TSM Filter Cartridges

The TSM cartridge is a durable and versatile pleated media cartridge offering the ultimate in submicron filtration. Long life, high flow rates and excellent particle retention makes the TSM cartridge an excellent choice for either final filtration or as a prefilter to membrane filters.

Charge modification enhances the particle removal efficiency of the nominally rated TSM filter. Contaminants too small to be mechanically strained are electrokinetically adsorbed by the TSM media. Because it is a depth filter, the tortuous matrix allows for high contaminant loading capabilities.

Zetapor TSM filter cartridges are available in two grades, 050TG and 100TG with particle retention ratings of 0.5 µm and 1.0 µm respectively based upon their mechanical straining efficiencies. Typical air and water flow rates of the 050TG and 100TG are on page 2.

Applications

The TSM cartridge can be applied to many filtration applications. It can be used to solve numerous fluid contamination problems. Below is a partial listing of typical applications.

Beverages
- Yeast removal and clarification of wine, final polishing of distilled spirits.

Food Processing
- Catalyst and microbial removal, polishing filter prior to bottling.

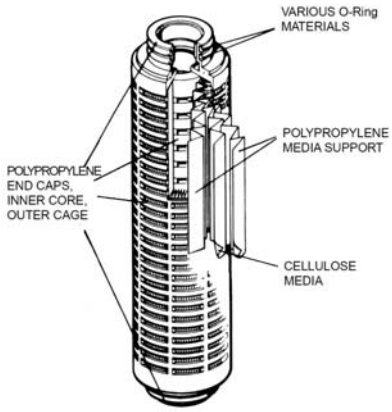
Cosmetics
- Perfumes and aftershave lotions, assuring stability and shelf life through removal of colloidal haze and bacteria.

Pharmaceutical
- Membrane prefiltration and clarification, make-up water, and prefiltration of many parenteral products.

Chemical
- Catalyst removal, photographic solutions and magnetic tape coatings filtration.

Air and Gas
- Air filtration and particle contamination removal from various gases.

Fluid Power
- Hydraulic fluids



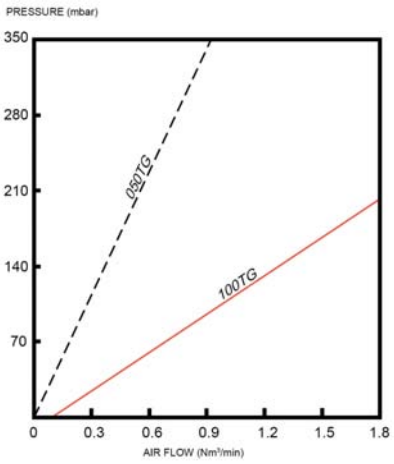
Cartridge Construction

The TSM cartridge is constructed with a pleated media composed of cellulose and inorganic filter aids completely free of asbestos or glass microfibers. Cartridges core, case, end caps and media support mesh materials are polypropylene made.

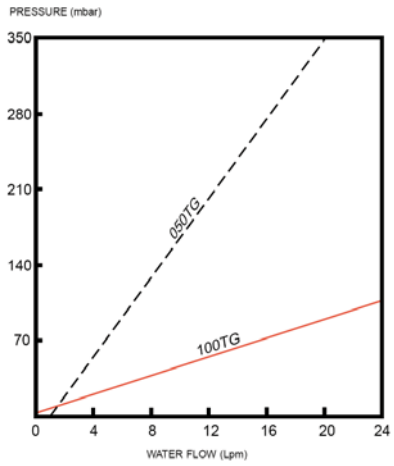
Multiple cartridge lengths of various end cap styles are produced by thermal bonding to eliminate the need for adapters. No adhesives are used in the cartridge assembly process. All materials used are FDA listed in the CFR 21 for food contact.

Operating Conditions	
Maximum Continuous Operating Temperature :	85°C
Maximum Operating Differential Pressure :	3,5 bar @ 25 °C
Sterilisation :	autoclaving (121 °C, 30 min.)
	in line steaming (126 °C, 30 min.)
	chemical sterilisation
Rinsing :	30 litres/10" cartridge

Air Flow Rate TSM 050TG and 100TG Cartridges



Water Flow Rate TSM 050TG and 100TG Cartridges



Extractables

Inorganic and organic extractable levels for TSM cartridges are tabulated below. Cartridges were rinsed with 30 litres of deionized water and samples collected. Inorganic levels were determined by graphite furnace atomic absorption techniques and wet chemical analysis. Organic extractables were quantified by a low temperature carbon analyzer.

Inorganics	
Extractable levels	Substance
<1 ppb	Ca, Fe, Cr, Mn, Zn, Co, Al
<10 ppb	K, Ni, P04, NO3, F
<50 ppb	Si, Cu
<100 ppb	S04, HCO3
<500 ppb	Cl, Na
Organics	
Total Carbon and Total Organic Carbon	< 1.6 ppm
Purgeable Organic Carbon	< 1.0 ppb

Pyrogenicity

Testing by LAL Gel Clot methods after recommended rinsing procedures produce results of less than 1 EU/ml pyrogenic substance.

Maximum particle removal efficiency

The TSM cartridge is a highly efficient nominally rated filter. In addition to mechanical straining efficiencies, the TSM cartridge is charge modified to provide submicron filtration. Studies with AC Fine Test Dust have shown TSM cartridges will provide excellent particle retention and high contaminant-holding capacity. These results demonstrate the combined effects of electrokinetic and mechanical straining adsorption.

Test results						
TSM 100TG						
Flow Rate (lpm)	Pressure (bar)	Particle Removal Efficiency %				
		>0,5 µ	>1 µ	>10 µ	>20 µ	>25 µ
11.4	0.2	99.35	96.95	96.55	97.65	98.58
7.6	3.2	99.99	99.99	99.99	99.99	99.99
3.8	4.0	99.99	99.99	99.99	99.99	99.99
0.0	4.1	99.99	99.99	99.99	99.99	99.99
TSM 050TG						
Flow Rate (lpm)	Pressure (bar)	Particle Removal Efficiency %				
		>0,5 µ	>1 µ	>10 µ	>20 µ	>25 µ
11.4	0.3	99.64	99.89	99.95	99.98	99.99
7.6	2.3	99.99	99.99	99.99	99.99	99.99
3.8	3.7	99.99	99.99	99.99	99.99	99.99
0.0	4.1	99.99	99.99	99.99	99.99	99.99

Contaminant Holding Capacity per 10” element :

TSM 100 TG – 225 grams

TSM 050 TG – 260 grams

When used as a prefilter prior to membrane filtration, TSM cartridges can extend the useful life of the membrane significantly.

TSM 100TG is effective for prefiltration of 0.45 µm membrane and TSM 050TG is effective for prefiltration of 0.2 µm membrane.

Particulate matter

TSM TG cartridges have been examined for particulate matter that may be extracted during normal cartridge use. The test was designed using the USP XXI procedure for Particulate Matter in Injections as a guide. In all cases, the cartridges did not exceed the USP XXI limit of not greater than 50 particles par ml that are larger than or equal to 10 microns.

Cartridge specifications

Nominal filtration rate : 050 TG = 0.5 µm
100 TG = 1.0 µm

Filtration area : 0.56 m²

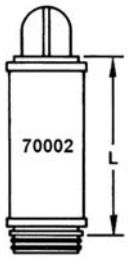
TSM media is manufactured according to the procedures described in Cuno’s Drug Master Files on record at the National Center for Drugs and Biologics.

TSM media is non-toxic in accordance with USP systemic injection testing. Therefore, it is suitable for use as a prefilter in the processing of parenteral drug products in accordance with the FDA.

TSM Cartridge Ordering Guide

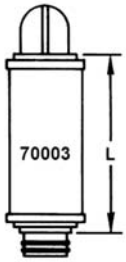
Basic Cartridge Design	Nominal Cartridge Length	Gasket or O-Ring Material*	Nominal Micron Rating	Formulation	Control Grade
70002 **70003** **70005** **70006** **70012**** **70025** **70026** **70048*****	**01** **02** **03** **04**	**A** - Silicone (MVQ) **B** - Fluorocarbon (FMP) **C** - Ethylene Propylene (EPDM) **D** - Nitrile (NBR)	**050** -0,5 µm **100** -1,0 µm	**T**	**G** - General Purpose

* ISO Designation
** Only in nominal lengths 01, 02 and 03
*** Only in nominal length 01 and 02



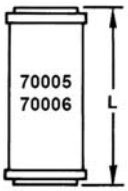
Single open end Code 7 (226) O-Ring Bayonet Lock Pall

Nominal Ctg Length	70002 L (mm)
01	259
02	506
03	754
04	1002



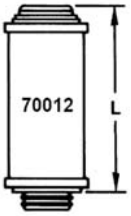
Single open end Code 8 (222) O-Ring CUNO & Pall

Nominal Ctg Length	70003 L (mm)
01	260
02	507
03	755
04	1002



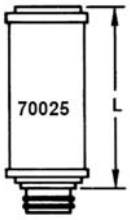
Double open end Flat Gasket Filterite & Pall (70005) Pall & Gelman (70006)

Nominal Ctg Length	70005 L (mm)	70006 L (mm)
01	254	248
02	508	495
03	762	743
04	1016	991



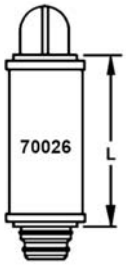
Single open end (222) O-Ring CUNO & Millipore

Nominal Ctg Length	70012 L (mm)
01	260
02	559
03	787



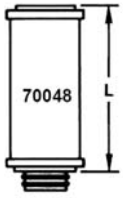
Single open end Code 3 (222) O-Ring Pall

Nominal Ctg Length	70025 L (mm)
01	260
02	507
03	755
04	1002



Single open end (216) (218) O-Ring Sartorius

Nominal Ctg Length	70026 L (mm)
01	252
02	500
03	748
04	995



Single open end (222) O-Ring CUNO

Nominal Ctg Length	70048 L (mm)
01	253
02	501

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