Standard Operating Procedures

GlassBore® Premium Tubular Goods

Focus on Safety and Quality

CLS COMPOSITE LINING SYSTEMS

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Focal Points

- Focus on Safety
- Focus on Quality

Arrival on Production Rig Location

Inspection of Work Area

1. Arrive safely on client location.

- Park vehicle in accordance with CLS/client policy (observe orientation of vehicle, position with respect to guy wires, wind direction etc.).

2. Meet with rig personnel and conduct appropriate safety and orientation activities in accordance with CLS and client policy.

- Complete Safety Paperwork/Tailgate Safety Meetings and JSA documents.

3. When rig activity and personnel indicate that it is time to rig up CLS, gather equipment and proceed to rig floor.

- Inspect the work area for hazards and proceed with installation of running and handling tools once it is secure.

Placement of Running and Handling Equipment on Rig Floor

1. Communicate your purpose and requirements with Rig Operator and rig site personnel.

- Insure that a rabbit (a PVC tube of known diameter, for example) of appropriate weight and dimension is made available to the crew.

2. Hang sheave in a safe location (see detailed installation guidelines below) - use provided wire rope slings and hooks/shackle assemblies.

- Ask for help from the rig crew. Have the operator secure the sheave to a derrick leg or other rigid component of the structure where it will not interfere with block/elevators motion. Any winch line is an unsafe hanging point for the sheave.

3. Thread drift rope through sheave and insure that drift is secured to rope by application of steel wire and plastic tape.
4. Position yourself in a safe location and proceed with the installation in accordance with the quality guidelines in Section 2.
5. Upon completion of the installation, remove all material and equipment from the rig floor and safely return to your vehicle and then to the CLS facility.

- Maintain your work area and keep it clean and free from trip hazards.

Drift Equipment Description

Proper Drift Equipment consists of the following:

- Drift bar manufactured to accommodate an appropriate length of ½-inch sash cord. A steel loop welded to the drift bar is CLS minimum requirement. The drift bar should be carefully machined to the dimensions indicated in ***Table 1***. Drifting with a known diameter is very important because the selected drift dimension will be kept in the well file to determine future profile diameters, blanking plug diameters, wireline tools etc.
- Sheave should be rated for 550 pounds at a minimum and be constructed with a bearing-supported pulley and accommodation for an equally-rated shackle.
- Sling should be constructed of wire rope by an approved vendor and capable of supporting at least 950 pounds. The D-Ring should be equally rated.

Drift Equipment Installation and Usage

CLS recommends drifting each connection to insure against over-compressed C-Rings of other restrictions in the *GlassBore*® tubing string. Please use the following guidelines to rig up, operate and rig down the drift equipment:

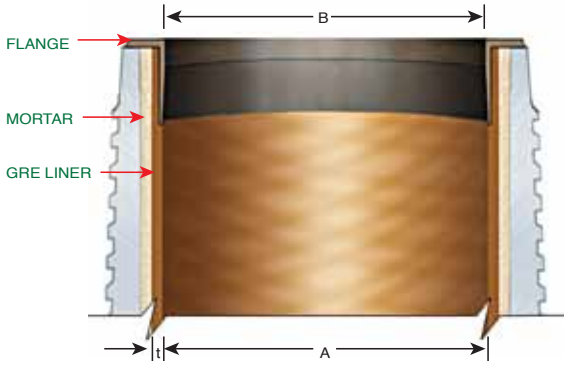
1. Secure sheave to derrick leg or other rigid location with wire rope sling/clevis hook. The derrick leg is the optimal choice but other secure locations may be approved including chain/wire rope assemblies secured in tension away from the rotary table.
2. Place C-Ring in collared end of the joint in the rotary table and place stabbing guide on top of the coupling.
3. Operator picks up and makes up the next joint or stand.

- Make sure that the rabbit has not been left in the tubing prior to makeup. NEVER physically inspect the tubing ID in the derrick by looking upward through the tubing.

4. Drift the connection.
   a. Rig operator opens slips and lowers string into the wellbore to next connection.
   b. Field Service Rep drifts the tubing by lowering the drift tool on the sash cord through the previous connection and then retrieving it.
5. Once the drift has passed through the new connection and is retrieved without interference the tool is set aside away from the rig activity and the rotary table. Repeat until the string is installed.

- Remove the sheave and all surface running and handling equipment and return to company vehicle prior to departure from location.

GlassBore® *Thread Profile and Dimension for Premium Connections*



		A	B	t	
Pipe Dia. (inches)	**Weight ppf**	**Liner ID**	**Flange ID**	**Wall Thickness**	**Drift (Premium)**
2-1/16	3.25	1.500	1.420	0.040	1.300
2-3/8	4.70	1.810	1.750	0.040	1.625
2-7/8	6.50	2.250	2.200	0.040	2.070
3-1/2	9.30	2.750	2.690	0.045	2.565
4-1/2	11.60	3.690	3.600	0.060	3.475
4-1/2	12.75	3.690	3.600	0.060	3.475
4-1/2	13.50	3.600	3.510	0.060	3.380
5	15.00	4.010	3.900	0.065	3.780
5	18.00	4.010	3.900	0.065	3.780
5-1/2	15.50	4.520	4.400	0.075	4.275
5-1/2	17.00	4.520	4.400	0.075	4.275
5-1/2	20.00	4.520	4.400	0.075	4.275
5-1/2	23.00	4.395	4.280	0.075	4.155
7	23.00	5.900	5.780	0.095	5.655
7	26.00	5.900	5.780	0.095	5.655
7	29.00	5.800	5.690	0.095	5.565
7	32.00	5.800	5.690	0.095	5.565

Table 1

Section 2
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.
- The C-ring must be in compression AND the thread must be tightened to normal torque level for the system to protect the connection.

Section 3
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 *Glass**Bore***® 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 *Glass**Bore***® 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 *Glass**Bore***® tubing. Use the Operating Procedures for Adapting *Glass**Bore***® 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 co pressed into the ID and should be replaced. Always insure the drift rope length is suff cient to pass through the longest joint length. The recommended drift diameter is determined by the flange diameter in the coupling.

Section 4
Removing *Glass**Bore***® 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.

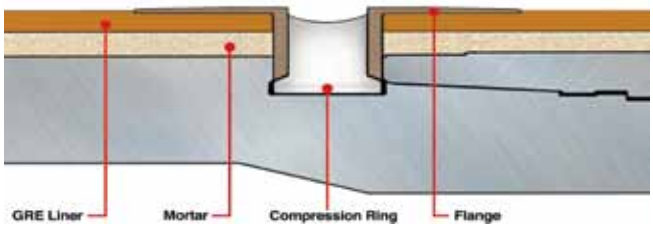
Section 5

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

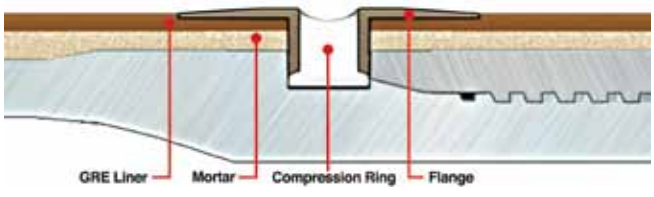
1. Check to see that correct C-Rings are present.
2. Always use a stabbing guide.
3. Always place tong backups on the couplings of T&C connections while tightening pipe.
4. Drift each joint after make-up with proper drift size; ensure drift will extend through the connection.
5. Use low tong speed when 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

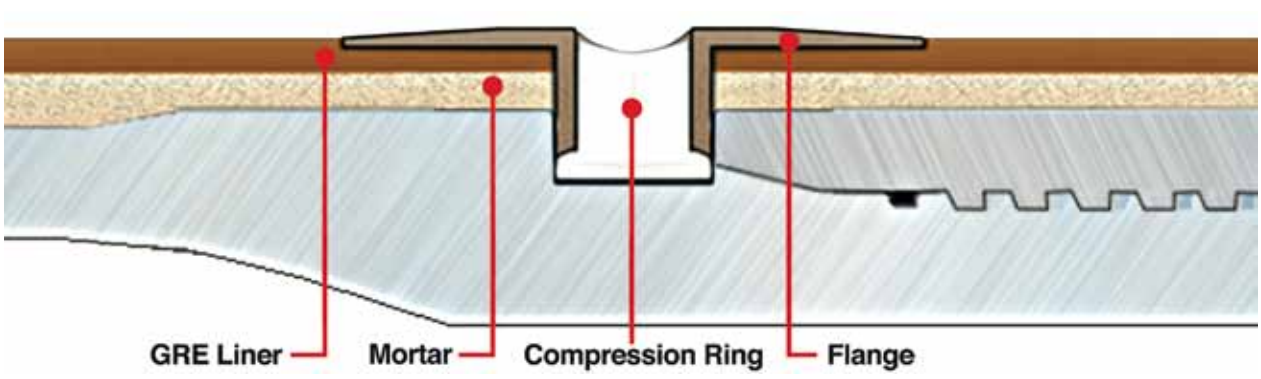
Integral Joint



Two Step Joint



Drawing 1 and 2



Drawing 3

HSE and Quality Issue Chain of Communication

In the event that a safety or quality issue is not being addressed on a Client location, *DO NOT HESITATE* to call the first person or people in the following chain of communication.

Safety

- If a medical emergency, contact 911 then proceed with the following:

All medical incidents call CLS Supervisor

CLS Supervisor to notify HSE Manager

CLS Supervisor to notify Client Operations Supervisor

HSE Manager to notify Client HSE Manager for Client reporting procedure

Quality

- Call CLS Supervisor

Call Client Operations Supervisor at request of CLS Supervisor only CLS Supervisor to notify Client Operations Supervisor in all cases

YOU HAVE THE RIGHT TO SHUT DOWN THE WELLSITE OPERATION FOR ALL SAFETY AND QUALITY CONSIDERATIONS. NOTIFY YOUR SUPERVISOR IMMEDIATELY.

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COMPOSITE LINING SYSTEMS

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*Glass**Bore**®* *Glass**Line**®* *Glass**Wrap**®*