

3M Purification Inc.

Betapure™ AU Series Rigid Filter Media Cartridges and Capsules



**3M**

## Designed for Optimum Filtration Quality



Betapure™ AU series filter cartridges and capsules set the standard for filtration performance. Offering more grades with absolute reduction ratings than competitive filters, the controlled pore size of the Betapure AU series filter matrix allow for absolute distinction between cartridge grades to provide the most accurate and consistent filtration. The Betapure AU series filter provides:

- Precise Contaminant Reduction
- Consistent Effluent Quality
- Superior On-stream Service Life

Betapure AU series filters, available in 18 distinct grades with absolute ratings from 2 to 190 microns to tailor the exact selection of performance characteristics for the greatest filtration economy by providing distinct reduction cut-off points by particle size. Betapure AU series filter manufacturing combines advanced incoming material quality assurance, exacting in-process controls, and extensive final product testing and verification. The result is a filter product that provides consistent filtration lot-to-lot, filter-to-filter.

## Features & Benefits

### Absolute Ratings

- Consistent and reproducible contaminant reduction

### Rigid Structure

- Reduces cartridge by-pass and unloading to provide consistent filtration from start to finish

### Depth Filtration

- Excellent reduction of deformable contaminants for consistent effluent

### Gasket Design

- Reduces by-pass from poor to damaged seals

### Lower Pressure Drop

- Provides long service life while using smaller filter housings

### Available in standard cartridge and disposable capsules

- Wide range of filter sizes allows more appropriate filter sizing for batch and continuous processes

## Applications

<b>Coatings</b>	High Quality Paint, Film Coatings, Resins, and Ink
<b>Food &amp; Beverage</b>	Bottled Water, Pre-Ro, Blend Water, Wash Water
<b>General Industrial</b>	Desalination, Plating, Machine Tool Coolant, Process Water
<b>Pharmaceutical</b>	Water, Solvents, Chemicals, Pre-RO, Antibiotic Intermediate Production
<b>Electronics</b>	Pre-Ro, Wafer Slurries, Ceramic Slurries, Chemical Mechanical Polishing, Cathode Ray Tube Production, Disc Cleaning
<b>Chemical/Petro-Chemical</b>	Process Water, Pre-Ro, Amine, Fine Chemicals

## The Rigid Construction Advantage

To meet demanding filtration quality standards in today's market, absolute ratings will provide product consistency, and improve product yields.

The rigid filter structure retains consistent pore size even under severe process conditions. Changes such as those caused by pump fluctuations, stopping and restarting the system, or high differential pressure will have minimal, if any effect on product consistency. Depth filtration reduces deformable contaminants to help eliminate rework or product quality rejection.

Critical to any filtration process is the reduction of filter by-pass. A closed cell polyethylene foam gasket ensures proper cartridge sealing when using knife-edge housing systems.

Minimizing flow restriction dramatically reduces filtration cost! Lower pressure drops mean increased filter life, product throughput, and permit the use of fewer filters to achieve a given flow vs. differential pressure.

Filters appropriately sized for a specific application reduces total filtration costs including purchase, installation, and disposal.

## Performance Construction for Precision Filtration

Betapure™ AU series filter manufacturing utilizes state-of-the-art technology to produce a clean, rigid, filter structure with consistent and reproducible filtration characteristics. The filter matrix is constructed using long bicomponent fibers, each fiber having an inner core and an outer sheath (see picture top inset). Betapure AU series filters are available in two bicomponent fiber structures, polypropylene/polyethylene or polyester/co-polyester, to provide the greatest range of process compatibility.

The bicomponent fibers of the filter matrix are thermally bonded by utilizing the difference in melt temperatures of the two fiber components. Heating the matrix to the melt temperature of the polyethylene sheath, but below that of the polypropylene core, causes the fiber-to-fiber bond at every contact point. **The high degree of fiber-to-fiber bonding provides a rigid structure that eliminates the need for a core support and any possibility of media migration.**

The Betapure AU series filter ensures that the unwanted particles are removed because:

- The rigid structure maintains its porosity throughout the filter life.
- The depth structure reduces more difficult deformable contaminants.

With 18 distinct grades in absolute ratings from 2 to 190 microns to permit the exact filter performance selection, Betapure AU series filters provide the greatest filtration economy available.

### Enhanced Effluent Consistency

The sole purpose of filtration is to remove contaminants or materials that compromise product quality throughout the entire service life of the filter. A non-rigid filter's pore structure changes as the system differential pressure increases. The result is changing filtration efficiency and inconsistent performance during the filter's service life. This can only be corrected by a filter that retains its pore structure. Betapure AU series filters are manufactured with precise control of the filter porosity coupled with the rigid Betapure AU series structure to maintain its porosity throughout its service life. The result is consistent filtrate quality that is reproducible time after time, week after week, year after year.

### Reduction Ratings

3M uses a Multiple Parameter Characterization (MPC) that, unlike single point evaluations, determines a reduction rating over a range of particle sizes (multi-value) and the filter's service life (multi-point). The parameters measured include particle counts, turbidimetric efficiencies, and removal efficiencies.

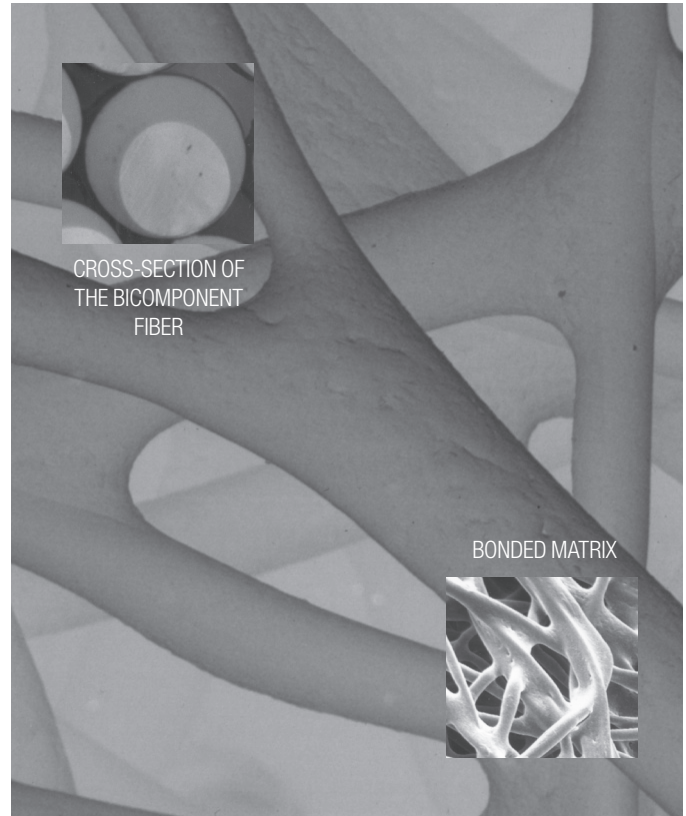


Table 1. – Polyolefin Betapure™ AU Series Ratings

Grade	Rating (mm)		Grade	Rating (mm)	
	Absolute	Nominal		Absolute	Nominal
Z13 - 020	2	0.2	B11	20	5
Z13 - 030	3	0.3	C11	30	10
Z13 - 050	5	0.5	E11	40	20
Z11 - 060	6	0.6	G11	70	30
Z11 - 070	7	0.7	L11	90	50
Z11 - 080	8	0.8	Q11	100	75
Z11 - 100	10	0.9	V11	140	100
Z11 - 120	12	1	W11	160	150
Z11 - 150	15	3	X11	190	175

Table 2. – Polyester Betapure™ AU Series Ratings

Grade	Rating (mm)	
	Absolute	Nominal
A12	8	3
B12	20	5
C12	30	10
E12	40	20
G12	70	30

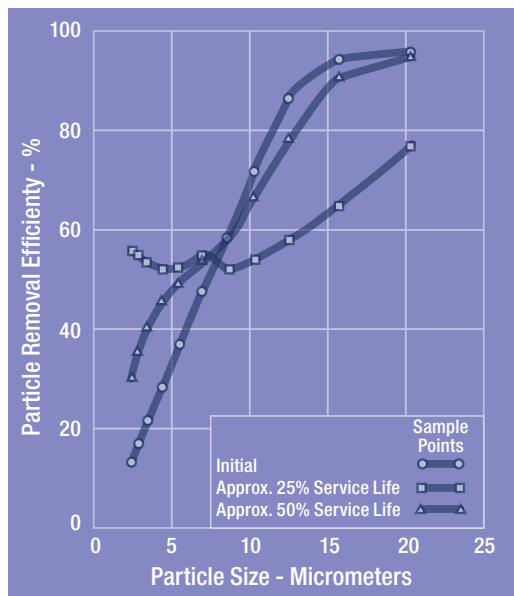
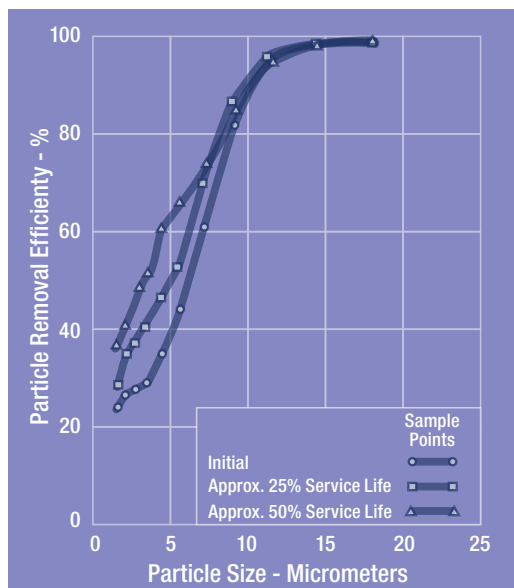
## Filtration Advantage - Rigid Construction

### How these tests were conducted...

3M Purification Inc. uses a Multiple Parameter Characterization (MPC) that, unlike single point evaluations, determines a reduction rating over a range of particle sizes (multi-value) and the filter's service life (multi-point). The parameters measured include particle counts, turbidimetric efficiencies, and removal efficiencies.

#### Conditions of Test

Flow:	3 gpm
Fluid:	Water



### Comparing Filtration Characteristics

The structure of the Betapure™ AU series cartridge provides filtration characteristics that are more consistent than competitive filter cartridges. The following curves show the filtration characteristics of the Betapure AU series cartridge compared to other polyolefin cartridges, typical polypropylene melt-blown and string-wound cartridges of equivalent removal rating.

### Betapure™ AU Series Filter

Note that the Betapure AU series filter exhibits excellent filtration capability during its service life. This is evident by the close proximity of the curves to one another. From start to finish, the filter performance does not vary. The rigid Betapure AU series filter structure resists deformation, particle unloading or filter bypass, and provides consistently high particle removal efficiency.

### Scientific Applications Support Services



The cornerstone of 3M philosophy is service to customers, not only in product quality and prompt delivery, but also in validation, application support and in the sharing of scientific information.

3M Purification Inc.'s Scientific Applications Support Services (SASS) works closely with customers to solve difficult filtration challenges and to recommend the most efficient, economical filter systems. SASS specialists can perform on-site testing and utilize filtration applications expertise to partner with customers. 3M resolves filtration problems promptly and efficiently in a cost-effective, confidential manner with a commercial support group consisting of 3M Purification's in-house customer service staff, application specialists, and engineering services. 3M Purification's broad distributor base and sales offices provide worldwide customer service, local inventory, and field support in virtually every major center of manufacturing.

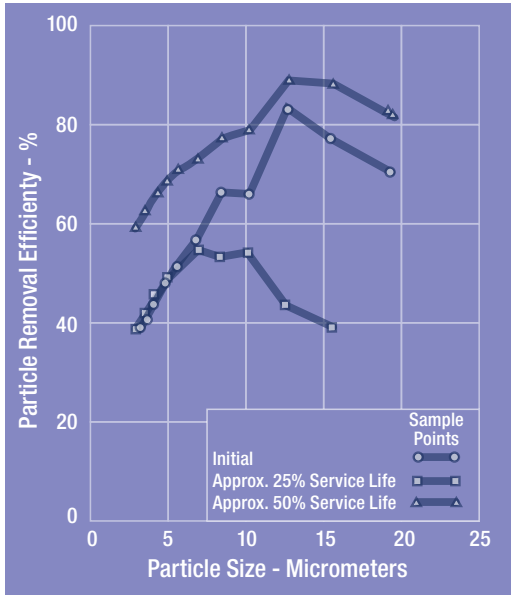
### Other Polyolefin Bicomponent Filters

Other bicomponent filters may look like Betapure AU series cartridges, but they can't match the performance. Note that immediately after the filter is put into service, the efficiency drops but then recovers to the initial efficiency. The inconsistent efficiency exhibited during the service life is reflected in poor effluent and is not reliable enough to satisfy the demand for exceptional product quality.

## Filtration Advantage - Rigid Construction

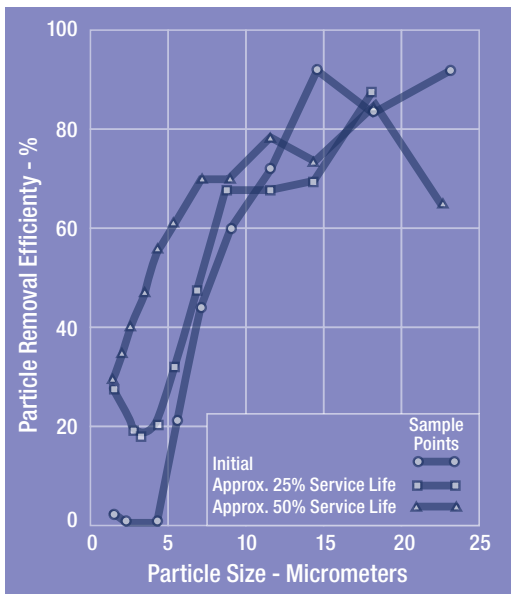
### String-Wound Filter

The competitive cartridge exhibits erratic filtration characteristics that dramatically fluctuate in response to increasing differential pressures.



### Melt-Blown Filter

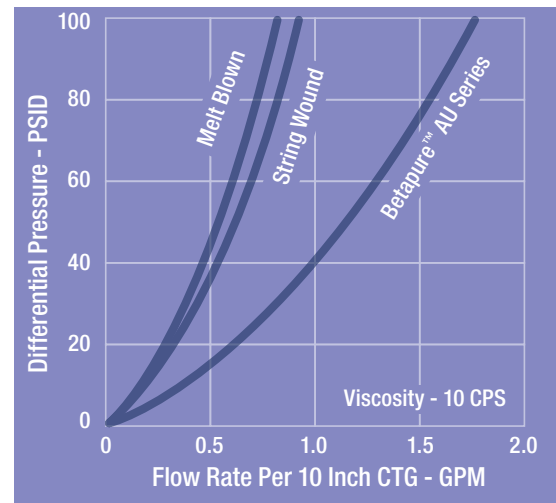
The compressible structure of a melt-blown filter exhibits wide fluctuations in performance efficiency as the system pressure changes. Such filtration characteristics lead to inconsistent and unpredictable product quality.



### Flow Characteristics

Betapure™ AU series exhibits superior flow characteristics for the same removal rating as other polyolefin fiber based cartridges. The curve shows that at a given flow rate the pressure drop across Betapure AU series is considerably lower than competitive products. The benefits of lower pressure drops are:

- Longer cartridge life
- Higher through puts
- Smaller housing requirements
- Lower overall costs



### Chemical Compatibility

Betapure AU series filters are composed of a bicomponent fibers, either polypropylene / polyethylene or polyester / copolyester, both offering broad chemical compatibility. Note that compatibility is always a function of exposure time, operating temperature, and chemical concentration. If compatibility is in question, 3M Purification recommends that the filter be tested. For more general information about Betapure AU series filter chemical compatibility, contact your local distributor and ask for 70-0201-8619-6.

### Regulatory Compliance

Standard Betapure AU series filters (polypropylene / polypropylene) comply with FDA regulations (CFR 21) for food and beverage applications. Betapure AU series filters have also been USP XXI Class VI (Safety Test for Plastics) tested and have been deemed suitable for pharmaceutical application. Detailed information about application compatibility and samples for testing are available by contacting your local 3M Purification representative.

## Operating Data

Operating Parameter	Description
Polyolefin Betapure™ AU Series	
Maximum Temperature	175 °F (80 °C)
Maximum Differential Pressure*	80 psid (5.5 bar) @ 68 °F (20 °C)
Polyester Betapure™ AU Series	
Maximum Operating Temperature *	250 °F (120 °C)
Maximum Differential Pressure*	80 psid (5.5 bar) @ 68 °F (20 °C)

\* Betapure AU series' rigid structure will tolerate up to 80 psid. Normally 3M recommends the use of the lowest possible flow rate and filter replacement at 35 psid to enhance both filter life and filtration efficiency.

### Disposal

Betapure™ AU series filter cartridges can be incinerated, shredded or crushed after use to reduce the overall disposal costs. For more information about Betapure AU series disposal, ask your local 3M distributor for 70020187434.

### Cartridge Configurations

All Betapure AU series cartridges are available in continuous multiple lengths up to 60 inches long, with various end treatments to fit your current housing (see ordering guide).

**Table 3. – Betapure™ AU Series Cartridge Parameters**

Parameter	Description
Length*	9 3/4" to 60" (24.8 - 152.4 cm)
Inside Diameter	1.0" (2.54 cm)
Outside Diameter	2.5" (6.35 cm)

\* Other sizes available on request, consult factory

### Special Configurations

Betapure AU series is available in special configurations upon request. The length, inside and outside diameters can be modified for your specific needs. Consult your local 3M Purification distributors for more information.

#### How to Determine Cartridge Flow Rates/Pressure Drop Sizing

Betapure AU series exhibits superior flow characteristics for the same micron rating compared to other fiber based cartridges. This allows for longer cartridge life, higher throughput, and smaller housing requirements. Table 4 provides flow information for Betapure AU Series filters in aqueous fluids.

The specific pressure drop values (psid/gpm) per 10" cartridge at 1 centipoise are provided for each filter grade. For fluids other than water, multiply the specific pressure drop value by the viscosity in centipoise. The specific pressure drop values may be effectively used when three of the four variables (viscosity, flow, differential pressure, and cartridge grade) are set.

**Table 4. – Betapure™ AU Series Filter Flow Information**

Grade	Absolute Rating (mm)	Specific Pressure Drop per 10" Cartridge*	
		psid/gpm	mbar/lpm
Polyolefin Betapure™ AU Series Filters			
B11	20	0.28	5.1
C11	30	0.12	2.18
E11	40	0.05	0.89
G11	70	0.03	0.55
L11	90	0.02	0.36
Q11	100	0.01	0.18
V11	140	0.007	0.127
W11	160	0.005	0.091
X11	190	0.004	0.074
Polyester Betapure™ AU Series			
A12	8	0.14	2.55
B12	20	0.11	2.00
C12	30	0.08	1.44
E12	40	0.03	0.55
G12	70	0.02	0.36
Betapure™ AU Series			
Z13-020	2	0.88	16.0
Z13-030	3	0.47	8.6
Z13-050	5	0.29	5.3
Z11-060	6	0.31	5.6
Z11-070	7	0.29	5.3
Z11-080	8	0.28	5.1
Z11-100	10	0.27	4.9
Z11-120	12	0.22	4.0
Z11-150	15	0.19	3.5

\* For multiple cartridge lengths, divide total flow by the number of single length equivalents.

**Example 1: Determine the initial pressure drop for water flowing at 15 gpm per 30" (C11) 30 µm cartridge.**

Fluid = Water (1 centipoise)  
 Flow = 15 gpm  
 Flow per 10" cartridge = 15 ÷ 3 = 5 gpm  
 Specific pressure drop from column 3 of Table 4 = 0.12  
 Calculate: 0.12 x 5 = 0.6 psi initial pressure drop (30" cartridge)

**Example 2: Determine the oil flow rate at an initial pressure drop of 2.0 psi per 10" (E11) 40 µm cartridge.**

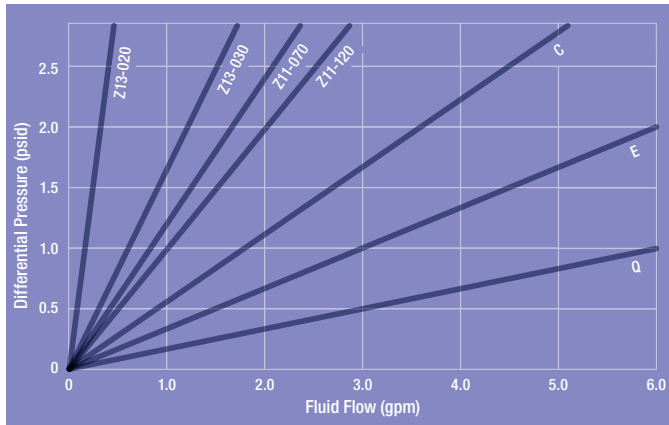
Fluid = 100 centipoise oil  
 Initial differential pressure = 2.0 psi  
 Specific pressure drop from column 3 of Table 4 = 0.05  
 Multiply psi/gpm x viscosity in centipoise = 0.05 x 100 = 5  
 Calculate: 2.0 (psi) x 5 (psi/gpm per 10" ctg) = 0.4 gpm (10" ctg)

# Betapure™ AU Series Rigid Filter Media Cartridges and Capsules

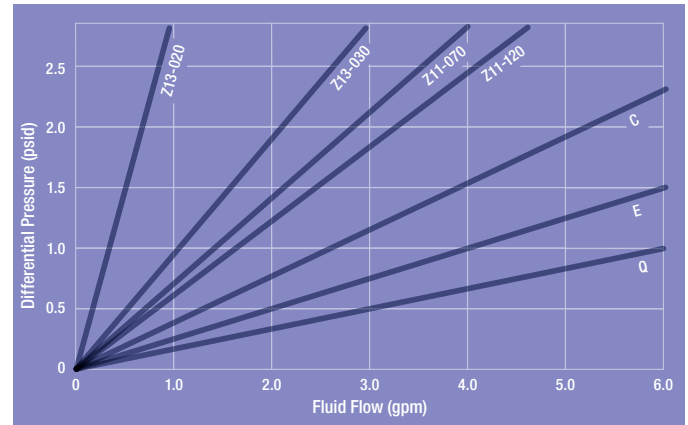
## Betapure™ AU Series Capsules

The Betapure™ AU series capsule is a polypropylene encapsulated filter that eliminates the need for a separate filter vessel. Available in a wide range of configurations (see ordering guide) including sanitary flange and hose barb connections, the 2.5" and 5" capsules are ideal for small batch and filter test applications. The following are typical water flow rates for Betapure AU series capsules with 1½" sanitary flange connections. Other end connections will affect maximum flow rates (see table at right). Consult factory representative for flow rates using optional end connections, request 70020301639, or visit [www.3MPurification.com](http://www.3MPurification.com).

Flow Rates for 2 ½" Capsules with 1 ½" Sanitary Flanges @ 20 °C



Flow Rates for 5" Capsules with 1 ½" Sanitary Flanges @ 20 °C



### Betapure™ AU Series Capsule – Materials of Construction

All Betapure Filter Media	Bi-component polypropylene / polyethylene fibers
Z11 Filter Media	Includes a polypropylene insert
Z13 Filter Media	Includes a glass paper insert
Capsule Body	PolyPropylene
Vent/drain O-rings	See ordering guide

### Betapure™ AU Series Capsule – Maximum Recommended Flow by Configuration

End Connection	Maximum Flow Rate (gpm)	Housing Pressure Loss (psid)
1½" Sanitary Flange	6.00	1.00
¾" FNPT	6.00	1.00
½" Hose Barb	3.00	1.50
¼" MNPT	1.50	2.40
Tapered Hose Barb	0.50	2.20

## Filter Systems

3M Purification Inc. manufactures a full line of Betapure AU Series compatible filter housings and a wide variety of industrial filter media to meet most application requirements. Housing Models are available for both air and liquid applications in a wide range of construction materials, from plastics to ASME Code Design 316L stainless steel, to suit a variety of application needs. For more information about 3M Purification filter housings and other filter media, consult your local 3M Purification distributor.

### Important Notice

The information described in this literature is accurate to the best of our knowledge. A variety of factors, however, can affect the performance of the Product(s) in a particular application, some of which are uniquely within your knowledge and control. **INFORMATION IS SUPPLIED UPON THE CONDITION THAT THE PERSONS RECEIVING THE SAME WILL MAKE THEIR OWN DETERMINATION AS TO ITS SUITABILITY FOR THEIR USE. IN NO EVENT WILL 3M PURIFICATION INC. BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON INFORMATION.**

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# Betapure™ AU Series Cartridge Ordering Guide

Cartridge Type	Length	Grade/Rating (µm)	Media	End Modification	Gasket or O-ring Material
AU	09 - 9 3/4" 10 - 10" 19 - 19 1/2" 20 - 20" 29 - 29 1/4" 30 - 30" 39 - 39" 40 - 40"	A* / 8 B / 20 C / 30 E / 40 G / 70 L** / 90 Q** / 100 V** / 140 W** / 160 X** / 190	11 - Polyolefin 12 - Polyester	A - Millipore** B - Code 7 Bayonet Lock C - Code 8 Double O-ring D - Double Open End W/Hard Cap 10" Nom. Length E - Double Open End W/Hard Cap 9 3/4" Nom. Length F - Code 3 Double O-ring K - Code 3 Single O-ring W/Polypropylene Snap Ring H - Gelman Internal O-ring** N - No End Modification	A - Silicone B - Fluorocarbon C - EPR D - Nitrile  G - Polyethylene** N - None

\* Available in polyester only, requires end modification \*\*Available in polyolefin only

# Betapure™ AU Series Grade Cartridge Ordering Guide\*

Cartridge Type	Length	Grade Designation	End Modification	Gasket or O-ring Material	Removal Rating
AU	09 - 9 3/4" 10 - 10" 19 - 19 1/2" 20 - 20" 29 - 29 1/4" 30 - 30" 39 - 39" 40 - 40"	Z11 - Polypropylene insert Z13 - Glass Paper insert	A - Millipore B - Code 7 Bayonet Lock C - Code 8 Double O-ring D - Double Open End W/Hard Cap 10" Nom. Length E - Double Open End W/Hard Cap 9 3/4" Nom. Length F - Code 3 Double O-ring K - Code 3 Single O-ring W/Snap Ring H - Gelman Internal O-ring** N - No End Modification	A - Silicone B - Fluorocarbon C - EPR D - Nitrile  G - Polyethylene**	Z13 MATERIAL ONLY 020 - 2µm Abs. 030 - 3µm Abs. 050 - 5µm Abs.  Z11 MATERIAL ONLY 060 - 6µm Abs. 070 - 7µm Abs. 080 - 8µm Abs. 100 - 10µm Abs. 120 - 12µm Abs. 150 - 15µm Abs.

# Betapure™ AU Series Filter Capsule Ordering Guide

Cartridge Type	Grade		Configuration	Nominal Length	End Connection	Vent O-ring Option	Packaging Option
	Code*	Rating (µm)					
AU	Z13020 Z13030 Z13050 Z11060 Z11070 Z11080 Z11100 Z11120 Z11150 B11 C11 E11 G11 L11 Q11 V11 W11 X11	2 3 5 6 7 8 10 12 15 20 30 40 70 90 100 140 160 190	C = Capsule	01 = 2 1/2" 02 = 5"	A = 1 1/2" sanitary flange B = 1/2" (14mm) hose barb C = 1/4" MNPT D = 3/8" FNPT E = 1/4" - 5/16" - 3/8" tapered hose barb	A = Silicone B = Fluorocarbon C = EPR	01 = single pack 03 = 3 pack 20 = 20 pack

\* Grades Z13020 through Z13050 employ a glass paper insert, grades Z11060 through Z11150 employ a polypropylene insert.



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