SPECIFICATION NOTE

SPI Supplies
206 Garfield Avenue,
West Chester, PA 19380, USA

SPI-Pore™ Silver Membrane Media

Physical Properties

Coefficient of thermal expansion per °C	18.8 x 10^{-6}
Resistivity at 20° C (Ω·cm)	1.59
Specific Heat at 20° C (Cal/g)	0.558
Thickness (µm)	50

Retention and Flow Rates

Pore Size[1] (µm)	Water Flow Rate[2] (mL/min/cm2)	Air Flow Rate[3] (L/min/cm2)	Bubble point[4](psi)	Operating Temperature[5] (°C/°F)
5.0	870	5.2	2	427/800
3.0	690	2.9	3	427/800
1.2	460	2.0	5	204/400
0.8	340	1.4	7	204/400
0.45	40	0.67	9	204/400
0.2	17	0.35	13	204/400

(1) Absolute retention; measured by bubble point pressure.
(2) Water flow rates are initial flow rates in mL/min/cm2 using prefiltered water at 10 psi differential pressure.
(3) Air flow rates initial flow rates in liters/min/cu2 using prefiltered air at 10 psi differential pressure.
(4) Bubble point values are for alcohol.
(5) SPI Silver Membrane filters provide excellent filtration performance at temperatures up to 550° C /1022° F.

Chemical and Thermal Properties

SPI Silver membrane filters have the chemical inertness and high thermal stability of pure silver. They are resistant to alcohols, fuels and hydrocarbons, natural and synthetic oils, alkalis, cryogenics, photoresists,

ether, propellants, oxidizers, halogenated hydrocarbons, esters, and most organics and acids. Under normal conditions, the silver membrane is attacked only by cyanide solutions and nitric and sulfuric acids.

The SPI membranes provide excellent filtration performance at temperatures from cryogenic up to 1022° F (550° C). They may be repeatedly autoclaved and can be sterilized with steam or hot air.

High Strength

In the manufacturing of the SPI silver membrane filters, the size and orientation of the silver particles are closely controlled and uniformly deposited in sheet form. The points of contact between the silver particles are then molecularly bonded into a homogeneous material that resists pore collapse even under conditions of high temperature and pressure. They can be used in low-intensity ultrasonic baths with no loss of integrity.

Absolute Retention

Careful control of the manufacturing process yields unusually precise pore size and uniformity. Performance tests indicate that absolute particle retention is achieved as the result of simple mechanical sieving by the filter structure. Thus, particle retention by the silver membrane is independent of random electrostatic charges or other extraneous, unpredictable molecular forces.

The surface of the silver membrane is flat and smooth, allowing surface capture. There is minimal background interference from the silver when using x-ray diffraction.

No Fiber Release - No Media Migration

Conventional tortuous pore membranes and other filters often shed fibers or parts of the filter material itself. With changing conditions of flow and pressure drop, pores may change in size allowing previously-filtered contaminants to migrate through the filter medium and to contaminate the filtrate. In the case of the silver membranes there are no fibers, and because the silver membrane is a strong, uniform, porous, monolithic structure where the silver particles are molecularly bonded to each other, there is no media migration.

Non-Absorptive and Non-Adsorptive

Many conventional membranes will absorb or adsorb constituents out of a solution and thereby alter analytical results. This is avoided with silver membranes due to the chemical resistance and intertness of pure silver and smoothness of the interstices within the membrane. Absorption and adsorption by silver membranes is virtually nonexistent.

Minimum Fluid Holdup

The thinness, characteristic non-adsorption and non-absorption and the smoothness of the interstices of the SPI Silver Membrane filters means retention of an insignificant quantity of filtrate.

Intrinsic Bacteriostatic Nature

The intrinsic bacteriostatic property of silver does not allow the growth of bacteria and other microorganisms.

Shelf Life

The shelf life of the SPI Silver Membrane filters is indefinite when they are kept in sealed packages. However, since the silver membrane is pure silver, it can become tarnished when exposed to some chemicals in the air. This is a cosmetic imperfection and the filtration properties are not affected in any way.

The most common tarnishing compounds will cause the membrane to turn black in the case of Ag2S, and dark brown in the case of AgCl. AgCl is simple to remove, requiring only a rinse with an ammonia solution. Ag2S is very stable, and is difficult to remove from the membrane without altering the structure. This it is important that the SPI Silver Membrane filters be kept in a sealed package as long as possible prior to use.

For really long term storage of the packages, after opening, we would recommend storage in some kind of an inexpensive vacuum desiccator cabinet.

The compounds formed on the SPI Silver Membrane filters with time should not be confused with the natural grayish-white appearance of the silver membrane filter surface. This appearance is due to the microporous structure of the membrane, which reflects light in a way that differs from polished silver.

Revised by: Junhang Luo

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