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**Contributors**

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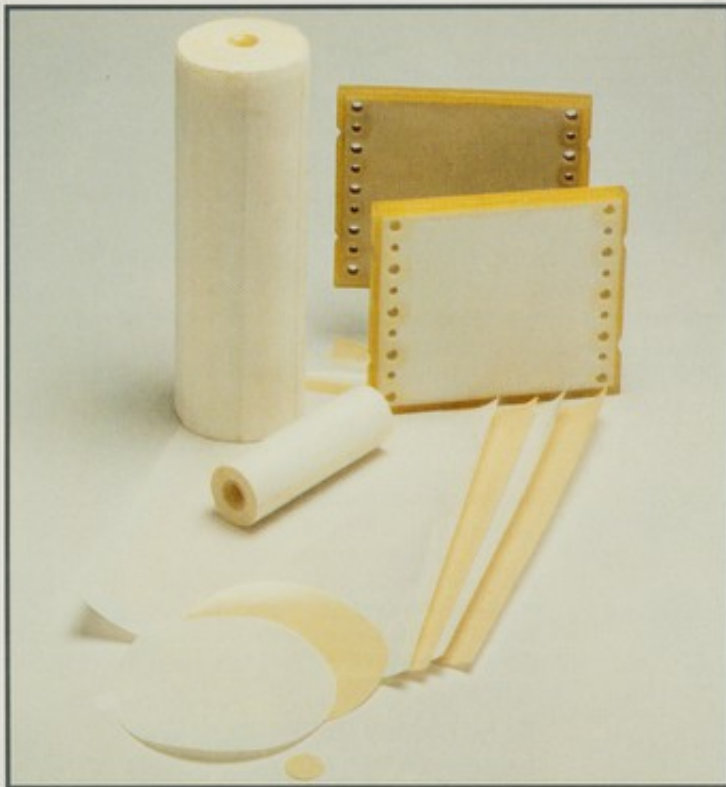
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**Nadir®**

**Ultrafiltration / Microfiltration  
Membranes**



**INTERSEP**  
FILTRATION SYSTEMS

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# Nadir® Ultrafiltration / Microfiltration Membranes

Intersep is a specialist in the manufacture and supply of ultrafiltration (UF) and microfiltration (MF) membranes and modules for the pharmaceutical and biotechnology industries for most laboratory, pilot plant and production applications.

By virtue of an exclusive relationship with Hoechst AG of Germany, Intersep can offer a unique range of benefits tailored to solve processing problems.

• Intersep have the widest commercially available range of UF/MF membranes and, as each production situation is unique, the membrane can be matched to the process requirements.

Select from:

- Proprietary Polyethersulphone (PES)
- Aromatic Polyamide (PA)
- Regenerated Cellulose (C)
- Polysulphone/PVP blend (PS)

• Excellent membrane characteristics and optimum design of modules have proven superior to other competitive products. Intersep UF/MF membranes are guaranteed free of defect, using the latest manufacturing technology.

• Intersep UF/MF membranes are compatible with a wide range of commercially available housings and can be supplied as:

## PROCESS PRODUCTS

Spira-Cel™ Spirally wound modules

Cel-Tan™ Cassette modules

Nadir® Flat sheet discs and special die cuts

Molsep™ Hollow fibre cartridges

Liqui-Cel® Phase contactors

## LAB. PRODUCTS

Fugisep™ Centrifugal filters

Nadir® Flat sheet discs

Syrasep™ Syringe filters

Nanosep™ Static concentrators

Gyrosep™ Stirred cells

## SELECTION GUIDE

NOMINAL MWCO (K DALTONS)

MEMBRANE SERIES	0.1	4	5	10	20	30	50	100	0.2µm	0.45µm	0.8µm	pH	Max. Temp (°C)	Max Pressure (bar)
POLYETHERSULPHONE(PES)	15LMH	45LMH		150LMH			450LMH					1-14	90	14
POLYAMIDE (PA)			55LMH		200LMH		400LMH					1-12	90	10
REGENERATED CELLULOSE (C)				50LMH		300LMH		400LMH				1-12	60	10
POLYSULPHONE (PS)								450LMH	1320LMH	2640LMH	6000LMH	1-14	90	10

Table 1: MEMBRANE SELECTION GUIDE

FLOW RATES FOR EACH MEMBRANE IN THE NADIR® RANGE ARE SHOWN IN THE ABOVE TABLE IN LITRE/METRE<sup>2</sup>/HOUR TESTED AT 3 BAR, 700 RPM, 20°C, STIRRED CELL. HIGHER RATES WILL BE OBTAINED IN MORE FAVOURABLE CONFIGURATIONS AND TEST CONDITIONS.

MWCO = MOLECULAR WEIGHT CUT OFF

## MEMBRANE TYPES

### Polyethersulphone Membranes (PES)

Intersep Nadir® Proprietary Polyethersulphone (PES) membranes are cast on polypropylene which provides support to the membrane.

Modified PES membranes are moderately hydrophilic, have a broad chemical resistance and can be used over a wide pH range. They have high fluxes and display low fouling characteristics when applied to chemical streams. They are ideally suited for the concentration and purification of a wide range of products, particularly antibiotics. High water flux at low pressure and elevated temperature resistance also proves very useful in pyrogen free liquid production in the pharmaceutical industry.

### Regenerated Cellulose Series(C)

Intersep Nadir® Regenerated Cellulose (C) membranes are also polypropylene backed. The C membrane range is the most hydrophilic membrane group available. They maintain relatively high flow rates when applied to biological streams, although showing relatively slow water fluxes. The low biological fouling characteristics are ideally suited for the concentration and purification of a wide range of biological solutions particularly where high product recovery is required. This has been well proven in the blood products industry where C membrane is routinely applied to Albumin and other blood fraction recovery processes offering 99.99% protein recovery. C membrane has also proven invaluable in the recovery of vaccines and enzymes where product losses are to be avoided at all costs.

### Polysulphone Series(PS)

Intersep Nadir® Polysulphone (PS) membranes are polypropylene backed. As with the polyethersulphone range, the PS membranes are chemically modified to be hydrophilic, have broad chemical resistance and wide pH range compatibility. Also with high water flow rates, PS membrane is the product of choice in the fine prefiltration of enzymes and antibiotics.

### Polyamide Series(PA)

Intersep Nadir® Polyamide(PA) membranes are proprietary aromatic polyamide membranes cast on a polypropylene backing to provide support to the membrane. The modified PA membrane range is hydrophilic, having a very broad chemical resistance which can also be used over a wide pH range. PA membranes can be used in applications where particularly aggressive solvents are present.

## BIO-SAFETY

Nadir® membranes are inert, non-cytotoxic and do not denature biological materials. All membranes listed have undergone assessment by internal audit for 10 different toxicity standards, including USP Class VI Certificate of Compliance. All membranes listed passed all tests. Full details available upon request.



## SOLUTE REJECTION

SOLUTE	M.WT.	MEMBRANE TYPE														
		PES-0.1	PES-4	PES-10	PES-50	PES-100	PA-5	PA-20	PA-50	C-10	C-30	C-100	PS-6.2	PS-0.45	PS-0.8	
NaCl (0.5%)*	58		7													
Na <sub>2</sub> SO <sub>4</sub> (1%)*	142		40													
SUCROSE (3%)	342	65														
RAFFINOSE (1%)	595	82					25									
VITAMIN B12 (0.01%)	1355	88	35				50									
BACITRACIN (1.5%)	1450						87									
PVP K12 (2%)	3000		70	35			81	37		55						
INULIN (1%)	5000	>98	77	25			80	25	75							
PVP K17 (2%)	9000		90	65	<10		92	70	75	15						
DEXTRAN T10 (1%)	10000	>98	93	65			96	60	85	7						
CYTOCHROME C (0.014%)	12400		>98				>98		97	7						
MYOGLOBIN (0.01%)	17000			97				97	20	25						
PVP K25 (2%)	29000															
B-L- GLOBULIN (0.05%)	36560			97	97			97								
DEXTRAN T40 (1%)	40000			77				77		35						
ALBUMIN (egg) (0.15%)	45000									70						
PVP K30 (2%)	45000		>98	95	75	<10		95	50	80	<10					
ALBUMIN (Bovine) (0.15%)	67000			>98	99	<10		>98	92	96	>99	100	100	100		
DEXTRAN T70 (1%)	70000				<10					75	15					
CONALBUMIN (0.075%)	77000					<10										
B-GLOBULIN (0.02%)	160000					>98										
DEXTRAN T500 (1%)	500000				91	60			98	>99	95					
PVP K90 (1%)	1100000				>99	87										
DEXTRAN T-2000 (1%)	2000000											>99	>99	>99		

NORMAL TEST CONDITIONS,  
3 BAR, 700 RPM, 20 °C, STIRRED  
CELL. MEMBRANES AREA  
USED IN EACH CASE=43CM<sup>2</sup>

\*40 bar, 700 RPM, Stirred Cell

Table 2: TYPICAL SOLUTE  
REJECTION

% SOLUTE REJECTION

## MEMBRANE USE

As with all UF/MF membranes, rejection of particles or macromolecules at the skin is nominal and expressed as a percentage of rejection. The information provided in Tables 1 & 2 is meant to be used as a guide in selecting the correct MWCO for the concentration or purification of your solution.

Nadir<sup>®</sup> membranes are cast on a tough, very porous substrate of polypropylene for improved handling and repeated use. The industrial production process employed in their manufacture offers dependably controlled retention characteristics, water permeability and solute transport. Each series differs in relativity range and environmental resistance. Typically the membranes may be re-used 10 times in laboratory stirred cells and normally withstand over one year of constant use in cartridge

The MWCO range is from 4000 Daltons to 100,000 Daltons. A reverse osmosis membrane (MWCO 100 Daltons) is also available in the UF range and 0.2 - 0.8µm in the MF range. Intersep offers 4 series of membrane types to meet the challenges of each specific application with superior performance and stability. The suitability of the Intersep Nadir<sup>®</sup> membranes in your application should be carefully determined based on your operating conditions. The information in Table 2 is meant to be used as a guide for the operating conditions of the individual products. A summary of the four membrane product ranges and their water fluxes are indicated in Table 1.

## CHEMICAL RESISTANCE

In order to select the most appropriate membrane type, chemical resistance must also be considered. Table 3 outlines the resistance of Nadir<sup>®</sup> membranes. Please refer to this table as a guideline, but do not hesitate to contact Intersep should your specific chemical environment not be identified. Our technical service department will be pleased to give you more detailed information.

A description of recommended membrane cleaning procedure is available for each product.

### SYMBOLS

++ no change in membrane properties  
+ membrane properties may be slightly changed  
- significant changes at short term exposure  
-- disintegrates or dissolves

	PES	PA	C	PS
<b>ALIPHATIC HYDROCARBONS:</b>				
Hexane	++	++	++	++
Isotane	++	++	++	+
Petrolether	++	++	++	+
Cyclohexane	++	++	++	+
<b>AROMATIC HYDROCARBONS:</b>				
	--	++	++	--
<b>HALOGENATED HYDROCARBONS:</b>				
	--	++	++	--
<b>KETONES:</b>				
	--	++	--	--
<b>ESTERS:</b>				
	--	++	++	--
<b>ETHERS:</b>				
	--	++	--	--
<b>ALCOHOLS:</b>				
Methanol (50%)	++	++	++	--
Ethanol (70%)	++	++	++	-
Isopropanol	++	++	++	--
<b>APROTIC SOLVENTS:</b>				
DMF/DMSO/NMP	--	--	--	--
HMPA/DMAC	--	--	--	--
<b>ACIDS:</b>				
HCl (5%)	++	++	++	++
Nitric Acid (1%)	++	++	-	++
Formic Acid (5%)	++	++	++	++
Formic Acid (100%)	--	++	--	--
Acetic Acid (25%)	++	++	++	++
Citric Acid	++	++	++	++
Oxalic Acid	++	++	++	++
<b>BASES:</b>				
NaOH (1M)	++	-	++	++
<b>FREE CHLORINE:</b>				
20 ppm	++	+	+	++
200ppm 35°C, 60 min	++	--	+	++
500 ppm, 60°C, 60 min	++	--	+	--
<b>OTHERS:</b>				
Hydrogen peroxide (1000 ppm)	++	-	++	++
Formaldehyde (1%)	++	++	++	++

Table 3: CHEMICAL RESISTANCE OF NADIR<sup>®</sup> MEMBRANES

## Nadir® Ultrafiltration / Microfiltration Membranes

Intersep® Nadir membranes are available in a wide range of membrane types and sizes. Die cuts are available to fit all commercially available stirred cell and plate / frame systems.

### Applications

- General ultrafiltration / microfiltration.
- Concentration / removal of enzymes, antibodies, proteins, nucleic acids.
- Pyrogen removal.
- Desalting, diafiltration, buffer exchange.

### Features

- Available in proprietary permanently hydrophilised Polyethersulphone (PES), Polysulphone (PS), Polyaramide (PA) and Regenerated Cellulose (C). Full membrane specifications are listed on Pages 2 and 3.
- Die Cuts are available as discs or modules.
- Conforms to USP XXI Class VI Biosafety Standards.

### Ordering Information

Membrane	Nominal MWCO (kDaltons)										
	0.1	4	5	10	20	30	50	100	0.2µm	0.45µm	0.8µm
PES	011000**	011004**		011010**			011050**				
PA			015005**		015020**		015050**				
C				013010**		013030**		013100**			
PS								012100**	012022**	012045**	012080**

**\*\*Diameters Available:** 13, 25, 43, 47, 62, 76, 90, 142, 150mm. Add these digits to produce product code. A wide range of plate and frame die cuts are also available along with custom cuts as required.

### FROM LAB...

- Fugisep™ Centrifugal filters
- Nadir® Flat sheet discs
- Syrasep™ Syringe filters
- Nanosep™ Static concentrators
- Gyrosep™ Stirred cells



### ...TO PROCESS

- Spira-Cel™ Spirally wound modules
- Cel-Tan™ Cassette modules
- Nadir® Flat sheet discs and special die cuts
- Molsep™ Hollow fibre cartridges
- Liqui-Cel® Phase contactors

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Note: This information is based on our latest state of knowledge and is intended to provide only general notes on our products. At any time we reserve the right to make modifications due to new developments. Any existing industrial property rights must be observed. The quality of our products is guaranteed under our general conditions of sale. The Intersep name and Fugisep™ are trade marks of Intersep Ltd. Cel-Tan™ and Spira-Cel™ are trade marks of Hoechst Celanese Corporation. Molsep™ is a trademark of Dexcel Chemical Industries. Nadir® is a trade mark of Hoechst A.G.