



# 10 System Commissioning

## 10.1 General Overview

<b>NOTE</b>	
	<b>ATTENTION!</b> Observe the following guidelines!

- System commissioning comprises functional testing and test operation.
- All PES-UF modules/racks must be put into operation in accordance with the guidelines stipulated below.
- The steps involved in commissioning the system must be logged and archived.
- DuPont™ recommends verifying the composition of the feed water quality before commencing the commissioning process.
- The operating personnel should be incorporated in the commissioning process.
- Before commencing water supply operations, the modules, T-Rack™, filtrate tank(s) and filtrate piping (including all the installed valves, fittings and devices) must be adequately rinsed and then disinfected.
- During system commissioning it is also necessary to determine the chemical injection times for the CEB by measuring the rise in concentration in the rinse water discharged from the rack during chemical dosing.
- Before commencing water supply operations, check that the water produced by the rack(s)/system meets the stipulated requirements.
  - DuPont™ recommends performing integrity tests immediately after the commissioning is completed, as described in the section on "Integrity Testing". This is also an important means of determining the reference value(s) required for future testing. This reference value(s) must be determined and documented during the commissioning process for the fully assembled rack(s).

## 10.2 Functional Testing

<b>NOTE</b>	
	<b>ATTENTION!</b> Observe the following guidelines!

Before beginning test operation, review the SCADA design. Verify that the automatic program control system (programmable logic controller, PLC) is running error-free. Consider checking all items on the below list for completion:


- Verify that all required system instruments are properly assembled and installed.
- Confirm data display, historic data archiving & processing.
- Confirm calculations TMP & permeability (hydrostatic offsets).
- Confirm permeability to be temperature corrected.
- Confirm dry operation all butterfly valves (functionality and adequate opening/closing speed).
- Confirm functionality all vent valves.
- Confirm filtration sequences (Top and Bottom) functional.
- Confirm Backwash Drain Top and Bottom sequence functional.
- Confirm Forward Flush Sequence functional.
- Confirm CEB set points adjustable.
- Confirm correct CEB sequence (caustic – acid – others, if applicable).

### 10.3 Module Preservation

Membranes in the Multibore™ family contain preservative in order to prevent the membranes from drying out, to protect the membranes from freezing temperatures during transport and storage and to inhibit microbiological growth in the membranes. Drying of the pores in the membranes would result in permanent permeability loss due to pore collapse, while freezing of the fluids in the pores could potentially damage the membranes. Microbiological growth wouldn't damage the membranes, but it would necessitate extensive oxidative cleaning.

PES-UF standard preservative solution consists of a mixture of glycerin (1,2,3-propantriol) and propylenglycol (1,2-propanediol). As both glycerin as well as propylenglycol are non-hazardous substances (approved as food additives), and are completely miscible with water, it is relatively easy to rinse these substances out of the modules.

### 10.4 Venting and Rinsing

<b>NOTE</b>	
	<p><b>ATTENTION!</b></p> <p>Observe the following guidelines!</p>

- After functional testing, but before test operation, the entire system including the piping, connecting pipework must be vented and cleaned to remove any contaminants, abrasive materials and oily substances from the system.
- Before filling the UF system/filtrate tank, it is important to thoroughly clean the filtrate tank to remove any contaminants.
- Ensure that the rinsing process removes the preservation solution from the system. The preservation solution is biologically available when sufficiently diluted with water. Consequently, it is possible that any residue of the preservation solution could cause microbial growth on the filtrate side or in the filtrate tank in certain circumstances.

#### 10.4.1 Venting the System

To vent the module(s) prior to system commissioning, proceed as follows (the various operating modes are described in the section on "Membrane Operating Modes"). Below procedure applicable for each installed UF rack:


1. Filling the feed side with source water
  - Confirm that no valves are closed on the filtrate side.
  - Fill the feed side of the system with source water slowly to avoid water hammer. For this purpose, run the system in filtration bottom (FB) mode at a flux rate of approximately 40 L/(m<sup>2</sup>h) (23.5 GFD) for at least 20 minutes.
  - Where possible, the filtrate should be discharged before it reaches the filtrate tank to prevent the preservation solution from accumulating in the filtrate tank.
2. Venting the modules
  - Run system in forward flush bottom (FFB) mode at a volume flow rate corresponding to a flux rate of approximately 80 L/(m<sup>2</sup>h) (47 GFD) for at least 10 minutes.
3. Filling the filtrate side
  - Confirm that no valves are closed on the filtrate side.
  - Run system in filtration bottom (FB) mode at a flux rate of approximately 40 L/(m<sup>2</sup>h) (23.5 GFD) for at least 15 minutes.


- Run system in filtration top (FT) mode at a flux rate of approximately 40 L/(m<sup>2</sup>h)(23.5 GFD) for at least 15 minutes.
  - Where possible, the filtrate should be discharged before it reaches the filtrate tank to prevent the preservation solution from accumulating in the filtrate tank.
4. In the event that it was not possible to discharge the filtrate before it reached the filtrate tank, empty the filtrate tank completely (including removal of any residue), discharging its contents into the drain, and then clean the filtrate tank if necessary.

## 10.4.2 Rinsing the System

To rinse the system, proceed as follows:

1. Filling the filtrate tank
  - Confirm that no valves are closed on the filtrate side.
  - Run system in filtration bottom (FB) mode at a flux rate of approximately 40 L/(m<sup>2</sup>h) (23.5 GFD) for at least 15 minutes to completely refill the filtrate tank.
2. Performing backwashes
  - Run system in backwash drain top (BWDT) mode for at least 60 seconds (or use up the full volume contained in the filtrate tank).
  - Fill the filtrate tank (see point 1), but this time running the system in filtration top (FT) mode.
  - Run system in backwash drain bottom (BWDB) mode for at least 60 seconds (or use up the full volume contained in the filtrate tank).
  - Fill the filtrate tank (see point 1).

<b>NOTE</b>	
	Due to the preservation solution, consisting of glycerin and propylenglycol, some COD will still be measurable after this rinsing procedure. If there are specific limits to the amount of COD in the Wastewater and/or filtered water, then further rinsing might be required. Please contact DuPont™ for further information.

<b>NOTE</b>	
	If the modules are used for producing potable water, further rinsing is necessary in order to comply with drinking water regulations. Please contact DuPont™ for further information.