

Featured Technical Topic Summary **FGI Monthly Members Meeting** **Friday, May 4, 2023**



TOPIC: Leak Testing of Mechanical Attachments & Pipe Boots

Each month Tim Stark introduces a new technical topic for discussion and possible action. This month's topic is: "Leak Testing of Mechanical Attachments & Pipe Boots". This topic generated significant discussion with the main "take-aways" being listed below:

1. Leak testing mechanical attachments and pipe boots is difficult and a common leak point (see **Figure 1**). This White Paper summarizes the responses to the testing of mechanical attachments and pipe boots during and after installation.

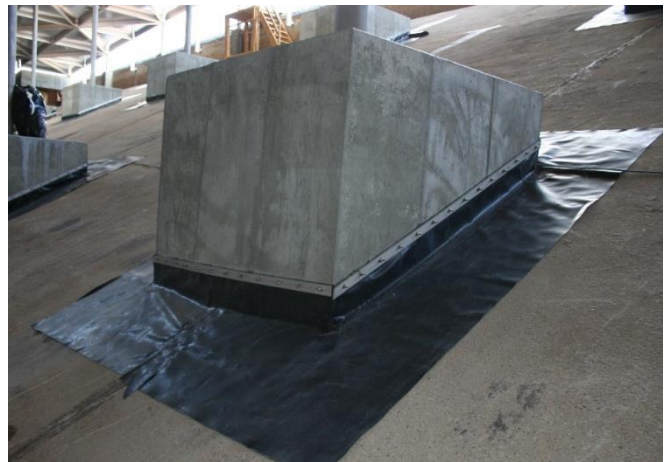


Figure 1. Photographs of mechanical attachments and pipe boot.

2. **Leak Testing Mechanical Attachments**
 - i. Cannot conduct electronic leak locate survey near metal attachments because of interference so need some other type of testing of attachments
 - ii. Place ballast tubes around penetration, inject air below geomembrane, soap the

- attachment, and watch for bubbles along or around attachment
- iii. Thermal imaging – not tried yet but possibly effective on sunny day to measure cooler air being pumped below geomembrane and exiting at leak(s) along attachment
- iv. Vacuum below the geomembrane in tank or attachment and listen for vacuum sound along attachment
- v. Vacuum Acoustic Leak Identification (VALID) method – apply vacuum between primary and secondary geomembranes and listen for vacuum sound along attachments; tests both geomembranes; the top surface of the geomembrane is scanned with ultrasonic microphones that can detect distinctive sounds of a vacuum leak.
- vi. Smoke Test – smoke exits at attachment surrounded by ballast tubes
- vii. Spark test with material embed but cannot be used at landfills and oil and gas sites
- viii. Vacuum boxes for strips and corners but limited because not straight segments for box
- ix. Dye test – divers places dye along attachment or concrete joint and see if dye disappears into attachment or crack (see video)

3. **Leak Testing Pipe Boots**

- i. Spark test with wire below pipe boot
- ii. Vertical pipe boot can be air lance tested
- iii. Pipe clamps can degrade and should be checked and/or replaced
- iv. Collar weld on Slope Pipe Boot is difficult and should be checked first – This is weld underneath or on downslope side of pipe
- v. Cannot use spark test in landfills and oil and gas sites
- vi. Try eliminating pipe boots in landfills
- vii. Apply vacuum under the pipe boot and listen for vacuum sound along attachment

4. **Preventive Measures**

- i. Coat entire attachment/connection with Fluid Applied Membrane (elastomer) – durable with time
- ii. Epoxy can be brittle so use something more flexible, i.e., Fluid Applied Membrane
- iii. Caulking around attachments may not be suitable because of freeze-thaw cycles and dirt can make caulk ineffective – less durable than Fluid Applied Membrane
- iv. Concrete or concrete joints can leak so the concrete must be tested possibly with the dye test

5. **Installation Details**

- i. Mechanical attachment and pipe boot details (see **Figure 2**) are available on the FGI website using the following QR code.



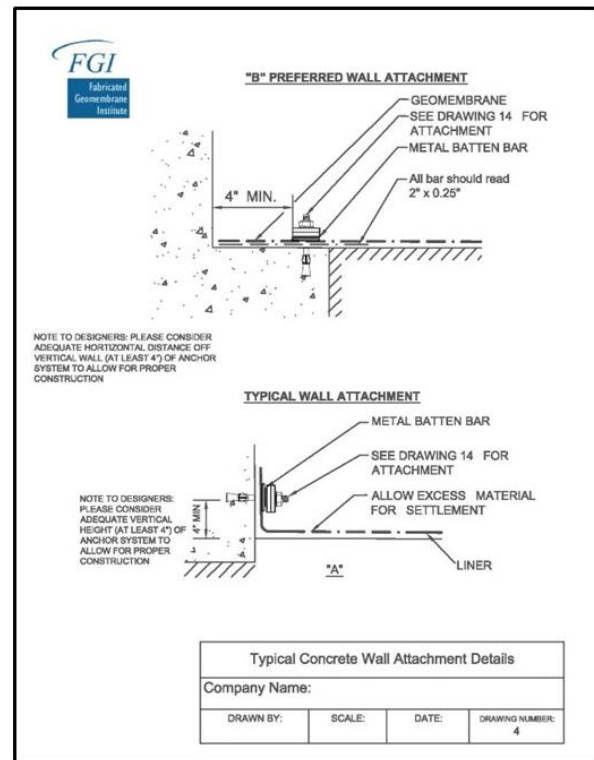
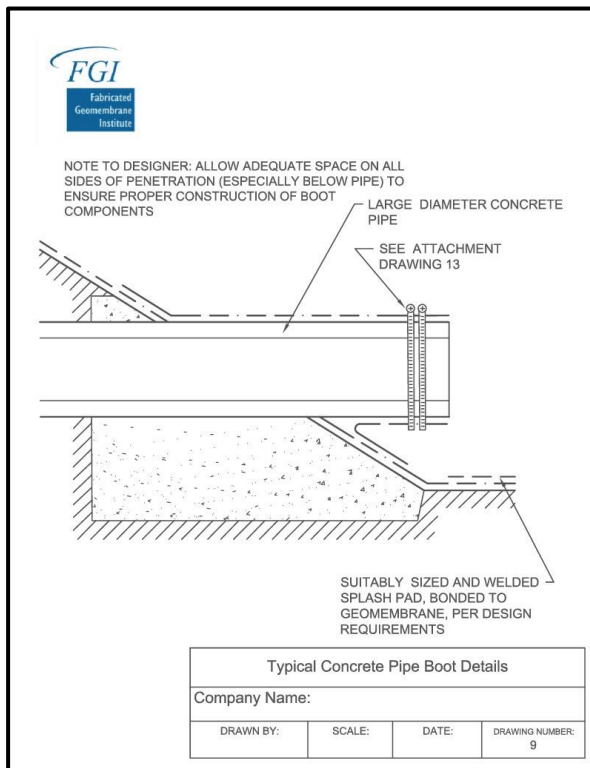


Figure 2. Sample pipe boot and wall attachment details available on FGI Website (www.fabricatedgeomembrane.com).