Standard Operating Procedures

GlassBore® and *GlassLine*®
Premium Tubular Goods

Composite Lining Systems

Focus on Safety and Quality

CLS® COMPOSITE LINING SYSTEMS

Installing CLS Compression Rings in *Glass**Bore*®* GRE-Lined Tubing with Premium Connections

1. Check for the presence of the C-Ring in the coupling or box. Some connections will come with a C-Ring pre-installed. If C-Ring is not present, install the C-Ring into a clean coupling. ***Do not dope coupling before installing ring!***

2. Insert ring into the box. For connections with a ring groove cut into the box, a plastic ring insertion tool will be needed to place the C-ring into the groove. To do this place the ring into the box by hand, insert the smaller end of the ring insertion tool into the box and flat against the ring, lightly tap the insertion tool with a hammer until the C-ring "snaps" into place. The ring should sit flat and be firmly seated on the face of the flange inside the box.

3. Use a stabbing guide during the installation of all lined joints. Make up to normal torque value, then observe the connection to insure proper shoulder engagement. Use low tong speed when approaching shoulder engagement to avoid liner or C-ring damage.

4. The C-ring must be in compression AND the thread must be tightened to normal torque level for the system to protect the connection.

Running Procedures for *Glass**Bore*® GRE-Lined Tubing with Premium Connections

CL Systems recommends the presence of a CLS Service Technician whenever GlassBore internally lined tubing is to be run, pulled or repaired on location. The purpose of the CLS Technician is to advise proper handling procedures and to ensure proper installation and compression of the CLS Compression Rings. Proper makeup and C-Ring compression will significantly enhance the useful life of the lined tubing string. Composite Lining Systems does not recommend makeup torque. However, CLS advises that sufficient torque (recommended by the manufacturer) must be applied or the system may fail because the C-Ring does not provide pressure integrity to the connection. Composite Lining Systems would advise a customer to use normal torque specifications or refer to the manufacturer's suggested torque values when running GlassBore lined tubing. The following procedures are for Premium tubing connections:

1. Leave thread protectors in place until the moment the pipe is to be made up.

2. Always use a stabbing guide to protect the lining when running GlassBore line tubing.

3. Always place a backup tong on the coupling of T&C connections. If the coupling turns on the mill side, the connection should be taken apart to inspect for liner damage.

4. Verify the correct C-Ring has been installed, if one has not been installed use the C-Ring installation procedure for Premium Connections to insure the ring is installed correctly.

5. Do not apply thread compound to the box or coupling before installing the C-Ring. Generally, CLS recommends doping the pin only. If the box or coupling is to be doped, do so only after the C-Ring has been installed.

6. When using power tongs, make up in low speed when approaching shoulder engagement. High-speed makeup can damage the C-Ring or lining system.

7. Use normal company specified torque values or reference published torque guidelines for determination of make-up torque. Composite Lining Systems Service Technicians do not recommend torque for lined tubing. Make-up each connection to the same torque level and monitor the C-Ring compression by observing the shoulder engagement.

8. Compression of the C-Ring is required to achieve corrosion protection across the connection.

9. An Adaptor Ring and/or special C-Rings may be required when mating an unlined packer or tool joint to a joint of GlassBore tubing. Use the Operating Procedures for Adapting GlassBore to Unlined Accessories for Premium Connections to insure proper installation. CLS service Technicians are trained to accommodate such situations.

10. CLS recommends drifting each connection when running tubing down hole. After the connection is made up, lower the joint and set slips to access the top coupling or box. Lower the drift into the tubing on a rope until it reaches the connection that was just made up. If the drift does not pass through the connection, the C-Ring has over compressed into the ID and should be replaced. Always insure the drift rope length is sufficient to pass through the longest joint length. The recommended drift diameter is determined by the flange diameter in the coupling.

The table below specifies the liner, flange and drift diameters. The listed nominal drift tool diameter identifies the typical drift tool carried by the CLS Service Technicians. Alternate drift diameters may be specified.

Pipe Size and Weight Per Foot	Fiberglass Liner Inside Diameter	GRE Liner Nominal Thickness	Combined Pipe and Liner Weight	Nominal Drift Tool Diameter
2-3/8" 4.6 ppf	1.81"	0.040"	5.1 ppf	1.625"
2-7/8" 6.4 ppf	2.25"	0.040"	6.9 ppf	2.075"
3-1/2" 9.2 ppf	2.75"	0.045"	9.9 ppf	2.565"
4-1/2" 11.6 ppf	3.69"	0.060"	13.1 ppf	3.475"

Removing *GlassBore*® GRE-Lined Premium Connection Tubing

CL Systems recommends the presence of a CLS Service Technician whenever GlassBore lined tubing is to be run, pulled, or repaired on location. These general guidelines should be followed when removing and reinstalling Glass-Bore tubing:

1. Always place tong backups on the coupling on T&C tubing connections. The backup tong must grip sufficiently to prevent the coupling from turning on the mill side.

2. Install pin thread protectors on all pins prior to racking or standing back.

3. When standing back in the derrick, set pipe down gently to prevent damage to the lining and threads.

4. Lay tubing down on racks for inspection of threads and lining.

5. Remove all damaged C-Rings. Inspect pin and box threads for damage and corrosion. Inspect all liners and flanges for damage or obstruction.

6. Cleaning of lining and threads may be necessary for full visual inspection.

7. Re-dope all threads if the pipe is not to be re-run immediately to prevent corrosion.

8. Repair joints with damaged flanges.

9. Consult CLS facility prior to removing couplings for T&C joints because lining damage may occur. Removing the flange from the liner inside the coupling significantly reduces the risk of liner damage when removing the coupling.

Re-running *Glass**Bore***® GRE-Lined Premium Connection Tubing

1. Check to see that correct C-Rings are present.

2. Always use a stabbing guide.

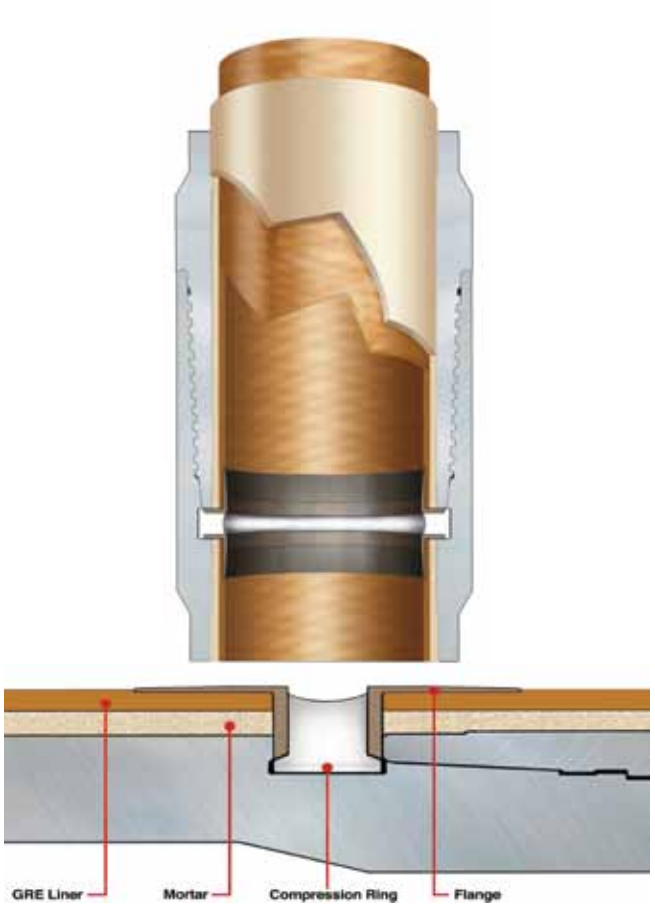
3. Always place tong backups on the couplings of T&C connections while tightening pipe.

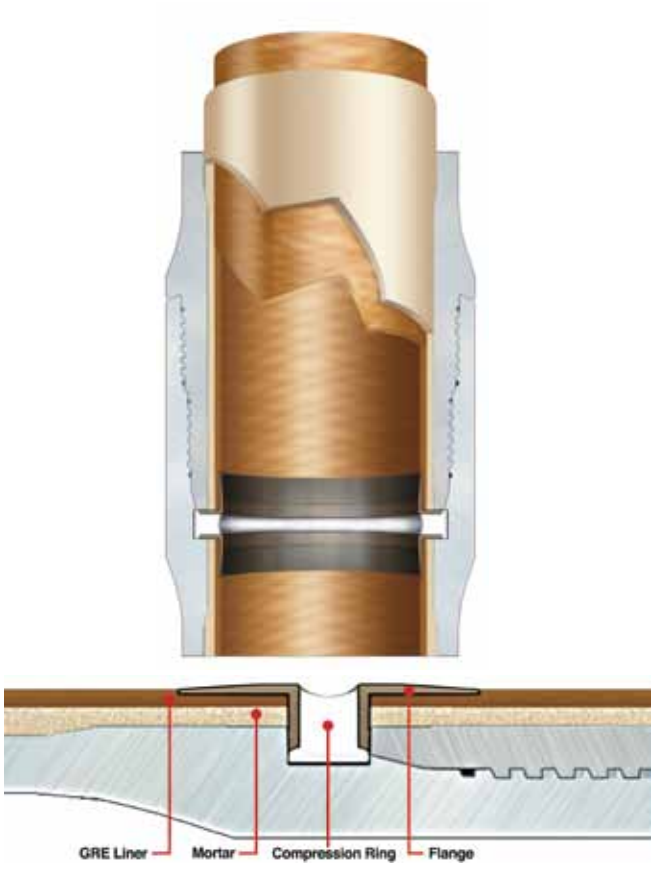
4. Drift each joint after make-up with proper drift size; ensure drift will extend through the connection.

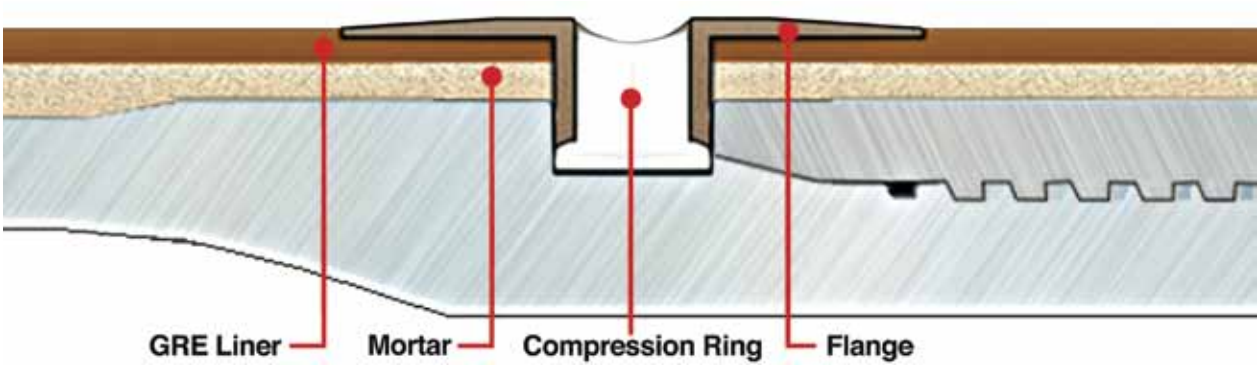
5. Use low tong speed when approaching shoulder engagement to avoid damage to the C-Ring and lining.

6. A CLS Service Technician on location is recommended.

Premium IJ *Glass**Bore***® Tubing with CLS Compression Ring







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
1.81	1.625	0.50	0.040”	2.25	2.075	0.50	0.040”	2.75	2.565	0.70	0.045”	3.69	3.475	1.50	0.060”

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COMPOSITE LINING SYSTEMS

GlassBore® GlassLine® GlassWrap® APPLIEDPLASTICS