

# ReadyToProcess hollow fiber cartridges

## BIOPROCESS FILTRATION

ReadyToProcess™ hollow fiber cartridges are designed to enable simpler and faster drug development and production by minimizing device preparation steps such as wetting and sterilizing (Fig 1). The single-use nature of the cartridges eliminates the need for cleaning protocols and cleaning validation. ReadyToProcess hollow fiber cartridges incorporate ReadyMate™ single-use connectors, which allow installation and aseptic connection of ReadyToProcess hollow fiber cartridges to other components within Cytiva's ReadyToProcess product platform, including BioProcess™ containers and tubing assemblies.

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

### ReadyToProcess hollow fiber cartridges offers 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 single-use connectors 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 and microfiltration pore sizes, to allow scalability from laboratory to production scale.

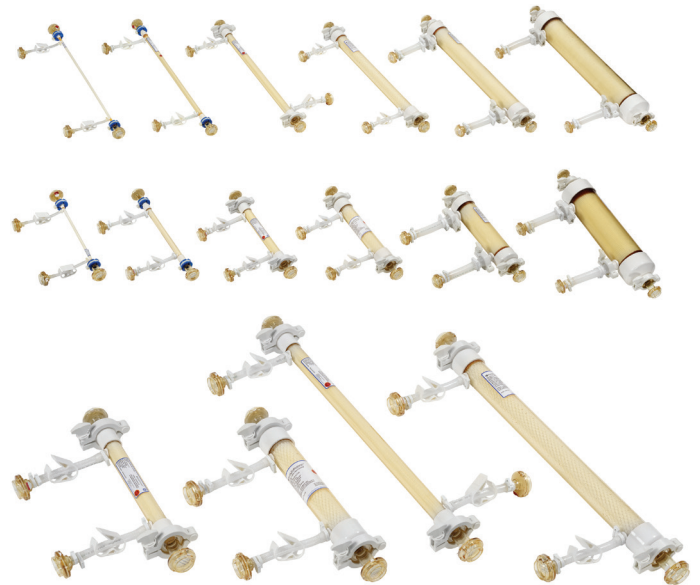


Fig 1. ReadyToProcess hollow fiber cartridges.

## ReadyToProcess product platform

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

- ReadyToProcess cross flow and normal flow filters
- ReadyToProcess columns and ÄKTA™ ready automated chromatography system
- ÄKTA readyflux automated filtration system
- WAVE Bioreactor™ systems and Cellbag™ bioreactor chambers
- Xcellerex™ bioreactors and mixers
- ReadyCircuit bioprocessing containers and tubing assemblies
- ReadyKart hardware and portability solutions
- ReadyMate single-use 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
- Preclinical to commercial GMP production
- Processing in areas where the risk of cross-contamination is high
- Fast Trak drug development processes

# Specifications

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

**Table 1.** Operating specifications

<b>Ultrafiltration</b>	
Temperature range	Up 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	M, 10 000 to 30 000: < 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)  M, 50 000 to 750 000: < 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)
<b>Microfiltration</b>	
Temperature range	0.1 to 0.2 µm: up to 80°C 0.45 to 0.65 µm: up 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 barg (15 psig) 0.65 µm: 1 barg (15 psig)
Maximum transmembrane pressure	At 25°C: 0.1 µm: 1.4 barg (20 psig) 0.2 µm: 1 barg (15 psig) 0.45 µm: 0.7 barg (10 psig) 0.65 µm: 0.7 barg (10 psig)

**Table 2.** Technical specifications

<b>Model</b>	<b>Cartridge diameter</b>
3M, 3×2M	0.9 cm (0.375 in)
4M, 4×2M	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)
<b>Model</b>	<b>Path length</b>
3M, 4M, 5, 8, 35, 45	30 cm (12 in)
3×2M, 4×2M, 6, 9, 55, 65, 152	60 cm (24 in)
<b>Fluid connections (excludes size 152)</b>	
Feed/retentate	ReadyMate
Permeate	ReadyMate
<b>Materials of construction</b>	
Cartridge housing, fittings, fiber	Polysulfone
Cartridge sleeve	Polypropylene
Fiber net	Polyethylene
Fiber potting	Epoxy
Permeate tubing	C-Flex™ (3M, 3×2M) AdvantaPure™ (4M, 4×2M, 5, 6, 8, 9, 35, 55, 45, 65)
ReadyMate	Polycarbonate, silicone
Gaskets	Silicone
<b>Regulatory conformance</b>	
EMA/410/01	Compliant
Biological Reactivity Test, In Vivo per USP <88> Class VI	Compliant
21CFR177 Indirect Food Additives	Compliant (except Size 3M and 3×2M)
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<sup>†</sup>

Nominal lumen i.d. (mm)	Shear rate ~ 2000 s <sup>-1</sup>	Shear rate ~ 4000 s <sup>-1</sup>	Shear rate ~ 8000 s <sup>-1</sup>	Shear rate ~ 16 000 s <sup>-1</sup>
<b>Size 3M and 3×2M</b>				
0.5	60	120	250	500
0.75	100	200	400	800
1	150	300	600	1200
<b>Size 4M and 4×2M</b>				
0.5	300	600	1200	2400
0.75	400	800	1500	3000
1	600	1200	2500	5000
<b>Size 5 and 6</b>				
0.5	1100	2100	4300	8600
0.75	1400	2800	5600	11 200
1	2000	4000	8000	16 000
<b>Size 8 and 9</b>				
0.5	2700	5400	10 600	21 500
0.75	4400	8800	18 000	35 000
1	6100	12 200	24 500	49 000
<b>Size 35 and 55</b>				
0.5	6600	13 200	26 000	52 000
0.75	10 000	20 000	40 000	80 000
1	15 000	30 000	60 000	120 000
<b>Size 45 and 65</b>				
0.5	14 000	28 000	55 000	111 000
0.75	19 000	39 000	77 000	154 000
1	31 000	61 000	122 000	245 000
<b>Size 152</b>				
1	70 000	140 000	280 000	560 000

<sup>†</sup> Based on a fluid viscosity of 1 cP.

# Ordering information

## ReadyToProcess hollow fiber ultrafiltration cartridges

Model number	Pore size (NMWC)	Fiber i.d. (mm)	Membrane surface area (m <sup>2</sup> ) (ft <sup>2</sup> )		Nominal flowpath length (cm)	Product code
RTPUFP-10-C-3X2MS	10 000	0.5	0.029	0.31	60	39000004
RTPUFP-30-C-3X2MS	30 000	0.5	0.029	0.31	60	39000005
RTPUFP-50-C-3X2MS	50 000	0.5	0.029	0.31	60	39000006
RTPUFP-100-C-3X2MS	100 000	0.5	0.029	0.31	60	39000007
RTPUFP-300-C-3X2MS	300 000	0.5	0.029	0.31	60	39000008
RTPUFP-500-C-3X2MS	500 000	0.5	0.029	0.31	60	39000009
RTPUFP-750-C-3X2MS	750 000	0.5	0.029	0.31	60	29023633
RTPUFP-750-E-3X2MS	750 000	1	0.023	0.24	60	39000010
RTPUFP-10-C-4MS	10 000	0.5	0.065	0.7	30	39000067
RTPUFP-30-C-4MS	30 000	0.5	0.065	0.7	30	39000068
RTPUFP-50-C-4MS	50 000	0.5	0.065	0.7	30	39000069
RTPUFP-100-C-4MS	100 000	0.5	0.065	0.7	30	39000070
RTPUFP-300-C-4MS	300 000	0.5	0.065	0.7	30	39000071
RTPUFP-500-C-4MS	500 000	0.5	0.065	0.7	30	39000072
RTPUFP-750-C-4MS	750 000	0.5	0.065	0.7	30	29019184
RTPUFP-750-E-4MS	750 000	1	0.042	0.45	30	39000073
RTPUFP-10-C-4X2MS	10 000	0.5	0.14	1.5	60	39000019
RTPUFP-30-C-4X2MS	30 000	0.5	0.14	1.5	60	39000020
RTPUFP-50-C-4X2MS	50 000	0.5	0.14	1.5	60	39000021
RTPUFP-100-C-4X2MS	100 000	0.5	0.14	1.5	60	39000022
RTPUFP-300-C-4X2MS	300 000	0.5	0.14	1.5	60	39000023
RTPUFP-500-C-4X2MS	500 000	0.5	0.14	1.5	60	39000024
RTPUFP-750-C-4X2MS	750 000	0.5	0.14	1.5	60	29023956
RTPUFP-750-E-4X2MS	750 000	1	0.085	0.9	60	39000025
RTPUFP-10-C-5S	10 000	0.5	0.2	2.1	30	39000074
RTPUFP-30-C-5S	30 000	0.5	0.2	2.1	30	39000075
RTPUFP-50-C-5S	50 000	0.5	0.2	2.1	30	39000076
RTPUFP-100-C-5S	100 000	0.5	0.2	2.1	30	39000077
RTPUFP-300-C-5S	300 000	0.5	0.2	2.1	30	39000078
RTPUFP-500-C-5S	500 000	0.5	0.2	2.1	30	39000079
RTPUFP-750-C-5S	750 000	0.5	0.2	2.1	30	29019187
RTPUFP-750-E-5S	750 000	1	0.12	1.3	30	39000080
RTPUFP-10-C-6S	10 000	0.5	0.48	5.2	60	39000034
RTPUFP-30-C-6S	30 000	0.5	0.48	5.2	60	39000035
RTPUFP-50-C-6S	50 000	0.5	0.48	5.2	60	39000036
RTPUFP-100-C-6S	100 000	0.5	0.48	5.2	60	39000037
RTPUFP-300-C-6S	300 000	0.5	0.48	5.2	60	39000038
RTPUFP-500-C-6S	500 000	0.5	0.48	5.2	60	39000039
RTPUFP-750-C-6S	750 000	0.5	0.48	5.2	60	29019190
RTPUFP-750-E-6S	750 000	1	0.28	3	60	39000040
RTPUFP-10-C-8S	10 000	0.5	0.53	5.7	30	39000081
RTPUFP-30-C-8S	30 000	0.5	0.53	5.7	30	39000082
RTPUFP-50-C-8S	50 000	0.5	0.53	5.7	30	39000083
RTPUFP-100-C-8S	100 000	0.5	0.53	5.7	30	39000084
RTPUFP-300-C-8S	300 000	0.5	0.53	5.7	30	39000085
RTPUFP-500-C-8S	500 000	0.5	0.53	5.7	30	39000086
RTPUFP-750-C-8S	750 000	0.5	0.53	5.7	30	29019193
RTPUFP-750-E-8S	750 000	1	0.36	3.9	30	39000087

## ReadyToProcess hollow fiber ultrafiltration cartridges continued

Model number	Pore size (NMWC)	Fiber i.d. (mm)	Membrane surface area		Nominal flowpath length (cm)	Product code
			(m <sup>2</sup> )	(ft <sup>2</sup> )		
RTPUFP-10-C-9S	10 000	0.5	1.15	12.5	60	39000049
RTPUFP-30-C-9S	30 000	0.5	1.15	12.5	60	39000050
RTPUFP-50-C-9S	50 000	0.5	1.15	12.5	60	39000051
RTPUFP-100-C-9S	100 000	0.5	1.15	12.5	60	39000052
RTPUFP-300-C-9S	300 000	0.5	1.15	12.5	60	39000053
RTPUFP-500-C-9S	500 000	0.5	1.15	12.5	60	39000054
RTPUFP-750-C-9S	750 000	0.5	1.15	12.5	60	29019196
RTPUFP-750-E-9S	750 000	1	0.84	9	60	39000055
RTPUFP-500-C-35S	500 000	0.5	1.35	14.5	30	39000089
RTPUFP-750-C-35S	750 000	0.5	1.35	14.5	30	29019349
RTPUFP-500-C-55S	500 000	0.5	3.25	35	60	39000091
RTPUFP-750-C-55S	750 000	0.5	3.25	35	60	29019352
RTPUFP-10-C-45S	10 000	0.5	3.5	37	30	29164525
RTPUFP-750-C-45S	750 000	0.5	3.5	37	30	29164534
RTPUFP-10-C-65S	10 000	0.5	6.1	66	60	29168275
RTPUFP-30-C-65S	30 000	0.5	6.1	66	60	29168593
RTPUFP-100-C-65S	100 000	0.5	6.1	66	60	29168280
RTPUFP-500-C-65S	500 000	0.5	6.1	66	60	29168284
RTPUFP-750-C-65S	750 000	0.5	6.1	66	60	29168287
RTPUFP-10-E-65S	10 000	1	4.4	47	60	29168291
RTPUFP-30-E-65S	30 000	1	4.4	47	60	29168314
RTPUFP-750-E-65S	750 000	1	4.4	47	60	29168319
RTPUFP-10-E-152*	10 000	1	8.3	89.3	60	29179084
RTPUFP-30-E-152*	30 000	1	8.3	89.3	60	29168665
RTPUFP-750-E-152*	750 000	1	8.3	89.3	60	29179085

## ReadyToProcess hollow fiber microfiltration cartridges

Model number	Pore size (µm)	Fiber i.d. (mm)	Membrane surface area (m <sup>2</sup> )	Membrane surface area (ft <sup>2</sup> )	Nominal flowpath length (cm)	Product code
RTPCFP-1-E-3MS	0.1	1	0.011	0.12	30	39000000
RTPCFP-2-E-3MS	0.2	1	0.011	0.12	30	39000001
RTPCFP-4-E-3MS	0.45	1	0.011	0.12	30	39000002
RTPCFP-6-D-3MS	0.65	0.75	0.012	0.13	30	39000003
RTPCFP-1-E-3X2MS	0.1	1	0.023	0.24	60	39000011
RTPCFP-2-E-3X2MS	0.2	1	0.023	0.24	60	39000012
RTPCFP-4-E-3X2MS	0.45	1	0.023	0.24	60	39000013
RTPCFP-6-D-3X2MS	0.65	0.75	0.027	0.29	60	39000014
RTPCFP-1-E-4MS	0.1	1	0.042	0.45	30	39000015
RTPCFP-2-E-4MS	0.2	1	0.042	0.45	30	39000016
RTPCFP-4-E-4MS	0.45	1	0.042	0.45	30	39000017
RTPCFP-6-D-4MS	0.65	0.75	0.046	0.5	30	39000018
RTPCFP-1-E-4X2MS	0.1	1	0.085	0.91	60	39000026
RTPCFP-2-E-4X2MS	0.2	1	0.085	0.91	60	39000027
RTPCFP-4-E-4X2MS	0.45	1	0.085	0.91	60	39000028
RTPCFP-6-D-4X2MS	0.65	0.75	0.095	1.02	60	39000029
RTPCFP-1-E-5S	0.1	1	0.12	1.3	30	39000030
RTPCFP-2-E-5S	0.2	1	0.12	1.3	30	39000031
RTPCFP-4-E-5S	0.45	1	0.12	1.3	30	39000032
RTPCFP-6-D-5S	0.65	0.75	0.16	1.7	30	39000033
RTPCFP-1-E-6S	0.1	1	0.28	3	60	39000041
RTPCFP-2-E-6S	0.2	1	0.28	3	60	39000042
RTPCFP-4-E-6S	0.45	1	0.28	3	60	39000043
RTPCFP-6-D-6S	0.65	0.75	0.37	4	60	39000044
RTPCFP-1-E-8S	0.1	1	0.36	3.9	30	39000045
RTPCFP-2-E-8S	0.2	1	0.36	3.9	30	39000046
RTPCFP-4-E-8S	0.45	1	0.36	3.9	30	39000047
RTPCFP-6-D-8S	0.65	0.75	0.41	4.4	30	39000048
RTPCFP-1-E-9S	0.1	1	0.84	9	60	39000056
RTPCFP-2-E-9S	0.2	1	0.84	9	60	39000057
RTPCFP-4-E-9S	0.45	1	0.84	9	60	39000058
RTPCFP-6-D-9S	0.65	0.75	0.93	10	60	39000059
RTPCFP-6-D-35S	0.65	0.75	1	10.8	30	39000088
RTPCFP-6-D-55S	0.65	0.75	2.5	27	60	39000090
RTPCFP-1-E-45S	0.1	1	2.5	27	30	29164539
RTPCFP-2-E-45S	0.2	1	2.5	27	30	29164548
RTPCFP-4-E-45S	0.45	1	2.5	27	30	29165191
RTPCFP-6-D-45S	0.65	0.75	2.65	28.5	30	29165198
RTPCFP-1-E-65S	0.1	1	4.4	47	60	29168591
RTPCFP-2-E-65S	0.2	1	4.4	47	60	29168568
RTPCFP-4-E-65S	0.45	1	4.4	47	60	29168571
RTPCFP-6-D-65S	0.65	0.75	4.9	53	60	29168589
RTPCFP-1-E-152*	0.1	1	8.2	89.3	89.3	29168658
RTPCFP-2-E-152*	0.2	1	8.2	89.3	89.3	29168660
RTPCFP-4-E-152*	0.45	1	8.2	89.3	89.3	29168663



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