

## Technical Service Bulletin

December 2023 TSB333.09

### Integrity Testing for HYDRAcap™ MAX Modules and Elements

This Technical Service Bulletin provides information for testing the integrity of the HYDRAcap™ MAX modules and elements. This applies to both HYDRAcapMAX™ modules (either with a conventional rack or using HYDRAcube skids) as well as elements used in pressure vessels.

#### Integrity Testing

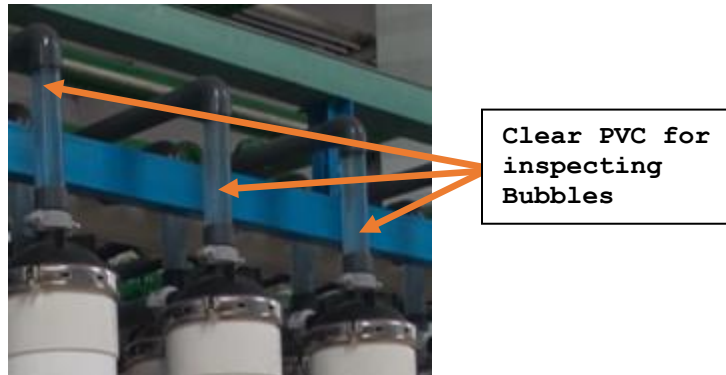
Occasionally, a HYDRAcap™ MAX fiber may become damaged, resulting in a loss of integrity. The integrity test frequency and usage will vary with each application and site requirements. For example, many applications may only require an integrity test if a loss in performance has been detected, e.g. measured 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) plus back pressure to identify HYDRAcap™ MAX modules or elements 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) plus back pressure 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 required air pressure noted in step 3 wait 1 to 2 minutes before continuing to allow all water to be purged from inside the filtrate side of the fibers.
6. If the filtrate header does not pressurize to the desired pressure, 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, further inspection

of the decay will be required (see steps 9 to 11 as appropriate). 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 modules:** 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 or HYDRAcap™ MAX elements:** To identify the module(s) or element(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. For elements housed in pressure vessels and HYDRAcube modules where access is restricted, it will be necessary to use a listening device such as a stethoscope to inspect each module or pressure vessel. 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 on HYDRAcube module.**

- c. Listen for intense bubbling. Please contact a Hydranautics representative for sound bites of an intact module/element vs. a module/element with integrity failure.
- d. If intense bubbling is heard in one of the HYDRAcap™ MAX modules or elements, 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 or element.**

11. Mark any leaking modules/vessels 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/vessels 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). In the case of the element design, each compromised element will need to be removed from its pressure vessel.
15. Once repairs have been completed, reconnect the module(s) or reload the element(s) in the rack manifold. (See TSB 332 for HYDRAcap™ MAX installation, TSB 352 for HYDRAcube installation or TSB 346 for the HYDRAcap™ MAX element).
16. Refill modules or pressure vessels 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 or element was repaired.
18. Once the integrity is confirmed, the rack is now ready for processing.

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