

3M Science.
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Separation and Purification Sciences Division

**Betapure™ AU Series
Rigid Filter Media Cartridges**

Designed for Optimum Filtration Quality



Betapure™ AU series filter cartridges set the standard for filtration performance. The controlled pore size of the filter matrix allows for absolute distinction between cartridge grades to provide accurate and consistent filtration. The Betapure AU series filters provide:

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

Betapure AU series filters are available in 18 distinct grades with absolute ratings from 2 to 190 microns. By providing distinct reduction cut-off points by particle size, exact filtration performance characteristics can be selected. 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 designed to provide 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 within a small filter housing

Available in standard cartridge

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

Applications

Coatings	High Quality Paint, Film Coatings, Resins, and Inks
General Industrial	Desalination, Plating, Process Water
Electronics	Pre-RO, Ceramic Slurries, Chemical Mechanical Polishing
Chemical/Petro-Chemical	Process Water, Pre-RO

The Rigid Construction Advantage

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

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.

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

Filters appropriately sized for a specific application will provide longer service life, thereby reducing costs associated with frequency of purchase, installation, and disposal.

Designed for Optimum Filtration Quality

Betapure™ AU series filter manufacturing technology produces 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, for compatibility in a wide range of industrial processes.

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 does not require a core support.**

The Betapure AU series filter efficiently reduces unwanted particles by:

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

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

Enhanced Effluent Consistency

The sole purpose of filtration is to help 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 reproducible, consistent filtrate quality.

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. – 3M Betapure™ AU Series Polyester Filter, ratings, from 8 to 70 microns absolute (3 to 30 nominal).

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

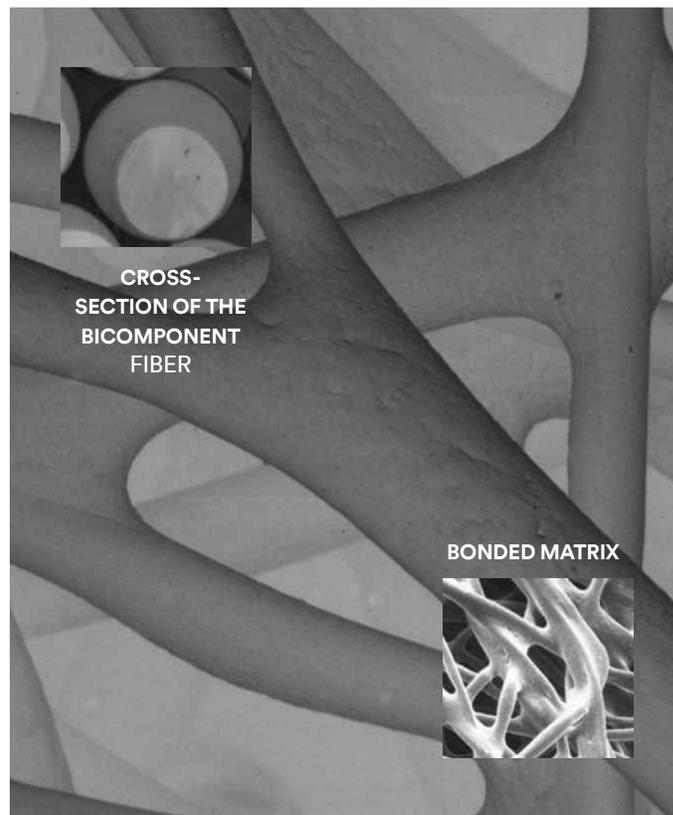


Table 2. – Betapure™ AU Series Polyolefin Filter, Z Grade ratings, from 2 to 15 microns absolute (0.2 to 3 nominal).

Grade	Rating (µm)	
	Absolute	Nominal
Z13 - 020	2	0.2
Z13 - 030	3	0.3
Z13 - 050	5	0.5
Z11 - 060	6	0.6
Z11 - 070	7	0.7
Z11 - 080	8	0.8
Z11 - 100	10	0.9
Z11 - 120	12	1
Z11 - 150	15	3

Table 2. continued - Betapure™ AU Series Polyolefin Filter, ratings, from 20 to 190 microns absolute (5 to 175 nominal).

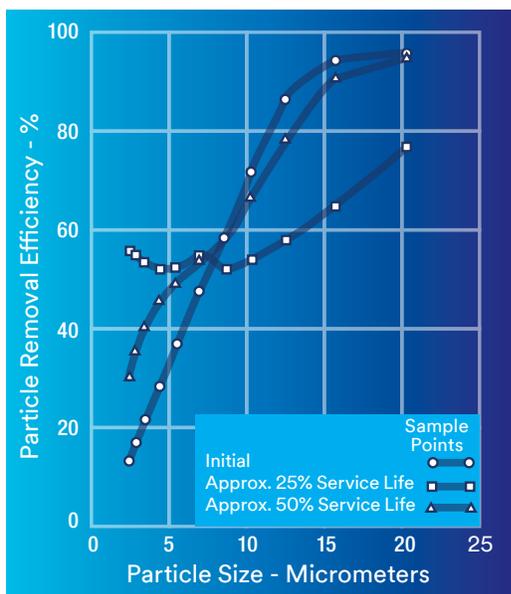
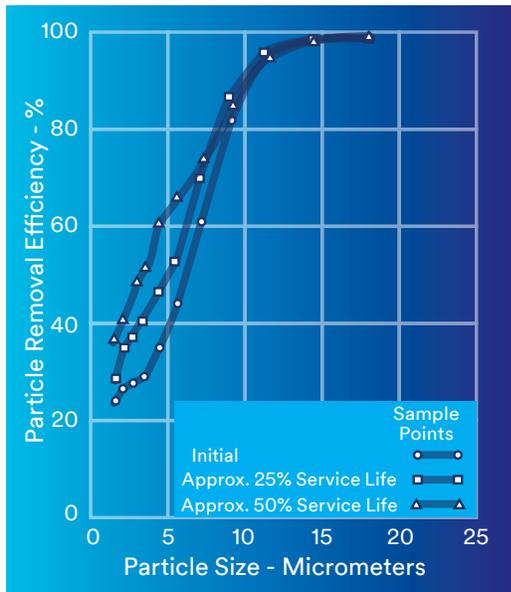
Grade	Rating (µm)	
	Absolute	Nominal
B11	20	5
C11	30	10
E11	40	20
G11	70	30
L11	90	50
Q11	100	75
V11	140	100
W11	160	150
X11	190	175

Filtration Advantage - Rigid Construction

How these tests were conducted...

3M Separation and Purification Sciences Division 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 demonstrate consistency. The Particle Removal Efficiency 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 by-pass, and provides consistently



high particle removal efficiency.

Applications Engineering

3M Purification, Inc., Industrial Products has a global team of

market-focused scientists and engineers who excel in supporting and collaborating with end-users. Our technical teams are skilled in performing on-site bench-scale or in-house tests, and relating results to full scale manufacturing operations and optimizing cost of purification. When unique processing problems are encountered, our product and application specialists are equipped to identify solutions using either 3M's broad array of existing products or potentially develop a custom solution for your application.

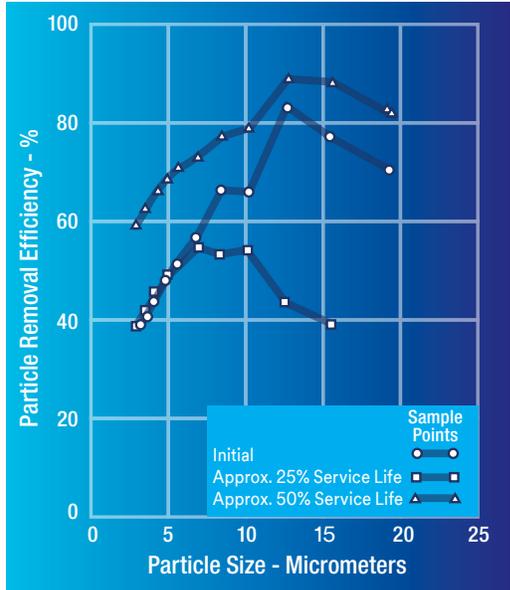
Other Polyolefin Bicomponent Filters

Other bicomponent filters may look like 3M's, but their performance is a clear indication they are not Betapure AU series cartridges. Note that immediately after the other filters are put into service, the efficiency drops but then recovers to the initial efficiency. Inconsistent efficiency exhibited during a filter's service life affects effluent quality, which may not be reliable enough to satisfy the demand for exceptional product quality.

Filtration Advantage - Rigid Construction

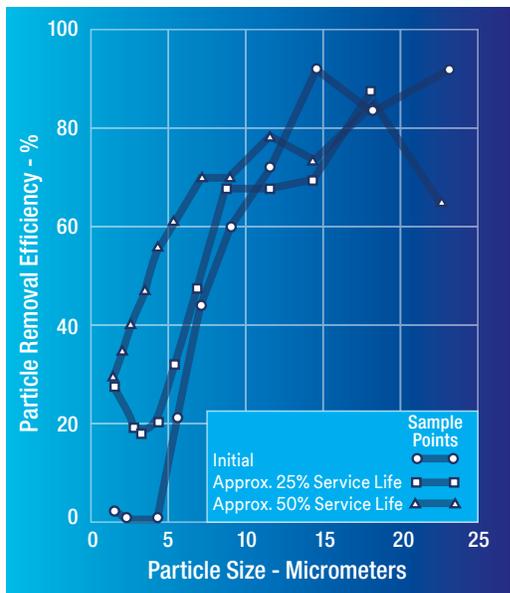
String-Wound Filter

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



Melt-Blown Filter

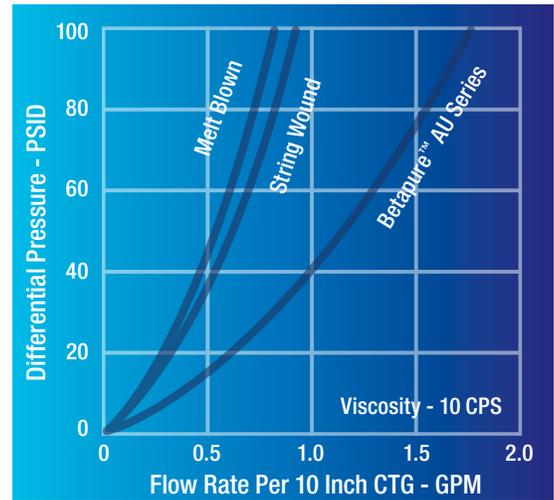
The compressible structure of a melt-blown filter exhibits wide fluctuations in performance efficiency as the system pressure changes. Such filtration characteristics lead to inconsistent and unpredictable product quality.



Flow Characteristics

Betapure™ AU series filters exhibit 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 filters is considerably lower than that of the competitive products tested. The benefits of lower pressure drops are:

- Longer cartridge life
- Higher throughputs
- 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 SPSSD recommends that the filter be tested. For more general information about Betapure AU series filter chemical compatibility, contact your local distributor.

Regulatory Compliance

Standard Betapure AU series filters (polypropylene/ polypropylene) are constructed of FDA CFR-21 compliant material for food and beverage applications. Detailed information about application compatibility and samples for testing are available by contacting your local 3M SPSSD representative.

Betapure™ AU Series Filters Operating Data

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

* Betapure AU series filter's 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

Depending upon the substance contained within the used filter cartridges, and in accordance with federal, state, and local regulations regarding its handling and disposal, Betapure AU series filter cartridges can be incinerated, shredded or crushed after use to reduce disposal costs related to volume.

Cartridge Configurations

All Betapure AU series filter cartridges are available in continuous multiple lengths up to 40 inches long, with various end treatments to fit your current housing (see ordering guide).

Table 3. – Betapure™ AU Series Filter Cartridge Parameters

Parameter	Description
Length*	9 3/4" to 40" (24.8 - 101.6 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 filter cartridges are available in special configurations upon request. The length, inside and outside diameters can be modified for your specific needs. Consult your local 3M SPSD distributors for more information.

Table 4. – Betapure™ AU Series Filter Flow Information

Grade	Absolute Rating (µm)	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 Filters			
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
3M Betapure™ AU Series Filters			
Z13-020	2	0.88	16.0
Z13-030	3	0.47	8.6
Z13-050	5	0.29	5.3
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.

How to Determine Cartridge Flow Rates/ Pressure Drop Sizing

Betapure™ AU series filters exhibit superior flow characteristics compared to other fiber-based cartridges of the same micron rating. 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.

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

Fluid = Water (1 centipoise)
 Flow = 15 gpm
 Flow per 10” cartridge = $15 \div 3 = 5$ gpm
 Specific pressure drop from column 3 of Table 4 = 0.12
 Calculate: $0.12 \times 5 = 0.6$ 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 micron 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 = $0.05 \times 100 = 5$
 Calculate: $2.0 \text{ (psi)} / 5 \text{ (psi/gpm per 10” ctg)} = 0.4$ gpm (10” ctg)

Filter Systems

3M Separation and Purification Sciences Division 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 SPSP filter housings and other filter media, consult your local 3M SPSP distributor.

Technical Information:
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Betapure™ AU Series Filter Cartridge Ordering Guide

Cartridge Type	Length	Grade/Removal Rating (micron)	Media	End Modification	Gasket or O-ring Material
AU	09 - 9 3/4"	A* / 8	11 - Polyolefin 12 - Polyester	C - Code 8 Double O-ring F - Code 3 Double O-ring N - No End Modification	A - Silicone B - Fluorocarbon C - EPR D - Nitrile G - Polyethylene (with Polyolefin media only) N - None
	10 - 10"	B / 20			
	19 - 19 1/2"	C / 30			
	20 - 20"	E / 40			
	29 - 29 1/4"	G / 70			
	30 - 30"	L** / 90			
	39 - 39"	Q** / 100			
	40 - 40"	V** / 140			
		W** / 160			
		X** / 190			

* Available in Polyester only, requires end modification.

** Available in Polyolefin only.

Part number example: AU09B11CA is a 3M Betapure AU Series filter cartridge, 9 3/4" long, 20 micron, Polyolefin Media, Code 8 Double O-ring style with Silicone O-ring.

Betapure™ AU Series “Z” Grade Polyolefin Filter Cartridge Ordering

Cartridge Type	Length	Grade Designation	End Modification	Gasket or O-ring Material	Grade/Removal Rating (micron)
AU	09 - 9 3/4"	Z11 - Polypropylene insert Z13 - Glass Paper insert	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 N - No End Modification	A - Silicone B - Fluorocarbon C - EPR D - Nitrile G - Polyethylene (with Polyolefin media only)	Z13 MATERIAL ONLY
	10 - 10"				020 - 2µm Abs.
	19 - 19 1/2"				030 - 3µm Abs.
	20 - 20"				050 - 5µm Abs.
	29 - 29 1/4"				Z11 MATERIAL ONLY
	30 - 30"				070 - 7µm Abs.
	39 - 39"				080 - 8µm Abs.
	40 - 40"				100 - 10µm Abs. 120 - 12µm Abs. 150 - 15µm Abs.

09, 19, 29, 39 Lengths available with E & N end modifications only.

10, 20, 30, 40 Lengths not available with E end modifications.

Part number example: AU09Z11CA080 is a 3M Betapure AU Series “Z” grade filter cartridge, 9 3/4" long, Polypropylene insert, Code 8 Double O-ring style with Silicone O-ring, 8 micron.

PLEASE NOTE: The Ordering Guides above are for reference only. Not all combinations are available. Please consult with your 3M representative to determine the appropriate part number for your application.



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