CORE LINEPIPE

RELIABILITY THROUGH INNOVATION

AN INTRODUCTION TO CORE LINEPIPE®

REVISION 3.0 2023

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1. WHO WE ARE

We are a pipeline technology company focused on innovative solutions that rethink traditional pipeline systems. CORE's goal is to change how pipelines are constructed by shifting the focus to factory installation over fieldwork. We pride ourselves on providing an affordable pipeline system that offers superior corrosion resistance and dual containment, backed by zero environmental releases since beginning operations in 2014.

Our world class team consists of energy pipeline veterans who have a proven track record building relationships with clients and delivering positive results, thriving where other pipelines cannot.

OVER A CENTURY OF PROVEN EXPERIENCE

In addition to our industry leading product reliability and service record, as illustrated by zero environmental releases and a long record of stellar client satisfaction since our inception, our team delivers decades of experience at every level of the pipeline process, with particular expertise in:

- Composite pipeline systems
- Internal coatings
- Field installed liner systems
- Low impact pipelines

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2. CORE SAFETY

The safety of all stakeholders is paramount to CORE Linepipe® Leadership. Safety is embedded throughout the development of every strategy, system, process, product, and service offering. The CORE Linepipe® team takes pride in our safety culture built on:

- The engineering of safety into systems, processes, products, and equipment designs.
- Critical assessment of hazards and work procedures to ensure the safe and efficient operation by production and field personnel.
- Documentation of processes, inspections, near misses, incidents, and daily toolbox talks for training, monitoring, and compliance.

CORE Linepipe® successfully worked through the Manufacturer's Health & Safety Association to obtain our COR (Certificate of Recognition) with a 2021 external audit score of 98.5%.

In March of 2018, CORE Linepipe® launched a company-wide safety campaign to increase engagement and further improve our safety culture. The "See Something, Say Something, Do Something" campaign is working to improve behaviors and advance CORE Linepipe®'s proactive, leadership-owned safety culture.

In February of 2022, CORE Linepipe® introduced a training program that offers practical techniques to keep workers alert to risk all day, every day. By implementing SafeStart, CORE Linepipe® can build off existing progress and further develop workplace safety awareness.

3. CORE QUALITY

CORE Linepipe® utilizes an extensive quality assurance and quality control program that adheres to international standards and utilizes Lean and Six Sigma methodologies to ensure we are industry leaders.

Our policies and procedures provide complete traceability from production to installation, delivering a complete documentation package to every client upon project completion.

CORE Linepipe®'s quality commitment allows our client to focus on everything else.

CORE is ISO 9001 certified as of 2022.

LEAN PROCESS MANAGEMENT

Born out of practices developed by Toyota in the 1940s, lean process management provides tools that increase efficiencies and client satisfaction by eliminating processes and wastes that do not add value to the client, delivering improved efficiency, productivity, and continuous improvement.

CORE LINEPIPE®'S QUALITY PROCEDURES

STEEL LINEPIPE

CSA Z245.1 MTR

- Diameter
- Wall thickness
- Heat #
- Yield strength
- UTS
- Hardness
- Charpy v-notch

GATEWAY TUBULARS

EXTERNAL COATING

CSA Z245.30

- Batch #
- Thickness
- Surface prep/temp
- Cutback

LINER SUBASSEMBLY

Electrofusion (EF)

- Dimensional testing
- Resistance testing
- Decohesion testing
- EF continuity

Liner

- Batch #'s
- Dimensional testing

STEEL LINEPIPE

- WT pre/post swage
- Swage forces
- Dye-penetrant testing
- ClickWeld® make-up forces

CORE LINEPIPE

ELECTROFUSION

European Standard/API 15 LE

- Dimensional testing
- Resistance testing
- Post extrusion batch testing

CLICKWELD®

API 5CT MTR

- Notch toughness
- Hardness
- Dimensional testing

HDPE LINER

API 15LE

- Cell classification
- MTR
- Dimensional testing
- Certificate of Compliance

PIPE INSTALLATION

CORE SERVICE®

CSA Z662 Weldmap

- ClickWeld® forces
- Fusion parameters
- Dimensional testing

QA/QC PIPELINE PACKAGE

Compilation of quality records from supply chain, manufacturing, and installation

4. COST SAVINGS THROUGH INNOVATION

At CORE Linepipe®, we studied how to reduce client costs for pipeline installation and operations. Could we improve pipeline manufacturing and construction processes while also improving pipeline performance in a meaningful and impactful way to reduce client total cost of ownership and increase pipeline reliability?

The answer is a resounding YES! We've taken an innovative approach to pipeline manufacturing while streamlining the installation process and delivering significant savings in capital and operating expenses. No environmental releases over hundreds of projects throughout North America since 2014 and a competitive total installed cost has allowed CORE to grow with our clients though challenging market conditions and demonstrates our approach works.

5. CORE LINER® OVERVIEW

SOLUTIONS FOR FLUID HANDLING

Water

- Produced Water
- Water Flood
- Water Supply
- Industrial Waste Water
- Potable Water
- Water for beneficial re-use
- SWD

Oil

- EOR
- Corrosive Oil
- Crude Oil
- Oil Emulsion

Industrial Pipeline Solutions

- Low Pressure Natural Gas
- Slurry
- Tailings
- Industrial Waste Streams
- Acidic Service
- CO2
- Hydrogen

CORE Liner® is a corrosion resistant, dual containment pipe-in-pipe system that combines the high-pressure capacity of steel with the corrosion resistance of plastics, utilizing an outer steel pipe with a pre-installed inner HDPE liner. This pipe-in-pipe system provides true dual containment as well as internal and external corrosion resistance from flange to flange.

The two components are joined together using CORE Linepipe®'s proprietary ClickWeld® system, while the HDPE liner is joined using an electrofusion process. The result is less field work and lower total cost of ownership and increased reliability for your pipeline system. The structural steel pipes provide the pressure capacity, secondary containment and are joined together using CORE Linepipe®'s proprietary ClickWeld® system.

The internal plastic liner provides corrosion resistance, primary containment and is joined using an integral electrofusion process.

Corrosion Resistant

Dual Containment Pipe-in-pipe System

6. CORE LINER® BENEFITS & ESG ADVANTAGES

Engineered, Modular Pipeline System:

CORE Linepipe®'s project involvement starts with the manufacturing process, where we produce a robust corrosion resistant pipeline system that includes:

- ClickWeld® Mechanical Joints
- A factory installed internal high-density polyethylene (HDPE) liner
- Integral Electrofusion joining system

Emissions reductions through:

- No fugitive emissions
- Lower emissions caused by manpower and equipment during installation
- Lower pumping emissions and associated costs

Elimination of environmental releases through:

- Dual Containment
- Internal and external corrosion resistance
- Annular monitoring
- Preventative leak detection

Track record: Zero environmental releases in the operating history of CORE.

7. CORE INSTALLATION, SERVICE AND SUPPORT BENEFITS

FOCUSED ON THE CLIENT EXPERIENCE

We build partnerships and trust with our clients, working together throughout the project planning and execution processes to ensure superb execution, including:

- Detailed and documented conversations to understand the requirements of the intended pipeline service
- An engineering application review
- Fit for service pipeline solutions
- Robust operating range
- A service-oriented culture centered around being easy to do business with

CORE Linepipe® is involved in every stage of a pipeline project from planning and manufacturing through project execution. Working with our team has many benefits, including:

- Engineering and design support
- Reduced crew costs for contractors by not requiring liner or welding inspection personnel
- Less vulnerabilities to adverse weather conditions
- Reduced pipeline construction duration
- Engineering support for design and applications including:
  - Regulatory approvals
  - Pressure drop and volume calculations
  - Engineering review and approval for suitability of service
    - Temperature, pressure, H2S, tensile ratings (HDD), etc.
- Dedicated field supervision, both highly trained and experienced with pipeline work – we are Pipeliners!
- Reduced crew costs for contractors – no liner or welding personnel required
- Third-party inspections are not required
- Training and support with contractor and construction teams that begins prior to project kickoff
- Daily reporting with simple field tickets and a single lump sum day rate
- Daily efficiency reports
- No rental or reel returns
- Lessons learned and continuous improvement meeting at project's conclusion

CORE Liner®'s proprietary technology has numerous additional advantages:

- Reduced total installed cost
- No welding or X-ray required
- Small bell holes required for tie-ins only
- No buried flanges or jumper vents required
- One hydrotest required
- High pressure and high-grade sour service tubulars
- Internal and external corrosion protection
- Modular construction – less manpower and equipment during project
- **ESG Leading:**
  - **ZERO** fugitive emissions
  - Spill elimination – internal and external corrosion protection, dual containment, and preventative leak detection

8. THE CLICKWELD® PROCESS

ClickWeld® is the innovative proprietary mechanical joining system of CORE Linepipe®. The ClickWeld® system uses high grade carbon steel components to form a connection that is gas and liquid tight, eliminating the need for field welding.

ASSEMBLY IS AN 8-STEP PROCESS

At the Production Plant:

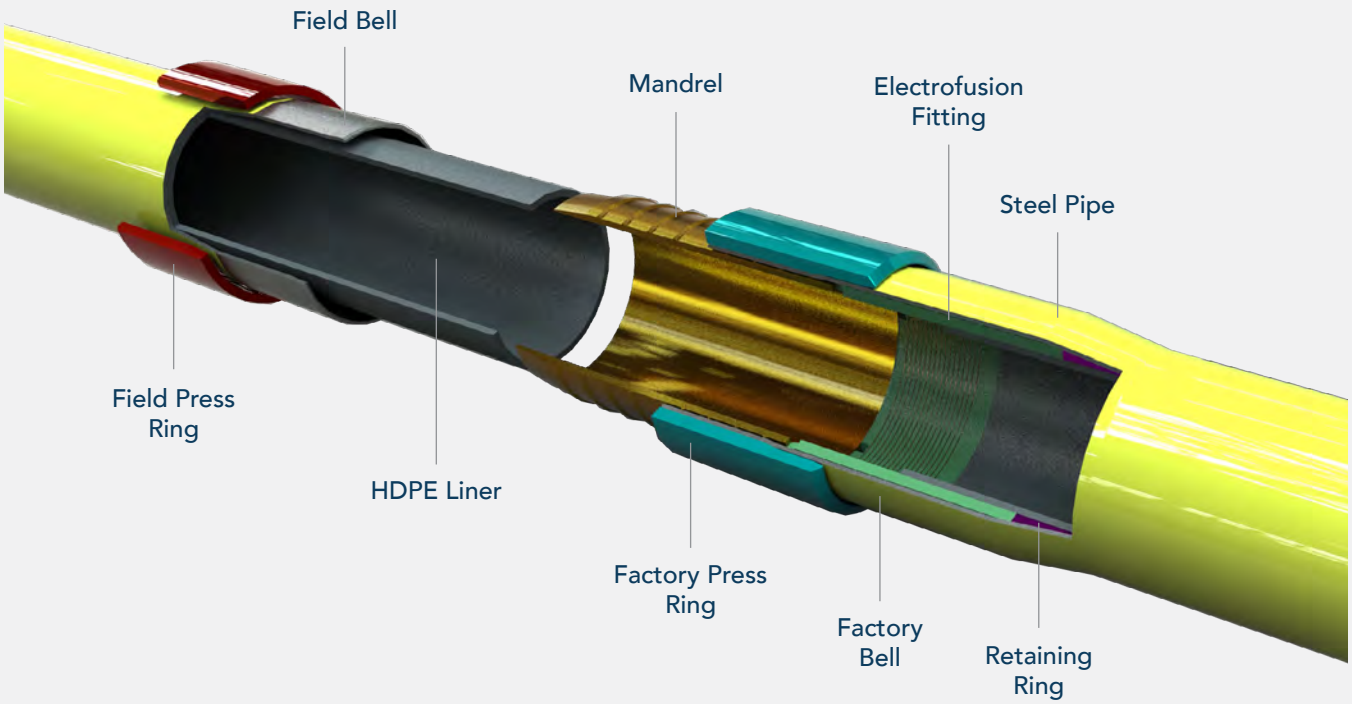
1. Belled steel factory end is created
2. Retaining ring is inserted
3. Liner and electrofusion (EF) coupling is inserted into the steel pipe
4. A mandrel is inserted inside the bell, butted up to EF coupling
5. A factory ring is pressed over the bell completing the factory connection

In the Field:

6. Field and factory ends are stabbed together
7. The field bell is pulled over the mandrel
8. The field ring is finally pressed, deforming the pipe onto the mandrel's profile, completing the ClickWeld® joint

Cycle time for a ClickWeld® joint is consistently 5-11 minutes, under favorable terrain and weather conditions.

THE CLICKWELD® PROCESS



9. THE ELECTROFUSION PROCESS

Premium Electrofusion fittings (EF) serve as an alternative to butt fusion for HDPE joining.

CORE Liner® Dual Zone EF consists of an HDPE coupling with copper wiring embedded inside. That wiring is connected to an electrofusion control unit (ECU) that fuses the coupling and HDPE pipe, creating a homogenous joint stronger than the parent pipe.

The ECU measures and records a variety of data, adjusts fusion/soak time to account for ambient temperature and ensures continuity of the wiring. This data is included in CORE Liner® quality and traceability documentation.

EFs have more than 70 years of usage and are commonplace in gas distribution and offer significant advantages to butt fusion.

ADVANTAGES

- 7 times the strength and surface area of a perfect butt fusion
- Reinforces the liner against radial collapse
- Anchors the liner against axial collapse
- Increased quality control on all joints due to the Electrofusion Control Unit
- Easier pigging through the full-bore profile at the joint

10. HYDRAULIC PERFORMANCE

FLOW VELOCITY AND FLOW RATE

The smooth polyethylene inner layer of CORE Liner® provides excellent flow characteristics with minimal friction loss. The maximum flow velocity and the maximum flow rate for a particular pipeline will depend on the level of friction loss that can be tolerated as well as the likelihood and impact of potential water hammer events.

Erosion is typically not a limiting factor for flow velocity in polyethylene lined pipelines in liquid service. As a guideline, the industry commonly uses a typical **maximum flow velocity of 13 ft/s (3.96 m/s),** resulting in the following flow rates and friction losses in water service:

HYDRAULIC PERFORMANCE - IMPERIAL

		MAX. FRICTION LOSS, PSI				
Size	Max. Flow Rate	Max. Friction loss	2	4	8	10
inches	bbl/day	psi/mile	miles	miles	miles	miles
CL440 (4”)	15,000	287	574	1148	2296	-
CL640 (6”)	37,000	175	350	700	1400	1750
CL648 (6”)	36,000	176	352	704	1408	1760
CL671 (6”)	34,000	181	362	724	1448	1810
CL856 (8”)	62,000	130	260	520	1040	1300
CL1071 (10”)*	96,000	100	200	400	800	1000
CL1279 (12”)*	135,000	81	162	324	648	810

HYDRAULIC PERFORMANCE - METRIC

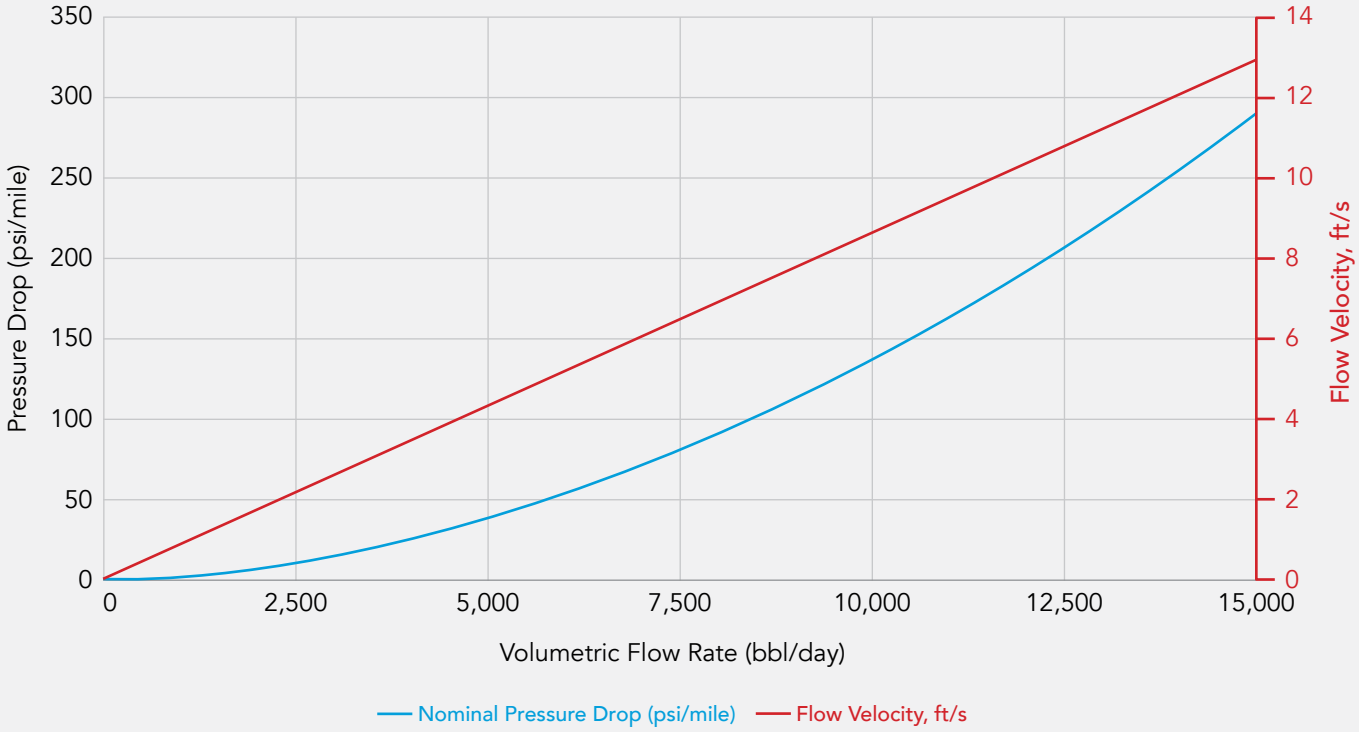
		MAX. FRICTION LOSS, PSI				
Size	Max. Flow Rate	Max. Friction loss	2	5	10	15
-	m3/day	psi/km	km	km	km	km
CL440 (4”)	2,400	185	370	925	1850	-
CL640 (6”)	5,900	110	220	550	1100	1650
CL648 (6”)	5,800	112	224	560	1120	1680
CL671 (6”)	5,500	116	232	580	1160	1740
CL856 (8”)	9,900	81	162	405	810	1215
CL1071 (10”)*	15,400	63	126	315	630	945
CL1071 (10”)*	21,700	52	104	260	520	780

*12” will be available Q3 2023. 10”will be available Q1 2024. 10” and 12” info is subject to change.

These charts depict the expected friction loss in a CORE Liner® pipeline for a variety of flow rates. Currently, the 4", 6" and 8" product sizes are commercially available. 10" and 12" versions are under development.

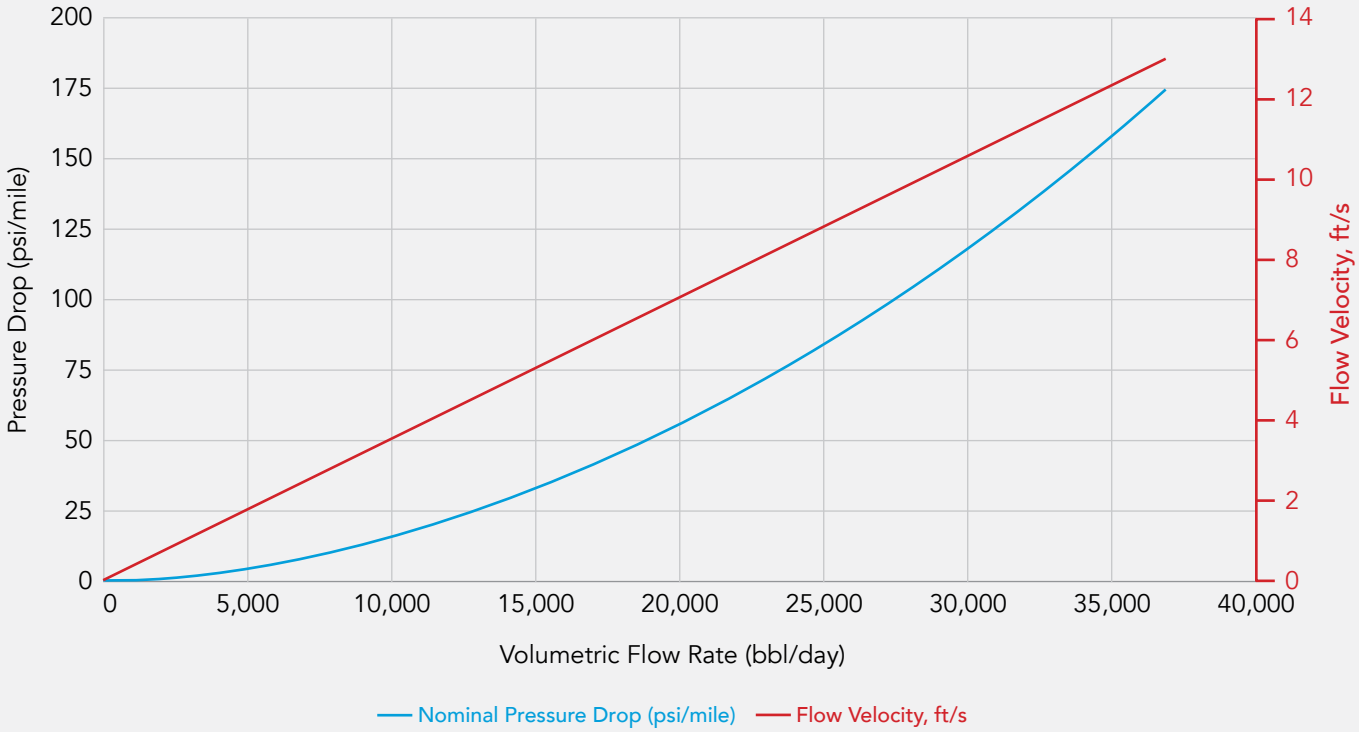
FRICTION LOSS IN WATER SERVICE, PSI/MILE

CL440 (4") Pipe - ID 3.72"



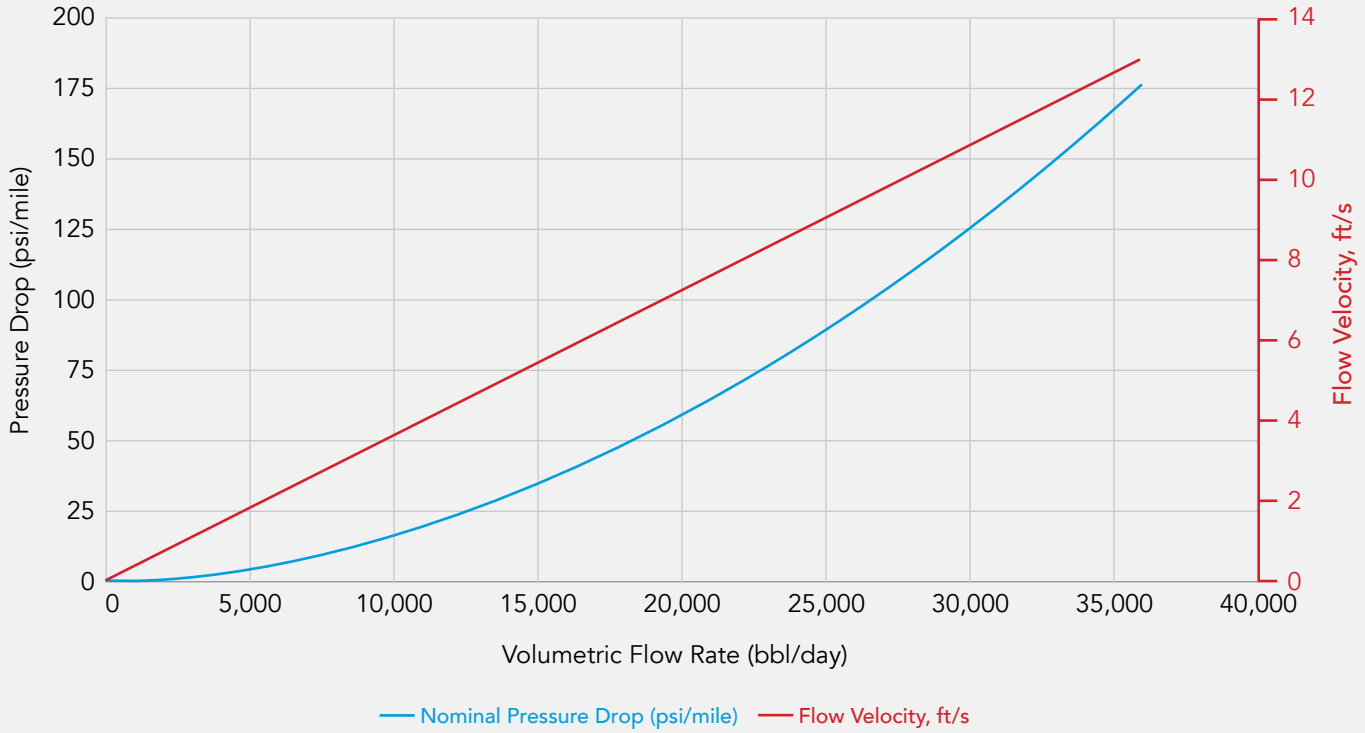
FRICTION LOSS IN WATER SERVICE, PSI/MILE

CL640 (6") Pipe - ID 5.81"



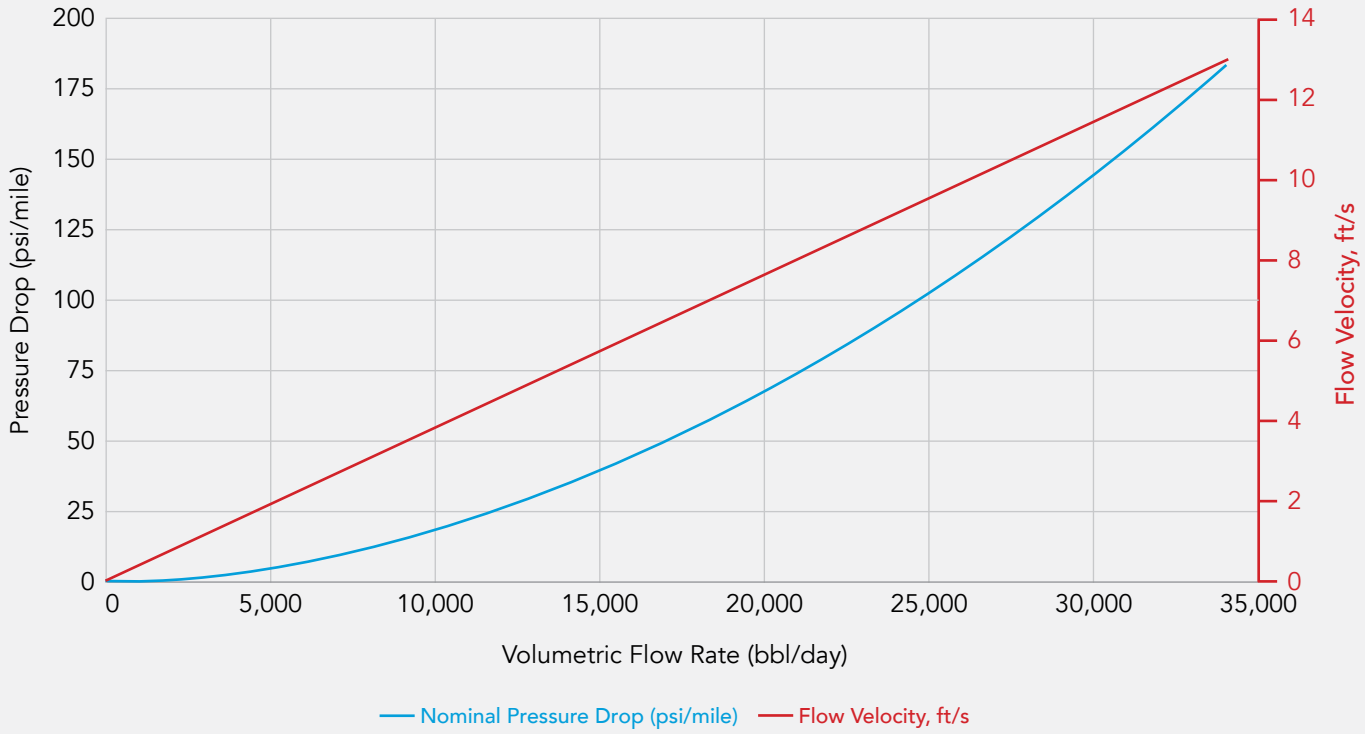
FRICTION LOSS IN WATER SERVICE, PSI/MILE

CL648 (6") Pipe - ID 5.74"



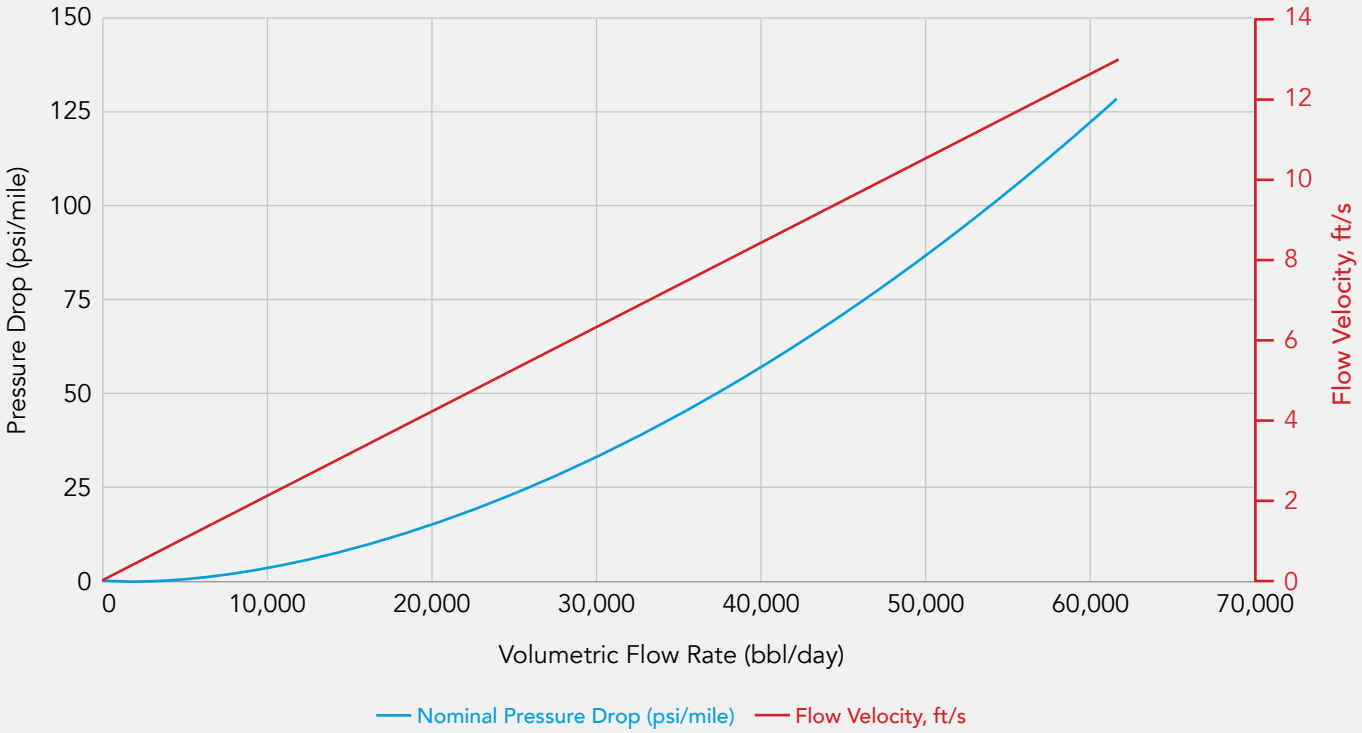
FRICTION LOSS FOR CL671 (6") IN WATER SERVICE

CL671 (6") Pipe - ID 5.59"



FRICTION LOSS IN WATER SERVICE, PSI/MILE

CL856 (8") Pipe - ID 7.52"



FRICTION LOSS IN WATER SERVICE, PSI/MILE

Twin CL856 (8") Pipe - ID 7.52"

FLOW COEFFICIENTS

Hazen-Williams: 150 . **Darcy-Weisbach Surface Roughness:** 0.000005 ft . **Manning:** 0.009

11. SERVICES OFFERED

CORE SERVICE® SPREAD

The CORE Service® field spread consists of a track hoe; hydraulic installation equipment for ClickWeld® (nicknamed Walter); an electrofusion control unit; and all required tools, trucks, trailers, and quads. Field crews vary in size from 2-4 people as needed (foreman, lead, electrofusion technician, laborer.)

BENDS

The minimum bend radius of CORE Liner® is 20D and must be cold bent to ensure the internal liner is not compromised. CORE Liner® products can easily be field bent using standard field bending equipment.

Bends greater than 30° can be factory bent, improving QA/QC and saving time in the field, and must be pre-ordered.

RISERS

CORE Liner® risers are factory bent and are available in 45° or 90°. CORE Liner® risers allow clients to have a corrosion resistant pipeline from flange to flange, without having to resort to expensive internal coatings. CORE Liner® risers must be pre-ordered and client sign-off on the CORE Liner® riser drawings is required **prior** to bending to assure delivered dimensional quality.

FLANGES

Flanges are to ASME B16.5 and are joined to the CORE Liner® pipeline using the patented ClickWeld® joining system. Each flange connection comes with an HDPE stub end, ClickWeld® components, and an electrofusion fitting to easily connect to an existing CORE Liner® pipeline. The design of the flange assembly has safeguards against excessive strain on the HDPE stub end, thereby eliminating a failure mode common to other liner systems.

BORES AND HORIZONTAL DIRECTIONAL DRILLING

CORE Liner® is suitable for HDD and boring applications. CORE Linepipe® has developed custom pull heads used when pulling drag sections of CORE Liner®. These reusable pull heads are specially designed to eliminate damage to the mandrel while providing excellent tensile pull capability.

PRODUCT	MAXIMUM RECOMMENDED		OD OF PULL HEAD ASSEMBLY		MIN. REAMER SIZE IN COMPRESSIBLE SOILS	
-	lb	kN	in	mm	in	mm
CL440	90,000	401	7.3	185	12	305
CL640	130,000	579	9.5	241	14	356
CL648	160,000	713	9.5	241	14	356
CL671	230,000	1024	9.5	241	14	356
CL856	190,000	846	12.8	325	16	406
CL1071*	380,000	1,692	16.24	412	22	559
CL1279*	510,000	2,271	18.33	466	26	660

*12" will be available Q3 2023. 10"will be available Q1 2024. 10" and 12" info is subject to change.

TIE-INS

Above ground and below ground tie-ins can be accommodated. At risers and tie-in points where a CORE Service® team is working in the ditch, bell holes are required with proper ingress and egress, following industry safety best practices.

CORE Linepipe® requires accessible bell holes that are large enough to accommodate the Walter unit. Typically, a bell hole of at least 8 feet wide by 20 feet long (2.43m by 6.09m) is required.

CORE Liner® field crews can make custom length cuts on location if required using standard CORE Liner® product. This process does not require additional fittings or materials. Most tie-ins are completed outside of the ditch and do not require a bell hole.

CROSSINGS

Crossings, where drag sections are required can be treated just like conventional steel linepipe. Roped bends or long sweeping bends react like conventional line pipe and are easily incorporated into the CORE Liner® system design.

FLOW JOINTS

Flow Ts and Y laterals must be constructed using lap joint flanges and are easily integrated into the CORE Liner® system. Since CORE Liner® is a corrosion resistant system, it is recommended that flow joints are internally coated or are fabricated using stainless-steel materials.

12. PROJECT EXECUTION

The breakdown below highlights the division of responsibilities between CORE Service® and the pipeline contractor.

Please note that to ensure safe working conditions and project success, contractor support as detailed below is essential for the CORE Liner® crew. Without this support, work will not be able to progress.

CLIENT/CONTRACTOR TO PROVIDE:

- Licenses and permits
- Site preparation and access
- Pipeline right-of-way preparation (minimum 50ft/15.24m)
- Strip, ditch, lower, and backfill
- Pipe stringing including all equipment and personnel
- In-field CORE equipment mobilization
- Dedicated crew and equipment to support the CORE Service® team (stabbing crew)
  - Side boom with operator and laborer (100% of job duration)
  - **Please note:** if there is no side boom, ClickWelding cannot be achieved
- Field bending
- Equipment, material, and labor for crossings/bores/HDD
- Excavation of bell holes to CORE specifications
- **Minimum** two lifting implements are required for in the ditch tie-ins and risers (Additional equipment may be needed depending on the project conditions)
- Installation of shrink sleeves over ClickWeld®
- Pipe jeeping
- Supply and installation of sleeves, patches, and melt sticks, for field jeep repairs
- Support pile and hardware for risers
- Tie-in of CORE Liner® risers
- Bolt up of all flanges, including supply of studs (1" longer), washers, and nuts
- Hydrotest including fluids and disposal
- Supply and install consumables as needed
- Pipeline quality control
- Reclamation of ROW including back fill
- **All other typical activities not specified under CORE's scope of work**

SCOPE OF CORE SERVICE® (INCLUDED IN LUMP SUM DAY RATE):

- Review of drawings
- Site visit – suggested for projects over 3 miles/4.82km.
- Coordinate delivery of pipe, bends, and ancillary materials to site
- Joining of all ClickWeld® joints
- Supply ClickWeld® pull head
- Supply ClickWeld® quality documentation
- Supply material MTRs

PURCHASED FROM CORE LINEPIPE® BY CLIENT:

- Supply of CORE Liner® product (Gateway Tubulars)
- Mob/Demob of CORE Liner® crew and equipment
- Pipe freight
- Supply of CORE Liner® risers/ROW bends
- Bends between 30-90° are recommended to be factory bent
- Supply of ClickWeld® flanges and transition pups
- Supply of shrink sleeves (1 per ClickWeld®)
- Supply and install riser vents

13. SPEC SHEET

Product data is subject to change. Consult your CORE Linepipe® representative for more information.

APPLICATION ENVELOPE

PRODUCT	MAXIMUM PRESSURE RATING		MAXIMUM TEMPERATURE RATING		WATER	OIL	GAS	SOUR
-	psi	kPa	°F	°C	Water	Oil	Gas	H2S
CL440	2620	18,070	180°F Water/ 140°F Oil	82°C Water/ 60°C Oil	YES			
CL640	1780	12,280						
CL648	2140	14,740						
CL671	3160	21,810						
CL856	1870	12,900						
CL1071*	1950	13,440						
CL1279*	1830	12,610						

Note: the product performance is dependent on the actual service parameters. Consult CORE Linepipe® for a project specific suitability evaluation.

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PRODUCT SPECIFICATIONS

PARAMETER	SPECIFICATION
Steel pipe	API spec 5L X52 PSL 2 ERW or CSA Z245.1 GR359 M45C SS ERW
Thermoplastic liner	Bi-Modal HDPE PE4710 liner, API 15LE
Bends	Shop or field cold bent pipes, minimum 20 x D bend radius
Flanges	ASME B16.5 raised face with a ClickWeld® end
Pipe coating	Two Layer HDPE Coating, or Three Layer FBE with HDPE Coating
Joint protection	Field applied shrink sleeves, or a visco-elastic wraparound
Flow coefficients	Hazen-Williams 150 / Darcy-Weisbach = 0.000005 ft or 0.0015 mm / Manning 0.009

PRODUCT DIMENSIONS

PRODUCT	STEEL OUTSIDE DIAMETER		STEEL WALL THICKNESS		LINER INSIDE DIAMETER		LINER THICKNESS		CLICKWELD® RING OUTSIDE DIAMETER		PIPE WEIGHT	
	in	mm	in	mm	in	mm	in	mm	in	mm	lb/ft	kg/m
CL440	4.500	114.3	0.157	4.0	3.72	94	0.23	5.8	5.98	152	9	14
CL640	6.625	168.3	0.157	4.0	5.81	148	0.25	6.4	8.25	210	14	21
CL648	6.625	168.3	0.188	4.8	5.74	146	0.25	6.3	8.25	210	16	24
CL671	6.625	168.3	0.280	7.1	5.59	142	0.24	6.1	8.66	220	23	34
CL856	8.625	219.1	0.220	5.6	7.52	191	0.33	8.3	10.75	273	26	38
CL1071*	10.750	273.0	0.280	7.1	9.37	238	0.41	10.3	13.74	349	40	59
CL1279*	12.750	323.8	0.312	7.9	11.14	283	0.49	12.4	15.83	402	53	79

Pipe standard length of 62 ft (18.9 meters)

14. QUALIFICATION TESTING

SR#	TEST DESCRIPTION	REFERENCE STANDARD	PRODUCT	REQUIREMENT	RESULT	REPORT
1	Tensile Strength of ClickWeld®	CSA Z662-15 Sec. 4.5.4.4	CL440	Resist 104,000 lbf	Pass, 158,200 lbf and 160,200 lbf.	CL440 Qualif. Report
			CL640	Resist 153,000 lbf	Pass, 230,000 lbf	CL640 Qualif. Report
			CL648	Resist 184,000 lbf	Pass, 262,000 lbf	CL648 Qualif. Report
			CL671	Resist 272,000 lbf	Pass, 396,000 and 400,000 lbf.	CL671 Qualif. Report
			CL856	Resist 219,000 lbf	Pass, 278,000 lbf and 365,000 lbf.	CL856 Qualif. Report
2	Compressive Strength of ClickWeld®	CSA Z662-15 Sec. 4.5.4.4	CL648	Resist 184,000 lbf	Pass, 256,000 lbf	CL648 Qualif. Report
3	Bending Strength of ClickWeld®	CSA Z662-15 Sec. 4.5.4.4	CL648	Resist 10,294 lbf	Pass, 21,720 lbf	CL648 Qualif. Report
			CL856	Resist 20,664 lbf	Pass, 36,902 lbf	CL856 Qualif. Report
4	Torsional Strength of ClickWeld®	CSA Z662-15 Sec. 4.5.4.4	CL856	-	42,000 lbf-ft	CL856 Qualif. Report
5	Electrofusion Evaluation	CSA Z662-15 Sec. 12.7.9.1	CL648 CL856	Min 85% ductility	Pass, 95% ductility	Electrofusion Validation Reports
6	Gas Tightness	CORE Linepipe®	CL648 CL856	No failure at 1800 psig for 4 hours	Pass	CL648 Qualif. Report CL856 Qualif. Report
7	Hydrostatic Pressure	CSA Z662-15 Sec. 4.5.3.2	CL440	No failure at 3930 psig for 15 minutes	Pass	CL440 Qualif. Report
			CL640	No failure at 1800 psig for 1 hour	Pass	CL640 Qualif. Report
			CL648 CL856	No failure at 1800 psig for 12 hours	Pass	CL648 Qualif. Report CL856 Qualif. Report
			CL671	No failure at 4740 psig for 5 minutes.	Pass	CL671 Qualif. Report

SR#	TEST DESCRIPTION	REFERENCE STANDARD	PRODUCT	REQUIREMENT	RESULT	REPORT
8	Hydrostatic Burst Pressure	CSA Z662-15 Sec. 4.5.3.2	CL440	No failure below 4620 psig	Burst at ~5600 psig	CL440 Qualif. Report
			CL640	No failure below 3136 psig	Burst at ~3550 psig	CL640 Qualif. Report
			CL648	No failure below 3875 psig	Average burst at ~4779 psig	CL648 Qualif. Report
			CL671	No Failure below 5630 psig	Burst at ~6195 psig	CL671 Qualif. Report
			CL856	No failure below 3454 psig	Pass	-
9	Cyclic Pressure	CSA Z662-15 Sec. 4.5.3.2	CL440	No failure at 50,000 cycles from zero to 2620 psig	Pass	CL440 Qualif. Report
			CL648 CL856	No failure at 100,000 cycles from 500 to 1800 psig	Pass	CL648 Qualif. Report CL856 Qualif. Report
			CL671	No failure at 50,000 cycles from 200 to 3360 psig	Pass. 86,000 cycles from 200 - 3360 psig	CL671 Qualif. Report
10	High Frequency Pressure Pulsations	CSA Z662-15 Sec. 4.5.3.2	CL648 CL856	No failure at 1,000,000 cycles from 1300 to 1480 psig	Pass	CL648 Qualif. Report CL856 Qualif. Report
11	Thermal Cycling	CSA Z662-15 Sec. 4.5.3.2	CL648	No Failure at 0-1800 psig & 0-80˚C for 10 cycles	Pass	CL648 Qualif. Report
12	Vacuum	CORE Linepipe®	CL648 CL856	<0.5 psia, 5 min at 80˚C	Pass for 30 min	CL648 Qualif. Report CL856 Qualif. Report
13	Field Trials	CORE Linepipe®	CL648 CL856	Field construction of a pipeline	Pass	Several projects executed
			CL440 CL640 CL671	Field construction of a pipeline	Pass	Field trial of five sticks

SR#	TEST DESCRIPTION	REFERENCE STANDARD	PRODUCT	REQUIREMENT	RESULT	REPORT
14	Notch Toughness	ASTM A370	CL440	Exceed 9 Joules on 3.3x10x55 mm	Body: 43 Joules HAZ: 46 Joules	Corrmat report 2005-1501
			CL640	Exceed 9 Joules on 3.3x10x55 mm	Body : 54 Joules HAZ: 54-56 Joules	Corrmat report 2107-1615
			CL648	Exceed 9 Joules on 3.3x10x55 mm	Body : 40 Joules HAZ: 30-42 Joules	Corrmat report 1903-1285
			CL671	Exceed 9 Joules on 3.3x10x55 mm	Body: 51 Joules HAZ: 31-50 Joules	Corrmat report 1905-1320
			CL856	Exceed 9 Joules on 3.3x10x55 mm	Body : 45 Joules HAZ: 47 Joules	Acuren report 15-Sep-2015
15	Hardness	ASTM E92	CL440	-	Bell: HV 202-219 Indent: HV 209-280 Tooth: HV 221-277	Corrmat report 2005-1501.
			CL640	-	Bell: HV 188-204 Indent: HV 191-251 Tooth: HV 229-250	Corrmat report 2110-1650.
			CL648	-	Bell: HV 211-224 Indent: HV 211-283 Tooth: HV 222-285	Corrmat report 1903-1285
			CL671	-	Bell: HV 178-197 Indent: HV 178-261 Tooth: HV 239-289	Corrmat report 1905-1320.
			CL856	-	Bell <250 HV	Acuren report 15-Sep-2015
16	Hydrogen Induced Cracking	CSA Z662-15 Sec. 16.4.2.2/ NACE MR0175/ NACE TM0284	CL648	No cracks	No cracks on the expanded steel or ERW in Solution A.	Corrmat report 1903-1284R
			CL671			Corrmat report 1905-1319
17	Sulfide Stress Cracking	CSA Z662-15 Sec. 16.4.2.2/ NACE MR0175/ NACE TM0177 Method C	CL440	No cracks	No cracks on the bell ERW in Solution A at a stress of 25% x AYS	Corrmat report 2110-1651
			CL640	No cracks	No cracks on the bell ERW in Solution A at a stress of 35% x AYS	Corrmat report 2107-1613
			CL648	No cracks	No cracks on the bell ERW in Solution A at a stress of 40% x AYS	Corrmat report 1504-9459

SR#	TEST DESCRIPTION	REFERENCE STANDARD	PRODUCT	REQUIREMENT	RESULT	REPORT
18	Sulfide Stress Cracking	CSA Z662-15 Sec. 16.4.2.2/ NACE MR0175/ NACE TM0177 Method C	CL648	No cracks	No cracks on the bell ERW in MR0175-2 region 2 at a stress of 90% x AYS	Element report dated 30-Nov-2017
			CL671	No cracks	No cracks on the bell ERW in a solution with a pH=5.5 and 100 kPa H2S at a stress of 90% x AYS	Corrmat report 1905-1317
19	Sulfide Stress Cracking	CSA Z662-15 Sec. 16.4.2.2/ NACE MR0175/ NACE TM0177 Four Point Bend Test	CL440	No cracks	No cracks on the bell indentation in Solution A at a stress of 25% x AYS	Corrmat report 2103-1568
			CL640	No cracks	No cracks on the bell indentation in Solution A at a stress of 35% x AYS	Corrmat report 2110-1649
			CL648	No cracks	No cracks on the bell indentation in Solution A at a stress of 80% x AYS	Corrmat report 1901-1257R
			CL640	No cracks	No cracks on the bell indentation in a solution with a pH=5.5 and 100 kPa H2S at a stress of 90% x AYS	Corrmat report 2110-1649
			CL671			Corrmat report 1905-1318

15. CONTACT US

FOR MORE INFORMATION:

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NOTES

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