

### Integrity Testing for HYDRAcap® MAX Modules

This Technical Service Bulletin provides information for testing the integrity of the HYDRAcap® MAX modules. This applies to both conventional HYDRAcap® MAX racks as well as HYDRAcube skids.

#### Integrity Testing

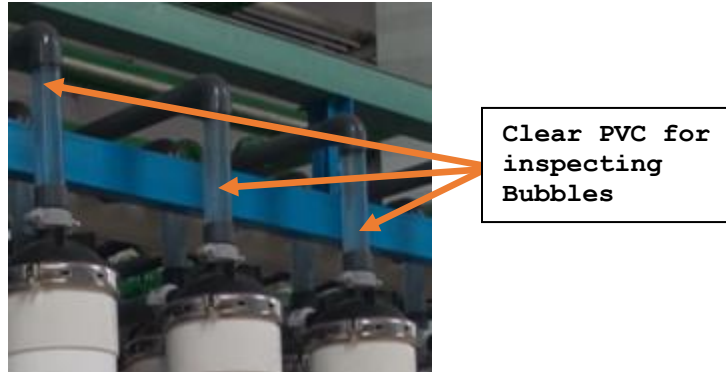
Occasionally, a HYDRAcap® MAX fiber may become damaged, resulting in a loss of integrity. The integrity test frequency and usage will vary with each application and site requirements. For example, many applications may only require an integrity test if a loss in performance has been detected, e.g. measured filtrate turbidity has increased significantly. In other applications, such as potable water, it may be required to perform the integrity test every day regardless of the filtrate turbidity. Please note site and application requirements to determine when an integrity test should be performed. The integrity test utilizes **oil free** air at 1 bar (15 psi) to identify HYDRAcap® MAX modules with broken fibers or other integrity breaches.

1. Shut down the rack to be tested and ensure feed and filtrate valves are closed.
2. Open the concentrate valve on the rack to atmospheric pressure.
3. Introduce oil free air at 1 bar (15 psi) to the filtrate header.
4. Purge water from inside of fibers by slowly pressurizing the filtrate header and allow air pressure to stabilize.
5. Once the filtrate header has stabilized at 1 bar (15 psi) of air pressure wait 1 minute before continuing.
6. If the filtrate header does not pressurize to the desired 1 bar (15 psi), it may be necessary to inspect the rack for air leaks (see steps 9 to 11).
7. Close air supply valve and ensure concentrate valve remains open.
8. Monitor and record the pressure decay of the filtrate header after 5 minutes. The pressure decay should be used as a tool to help determine if there is a breach. In general, a pressure decay rate exceeding 5 psi/5 min indicates an integrity failure. For drinking water applications, the acceptable pressure decay will vary depending on local regulations. If a broken fiber is suspected, a visual inspection

of the decay will be required (see steps 9 to 11). If pressure decay is acceptable, proceed to step 12.

**NOTE: The maximum pressurized air exposure limit is 15 minutes. DO NOT EXCEED THIS TIME LIMIT.**

9. **HYDRAcap® MAX:** To identify the module(s) with the broken fiber(s):
  - a. Repeat the test (make sure to rewet fiber as stated in step 11 if necessary) while visually inspecting the clear piece of concentrate piping leaving each module on the concentrate port side.



***Figure 1: Clear PVC pipe for inspection during bubble testing.***

- b. Identify any modules that have intense bubbling in the clear pipe.
  - c. If intense bubbling is observed in one of the HYDRAcap® MAX modules, it may have one or more damaged fiber(s).
10. **HYDRAcube:** To identify the module(s) with the broken fiber(s):
  - a. Repeat the test (make sure to rewet fiber as stated in step 11 if necessary) and listen to each module to hear for bubbling. Depending on the location of the module, it may be necessary to use a listening device such as a stethoscope to inspect each module. It is recommended to obtain an electronic stethoscope such as the Littmann 3100 or 3200 to amplify the sound.



**Figure 2:** *Littman 3100 or 3200 example*

- b. Place the stethoscope on the PVC shell and move the stethoscope to different locations on the module.



**Figure 3:** *Stethoscope locations to check for bubbles.*

- c. Listen for intense bubbling. Please contact a Hydranautics representative for sound bites of an intact module vs. a module with integrity failure.
- d. If intense bubbling is heard in one of the HYDRAcap<sup>®</sup> MAX modules, it may have one or more damaged fiber(s).

**NOTE: Intermittent bubbling or light bubbling is normal due to air diffusion through the membrane. Only sharp differences in air flow between two neighboring modules will expose a leaking module.**

11. Mark any leaking modules for subsequent repair while air pressure is still applied to the inside of the fiber.
12. After the 5 minutes pressure hold test period, conduct an air scour for 60 – 90 sec. Then, perform an air scour and drain the system until the solution is completely evacuated on all modules whether they have passed or failed the Integrity Test.
13. Once air scour and drain is completed, relieve air pressure by opening the filtrate purge valve or filtrate line.
14. If there is a module or modules that need repair, remove and repair module(s) with broken fibers at this time. (See TSB 334 for repair instructions).
15. Once repairs have been completed, reconnect the module(s) to the rack manifold. (See TSB 332 for HYDRAcap® MAX installation or TSB 352 for HYDRAcube installation).
16. Refill modules by opening feed, filtrate, and concentrate valves and slowly ramp up the pump to remove trapped air from the rack.

**NOTE: There should also be an air purge valve on the filtrate line. Air release valves at the top of the filtrate manifold may be required to remove any remaining trapped air and prevent water hammer.**

17. Repeat the integrity test (Steps 1 – 8) to confirm the integrity if a module was repaired.
18. Once the integrity is confirmed, the rack is now ready for processing.

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