



## COLORADO

Department of Public  
Health & Environment

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

March 11, 2015

Kelly Lange-Haider  
Dow Water and Process Solutions  
7600 Metro Blvd  
Edina, MN 55439

Subject: Acceptance of the Dow SFD-2860, SFD-2280, IntegraPac-51, IntegraPac-77, IntegraFlo-74, and IntegraFlo-102 Ultrafiltration Modules as Alternative Filtration Technologies to meet the *Colorado Primary Drinking Water Regulations* requirements for *Giardia lamblia* and *Cryptosporidium* Removal

Dear Ms. Lange-Haider;

The Colorado Department of Public Health and Environment's Water Quality Control Division ("the Department") has received and reviewed the information for the Dow SFD-2860, SFD-2880, IntegraPac-51, IntegraPac-77, IntegraFlo-74, and IntegraFlo-102 Ultrafiltration 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 Dow 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 Dow Modules, the Dow IntegraFlo skids, and the Wigen ultrafiltration skids are outlined in Tables 1, 2, and 3 as well as Section 4.3.8 of the DCPWS.

This acceptance addresses the following items:

- Dow SFD-2860 Module
- Dow SFD-2880 Module
- Dow IntegraPac-51 Module
- Dow IntegraPac-77 Module
- Dow IntegraFlo-74 Module
- Dow IntegraFlo-102 Module
- Dow IntegraFlo Skids
- Wigen Ultrafiltration Skids utilizing the IntegraFlo-102 and SFD-2880 modules

This acceptance applies only to the Dow 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:

- Wigen Water Technologies Ultrafiltration Skid System with Dow UF Modules, Technical Submission for Review by CDPHE, January 2014
- Dow Water and Process Solutions Alternative Technology Acceptance Application for the Dow SFD-2860, SFD-2880, IntegraPac-51, IntegraPac-77, IntegraFlo-74, and IntegraFlo-102 Ultrafiltration Modules
- NSF Test Report - Public Drinking Water Equipment Performance. Final Report: The Dow Chemical Company, Dow Water and Process Solutions Ultrafiltration Modules
  - IntegraFlo DW102-1100 dated Jan 31, 2013
  - IntegraPac IPD-77 dated March 5, 2013
  - SFD-2880 dated December 16, 2010
- Nsf.org Website - the Dow SFD-2860, SFD-2880, IntegraPac-51, IntegraPac-77, IntegraFlo-74, and IntegraFlo-102 Ultrafiltration Modules
- Dow Product Information sheets for each membrane
- Dow Water & Process Solutions IntegraPac Module and Skid Product Manual, May 2013
- Dow UltraFiltration Product Manual, Version 3, April 2011
- Email correspondence Michael Bourke, Wigen Water Technology and the Department

Any addenda that will modify any of 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 Dow Modules, 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: Dow SFD-2860, SFD-2880, IntegraPac-51, IntegraPac-77, IntegraFlo-74, and IntegraFlo-102 Technical Specifications and Conditions of Acceptance**

Filter Manufacturer	Dow Water and Process Solutions					
Filter Model	SFD-2860	SFD-2880	IntegraPac-51	IntegraPac-77	IntegraFlo-74	IntegraFlo-102
Surface area per module (ft <sup>2</sup> )	549	829	549	829	797	1103
Maximum Flux (gfd -gallons per sq. ft. per day) @ 20 °C	70	70	70	70	70	70
Maximum Flux (gfd) @ 1 °C	40	40	40	40	40	40
Max Transmembrane Pressure lbs per square inch differential (psid)	30					
Alarm Transmembrane Pressure (psid)	30					
Maximum Inlet Pressure - lbs per square inch gauge (psig)	44					
Minimum direct integrity test pressure (starting pressure) (psig)	18	18	18	18	18	18
Direct integrity testing failure criteria	Pressure drop greater than 2.9 psi in 10 min must be investigated.					

Prefiltration	300 micron pre-screening is required.
<b>Additional Operations and Maintenance Criteria</b>	
<ol style="list-style-type: none"> <li>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.</li> <li>2. The public water system must keep records of the following operational parameters (available for Department review): <ol style="list-style-type: none"> <li>a. Integrity test date, results (pass or fail), and initials of person performing the test</li> <li>b. Calculated LRV for each integrity test (as applicable)</li> <li>c. Clean in place (CIP) dates with clean water permeability and integrity test result.</li> <li>d. Filter maintenance and fiber repair results</li> <li>e. Filter replacement date and reason for replacement.</li> </ol> </li> <li>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.</li> </ol>	

**Table 2: Pre-Accepted Skids Conditions of Acceptance:**

Skid Type	Dow IntegraPac or IntegraFlo Skids
Skid Model Number	Varies by Installation
Maximum Daily Production (gallons) Based on max flux @ temperature - See Table 1	Calculated based on number of Modules per specific Skid
Cross connection control (DCPWS 4.3.8.8(b)(vii))	Not verified.  <b>Block and bleed for filtrate not shown on DOW schematic - must be verified.</b>  <b>Must be demonstrated on each submittal per DCPWS 4.3.8.8(b)(vii)</b>
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.

**Table 3: Pre-Accepted Wigen Skids Conditions of Acceptance:**

Skid Type	Wigen Ultrafiltration
Skid Model Number	Not specified - individual submittal must specify differences between general schematic and site-specific drawings.
Maximum Daily Production (gallons) Based on max flux @ temperature - See Table 1	Not verified. Site Specific.

Cross connection control (DCPWS 4.3.8.8(b)(vii))	Verified. Reverify valve numbers on specific skid filtrate line.
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.

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