

STATE OF COLORADO

John W. Hickenlooper, Governor
Larry Wolk, MD, MSPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
Located in Glendale, Colorado

www.colorado.gov/cdphe



Colorado Department
of Public Health
and Environment

May 23, 2014

Todd Broad, Process Engineer
Pentair Process Technologies
X-Flow B.V.
293 Wright Street
Delevin, WI 61115

Subject: Acceptance of the Pentair X-Flow B.V. SXL-225/SXL-55 Membrane Modules as an Alternative Filtration Technologies to meet the *Colorado Primary Drinking Water Regulations* requirements for *Giardia lamblia* and *Cryptosporidium* Removal

Dear Mr. Broad;

The Colorado Department of Public Health and Environment's Water Quality Control Division ("the Department") has received and reviewed the information for the Pentair X-Flow B.V. SXL-225/SXL-55 Membrane Modules in accordance with Section 11.8(2)(b)(ii) and 11.10(5)(j) of the *Colorado Primary Drinking Water Regulations* (Regulation 11), 5 CCR 1002-11. The X-Flow B.V. SXL-225/SXL-55 modules meet or exceed the requirements of the *State of Colorado Design Criteria for Potable Water Systems* (DCPWS) Sections 1.11, 4.3.8 and the requirements of Regulation 11. The technology is conditionally accepted for use as an Alternative Filtration Technology and granted the removal credit in Table 4.1, Section 4.3.8.2 of the DCPWS. The technical specifications and conditions of acceptance for the X-Flow B.V. SXL-225/SXL-55 modules and Filter Tech skids are outlined in Tables 1 and 2 as well as Section 4.3.8 of the DCPWS.

This acceptance supersedes the previous acceptance of the X-Flow B.V. SXL-225/SXL-55 modules dated January 3, 2013.

This acceptance addresses the following items:

- X-Flow B.V. SXL-225 and SXL-55 modules
- Filter Tech Skids utilizing X-Flow SXL-225 and SXL-55 modules

This acceptance applies only to the X-Flow B.V. SXL-225/SXL-55 modules and does not constitute construction approval for installation at any public water system. Each individual submittal to the Department must demonstrate conformance with Section 4.3.8 of the DCPWS for each installation of the filters. **Review and approval for the design of any public water system proposing to use this technology will be handled on a case-by-case basis by the Department as required by Section 11.4 of Regulation 11.**

As part of this review, the Department has evaluated the following documents:

- Previous Division acceptance of the SXL-225 Modules dated June 5, 2009 (and associated documentation)
- Letter from Filter Tech requesting acceptance of SXL-55 module and attachments (dated June 1, 2012)
- Letter from Filter Tech requesting acceptance of pressure decay test as a direct integrity test in addition to the air flow integrity test (dated June 12, 2012)
- <http://www.nsf.org> – X-Flow B.V. materials certification for membrane

Any addenda that will modify the modules must be submitted to the Department for review and acceptance prior to use in Colorado by a regulated public water system. This requirement includes any changes made to the membranes, materials of construction, or associated interfaces with process piping. The Department will review any additional third party verification reports and issue a revised acceptance letter if appropriate.

Table 1: SXL-225/SXL-55 Technical Specifications and Conditions of Acceptance

Filter Manufacturer	X-Flow B.V.	
Filter Model	SXL-225	SXL-55
Maximum Flux (gfd -gallons per sq. ft. per day) @ 20 °C	120	120
Maximum Flux (gfd) @ 1 °C	68	68
Max Transmembrane Pressure lbs per square inch differential (psid)	31	31
Alarm Transmembrane Pressure (psid)	18	18
Maximum Inlet Pressure – lbs per square inch gauge (psig)	85	85
Minimum Inlet Pressure – lbs per square inch gauge (psig)	15	15
Prefiltration	150 micron pre-screen	
DIRECT INTEGRITY TESTING - submittal must specify air flow or pressure decay		
Air Integrity Test	System must follow air flow protocol from X-Flow TBU-AQF-INT-01-1016	Same
Air flow - Direct integrity testing failure criteria	Failure criteria must be specified for each installation – typical failure is 250 lt/hr for 1 cut fiber	Same
Pressure decay test (PDT) - Minimum direct integrity test pressure (starting pressure)	14.5 psig (1 bar) follow protocol in TBU-AQF-INT-05-1016	Same
PDT - Direct integrity testing failure criteria	Must be calculated based on configuration – single module failure is >1.16 psi/min	Same
Additional Operations and Maintenance Criteria		
1. If a filter fails an integrity test, the filter must be removed from service immediately and replaced with a functional filter or repaired prior to being returned to operation.		

2. The public water system must keep records of the following operational parameters (available for Department review):
 - a. Integrity test date, results (pass or fail), and initials of person performing the test
 - b. Clean in place (CIP) dates with clean water permeability and integrity test result.
 - c. Filter maintenance and fiber repair results
 - d. Filter replacement date and reason for replacement.
3. Public water systems must maintain an operation and maintenance manual for the micro/ultrafiltration system. All integrity tests and CIP procedures must follow manufacturer prescribed procedures.

Table 2: Pre-Accepted Z-Pak Skids Conditions of Acceptance:

Skid Type	Filter Tech							
	Approved flux (gfd)	70						
Skid Model Number (using SXL-55)	UFX55-1	UFX55-2	UFX55-3	UFX55 -4	UFX55-5	UFX55-6	UFX55-7	UFX55-8
Number of Modules	1	2	3-5	6-10	11-20	21-32	33-40	41-50
Maximum production capacity (gallons per minute – gpm @ 20 deg C)	29	57	143	287	574	918	1147	1434
Skid Model Number (using SXL-225)	UFX-1	UFX-2	UFX-3	UFX-4	UFX-5	UFX-6	UFX-7	
Number of Modules	1	2	3-4	5-10	11-18	19-28	29-40	
Maximum production capacity (gallons per minute – gpm @ 20 deg C)	20	40	85	210	375	585	835	
Cross connection control (DCPWS 4.3.8.8(b)(vii))	Verified. On Filter Effluent Valves V6A, V6C closed. Valve V6B open to drain section of pipe – operator to verify no flow.							
Individual Skid Effluent Turbidity (DCPWS 4.3.8.10(a)and (d))	Not Verified.							
Flow Control (DCPWS 4.3.8.10 (c) and (e))	Not Verified.							

Please be aware that any point source discharges of water from treatment facilities are potentially subject to a discharge permit under Colorado’s State Discharge Permit System. Any point source discharges to state waters without a permit are subject to civil or criminal enforcement action.

Todd Broad
X-Flow B.V.
May 23, 2014
Page 4

Please direct any further correspondence regarding this acceptance to:

Tyson Ingels, P.E.
Colorado Department of Public Health and Environment
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, CO 80246

If you have any questions or comments, please call Tyson Ingels at 303-692-3002.

Sincerely,

Tyson Ingels, P.E.
Lead Drinking Water Engineer
Engineering Section
Water Quality Control Division
Colorado Department of Public Health and Environment