

GRE LINING

BEST-IN-CLASS PROTECTION FOR OILFIELD TUBULARS USE LINER® GLASS REINFORCED EPOXY (GRE) LINING SERVICE

USE LINER® Glass Reinforced Epoxy (GRE) Lining Service



- **Cost Effective**

GRE lining reduces maintenance and downtime, delivering long-term savings across operations.

- **Composite Strength**

Engineered epoxy composites provide superior mechanical strength with lightweight efficiency.

- **Durable**

Designed to withstand harsh environments, ensuring reliable performance over decades of service.

- **Holiday Free**

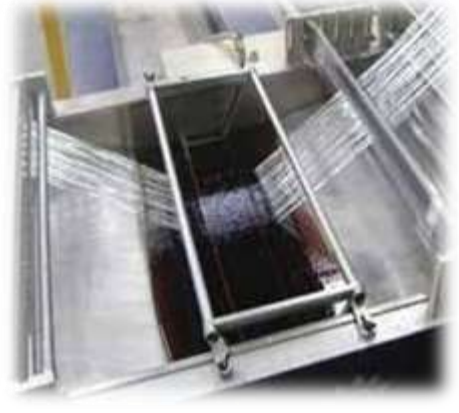
Advanced testing guarantees defect-free linings with continuous, uninterrupted protection.

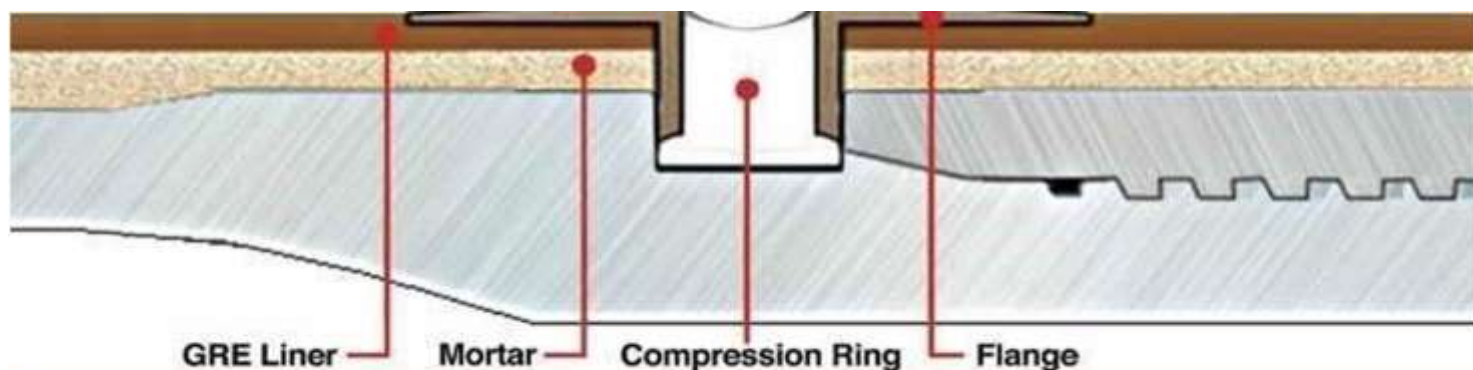
- **Proven American Technology**

Backed by decades of successful deployment in global oil and gas operations.

- **Premium Protection**

Safeguards assets against corrosion, sour service, and aggressive fluids with unmatched reliability.





Dimensions															
2 3/8 4.6 ppf				2 7/8 6.4 ppf				3 1/2 9.2 ppf				4 1/2 11.6 ppf & 12.60 ppf			
ID- Inch	Drift- Inch	WT- ppf	Thickness	ID- Inch	Drift- Inch	WT- ppf	Thickness	ID- Inch	Drift- Inch	WT- ppf	Thickness	ID- Inch	Drift- Inch	WT- ppf	Thickness
1.80	1.624	0.50	0.041"	2.24	2.074	0.50	0.041"	2.74	2.560	0.70	0.046"	3.68	3.470	1.50	0.061"

Specifications

Temperature Rating – 300°F

Compression Ring Material – Reinforced Nitrile Rubber

Liner Material – Glass Reinforced Epoxy

Resin System – Amine-Cured Epoxy

Strength of Material – To tensile limit of steel tubing

Flow characteristics

Hazen-Williams Coefficient = 150

Absolute Roughness = 0.00021 inch

Improved flow efficiency

The GRE liner provides a smooth friction-reduced surface to increase the flowing efficiency of produced or injected gases and fluids.

The chart illustrates nearly equivalent efficiency of flow through a string of GRE-lined premium tubing compared to that of new bare tubing in spite of the disproportionate diameter. As new tubing corrodes (Used Steel curve) the benefit of USE Liner® becomes even more apparent

Example – Tubing and Flow Parameters

Tubing: 2 3/8" IJ Premium

Hazen-Williams Coefficient (USE Liner®): 150

Hazen-Williams Coefficient (New Steel): 120

Hazen-Williams Coefficient (Used Steel): 80

Inside Diameter (USE Liner®): 1.80

inches Inside Diameter (Steel): 1.99 inches

String Length: 5,500 Feet

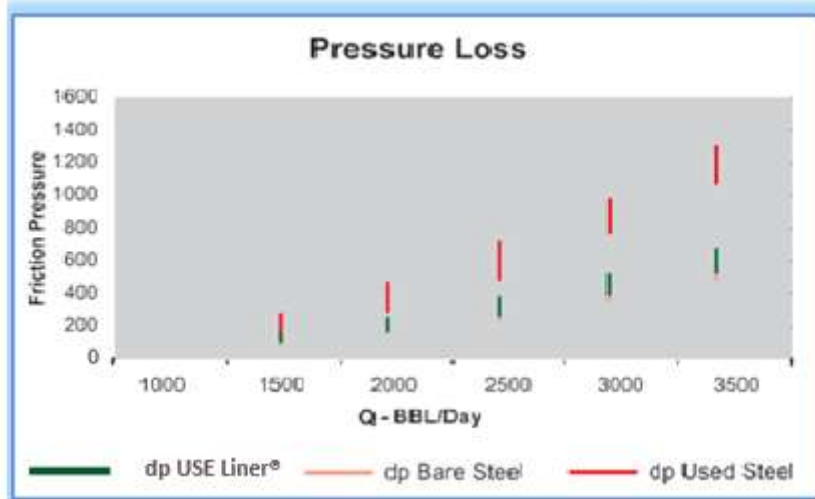
Flow Rate Range: 1,000 – 3,500 bbl/day

Service Arrangements

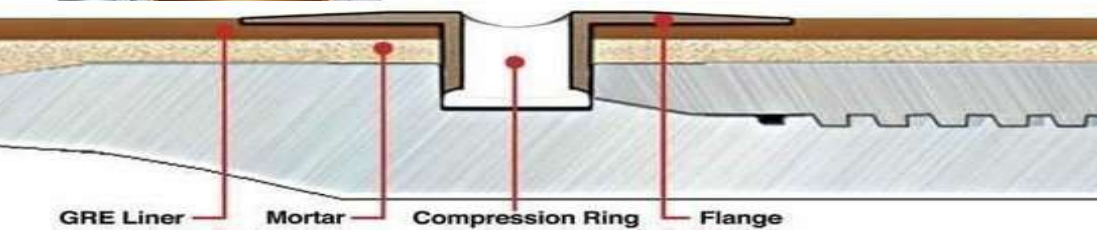
We will take delivery of new or used API tubular goods into an equipped facility for installation of the GRE liner and your choice of immediate dispatch to well site or storage in our yard at your convenience. Tubing must drift to API specification; if necessary, sufficient upset must exist to apply new threads. Additionally, technical supervision is available to help ensure proper installation of the USE Liner® or Glass Line tubing into your well bore

Warranty, Terms & Conditions

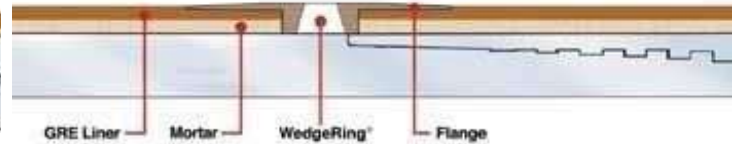
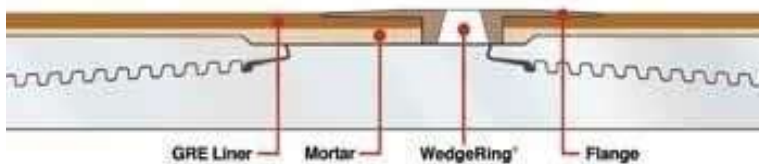
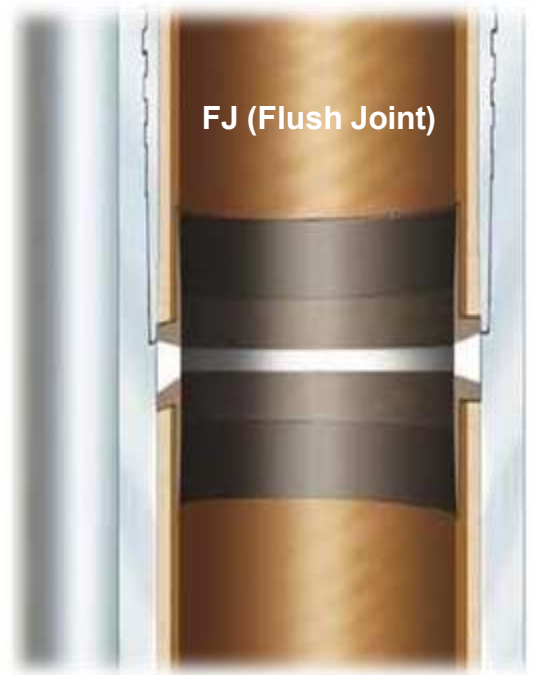
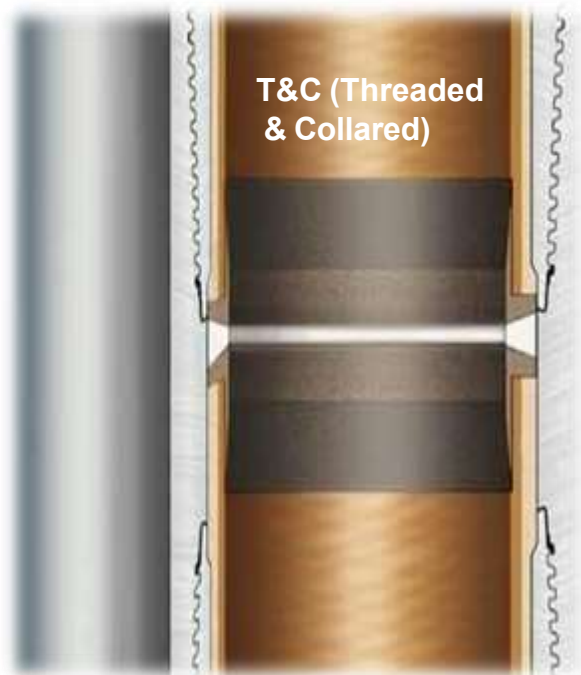
- Standard terms and conditions apply
- Twelve-month product replacement as defined by the standard Terms and Conditions



DIMENSIONAL SPECIFICATIONS



Pipe Dia. (inches)	Weight PPF	Liner ID	Flange ID	Wall Thickness	Drift (Premium)	Drift (API)
2-1/16	3.25	1.5	1.42	0.04	1.35	1.25
2-3/8	4.7	1.81	1.75	0.04	1.7	1.6
2-7/8	6.5	2.25	2.2	0.04	2.1	1.95
3-1/2	9.3	2.75	2.69	0.045	2.6	2.55
3-1/2	12.7	2.55	2.49	0.045	2.4	2.35
4-1/2	11.6	3.69	3.6	0.06	3.5	3.4
4-1/2	12.75	3.69	3.6	0.06	3.5	3.4
4-1/2	13.5	3.6	3.51	0.06	3.45	3.35
5	15	4.01	3.9	0.065	3.8	3.7
5	18	4.01	3.9	0.065	3.8	3.7
5-1/2	15.5	4.52	4.4	0.075	4.3	4.2
5-1/2	17	4.52	4.4	0.075	4.3	4.2
5-1/2	20	4.52	4.4	0.075	4.3	4.2
5-1/2	23	4.395	4.28	0.075	4.15	4.05
7	23	5.9	5.78	0.095	5.65	5.55
7	26	5.9	5.78	0.095	5.65	5.55
7	29	5.8	5.69	0.095	5.55	5.45
7	32	5.8	5.69	0.095	5.55	5.45
7	35	5.7	5.64	0.095	5.54	5.45
9-5/8	43.5	8.2	8.12	0.094	8.003	7.9
9-5/8	47	8.2	8.12	0.094	8.003	7.9
10-3/4	51	9.444	9.361	0.106	9.244	9.14
11-3/4	60	10.3625	10.2838	0.106	10.165	10.05
13-3/8	72	11.96	11.88	0.118	11.77	11.61
13-5/8	88.2	11.96	11.88	0.118	11.77	11.61



Delivery Compatibility with common connections eliminate extra shop time for special order threading requirement

Durability resistant to sour corrosive environments and capable of withstanding high temperature well conditions

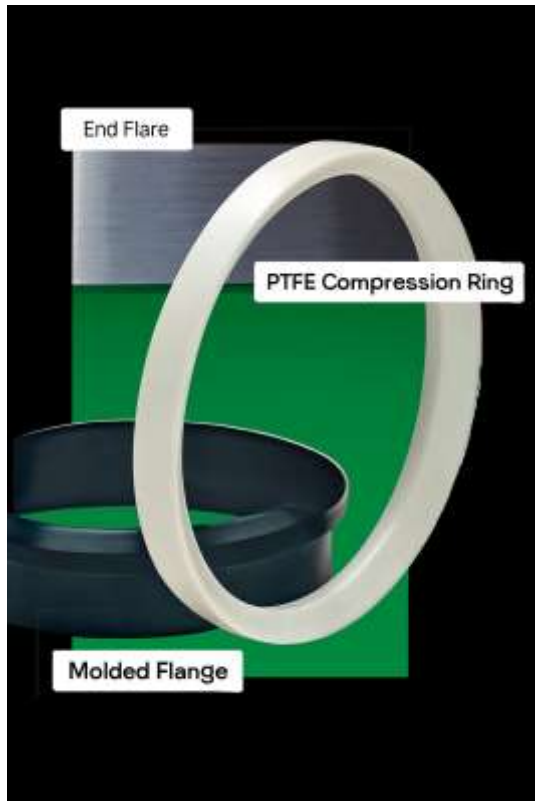
Quality combined performance of premium-jointed tubing with the advanced protection of Glass Reinforced Epoxy (GRE)

Economy lowest cost alternative to competitive adapters, no additional costs incurred to modify off-the-shelf premium connection

Flexibility increased availability and wider variety of serviceable premium connections

Simplicity easily installed, maintained and repaired at well site

Premium Rings



Specifications

- Temperature Rating: 260°C
- Premium Ring Material: PTFE

This connection is not over-engineered and requires very little maintenance or meticulous, time-consuming measurement upon installation. It is easily repaired or replaced and is highly affordable. The wedge-shaped, glass-filled PTFE ring compresses between two sturdy molded flanges across the connection to ensure protection against corrosion of exposed box or collar steel surfaces

GRE TESTS

- List of Tests applicable on GRE
 - Density Calculation
 - ASH Test
 - Glass Transition Temperature (T_g).
 - Hardness Test results
 - Compression Test.
 - Flex Test

GRE TESTS

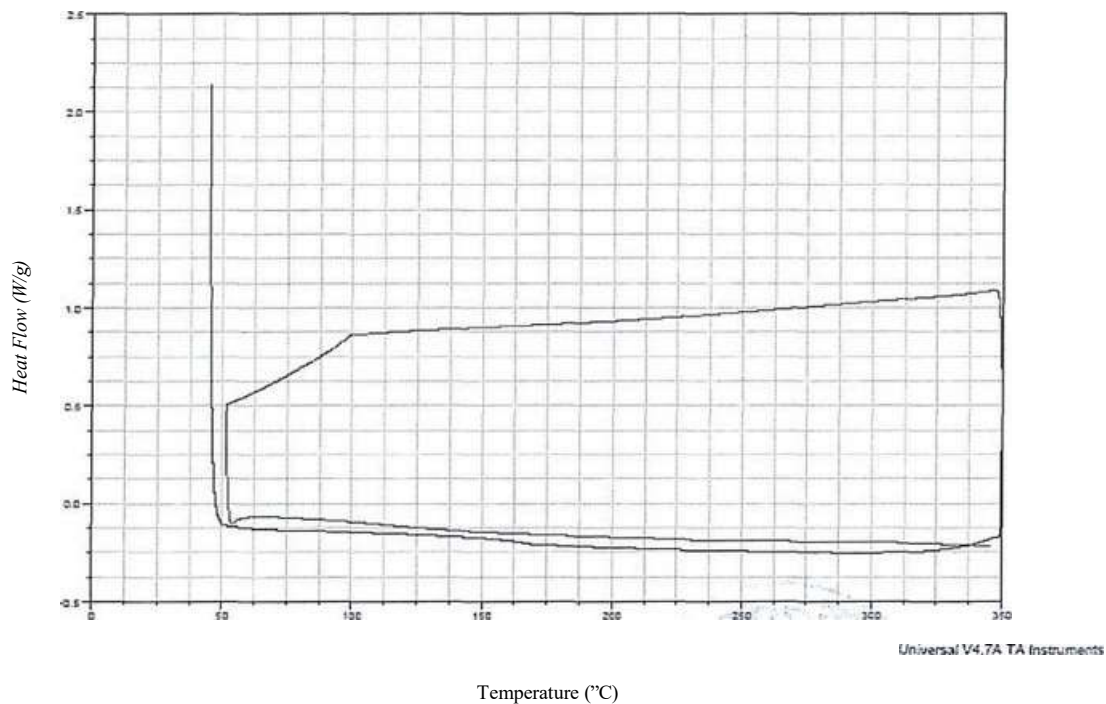
■ Glass Transition Temperature

This test was executed by using wire cutters to take a small sample off the end of one of the GRE Liners. The sample was then cleaned of fiberglass residue and placed inside a metal container. The container was then placed inside the Differential Scanning Calorimeter.

The glass transition temperature (T_g) was found by measuring the heat required to change the temperature of the sample as opposed to the reference. During the cooling process there are sudden changes in the material's thermal expansion, heat capacity, and shear modulus and other physical properties that mark the (T_g) temperature which is independent of its past history and handling and indicates only material properties.

Once the cycle was completed the computer displayed the results. The resulting glass transition temperature is 165.2°C.

DSC



Graphical Data of the T

GRE TESTS

■ Hardness Test result (Shore D Hardness)

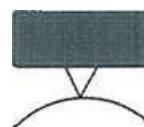
The test was performed by pressing down on samples cut from the tubes into 1/2" by 1/2" squares. The test was performed on such small samples to ensure the radius of curvature did not affect the hardness reading. Tests were performed by taking the Shore D Hardness Instrument and pressing down firmly into the samples with the samples facing the table at a concave downwards position. Readings were taken directly from the analog device.

Hardness Test

Test #	Sample#	Hardness
1	1	91
2	1	87
3	1	92
4	1	88
5	1	89
6	2	85
7	2	89
8	2	93
9	2	90
10	2	94

Average Value — 90

Testing sample concave downwards



Shore D Hardness Test Results

Performance Results

Overall, the results indicate a high level of quality for the tested GRE Liners. Below are the average values for the tests displayed in table form. A detailed description of the tests along with Their specific results follow

Liner Property Evaluation – Average Results

- Specific Gravity (mean value): 52.75 g/cm³
- Glass Content (average): 72%
- Compressive Load at Break (average): 95 N
- Strength at 5% Strain: 0.75 MPa at 21 N
- Glass Transition Temperature (Tg): 165.19 °C
- Shore D Hardness (mean value): 90
- Flexural Strength (average): 25 MPa

SPC Director

Prof.Dr. Ashraf EL-said

