

## Technical Service Bulletin

October 2013 TSB 134.03

### Bubble Testing and Fiber Repair.

This Technical Service Bulletin provides information for locating compromised fibers within a HYDRAcap module, their isolation and repair.

#### General

#### Bubble Testing

Once a module has been determined to have a leak, from integrity testing (see TSB133), the module must be removed from the HYDRABLOC or rack to be bubble tested. Bubble testing is used to determine location of the leak(s). When the module is properly fitted with Hydranautics' bubble test apparatus (see Drawing M51181-G), it then becomes a matter of watching for bubble formation from the leak source. Continuous large bubble formation will be indicative of a compromised fiber. The following will be required to perform a bubble test:

- ◆ Hydranautics' bubble test apparatus.
  - ◆ Table, saw horses or other support structure.
  - ◆ Air hose with ¼" (NPT) male pipe thread.
  - ◆ Pressurized air (oil free) and pressure regulator set to 15 psi (1 bar).
  - ◆ Tools for removing HYDRAcap module end caps (see TSB136).
  - ◆ A water source to fill bubble test apparatus.
  - ◆ A flashlight is useful for viewing the fiber ends and locating specific leaks.
1. Drain water from HYDRABLOC or rack. Remove suspect module(s) and seal manifold piping connections with caps (not supplied).
  2. Disassemble module (see TSB136).
  3. The module should be supported horizontally at least three feet above ground for effective usage of the apparatus.
  4. Attach tension rod (PN: 11620.1000 for 40" module or 11620.0000 for 60" module) to product plug adapter (PN: 11611.1000).
  5. Insert rod through the module core tube such that O-rings of the product plug adapter engage into the core tube.
  6. Attach bubble test apparatus endcap encasements (PN: 11570.0000) to both module ends. Ensure that the Tygon tubing seals (PN: 11580.2000) are engaged.
  7. Tighten clamping knobs (PN: 11623.0000) to secure endcap encasements.
  8. Fill endcap encasements with water. Ensure that water fills the core tube and filtrate area of the module.

9. Connect product end adapter (PN: 11568.1000) to other end of tension rod. The O-rings of the product end adapter must engage into the core tube after tightening is completed (see figure 1.).

NOTE: All fibers should be completely immersed in water. Be aware that upon pressurization, this water will be pushed thru the fibers and will overflow the test apparatus.

10. Connect air source with female quick connection (provided with apparatus).
11. Slowly introduce pressurized air into the module. At this point, water should overflow the encasements. After all the water from the filtrate has been displaced by air, leaking fibers will then be evident by the presence of streaming bubbles.
12. Observe bubble formation on both sides of the module. Compromised fibers will show large continuous bubble formation. If the fiber damage is severe, extremely vigorous bubbling will obscure vision. If this occurs, reduce the pressure and proceed.  
NOTE: Small bubbles are common and a result of air diffusion through membrane pores. Diffusion rates are proportional to air pressure so initial bubble testing at lower pressure (i.e., 5 psi) may be beneficial.
13. If a compromised fiber is located, it must be “marked” by plugging it with a fiber repair pin (PN: 11612.0000).
14. Once all suspected leaking fibers have been “marked”, shut off air supply and bleed air from the module.
15. Loosen clamping knobs and disengage O-ring on endcap encasements such that the water is drained from the module.
16. Remove endcap encasements from the module.

### **Fiber Repair**

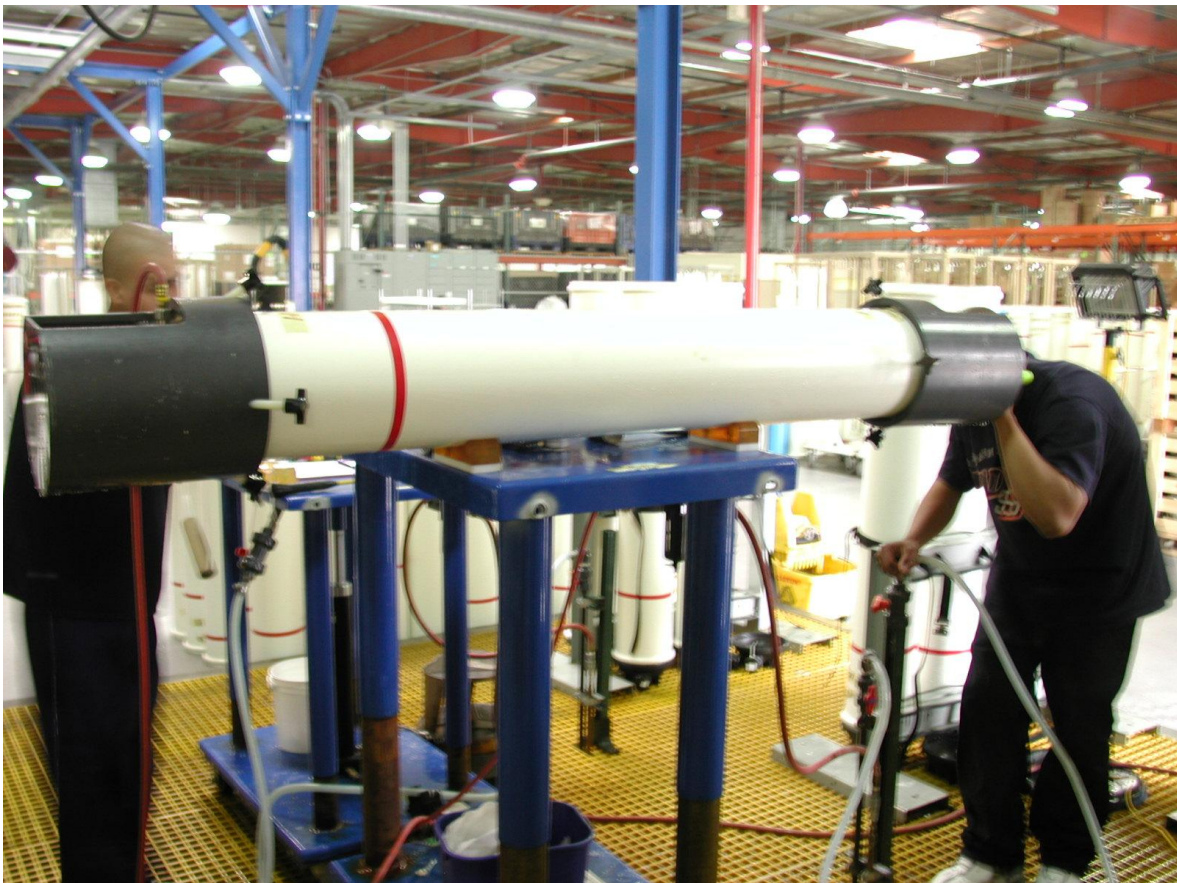
To restore integrity (“membrane barrier”) of the module, all leaking fibers should be isolated or rendered inactive by permanently plugging them with Hydranautics’ repair pins. The polysulfone pins are permanently bonded to the inside fiber wall by first applying Loctite 4061 adhesive to the pins and then pressing them into the leaking fiber. The following items are required for fiber repair:

- ◆ Hydranautics’ repair pins (PN: 11612.0000) – 6 pins per assembly
- ◆ Loctite cyanoacrylate 4061 adhesive.
- ◆ Utility knife or razor blade.

1. At this point the module should be depressurized, drained of all water and the “marker” repair pins should be inside suspect fibers. Apply the Loctite adhesive to a new pin, immediately remove a “marker” pin, and replace it with the new pin. Repeat as necessary.
2. The bonding of the pins should take no more than one minute. Carefully remove any residual length of pin with a utility knife or blade.
3. Repeat bubble test, with special care to check at low pressure 0.5psi and slowly up to 15psi to verify no leaks are present.
4. Reassemble module (see TSB136).
5. When all modules are completed, verify Integrity by performing an integrity test (see TSB133).



Encasement – end view



Bubble test apparatus – during bubble testing.



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