



**November 2006  
(Updated August 2007)**

## **GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) TREATMENT**

**For**

**Contech Stormwater Solutions, Inc.'s Media Filtration System**

### **Ecology's Decision:**

**Based on the CDS application submissions and recommendations by the Technical Review Committee (TRC), Ecology hereby issues a General Use Level Designation (GULD) for the CDS Media Filtration System (MFS):**

- **As a basic stormwater treatment practice for total suspended solids (TSS) removal,**
- **Using perlite media, with the size distribution described below,**
- **Sized at a design rate of 9.0 GPM per cartridge (18-in diameter, 22-in tall) (except as stated in Condition #1, below), and**
- **Internal bypassing needs to be consistent with the design guidelines in CDS's current product design manual. Off-line configurations allow for maintenance needs to be most easily identified.**

**This designation has no expiration date, but it may be amended or revoked by Ecology, and is subject to the conditions specified below.**

### **Ecology's Conditions of Use:**

**The CDS MFS shall be designed, installed, and maintained to comply with these conditions:**

1. **CDS systems containing perlite are approved for basic treatment at 9.0 GPM maximum flow rate per cartridge (18-in diameter, 22-in tall) at the 15-minute water quality design flow rate (as specified in Ecology's most recent Stormwater Manual), as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model (e.g. MGS Flood). Note that if single event methods are used to estimate runoff flowrates, Figures 9.6a and 9.6b in Volume V of the 2005 Stormwater**

Management Manual for Western Washington should be used to adjust the peak flowrate. This is done by dividing the peak 10-minute flowrate predicted by the single event method by the ratio indicated in Figure 9.6a for on-line designs, or Figure 9.6b for off-line designs. The 6-month, 24-hour rainfall amount for the project site must be known to identify the appropriate ratio. The adjusted flowrate is then divided by the approved hydraulic loading rate of 9 GPM per 22-inch tall cartridge to compute the number of cartridges necessary.

2. For CDS media filtration systems located downstream of a stormwater detention facility, the CDS MFS size shall be calculated using both the flow-based method (full 2-year release flowrate) and mass-based method (as described in the most recent CDS Product Design Manual) and the designer shall select the result yielding the larger number of cartridges.
3. CDS media filtration systems shall be installed in such a manner that flows exceeding 9.0 GPM are bypassed or will not resuspend captured sediments. CDS media filtration systems shall be designed in accordance with the performance goals in Ecology's most recent Stormwater Manual. The design, pretreatment, land use application, and maintenance criteria must follow CDS media filtration system design requirements.
4. Pretreatment of TSS and oil and grease may be necessary, and shall be provided in accordance with the most recent Ecology Stormwater Manual, and using the performance criteria and pretreatment practices provided on Ecology's "Evaluation of Emerging Stormwater Treatment Technologies" website.
5. Inspections should be used to determine site-specific maintenance schedules and/or requirements. When inspections are performed, the following findings shall serve as maintenance triggers:
  - a) Accumulated vault sediment depths exceed an average of 12 inches, or
  - b) Accumulated sediment depths on the tops of the cartridges exceed an average of 0.5 inches, or
  - c) If excessive floatables (trash and debris) are present, perform a minor maintenance consisting of gross solids removal, not cartridge replacement.
6. Contech shall maintain readily available those reports listed under "Application Documents" as public, as well as the documentation submitted with its previous conditional use designation application. Contech shall make this information available upon request, at no cost and in a timely manner.
7. The perlite media used shall conform with the following specifications:

The size of the media ranges from 0.125 to 0.375 inches. The dry bulk density ranges from 4.5 to 6.5 lbs per cubic foot. The following table shows a

**typical particle size distribution of the XSORB media.**

**Sieve Analysis of the XSORB media:**

<b>US Sieve No.</b>	<b>Sieve Opening (µm)</b>	<b>% Retained by Volume</b>
4	4760	35-50
8	2360	75-99
16	1180	98-100
30	600	99-100
50	300	99-100
100	150	99-100

**Each cartridge contains a total of approximately 3.14 cubic feet of media.**

**Applicant:** CDS Technologies, Inc., Manufacturer and Vendor  
Diane Warner, PE

**Applicant's Address:** Contech Stormwater Solutions, Inc.  
11835 NE Glen Widing Drive  
Portland, OR 97220

**Application Documents:**

“Application to Washington Department of Ecology Water Control Program for General Use Level Designation of Media Filtration System – Technical Evaluation Engineering Report”, CDS Technologies, Inc., July 2006. It includes the following public report:

- (Public) “Evaluation of the CDS Technologies Media Filtration System: Data Validation Report and Summary of the Technical Evaluation Engineering Report (TEER)”, Water Resources Management, June 2006.

Ecology’s technology assessment protocol requires the applicant to hire an independent consultant to complete the following work:

1. Complete the data validation report.
2. Prepare a TEER summary, including a testing summary and conclusions compared with the supplier’s performance claims.
3. Provide a recommendation of the appropriate technology use level.
4. Recommend relevant information to be posted on Ecology’s website.
5. Provide additional testing recommendations, if needed.”

This report, authored by Roger B. James, P.E., Water Resources Management, satisfies the Ecology requirement.

Above-listed document noted as “public” is available by contacting CDS.

**Applicant's Use Level Request:**

General Use Level Designation for Basic Treatment for the CDS MFS using perlite at 9.0 GPM/filter (18-in diameter, 22-in tall) in accordance with Ecology's most recent stormwater management manual.

**Applicant's Performance Claim:**

The combined data from the two field sites reported in this TEER (Silverton Highway, Hillsboro, OR and Lolo Pass, Zigzag, OR) indicate that the performance of a CDS MFS configured for inline bypass with perlite media and a 9.0 GPM filtration rate per 22-inch tall cartridge meets Ecology performance goals for Basic Treatment.

**Technical Review Committee Recommendations:**

The TRC, based on the weight of the evidence and using its best professional judgment, finds that:

- CDS MFS, using perlite media and operating at no more than 9.0 GPM per 22-inch tall cartridge is expected to provide effective stormwater treatment achieving Ecology’s basic treatment removal goals, as demonstrated by field and laboratory testing performed in accordance with the protocol; and
- CDS MFS is deemed satisfactory with respect to factors other than treatment performance.

**Findings of Fact:**

- Influent TSS concentrations and particle size distributions were generally within the range of what would be considered “typical” for western Washington (silt to silt loam).
- Storm events were sampled at two monitoring sites for storms from December 2005 to April 2006, of which twenty nine (29) were deemed “qualified” and were therefore included in the data evaluation. Both sites were located on roadways.
- Statistical analysis of these 29 storm events verifies the data set’s adequacy.
- For the ten (10) qualifying events with influent TSS concentrations greater than 100 mg/L but less than 300 mg/L, the average influent concentration, average effluent concentration, and average pollutant reduction were 151.70 mg/L, 24.81 mg/L, and 83.6%, respectively.
- For the nineteen (19) qualifying events with influent TSS concentrations less than 100 mg/L, the average influent concentration, average effluent concentration, and average pollutant reduction were 61.42 mg/L, 19.09 mg/L, and 68.9%, respectively.

- The float control valve operated as designed according to the inflow, outflow and water elevation measurements in the vault.
- Laboratory testing using U.S. Sil-Co-Sil 106 showed removal rates around 85% for flowrates 10 GPM or below, and between 72% and 81% for flowrates at or above 15 GPM.
- At the Silverton site, flows ranged between 19.6% and 304.5% of the water quality design flowrate, and averaged 138% of the water quality design flowrate.
- At the Lolo Pass site, flows ranged between 7.8% and 150.9% of the water quality design flowrate, and averaged 57.4% of the water quality design flowrate.
- Analyzing the individual storm events at Lolo Pass, Zigzag (20 storms) and Silverton Highway, Hillsboro site (11 storms), the average removal of total chromium ranged from 62.1% to 62.9%, the average removal of total zinc ranged from 51.9% to 63.5%, the average removal of total copper ranged from 57.2% to 61.3%, and the average removal of total lead ranged from 69.4% to 70.9%. These removals do not qualify for an enhanced treatment designation.
- Analyzing the individual storm events at Lolo Pass, Zigzag (17 storms) and Silverton Highway, Hillsboro site (11 storms) the removal of total phosphorus was 67%. These removals do not qualify for phosphorus treatment designations.
- The CDS application included a satisfactory discussion for the “Factors other than Treatment Performance” section.

*Note: Ecology’s 80% TSS removal goal applies to 100 mg/l and greater influent TSS. Below 100 mg/L influent TSS, the goal is 20 mg/L effluent TSS.*

### **Technology Description and System Operation:**

Stormwater runoff entering the system is diverted by a weir and flows to the portion of the vault beneath the cartridge where larger solids will settle and be captured. The system operates by filtering the stormwater through media filled cartridges. The system is designed to allow approximately 3 GPM or less to flow through each cartridge while the water level is rising in the vault (slide gate is in the closed position).

Filtered water enters a perforated drain tube located in the center of the cartridge and flows to the collector manifold through a flexible pipe. The manifold is plumbed to a float controlled slide gate that sets the overall operational control of the Media Filtration System to achieve a balance between flow and driving head level. The float is designed to fully open the slide gate as the water level reaches the top of the cartridges. The float control valve ensures that a uniform vertical pressure distribution is developed from the bottom to the top of each cartridge, which ensures even hydraulic loading and maximum exposure of the perlite media within each cartridge filter at the same time and hydraulic loading rate.

After the storm event has ended, the remaining water is slowly released at less than or equal to 3GPM through each cartridge and the slide gate until the vault is drained to the outlet pipe’s invert level. This less than or equal to 3 GPM/cartridge drain down is an engineered process that has been designed into the slide gate and is referred as the

“leakage”. This operation of the slide gate assures that media are not exposed to artificial shocking flows or abrupt hammering hydraulic forces that can destabilize and/or induce channelization through the media. When stormwater runoff flows recede, the float controlled slide gate will close until the next triggering runoff event.

Cartridges are positioned 21 inches above the vault floor providing an underbay (forebay) volume for settling larger, heavier sediments below the cartridges preventing occlusion of the media resulting from sediment buildup. When the system is operating at a 9GPM/cartridge design loading rate, the maximum upflow velocity in the vault is approximately 2 mm/sec. At this upflow velocity, particles in the 45 to 50 micron size range with a specific gravity of 2.65 may settle in the area beneath the cartridges removing the majority of the mass of suspended solids found in stormwater runoff. This presettling design feature makes for long filter bed run times, reduces the frequency of maintenance, and negates the need to thoroughly clean the entire vault structure each time media cartridges are exchanged or recharged.

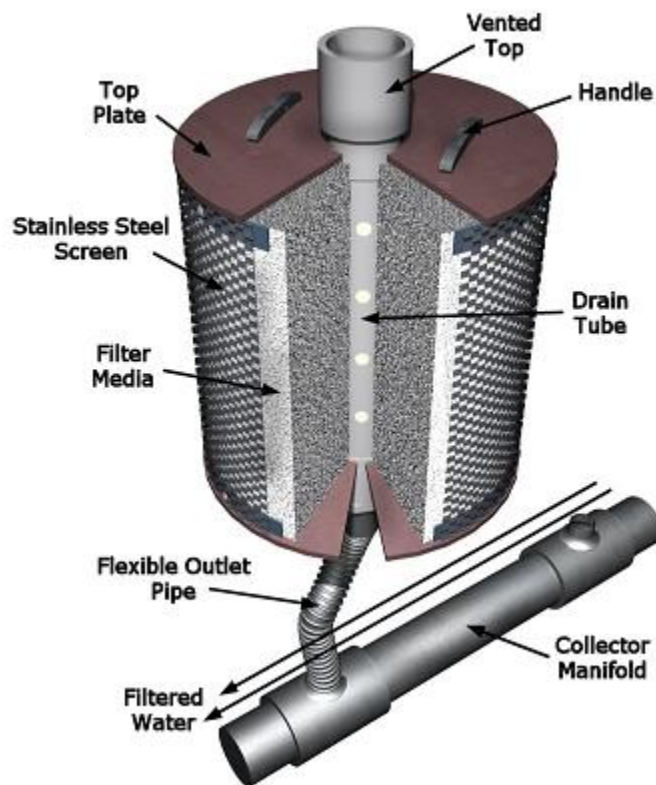


Figure 1 - Schematics of CDS Media Filter

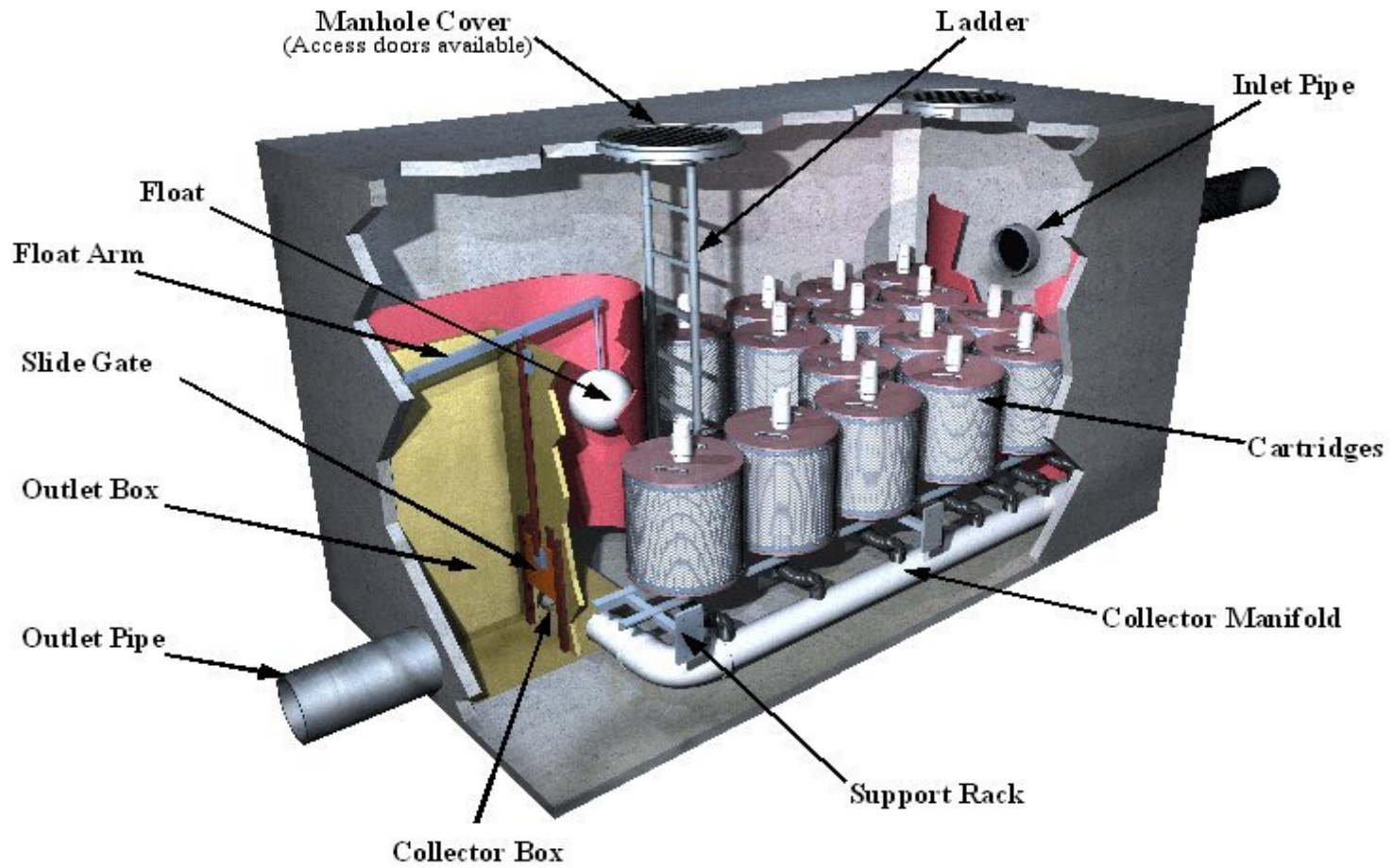


Figure 2 - CDS Media Filtration System

### **CDS Configurations:**

The MFS is offered in four basic configurations: precast manhole, trench catchbasin, and vault or cast-in-place vault form. The precast models use pre-manufactured units to ease the design and installation process. Cast-in-place units are customized for larger flows and may be either uncovered or covered underground units.

### **Recommended Research and Development:**

Ecology encourages CDS to pursue continuous improvements to the CDS MFS. To that end, the following actions are recommended:

- Conduct a hydraulic analysis of units that require complete drawdown of water between events. Conduct a hydraulic analysis to discover the percent of untreated water that is lost during drawdown and operation of these units.
- Continue work on developing best operation and maintenance practices. CDS is encouraged to update Ecology and the TRC of their operation and maintenance experiences.
- As experience is gained on operation and maintenance, CDS is encouraged to update their O&M manual to reflect learned knowledge.

### **Contact Information:**

Applicant Contact: Sean Darcy, [darcys@contech-cpi.com](mailto:darcys@contech-cpi.com)  
(800) 548-4667

Applicant Web link: <http://www.contechstormwater.com>

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

Ecology Contact: Mieke Hoppin  
Water Quality Program  
(360) 407-6435  
[mhop461@ecy.wa.gov](mailto:mhop461@ecy.wa.gov)

Technical Review Committee: Dave Tucker, P.E.  
Kitsap County  
(360) 337-7292  
[dtucker@co.kitsap.wa.us](mailto:dtucker@co.kitsap.wa.us)