MEMSEP FILTRATION Ltd.

Laboratory Technical Procedure

Water Intrusion Test of MEMFLO PTFE Filter Cartridges

Introduction

The water based, Water Intrusion Test measures the Pressure decay over a fixed Time period and converted by the Auto tester to an averaged calculated Flow value in correlation to the measured Hardware Volume. This Flow measured on the upstream side is directly related to the Volume transfer [small but continuous volume change over a fixed time period] across the membrane because of the evaporation of water within the membrane and vapour-phase transfer through the membrane.

The Water Intrusion Test is a highly sensitive, non-alcohol based, water flow integrity test, this LTP applies to MEMFLO PTFE hydrophobic filter Cartridges with end connections such as **Code-7, 222, Double open end** are tested as per below described Test procedure. This Test overcomes the limitations associated with contamination of filters due to below factors -

- Suitable for *in-situ* testing.
- No alcohol based fluids used, therefore no flammability and contamination concerns.
- Suitable for testing sterilising systems.
- Drying of filter is not required normally.

Working Procedure

✓ **Measurement of Hardware Volume**

- The volume between the top end of the Filter Cartridge after Filter installation and the top end of the Shell of Test Filter housing is termed as Hardware Volume.
- Hardware volume is calculated either manually by measuring the volume between the two defined points using measuring beaker or by using a Pressure Sensor along with weighing balance to indicate the upstream flow of volume inside the filter housing.
- This volume is required by the system so as to correlate it with the Test values and obtain the Water Flow rate result for the Filter element area only by reducing the other volume.
- This volume vary with respect to the Filter to be tested and the Test filter housing to be used for the Testing purpose, So Hardware volume is to be measured every time for precise results .This is due to the manufacturing defaults which may cause few deformations in the shape and design of Filters as well as Filter Housings.

✓ **Determination of Water Flow Rate of Filter Cartridge**

a) Ready a Pressure vessel filled with RO / DI water to be used for the Integrity purpose.

b) Fix the Filter cartridge inside the filter housing and tight the housing Clamp.

c) Connect the pressure sensor on the top of the filter housing and interconnect it to Pressure sensor connector on Filter Integrity Tester.

d) Also connect the filling valve to the inlet of filter housing and interconnect it to filling valve connector on Filter integrity tester.

e) Connect filling valve PU tubing to the outlet of pressure vessel filled with RO / DI water.

f) Interconnect inlet of pressure vessel filled with RO / DI water to the pressure outlet on Filter integrity tester using PU tube.

g) Ensure that the outlet of filter housing is open to the atmosphere.

h) Connect the power supply charger to the back side of Filter integrity tester.

i) Start the tester with "**ON**" button.

j) Select the Block No. in which the specified Test program is pre-created.

k) Then select the Program No. in which program is stored and press "ENTER".

l) Enter filter details using IR- keyboard in programme and press "ENTER".

m) Start the compressed air and take pressure between 6 to 8 bars [Max. operational pressure required by the Tester].

n) As **"Ready to start"** appears on the display of Tester Press **"START"** button.

o) The tester will automatically do the test and printed result will come out.

p) On completion of Test disconnect the air line and dismantle the assembly, leave the filling valve connected so as to remove the water from the housing.

q) As soon as the whole water drains out of the housing, disconnect the filling valve and place it back to the Filter integrity tester.

r) Perform the drying of Filter Cartridge using compressed air at ambient Temperature for about 15-30 minutes to remove the excess water if any trapped inside the Filter pleats.

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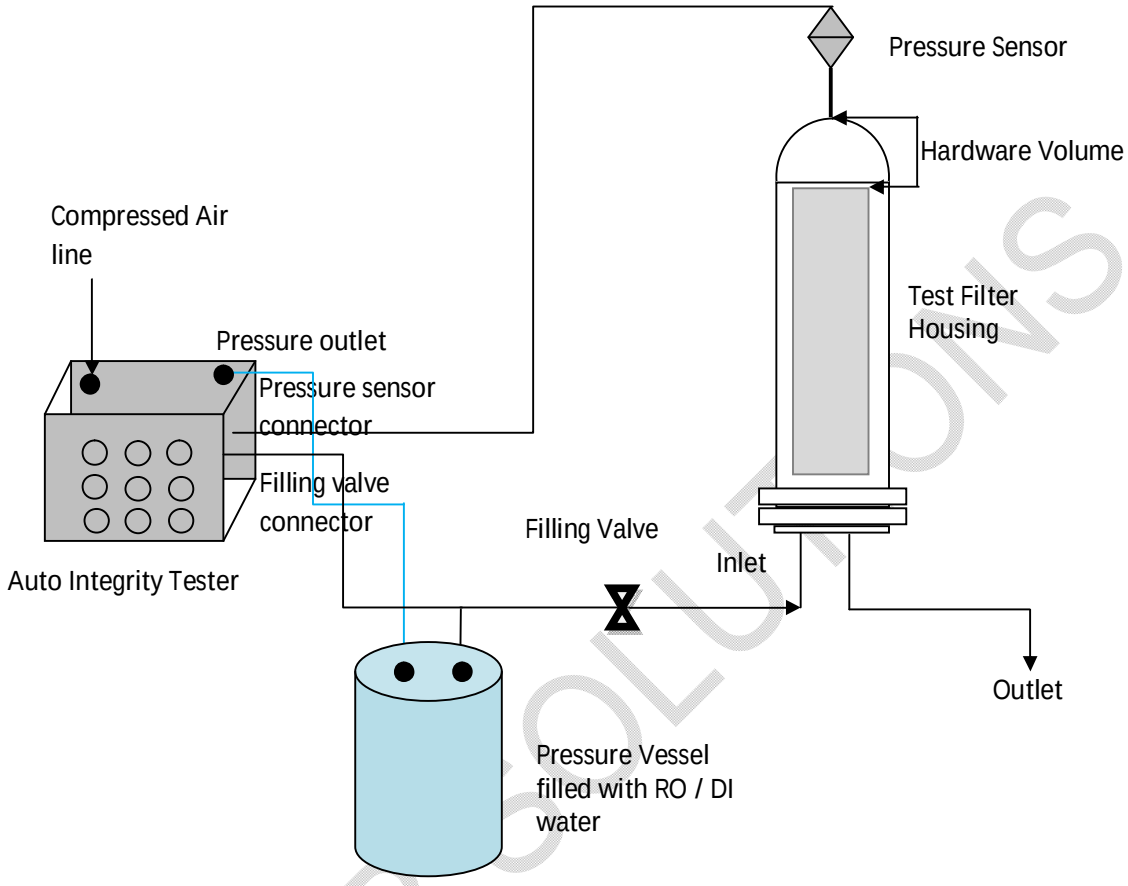
Water Intrusion Test Assembly



Key points to remember

- Contaminants arrested by the filter can potentially reduce the hydrophobicity of the membrane. These include antifoams from fermentors broth, chemical additives used and rust from corroded pipes.
- The purity of the water used for Test purpose is important if consistent results are to be achieved as increased conductivity or ionic concentration of water will result in increased water flow rates. Hence it is recommended that RO or DI water be used. Untreated tap water should be avoided.
- The filter cartridge must be completely dry before testing commences. Any residual water within the pore structure of the membrane will result in a higher water flow value.

- It is a highly sensitive Test which requires measurement of Hardware volume each time before proceeding for Water Intrusion Test as variation in Hardware volume can affect the calculated Flow rate as well as Pressure drop values of the Test.

- Increase in Test Temperature or Test Fluid Temperature will cause increase in rate of evaporation which may result in Test Failure or High water Flow rate values.

- Any leakage from seal material may result in test failure.

- Once the hydrophobic membrane is wetted using low surface tension fluid it turns into hydrophilic nature. To convert it again into hydrophobic it is necessary to break the bond formed by the intermolecular attraction between the solid surface of membrane and the wetting fluid.

Failure Investigation Procedure for Filter Cartridge

- *Improper installation of "O" ring*- Do the physical verification of "O" ring to check the size for proper fitting and for any cuts and then Re-install it.

- *Leakage in Filter System*- Check the leakage in filter system, Staubli connectors, filter housing and PU tubes through Hydro Test or use soap solution at the connection sites.

- *Puncture in membrane*- Check for integrity of cartridge filter through Reverse Bubble Test. If Filter cartridge is found ok in test and no physical leakage or damage observed means that cartridge is integral and if not found ok in test proceed to next step.

- *Pre-wet Filter surface- If the Filter membrane is kept in contact with any wetting fluid which wets the surface of membrane and turns out it's nature to hydrophilic from hydrophobic, then the filter will allow water to flow through it causing Test failure.*

- *Check for Integrity Parameters*- Increase in Test Temperature or Test Fluid Temperature will cause increase in rate of evaporation which may result in Test Failure or High water Flow rate values.