WISCONSIN DEPARTMENT OF NATURAL RESOURCES

TECHNICAL STANDARD

PROPRIETARY STORM WATER FILTRATION DEVICES

1010

DEFINITION

A *proprietary flow-through storm water filtration device*[1] is a commercially-available treatment unit, which contains either granular filter media or a membrane that storm water passes through to remove pollutants. The proprietary filtration device may include treatment processes in addition to filtration, such as oil and grease removal with baffles or a settling chamber to reduce sediment load to the filter.

PURPOSE

Proprietary filtration devices are used to reduce the storm water pollutant load to waters of the state or for pretreatment to an infiltration system.

This standard is used to predict the reduction in the *annual average* mass load of total suspended solids (TSS) and other *selected pollutants* removed by a proprietary filtration device when installed to treat runoff from a specific drainage area of defined characteristics. Application of this standard provides information necessary for an *administering authority* and the regulated community to predict the effectiveness of these devices in meeting *regulatory*, grant-based, and other storm water management requirements and goals.

Pollutant reductions from proprietary filtration devices that are designed, installed and maintained in accordance with this standard may be applied toward meeting post-construction performance standards of ch. NR 151, Wis. Adm. Code, and storm water Total Maximum Daily Load (TMDL) requirements. This standard was developed with its focus on pollutant removal of TSS and total phosphorus (TP). In the future, this standard may be expanded to consider proprietary filtration removal of additional storm water pollutants.

This standard utilizes the New Jersey Department of Environmental Protection (NJDEP)-*a*pproved maximum allowable drainage area for proprietary filtration devices. This maximum allowable drainage area is, by design, used to prevent a filtration device from becoming *spent* in less than 12 months. See section (4)a of this standard.

This standard allows use of Washington State Department of Ecology Technology Assessment Protocol – Ecology (*TAPE*) *General Use Level Designation (GULD)* certified monitoring data, which is used to calculate an adjusted filter treatment efficiency for use in Wisconsin. See section (3) of this standard.

Websites for NJDEP and WA State TAPE are included in the References section of this standard.

This standard does not constitute a *general product approval method*. This standard does not apply to non-proprietary filtration such as those regulated under the Bioretention for Infiltration Technical Standard 1004. This standard is not intended to address biofiltration devices.

CONDITIONS WHERE PRACTICE APPLIES

This standard is intended for *development* sites that will utilize a proprietary filtration device to meet storm water post-construction performance standards, such as the TSS performance standard under s. NR 151.122, Wis. Adm. Code. This standard is not designed to meet an end-of-pipe effluent concentration-based limitation such as a wastewater discharge permit limitation. A proprietary filtration device is more

---

[1] Words in the standard that are shown in italics are described in the Glossary section. The words are italicized the first time they are used in the text.

likely to be utilized in *redevelopment* and retrofit sites or *new development* sites where there is insufficient space for an above-ground storm water treatment system, such as a wet pond or bioretention facility.

Proprietary filtration devices are not suitable for controlling sediment from construction sites. The proprietary filtration device shall be protected from construction site sediment until the drainage area to it is stabilized from erosion.

CRITERIA

Proprietary filtration devices shall be designed and implemented in accordance with the following criteria:

General Criteria

Laws and Regulations. Comply with applicable federal, tribal, state, and local laws, rules, or regulations, including, but not limited to, safety procedures. This standard does not contain the text of federal, tribal, state, or local laws. The criteria contained in this document may help a user meet a storm water performance standard under s. NR 151.122 or 151.242, Wis. Adm. Code, or as may be required in local storm water ordinances. However, the applicable administering authority makes the final determination of compliance with any regulation.

Location. Locate the filter media at least one foot above seasonal high groundwater or have other protection such as an underdrain below the device to prevent groundwater from affecting the filter media. Perform an on-site soil evaluation to verify depth to seasonal high groundwater. Filter media needs to be able to have regular dry out periods to allow the media to aerate between runoff events or it may prematurely clog the filter media. This location requirement does not apply to membrane filters designed to be permanently submerged in water.

Design the system so that any storm up to the 10-yr., 24-hr. design storm will not create a condition where storm water flows backward through the treatment device. Flap gates, check valves or other devices may be necessary to prevent backward flow in the conveyance system downgradient of the device. If flap gates, check valves or other devices are used, consider the headloss through these appurtenances as part of the design process to ensure that the treatment system will not be compromised and that overall system headloss is acceptable. Include a means of access to flap gates, check valves, or other devices for maintenance.

Design Criteria

(1) **Filtration Design Life before Maintenance.** The New Jersey Department of Environmental Protection (NJDEP) certifies proprietary filter sizing so that a filter can be expected to operate for 12 months based on an annual TSS load of 600 lb/ac. The annual 600 lb/ac TSS load is comparable to that from a typical Wisconsin parking lot. The NJDEP-certified maximum allowable inflow drainage area for a specific proprietary filter shall be met. Alternatively, the filtration device may be modeled in a Wisconsin Department of Natural Resources (WDNR)-approved model that includes a maintenance sizing methodology that incorporates, or is determined by the permit authority to be equivalent to, the NJDEP-certified proprietary filter sizing criteria for maintenance. Use either the NJDEP-certified maximum allowable drainage area or an approved model to verify that the filtration device is designed to operate for 12 months without becoming spent.

A filtration device that does not have a NJDEP-maximum allowable drainage area for maintenance established may have an independent evaluation performed to determine a maximum allowable drainage area that the administering authority determines to be equivalent to an NJDEP-certified design.

(2) **Methodology or *Approved Model* to Determine TSS Reduction.** A methodology or approved model is required to predict the reduction in the annual average mass load of TSS or other pollutant(s) as required by the administering authority. There are two options:

a. Option 1: Use section (3) of this standard to determine the TSS filter efficiency and section (4) to determine the number of filters required.

Section (3) is a conservative methodology to determine the Overall Adjusted TSS Filtration Efficiency based on data collected under the WA State TAPE, which is used to establish an annual average TSS reduction. The TSS reduction is adjusted based on the influent *particle size distribution (PSD)* relative to the *Nationwide Urban Runoff Program (NURP)* PSD used in Wisconsin.

Under section (4)a, a conservative methodology is used to establish a minimum filter *Maximum Treatment Flow Rate (MTFR*) needed for annual average rainfall in Wisconsin.

b. Option 2: Use a model approved by the administering authority that is designed to model a proprietary filtration device and is based on removal of a NURP PSD.

(3) **Methodology to Predict TSS Filter Efficiency**

a. **Data for Evaluation.** The methodology to determine a proprietary filtration device's annual average TSS treatment efficiency is based on field test data used to obtain a WA State TAPE General Use Level Designation (GULD) approval, adjustment for the NURP PSD, and application of a safety factor.

b. **Efficiency Adjustment for NURP PSD.** The TAPE field test data commonly has a limited number of particle size groupings of the influent data. Unless the administering authority approves an alternative method, use the following adjustment method to determine, along with the safety factor adjustment described in section (3)d, the overall adjusted TSS filter efficiency described in section (3)e:

Particle Size (*microns*)	NURP PSD (% by mass)	Average Influent PSD from Field Samples (% by mass)
<4	29	X
4 – 62.5	58	Y
> 62.5	13	

c. **Administering Authority Data Evaluation.** An administering authority may allow alternative particle size groupings to calculate an efficiency adjustment for NURP PSD using a calculation comparable to section (3)b. The administering authority may also elect to not use all of the field data if the administering authority determines data to be unrepresentative.

d. **Safety Factor Adjustment for PSD Measurements of Influent and Effluent.** Apply a safety factor to the NURP-adjusted efficiency selected from the table below based on the number of rainfall events for which both influent and effluent PSD measurements were taken. All PSD measurements of the influent and effluent shall be reported.

Number of Rainfall Events with both Influent and Effluent PSD measurements	Safety Factor
15 or more	1.0
12 – 14	0.98
9 – 11	0.96
6 – 8	0.94
3 – 5	0.90

e. **Overall Adjusted TSS Filter Efficiency.** Use the equation below to calculate the overall adjusted TSS filter efficiency. However, the overall adjusted TSS filter efficiency is limited to a range of no less than 50% and no greater than 80%. This is the value used by a designer for TSS filter efficiency but it does not account for runoff that bypasses the filters or runoff that does not discharge through the filter device.

Overall Adjusted TSS Filter Efficiency = (NURP-Adj. Efficiency) * (Safety Factor)

A spreadsheet has been developed to determine the overall adjusted TSS filter efficiency using the process in sections (3)a through (3)e. Use the spreadsheet to reduce calculation time and potential errors. The spreadsheet is available on WDNR's post-construction standards web page: https://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html.

Determine the Overall NURP-Adjusted TSS Filter Efficiency

NURP-Adjusted Efficiency = (TAPE GULD overall efficiency) x (NURP % Adj. Factor) / 100%

Use the following equations to calculate the NURP-Adjusted Efficiency:

Where: NURP % Adj. Factor = X + Y + 13%

Where: $X \leq 29\%$; $Y \leq 58\%$

However, if the average influent PSD has a greater percentage of particles in the < 4 micron range than NURP, include the excess as part of the next particle range (Y, 4 - 62.5 microns).

Example 1:

The proprietary filtration device has a TAPE GULD overall efficiency of 82% based on 12 samples. The average influent PSD had 39% (< 4 microns) and 54% (4 – 62.5 microns) based on 3 samples.

NURP % Adj. Factor = X + Y + 13%

Determine X and Y to solve above equation:

X: 39% (< 4 microns) but it exceeds the maximum allowed X of 29%, so X = 29% with 10% (39% – 29%) excess to include in the next larger particle range.

Y: 54% (4 – 62.5 microns) plus 10% excess from the < 4 microns range is 64% but it exceeds the maximum allowed Y value of 58%, so Y = 58%.

NURP % Adj. Factor = 29% + 58% + 13% = **100%**

$$\text{NURP-Adjusted Efficiency} = \frac{\text{(TAPE GULD overall efficiency) * (NURP \% Adj. Factor)}}{100\%}$$

$$\text{NURP-Adjusted Efficiency} = \frac{82\% * 100\%}{100\%} = \mathbf{82\%}$$

Overall Adjusted TSS Filter Efficiency = (NURP Adj. Efficiency) * (Safety Factor)

Overall Adjusted TSS Filter Efficiency = 82% * 0.90 = **74%**

Example 2:

The proprietary filtration device has a TAPE GULD overall measured efficiency of 85% based on 15 samples. The average influent PSD had 12% (< 4 microns) and 74% (4 – 62.5 microns) based on 15 samples.

$$\text{NURP \% Adj. Factor} = X + Y + 13\%$$

Determine X and Y to solve above equation:

X: 12% (< 4 microns) does not exceed the maximum allowed X value of 29%, so X = 12%.

Y: 74% (4 – 62.5 microns) but it exceeds the maximum allowed Y value of 58%, so Y = 58%.

NURP % Adj. Factor = 12% + 58% + 13% = **83%**

$$\text{NURP-Adjusted Efficiency} = \frac{\text{(TAPE GULD overall efficiency) * (NURP \% Adj. Factor)}}{100\%}$$

$$\text{NURP-Adjusted Efficiency} = \frac{85\% * 83\%}{100\%} = \mathbf{71\%}$$

Overall Adjusted TSS Filter Efficiency = (NURP Adj. Efficiency) * (Safety Factor)

Overall Adjusted TSS Filter Efficiency = 71% * 1.0 = **71%**

(4) **Conservative Filter Sizing Methodology**. Design proprietary filtration devices to achieve pollutant removal based on an annual average rainfall year and a NURP PSD. Design devices to operate for a minimum of 12 months without filters becoming spent. Manufacturers shall specify whether *pretreatment*, flow attenuation, or a bypass device is required in conjunction with the device for it to perform to its design specifications.

To determine the required filter capacity, with no flow attenuation or storage, calculate the capacity based on both maintenance and flow. The higher capacity determines the minimum MTFR needed.

a. **Filter Capacity Based on Maintenance**: As identified under section (1), use the NJDEP-certified maximum allowable inflow drainage area for a specific proprietary filter to determine the minimum filter capacity needed.

b. **Filter Capacity Based on Flow:** Figure 1 is used to determine the MTFR needed to filter a given percentage of annual average runoff (as opposed to runoff bypassing the filter). This figure is based on a one-acre impervious area, and the necessary MTFR is scalable based on the actual drainage area to the device. The curve in Figure 1 is the following equation:

$$Y = 48.05 * (1-\exp(1-0.01486*X)) + 50.03 * (1-\exp(-0.08065*X))$$

Where**:**

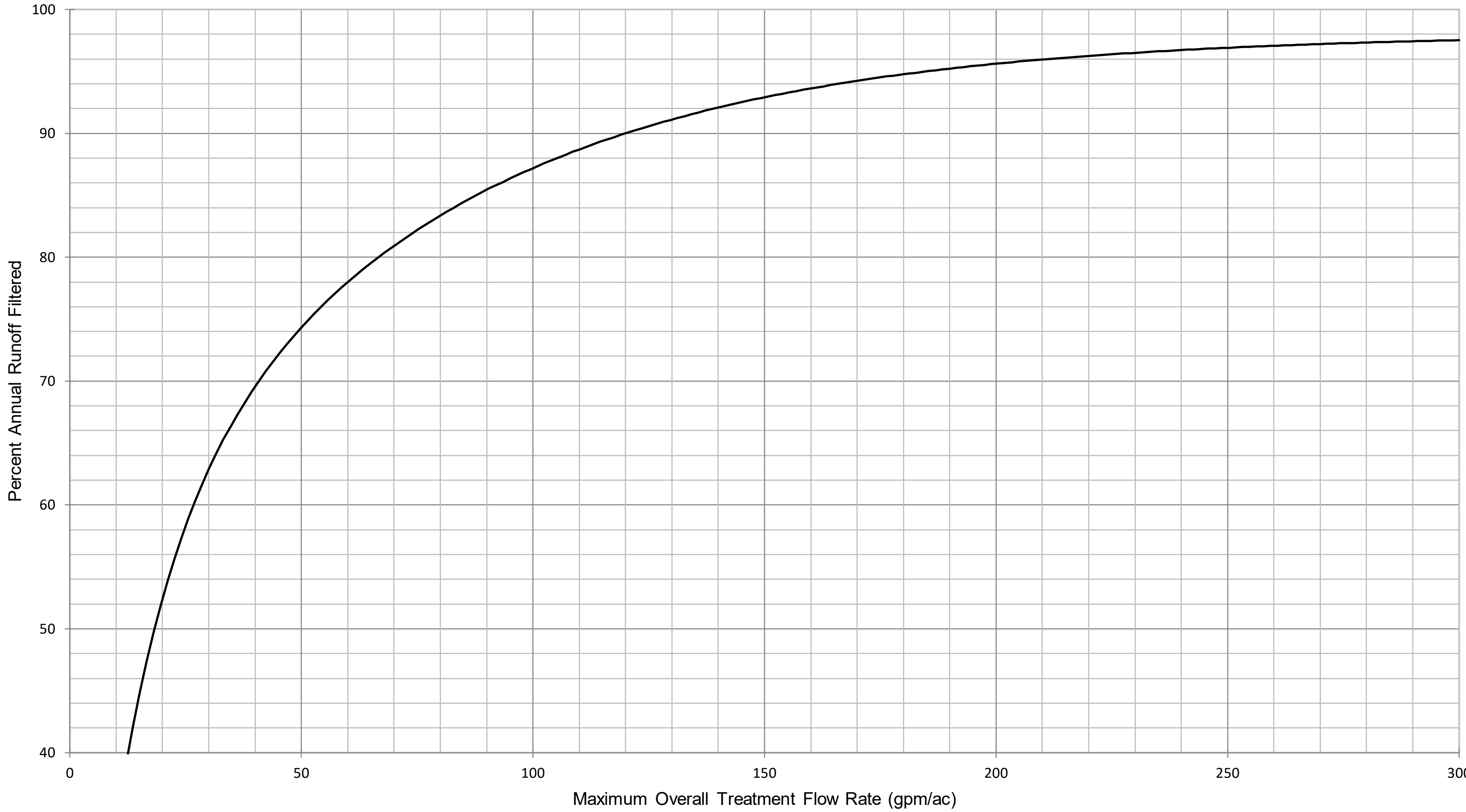
X = Maximum Treatment Flow Rate (gpm/ac)

Y = Percent Annual Runoff Filtered

This curve was established using the Madison 1981 rainfall year, which WDNR allows to be used as the annual average rainfall year throughout Wisconsin.

Figure 1.

Percentage of Runoff Filter Treatment of One Acre Impervious Area



Overall Site Treatment Efficiency = (Percent Annual Runoff Filtered / 100%) * Overall Adjusted Filter Efficiency

WDNR
September 2020

Determine the Number of Filters Based on Maintenance

Follow these steps to determine the number of filters needed based on filter maintenance needs:

1. Determine, based upon the filter's NJDEP certification, the maximum allowable drainage area that a single filter cartridge under consideration can treat.
2. Calculate the number of filters needed based on maintenance requirements by dividing the treated site drainage area by the area that a single cartridge can treat, as determined in step 1. Round up to the nearest whole number.

Example 3:

Find the number of filters based on maintenance.

The total drainage area to be treated is 1.1 acres. Assume that NJDEP has approved this filter to treat a maximum allowable inflow drainage area of 0.060 acre.

$$\text{Number of filters needed} = \frac{\text{Treated site drainage area (ac)}}{\text{Maximum allowable drainage area per filter (ac)}}$$

$$\text{Number of filters needed} = \frac{1.1 \text{ ac}}{0.060 \text{ ac}}$$

Number of filters needed = 18.3 = **19 filters**

Determine the Number of Filters Based on Flow

Follow these steps to determine the number of filters needed based upon the flow rate through the filter:

1. Determine the design standard TSS percent control required for the site.
2. From the manufacturer, get the MTFR for the cartridge under consideration.
3. Calculate the minimum percent annual runoff filtered, which is the post-construction performance standard TSS percent reduction required divided by the overall adjusted TSS filter efficiency (from section (3)e).
4. From Figure 1, use the Minimum Percent Annual Runoff Filtered value calculated in step 3 to determine the MTFR per acre. Multiply the MTFR per acre by the number of acres of the site to determine the MTFR for the site.
5. Determine the number of filters needed for the site by dividing the MTFR for the site by the individual filter cartridge MTFR, rounded up to the nearest whole number.

Example 4:

Find the number of filters based on flow.

For a 1.4-acre parking lot redevelopment site where 1.1 acres will be treated (0.3 acres untreated), the post-construction performance standard requires a minimum of 40% TSS reduction for the overall site. In this example assume an individual filter cartridge MTFR of 10 gpm.

The overall adjusted filter efficiency is 60% TSS control based on section (3) analysis. For design flow sizing, determine the number of cartridges needed as follows:

$$\text{Minimum percent annual runoff filtered} = \frac{\text{TSS standard reduction} * 100\%}{\text{(Overall adj TSS filter eff)} * \text{(Percent site treated)}}$$

$$\text{Minimum percent annual runoff filtered} = \frac{40\% * 100\%}{60\% * (1.1\text{ ac}/ 1.4\text{ ac})} = \mathbf{85\%}$$

From Figure 1: If 85% of the annual runoff to the filter must be treated, then 87 gpm MTFR is needed per acre of drainage area treated. Determine minimum MTFR needed for 1.1 acres of treated area:

87 gpm/ac * 1.1 ac = **96 gpm**

With each filter treating 10 gpm MTFR, then 10 filters are needed:

$$\frac{96\text{ gpm}}{10\text{ gpm}} = 9.6 = \mathbf{10\ filters}$$

Solution: The calculations in Example 3 and Example 4 are for ‘filters based on maintenance’ and for ‘filters based on flow’, respectively, and they are for the same filter and project. These example calculations demonstrate that at least 19 filters are needed based on maintenance and at least 10 filters are needed based on flow. The higher of the two calculations determines the number of filters needed. **Therefore, at least 19 filters are needed.**

(5) **Total Phosphorus Filtration Efficiency.** It is acceptable to assume a proprietary filtration device with GULD Phosphorus approval by Washington State Department of Ecology TAPE achieves the reported total phosphorus removal for devices. Apply any potential GULD Phosphorus approval limitations or conditions to device’s use in Wisconsin unless the administering authority determines otherwise.

For a proprietary filtration devices that do not have GULD Phosphorus approval, but have GULD Basic approval, assume 25% total phosphorus removal for the percentage of runoff that is filtered. This is a conservative total phosphorus removal level of that expected to be associated with TSS removed.

(6) **Flow Routing.** Include a flow bypass, flow limiter or overflow mechanism either before the proprietary filtration device or within the device consistent with field testing to:

a. Prevent flow in excess of the Maximum Treatment Flow Rate (MTFR) from passing through the filter, and

b. Prevent sediment scour from the bottom of a proprietary filtration device.

For a flow bypass or limiter before the proprietary filtration device, consider designing such that it does not have standing water as this may cause maintenance issues, unless such flow bypass or limiter is designed to continually hold water.

(7) **Oil and Grease Pretreatment**. Pretreatment of runoff from vehicle parking areas, drive-up window areas, vehicle maintenance or repair areas, and any other areas where the potential for oil or grease exists, is required before the runoff reaches the filter media or membrane. This pretreatment is required to prevent premature filter clogging, and is required either before the proprietary filtration device or as a component of the proprietary filtration device. Acceptable pretreatment includes baffling, sorbent booms or other methods of oil control.

(8) **Sediment Pretreatment**. Pretreatment of runoff to remove larger sediment particles is required either before the proprietary filtration device or as a component of the proprietary filtration device. Sediment pretreatment before the proprietary filtration device is intended to protect the device from a heavy sediment load due to, for example, winter sanding.

Generally, pretreatment will not have a significant increase in pollutant removal, as it primarily removes particles larger than those typically found in TSS. However, if the pretreatment will treat storm water that bypasses the filter, then treatment credit may be taken for the pretreated water that bypasses the filter. Determine TSS removal by modeling or another method approved by the administering authority.

(9) **Access for Maintenance.** Design the proprietary filtration device to allow for easy access to perform all applicable maintenance including filter replacement, sediment cleanout, and any other procedures necessary for the device to operate as designed.

(10) **Requirements for Reporting Performance Predictions**. Report the following information to the administering authority to support performance predictions for a device installed to control TSS and other selected pollutants in a drainage area of specified characteristics.

a. Device name, schematic (plan and elevation), flow diagrams and model number;

b. Device treatment filter surface area and dimensions used in making the surface area calculation;

c. MTFR for the device, from TAPE GULD;

d. Maximum allowable inflow drainage area per filter, from NJDEP;

e. Sump information, including: depth of clean sump (in feet) as measured from the bottom of the sediment chamber to the outlet invert; and maximum allowable sediment depth (in feet) as measured from the bottom of the sediment chamber to the top of the maximum allowable sediment depth;

f. Bypass information, including: location (internal, external); flow-rated capacity; and justification for selected bypass capacity;

g. Inflow drainage area, land use type, acres of the paved and unpaved surfaces, and the connectedness of these areas to the storm drain system;

h. Identity of model input files;

i. Efficiency determinations:

- Annual average % reduction of TSS mass load; and
- Range and mean of the event-mean TSS discharge concentrations.

(11) **Installation.** Install proprietary filtration devices in a manner consistent with the field testing and modeling assumptions used to predict effectiveness. This includes the following requirements:

a. Install the device in accordance with manufacturer recommendations.

b. Equip the installed device with an internal or external bypass to divert flows in excess of the MTFR of the filter(s).

(12) **Protection from Construction Site Erosion.** In the plans associated with installation of the proprietary filtration device, specify how the filter media or membrane shall be protected from

construction site sediment. This is best accomplished by not installing the filter media or membrane until after the construction site is stabilized from erosion.

CONSIDERATIONS

The following are not required but are recommendations:

(1) Consider additional flow attenuation and pretreatment before the filtration devices. Additional pretreatment may extend the life of the filters and reduce the cost of sediment removal. Flow attenuation may reduce the number of filters needed and will improve performance of the filters. However, the calculation method under section (4) does not address credit for flow attenuation, storage or pretreatment. Use calculation procedures outside of this standard to address this.

(2) Consider potential backwater effects to the filter media and also other non-storm water discharges to the filtration device. Backwater affects or other regular discharges that do not allow the filter media to have regular dry out periods may prematurely clog the filter media.

(3) Rainfall intensity and frequency have increased from historical averages. Evaluation of the filtration device under more intense rainfall conditions may be appropriate.

(4) Consider field sampling with a more thorough PSD analysis for both influent and effluent including the following particle size breakdown (in microns):

    a. < 2.0
    b. 2.0 to < 3.9
    c. 3.9 to < 7.8
    d. 7.8 to < 15.6
    e. 15.6 to < 31.25
    f. 31.25 to < 62.5

(5) Consider more robust oil and grease pretreatment including capture of emulsified oil in areas that have a high risk of oil spills or leaks.

PLANS AND SPECIFICATIONS

Prepare plans and specifications in accordance with the criteria of this standard and describe the requirements for applying the practice to achieve its intended use. Plans shall specify the materials, construction processes, locations, size and elevations of all components of the practice to allow for certification of construction upon completion. The plans shall include the seasonal high groundwater elevation on a to-scale profile or cross-section view of the proprietary storm water filtration device and the storm sewer system connected to it.

OPERATIONS AND MAINTENANCE

A site-specific operation and maintenance (O&M) plan for the proprietary filtration device shall be prepared, which includes the following:

- Identify the person and their position responsible for inspections and maintenance actions to keep the filtration device functioning as designed. Provide contact information.
- Conduct inspections quarterly for at least one year after the site has been stabilized from erosion and the inflow drainage area is of normal operational condition. Inspections may be reduced to no less than once every 12 months if the quarterly inspections reveal that the filtration device does not require maintenance any more frequently than once every 12 months. If inspections are

reduced to once every 12 months, the recommended inspection time is in early spring after the snow cover has melted.

- Also conduct inspections whenever a significant source of soil, sediment, oil, grease or petroleum has drained to the device.
- Remove accumulated sediment in the bottom of the device as recommended in the original equipment manufacturer (OEM) O&M manual, however, no less frequent than once every 12 months as sediment may start to become cemented if not removed within 12 months.
- Maintain the filter media or membrane as recommended in OEM O&M manual, except replace filter media every 12 months. However, if it is clear that a media filter is not close to reaching the O&M media replacement indicators of requiring replacement then it may continue to be used but shall be replaced after a maximum period of 24 months, no matter what the O&M media replacement indicators suggest.
- Require written record of inspections including: date, name of person conducting inspection, identify apparent indicators of filter or membrane replacement and sediment sump cleanout needs, maintenance actions taken or identified.

See the Technical Note: "General Filter Inspection and Maintenance" for additional information to aid with inspections. Record the O&M plan on the property deed and the person responsible for maintenance shall evaluate the effectiveness of the plan at least once per year and adjust the plan and deed as needed.

REFERENCES

Washington State Department of Ecology. Technology Assessment Protocol – Ecology (TAPE) Process Overview. September 2018. Publication No. 18-10-039 (Revision of 11-10-010). https://fortress.wa.gov/ecy/publications/documents/1810039.pdf

Washington State Department of Ecology. Emerging Stormwater Treatment Approved Technologies website: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

New Jersey Department of Environmental Protection, Stormwater Manufactured Treatment Devices website: https://www.nj.gov/dep/stormwater/treatment.html

United States Environmental Protection Agency, Results of the Nationwide Urban Runoff Program. December 1983. https://www3.epa.gov/npdes/pubs/sw_nurp_vol_1_finalreport.pdf

GLOSSARY

Administering authority: The local or state agency or its agents responsible for administering the storm water regulations applicable to the site. Responsible state agencies are the Department of Natural Resources for chs. NR 151 and NR 216, Wis. Adm. Code, and the Department of Safety and Professional Services for chs. SPS 320, 360 and 382, Wis. Adm. Code.

Approved model: A computer model or methodology that has been approved by the applicable administering authority. Examples include SLAMM, P-8, and RECARGA.

Annual average: A condition (such as rainfall or mass load) characterized by a calendar year of precipitation, excluding snow, which is considered typical. Typical average rainfall years for five regions in Wisconsin are available from the Department of Natural Resources.

Development: As defined in s. NR 151.002, Wis. Adm. Code.

Device: See definition of *Proprietary flow-through storm water filtration device.*

General product approval method: A method that gives blanket approval for use of a device.

General Use Level Designation or GULD: A Washington State Department of Ecology Technology Assessment Protocol – Ecology (TAPE) use level designation for technologies whose evaluation report demonstrates confidently that the technology can achieved TAPE performance goals.

Maximum Treatment Flow Rate or MTFR: A flow rate, which is specified in the device approval letters from TAPE and NJDEP.

Micron: Micrometer, or 1 millionth of a meter.

New development: As defined in NR 151.002, Wis. Adm. Code.

Nationwide Urban Runoff Program or NURP: Refers to the NURP particle size distribution (PSD). See reference: "Nationwide Urban Runoff Program", USEPA, 1983, for more information.

Particle Size Distribution or PSD: Refers to a range analysis, in which the mass of particles in each size range is listed.

Pretreatment: A device or practice to reduce pollutant loading upstream of the filtration media or membrane. Pretreatment options may include, but are not limited to, oil & grease separation, sedimentation, biofiltration, vegetated swales or filter strips.

Proprietary filtration device: See definition of *Proprietary flow-through storm water filtration device.*

Proprietary flow-through storm water filtration device: A proprietary filter or set of filters (which may include pre-treatment or other equipment and associated piping) that is provided as a defined product or system by a commercial vendor and is warranted by that vendor to provide specific storm water pollutant removal performance under specified conditions.

Redevelopment: As defined in s. NR 151.002, Wis. Adm. Code.

Regulatory: Decisions made in administering state storm water management requirements. This includes sites regulated by the Department of Natural Resources under ch. NR 151 or 216, Wis. Adm. Code, and the Department of Safety and Professional Services under ch. SPS 320, 360 or 382, Wis. Adm. Code.

Sedimentation device: Examples of sedimentation devices that could be used for filter device pre-treatment may include wet detention ponds, proprietary sedimentation devices, catch basins, and hydrodynamic devices.

Selected pollutants: Pollutants that include the following: total phosphorus, ortho (dissolved) phosphorus, bacteria, chloride, nitrogen and hydrocarbons.

Spent [filter]: A filter is spent when it loses 10% of its MTFR. A filter manufacturer generally has a method to make this determination, which may be by a weight change of the filter and/or by a visual assessment.

TAPE: Refers to the Washington State Department of Ecology. Technology Assessment Protocol – Ecology where this standard allows use of the proprietary filtration technology with General Use Level Designation (GULD) approval.

Total Maximum Daily Load or TMDL: A regulatory term in the U.S. Clean Water Act, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

Total Phosphorus or TP: Operationally defined as the concentration or mass of phosphorus determined by testing under method EPA 365.1 (EPA 1993).

Total suspended solids (TSS)*:* Operationally defined as the concentration or mass of sediment determined by testing under method ASTM D3977-97 (2019).