Table 2 Maximum Recommended Operating Pressures

Maximum Operating Pressures at 30°C	
Forward	100 psi (7 bar)
Reverse	7 psi (0.48 bar)

Table 3 Air Integrity Test Specification

Air Diffusion Rates	
Ultrafiltration 1kD thru 5kD	≤ 323 sccm/m^2 @ 15 psi (1 bar)
Ultrafiltration 10kD thru 300kD	≤ 323 sccm/m^2 @ 7.3 psi (0.5 bar)
Microfiltration ≥ 0.1 µm	≤ 323 sccm/m^2 @ 3 psi (0.2 bar)

Maximum Operating Temperature: 50°C

CHEMICAL RESTRICTIONS

Do NOT use TangenX™ membranes with the following materials:

- DMF (≥ 40%)
- DMSO (≥ 40%)
- M-PYROL
- phosphoric acid (≥ 1M)
- Pure aromatic and chlorinated hydrocarbons
- Ketones
- Polar aromatics
- Aliphatic esters

CAUTION

In the event that the cassette is subjected to any of the conditions listed below, it is recommended that you perform both cassette integrity and water flux tests to ensure your cassette is not damaged. Damage may occur as a result of the following:

- Dropping on hard surfaces, or other mechanical shock.
- Poking with sharp objects on screened surfaces.
- Excessive feed pressure.
- Excessive permeate backpressure, or pressurizing the filtrate port.
- Exposure to harsh chemicals.
- Freezing.
- Excessive heat.
- Drying out - ultrafiltration membrane that is allowed to dry out can permanently damage the pore structure.

UPON CONTACT WITH LIQUID, MEMBRANES MUST REMAIN WET AT ALL TIMES TO MAINTAIN PRODUCT INTEGRITY AND PERFORMANCE.

REPLIGEN TANGENX™ STANDARD WARRANTY

Repligen Corporation warrants its TangenX™ products will meet their applicable published specifications when used in accordance with their applicable instructions for a period of one year from shipment of the products. **REPLIGEN MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED. THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The warranty provided herein and the data, specifications and descriptions of Repligen TangenX™ products appearing in published catalogues and product literature may not be altered except by express written agreement signed by an officer of Repligen. Representations, oral or written, which are inconsistent with this warranty or such publications are not authorized and if given, should not be relied upon.
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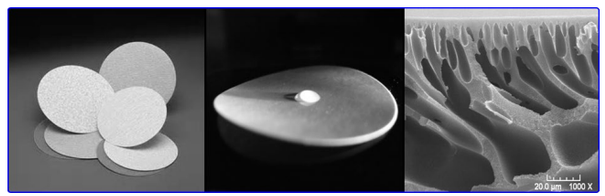
Disc Membrane

USER GUIDE

ProStream™ Low-Binding Membrane
HyStream™ Hydrophilic Membrane



REPLIGEN
INSPIRING ADVANCES IN BIOPROCESSING

Phone 508.845.6400 | Fax 508.845.3030

www.repligen.com/tangenx

TXCustomerService@repligen.com

PRODUCT CONTENTS

Includes the following:

- (1) Package of disc or sheet membrane in the product chemistry type and molecular weight cutoff/pore size selected by the customer.

REQUIRED FOR OPERATION

- Ultrafiltration cell device
- Connection to the appropriate pressure source required for the cell used: i.e., pump, compressed air, nitrogen, etc.
- Deionized (DI) water or water for injection (WFI)

IMPORTANT INFORMATION BEFORE YOU BEGIN

- Please record your membrane lot number, found on the package label, which will be required when making product inquiries.
- Handle the membrane carefully by the edges, as the surface can be damaged by fingernails or other sharp objects.
- Ensure the disc is oriented correctly in the cell. The glossy white side of the membrane faces upwards in the cell and comes into contact with the feed solution when it is introduce into the cell. The glossy side performs the separation, and performance will be compromised if the disc is placed upside down.
- Before introducing solvents into the ultrafiltration cell device, check for chemical compatibility.
- Membrane that is allowed to dry out will have severely reduced flux performance.
- Reduced recoveries and/or lower filtration rates may signal the need for membrane replacement or cleaning.
- Specified maximum operating temperatures are for aqueous solutions only.
- Membranes may be used at colder temperatures, although flux rates are reduced.

OPERATING PROCEDURE

1. Carefully remove the white membrane disc from the package. Handle the membrane by its edge only; avoid scratching the glossy surface, which is the working surface. The membrane is cast onto a non-woven polypropylene or polyester support structure to improve handling. There is a blue polyethylene film protecting the glossy membrane surface that must be removed prior to use – this may be discarded at the user's discretion.
2. All membranes are pretreated with glycerin to prevent the membrane from drying out. In addition, sodium azide is also added as a preservative. Two methods are given below for removing these materials prior to use.
   a) Method 1:
   Rinse each disc or sheet by soaking it skin side down in a container filled with water for injection (WFI) or 0.2um filtered deionized (DI) water at 25 - 45°C for a minimum of one hour - change out the water at least two times.
   b) Method 2:
   Mount the membrane in a suitable ultrafiltration cell with the glossy side towards the rinse water solution. Rinse by flushing WFI or DI water through the cell and filtrate at 40 to 120 liters per m2 (4 to 12 liters per ft^2) of membrane area. See Table 2 for maximum cell pressure.
   c) If traces of UV-absorbing material cause interference in a specific experiment, place membrane into 5% NaCl for 30 minutes then rinse, or keep rinsing until there is no more interference.
   d) PLEASE NOTE THAT THE MEMBRANE MAY BE USED WITHOUT RINSING.
3. Place the rinsed membrane into the cell with the skin side toward the feed solution and proceed with normal use.

MEMBRANE CLEANING

Clean membranes by soaking or flushing with 0.1N–0.5N NaOH at 35°C (see Table 1), then flushing with WFI or DI water prior to reuse or storage.

If cleaned properly, discs can be washed and reused up to 20 times.

Table 1 Recommended Cleaning Solutions

Cleaning Agent	Cleaning Conditions
0.1N to 0.5N Sodium Hydroxide	Contact Time = 30 – 60 minutes Temperature = 35°C (95°F)
1.5% Alconox® Detergent	Contact Time = 30 – 60 minutes Temperature = 40°C (104°F)

MEMBRANE STORAGE

Membranes must be stored wet to maintain their characteristics and integrity and prevent microbial growth. Below are critical factors to remember when storing membranes:

- ❑ Discs or sheets stored:
  - ○ < 3 days — Use buffer or saline solution
  - ○ < 6 months — 0.05N – 0.1N NaOH
  - ○ > 6 months — 15% glycerin + 0.05% sodium azide
- ❑ Recommended storage temperature:
  - ○ 4 - 15°C (optimal)
  - ○ 25°C (maximum)
  - ❖ Do not freeze membrane.

MEMBRANE OPERATING CHARACTERISTICS

Take care to use the membrane at the lowest pressure possible while still producing consistent permeate flow. Although higher operating pressures initially improve flow rate, they also promote increased concentration polarization and membrane compaction, which ultimately limits flow. With very low NMWL membranes, lower operating pressure may also reduce the retention of salts and very low molecular weight species.

MATERIALS OF CONSTRUCTION & SPECIFICATIONS

- ❑ Physical Properties
  - ○ Substrate Composition — non-woven polypropylene
  - ○ Substrate Thickness — 160 microns
  - ○ Membrane Composition — modified polyethersulfone (PES)
  - ○ Membrane Thickness — 70 microns
  - ○ Membrane Charge — neutral
  - ○ Hydrophilicity (contact angle)
    - HyStream™ — 4 degrees
    - ProStream™ — 22 degrees

PRODUCT AVAILABILITY

- ❑ Membrane Chemistry:
  - ○ ProStream™ low protein-binding, high flux, modified PES
  - ○ HyStream™ hydrophilic, anti-foam resistant, modified PES
- ❑ Disc / Sheet Sizes and Package Quantities:
  - ○ 25 mm (D025) - 12 discs
  - ○ 44.5 mm (D044) - 12 discs
  - ○ 47 mm (D047) - 12 discs
  - ○ 63.5 mm (D063) - 12 discs
  - ○ 76 mm (D076) - 12 discs
  - ○ 90 mm (D090) - 6 discs
  - ○ 203 x 228 mm (SR01) - 1 sheet
  - ○ 203 x 228 mm (SR05) - 5 sheets
- ❑ Nominal Molecular Weight Cutoff / Pore Size
  - ○ Ultrafiltration: 0.65kD, 1kD, 1kD+, 3kD, 5kD, 10kD, 20kD, 30kD, 50kD, 100kD, 300kD
  - ○ Microfiltration: 0.1µm, 0.2µm, 0.45µm, 0.65µm

For technical support or ordering assistance, please call 508.845.6400