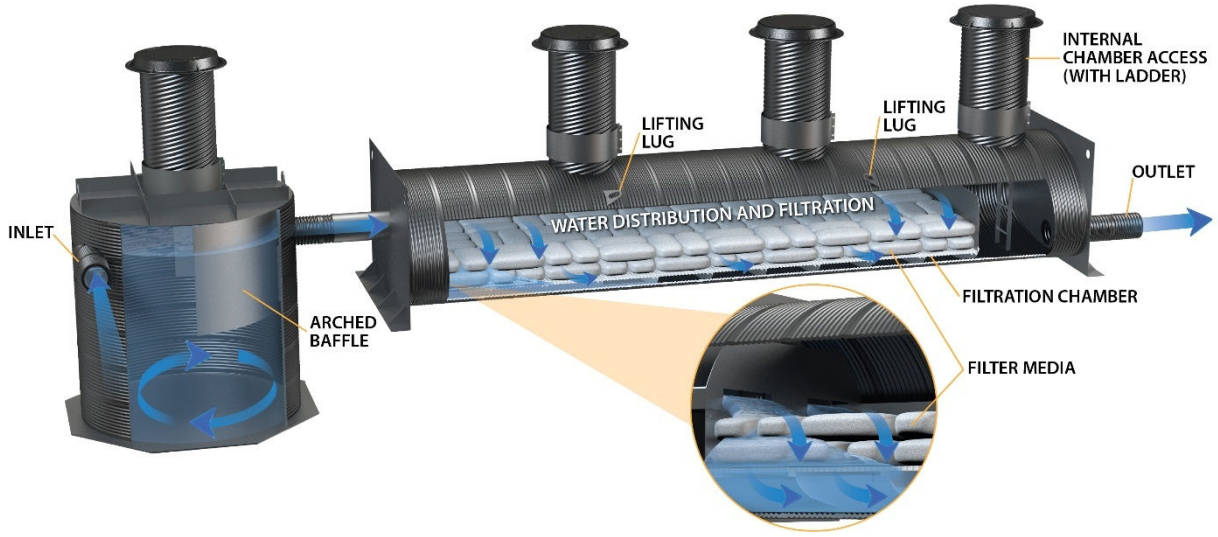
# Aqua-Filter™ Inspection and Maintenance Guide

## Aqua-Filter Stormwater Treatment System

Aqua-Filter Stormwater Treatment System (AquaFilter) utilizes a “treatment-train” approach, combining a pretreatment hydrodynamic separator (HDS) with a filtration chamber.




The AquaFilter Stormwater Filtration System is designed for sites that require advanced treatment of runoff stormwater to meet stringent discharge requirements. This treatment begins with the removal of sediment, debris and free-floating oil by the pretreatment HDS unit, followed by the removal of fine sediments and other waterborne pollutants by the filtration chamber. Inspection and maintenance are made simplified with oversized risers that allow for both examination and cleanout. An ingress/egress ladder is provided for the filtration chamber to better facilitate maintenance.

Each AquaFilter is constructed of high performance, lightweight and durable materials including polymer coated steel (PCS). These materials eliminate the need for heavy lifting equipment during installation.

Third-party performance and functionality testing has demonstrated Total Suspended Solids (TSS) removals of greater than 80% on a net annual basis using perlite filter media. In addition, the AquaFilter is effective for the removal of other pollutants including petroleum hydrocarbons, total phosphorus and various heavy metals when bound to particulate material.

The long-term performance of any stormwater treatment structure depends on a consistent maintenance plan. With the AquaFilter, inspection functions are simple and performed from the surface without confined space entry.

## Pretreatment HDS Inspection Procedure

The pretreatment HDS unit has been designed to minimize and simplify the inspection and maintenance process. To inspect the HDS, a hook is typically needed to remove the manhole cover. Most projects include a manhole cover with an AquaShield logo for easy identification. Within the access riser, the inspector will find a metal plate which provides our contact information, the HDS model size, and serial number.

The only tools needed to inspect the HDS unit are a flashlight and a measuring device. From the surface, the inspector can observe any floating oil and debris. To measure sediment depths, lower the measuring device to the top of the sediment pile. Keep in mind that the finer sediment at the top of the pile may offer less resistance to pressure.

## Pretreatment HDS Cleanout Procedure

Cleaning the HDS unit is simple and quick. Free-floating oil and floatable debris can be observed and removed directly through the 30-inch service access riser provided. A vacuum truck is typically used to remove the accumulated sediment and debris. An advantage of the HDS unit's design is that the entire sediment storage area can be reached with a vacuum hose from the surface reaching all sides. Since there are no multiple or limited (blind) access chambers in the HDS unit, there are no restrictions to impede on-site maintenance tasks. If applicable, the trash screen can be reached from the surface and cleaned with a vacuum hose.

*Vacuum (Vactor) truck quickly cleans the single open access swirl chamber.*

## Filtration Chamber Inspection Procedure

The filter media is also easily observed from the surface. Manhole covers are spaced over the entire filtration bed to provide easy access. As with the HDS unit, most projects include a manhole cover with an AquaShield logo for easy identification. An entry riser provides direct access into the filtration chamber with a permanent ladder welded into the downstream section of the filtration chamber for systems larger than the AF-3.48 model. This additional access allows for the vacuuming of any standing water and unobstructed access to the downstream side of the filter bed. Permanent ladders are welded to the side of the AF-3.48 model.

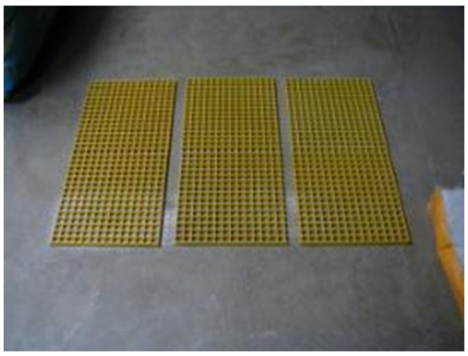
Inspection focuses on the condition of the perlite filter media bags. At activation, perlite filter media is light tan or white in color. When the media color turns black or dark brown, it has become saturated due to pollutant loading and likely requires replacement.

## Filtration Chamber Media Replacement Procedure

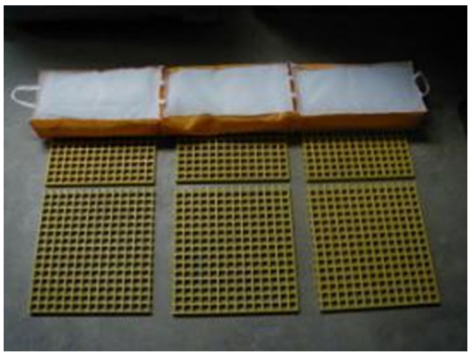
Replacement of the filtration media typically requires entry into the filtration chamber by one of a minimum two-member maintenance crew. Confined space entry methods should be followed by the maintenance crew when removing and replacing the filters. The spent filter containers are normally retrieved from the filter chamber by a second crewmember at the surface through the multiple 30-inch risers spaced across the top of the filter bed.

Filter media containers are installed in two layered courses. AquaFilter systems (except the AF-3.48) utilize rectangular shaped filter containers. The top layer of filter containers are offset by 90 degrees to that of the bottom layer. The AF-3.48 uses “wedge-shaped” filter containers. The top layer of these containers are offset by approximately 45 degrees to that of the bottom layer.

Installation Process for Rectangular Filter Containers

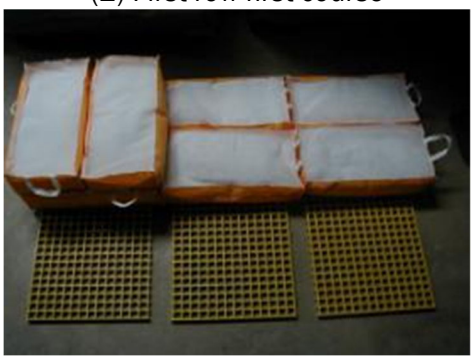


(1) Bottom grates



(2) First row first course

(3) Second row



(4) Second course started

(5) Second course complete

## Cargo Netting Installation

Cargo netting is used to secure filter containers in place after containers are installed in the appropriate orientation within the filtration chamber. Cargo netting is placed on top of the top course of filter containers and stretched into place using the provided heavy duty cable ties. The netting is cable-tied to anchor blocks and attached to the side walls of the filtration chamber. It is important to install the netting in such a way as to both cover the entire surface area of the containers while stretching netting snuggly to minimize container movement under high flow conditions. Netting installation is complete when all surface area of filter containers are covered with netting and the netting is secured with cable ties to anchor blocks.

*Ingress/Egress ladder and filter containers covered by cargo netting.*

## Disposal of Recovered Materials

AquaShield recommends that all maintenance activities be performed in accordance with appropriate health and safety practices for the tasks and equipment being used. All material removed during maintenance shall be handled and disposed of in full accordance with any applicable local and state requirements.

*AqauFilter Inspection and Maintenance Worksheets on following pages.*

# AquaFilter Inspection Worksheets

## SITE and OWNER INFORMATION

Site Name: _____ Date / Time: _____

Site Location: _____

Inspector Name: _____

Inspector Company: _____ Phone #: _____

Owner Name: _____ Phone #: _____

Owner Address: _____

## INSPECTIONS

### I. Floatable Debris and Oil in HDS Unit

1. Remove manhole lid to expose liquid surface of the AquaFilter.
2. Remove floatable debris with basket or net if any present.
3. If oil is present, measure its depth. Clean liquids from system if one half (½) inch or more oil is present.

   Note: Water in AquaFilter can appear black and similar to oil due to the dark body of the surrounding structure. Oil may appear darker than water in the system and is usually accompanied by oil-stained debris (e.g. Styrofoam, etc.). The depth of oil can be measured with an oil/water interface probe, a stadia rod with water finding paste, a coliwasa, or collect a representative sample with a jar attached to a rod.

### II. Sediment Accumulation in HDS Unit

1. Lower measuring device (e.g. stadia rod) into swirl chamber through service access provided until top of sediment pile is reached.
2. Record distance to top of sediment pile from top of standing water: _____ inches.
3. Maximum recommended sediment depth prior to cleanout is 14 inches for all models. Consult system shop drawing for treatment chamber depth as measured from the inlet pipe inverted to base of the unit.

### III. Filtration Chamber

1. Remove manhole lid(s) to expose filter media bed and access ingress/egress ladder. At a minimum, one manhole lid will be present.
2. Enter filtration chamber via ladder or through access riser(s) over filter bed. Note that water may be present at minimal depths in the filtration chamber prior to cleaning out.
3. Remove bulkhead door (gate) at downstream end of filtration chamber and across from ladder.
4. Remove cargo nets and filters through access risers located along filtration chamber length or through ingress/egress ladder manhole.
5. Visually inspect filter media noting color and saturation or contaminants.
6. If media is dark brown or black, the media is fully spent and should be replaced

IV. Diversion Structures (External Bypass Features)

If a diversion (external bypass) configuration is present, it should be inspected as follows:

1. Inspect weir or other bypass features for structural decay or damage. Weirs are more susceptible to damage than off-set piping and should be checked to confirm that they are not crumbling (concrete or brick) or decaying (steel).
2. Inspect diversion structure and bypass piping for signs of structural damage or blockage from debris or sediment accumulation.
3. When feasible, measure elevations on diversion weir or piping to ensure it is consistent with site plan designs.
4. Inspect downstream (convergence) structure(s) for sign of blockage or structural failure as noted above.

## CLEANING

Schedule cleaning with local Vactor company to remove sediment, oil and other floatable pollutants. The captured material generally does not require special treatment or handling for disposal. Site-specific conditions or the presence of known contaminants may necessitate appropriate actions be taken to clean and dispose of materials captured and retained by the AquaFilter system. All cleaning activities should be performed in accordance with property health and safety procedures.

AquaShield always recommends that all materials removed from the AquaFilter (HDS unit and filtration chamber) during the maintenance process be handled and disposed of in accordance with local and state environmental or other regulatory requirements.

## MAINTENANCE SCHEDULE

I. During Construction

Inspect the AquaFilter system every three (3) months and clean the system as needed. The AquaFilter should be inspected and cleaned at the end of construction regardless of whether it has reached its maintenance trigger.

II. First Year Post-Construction

Inspect the AquaFilter every three (3) months and clean the system as needed. Inspect and clean the system once annually regardless of whether it has reached its sediment or floatable pollutant storage capacity.

III. Second and Subsequent Years Post-Construction

If the AquaFilter did not reach full sediment or floatable pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned once annually.

If the AquaFilter reached full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once every six (6) months and cleaned as needed. The AquaFilter should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.

Bypass structures should be inspected whenever the AquaFilter is inspected. Maintenance should be performed on bypass structures as needed.

# AquaFilter Maintenance Worksheets

## MAINTENANCE COMPANY INFORMATION

Company Name: _____

Street Address: _____

City: _____ State/Prov.: _____ Zip/Postal Code: _____

Contact: _____ Title: _____

Office Phone: _____ Cell Phone: _____

## ACTIVITY LOG

Date of Cleaning: _____ Time of Cleaning: _____

Date of Next Inspection: _____ Floatable in HDS: Yes No

Oil in HDS: Yes No Oil depth (inches): _____ Measurement Method: _____

Filter Media Replacement: Yes No Cargo Netting Repair / Replacement: Yes No

Number of Filter Media Bags: _____ Filter Media Type: Perlite Other

## STRUCTURAL CONDITIONS and OBSERVATIONS

Structural damage: Yes No Where: _____

Structural wear: Yes No Where: _____

Odors present: Yes No Describe: _____

Clogging: Yes No Describe: _____

## NOTES

| Additional Comments and/or Actions To Be Taken | Time Frame |
|---|---|
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| | |
| | |

## ATTACHMENTS

- Attach site plan showing AquaFilter location.
- Attach detail drawing showing AquaFilter dimensions and model number. If a diversion configuration is used, attach details showing basic design and elevations (where feasible).

## TABULAR MAINTENANCE SCHEDULE

Date Construction Started: _____ Date Construction Ended: _____

## DURING CONSTRUCTION

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| Inspect and Clean as needed | | | X | | | X | | | X | | | X |
| Inspect Bypass as needed | | | X | | | X | | | X | | | X |
| Clean System* | | | | | | | | | | | | X* |

* The AquaFilter should be cleaned at least **once a year** during construction. Additionally, the system should always be cleaned at the **end of construction**.

## FIRST YEAR POST-CONSTRUCTION

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| Inspect and Clean as needed | | | X | | | X | | | X | | | X |
| Inspect Bypass as needed | | | X | | | X | | | X | | | X |
| Clean System* | | | | | | | | | | | | X* |

* The AquaFilter should be cleaned at least **once** during the first year.

## Second and Subsequent Years Post-Construction

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| Inspect and Clean as needed | | | | | | | | | | | | X* |
| Inspect Bypass, as needed | | | | | | | | | | | | X* |
| Clean System* | | | | | | | | | | | | X* |

* If the AquaFilter **did not reach** full pollutant capacity in the First Year Post-Construction period, the system can be inspected and cleaned annually. If the AquaFilter **reached** full pollutant capacity in less than 12 months in the First Year Post-Construction period, the system should be inspected once every six (6) months or more.