

ReadyToProcess™

hollow fiber cartridges

BIOPROCESS™ FILTRATION

ReadyToProcess™ hollow fiber cartridges are designed to help you simplify and speed up drug development and production by minimizing device preparation steps such as wetting and sterilizing. Because of the single-use nature of the cartridges, you can eliminate the need for cleaning protocols and cleaning validation. ReadyToProcess hollow fiber cartridges incorporate ReadyMate™ disposable aseptic connectors (DAC), which allow you to install and aseptically connect the cartridges to other components within Cytiva's ReadyToProcess product platform, including BioProcess™ containers and tubing assemblies.

For your peace of mind, ReadyToProcess hollow fiber cartridges are supplied preconditioned for reduced conductivity and total organic carbon (TOC) level and processed to minimize endotoxin and bioburden levels. The cartridges are packaged and sterilized by gamma irradiation.

ReadyToProcess hollow fiber cartridges offer the following benefits:

- Preconditioned for reduced conductivity and TOC level
- Gamma irradiated for sterility to an assurance level of 10^{-6}
- Processed to minimize endotoxin and bioburden levels
- Supplied fully wet for quick start-up
- Incorporate ReadyMate DACs for easy installation and aseptic connections to ReadyCircuit™ products
- Enable optimized process throughput

ReadyToProcess hollow fiber cartridges are available in a wide variety of ultrafiltration molecular weight cut-offs (MWCO) and microfiltration pore sizes, to allow scalability from laboratory to production scale.

Compatible systems

ReadyToProcess hollow fiber cartridges are compatible with the following filtration systems:

- Xcellerex™ automated perfusion system (APS)
- ÄKTA readyflux™ automated filtration system

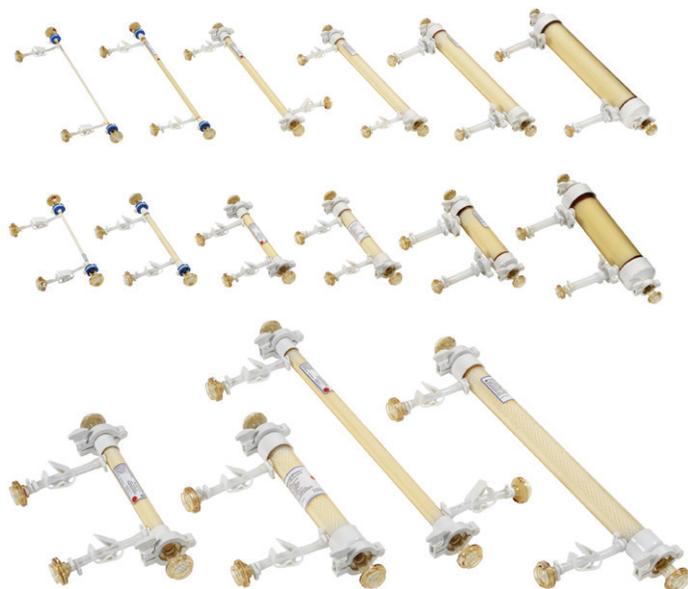


Fig 1. ReadyToProcess hollow fiber cartridges.

ReadyToProcess product platform

ReadyToProcess hollow fiber cartridges are part of the ReadyToProcess product platform, a suite of products that brings a comprehensive offering of ready-to-use cell culture, purification, and fluid management products such as:

- ReadyToProcess columns and ÄKTA ready™ automated chromatography system
- WAVE Bioreactor™ systems and Cellbag™ bioreactor chambers
- ReadyCircuit bioprocessing containers and tubing assemblies
- ReadyKart hardware and portability solutions
- ReadyMate disposable aseptic connectors

Applications

Typical applications for ReadyToProcess hollow fiber cartridges are:

- Aseptic clarification and purification of vaccines, monoclonal antibodies, recombinant proteins, and plasmids
- Aseptic cell processing
- Operations in environments where terminal sterilization is not feasible
- Across all stages of production, from preclinical to commercial stages
- Processing in areas where the risk of cross-contamination is high

Specifications

Specifications for ReadyToProcess hollow fiber cartridges are listed in Tables 1 to 3.

Table 1. Operating specifications

Ultrafiltration	
Temperature range	4°C to 80°C
Maximum feed pressure	< 10°C: 5.2 barg (75 psig)
	10°C to 25°C: 4.5 barg (65 psig)
	25°C to 80°C: 3.4 barg (50 psig)
Maximum transmembrane pressure	10 000 to 30 000 MWCO:
	< 10°C: 4.1 barg (60 psig)
	10°C to 25°C: 3.4 barg (50 psig)
	25°C to 50°C: 3.1 barg (45 psig)
	50°C to 80°C: 2.4 barg (35 psig)
	50 000 to 750 000 MWCO:
< 10°C: 3.4 barg (50 psig)	
	10°C to 25°C: 3.1 barg (45 psig)
	25°C to 50°C: 2.4 barg (35 psig)
	50°C to 80°C: 1.7 barg (25 psig)
Microfiltration	
Temperature range	0.1 to 0.2 µm: 4°C to 80°C
	0.45 to 0.65 µm: 4°C to 50°C
Maximum feed pressure	At 25°C:
	0.1 µm: 2.1 barg (30 psig)
	0.2 µm: 1.7 barg (25 psig)
	0.45 µm: 1.0 barg (15 psig)
	0.65 µm: 1.0 barg (15 psig)
Maximum transmembrane pressure	At 25°C:
	0.1 µm: 1.4 barg (20 psig)
	0.2 µm: 1.0 barg (15 psig)
	0.45 µm: 0.7 barg (10 psig)
	0.65 µm: 0.7 barg (10 psig)

Table 2. Technical specifications

Size	Cartridge diameter
3, 3X2	0.9 cm (0.375 in.)
4, 4X2	1.9 cm (0.75 in.)
5, 6	3.2 cm (1.25 in.)
8, 9	5.1 cm (2 in.)
35, 55	7.6 cm (3 in.)
45, 65	10.8 cm (4.25 in.)
152	16.8 cm (6.6 in.)
Size	Path length
3, 4, 5, 8, 35, 45	30 cm (12 in.)
3X2, 4X2, 6, 9, 55, 65, 152	60 cm (24 in.)
Fluid connections (excludes size 152)	
Feed/retentate	ReadyMate connector
Permeate	ReadyMate connector
Materials of construction	
Cartridge housing, fittings, fiber	Polysulfone
Cartridge sleeve	Polypropylene
Fiber net	Polyethylene
Fiber potting	Epoxy
Permeate tubing	C-Flex™ (3, 3X2) AdvantaPure™ (4, 4X2, 5, 6, 8, 9, 35, 55, 45, 65)
ReadyMate connectors	Polycarbonate, silicone
Gaskets	Silicone
Regulatory conformance	
EMA/410/01	Compliant
Biological Reactivity Test, <i>In vivo</i> per USP <88> Class VI	Compliant
21CFR177 Indirect Food Additives	Compliant (except size 3 and 3X2)
L929 MEM Elution Test – ISO 10993-5 (Cytotoxicity)	Compliant
Hemolysis – rabbit blood (direct contact) – ISO 10993-4	Compliant

Table 3. Nominal feed stream flow rates in mL/min*

Nominal lumen i.d. (mm)	Shear rate ~ 2000 s ⁻¹	Shear rate ~ 4000 s ⁻¹	Shear rate ~ 8000 s ⁻¹	Shear rate ~ 16 000 s ⁻¹
Size 3 and 3X2				
0.50	60	120	250	500
0.75	100	200	400	800
1.00	150	300	600	1200
Size 4 and 4X2				
0.50	300	600	1200	2400
0.75	400	800	1500	3000
1.00	600	1200	2500	5000
Size 5 and 6				
0.50	1100	2100	4300	8600
0.75	1400	2800	5600	11 200
1.00	2000	4000	8000	16 000
Size 8 and 9				
0.50	2700	5400	10 600	21 500
0.75	4400	8800	18 000	35 000
1.00	6100	12 200	24 500	49 000
Size 35 and 55				
0.50	6600	13 200	26 000	52 000
0.75	10 000	20 000	40 000	80 000
1.00	15 000	30 000	60 000	120 000
Size 45 and 65				
0.50	14 000	28 000	55 000	111 000
0.75	19 000	39 000	77 000	154 000
1.00	31 000	61 000	122 000	245 000
Size 152				
1.00	70 000	140 000	280 000	560 000

*Based on a fluid viscosity of 1 cP.

Ordering information

ReadyToProcess hollow fiber ultrafiltration cartridges

Product code	Pore size (MWCO)	Fiber i.d. (mm)	Membrane surface area (m ²)	Membrane surface area (ft ²)	Nominal flow path length (cm)
RTPUFP-10-C-3X2MS	10 000	0.5	0.029	0.31	60
RTPUFP-30-C-3X2MS	30 000	0.5	0.029	0.31	60
RTPUFP-50-C-3X2MS	50 000	0.5	0.029	0.31	60
RTPUFP-100-C-3X2MS	100 000	0.5	0.029	0.31	60
RTPUFP-300-C-3X2MS	300 000	0.5	0.029	0.31	60
RTPUFP-500-C-3X2MS	500 000	0.5	0.029	0.31	60
RTPUFP-750-C-3X2MS	750 000	0.5	0.029	0.31	60
RTPUFP-750-E-3X2MS	750 000	1.0	0.023	0.24	60
RTPUFP-10-C-4MS	10 000	0.5	0.065	0.70	30
RTPUFP-30-C-4MS	30 000	0.5	0.065	0.70	30
RTPUFP-50-C-4MS	50 000	0.5	0.065	0.70	30
RTPUFP-100-C-4MS	100 000	0.5	0.065	0.70	30
RTPUFP-300-C-4MS	300 000	0.5	0.065	0.70	30
RTPUFP-500-C-4MS	500 000	0.5	0.065	0.70	30
RTPUFP-750-C-4MS	750 000	0.5	0.065	0.70	30
RTPUFP-750-E-4MS	750 000	1.0	0.042	0.45	30
RTPUFP-10-C-4X2MS	10 000	0.5	0.140	1.50	60
RTPUFP-30-C-4X2MS	30 000	0.5	0.140	1.50	60
RTPUFP-50-C-4X2MS	50 000	0.5	0.140	1.50	60
RTPUFP-100-C-4X2MS	100 000	0.5	0.140	1.50	60
RTPUFP-300-C-4X2MS	300 000	0.5	0.140	1.50	60
RTPUFP-500-C-4X2MS	500 000	0.5	0.140	1.50	60
RTPUFP-750-C-4X2MS	750 000	0.5	0.140	1.50	60
RTPUFP-750-E-4X2MS	750 000	1.0	0.085	0.90	60
RTPUFP-10-C-5S	10 000	0.5	0.200	2.10	30
RTPUFP-30-C-5S	30 000	0.5	0.200	2.10	30
RTPUFP-50-C-5S	50 000	0.5	0.200	2.10	30
RTPUFP-100-C-5S	100 000	0.5	0.200	2.10	30
RTPUFP-300-C-5S	300 000	0.5	0.200	2.10	30
RTPUFP-500-C-5S	500 000	0.5	0.200	2.10	30
RTPUFP-750-C-5S	750 000	0.5	0.200	2.10	30
RTPUFP-750-E-5S	750 000	1.0	0.120	1.30	30
RTPUFP-10-C-6S	10 000	0.5	0.480	5.20	60
RTPUFP-30-C-6S	30 000	0.5	0.480	5.20	60
RTPUFP-50-C-6S	50 000	0.5	0.480	5.20	60
RTPUFP-100-C-6S	100 000	0.5	0.480	5.20	60
RTPUFP-300-C-6S	300 000	0.5	0.480	5.20	60
RTPUFP-500-C-6S	500 000	0.5	0.480	5.20	60
RTPUFP-750-C-6S	750 000	0.5	0.480	5.20	60
RTPUFP-750-E-6S	750 000	1.0	0.280	3.00	60
RTPUFP-10-C-8S	10 000	0.5	0.530	5.70	30
RTPUFP-30-C-8S	30 000	0.5	0.530	5.70	30
RTPUFP-50-C-8S	50 000	0.5	0.530	5.70	30
RTPUFP-100-C-8S	100 000	0.5	0.530	5.70	30
RTPUFP-300-C-8S	300 000	0.5	0.530	5.70	30
RTPUFP-500-C-8S	500 000	0.5	0.530	5.70	30
RTPUFP-750-C-8S	750 000	0.5	0.530	5.70	30
RTPUFP-750-E-8S	750 000	1.0	0.360	3.90	30

ReadyToProcess hollow fiber ultrafiltration cartridges continued

Product code	Pore size (MWCO)	Fiber i.d. (mm)	Membrane surface area (m ²)	Membrane surface area (ft ²)	Nominal flow path length (cm)
RTPUFP-10-C-9S	10 000	0.5	1.150	12.50	60
RTPUFP-30-C-9S	30 000	0.5	1.150	12.50	60
RTPUFP-50-C-9S	50 000	0.5	1.150	12.50	60
RTPUFP-100-C-9S	100 000	0.5	1.150	12.50	60
RTPUFP-300-C-9S	300 000	0.5	1.150	12.50	60
RTPUFP-500-C-9S	500 000	0.5	1.150	12.50	60
RTPUFP-750-C-9S	750 000	0.5	1.150	12.50	60
RTPUFP-750-E-9S	750 000	1.0	0.840	9.00	60
RTPUFP-500-C-35S	500 000	0.5	1.350	14.50	30
RTPUFP-750-C-35S	750 000	0.5	1.350	14.50	30
RTPUFP-500-C-55S	500 000	0.5	3.250	35.00	60
RTPUFP-750-C-55S	750 000	0.5	3.250	35.00	60
RTPUFP-10-C-45S	10 000	0.5	3.500	37.00	30
RTPUFP-750-C-45S	750 000	0.5	3.500	37.00	30
RTPUFP-10-C-65S	10 000	0.5	6.100	66.00	60
RTPUFP-30-C-65S	30 000	0.5	6.100	66.00	60
RTPUFP-100-C-65S	100 000	0.5	6.100	66.00	60
RTPUFP-500-C-65S	500 000	0.5	6.100	66.00	60
RTPUFP-750-C-65S	750 000	0.5	6.100	66.00	60
RTPUFP-10-E-65S	10 000	1.0	4.400	47.00	60
RTPUFP-30-E-65S	30 000	1.0	4.400	47.00	60
RTPUFP-750-E-65S	750 000	1.0	4.400	47.00	60
RTPUFP-10-E-152 [†]	10 000	1.0	8.300	89.30	60
RTPUFP-30-E-152 [†]	30 000	1.0	8.300	89.30	60
RTPUFP-750-E-152 [†]	750 000	1.0	8.300	89.30	60

[†]Size 152 cartridges do not carry a sterile claim due to their non-self-contained design but are exposed to the same radiation dose as the remainder of the product line.

ReadyToProcess hollow fiber microfiltration cartridges

Product code	Pore size (µm)	Fiber i.d. (mm)	Membrane surface area (m ²)	Membrane surface area (ft ²)	Nominal flow path length (cm)
RTPCFP-1-E-3MS	0.10	1.00	0.011	0.12	30.0
RTPCFP-2-E-3MS	0.20	1.00	0.011	0.12	30.0
RTPCFP-4-E-3MS	0.45	1.00	0.011	0.12	30.0
RTPCFP-6-D-3MS	0.65	0.75	0.012	0.13	30.0
RTPCFP-1-E-3X2MS	0.10	1.00	0.023	0.24	60.0
RTPCFP-2-E-3X2MS	0.20	1.00	0.023	0.24	60.0
RTPCFP-4-E-3X2MS	0.45	1.00	0.023	0.24	60.0
RTPCFP-6-D-3X2MS	0.65	0.75	0.027	0.29	60.0
RTPCFP-1-E-4MS	0.10	1.00	0.042	0.45	30.0
RTPCFP-2-E-4MS	0.20	1.00	0.042	0.45	30.0
RTPCFP-4-E-4MS	0.45	1.00	0.042	0.45	30.0
RTPCFP-6-D-4MS	0.65	0.75	0.046	0.50	30.0
RTPCFP-1-E-4X2MS	0.10	1.00	0.085	0.91	60.0
RTPCFP-2-E-4X2MS	0.20	1.00	0.085	0.91	60.0
RTPCFP-4-E-4X2MS	0.45	1.00	0.085	0.91	60.0
RTPCFP-6-D-4X2MS	0.65	0.75	0.095	1.02	60.0

ReadyToProcess hollow fiber microfiltration cartridges continued

Product code	Pore size (µm)	Fiber i.d. (mm)	Membrane surface area (m ²)	Membrane surface area (ft ²)	Nominal flow path length (cm)
RTPCFP-1-E-5S	0.10	1.00	0.120	1.30	30.0
RTPCFP-2-E-5S	0.20	1.00	0.120	1.30	30.0
RTPCFP-4-E-5S	0.45	1.00	0.120	1.30	30.0
RTPCFP-6-D-5S	0.65	0.75	0.160	1.70	30.0
RTPCFP-1-E-6S	0.10	1.00	0.280	3.00	60.0
RTPCFP-2-E-6S	0.20	1.00	0.280	3.00	60.0
RTPCFP-4-E-6S	0.45	1.00	0.280	3.00	60.0
RTPCFP-6-D-6S	0.65	0.75	0.370	4.00	60.0
RTPCFP-1-E-8S	0.10	1.00	0.360	3.90	30.0
RTPCFP-2-E-8S	0.20	1.00	0.360	3.90	30.0
RTPCFP-4-E-8S	0.45	1.00	0.360	3.90	30.0
RTPCFP-6-D-8S	0.65	0.75	0.410	4.40	30.0
RTPCFP-1-E-9S	0.10	1.00	0.840	9.00	60.0
RTPCFP-2-E-9S	0.20	1.00	0.840	9.00	60.0
RTPCFP-4-E-9S	0.45	1.00	0.840	9.00	60.0
RTPCFP-6-D-9S	0.65	0.75	0.930	10.00	60.0
RTPCFP-6-D-35S	0.65	0.75	1.000	10.80	30.0
RTPCFP-6-D-55S	0.65	0.75	2.500	27.00	60.0
RTPCFP-1-E-45S	0.10	1.00	2.500	27.00	30.0
RTPCFP-2-E-45S	0.20	1.00	2.500	27.00	30.0
RTPCFP-4-E-45S	0.45	1.00	2.500	27.00	30.0
RTPCFP-6-D-45S	0.65	0.75	2.650	28.50	30.0
RTPCFP-1-E-65S	0.10	1.00	4.400	47.00	60.0
RTPCFP-2-E-65S	0.20	1.00	4.400	47.00	60.0
RTPCFP-4-E-65S	0.45	1.00	4.400	47.00	60.0
RTPCFP-6-D-65S	0.65	0.75	4.900	53.00	60.0
RTPCFP-1-E-152 [†]	0.10	1.00	8.200	89.30	89.3
RTPCFP-2-E-152 [†]	0.20	1.00	8.200	89.30	89.3
RTPCFP-4-E-152 [†]	0.45	1.00	8.200	89.30	89.3

[†]Size 152 cartridges do not carry a sterile claim due to their non-self-contained design but are exposed to the same radiation dose as the remainder of the product line.

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