



FILMTEC Membranes

Troubleshooting: Membrane Element Evaluation

Vacuum Decay Test

A FILMTEC™ element with a high salt passage should first be checked if leaks are present with feed/concentrate water leaking into the permeate side of the element. Leaks may occur through damage of the membrane surface itself by punctures or scratches or by delamination and physical damage of the membrane by e.g. permeate backpressure or water hammer. The vacuum decay test as described in the following may be used to detect leaks or to confirm the mechanical integrity of a FILMTEC element. The method is based on ASTM Standards D3923 [/2/](#) and D6908 [/3/](#).

The vacuum decay test is a tool to detect leaks or to confirm the integrity of FILMTEC RO and NF elements after they have been in operation. It can be applied to a single element or to a complete pressure vessel containing several elements. Before testing, the element has to be drained from water present in the feed channels and in the permeate leaves. The pressure vessel to be tested must not contain any water. The permeate tube of the element is evacuated and isolated. The rate of the vacuum decay indicates mechanical integrity or a leak of the membrane element. A mechanically intact element and also a chemically damaged membrane would still hold the vacuum, but a mechanically damaged membrane would not.

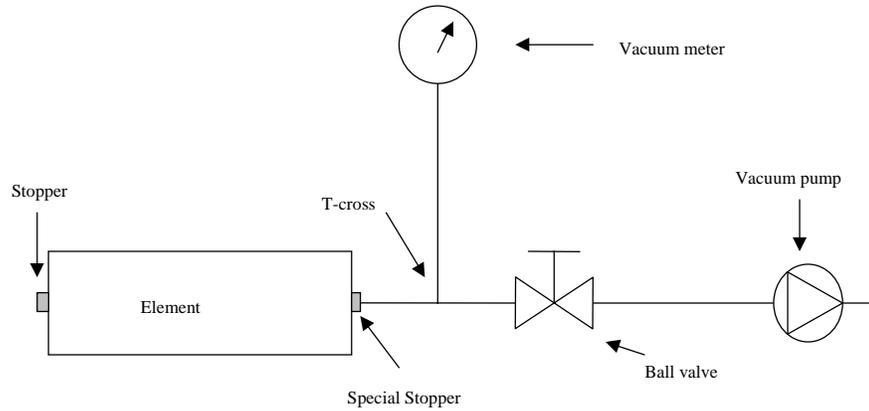
This test is useful as a screening procedure and is not intended as a mean of absolute verification of a leak. However, the test allows identifying leaking elements or O-rings within a short time. It also helps to distinguish between chemical membrane damage (which would not show up as a leak) and mechanical membrane damage. The test can be applied in the field to test a large number of elements when a single element test unit is not available, or if not enough time is available for performance testing.

The procedure is as follows (see Figure 8.3):

- a. Drain the element.
- b. Seal one end of the permeate tube with a suitable leak-tight cap.
- c. Connect the other end of the permeate tube to a vacuum gauge and a valved vacuum source.
- d. Evacuate the element to 100-300 mbar absolute pressure.
- e. Close the isolation valve and observe the reading on the vacuum gauge. Note the rate at which the vacuum decays. A rapid decay (greater than 100 mbar pressure increase per minute) will indicate the presence of a leak.
- f. Slowly release the vacuum and allow the element to reach atmospheric pressure before disconnecting.
- g. The test should be repeated several times to confirm it's reproducibility.

Testing a complete pressure vessel allows including the couplers and adaptors into the leak test. The procedure is the same as described with the difference that the permeate port at one side of the vessel is closed, and the vacuum is pulled from the permeate port of the other side. Feed and concentrate ports may be open.

Figure 8.3 Vacuum decay test



FILMTEC Membranes
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