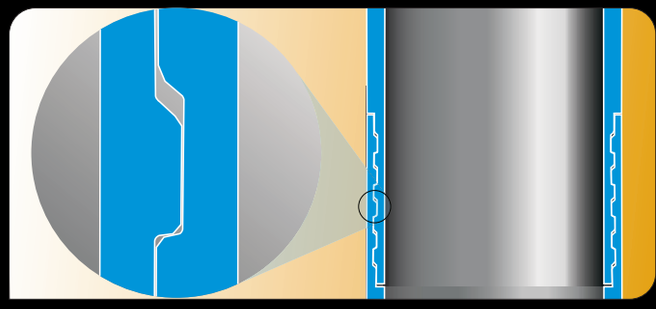
Features

TUBING
- High quality alloy steel tubing
- Consistent concentricity, straightness and heat treatment
- All tubing available in DCDMA sizes

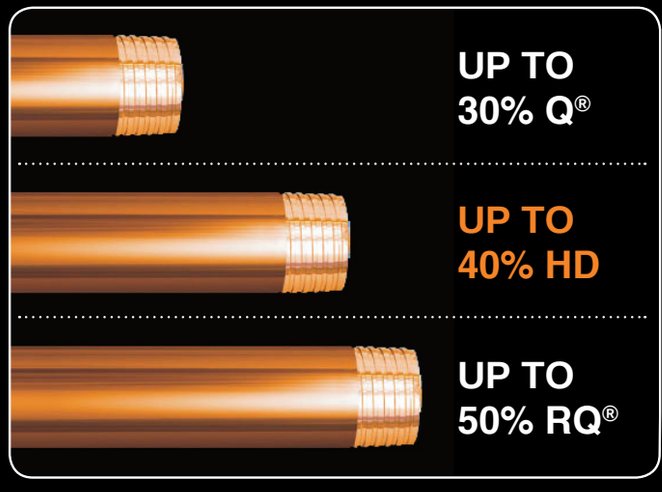
THREAD DESIGN
- Larger deeper threads (2.5 threads per inch) provide maximum durability
- Load efficiency of 40% provides sufficient strength for large hole sizes

CASE HARDENING
- Boart Longyear is the only manufacturer in the industry to case-harden threads
- Significant research, development and field testing has resulted in a hardening process that is unmatched in the marketplace
- Pin thread crest is hardened to eliminate damaging 'adhesion' wear
- Eliminates the transfer of wear material back and forth which is what happens between threads of equal hardness, leading to large scale galling and joint seizing

HD THREAD PROFILE



JOINT LOAD EFFICIENCY



DANGER Due to the significant safety risk, Boart Longyear drill rods should never be mixed with another manufacturers' rods. Doing so may cause catastrophic equipment failure, leading to bodily injury or death. In addition, mixing rods will void the Boart Longyear warranty.

RODS: HD THREAD PART NUMBERS

PHD

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
3542314	PHD 3.0 m ROD						
3541743	PHD 1.5 m ROD	114.00	102.00	52.20	10.2	63.00	810.80

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3540845	PHD 10’ ROD						
3540844	PHD 5’ ROD	4.50	4.00	117.00	2.5	2.47	65.30
3542519	PHD 2’ ROD						

PHD BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (7 RODS)
Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (14.1 ft^3)
Gross Weight..... 373 kg (823 lb)

1.5 m/5 ft ROD BUNDLE (7 RODS)
Dimensions (L x W x H)..... 1.6 x 0.4 x 0.3 m (5.3 x 1.2 x 1.1 ft)
Volume..... 0.20 m^3 (7.1 ft^3)
Gross Weight..... 194 kg (428 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 24 bundles (168 rods)
40 ft container load of 3.0 m/10 ft rods holds 54 bundles (378 rods)

V-WALL™ ROD OPTION

The V-Wall™ Rod is an internally-upset rod available with our genuine Q® thread, the high load-efficiency patented RQ® thread or HD thread. In addition, all V-Wall™ rods undergo our unique combination of heat treatment processes for performance in demanding applications.

METRIC

ITEM	DESCRIPTION	OD (mm)	BODY ID (mm)	JOINT ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
3003743	ROD, PHD 3.0M V-WALL	114.00	106.00	102.00	37.21	10.2	63.00	869.30

IMPERIAL

ITEM	DESCRIPTION	OD (in)	BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3546256	ROD, PHD 10' V-WALL	4.50	4.19	4.00	82.00	2.5	2.47	70.00

V-WALL™ ROD BUNDLE SPECIFICATIONS

PHD 3.0 m/10 ft ROD BUNDLE (7 RODS)

Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (14.1 ft^3)
Gross Weight..... 268 kg (591 lb)

CONTAINER SHIPMENTS:

20 ft container load of 3.0 m/10 ft rods holds 25 bundles (175 rods)
40 ft container load of 3.0 m/10 ft rods holds 56 bundles (392 rods)

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RODS: WJ THREAD OVERVIEW

The WJ rod is a conventional drill rod consisting of a tubular mid-body with friction welded pin and box ends. The tapered threads are similar to an API thread form, and are manufactured using DCDMA gauges. WJ rods are used for conventional core drilling, geotechnical and environmental applications, and rotary drilling applications.

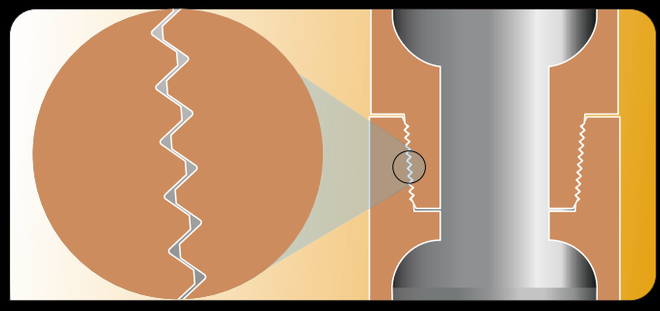
Features

MIDBODY TUBING
- High quality alloy steel tubing
- Consistent concentricity and straightness
- Midbody tubing is standard Q® weight for WJ or Q®TK weight for WJLW

THREAD DESIGN
- API style of thread featuring a 'V' style thread with ample taper providing easier and faster making and breaking
- Excellent pulling load capacity

CONSTRUCTION
- Reliable friction welded construction ensure joints have mechanical properties equal to the parent material
- Avoids failures inherent to the brittle material created by conventional welding techniques

WJ THREAD PROFILE



RODS: WJ THREAD PART NUMBERS

Light weight (LW) WJ rods utilize the RQ®TK rod tubing for midbodies to provide lighter weight thus providing greater drilling depths

AWJ and AWJLW

	ITEM	DESCRIPTION	OD (mm)	ROD BODY ID (mm)	JOINT ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
METRIC	63467	AWJLW 3.0 m ROD							
	63468	AWJLW 1.5 m ROD	44.50	38.10	15.90	10.40	5.1	44.45	94.40

	ITEM	DESCRIPTION	OD (in)	ROD BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
IMPERIAL	62785	AWJ 10’ ROD							
	62786	AWJ 5’ ROD	1.75	1.50	0.63	32.00	5.0	1.75	7.40
	63094	AWJ 2’ ROD							

AWJ and AWJLW BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.2 x 0.2 m (10.3 x 0.8 x 0.7 ft)
Volume..... 0.2 m^3 (7.1 ft^3)
Gross Weight..... AWJ: 288.5 kg (636 lb); AWJLW: 209.0 kg (461 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.2 x 0.2 m (5.3 x 0.8 x 0.7 ft)
Volume..... 0.1 m^3 (3.5 ft^3)
Gross Weight..... AWJ: 149.7 kg (330 lb); AWJLW: 109 kg (242 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 75 bundles (1425 rods)
40 ft container load of 3.0 m/10 ft rods holds 97 bundles (1843 rods)

BWJ and BWJLW

	ITEM	DESCRIPTION	OD (mm)	ROD BODY ID (mm)	JOINT ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
METRIC	3544303	BWJLW 3.0 m ROD							
	3544361	BWJLW 1.5 m ROD							
	3544732	BWJ 3.0 m ROD	55.80	BWJ: 44.50 BWJLW: 48.40	19.00	BWJ: 54.00 BWJLW: 49.20	5.1	50.80	176.60
	3544731	BWJ 1.5 m ROD							

BWJ and BWJLW BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 0.8 ft)
Volume..... 0.2 m^3 (8.1 ft^3)
Gross Weight..... BWJ: 360 kg (796 lb); BWJLW 289 kg (639 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 0.8 ft)
Volume..... 0.1 m^3 (3.9 ft^3)
Gross Weight..... BWJ: 193 kg (427 lb); BWJLW 164 kg (362 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 36 bundles (684 rods)
40 ft container load of 3.0 m/10 ft rods holds 36 bundles (684 rods)

RODS: WJ THREAD PART NUMBERS

NWJ

METRIC

ITEM	DESCRIPTION	OD (mm)	ROD BODY ID (mm)	JOINT ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
63739	NWJ 3.0 m ROD							
63738	NWJ 1.5 m ROD	66.70	57.20	28.60	23.50	6.4	63.50	243.60

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ROD BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3543046	NWJ 10’ ROD							
62999	NWJ 5’ ROD	2.63	2.25	1.13	52.00	4.0	2.50	20.00
63098	NWJ 2’ ROD							

NWJ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 0.8 ft)
Volume..... 0.3 m^3 (10.2 ft^3)
Gross Weight..... 458 kg (1,012 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 0.8 ft)
Volume..... 0.1 m^3 (5.1 ft^3)
Gross Weight..... 248 kg (597 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 34 bundles (646 rods)
40 ft container load of 3.0 m/10 ft rods holds 45 bundles (855 rods)

RODS: WJ THREAD PART NUMBERS

Wrench Flats are standard size and are applied to the box end of the drill rod. The flats allow the driller to apply a wrench and break the tool joint easily.

AWJ: FLATS OPTION

	ITEM	DESCRIPTION	OD (in)	ROD BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
IMPERIAL	3544755	AWJ 10' ROD W/FLATS							
	3544756	AWJ 5' ROD W/FLATS	1.75	1.38	0.63	32.00	5.0	1.75	7.40

AWJ and AWJLW BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.2 x 0.2 m (10.3 x 0.8 x 0.7 ft)
Volume..... 0.2 m^3 (7.1 ft^3)
Gross Weight..... AWJ: 288.5 kg (636 lb); AWJLW: 209.0 kg (461 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.2 x 0.2 m (5.3 x 0.8 x 0.7 ft)
Volume..... 0.1 m^3 (3.5 ft^3)
Gross Weight..... AWJ: 149.7 kg (330 lb); AWJLW: 109 kg (242 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 75 bundles (1425 rods)
40 ft container load of 3.0 m/10 ft rods holds 97 bundles (1843 rods)

BWJ: FLATS OPTION

	ITEM	DESCRIPTION	OD (in)	ROD BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
IMPERIAL	3546906	BWJ 10' ROD W/FLATS							
	3546905	BWJ 5' ROD W/FLATS	1.75	1.38	0.63	32.00	5.0	2.00	7.40

BWJ and BWJLW BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 0.8 ft)
Volume..... 0.2 m^3 (8.1 ft^3)
Gross Weight..... BWJ: 360 kg (796 lb); BWJLW 289 kg (639 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 0.8 ft)
Volume..... 0.1 m^3 (3.9 ft^3)
Gross Weight..... BWJ: 193 kg (427 lb); BWJLW 164 kg (362 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 36 bundles (684 rods)
40 ft container load of 3.0 m/10 ft rods holds 36 bundles (684 rods)

RODS: WJ THREAD PART NUMBERS

NWJ: FLATS OPTION

IMPERIAL

ITEM	DESCRIPTION
3545289	NWJ 10’ ROD W/FLATS
3545288	NWJ 5’ ROD W/FLATS

OD (in)	ROD BODY ID (in)	JOINT ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
1.75	1.38	0.63	32.00	5.0	2.50	7.40

NWJ BUNDLE SPECIFICATIONS

3.0 m/10 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 0.8 ft)
Volume..... 0.3 m^3 (10.2 ft^3)
Gross Weight..... 458 kg (1012 lb)

1.5 m/5 ft ROD BUNDLE (19 RODS)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 0.8 ft)
Volume..... 0.1 m^3 (5.1 ft^3)
Gross Weight..... 248 kg (547 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 34 bundles (646 rods)
40 ft container load of 3.0 m/10 ft rods holds 45 bundles (855 rods)

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CASING

CASING: W THREAD OVERVIEW

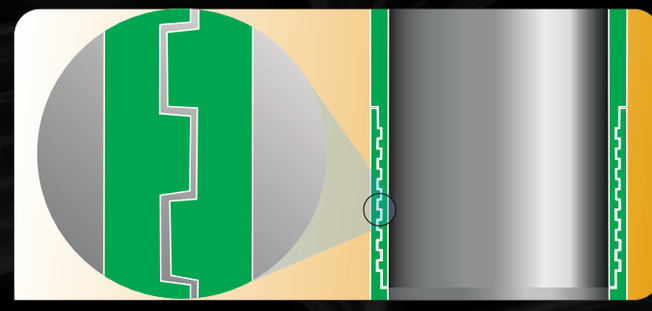
This casing is intended for single use or situations where the casing is left in the hole. The W casing is made from DCDMA C80 tubing and utilize the DCDMA W thread form. The W thread is a straight thread (4 threads per inch). This casing is universal in design and can be used in any drilling application where threaded casing is required to be left in the ground.

Features

TUBING
- Parallel wall tubing compatible with Q® Wireline in-hole tools
- Standard DCDMA W sizes allow 'nesting' of other W casing

THREAD DESIGN
- Double-butt joint gives strength in driving and jarring

W THREAD PROFILE



CASING: W THREAD PART NUMBERS

AW

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
66533	AW 3.0 m CASING						
66531	AW 1.5 m CASING	57.10	48.40	17.00	6.4	57.15	184.10

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
26355	AW 10' CASING						
26356	AW 5' CASING	2.25	1.91	38.00	4.0	2.25	14.80
26358	AW 2' CASING						
26359	AW 1' CASING						

AW BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 1.0 ft)
Volume..... 0.3 m^3 (10.6 ft^3)
Gross Weight..... 343 kg (756 lb)

1.5 m/5 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 1.0 ft)
Volume..... 0.1 m^3 (5.1 ft^3)
Gross Weight..... 179 kg (395 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 44 bundles (836 rods)
40 ft container load of 3.0 m/10 ft rods holds 59 bundles (1121 rods)

BW

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
66539	BW 3.0 m CASING						
66537	BW 1.5 m CASING	73.00	60.30	31.30	6.4	63.50	285.80

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
26360	BW 10' CASING						
26361	BW 5' CASING	2.88	2.38	70.00	4.0	2.50	23.00
3543007	BW 2' CASING						
26364	BW 1' CASING						

BW BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.3 x 0.3 m (10.3 x 1.0 x 1.0 ft)
Volume..... 0.3 m^3 (10.6 ft^3)
Gross Weight..... 343 kg (756 lb)

1.5 m/5 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.3 x 0.3 m (5.3 x 1.0 x 1.0 ft)
Volume..... 0.1 m^3 (5.1 ft^3)
Gross Weight..... 179 kg (395 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 24 bundles (456 rods)
40 ft container load of 3.0 m/10 ft rods holds 33 bundles (627 rods)

CASING: W THREAD PART NUMBERS

NW

METRIC

ITEM	DESCRIPTION
66545	NW 3.0 m CASING
66543	NW 1.5 m CASING
66542	NW 1.0 m CASING

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
88.90	76.20	38.40	6.4	69.85	455.70

IMPERIAL

ITEM	DESCRIPTION
26365	NW 10’ CASING
26366	NW 5’ CASING
26368	NW 2’ CASING

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3.50	3.00	86.00	4.0	2.75	36.70

NW BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.5 x 0.4 m (10.3 x 1.5 x 1.3 ft)
Volume..... 0.6 m^3 (21.0 ft^3)
Gross Weight..... 760 kg (1,676 lb)

1.5 m/5 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.5 x 0.4 m (5.3 x 1.5 x 1.3 ft)
Volume..... 0.3 m^3 (11.0 ft^3)
Gross Weight..... 390 kg (860 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 20 bundles (380 rods)
40 ft container load of 3.0 m/10 ft rods holds 26 bundles (494 rods)

HW

METRIC

ITEM	DESCRIPTION
66551	HW 3.0 m CASING
66549	HW 1.5 m CASING
66548	HW 1.0 m CASING

OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
114.30	101.60	52.20	6.4	76.20	810.80

IMPERIAL

ITEM	DESCRIPTION
26370	HW 10’ CASING
26371	HW 5’ CASING
26373	HW 2’ CASING
26374	HW 1’ CASING

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
4.50	4.00	117.00	4.0	3.00	65.30

HW BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (14.1 ft^3)
Gross Weight..... 373 kg (823 lb)

1.5 m/5 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.4 x 0.3 m (5.3 x 1.2 x 1.1 ft)
Volume..... 0.2 m^3 (7.1 ft^3)
Gross Weight..... 194.1 kg (428 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 24 bundles (168 rods)
40 ft container load of 3.0 m/10 ft rods holds 54 bundles (378 rods)

CASING: W THREAD PART NUMBERS

PW

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
66731	PW 3.0 m CASING	139.70	127.00	64.30	6.4	82.55	1266.60
66730	PW 1.5 m CASING						
66729	PW 1.0 m CASING						

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
26629	PW 10’ CASING	5.50	5.00	144.00	4.0	3.25	102.00
26630	PW 5’ CASING						
26631	PW 2’ CASING						
26632	PW 1’ CASING						

PW BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.5 x 0.4 m (10.3 x 1.5 x 1.3 ft)
Volume..... 0.6 m^3 (21.2 ft^3)
Gross Weight..... 463 kg (1022 lb)

1.5 m/5 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.5 x 0.4 m (5.3 x 1.5 x 1.3 ft)
Volume..... 0.3 m^3 (10.6 ft^3)
Gross Weight..... 254 kg (560 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 20 bundles (140 rods)
40 ft container load of 3.0 m/10 ft rods holds 44 bundles (308 rods)

CASING: W THREAD PART NUMBERS

During heat treatment, the pin thread crest is hardened to nominal 55 HRc to eliminate damaging adhesion wear.

NW: HEAT TREATED OPTION

	ITEM	DESCRIPTION
IMPERIAL	100601	NW 10’ 4130 H/T CASING
	100602	NW 5’ 4130 H/T CASING
	100603	NW 2’ 4130 H/T CASING
	102758	NW 1’ 4130 H/T CASING

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (mm)	CONTENT (g/100 ft)
3.50	3.00	86.00	4.0	2.75	36.70

NW BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.5 x 0.4 m (10.3 x 1.5 x 1.3 ft)
Volume..... 0.6 m^3 (21.0 ft^3)
Gross Weight..... 760 kg (1,676 lb)

1.5 m/5 ft CASING BUNDLE (19 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.5 x 0.4 m (5.3 x 1.5 x 1.3 ft)
Volume..... 0.3 m^3 (11.0 ft^3)
Gross Weight..... 390 kg (860 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 20 bundles (380 rods)
40 ft container load of 3.0 m/10 ft rods holds 26 bundles (494 rods)

HW: HEAT TREATED OPTION

	ITEM	DESCRIPTION
IMPERIAL	100595	HW 10’ 4130 H/T CASING
	100596	HW 5’ 4130 H/T CASING
	100597	HW 2’ 4130 H/T CASING
	102759	HW 1’ 4130 H/T CASING

OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
4.50	4.00	117.00	4.0	3.00	65.30

HW BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (14.1 ft^3)
Gross Weight..... 373 kg (823 lb)

1.5 m/5 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.4 x 0.3 m (5.3 x 1.2 x 1.1 ft)
Volume..... 0.2 m^3 (7.1 ft^3)
Gross Weight..... 194.1 kg (428 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 24 bundles (168 rods)
40 ft container load of 3.0 m/10 ft rods holds 54 bundles (378 rods)

CASING: WT THREAD OVERVIEW

This casing is engineered to surpass expectations for a casing and features quicker make-up and easier break-out characteristics than the standard W casing. This thread works well under difficult drilling conditions and is designed for repeated application. The WT casing is made with DCDMA C80 tubing and the tapered HD thread provides increased strength and easier make and break-out (2.5 threads per inch).

Features

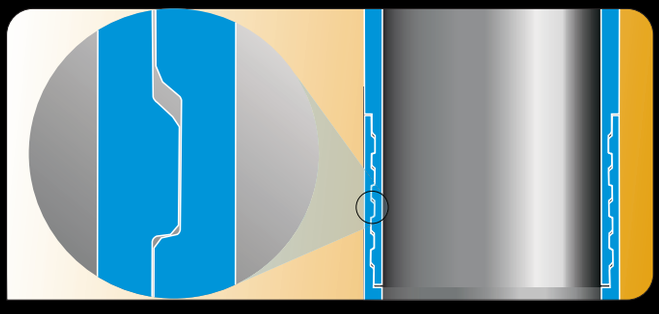
TUBING

- Parallel wall tubing compatible with Q® wireline in-hole tools
- Standard DCDMA W sizes allow nesting of other W casing

THREAD DESIGN

- Tapered joint and fewer threads per inch result in easier and faster make and break for reduced wear and reduced labor costs
- Double-butt tapered joint and heavy duty buttress thread form provide greater torsion and pullback strength
- Tapered thread reduces stress and provides a rigid joint to reduce movement and lubricant loss
- Load efficiency of 40% provides greater pullback strength to allow retrieval from difficult ground conditions and repeated use
- Threads are easier to clean due to wider spacing of the threads for situations where casing is reused
- Compatible with HD rod threads

WT THREAD PROFILE



CASING: WT THREAD PART NUMBERS

HWT

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
101338	HWT 3.0 m CASING	114.30	101.60	52.20	10.2	44.45	810.80
101339	HWT 1.5 m CASING						
3541683	HWT 1.0 m CASING						
3541682	HWT 0.5M CASING						

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
54843	HWT 10’ CASING	4.50	4.00	117.00	2.5	2.47	65.30
54826	HWT 5’ CASING						
102987	HWT 5’ CASING L/H						
55055	HWT 2’ CASING						

HWT BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.4 x 0.3 m (10.3 x 1.2 x 1.1 ft)
Volume..... 0.4 m^3 (14.1 ft^3)
Gross Weight..... 373 kg (823 lb)

1.5 m/5 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.4 x 0.3 m (5.3 x 1.2 x 1.1 ft)
Volume..... 0.2 m^3 (7.1 ft^3)
Gross Weight..... 194.1 kg (428 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 24 bundles (168 rods)
40 ft container load of 3.0 m/10 ft rods holds 54 bundles (378 rods)

PWT

METRIC

ITEM	DESCRIPTION	OD (mm)	ID (mm)	WEIGHT (kg/3 m)	THREAD PITCH (mm)	PIN LENGTH (mm)	CONTENT (l/100 m)
3543977	PWT 3.0 m CASING	139.70	127.00	64.30	10.2	44.45	1266.60
3543976	PWT 1.5 m CASING						
3547569	PWT 1.0 m CASING						

IMPERIAL

ITEM	DESCRIPTION	OD (in)	ID (in)	WEIGHT (lb/10 ft)	THREAD PITCH (in)	PIN LENGTH (in)	CONTENT (g/100 ft)
3543975	PWT 10’ CASING	5.50	5.00	144.00	2.5	2.47	102.00
3543974	PWT 5’ CASING						
3543973	PWT 2’ CASING						

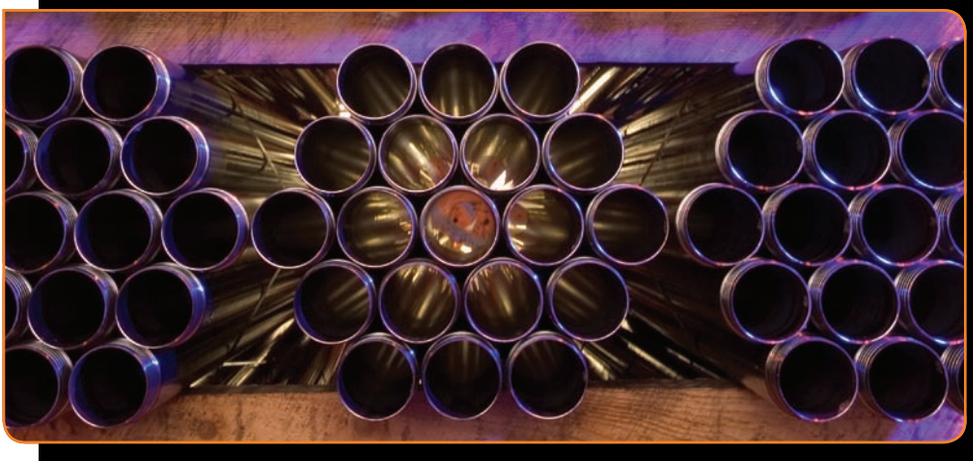
PWT BUNDLE SPECIFICATIONS

3.0 m/10 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 3.2 x 0.5 x 0.4 m (10.3 x 1.5 x 1.3 ft)
Volume..... 0.6 m^3 (21.2 ft^3)
Gross Weight..... 466 kg (1027 lb)

1.5 m/5 ft CASING BUNDLE (7 PIECES)
Dimensions (L x W x H)..... 1.6 x 0.5 x 0.4 m (5.3 x 1.5 x 1.3 ft)
Volume..... 0.3 m^3 (10.6 ft^3)
Gross Weight..... 254 kg (560 lb)

CONTAINER SHIPMENTS:
20 ft container load of 3.0 m/10 ft rods holds 20 bundles (140 rods)
40 ft container load of 3.0 m/10 ft rods holds 44 bundles (308 rods)

CARE AND HANDLING



CARE AND HANDLING

Packing Features:

- Drill rods and casing are packaged and sold in “bundles” which offer product protection during shipping and handling.
- Protective cardboard caps cover box and pin threads sealing in thread lubrication.
- Heavy duty galvanized hexagon bundle end caps protect the drill rod ends.
- Drill rods are coated with rust inhibitor to reduce surface oxidation during shipping. When storing rods for long periods of time, it is recommended you reapply a rust inhibitor to protect the rods from oxidation.

Lubrication and Cleaning

Boart Longyear® drill rod threads are coated with thread compound (lubricant) for shipment from the factory. For initial use, it is neither necessary nor desirable to remove this thread compound unless contamination has occurred. Thereafter, each time the rods are used, clean and re-lubricate the threads with a Boart Longyear recommended compound (BOL or Esso Z50). Use enough compound to cover both thread and shoulder surfaces. A 40 to 50 mm (1.5 to 2 inches) brush is excellent for applying compound.

⚠ WARNING

Note: Keep the compound and brush clean
Note: While occasional mixing of the compound is recommended to avoid settling, dilution of any kind (e.g. Diesel, gasoline or oil) will render the compound ineffective.

The thread compound is critical to the wear life of the joint. In order to prevent wear, metallic particulate in the compound forms an inner-layer that is able to withstand the contact pressure and prevent the mating surfaces from interacting. A poor choice of compound or diluted compound will allow the mating surfaces to interact, resulting in adhesion or abrasion wear.

The thread compound is also critical to the strength of the joint. The interaction of the metallic particulate and the surface determines the frictional resistance to torque loads. This in turn determines the joint load efficiency: how much torque is transferred through the joint versus how much is absorbed by the joint. A poor choice of compound or diluted compound will provide insufficient friction, decreasing efficiency loading to overload failure.

Compounds containing 50% zinc particulate generally provide a higher friction factor (higher torque capacity) and get better resistance than those containing similar amounts of copper, lead or graphite particulate. Environmentally friendly compounds must contain non-toxic, bio-stable, solid particles of similar properties and performance characteristics to that of typical zinc particles in order to perform.

⚠ WARNING

Note: Use of compounds without solid particulate will void the warranty.
Note: Metal compounds will react in acidic water leading to hydrogen embrittlement and reduce fatigue life (see glossary) however, copper is less reactive than zinc.

In addition, lubricating the rod body with grease is recommended to reduce hole friction, drilling torque, and midbody wear.

CARE AND HANDLING

Preparation for Transit

Load rods on at least three cross members and tie down with suitable chain or strap at end cross members. For long rods, an additional chain or strap should be provided in the middle.

⚠ WARNING **Note: Always provide proper protection for threaded ends.**

Storage of Drill Rods

Always clean and grease the pin and box end threads of the rods before storing. Store rods horizontally on a minimum of three cross supports on less than 30 cm (12 in) from the ground to keep moisture and dirt away from the rods.

⚠ WARNING **Note: Always provide proper protection for threaded ends.**

When rods are to be temporarily stacked in the mast or rod rack, always provide a wooden or rubber base to protect the pin ends. This is especially important when handling multiple length stands of 6 m (20 ft) or more.

Inspect used rods for bent midbodies regularly. Discard bent rods immediately as these cause vibration and can hamper drilling performance. Restraightening of rods is not recommended as this further reduces the bend strength of the midbody and bending will likely reoccur (see midbody wear).

In addition to thread compound, a corrosion inhibitor on the body is recommended for long term storage (see packaging).

⚠ DANGER Due to the significant safety risk, Boart Longyear drill rods should never be mixed with another manufacturers' rods. Doing so may cause catastrophic equipment failure, leading to bodily injury or death. In addition, mixing rods will void the Boart Longyear warranty.

CARE AND HANDLING

Thread Wear

The wear of sliding steel-on-steel surfaces, such as in a rod or casing joint, is well defined in engineering literature. Galling is the common industry term given to thread wear which mainly consists of adhesion and abrasion wear as a result of making and breaking (see glossary). While some wear can be tolerated without compromising performance, worn surfaces are prone to further wear. Unattended, the degree of wear can worsen to the point where it can cause premature failure or, in the case of mating surfaces of similar hardness, seize the joint. Alternatively, a worn thread can damage a good thread.

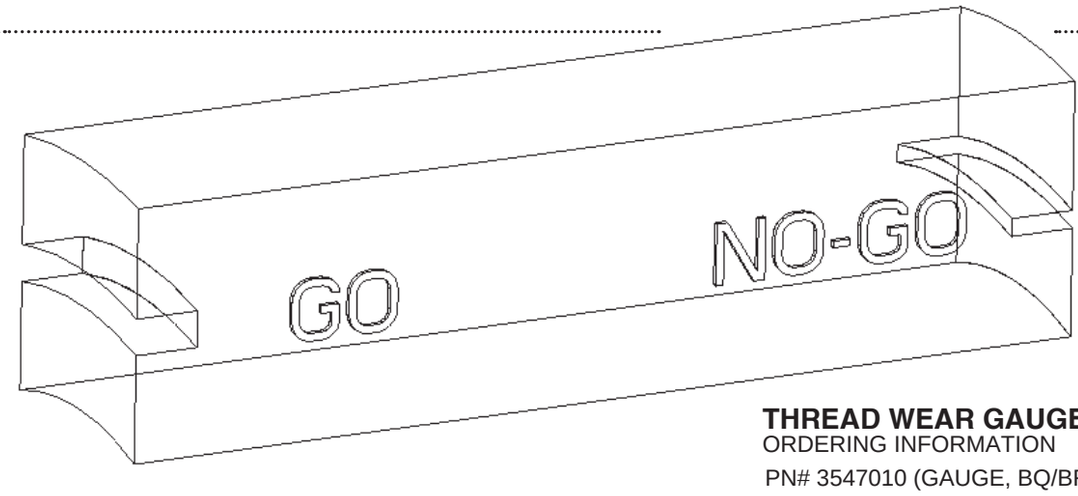
The rate of wear to be expected in a sliding metal-to-metal system can only be determined by considering all of the following variables:

- Lubrication or wear factor: published values are greater for poor lubrication; less for mating surfaces of dissimilar hardness (see lubrication and cleaning)
- The hardness of the softer surface
- The distance of contact slide
- The contact load or pressure

Less wear resistance can be achieved by:

- Cleaning and lubricating joints regularly; preferably after every break. Dry lubrication coatings are available but these wear off and must also be cleaned and lubricated (see lubrication and cleaning)
- Choosing joints with mating surfaces of dissimilar hardness. Published data shows that given equal contact pressures and equal hardness on the softer surfaces, a system with a harder mating surface (dissimilar hardness) can provide several times the wear life
- Choosing joints with greater hardness on the softer thread
- Reduce the sliding contact distance by choosing joints with greater taper
- Reduce or eliminate the contact pressure by adjusting the feed rate and rotation speed during make and break to match the thread pitch and compensate for rod and drill head weight

Another source of rod joint wear is worn accessories. All threaded accessory equipment, such as Kelly (drive) rods, drive head adapter subs, hoist plugs, water swivels and cross-over adapter subs should be inspected prior to use to ensure they are in good condition. Use only genuine Boart Longyear accessories to ensure proper fits and maximum wear life. Boart Longyear tooling and gauging adhere to an uncompromising global standard.



THREAD WEAR GAUGE
ORDERING INFORMATION

PN# 3547010 (GAUGE, BQ/BRQ R/B)
PN# 3547011 (GAUGE, HQ/HRQ R/B)
PN# 3547027 (GAUGE, NQ/NRQ R/B)

CARE AND HANDLING

Box and Midbody Wear

Similar to the steel-on-steel wear systems of the joint, the box and midbody are subject to relative sliding contact with the wall of the casing or hole. In the case of wear against the wall of the hole, the surface of the hole may be of significantly greater hardness and roughness (not to mention cuttings suspended in the drilling fluid) potentially resulting in rapid wear rates. However, in many applications the cause of retirement of a drill rod is due to localized wear resulting from the deformation of the box out of a 'flush' position or of the typical midbody out of straight.

In typical joints, it is inherent for the box and box end shoulder to elastically deform radially or 'bulge'. This is due to radial and hoop stresses (see glossary) imposed by conventional threads which add to drilling load stresses. This is evident by a thin section in the box shoulder and/or a small polished area on the side of the joint where thread engagement begins. As the wear progresses, the box becomes weaker and the deformation more pronounced, increasing the wear rate. RQ® style joints however, mimic the load response of a solid tube in that radial and hoop stresses imposed by the thread subtract from drill load stresses, virtually eliminating "bulging".

It is inherent for a rod string to respond to significant drilling loads and rotation in a three dimensional corkscrew shape, a phenomenon first identified and defined by Boart Longyear as 'helical whirling'. As loads or rotation increase, the contact pressure between the string and the hole increases contributing to an increased midbody wear rate.

Given sufficient contact pressure and speed, the heat generated between the rod string and casing or hole can cause heat-check cracking (see glossary) which ultimately appears as an axial crack, typically on the box end.

The bending stresses associated with this helical whirling become significant under high load or rotation, especially in oversize holes or 'caves', and may cause permanent bending of the string. Boart Longyear drill rods incorporate enhanced tubing processing which doubles the bend strength of the midbody virtually eliminating permanent bending.

The use of 'rod grease' to reduce friction between the rod string and the casing or hole is common (see lubrication and cleaning) however the only effective solution to reduce midbody abrasion wear is to significantly increase the hardness through case hardening.

CARE AND HANDLING

Loads and Deviated Holes

Fatigue failures are brittle failures or cracks that occur under stress or load levels that are significantly below static load ratings; however, the loads are applied or cycled a large number of times. An example of this type of load is where a rod string is rotating in a deviated hole, the surface of the rod undergoes both tension and compression in each revolution. Where the rod is deviated at significant depth, this bending load is superimposed on a constant pullback load resulting in a fluctuating tension load on the rotating surface. Another example is in oversized holes or caved hole sections wherein the string can bend or buckle, significantly increasing bending stresses.

Due to the reduced cross-sections of material in the threaded ends, the joints between mated rods in the string are significantly weaker than the rod midbodies – regardless of heat treatment or thread design (despite the interlocking thread, RQ® joints for example, are weaker and are not stiffer than their midbody). Also, joints are pre-loaded (make-up) and have interference fits which further reduce the deviation capacity of the joint.

A further limitation on the ability of a drill rod joint to perform through a bend is due to a peculiarity of the steel material itself. If there is a constant tension load applied in addition to a cyclical load, the fatigue strength is even further reduced. In the case of drill rod joints, if the joint is properly made up the pin end will always be under a greater tension load than the box end (see make-up torque). As a result, the pin end is the weakest part of a drill rod and is the typical location of failure under an excessive cyclic load. Boart Longyear utilizes a full scale cyclic bend load test to evaluate joint designs and to ensure manufacturing quality.

A fatigue failure crack always occurs perpendicular to the cyclic load or stress. Therefore the most common failure is a circumferentially oriented crack which indicates that the cyclic load or stress was axially oriented which can only be caused by bending. If the crack is axially oriented it is either the result of heat-check cracking (see glossary) or indicates that the cyclic load was circumferentially oriented and this can only be caused by improper fit of a joint in terms of make-up, deformation, foreign debris, or wear.

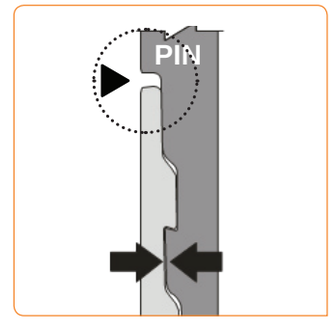
Fatigue failures can be avoided by limiting the level of cyclic loads with consideration for the pullback load. Limit the build angle or rate of hole deviations checking that the deviation rating per rod length is not exceeded rather than the deviation per 30 m (100 ft), for example, which can be significantly less. Deviation should be further limited as pullback increases with increasing hole depth.

⚠ WARNING

Note: Standard weight wireline drill rods have limited deviation capacity. Lightweight or internally upset rods are recommended for greater deviation.

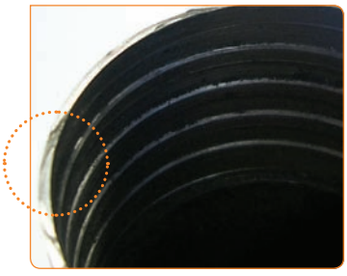
TROUBLE SHOOTING

TROUBLE SHOOTING



Stand-Off Gap Excessive or Does Not Close Upon Minimal Make-Up or Difficulty Breaking Out

CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Clean and inspect threads for excessive foreign or wear debris. Accelerated wear may be due to damaged accessories; inspect accessories (e.g. adapter subs).	
Rods are of different manufacture. Separate all rods by manufacturer and do not interchange. RQ® style joints are proprietary to Boart Longyear. DANGER	
Threads are deformed from overload or excessive load during make and break. Inspect string for damage and discard rods with deformed threads. Overload or difficult breaking may be due to poor choice of thread compound (see lubrication and cleaning and break-out).	
Deformation due to hammering damage (see break-out) or stabbing damage (see stabbing). Inspect string and discard damaged rods.	



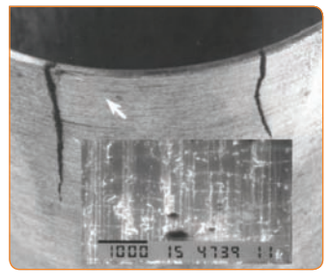
Leakage (see Fluid Seal)

CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Rods run in loose (joints not closed) due to insufficient make-up or to excessive stand-off gap (see causes of excessive stand-off above).	
The pin or box outer diameter shoulder face has stabbing or handling damage (see stabbing).	
Outer shoulder contact pressure distribution is uneven due to poor fit. Threads are significantly worn or deformed from overload or excessive load during make and break (see thread wear) or shoulders are deformed from overload. Accelerated wear may be due to damaged accessories; inspect accessories e.g. adapter subs. Inspect string for excessive wear (see thread wear). Overload may be due to poor choice of thread compound (see lubrication and cleaning). If using Q®, consider upgrade to RQ® rods.	
Box wear life exceeded. Inspect string for excessive wear. Consider upgrade to RQ® rods.	
Rods are of different manufacture. Separate all rods by manufacturer and do not interchange. RQ® style joints are proprietary to Boart Longyear. DANGER	

Fatigue Failures or Cracked Pins or Boxes (see Fatigue Strength)

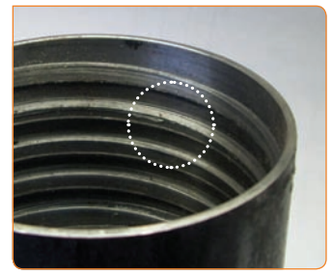
CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Bend stresses have exceeded the fatigue strength of the joint. Bend stresses are caused by excessive steering, excessive hole deviations or caves, or helical whirling (see midbody wear). Do not exceed deviation ratings. This may have been compounded by high pullback loads at depth or excessive make-up. Plan deviations to occur at portions of the string that are under low pullback (e.g. avoid the upper portion of a deep hole string). Fatigue strength may have been exceeded in previous application and joint has now reached limit (see memory and fatigue strength). Consider upgrading to RQ® joints for higher load capacity or consider lightweight rods for reduced stiffness.	
Rods run in loose (joints not closed) due to insufficient make-up or to excessive stand-off gap (see causes of excessive stand-off).	
Extraneous hoop stresses (see glossary) caused by deformation due to hammering damage (see break-out), stabbing damage (see stabbing), excessive foreign debris, or wear debris in the joint (see thread wear).	
Box shoulder deformed due to overload leaving pin or box unsupported. Overload may be due to poor choice of thread compound (see lubrication and cleaning). Consider upgrade to RQ® rods.	
Box wear life exceeded. Inspect string for excessive wear (see wear life).	
Rods string has suffered from hydrogen embrittlement (see glossary). Replace rod string and use non-metallic thread compound.	
Rods are of different manufacture. Separate all rods by manufacturer and do not interchange. RQ® style joints are proprietary to Boart Longyear. DANGER	

Premature Box End Cracking / Heat Check Cracking



CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Axial cracks at the box end due to a change in micro-structure of the tubing material. Change in microstructure is caused by the cyclic friction between the rotating string and the casing or hole wall and is independent of tubing type, steel grade and/or applied heat treatments. Reduce drilling loads and/or pullback, or improve lubrication of the string to compensate.	

TROUBLE SHOOTING



Thread Wear or Galling (see Thread Wear)

CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Thread compound has failed to prevent mating thread surfaces from interacting. This is due to either a poor or diluted compound or poor lubrication practice. Upgrade thread compound or increase frequency of cleaning and re-lubing joints.	
Thread contact pressure is excessive. For stab flank wear, reduce feed rate/pressure and/or increase rotation during make and break. For load flank wear, increase feed rate and/or reduce rotation during make and break. Rods with significant load flank wear should be discarded.	
Thread sliding contact is excessive (e.g. too much drag during make/break turns) or frequent jamming or cross-threading. Consider upgrade to RQ® style joints.	RQ® style joints have the greatest joint taper (e.g. fewest make/break turns) available in the industry and have anti-jamming geometry.
Accelerated wear may be due to damaged accessories; inspect accessories for damage or wear (e.g. adapter subs).	
Thread wear life exceeded. Accelerated wear may be due to damaged accessories; inspect accessories (e.g. adapter subs). Inspect string for excessive wear.	
Consider upgrade to RQ® rods (e.g. harder threads last longer).	RQ® joints have the hardest threads available in the industry.

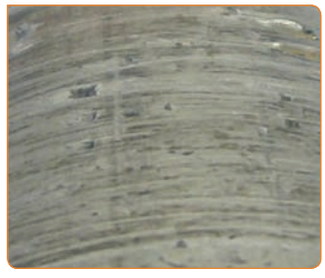
Box Wear or Box Bulging or Thread Jumping (see Box and Midbody Wear)

CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Box bulging due to excessive hoop stresses (see glossary) imposed by thread, potentially from overload. Evident by polished areas on one side of box or thread jumping in the extreme case. Overload may be caused by poor choice of thread compound (see lubrication). Consider upgrade to RQ® rods.	RQ® joints do not bulge nor jump, and have the highest yield strength material available in the industry.
Box wear life exceeded leading to overload. Inspect string for excessive wear. Consider upgrade to RQ® rods (e.g. harder material lasts longer).	

TROUBLE SHOOTING

External Shoulder Wear or External Shoulder Flared/Rolled Over

CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Box shoulder flared and/or pin outer shoulder rolled over due to overload. Overload may be due to poor choice of thread compound (see lubrication). Consider upgrading to RQ® joints. RQ® joints have the highest load capacity available in the industry.	
Box shoulder wear life exceeded. Inspect string for excessive wear. Consider upgrade to RQ® rods.	RQ® boxes are the hardest available in the industry.



Premature Midbody Wear or High Drilling Torque

CONVENTIONAL AND Q® ROD	RQ® AND RQ®TK ROD
Hole deviations (e.g. rotary drilled holes, wedging, or down-hole monitoring) induce increased contact pressure and friction between string and hole or casing wall. Improve lubrication of string to compensate.	
Hole has oversized or 'cave' sections allowing the string to elastically bend or buckle under load increasing contact pressure and friction. Reduce drilling loads or rotation speed to compensate or repair hole.	
High pullback or thrust load combined with high rotation speed has caused the string to elastically or permanently bend, increasing contact pressure and friction against the hole or casing wall. Evident by polished or heavy wear on one side of string in a slow spiral pattern (e.g. spiral has a multiple length pitch). Reduce drilling loads and/or pullback. Consider upgrade to RQ® rods (e.g. RQ® midbodies have double the bend strength).	High pullback or thrust load combined with high rotation speed has caused the string to elastically bend, increasing contact pressure and friction against the hole or casing wall. Evident by polished or heavy wear on one side of string in a 'slow' spiral pattern (e.g. spiral has a multiple length pitch).

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GLOSSARY

GLOSSARY

Adhesion Wear
This type of wear involves the adhesion (micro-bonding or micro-welding) of very small areas between the contacting surfaces of mating threads with similar hardness. The bonded areas can fracture off, generating wear particles, or transfer to the mating surface. Wear particulate can then bond together and grow in size, producing larger scale wear. In the extreme case, adhesion wear can seize a joint (see seizure). The rate of adhesion wear decreases as the surface hardness increases. Adhesion wear will not occur if the thread compound prevents contact of the surfaces (see lubrication and cleaning).

Abrasion Wear
This type of wear involves gouging and polishing of a surface by wear particles or foreign debris. Wear particles are either repelled or embedded into the subject surface but do not build or micro-weld avoiding joint seizure (see adhesion wear). The rate of abrasion wear is directly proportional to the contact pressure and the sliding distance between the mating surfaces. The rate of abrasion wear decreases as the surface hardness increases. Also, the rate of wear is less between mating thread surfaces of differing hardness. Abrasion wear will not occur if the thread compound prevents contact of the surfaces (see lubrication and cleaning).

Fretting
Small relative cyclic movement between two surfaces in contact. Fretting produces pitting wear (a form of adhesion wear) which can lead to fatigue failures. The wear rate increases with amplitude but not with frequency (see fatigue strength).

Galling
Large scale (visual) damage to both mating thread surfaces in a joint caused by small areas of plastic deformation (adhesions or transfers, see adhesion wear) that interfere with sliding which can lead to seizure. Galling resistance is a function of the mating surfaces, not of a single surface, and is typically not seen on Boart Longyear drill rods. The term galling may also be applied to significant abrasion wear although this is not technically correct (see abrasion wear).

Heat-Check Cracking
This is axial cracking (crack works from the outside surface in) resulting of the rapid expansion of a thin layer of brittle surface material that was hardened by the heat of friction (e.g. rods rubbing on casing or hole) and then rapidly quenched by drilling fluid and the cooler material underneath.

Hydrogen Embrittlement
Hydrogen has damaging effects on all metals, including reduction of fatigue strength, enhancement of crack propagation and corrosion cracking. Hydrogen may be encountered in the hole, or may be created by reactions with acidic fluids in the hole or generated by corrosion. The absorption of hydrogen in metals is enhanced by sulphide-bearing waters (H_2S) and by thread compounds containing metal particulate.

Inertia
The force developed by the momentum of a moving or rotating mass (such as a rotating rod string or a drill head) which resists acceleration or deceleration.

Inertial Torque
Inertial torque is the make-up induced when the joint of an added rod is fully made up and stops abruptly against the inertia of the rotating drill head.

GLOSSARY

Joint / Load Efficiency
This is a measure of how much load a joint can carry, as compared to the midbody. Inversely, this is a measure of how much more stress is created in the joint by a load, as compared to the midbody. Consider that about half of the rod tubing wall thickness or section is removed when cutting a threaded joint, which means a loss of half the strength. Also, all traditional threads create additional stress (less strength) due to poor choice of geometry. For example, the Q® joints are 30% load efficient which means there is only a third the load capacity of the full section of tube, or three times the stress than that created in a full section of tube. The HD threads have a better choice of geometry improving load efficiency to 40%, producing only 2.5 times the stress under load. Ultimately, the engineered RQ® joints actually mimic the load response of a solid tube and provide 50% load efficiency which is half the strength of a solid tube, or only twice the stress under load.

Joint Seizure
Mating thread surfaces are not able to move relative to each other as a result of increased friction due to galling or adhesion wear (local solid-state welding, “micro-welding”) potentially preventing break-out of a joint.

Memory
Fatigue damage is cumulative. All steels have a limit to the number of applications or reversals of an excessive repeating load which is commonly referred to as memory. For example, a rod may successfully complete one demanding application and then fail in a future less demanding application when the limit is finally exceeded with only a few more cycles of excessive load. The generally accepted limit for steels to an excessive repeating or alternating load is three million cycles. At 500 RPM, this is 100 hours of drilling which could easily traverse more than one job where the excessive loading is not continuous (larger sizes are more prone to memory failures as they run at lower RPM and have inherently higher bend stresses). Memory failures can be caused by any excessive load that fluctuates due to rotation (e.g. a bend load, a hoop stress due to large foreign debris particles, stabbing damage, etc).

Spin Outs
Sudden break-out of joints due to the inertia (see inertia) of a rotating rod string under deceleration.

Stress
Stress is the material response to a load. Stress causes steel to deform elastically (strain) up to the yield strength, beyond which deformation is permanent. In a drill rod, there are three components or directions of stress:

- Axial stress
- Hoop stress
- Radial stress

These components add together according to vector addition to a total stress value known as the principle or Von-Mises stress. The axial stress is directed parallel to the rod longitudinal axis and is a direct result of drilling or bend loads. The hoop stress is directed circumferentially around the tube and perpendicular to the rod axis. In a rod joint, hoop stress is induced by the thread form and adds to the total stress – except in RQ® style joints which reduce the total stress – mimicking the midbody. The radial stress is directed radially inwards or outwards from the rod longitudinal axis and is typically not significant, except under extraordinarily high fluid pressures.

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WARRANTY

Limited Warranty.

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

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

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

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

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

GLOBAL PRODUCT CATALOGUE

CORING RODS AND CASING

Global Headquarters
Boart Longyear
10808 South River Front Parkway
Suite 600
South Jordan, Utah 84095
United States of America
info@boartlongyear.com

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

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

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

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

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

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

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

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

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

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

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

BOART LONGYEAR™

www.boartlongyear.com