

SPIRAPRO™ HFK™ PHARMACEUTICAL GRADE UF ELEMENTS

Ultrafiltration 4" and 8" Spiral Element Series

PRODUCT DESCRIPTION

Membrane Chemistry:	Proprietary semi-permeable polyethersulfone (PES)
Membrane Type:	HFK™-131 with observed separation range of 10,000 Daltons HFK™-328 with observed separation range of 5,000 Daltons
Construction:	Sanitary spiral wound element with net outer wrap
Feed Spacer:	V (46 mil)
Permeate Tube:	Stainless steel
Applications:	For enzyme purification, protein concentration, and protein fractionation
Regulatory Status:	Conform to FDA food-contact regulations (CFR Title 21)
Options:	Outer wrap: Controlled (VSV) or trimmable (VST) Diameter: 4.3" or 8.3"

SPECIFICATIONS

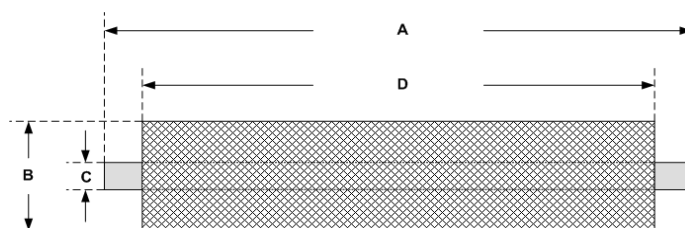
Part Number	Active Membrane Area	
	ft ²	(m ²)
0709290 SPIRAPRO,4333-K131-VSV	75	(7.0)
0709746 SPIRAPRO,8333-K131-VST	278	(25.8)
0709756 SPIRAPRO,8333-K328-VST	286	(26.6)

OPERATING AND DESIGN INFORMATION*

Typical Operating Pressure:	30 - 120 psi (2.1 - 8.3 bar)
Maximum Operating Pressure:	140 psi (9.7 bar)
Operating Temperature Range:	41 - 131°F (5 - 55°C)
Cleaning Temperature Range:	105 - 122°F (40 - 50°C)
Allowable pH - Continuous Operation:	2.0 - 10.0
Allowable pH - Clean-In-Place (CIP):	1.8 - 11.0
Design Pressure Drop Per Element:	15-20 psi (1.0-1.4 bar)
Design Pressure Drop Per Vessel (3 in series):	45-60 psi (3.1-4.1 bar)
Design Pressure Drop Per Vessel (4 in series):	60-68 psi (4.1-4.7 bar)

* Consult KMS Process Technology Group for specific applications.

NOMINAL DIMENSIONS*



Model	A inches (mm)	B inches (mm)	C inches (mm)	D inches (mm)
4333 models	37.0 (940)	4.3 (109)	0.811 (20.6)	33.0 (838)
8333 models	36.7 (933)	8.3 (211)	1.632 (41.5)	33.0 (838)

* Dimensions are provided for reference only and should not be interpreted as accurate specifications.

Membrane Characteristics:

- The membrane used in these modules consists of a semipermeable polyethersulfone (PES) layer on a polyester backing material.
- Pure water flux of these PES HFK™ membranes is 1.0-2.2 gfd/psi (24-53 l/m²/h/bar) at 77°F (25°C).

Operating Limits:

- **Operating Pressure:** Maximum operating pressure is 140 psi (9.7 bar).
- **Permeate Pressure:** Permeate pressure should not exceed baseline (concentrate) pressure at any time (including on-line, off-line and during transition). Reverse pressure will damage the membrane.
- **Differential Pressure:** The maximum differential pressures per element are listed on the front of this document, including design values for multi-element housings.
- **Temperature:** Maximum operating temperature is 131°F (55°C). Maximum cleaning temperature is 122°F (50°C).
- **pH:** Allowable range for continuous operation is 2.0 to 10.0. Allowable pH range for cleaning is 1.8 to 11.0.

Water Quality for Cleaning & Diafiltration:

- **Turbidity and SDI:** Maximum feed turbidity is 1 NTU. Maximum feed SDI is 5.0 (15-minute test).
- **Guidelines:** Please refer to the KMS "Water Quality Guidelines for CIP and Diafiltration" for more detailed information.

Chlorine and Chemical Exposure:

- Adherence to cleaning and sanitizing procedures including chemical concentrations, pH, temperature, and exposure time is necessary to achieve maximum useful element life. Accurate records should be maintained.
- KMS standard cleaning procedures should be followed. Recommended chlorine exposure time at the defined conditions is 30 minutes per day.
- Residual chlorine concentration during cleaning cycle (CIP) should be 150 ppm @ pH 10.5 or higher. Chlorine concentration should never exceed 200 ppm.

- Chlorine should only be added to the cleaning solution after the pH has been adjusted to 10.5 or higher.
- Iron or other catalyzing metals in the presence of free chlorine or hydrogen peroxide will accelerate membrane degradation.
- Sanitizing should be done only after a complete cleaning cycle and with water of acceptable quality. Refer to cleaning instructions and feedwater quality technical bulletins.

Cationic Polymers and Surfactants:

HFK membranes may be irreversibly fouled if exposed to cationic (positively charged) polymers or surfactants. Exposure to these chemicals during operation or cleaning is not recommended and will void the warranty.

Lubricants:

For element installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and will void the warranty.

Supplemental Technical Bulletins:

- UF Element Cleaning Procedures
- Water Quality Guidelines for CIP and Diafiltration

Service and Ongoing Technical Support:

KMS has an experienced staff available to assist end-users and OEM's for optimization of existing systems and development of new applications. KMS also offers a complete line of KOCHKLEEN® membrane pretreatment, cleaning, and maintenance chemicals.

KMS Capability

KMS is the leader in crossflow membrane technology, manufacturing reverse osmosis, nanofiltration, microfiltration, and ultrafiltration membranes and membrane systems. The industries served include food, dairy and beverage, semiconductors, automotive, water and wastewater, chemical and general manufacturing. KMS adds value by providing top quality membrane products and by sharing experience in the design and supply of thousands of crossflow membrane systems worldwide.

The information contained in this publication is believed to be accurate and reliable, but is not to be construed as implying any warranty or guarantee of performance. We assume no responsibility, obligation or liability for results obtained or damages incurred through the application of the information contained herein. Refer to Standard Terms and Conditions of Sale and Performance Warranty documentation for additional information.

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