



August 2018

GENERAL USE LEVEL DESIGNATION FOR BASIC AND PHOSPHORUS TREATMENT

For

Kristar/Oldcastle Precast, Inc. FloGard Perk Filter™ (using ZPC Filter Media)

Ecology’s Decision:

Based on Kristar/Oldcastle’s application submissions, including the Draft Technical Evaluation Report, dated April 2010, Ecology hereby issues the following use level designations:

1. General use level designation (GULD) for the Perk Filter™ for basic treatment:
 - Using a zeolite-perlite-carbon (ZPC) filter media as specified by Kristar/Oldcastle.
 - Sized at hydraulic loading rate of no more than 1.5 gpm/ft² of media surface area, per Table 1.

Table 1. Design Flowrate per Cartridge

Effective Cartridge Height (inches)	12	18
Cartridge Flowrate (gpm/cartridge)	6.8	10.2

2. General use level designation (GULD) for the Perk Filter™ for phosphorus treatment:
 - Using a zeolite-perlite-carbon (ZPC) filter media as specified by Kristar/Oldcastle.
 - Sized at hydraulic loading rate of no more than 1.5 gpm/ft² of media surface area, per Table 1.
3. Ecology approves Perk Filter™ units for treatment at the hydraulic loading rates shown in Table 1, and sized based on the water quality design flow rate for an off-line system. The internal weir in the inlet chamber functions as a bypass to route flow in excess of the water quality design flow rate around the treatment chamber. Calculate the water quality design flow rate using the following procedures:
 - **Western Washington:** For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.

- **Eastern Washington:** For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- **Entire State:** For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

4. These General Use Level Designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Perk Filter™ units shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain Perk Filter™ units in accordance with Kristar/Oldcastle's applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Kristar/Oldcastle review and approval before site installation. This ensures that site grading and slope are appropriate for use of a Perk Filter™ unit.
3. Perk Filter™ media shall conform to the specifications submitted to, and approved by, Ecology.
4. **Maintenance:** The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

- Typically, Kristar/Oldcastle designs PerkFilter systems for a target filter media replacement interval of 12 months. Maintenance includes removing accumulated sediment from the vault, and replacing spent cartridges with recharged cartridges.
- Indications of the need for maintenance include effluent flow decreasing to below the design flow rate, as indicated by the scumline above the shoulder of the cartridge.
- Owners/operators must inspect PerkFilter for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- **Conduct inspections by qualified personnel, follow manufacturer’s guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.**
- **When inspections are performed, the following findings typically serve as maintenance triggers:**
 - **Accumulated vault sediment depths exceed an average of 2 inches, or**
 - **Accumulated sediment depths on the tops of the cartridges exceed an average of 0.5 inches, or**
 - **Standing water remains in the vault between rain events, or**
 - **Bypass occurs during storms smaller than the design storm.**
- **Note: If excessive floatables (trash and debris) are present, perform a minor maintenance consisting of gross solids removal, not cartridge replacement.**

5. Discharges from the Perk Filter™ units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Kristar/Oldcastle Precast, Inc.

Applicant’s Address: 5331 SW Macadam Avenue
Suite 376
Portland, OR 97239

Application Documents:

- Perk Filter™ Final Report, prepared by: Office of Water Programs, California State University, Sacramento (September 2007)
- Verification Phase of Perk Filter™ Tests with Zeolite-Perlite-Carbon Media and Zeolite-Carbon Media (August 2007)
- Quality Assurance Project Plan KriStar Perk Filter™ Stormwater Treatment Performance Monitoring Project, October 2008 Draft
- Technical Evaluation Report Volume 1: KriStar Perk Filter™ Stormwater Treatment System Performance Monitoring, April 2010
- Technical Evaluation Report Volume 2 - Appendices: KriStar Perk Filter™ Stormwater Treatment System Performance Monitoring, April 2010.

Applicant’s Use Level Request:

- General use level designation as a basic and Phosphorus treatment device in accordance with Ecology’s *Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision*.

Applicant's Performance Claims:

- Capability to remove 80% of total suspended solids from stormwater runoff from sites with influent concentrations between 100 mg/L and 200 mg/L and provide effluent concentrations of 20 mg/L or less with influent concentrations less than 100 mg/L given a typical particle size distribution.
- Capability to remove 50% of Total Phosphorus from stormwater runoff from sites with influent concentrations between 0.1 mg/l and 0.5 mg/l.

Findings of Fact:

- Based on laboratory testing at a flowrate of 12 GPM per filter, the Perk Filter™ containing ZPC media had an average total suspended solids removal efficiency of 82% using Sil-Co-Sil 106 with an average influent concentration of 102 mg/L and zero initial sediment loading.
- Based on field-testing at a flowrate of 0.57 GPM/inch of cartridge height (17.25 inch diameter cartridge) (1.5 gpm per sq ft filter surface area), the Perk Filter™ containing ZPC media had an average total suspended solids removal efficiency of 82.4% for an influent concentration between 20 mg/L and 200 mg/l. The Perk Filter™ containing ZPC media had an average removal efficiency of 85.2% for an influent concentration between 100 mg/l and 200 mg/l. Removal rates fell over time and dropped below 80% after approximately 10 months.
- Based on field testing at a flowrate of 0.57 GPM/inch of cartridge height (17.25 inch diameter cartridge) (1.5 gpm per sq ft filter surface area), the Perk Filter™ containing ZPC media had an average total Phosphorus removal efficiency of 62.4% for an influent concentration between 0.1 mg/L and 0.5 mg/l. Removal rates tended to remain relatively constant during the 10 months of monitoring.
- Field Testing indicates that sediment accumulation in the Sediment Gallery during the 10 months of sampling was within the available volume for sediment. Thus, maintenance at a 6-month frequency (vacuuming of sediment from Inlet Gallery) as suggested by the manufacturer is sufficient.
- Filter flows during bypass events utilize the full 30-inch height of the filter. Without bypass, an unknown amount of filter is used. Comparing the flow through the filter during bypass events with the design flow rate shows that the Kristar/Oldcastle system falls below the design flow rate after approximately 10 months of operation.
- Percent removal of TSS falls below 80% after approximately 10 months. There are earlier data points below 80% but these are from low influent concentration storms

Other Perk Filter™ Related Issues to be Addressed By the Company:

1. Kristar/Oldcastle may perform additional monitoring to better determine the maintenance frequency for the filters with respect to design flow rate and Total Suspended Solids removal. Presentation of additional data may result in a modification to the requirements in this Use Level designation document.

Technology Description: Download at www.kristar.com

Contact Information:

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Applicant website: www.kristar.com

Ecology web link: <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>

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Revision History

Date	Revision
March 2008	Original Draft use-level-designation document
June 2010	Revise Use Level to General
January 2013	Modified Design Storm Description, added Revision Table, formatted document to match Ecology standard
May 2014	Revised Company name and contact information
June 2016	Designated device for off-line sizing
August 2018	Revised Address and phone number for Oldcastle