VALIDATION GUIDE

TETPOR AIR

Sterilizing grade

Cartridge and Capsule Filters

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1. Introduction

Sterilizing grade filters used to sterilize gases that come into contact with food or drug products must conform to strictly defined quality standards.

This validation guide provides proof of performance of the TETPOR AIR filter cartridges with respect to bacterial retention and physical performance characteristics such as flow rates and resistance to steam sterilization. The performance tests conducted for TETPOR AIR products have been designed to guarantee that sterile gas will continue to be provided even under the most arduous operating conditions.

Guidelines for validation can be sourced from publications issued by the FDA, EMEA, USP, EP, BP, PDA[1], etc. This validation document has been produced with these guidelines in mind to enable the end user to incorporate this information within their own validation documentation or standard operating procedures for the process.

The performance of the filter cartridge has been tested in accordance with - and exceeds - the specific guidelines of PDA Technical Report 40 'Sterilizing Filtration of Gases' *(Supplement Volume 58 No.S-1 Jan / Feb 2005)*. The filter also conforms to ISO 8573-7 - Compressed Air Part 7. Test Methods for viable microbiological contaminant content.

NOTE

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Address: ……

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Registered No. ……

Date Issued: ……

Signed ……

[1] FDA, EMEA, USP, EP, BP, PDA – Food and Drug Administration, European Medicines Evaluation Agency, United States, European and British Pharmacopoeia, Parenteral Drug Association.

2. Quality Assurance

Quality is built into all Parker domnick hunter filtration products through a rigorous product design process, careful selection of suppliers and materials, and manufacture within a highly controlled environment using validated production technologies in adherence to cGMP.

2.1. Quality and Environmental Management Systems

Parker domnick hunter is certified by Lloyds Register Quality Assurance to:

- BS EN ISO9001 Quality Management Systems
- BS EN ISO14001 Environmental Management Standard
- PS 9100 The application of ISO9001 GMP guide to pharmaceutical excipients
- BS EN ISO13485 Medical Devices

Copies of the original certificates are available upon request.

2.2. PS 9100 within Parker domnick hunter

The pharmaceutical Quality Group of the Institute of Quality Assurance has developed and produced an application standard – PS9100 – which defines the application of ISO 9001 to pharmaceutical excipients; Parker domnick hunter filter products used within pharmaceutical and sterilizing processes are categorised as excipients.

PS 9100 introduces three levels of GMP, written in the ICH Q7A style. One of the key practical elements in this document is to assign an appropriate level of GMP for excipients using a risk assessment approach based on end-user safety. The Parker domnick hunter quality system defines, at an appropriate (intermediate) risk level, standards of GMP for the manufacture of filtration products under an appropriate system for managing quality.

Compliance to PS 9100 is independently assessed at regular intervals by Lloyds Register Quality Assurance.

2.3. Manufacturing Facilities

Parker domnick hunter continues to invest substantially in installation of the latest clean room and manufacturing technology. All manufacturing systems are validated using statistical methodologies (process, product and software) and constantly monitored using statistical process control charts. All personnel within the manufacturing operations are fully trained in cGMP and against competency frameworks to ensure their suitability to operate within specific manufacturing areas.

2.4. Material Conformity

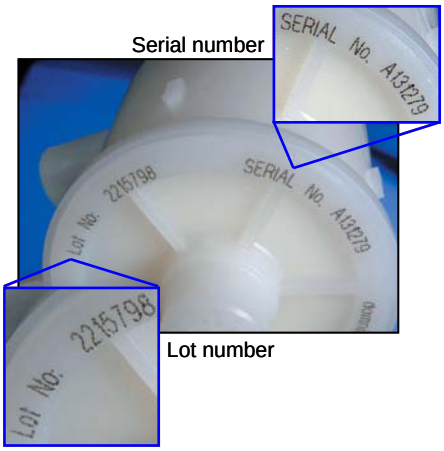
Parker domnick hunter works closely with suppliers to ensure materials supplied are of a consistently high quality and also to develop new materials as part of our ongoing product development activity. In addition to supplier certificates of conformity and analysis, incoming raw materials, including moulded parts, membranes and supports, and elastomeric seals, are subject to an appropriate level of incoming inspection. This includes bacterial challenge on each lot of membrane used in the manufacture of sterilizing grade filter cartridges.

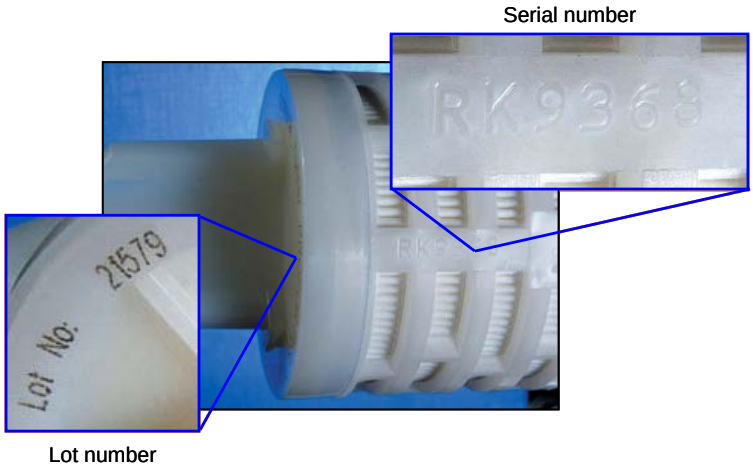
2.5. Product and Lot Release Criteria

Prior to shipment all Parker domnick hunter cartridges undergo final product quality control. 100% of testable products undergo a non-destructive integrity test (diffusional flow). This includes a high volume flush with water that meets or exceeds the current EP and USP standards for purified water. Products are dried using HEPA filtered air and sealed in a protective polyethylene bag within the controlled manufacturing environment prior to final pack and despatch.

2.6. Product Traceability

The product code and type, lot number and unique serial number are printed on all products. Additionally, the lot number is identified on the protective bag label and the box label within which the product is packed. The serial number provides complete traceability back to pleated materials used in the manufacture of each product and the manufacturing processes through the module routing sheet.





2.7. Product Shelf Life

The shelf life for TETPOR AIR cartridges is 5 years for cartridges and 3 years for capsules.

3. Product Description

All products within the TETPOR AIR range are fully validated to provide sterile air / gas under worst case conditions in a wide range of applications through the food & beverage, dairy and pharmaceutical industries.

This performance has been qualified under worst case condition (sterile gas system flooded with water) using the ASTM Standard Test Method F838-05 for sterilizing liquid filters. Their performance in gas streams has been qualified for full retention of both bacteria and bacteriophage when tested in accordance with the recommendations in PDA Technical Report 40 'Sterilizing Filtration of Gases' *(Supplement Volume 58 No.S-1 Jan / Feb 2005)*.

3.1. Materials of construction

All materials meet the FDA requirements as defined in Title 21 Code of Federal Regulations and the BioSafety Tests as defined in the current USP including the Class VI Plastics Testing.

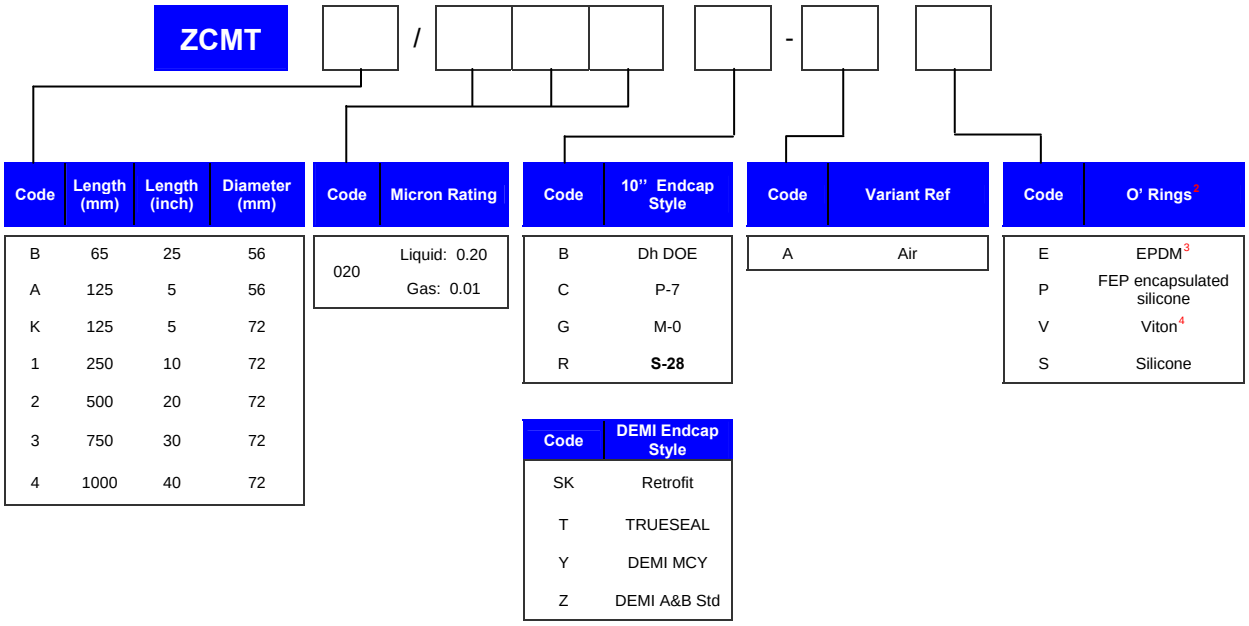
Filtration Membrane	Polytetrafluoroethylene (PTFE)
Upstream Support	Polypropylene
Downstream Support	Polypropylene
Inner Core	Polypropylene
Outer Protection Cage	Polypropylene
Endcaps	Polypropylene
Endcap Insert	316 Stainless Steel / Polysulphone (T-Style)
Standard o-rings	Silicone
Capsule body	Polypropylene
Capsule Vent Seals	Silicone
Filling Bell	Polycarbonate

3.2. Product Coding

Product code structures indicate the cartridge sizes, endcap configurations and o-rings that are available within the product range.

Cartridges

Example ZCMT2/-020C-A — 500 mm (20”) 0.2 micron TETPOR AIR filter cartridge, pharmaceutical grade with ‘C’ style endcap and Silicone o-rings.



Code	Length (mm)	Length (inch)	Diameter (mm)
B	65	25	56
A	125	5	56
K	125	5	72
1	250	10	72
2	500	20	72
3	750	30	72
4	1000	40	72

Code	Micron Rating
020	Liquid: 0.20 Gas: 0.01

Code	10’’ Endcap Style
B	Dh DOE
C	P-7
G	M-0
R	**S-28**

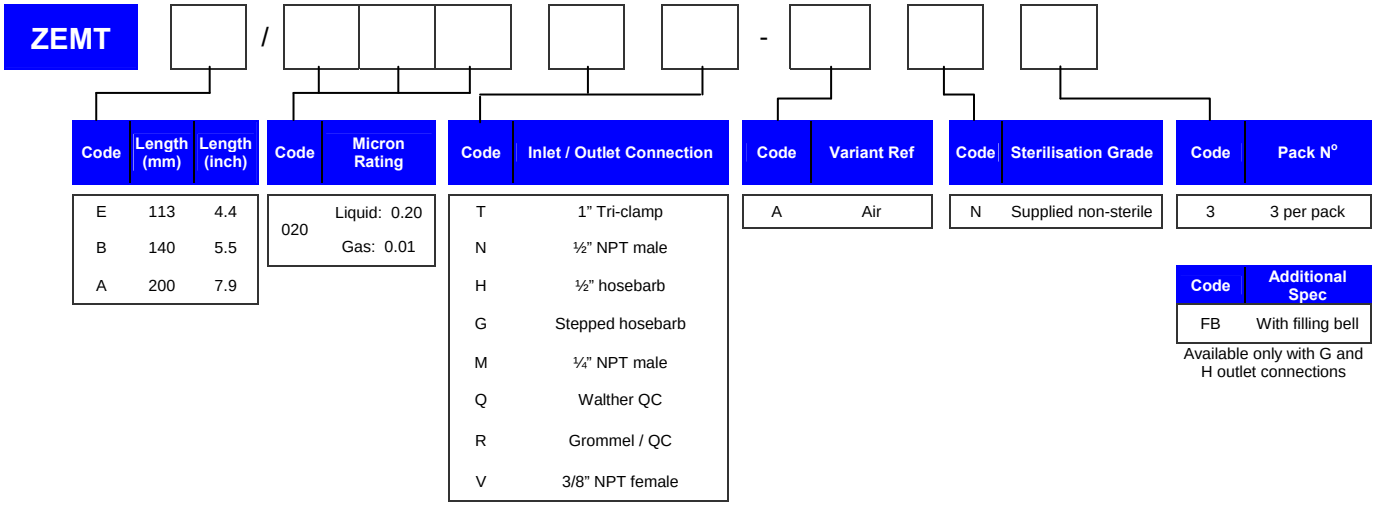
Code	DEMI Endcap Style
SK	Retrofit
T	TRUESEAL
Y	DEMI MCY
Z	DEMI A&B Std

Code	Variant Ref
A	Air

Code	O’ Rings[2]
E	EPDM[3]
P	FEP encapsulated silicone
V	Viton[4]
S	Silicone

Small scale DEMICAP capsules

Example ZEMTB-020TT-AN3 — B-size 0.2 micron TETPOR AIR filter capsule with tri-clamp connections supplied non-sterile in packs of 3.



Code	Length (mm)	Length (inch)
E	113	4.4
B	140	5.5
A	200	7.9

Code	Micron Rating
020	Liquid: 0.20 Gas: 0.01

Code	Inlet / Outlet Connection
T	1” Tri-clamp
N	½” NPT male
H	½” hosebarb
G	Stepped hosebarb
M	¼” NPT male
Q	Walther QC
R	Grommel / QC
V	3/8” NPT female

Code	Variant Ref
A	Air

Code	Sterilisation Grade
N	Supplied non-sterile

Code	Pack N°
3	3 per pack

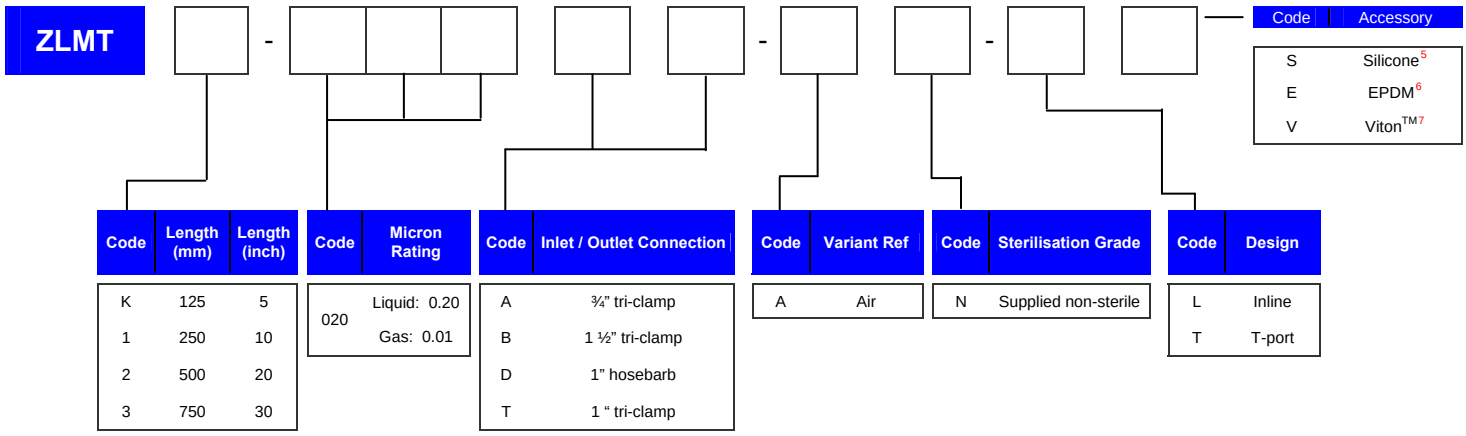
Code	Additional Spec
FB	With filling bell

Available only with G and H outlet connections

[2] Silicone o-rings are fitted as standard without having to specify the S in the code.
[3] EPDM – Ethylene Polypropylene Diene Monomer Rubber
[4] Viton is a registered trademark of DuPont Dow Corporation

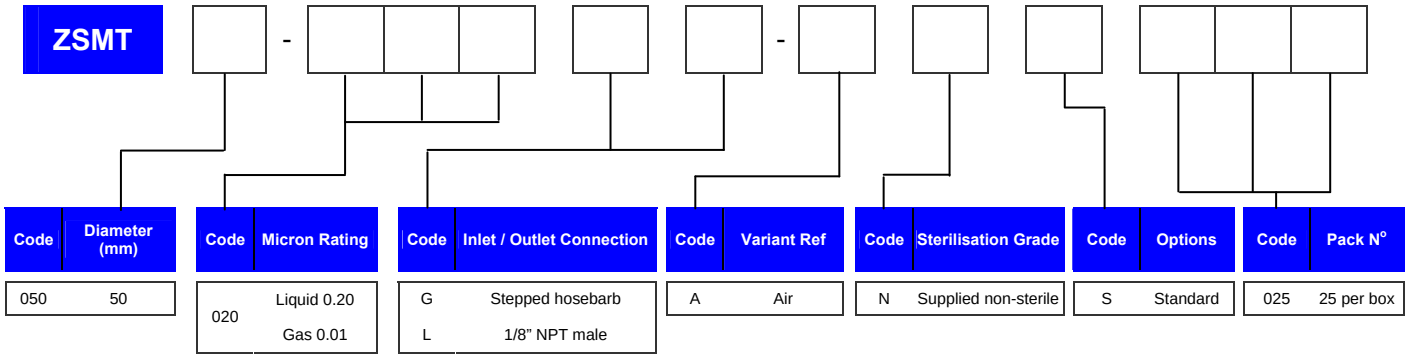
Large scale MURUS capsules

Example ZLMTK-020TT-ANL K-size 0.2 micron TETPOR AIR filter capsule with tri-clamp connections supplied non-sterile with inline design and silicone o-rings.



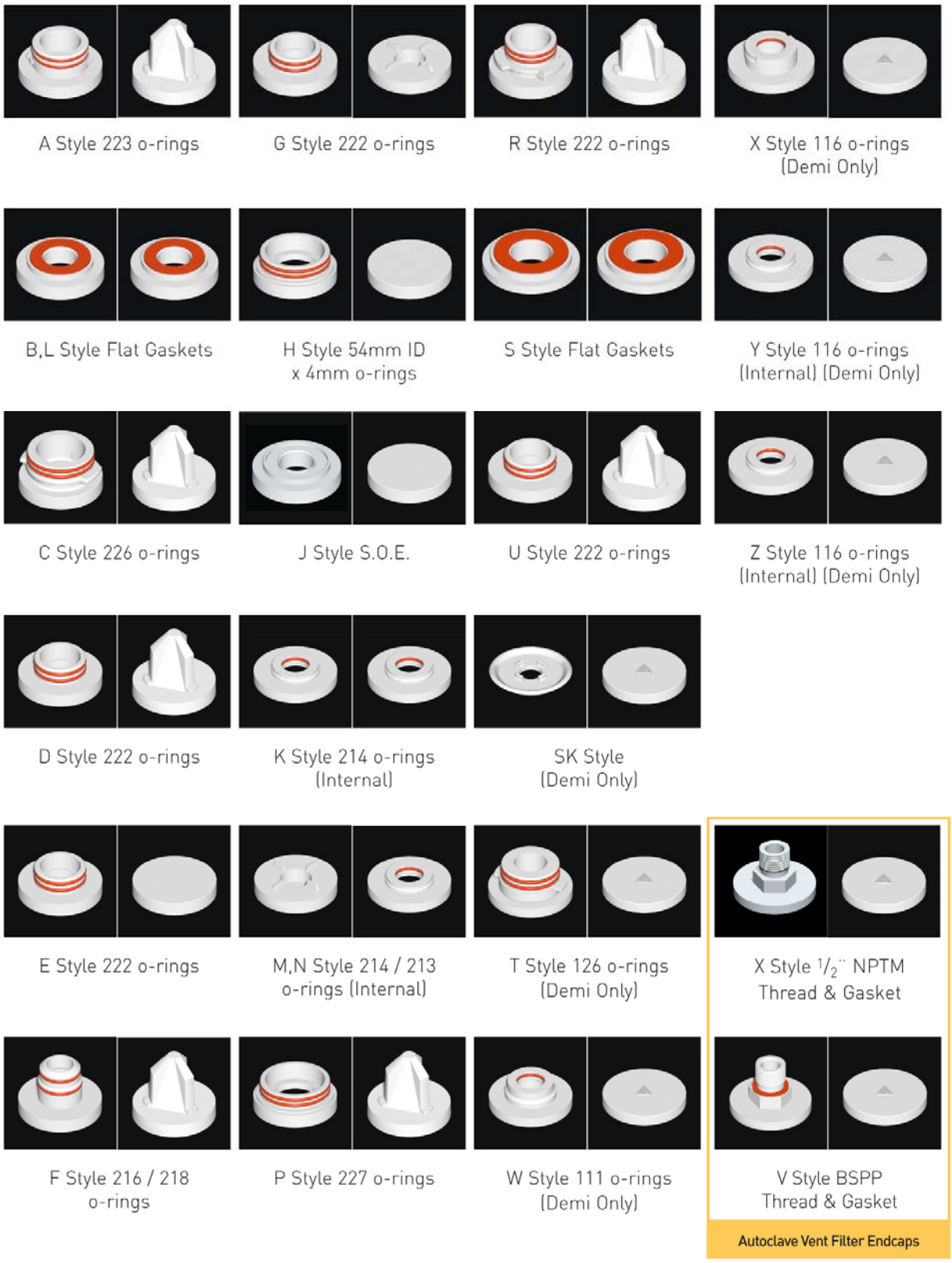
Syringe filters

Example ZSMT050-020GG-ANS025 50 mm TETPOR AIR syringe filter, 0.2 micron with stepped hosebarb connections supplied non-sterile in packs of 25

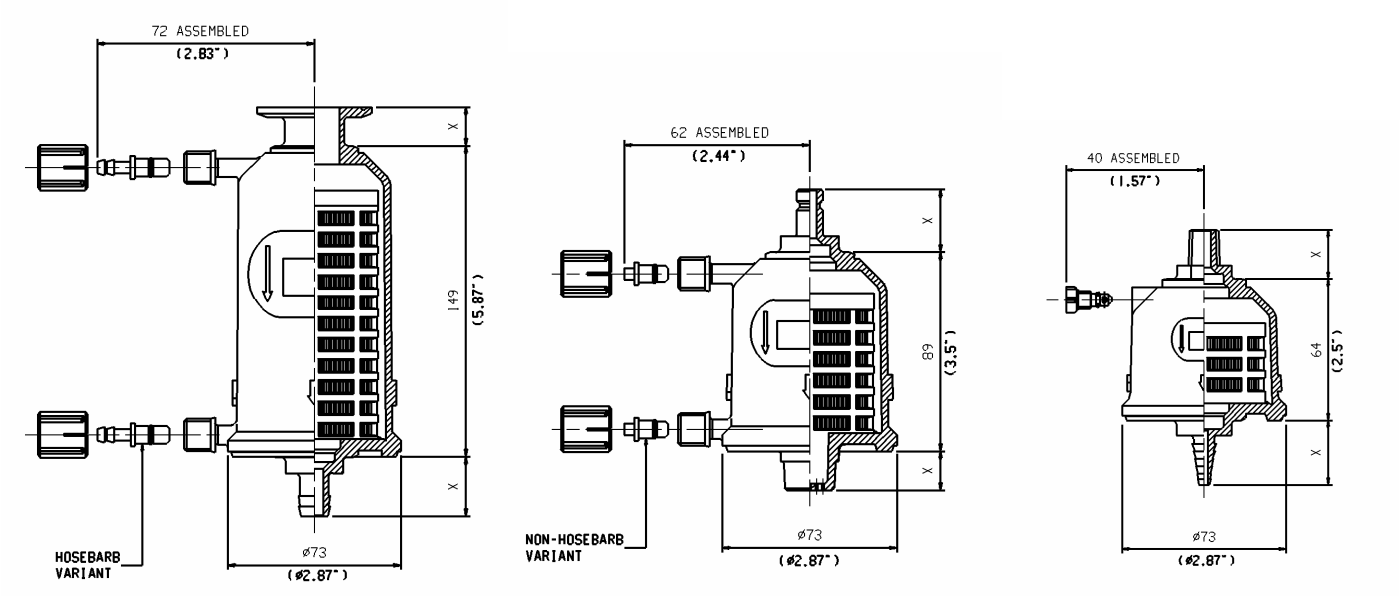


[5] Silicone o-rings are fitted as standard without having to specify the S in the code.
[6] **EPDM** – Ethylene Propylene Diene Momomer Rubber.
[7] Viton is a registered trademark of DuPont Dow Corporation.

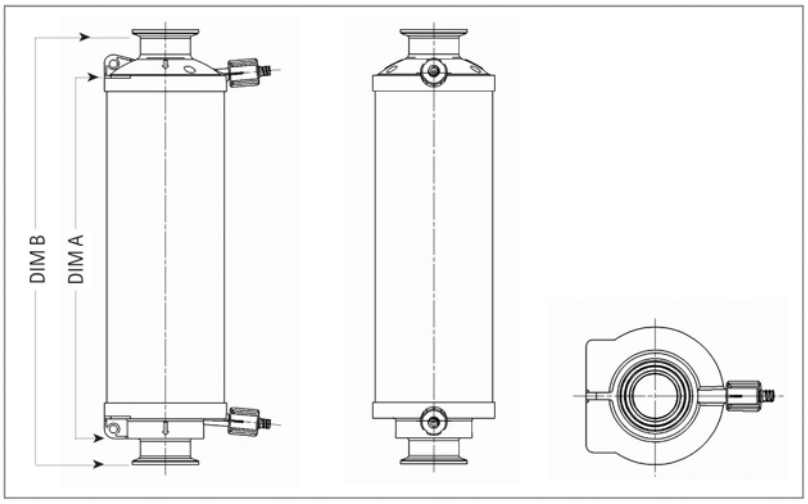
3.3. Cartridge Endcap Configurations



3.4. Capsule Dimensions



Dimensions

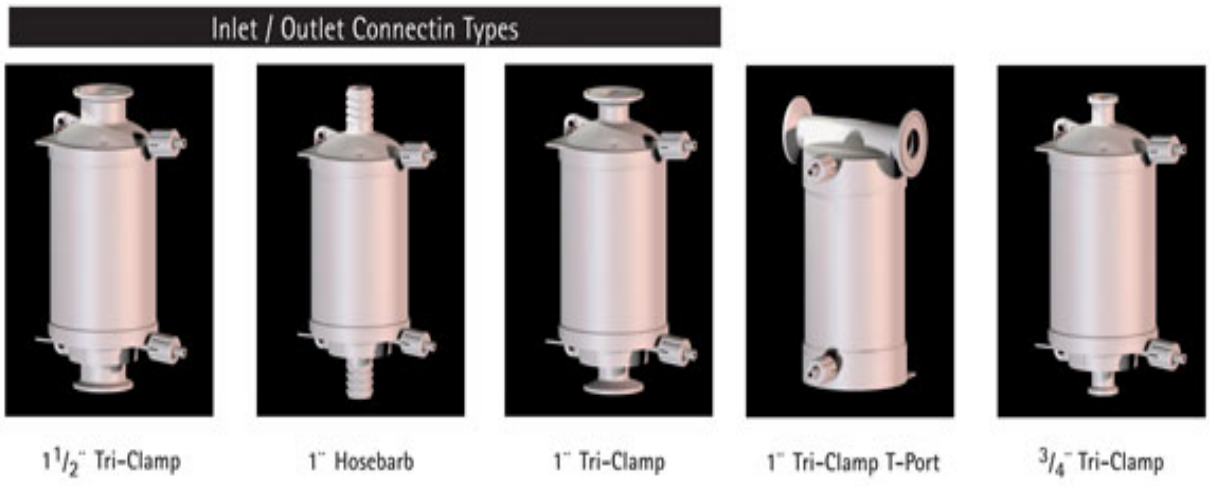


Cartidge Type	Dimension A	Dimension B
10" 250mm	10.30" 262mm	13.07" 332mm
20" 500mm	20.04" 509mm	22.79" 579mm
30" 750mm	29.80" 757mm	32.56" 827mm

Dimensions shown are typical lengths for $1^{1}/_{2}$" Tri-Clamp. Further dimensions available from domnick hunter.

DEMICAP Inlet / Outlet Connection Styles

MURUS Inlet / Outlet Connection Styles



4. Product Specifications

4.1. Cartridge Operating Differential Pressures and Temperatures

To obtain representative maximum differential pressures the filter cartridge membrane was first wet out in 60:40$_{v/v}$ IPA:Water then water was flowed through representative 10 inch cartridges at temperature to achieve the required differential pressure for 30 minutes.

The recommended continuous maximum differential operating pressure and temperature is shown below.

Temperature		Differential Pressure Cartridges	
°C	°F	bar	psi
60	140	3.50	50.8

4.2. Capsule Operating Differential Pressures and Temperatures

DEMICAP

The TETPOR AIR range of DEMICAP capsules can be operated up to 40°C (104°F) at line pressures up to 5.0 barg (72psig)

MURUS

The TETPOR AIR range of MURUS capsules can be operated up to 25oC (77°F) at line pressures of 5.5 barg (79.7 psig) or up to 60oC (140°F) at line pressures of 2.8 barg (40.6 psig).

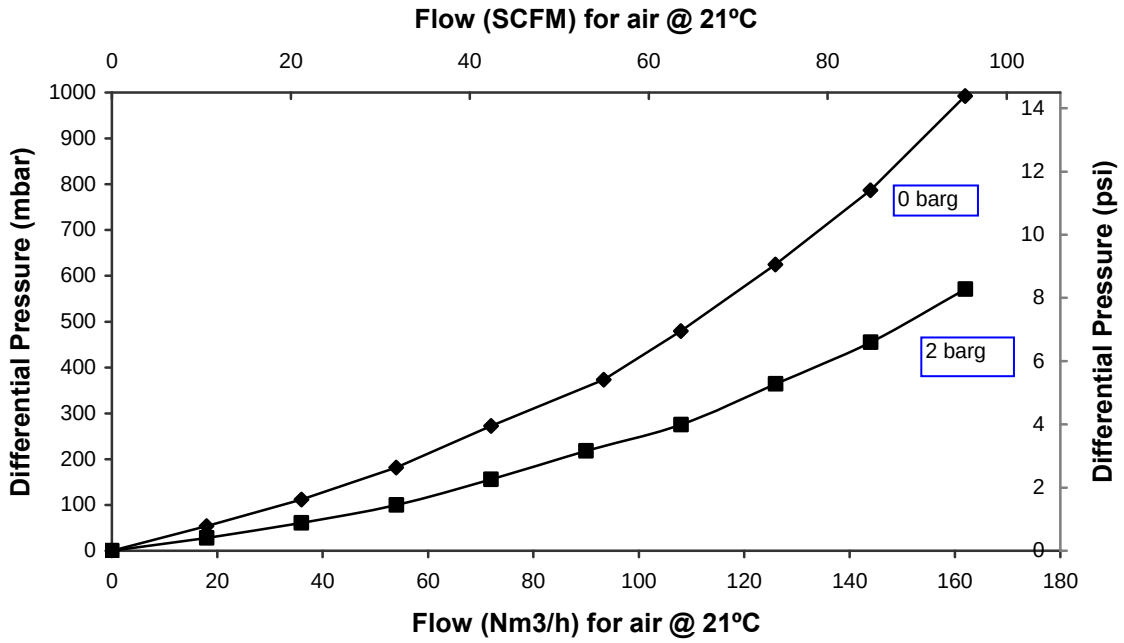
4.3. Effective Filtration Area (EFA)

Product Size	Surface Area (m^2)	Surface Area (ft^2)
Syringe	0.015	0.1
E	0.06	0.64
B	0.12	1.29
A	0.25	2.69
K	0.36	3.87
10	0.77	8.28
20	1.54	16.58
30	2.31	24.86

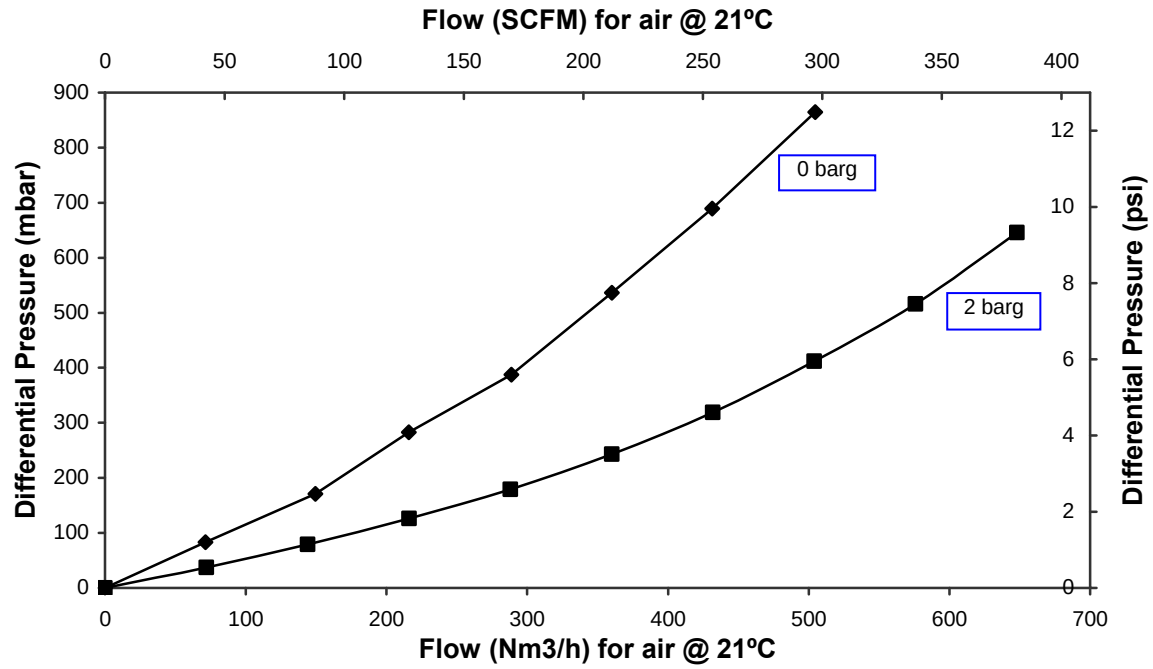
4.4. Flow Rates

Cartridge flow rates were determined for filters from three separate lots.

Air Flow Characteristics for TETPOR Air Capsules (1" tri-clamp connections)



Air Flow Characteristics for 250mm (10") TETPOR Air Cartridges



4.5. Autoclave life

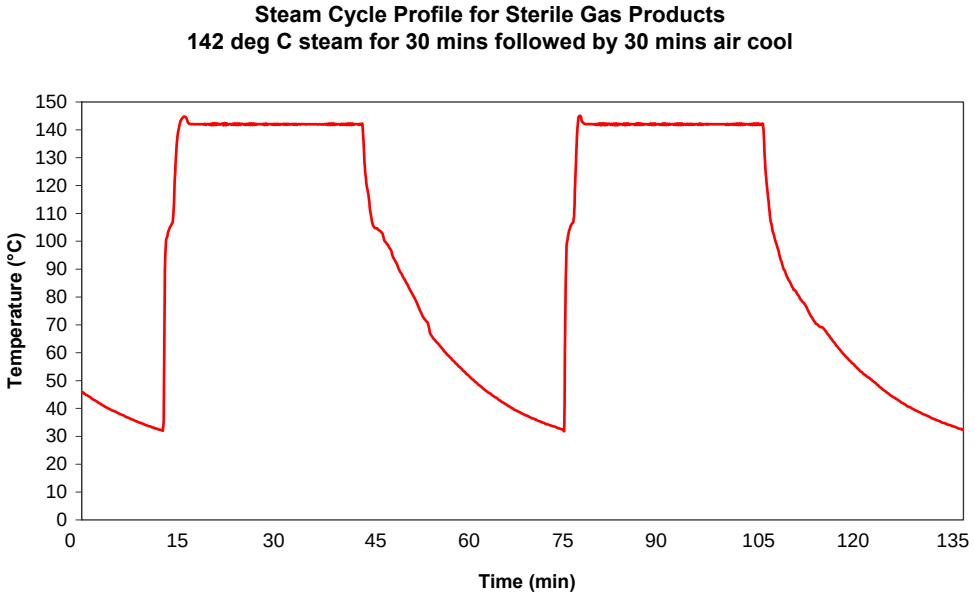
The autoclave life of capsules was determined using a porous load cycle.

Product Format	SIP Temp °C	SIP Temp °F	Number of Cycles	Cycle Time (minutes at temperature)
Cartridges	142	288	120	30
Capsules	135	275	100	30

To maximize cartridge and capsule life, a slow exhaust cycle is recommended.

4.6. Steam Sterilization (Autoclaving and Steam in Place)

The steam life of cartridges was determined using the 1 hour Steam in Place (SIP) cycle which replicates extreme conditions. This includes a combination of steaming for 30 minutes at temperature followed by rapid cooling with ambient temperature compressed air for 30 minutes.



Product Format	SIP Temp °C	SIP Temp °F	Number of Cycles	Cycle Time (minutes at temperature)
Cartridges	142	288	120	30
Capsules	Do not steam in place			

It should be noted that the number of times the temperature is cycled from ambient to the sterilisation temperature rather than the time at temperature determines the lifetime of the cartridge in steam.

To maximise the life of the cartridge, the differential pressure across the cartridge should not exceed 0.30 bar (4.4 psi) at 142°C (288°F). For new applications it is recommended that the Parker domnick hunter guidance for the method of steam sterilisation be followed.

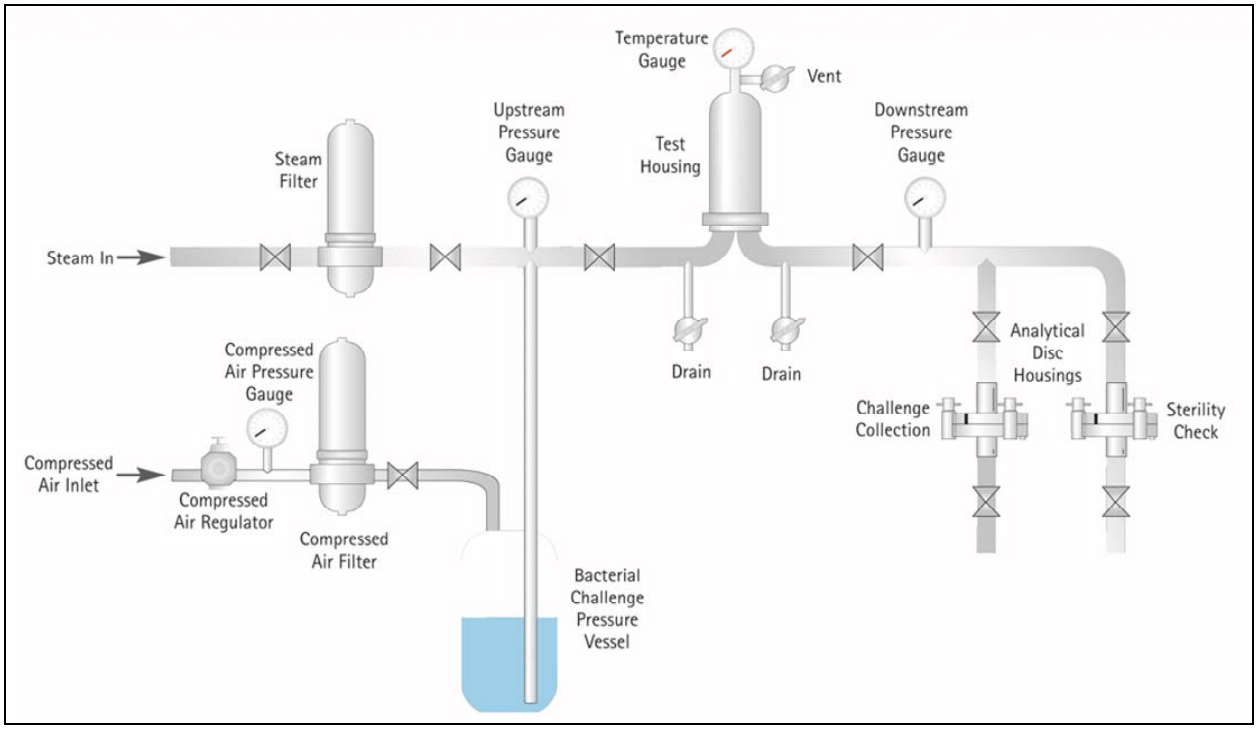
4.7. Retention

The retention of a sterilizing grade filter cartridge that may be used in the manufacture of a drug product needs to be correlated to both a liquid and gas phase challenge. Tests in the liquid phase are conducted because they are seen as worst case i.e. if the compressed air system becomes flooded with water / condensate the filter will still maintain sterility of the process. This testing is a required when the process air comes into contact with the final drug product i.e. vent filters in sterile filling lines and compressed air used in BFS equipment. The industry recognized test procedure ASTM F838-05 'Standard Test Method for Determining Bacterial Retention of Membrane Filters Utilized for Liquid Filtration'[8] is used in this case.

To ensure the filter is capable of sterilizing in the gas phase it is subjected to aerosol bacterial and bacteriophage challenges. These tests are conducted in line with the guidelines published in PDA Technical Report 40 'Sterilizing Filtration of Gases' *(Supplement Volume 58 No.S-1 Jan / Feb 2005)*.

4.8. Liquid Bacterial Challenge

Liquid Bacterial Challenge Schematic



Under these test conditions, the test filter is challenged with a minimum of 10^7 viable *Brevundimonas diminuta* (ATCC 19146) per square centimetre of effective filtration area. Any organisms that pass through the test filter are collected and cultured on the surface of analytical discs. In this way colonies may be counted and bacterial species identified. The filter retention is quantified by expressing the filter's efficiency to remove the challenge organism from the challenge suspension as a Log Reduction Value (LRV).

$$LRV = Log_{10} \left({}^{\text{Number of organisms in the challenge}} / _{\text{Number of organisms in the filtrate}} \right)$$

[8] Previous reference to the guidance document *Microbial Evaluation of Filters for Sterilizing Liquids*, HIMA Document No. 3 Vol. 4, April 1982, referred to in USP<1211> *Sterilization by Filtration* has been superseded by the equivalent ASTM F838-05.

4.9. Diffusional Flow Correlation Data

The correlation between diffusional flow and bacterial challenge for TETPOR AIR cartridges is shown in the table below. This data shows that a 250mm (10") TETPOR AIR filter exhibiting a diffusional flow of < 22.0 ml/min when completely wet with 60:40$_{v/v}$ IPA:Water at a test pressure of 0.8 barg (11.6psig) at 20°C (68°F) will produce a sterile filtrate.

Filter type: ZCMT1/020C-A TETPOR AIR 0.2µm 10" cartridge

Challenge organism: *Brevundimonas diminuta* (ATCC 19146)

Serial No.	Diffusional Flow (Air in 60:40$_{v/v}$ IPA:Water) @ 0.80 barg (11.6 psig) *ml/min*	Challenge Level (x 10^{11})	Organisms Passed	LRV[9]
M62898	0.5	1.70	0	11.23
M36067	2.0	2.50	0	11.40
M32903	2.2	1.34	0	11.13
M32914	2.2	2.64	0	11.42
M36065	2.3	0.31	0	11.49
M32894	3.1	1.64	0	11.21
M32902	3.1	1.77	0	10.25
M41707	3.5	0.14	0	10.10
M32908	3.7	2.41	0	11.38
M41710	5.1	0.15	0	10.18
M36069	6.1	1.57	0	11.20
N008205	6.6	2.88	0	11.46
M37703	6.7	3.25	0	11.51
M32916	6.7	2.32	0	11.37
M32910	6.8	1.65	0	11.22
M41722	6.8	0.13	0	10.11
N008204	7.0	1.99	0	11.30
M37700	7.2	3.08	0	11.49
J29578	7.9	1.80	0	11.26
J29577	7.9	3.02	0	11.48
S000143	9.9	2.87	0	11.46
M36064	11.0	3.11	0	11.49
M37710	11.0	2.01	0	11.30
E92447	22.0	0.52	0	10.72
M38639	22.4	3.29	15	10.31
M41723	36.5	0.40	333	8.08

[9] Where Organisms passed = 0, LRV is stated as *greater than*. TNTC : Too Numerous To Count

Conclusion

A maximum diffusional flow of 18.0 ml/min for a 60:40$_{v/v}$ IPA:Water wetted 10" TETPOR AIR filter cartridge provides complete assurance of a sterile effluent incorporating, as it does, a safety margin in relation to the correlation data above.

4.10. Water Intrusion Correlation Data

The correlation between water intrusion and bacterial challenge for TETPOR AIR cartridges is shown in the table below. This data shows that a 250 mm (10") TETPOR AIR filter exhibiting a water intrusion value of < 20.1 ml/10 min at a test pressure of 2.5 barg (36.3 psig) at 20°C (68°F) will produce a sterile filtrate.

Filter type: ZCMT1/020C-A TETPOR AIR 0.2µm 10" cartridge

Challenge organism: *Brevundimonas diminuta* (ATCC 19146)

Serial No.	Water Intrusion @ 2.50 barg (36.3 psig) ml/10min	Challenge Level (x 10^{11})	Organisms Passed	LRV[10]
M36064	6.0	3.11	0	11.49
M36067	7.7	2.5	0	11.39
M36069	7.9	1.57	0	11.19
M32894	10.3	1.64	0	11.21
M32898	11.2	1.70	0	11.23
M32907	11.8	2.04	0	11.31
M32908	12.1	2.41	0	11.38
M32910	12.7	1.65	0	11.22
M32902	13.3	1.77	0	11.25
N008204	13.3	1.99	0	11.30
M32896	15.4	1.93	0	11.29
M32916	16.0	2.32	0	11.37
M32915	20.1	1.99	0	11.30
N008200	29.3	1.19	TNTC[11]	<7.00
M38638	38.4	1.62	2083	7.9
M38636	72.2	3.29	16	10.30

Conclusion

A maximum water intrusion value of 16.0 ml / 10 min for a 10" TETPOR AIR filter cartridge provides complete assurance of a sterile effluent incorporating, as it does, a safety margin in relation to the correlation data above.

[10] Where Organisms passed = 0, LRV is stated as *greater than*.
[11] TNTC: Too numerous to count

4.11. Integrity Testing Data for Diffusional Flow

The following integrity test limits have been determined from the 10 inch correlation data. Limits for other sizes have been calculated directly from effective filtration area ratios for each variant. Diffusional flow and bubble point values are given for cartridges wetted in 60:40$_{v/v}$ IPA : Water solution using air as the test gas.

Micron Rating	Minimum Bubble Point[12]		Diffusional Flow Test Pressure		Maximum Diffusional Flow (ml/min)				
Liquid / Gas	bar	psi	bar	psi	10”	K	A	B	E
0.20 / 0.01	1.0	14.5	0.80	11.6	18.0	8.5	6.0	3.0	1.5

		Water Intrusion Test Pressure		Maximum Water Intrusion (ml/10min)				
		bar	psi	10”	K	A	B	E
		2.50	36.3	1.06	7.5	5.3	2.6	1.3

		Water Intrusion Test Pressure		Maximum Water Flow (µl/10min)[13]				
		bar	psi	10”	K	A	B	E
		2.50	36.3	4571	2142	1514	742	371

4.12. Retention to Aerosolised *Brevundimonas Diminuta*

Tests have shown that TETPOR AIR filters are fully retentive to aerosolised *Brevundimonas diminuta* (ATCC 19146) bacteria when challenged with a total of 2x10^{11} cfu[14] over a 1-hr test at the rated flow of the cartridge.

[12] Parker domnick hunter does not recommend the use of bubble point as an integrity test method for cartridges, but values are given for use as an indicator of product integrity.
[13] Values given for Water Flow (µl/10mins) and Water Intrusion (ml/10mins) are expressions of the same parameter, the first being the actual change in water volume during the test, the second being the pressurized gas volume change (expressed at atmospheric pressure) as a result of this water flow.
[14] Colony forming units

5. Chemical Compatibility

The following data is indicative of TETPOR AIR cartridge compatibility with a range of chemicals at ambient temperature and 72 hour exposure. However it is recommended that specific process conditions are reviewed with your local Parker domnick hunter representative.

	ASYPOR	BIO-X II	HIGH FLOW BIO-X	HIGH FLOW BIO-X VENT AUTOCLAVE	HIGH FLOW PREPOR GFA	HIGH FLOW TETPOR II	HIGH FLOW TETPOR H.T.	HIGH FLOW TETPOR VENT AUTOCLAVE	PEPLYN PLUS & PEPLYN PLUS DC	PREPOR GF	PREPOR PES	PROPOR PES / FS	TETPOR AIR	TETPOR LIQUID	TETPOR PLUS	EPDM 'O-Ring	VITON 'O-Ring	SILICONE 'O-Ring
Acetic acid 3.5N	LC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Acetic acid 8.75N	LC	C	C	-	C	C	C	C	C	C	-	-	C	C	C	LC	LC	NC
Acetic acid conc.17.5N	NC	C	C	-	C	C	C	C	C	C	-	-	C	C	C	LC	NC	NC
Acetone	NC	C	C	-	C	C	C	C	C	C	NC	NC	C	C	C	NC	NC	NC
Acetonitrile	NC	C	C	-	LC	C	C	C	C	LC	-	-	C	C	C	NC	NC	NC
Acidbrite 4 (Diversey) 3.0%$_{v/v}$	NC	-	-	-	C	-	-	-	C	C	-	-	-	-	-	C	C	C
Ammonium Hydroxide 8N	NC	C	C	C	C	C	C	C	C	C	C	LC	C	C	C	C	C	C
Ammonium Oxalate 0.07N	-	C	C	C	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Amyl Acetate	NC	C	C	C	LC	C	C	C	C	LC	LC	LC	C	C	C	NC	NC	LC
Aqueous Ammonia 15.5N	NC	C	C	C	LC	C	LC	C	C	LC	C	LC	C	C	C	C	C	C
Benzyl Alcohol	NC	C	C	C	NC	C	C	C	NC	NC	-	-	C	C	C	C	C	C
Benzyalkonium Chloride 0.1%	LC	C	C	C	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Boric acid,saturated	C	C	C	C	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Butan-1-ol	NC	C	C	C	C	LC	LC	LC	C	C	C	C	NC	NC	NC	C	C	C
Butan-2-ol	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	LC	C	C
Carbon Tetrachloride	NC	C	C	C	NC	C	C	C	NC	NC	-	-	NC	NC	NC	NC	C	NC
Chloroform	NC	C	C	C	NC	C	C	C	NC	NC	NC	NC	NC	NC	NC	NC	LC	NC
Cyclohexane	NC	C	C	C	NC	-	-	-	NC	NC	-	-	LC	LC	LC	NC	NC	NC
1,4 – Dioxane	NC	C	C	C	LC	C	C	C	C	LC	-	-	C	C	C	NC	NC	NC
Diverflow (Diversey) 3%v/v	NC	-	-	-	NC	-	-	-	C	NC	C	C	-	-	-	C	C	LC
Diversey 212G 0.6%v/v	NC	-	-	-	C	-	-	-	C	C	-	-	-	-	-	C	C	C
Divosan Forte 0.5%v/v	LC	-	-	-	C	-	-	-	C	C	C	C	-	-	-	C	C	C
Divosan XT 1%v/v	C	-	-	-	C	-	-	-	C	C	-	-	-	-	-	C	C	C
Ethanol	NC	C	C	C	C	C	-	C	C	C	C	C	C	C	C	C	C	LC
Ethanol 45%	LC	-	-	-	C	-	-	-	C	C	C	C	C	C	C	C	C	C
Ethyl Acetate	NC	LC	LC	LC	LC	LC	LC	LC	LC	LC	NC	NC	LC	LC	LC	C	NC	LC
Formaldehyde 0.3%	LC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Formaldehyde 37%	NC	C	C	C	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Formic acid conc.	NC	C	C	C	NC	C	C	C	C	NC	-	-	C	C	C	C	NC	NC
Glycerol	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Hexane	LC	C	C	C	-	C	C	C	NC	-	-	-	-	-	-	NC	NC	NC
Hydrochloric acid 1N	C	-	-	-	C	-	-	-	C	C	C	C	C	C	C	C	C	C
Hydrochloric acid conc.	NC	-	-	-	NC	-	-	-	C	NC	-	-	C	C	C	NC	NC	NC
Hydrochloric acid conc.13%	-	C	C	C	-	C	C	C	-	-	-	-	-	-	-	NC	NC	NC
Hydrogen Peroxide	-	C	C	C	-	-	-	-	C	-	-	-	-	-	-	C	C	C
Hydrogen Peroxide 10% Volume	C	-	-	-	C	-	-	-	C	C	C	C	C	C	C	C	C	C
Hydrogen Peroxide 100% Volume	LC	-	-	-	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Methanol	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	NC	C
Methyl-Iso-Butylketone	NC	C	C	C	C	C	C	C	C	C	NC	NC	C	C	C	NC	NC	LC
Methylene Chloride @ 40°C	-	-	-	-	LC	-	-	-	LC	LC	-	-	-	-	-	-	-	-
Nitric acid 2N 14.4%	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	LC	C	C
Nitric acid 15.8N	NC	C	C	C	NC	C	NC	C	C	NC	-	-	C	C	C	NC	NC	NC
Ozone	-	-	-	-	-	-	-	-	-	-	NC	NC	-	-	-	-	-	-
Paraffin yellow	LC	LC	LC	LC	LC	C	C	C	C	LC	-	-	C	C	C	NC	C	NC
Pentane	LC	C	C	C	LC	-	-	-	LC	LC	-	-	LC	LC	LC	NC	C	NC
Peracetic acid 0.5% (10 wk test)	C	-	-	-	-	C	C	C	-	-	-	-	-	-	-	C	C	C
Peracetic acid 4%	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Perchloroethylene	-	-	-	-	-	-	-	-	-	-	NC	NC	-	-	-	-	-	-
Petroleum spirits	NC	-	-	-	NC	C	C	C	NC	NC	-	-	LC	LC	LC	NC	C	NC

	ASYPOR	BIO-X II	HIGH FLOW BIO-X	HIGH FLOW BIO-X VENT AUTOCLAVE	HIGH FLOW PREPOR GFA	HIGH FLOW TETPOR II	HIGH FLOW TETPOR H.T.	HIGH FLOW TETPOR VENT AUTOCLAVE	PEPLYN PLUS & PEPLYN PLUS DC	PREPOR GF	PREPOR PES	PROPOR PES / FS	TETPOR AIR	TETPOR LIQUID	TETPOR PLUS	EPDM 'O-Ring	VITON 'O-Ring	SILICONE 'O-Ring
Phenol (aq) 0.5N	-	C	C	C	-	NC	-	NC	-	-	-	-	-	-	-	-	-	-
Phenol 5%	NC	-	-	-	C	-	-	-	C	C	-	-	C	C	C	C	C	C
Phenol 0.25%	C	-	-	-	C	-	-	-	C	C	-	-	C	C	C	C	C	C
Polyethylene Glycol 600	NC	LC	LC	LC	NC	C	C	C	LC	NC	NC	NC	-	-	-	-	-	-
Polyglycol 2000-E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	C	C
Potassium Dichromate 0.1N	LC	C	C	C	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Potassium Iodine 0.6N	C	C	C	C	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Potassium Hydroxide 10N	NC	C	C	C	NC	C	C	C	C	NC	C	LC	C	C	C	C	C	C
Potassium Permanganate 0.1N	NC	C	C	C	NC	C	LC	C	C	NC	C	C	C	C	C	C	C	C
Propan-1-ol	NC	C	C	C	NC	C	C	C	C	NC	C	C	C	C	C	C	C	LC
Propan-2-ol	C	C	C	C	NC	C	C	C	C	NC	C	C	C	C	C	C	C	LC
Propan-2-ol, 60:40 H_2O	C	C	C	C	NC	C	C	C	C	NC	C	C	C	C	C	C	C	C
Pyridine	NC	C	C	C	NC	C	C	C	C	NC	NC	NC	C	C	C	C	NC	C
Sodium Chloride 0.5N	LC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Saline Lactose Broth	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sodium Hydroxide 2N 8%	NC	NC	NC	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sodium Hydroxide 7N 28%	NC	NC	NC	NC	NC	C	C	C	C	NC	NC	NC	C	C	C	C	C	LC
Sodium Hypochlorite (14% Free Cl_2)	NC	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sodium thiosulphate 0.1N	LC	C	C	C	C	C	C	C	C	C	-	-	C	C	C	C	C	C
Sulphuric acid 1N	NC	C	C	C	LC	C	C	C	C	LC	C	C	-	-	-	C	C	C
Sulphuric acid conc.	NC	NC	NC	NC	LC	LC	NC	LC	LC	LC	NC	NC	LC	LC	LC	-	-	-
Sulphurous acid	-	-	-	-	-	-	-	-	-	-	NC	NC	-	-	-	-	-	-
Toluene	-	NC	NC	NC	-	NC	NC	NC	NC	-	NC	NC	-	-	-	NC	LC	NC
1,1,1 Trichloroethane	LC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2 Trichloroethane	-	C	C	C	LC	C	LC	C	LC	LC	NC	NC	LC	LC	LC	NC	LC	LC
Trichloroacetic Acid 80%	LC	-	-	-	LC	-	-	-	C	LC	-	-	C	C	C	NC	LC	NC
Trichloroacetic Acid 5N	-	C	C	C	-	C	C	C	-	-	-	-	-	-	-	---		
Toluene	NC	-	-	-	NC	-	-	-	-	NC	-	-	-	-	-	NC	LC	NC
Xylene	NC	LC	LC	LC	NC	LC	LC	LC	NC	NC	LC	LC	NC	NC	NC	C	LC	NC

Chemical Compatibility User Instructions and Notes

- The chemicals are arranged in alphabetical order using their most common or trade names. If the chemical in question does not appear to be listed, it may be found elsewhere in the table under a pseudonym, in particular its IUPAC[15] name.

- **Please note:**
  - Any product that has limited compatibility (LC) at ambient temperatures should not be used at a higher temperature.
  - The list of compatibilities does not take into account any synergistic effects of more than one chemical present in the solution to be filtered.

[15] International Union of Pure and Applied Chemistry

6. Cartridge Cleanliness

TETPOR AIR filters must meet stringent standards to be certified pharmaceutical (P) grade product by Parker domnick hunter. One aspect of this is to confirm levels of potential contaminants that may be added to a process stream by the addition of the filter cartridge. Although this requirement is normally associated with sterile liquid filters, a number of tests have been conducted to demonstrate the cleanliness of the product when in contact with some common fluids to prove acceptability in applications such as vent filtration non WFI holding tanks.

6.1. Extractables

All pharmaceutical grade filters are designed and manufactured to yield a minimum of extractables. Testing of a purified water filtrate with TETPOR AIR is documented below.

Test Method (1)

Non-volatile extractables from purified water samples after flowing through an autoclaved 250mm (10") TETPOR AIR cartridge are listed below. The levels shown are the quantities present in 100ml samples of filtrate, which were taken at stages throughout a 10-litre flush.

Cartridge Serial No. ML4583

Flush Quantity (litres)	Non-volatile Extract (mg per 100 ml)	Oxidisables (per USP 23 Test Method)
1	0.5	PASS
2	0.1	PASS
4	<0.1	PASS
6	0.1	PASS
8	<0.1	PASS
10	<0.1	PASS

Test Method (2)

Non-volatile extractables from an autoclaved 250mm (10") TETPOR AIR cartridge and a B-size TETPOR AIR capsule were measured following a 4-hour dynamic immersion in a variety of commonly used solvents. The solvent volume used was 1500ml.

Solvent	Serial No. Cartridge	Weight of extract (mg)	Serial No. Capsule	Weight of extract (mg)
Water	M41711	2.2	A022783	<0.01
Iso Propyl Alcohol (IPA)	M41719	17.6	A022782	0.38
Ethanol	M41729	9.8	A022777	0.11
Methanol	M41717	12.0	A022773	3.00
Ammonium Hydroxide (pH 12)	M41708	0.8	A022776	<0.01
Hydrochloric acid (pH3)	M41714	8.3	A02274	<0.01

7. Tests for Biocompatibility

An independent research establishment has assessed the biological safety associated with the use of TETPOR AIR filters designed for processing pharmaceutical products.

The materials used in the construction of TETPOR AIR products meet the requirements of the current USP <88> Biological Reactivity tests at Plastics Class VI – 121^{o}C.

8. Certificate of Conformance

To certify that Parker domnick hunter's TETPOR AIR filter products meet the highest pharmaceutical quality and performance requirements, a Certificate of Conformance is issued.

Certificate of Conformance (2)

For Pharmaceutical Grade TETPOR AIR filters
Rated To 0.2 Micron(s)
This certifies that the dominick hunter filter ZCMT1/020C-A
Recorded Lot Number 1234567

has been manufactured in a purpose-built facility within a controlled environment and subjected to a purified water flush.

Materials of Construction
All components of the cartridge are manufactured from materials suitable for contact with food and conform to the biological safety requirements laid down in the current USP Class VI - 121°C Plastics. They also conform with the requirements for non fibre releasing filters as laid down in the United States FDA Title 21 CFR 211.72 and 210.3(b), (6).

The filters also meet the domnick hunter quality control and assurance standards.

Product Integrity
This product has successfully passed a non-destructive integrity test, which for sterilising grade cartridges is correlated to a bacterial challenge which gave a sterile effluent when challenged with a minimum of 10^7 organisms per sq cm.

The maximum diffusional flow value for this product is 18.0 mL/min at a test pressure of 800 mbar.

During validation, filter samples underwent the following tests and satisfactorily met the respective criteria specified:-

Effluent Quality

TOC
Met the requirements of USP Total Organic Carbon <643>

Bacterial Endotoxins
Cartridge aqueous extraction contains less than 0.125 EU/mL as determined using the Limulus Amebocyte Lysate (LAL)test, which meets the requirements of USP Water for Injection.

Water Conductivity
Met the requirements of USP Water Conductivity <645>

Particle Release
Met the requirements of USP Particulate Matter in Injections <788>

Thermal Stability

Integrity was maintained after 120 steam cycles of 30 minutes at 142° C

This product is registered with the Food & Drug Administration
Drug Master File No 7564

Quality Manager
Date of manufacture: 28/06/2010
Use by date: 28/06/2015

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Documentation Approval Section

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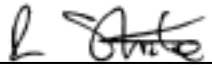
Signature: 

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