MEMSEP FILTRATION Ltd.

Laboratory Technical Procedure

Bubble Point Test of MEMFLO Filter Cartridges

Introduction

Bubble Point Test is a non-destructive integrity test for membrane filters, generally used to identify the presumed pore rating of a membrane. Bubble Point Test as stated in this LTP applies to MEMFLO filter cartridges with end connections such as **Code-7, 222, Double Open end** [i.e. Hydrophobic filters are wetted with IPA-water solution prepared using 60% isopropyl alcohol (IPA) and 40% RO/DI water while hydrophilic filters are wetted with water alone].

- Represents the force necessary to break the bond of the intermolecular attractions that characterize the wetting of the filters solid surface by the liquid.
- All types of membranes from small disc to cartridge can be tested.
- There is always a diffusion of air before the bubble point test is initialised.
- Bubble point identifies the largest pores present in the membrane by the differential pressure required to expel out the wetting fluid from the filter.

Working Procedure

✓ **Bubble Point Pressure measurement of the Filter Cartridge**

a) Prepare wetting solution i.e. for hydrophobic filters use 60% IPA [Isopropyl alcohol] and 40% RO/DI water while for hydrophilic filters use water alone. Pre-wet the filter cartridge as per wetting procedure either manual or using “it-Flush” wetting assembly.

b) After wetting of filter cartridge fix the filter cartridge inside the filter housing and tight the housing Clamp.

c) Close the Inlet of the filter housing.

d) Connect the pressure sensor on the top of the filter housing interconnect it to Pressure sensor connector on Filter integrity tester.

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

f) Ensure that the outlet of the filter housing is open in a beaker so as to store the excess fluid expelled out by the test pressure applied on the filter.

g) Interconnect the compressed air line to pressure regulator and then to pressure inlet on Filter integrity tester through PU tube.

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].

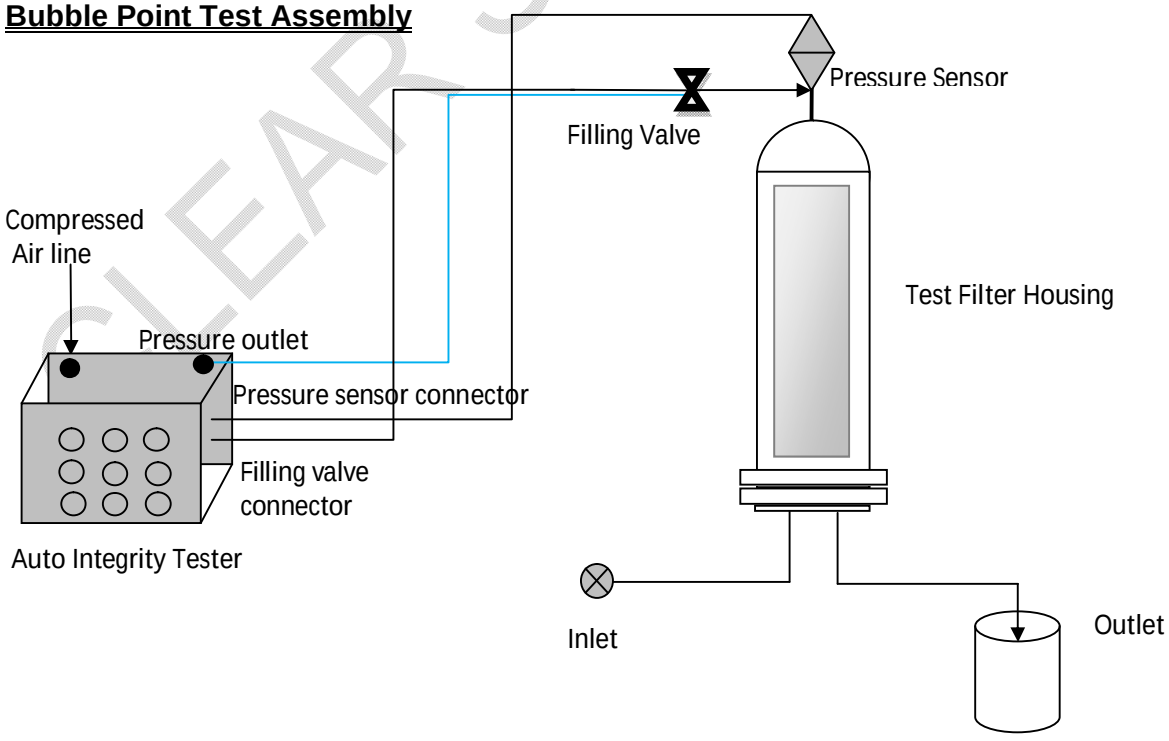
n) As **"Ready to start"** appears on the display of Tester Press **"START"** button.

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, put the pressure sensor and filling valve back to the tester.

q) Perform oven drying of Filter Cartridge at ambient Temperature for about 15-30 minutes to remove the excess wetting fluid from the surface of filter

Bubble Point Test Assembly



Key points to remember

- Ensure that the filter is thoroughly and uniformly wet as per wetting procedure. Any dry pores in the membrane will result in test failure.
- Contamination of the filter should be avoided as it can adversely affect the wetting of the membrane thus resulting in a false failure.
- Failure to wet the filter may result in premature air flow resulting in false failure. Rewet the filter and run the test again.
- Variation in temperature and leakage from seal material may result in test failure.
- Test parameters may vary by change in wetting fluid due to change in surface tension of the liquids.
- There is always a diffusion of air before the bubble point test, this pre-mature air flow should not be assumed as bubble flow observation while performing manual test.

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.
- *Improper wetting of Filter Cartridge*- Refer Standard Wetting procedure either manual or using "it-Flush" wetting assembly to attain proper wetting of filter cartridge and retest the filter.
- *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.
- *Check for Integrity of cartridge filter*- Check for any puncture or damage in filter membrane following standard protocol for Diffusion test/forward flow test. If Filter cartridge is found ok in test means that cartridge is integral and if not found ok in test denoting high flow rate then the membrane is damaged and Filter need to be replaced.