



**COLORADO**  
Department of Public  
Health & Environment

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

July 21, 2016

Cris Lemay, Product/Applications Manager  
Graver Technologies  
200 Lake Drive  
Glasgow, DE 19702

Subject: Acceptance of the Graver Technologies Model QCR, QMA, ZTEC-B, WaterTEC cartridge filters as an Alternative Filtration Technology to meet the *Colorado Primary Drinking Water Regulations* requirements for *Giardia lamblia* and *Cryptosporidium* Removal

Dear Mr. Lemay;

The Colorado Department of Public Health and Environment's (CDPHE) Water Quality Control Division ("the Department") has received and reviewed the information for the Graver Technologies Model QCR, QMA, ZTEC-B cartridge filters 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 Graver Technologies Model QCR, QMA, ZTEC-B, WaterTEC cartridge filters meet or exceed the requirements of the *State of Colorado Design Criteria for Potable Water Systems* (DCPWS) Sections 1.11 and 4.3.9 in addition to the requirements of Regulation 11. The technology is conditionally accepted for use as an Alternative Filtration Technology and granted the removal credit in Table 4.2, Section 4.3.9.2 of the DCPWS. The filters and filter housings are subject to the conditions outlined in Table 1 of this document and Section 4.3.9 of the DCPWS.

This revised acceptance supersedes all previous acceptance letters of the QCR, QMA, and ZTEC-B filters and associated filter housings.

This acceptance addresses the following items:

- Graver Technologies QCR pleated, calendared melt blown media cartridge filter (1.0 micron)
- Graver Technologies QMA pleated, calendared melt blown media cartridge filter (0.2 and 0.45 microns)
- Graver Technologies ZTEC-B membrane cartridge filters (0.2, 0.45 and 0.65 microns)
- Graver Technologies WaterTEC membrane cartridge filters (0.05, 0.1, 0.2, 0.45 and 0.65 microns)

This acceptance applies only to the Filter Graver Technologies Cartridge Filters Model QCR, QMA, ZTEC-B and WaterTEC technology and does not constitute construction approval for installation at any public water system. Each individual submittal to the Department must demonstrate conformance with Section 4.3.9 of the DCPWS for each installation of the filters and housings. 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:

- March 2, 2016 IBR Laboratories Test Report for the LPF 03R1 Housing with three 10" QCR elements showing 3.7 log removal at 35 PSI differential pressure.
- March 7, 2016 IBR Laboratories Test Report for the LPF 03R1 Housing with three 10" WaterTEC elements showing >3.8 log removal at 35 PSI differential pressure.



- October 23, 2015 IBR Laboratories Test Report for the LPF 03R1 Housing with three 10" QCR elements showing 3.7 log removal at 17.5 PSI differential pressure.
- June 2, 2011 letter from Graver Technologies representative Betty Wells requesting modifications to the December, 2009 letter.
- October 28, 2009 letter from Graver Technologies representative Betty J. Wells requesting modifications to the February 12, 2008 letter.
- September 2004 Inter Basic Resources Inc. (IBR) Report for the QCR 1.0/QMA 0.45 um filter NSF Standard 53 cyst reduction challenge test
- Nelson Laboratories Yeast Retention and Bacteria Retention test reports for the ZTEC-B 0.45um and 0.65um membrane filters.
- The American Association for Laboratory Accreditation (A2LA) accreditation certificate for Inter Basic Resources Inc. for mechanical testing, including standards NSF 42 and NSF 53 cyst reduction using polystyrene spheres.
- The North American Science Associates, Inc. (NAMSA) April 2005 Certificate of Compliance with U.S. Pharmacopeia Convention (USP) 27 Class VI Biological Reactivity tests for the QCR/QMA and ZTEC-B filters to be used in the medical products industry.
- US FDA Code of Federal Regulations (CFR) Title 21, section 210.3 (b) (6) and 211.72 compliance statement for non-fiber releasing filters used in the manufacturing, processing, packing, or holding of drugs used for human consumption.
- NSF International Standard 42 compliance statement for KX Industries Matrikx filters
- Certificate of Conformance from Graver Technologies for the Stratum Filter Elements with the USP XXIII Class V Biological tests for Plastics and supporting reports.

Any addenda that will modify the cartridges or housings 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 filter materials of construction and 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. Graver QMA, QCR, ZTEC-B Cartridge Filters Technical Specifications and Conditions of Acceptance:**

Technical Specifications				
Filter Model	QMA (0.2, 0.45)	QCR (1.0)	ZTEC-B (0.2, 0.45, 0.65)	WaterTEC (0.05, 0.1, 0.2, 0.45, 0.65)
Maximum Flow Rate	7 gallons per minute (gpm) for 10 inch cartridges 14 gpm for 20 inch cartridges 21 gpm for 30 inch cartridges 28 gpm for 40 inch cartridges			
Maximum Differential Pressure for Cartridge Change out	35 psi			
Filter cartridge configuration	Single open end cartridges only - Double open ended cartridges prohibited.			

Turbidity Performance Standards	< 1 NTU 95% of the time Not to exceed 5 NTU
<b>Vessels</b>	
Models	MC Series Multi-Cartridge Vessel LPF Series Multi-Cartridge Vessel SC Series Single Cartridge Vessel (may have lower flows due to housing constraints)
Materials	304L or 316L SS
Pressure Requirements	Maximum 150 pounds per square inch (PSI).
<b>Prefilters</b>	
Prefilter Models	Prefiltration is required for all the final compliance filters listed above. The prefilter specifications will be determined by a licensed Professional Engineer, Graver Technologies, and/or an authorized Graver Technologies representative based on raw water quality.
<b>Additional Operations and Maintenance Criteria</b>	
<ol style="list-style-type: none"> <li>Each public water system must keep a record daily routine pressure differential readings and filter change outs. The document must be available for review by the Department upon request.</li> <li>An Operations and Maintenance (O&amp;M) Manual must be provided for all installations including a protocol for filter change out to ensure sanitary conditions and good filter installation practice.</li> </ol>	

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

cc: Dirk Lamprecht, Industrial Process Technologies