



XQ™ WIRELINE CORING ROD

Technical Overview

XQ™ WIRELINE CORING ROD

Patented XQ™ wireline coring rods feature a combination of exclusive heat treatments and innovative engineering to provide the ultimate in performance and longevity. XQ drill rods are stronger, last longer, and offer easier make and break. Featuring innovative self-aligning, double-start threads, rod joints engage smoothly without wedging or jamming. XQ threads significantly improve depth capacity, productivity, and wear life.



STRONGER

A unique combination of -20 degree self-locking reverse flank angle on the threads and symmetrical load distribution when combined with W-Wall™ double-annealed mid-body, make XQ™ wireline coring rods some of the deepest rated coring rods in the market.

Self-Locking Reverse Flank Angle

XQ has an increased negative flank angle from of -20 degrees compared to -10 degrees in RQ™ rods. The increased negative flank angle combined with the double-start threads, nearly eliminate box bulging and provides greater strength in high torque applications.

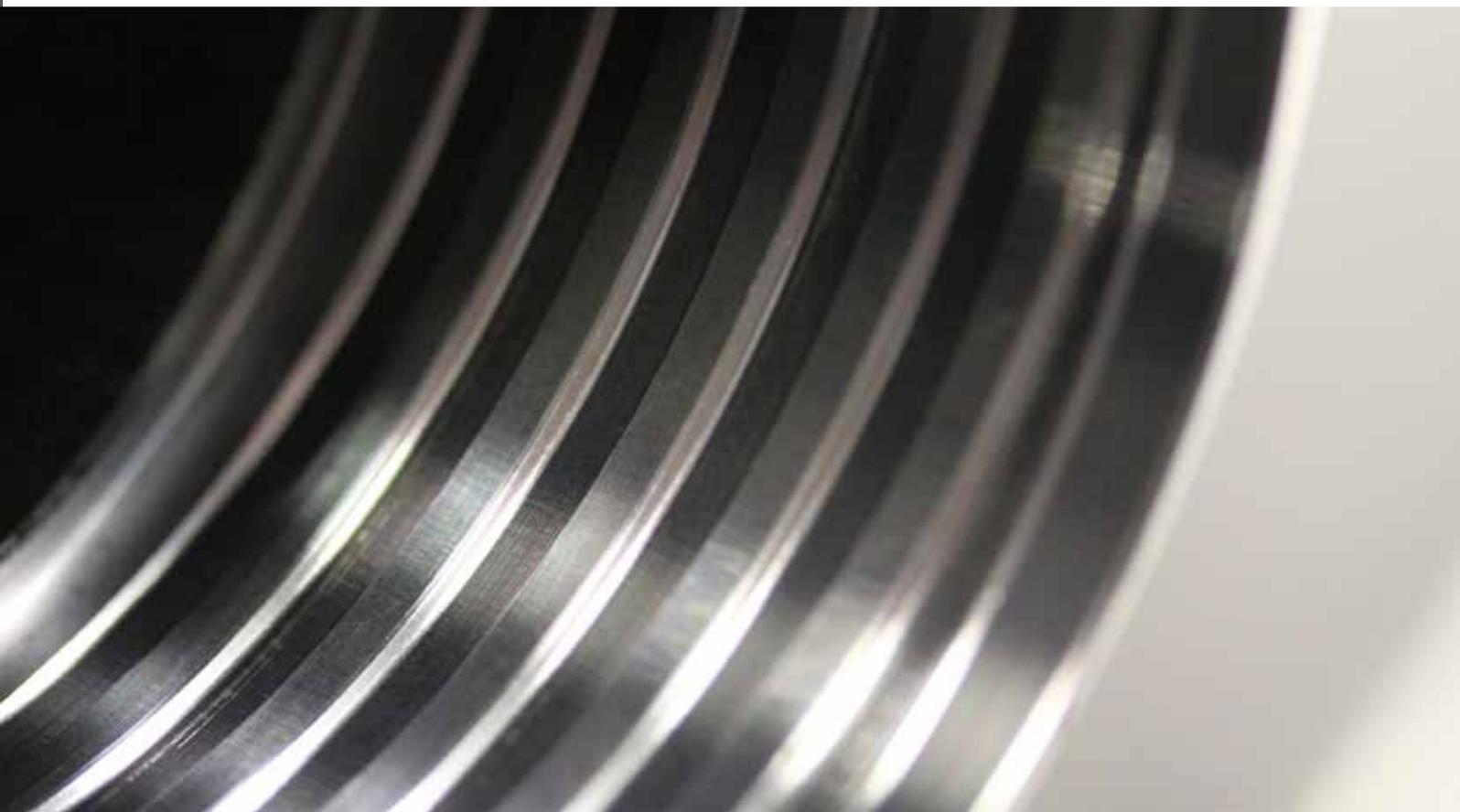


Symmetrical Load Distribution

Patented XQ joints have opposite double-start threads that are self-aligning so mating engages smoothly. This provides a balanced load response and double the contact area, which means half the contact pressure. This symmetrical load distribution increases load capacity significantly for stronger rods with deeper capacity.

W-Wall™ Double Annealed Mid-Body

W-Wall has a more uniform bend distribution like straight wall, stiffness comparable to Boart Longyear's variable wall rod, V-Wall™. The result is a rod with flexibility for ease of directional work that holds up better than V-Wall. Boart Longyear™ rods are put through a proprietary process during manufacturing to remove all residual stress and maximize strength and resistance to bending.



LASTS LONGER

Longer lasting rods means getting more meters per rod and replacing rods less often, directly adding value to the bottom line.

Pin Case Hardening

Case hardening is unmatched in protecting threads from wear. Other drill rods are typically through-wall hardened to 32 HRC. Boart Longyear coring rods are case hardened on the pin thread to maximum hardness – 60 HRC, creating a significant hardness difference between pin and box. This difference minimizes wear compared to the rapid galling that other threads experience. In repeated “make and break” field testing, other non-case-hardened rods were shown to fail at between 12 and 73 cycles, whereas XQ joints withstood more than 600 cycles.

Double-Start Threads

XQ double-start mating threads engage smoothly with innovative self-aligning geometry providing decreased wedging and jamming. Smooth starting, in combination with case hardening, significantly improves both productivity and wear life for the longest lasting rod threads.

The double-start threads on XQ rods balance out the drilling load stresses. Combined with the double-start thread, the increased negative flank angle virtually eliminates box bulging and results in better box wear. Box and thread wear are typically why well-maintained coring rods are retired.

Mid-Body Wear

Often variable wall rods used in directional drilling work are retired for thin mid-bodies prior to other failure modes. Thicker mid-bodies (standard wall thickness material in the center of the mid-body) virtually eliminates this failure mode in W-Wall. In directional work, other variable wall rods will wear thin in the mid-body center and need to be retired. W-Wall has the same mid-body wear life as straight wall rod so you can take advantage of all of the benefits of a lighter drill string and faster wireline tripping and still have longer lasting rods.

EASIER MAKE AND BREAK

Patented XQ Mating Joints

Opposite double-start threads are self-aligning so mating engages smoothly. XQ mating joints nearly eliminates jams for the best make and break around. They also eliminate the driller assistant back-turning thread joints during manual rod handling for better safety and productivity.

Imagine not having to send the driller assistant back near energized components to have them unjam rods because the rod handler mis-threaded them. XQ rods keep workers safer by keeping them away from rotating equipment more often. Plus, more meters can be drilled because less time is spent mating threads.

Thread Coarseness

XQ rods have two threads per inch for reduced rotation and easier manual make up. When making joints by hand, rotation places stress on the wrist. Threads with less rotation are faster to make up and generate less fatigue and potential for repetitive use injuries. The driller assistant spends less time trying to mate threads – for more meters and core in the box.

ADDITIONAL PRODUCTIVITY

Improved Wireline Tripping Speed

Wireline time, especially on deep holes, is a significant portion of time spent drilling. Measurable savings in wireline time adds significant productivity. The larger inner diameter of W-Wall tubing has more space to allow drilling fluid to pass by inner tube assemblies during wireline tripping, making wireline tripping up to 50% faster.

On an 800 meter hole, simply changing from straight wall to W-Wall rod can save 2 shifts or put 20% more core in the box.

HANDS-FREE AUTOMATION

Rod handlers improve safety by keeping helpers away from energized components and potential injury. Coring rod threads will jam in 20-30% of joint make-ups, requiring the helper to work near the rotation unit to apply a back turn or to clear jams, reducing safety. These jams add significant unproductive time either to unjam threads or rotate threads backward 100% of the time when manually making joints.

The patented XQ rods feature a unique thread entry, nearly eliminating jams, upgrading safety for hands-free rod handling, where making and breaking of rods is mechanized. XQ threads also feature a coarser pitch with less rotation, making them faster to make up by hand, generating less fatigue, lower stress on the wrist and less potential for repetitive use injuries.

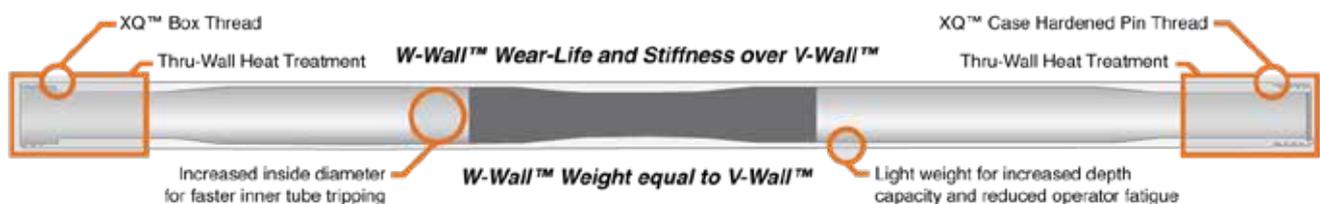


W-WALL™ RODS

Boart Longyear's V-Wall tubing option on RQ rods made drill strings up to 30 percent lighter, thanks to its thin-walled mid-body. The lighter drill string increased drill rig depth capacity and reduced fatigue in driller's when manually tripping. The enlarged inner diameter also significantly reduced inner tube tripping time for improved productivity. On an 800 meter hole, this means finishing the hole an estimated 26 hours, or 2 shifts faster.

The new NXQ™ and HXQ™ W-Wall coring rods feature patent-pending, double-upset tubing, with the same overall weight reduction and faster wireline tripping speed as V-Wall. However, the standard wall thickness in the middle of XQ rod eliminates premature mid-body wear and resists bending, performing like straight wall tubing.

As with all Boart Longyear coring rod, XQ W-Wall tubing is cold-drawn from high quality, North American alloy steel, uniquely processed to Boart Longyear specifications.



BXQ™ Performance Rating		
	Metric	U.S.
Rated Drilling Depth by Joint Strength	4 000 m	13,000 ft
Rated Pullback	330 kN	75,000 lbf
Rated Torque (Operating or Make-Up)	2 400 Nm	1,750 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 2000m	950 Nm	750 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 1000m	680 Nm	500 ft-lb
Recommended Minimum Make-Up Torque	405 Nm	300 ft-lb
API Theoretical Burst Pressure at Box Shoulder (per API bulletin 5C3)	61 300 MPa	8,891 psi
API Theoretical Burst Pressure at Midbody (per API bulletin 5C3)	93 200 MPa	13,511 psi
API Theoretical Collapse Pressure at Midbody (per API bulletin 5C3)	97 300 MPa	14,117 psi

BXQ™ Weights & Measures		
	Metric	U.S.
Rod Midbody Outer Diameter	55.9 mm	2.19 in
Rod Midbody Inner Diameter	46.1 mm	1.81 in
Rod Joint Inner Diameter	46.1 mm	1.81 in
Rod Weight per Unit Length	6.25 kg/m	4.20 lb/ft
Rod Content Weight (Water) per Unit Length	1.67 L/m	0.13 gal/ft
Rod Stiffness (Moment of Inertia)	6 183 mm ⁴	9.6 in ⁴

NOTE: All rod capacities and failure loads were determined through simultaneous torque and tension load testing by an independent party. An appropriate safety factor has been applied in determining the ratings above. These ratings apply to new, unused rods of Boart Longyear manufacture, in a straight vertical down hole, assuming compliance to Boart Longyear Care and Handling or Product Literature and standard core drilling practices. Actual performance may vary depending on operating conditions and drilling practices. Actual Burst and collapse pressure ratings will be reduced under drilling loads. Increase make-up torque to match operating torque in deep downholes. Operating torque should not exceed make-up torque.

NXQ™ Performance Rating		
	Metric	U.S.
Rated Drilling Depth by Joint Strength	3 350 m	11,000 ft
Rated Maximum Pullback	425 kN	95,000 lbf
Rated Maximum Torque (Operating or Make-Up)	3 400 Nm	2,500 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 2000 m	1 400 Nm	1,000 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 1000 m	1 000 Nm	750 ft-lb
Recommended Minimum Make-Up Torque	600 Nm	452 ft lb
API Theoretical Burst Pressure at Box Shoulder (per API bulletin 5C3)	49 700 kPa	7,215 psi
API Theoretical Burst Pressure at Midbody (per API bulletin 5C3)	75 513 kPa	10,952 psi
API Theoretical Collapse Pressure at Midbody (per API bulletin 5C3)	73 943 kPa	10,724 psi

NXQ™ Weights & Measures		
	Metric	U.S.
Rod Midbody Outer Diameter	70.0 mm	2.75 in
Rod Midbody Inner Diameter	60.3 mm	2.38 in
Rod Joint Inner Diameter	60.3 mm	2.38 in
Rod Stiffness (Moment of Inertia)	13 135 mm ⁴	20.4 in ⁴
Rod Weight per Unit Length	7.80 kg/m	5.20 lb/ft
Rod Content Weight (Water) per Unit Length	2.86 L/m	0.23 gal/ft
Rod Displacement (Water) per Unit Length	0.97 L/m	0.08 gal/ft

NXQ™ W-Wall™ Performance Rating		
	Metric	U.S.
Rated Drilling Depth by Joint Strength	4 000 m	13,000 ft
Rated Pullback	425 kN	95,000 lbf
Rated Torque (Operating or Make-Up)	3 400 Nm	2,500 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 2000 m	1 400 Nm	1,000 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 1000 m	1 000 Nm	750 ft-lb
Recommended Minimum Make-Up Torque	600 Nm	452 ft-lb
API Theoretical Burst Pressure at Box Shoulder (per API bulletin 5C3)	49 700 kPa	7,215 psi
API Theoretical Burst Pressure at Midbody (per API bulletin 5C3)	63 387 kPa	9,193 psi
API Theoretical Collapse Pressure at Midbody (per API bulletin 5C3)	52 421 kPa	7,603 psi

NXQ™ W-Wall™ Weights & Measures		
	Metric	U.S.
Rod Midbody Outer Diameter	70.0 mm	2.75 in
Rod Midbody Inner Diameter (maximum)	62.00 mm	2.44 in
Rod Joint Inner Diameter	60.30 mm	2.38 in
Rod Stiffness (Moment of Inertia)	11 408 mm ⁴	17.7 in ⁴
Rod Weight per Unit Length	6.8 kg/m	4.5 lb/ft
Rod Content Weight (Water) per Unit Length	2.97 L/m	0.24 gal/ft
Rod Displacement (Water) per Unit Length	0.80 L/m	0.07 gal/ft

NOTE: All rod capacities and failure loads were determined through simultaneous torque and tension load testing by an independent party. An appropriate safety factor has been applied in determining the ratings above. These ratings apply to new, unused rods of Boart Longyear manufacture, in a water-filled straight vertical down hole, assuming compliance to Boart Longyear Care and Handling or Product Literature and standard core drilling practices. Actual performance may vary depending on operating conditions and drilling practices. Actual Burst and collapse pressure ratings will be reduced under drilling loads. Increase make-up torque to match operating torque in deep downholes. Operating torque should not exceed make-up torque.

HXQ™ Performance Rating		
	Metric	U.S.
Rated Drilling Depth by Joint Strength	3 050 m	10,000 ft
Rated Maximum Pullback	510 kN	115,000 lbf
Rated Maximum Torque (Operating or Make-Up)	4 000 Nm	3,000 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 2000 m	2 750 Nm	2,000 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 1000 m	2 000 Nm	1,500 ft-lb
Recommended Minimum Make-Up Torque	1 000 Nm	750 ft lb
API Theoretical Burst Pressure at Box Shoulder (per API bulletin 5C3)	45 000 kPa	6,561 psi
API Theoretical Burst Pressure at Midbody (per API bulletin 5C3)	64 000 kPa	9,852 psi
API Theoretical Collapse Pressure at Midbody (per API bulletin 5C3)	60 000 kPa	8,772 psi

HXQ™ Weights & Measures		
	Metric	U.S.
Rod Midbody Outer Diameter	89.03 mm	3.505 in
Rod Midbody Inner Diameter	77.89 mm	3.067 in
Rod Joint Inner Diameter	77.89 mm	3.067 in
Rod Stiffness (Moment of Inertia)	31 669 mm ⁴	49.1 in ⁴
Rod Weight per Unit Length	11.40 kg/m	7.70 lb/ft
Rod Content Weight (Water) per Unit Length	5.14 L/m	0.38 gal/ft
Rod Displacement (Water) per Unit Length	1.54 L/m	0.12 gal/ft

HXQ™ W-Wall™ Performance Rating		
	Metric	U.S.
Rated Drilling Depth by Joint Strength	4 000 m	13,000 ft
Rated Pullback	510 kN	115,000 lbf
Rated Torque (Operating or Make-Up)	4 000 Nm	3,000 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 2000 m	2 750 Nm	2,000 ft-lb
Recommended Minimum Make-Up Torque for Deep Holes over 1000 m	2 000 Nm	1,500 ft-lb
Recommended Minimum Make-Up Torque	1 000 Nm	750 ft lb
API Theoretical Burst Pressure at Box Shoulder (per API bulletin 5C3)	44 500 kPa	6,458 psi
API Theoretical Burst Pressure at Midbody (per API bulletin 5C3)	50 200 kPa	7,280 psi
API Theoretical Collapse Pressure at Midbody (per API bulletin 5C3)	29 000 kPa	4,206 psi

HXQ™ W-Wall™ Weights & Measures		
	Metric	U.S.
Rod Midbody Outer Diameter	88.9 mm	3.50 in
Rod Midbody Inner Diameter	81.0 mm	3.19 in
Rod Joint Inner Diameter	77.9 mm	3.06 in
Rod Stiffness (Moment of Inertia)	24 592 mm ⁴	38.1 in ⁴
Rod Weight per Unit Length	9.1 kg/m	6.0 lb/ft
Avg. Content Weight (Water) per Unit Length	5.1 L/m	0.40 gal/ft
Rod Displacement (Water) per Unit Length	1.1 L/m	0.09 gal/ft

NOTE: All rod capacities and failure loads were determined through simultaneous torque and tension load testing by an independent party. An appropriate safety factor has been applied in determining the ratings above. These ratings apply to new, unused rods of Boart Longyear manufacture, in a water-filled straight vertical down hole, assuming compliance to Boart Longyear Care and Handling or Product Literature and standard core drilling practices. Actual performance may vary depending on operating conditions and drilling practices. Actual Burst and collapse pressure ratings will be reduced under drilling loads. Increase make-up torque to match operating torque in deep downholes. Operating torque should not exceed make-up torque.