



November 2016

GENERAL USE LEVEL DESIGNATION FOR PRETREATMENT (TSS)

For

Contech Engineered Solutions Inc. Vortechs® System

Ecology's Decision:

Based on the CONTECH Engineered Solutions Inc. (CONTECH) application submissions for the Vortechs® System, Ecology hereby issues the following use designations for the Vortechs technology:

1. **General Use Level Designation (GULD) for pretreatment use, as defined in the Ecology's 2011 *Technical Guidance Manual for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE)* Table 2, (a) ahead of infiltration treatment, or (b) to protect and extend the maintenance cycle of a Basic, Enhanced, or Phosphorus Treatment device.**
2. **This GULD applies to Vortechs units sized at an operating rate of no more than 35 gpm/sf of grit chamber area at the Water Quality design flow rate. The following table shows flow rates associated with various grit chamber sizes:**

Washington State Vortechs System Sizing		
Vortechs System	Grit Chamber Diameter	35 gpm/ft² Flow Rate
Model ID	ft	cfs
1000	3	0.55
2000	4	1.0
3000	5	1.5
4000	6	2.2
5000	7	3.0
7000	8	3.9
9000	9	5.0
11000	10	6.1
16000	12	8.8

3. Ecology approves Vortechs units for treatment at the hydraulic loading rates shown in the above Table, and sized based on the water quality design flow rate. 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. Properly designed and operated Vortechs systems may also have applicability in other situations (example: low-head situations such as bridges or ferry docks), for TSS and oil/grease removal where, on a case-by-case basis, it is found to be infeasible or impracticable to use any other approved practice. Local jurisdictions should follow established variance or exception procedures in approving such applications.

5. Ecology finds that the Vortechs, sized at an operating rate of 35 GPM/sf, could also provide:

- **Water quality benefits in retrofit situations.**
- **Provide the first component in a treatment train.**
- **Provide effective removal of deicing grit/sand.**
- **Vortechs units are applicable for low head situations and/or utility conflicts where the designer finds other approved practices to be infeasible or impractical to use.**

Ecology's Conditions of Use:

Vortechs systems shall comply with these conditions:

- 1. Design, assemble, install, operate, and maintain Vortechs Systems in accordance with applicable CONTECH *Product Design Manual Version 4.1 (April 2006)* or most current versions, and the Ecology Decision.**
- 2. Discharges from the Vortechs System shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant: CONTECH Engineered Solutions LLC,

Applicant's Address: 11835 NE Glen Widing Drive
Portland, OR 97220

Application Documents:

- Vortechs System Conditional Use Approval Application Letter to the Washington State Department of Ecology (June 25, 2003)
- *Vortechs Stormwater Treatment System Technology Report*, June 2003 Technical Appendices 1 through 16

Applicant's Use Level Request:

- Conditional Use Designation as a Basic Treatment device in accordance with Ecology's 2001 stormwater manual.

Applicant's Performance Claims:

- Based on laboratory trials, the Vortechs System will achieve an 80% TSS removal efficiency for sediment particles ranging from 38 to 75 microns at an operating rate of 13 gallons per minute per square foot (GPM/sf) at the peak flow for the Ecology water quality design storm.
- The system is recommended only for sites likely to produce relatively high TSS concentrations (above 100 mg/L), where TSS is primarily composed of 50 microns and larger particles. Potentially appropriate sites include parking lots, highways and urban streets, material transfer sites, hydrocarbon transfer sites, retrofits, steep/erosive sites, and space-limited sites.

Ecology's Recommendation:

Ecology finds that:

- The Vortechs system, sized at 35 GPM/sf, should provide, at a minimum, equivalent performance to a presettling basin as defined in the most recent *Stormwater Management Manual for Western Washington*, Volume V, Chapter 6.

Findings of Fact:

1. Contech completed laboratory testing for sieved sand using a Vortechs Model 2000. Laboratory results for the "50 micron" particle range (included particles ranging from 38 to 75 microns) showed 80% removal at 13 GPM/sf operating rate.

2. Contech completed abbreviated laboratory testing for Sil-Co-Sil 106, a ground silica product with a mean particle size of about 20 microns. Removal rates at 5 to 10 GPM/sf were around 40%.
3. Various independent parties in the eastern and northeastern United States (Lake George, NY; South Windsor, CT; Yarmouth, ME; Harding Township, NJ; Lexington, MA; Burlington, VT; and Charlottesville, VA) completed field studies. Contech provides study details in the technical appendices. These studies generally show above 80% TSS removal rates. However, the results from a particle size distribution analysis on sediment captured in the Lake George Vortechs System indicate that mainly coarse particles were present. Because the influent particle size distribution was not measured removal efficiency of specific particle sizes could not be determined.
4. Independent parties in the Pacific Northwest (WSDOT SR-405; Buffalo Slough/City of Portland; Unified Sewerage Agency, Oregon) completed three field studies. Study details were not included in CONTECH submissions. These studies generally show TSS removal rates to support a 40% pretreatment rating by Ecology for systems in the PNW, where soils range from silt to silt-loam.
5. Use of a vacuum truck can easily maintain this system.
6. There are over 4,400 and 100 Vortechs systems installed nationwide and in the Pacific Northwest, respectively.

Technology Description:

Download at:

<http://www.conteches.com/Products/Stormwater-management/Treatment/Vortechs.aspx>

Contact Information:

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

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Revision History

Date	Revision
November 2003	Original Draft use-level-designation document: GULD for pretreatment.
August 2007	Revised contact information
January 2013	Modified Design Storm Description, added Revision Table
November 2016	Revised Contech contact information