SorbtiveFILTER

INSPECTION & MAINTENANCE

SorbtiveFILTER Inspection and Maintenance Information

SorbtiveFILTER Inspection and Maintenance
Regular inspection and maintenance is a proven, cost-effective way to maximize water quality protection for all stormwater treatment practices, and is required to ensure proper functioning of the SorbtiveFILTER. Inspection of the SorbtiveFILTER system is easily performed from the surface. Scheduled maintenance requires confined space entry into the structure. The SorbtiveFILTER's patent pending technology has no moving parts, keeping the pollutant removal process effective and simple.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

When is an inspection needed?

- Post-construction inspection is required prior to putting the SorbtiveFILTER into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment and floatable pollutant load accumulation, and to ensure proper draindown is occurring.
- Required inspection frequency in subsequent years is estimated based on observations made in the first year, but should be completed on an annual basis as a minimum.
- Inspections should also be performed immediately after an oil, fuel or other chemical spill.

When is maintenance needed?

- The primary controlling factor that determines SorbtiveFILTER maintenance is sediment loading and capture. As sediment is captured it settles on the system floor and is also trapped within the SorbtiveMEDIA contained within the cartridges. The sorption capacity of SorbtiveMEDIA for capture of dissolved phosphorus from urban sites will typically outlast the SorbtiveFILTER's ability to capture sediment.
- Typical site sediment loadings will correspond to a maintenance frequency of approximately one to three years. Extending maintenance beyond one year should only be based on historical inspection results, site conditions and associated pollutant loading.
- When maintenance is conducted;
    - SorbtiveFILTER cartridges should be removed, cleaned and re-commissioned with fresh SorbtiveMEDIA.
    - SorbtiveBRICKs should be removed, cleaned and manually flushed with clean water prior to re-commissioning during each system maintenance cycle.
    - SorbtiveBRICKs should be replaced if the system has standing water above the sediment layer beyond 40 hours after a rain event.
    - In event of any hazardous material spill, it is recommended that the unit be thoroughly cleaned and maintained immediately by a licensed liquid waste hauler.

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What conditions can compromise the SorbtiveFILTER performance?

- If sediment accumulates beyond a depth of 6 inches, SorbtiveFILTER cartridge life, SorbtiveBRICK draindown performance and pollutant removal efficiency may be reduced.
- If SorbtiveFILTER cartridges become saturated with sediment, the system may not provide filtration treatment at the designed water quality flow rate.
- If the SorbtiveBRICKs become saturated with sediment or are not maintained, the system may not properly draindown within 40 hours.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured and may cause fouling of the SorbtiveFILTER cartridges.

What training is required?

For typical inspection activities, no specific supplemental training is required. Information provided in this document or the SorbtiveFILTER Operation and Maintenance Manual (provided to the system owner) contains sufficient guidance to inspect, operate and maintain the system properly.

The SorbtiveFILTER should be maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. Since manned entry into the SorbtiveFILTER structure is required as part of the maintenance procedure, only professional maintenance service providers trained in confined space entry should enter the vessel. Service provider companies typically have personnel who are trained and certified in confined space entry procedures according to local, state, federal and OSHA guidelines, as outlined in 29 CFR 1910.146.

What equipment is typically required for inspection?

- Manhole access cover lifting tool
- Oil dipstick or sampling tool
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

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How is the SorbtiveFILTER inspected?

- The surrounding site must first be safely confined from pedestrian and vehicular traffic in accordance with all local, state, federal and OSHA guidelines.
- Inspection occurs from the surface through the manhole access covers or custom doors.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick.
- Visual inspection is made for floatable pollutant accumulation such as litter and hydrocarbons by shining a flashlight into the Pre-treatment Bay.
- Visual inspection of the sediment loading in the Cartridge Bay should also be performed by probing to the floor to determine the sediment depth. If greater than 6 inches, maintenance is required.
- Visual inspection of the Cartridge Bay should also be performed to check that proper draindown is occurring. If at least 40 hours of dry weather have elapsed since the most recent rainfall/runoff event and the Cartridge Bay contains more than 3 inches of standing water above the captured sediment layer, this condition indicates that the SorbtiveBRICKs are saturated with sediment and should be cleaned or replaced.
- Inspections also involve a visual inspection of the internal components of the system for obvious damage.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Boom, crane, tripod or alternative cartridge mobilization device
- Cable or sling
- Small pump and hose for oil removal, if necessary
- Manhole access cover lifting tool
- Oil dipstick or sampling tool
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel to conduct safe and proper confined space entry
- Screw driver or Drill
- Replacement SorbtiveFILTER cartridges filled with SorbtiveMEDIA, or only SorbtiveMEDIA
- Replacement SorbtiveBRICKs if and when determined necessary

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How is the SorbtiveFILTER maintained?

- The surrounding site must first be safely confined from pedestrian and vehicular traffic in accordance with all local, state, federal and OSHA guidelines.

- Open all SorbtiveFILTER access covers or doors to provide maximum ventilation and light.

- Entry into the SorbtiveFILTER structure should only be conducted by personnel trained and certified in confined space entry procedures according to local, state, federal and OSHA guidelines, as outlined in 29 CFR 1910.146.

Pretreatment Bay Cleaning:

- If oil is present, pump off the oil layer into a separate containment using a small pump and hose to allow proper disposal.

- Vacuum all accumulated floatable litter, gross solids, sludge and sediment from the Pretreatment Bay.

- Gently flush the Inlet Flow and Floatables Control PVC elbow pipes into the Cartridge Bay to ensure they are clean and free of debris.

Cartridge Bay Cleaning with Cartridges & SorbtiveMEDIA Removed & Replaced:

- After fully adhering to confined space entry procedures according to local, state, federal and OSHA guidelines, as outlined in 29 CFR 1910.146, descend into structure.

Either method of Cartridge and SorbtiveMEDIA maintenance can be employed, with either method care should be taken not to damage the cartridges while handling;

Method 1 – on-site cartridge cleaning and SorbtiveMEDIA recharge:

- Remove the SorbtiveFILTER cartridges Top lids, by removing each of the screws to provide direct access to the spent SorbtiveMEDIA.

- Gently lifting each cartridge off their respective Underdrain Manifold Connector Pipe by using a compact portable dolly or tripod.

- Gently dump all contents of each cartridge on the Cartridge Bay Floor, and vacuum up all contents including the spent media and sediment in preparation for disposal.

- Rinse thoroughly internally and externally each empty SorbtiveFILTER cartridge and then safely remove from the structure. Rinse water and associated contents can be vacuumed up in preparation for disposal.

- Recharge each cartridge on-site with fresh SorbtiveMEDIA, and prepare for re-use.

Method 2 – full cartridge replacement, off-site SorbtiveMEDIA recharge:

This method may be more efficient if an inventory of clean ready-to-go replacement SorbtiveFILTER cartridges and SorbtiveMEDIA have been obtained in advance.

- Remove full SorbtiveFILTER cartridges from the vault by gently lifting each off their respective Underdrain Manifold Connector Pipe by using a compact portable dolly or tripod. Note: full, wet cartridges can weigh over approximately 300 pounds, requiring considerable attention to safe handling and attachment.

- Move each a cartridge underneath the manhole or access doors, and safely secure using an appropriate sling and cable to a boom, crane, tripod or alternative device from grade and safely raise and remove each cartridge from the vault.

- Cartridge cleaning and SorbtiveMEDIA replacement would be performed off-site at an appropriate location.

- Remove each SorbtiveBRICK by cutting plastic hold-down ties. Clean or replace as required.

- Remove and replace each 2 inch diameter PVC Underdrain Manifold Connector Pipe with 2 inch temporary maintenance plugs, until the system is ready for component replacement.

- Once all cartridges, 2-inch diameter PVC Underdrain Manifold Connector Pipes and SorbtiveBRICKs have been removed, finish vacuuming and removing the remaining sediment and water from the Cartridge Bay's floor.

- Flush each of the Underdrain Manifold Connection Ports and SorbtiveBRICK outlet pipes with fresh water to ensure they are clean and free of any debris and sediment. This will also allow for easy cartridge replacement.

Clear Well Cleaning:

- Vacuum any accumulated sediment or debris from the Clear Well.

Cartridge Bay Preparation - Installation of SorbtiveFILTER Cartridges & SorbtiveBRICKS:

After the entire underground SorbtiveFILTER structure has been fully ventilated descend into structure in accordance to local, state, federal and OSHA guidelines, as outlined in 29 CFR 1910.146. SorbtiveFILTER Cartridges and SorbtiveBRICKS should be installed ONLY after the site has been fully stabilized, or if the inlet and outlet remains plugged and the entire system remain off-line to prevent excessive sedimentation. Prior to SorbtiveBRICK or SorbtiveFILTER cartridge installation, ensure all maintenance plugs located in each of the Under Drain Connection Ports have been removed and each SorbtiveBRICK drain port is free and clear of sediment and debris.

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SorbtiveBRICK

- At grade, safely secure each SorbtiveBRICK using an appropriate sling and cable to a boom, crane, tripod or alternative device and lower it into the Cartridge Bay Chamber. Note: SorbtiveBRICKs can weigh approximately 50-pounds (23 kg) dry, requiring considerable attention to safe handling and attachment.
- Confirm each SorbtiveBRICK draindown port is clean and free of debris.
- Install each SorbtiveBRICK by seating it on the gasket in place on the wall and floor. Replace gasket if obvious signs of wear are apparent.
- Secure each SorbtiveBRICK in place using plastic tie-downs.

SorbtiveFILTER Cartridges

- SorbtiveFILTER Cartridges should generally be placed in a logical fashion, furthest away from the maintenance access first and working towards the maintenance access point last.
- At grade, attach an appropriate sling and cable to a boom, crane, tripod or alternative device to safely secure the pre-filled SorbtiveFILTER cartridges. SorbtiveFILTER cartridges are pre-filled with SorbtiveMEDIA. Note: cartridges can weigh approximately 150-pounds (70 kg) dry, requiring considerable attention to safe handling and attachment.
- Lower each SorbtiveMEDIA filled cartridge down into the Cartridge Bay through the manhole access or doors.
- Maneuver each cartridge into its place using a compact portable dolly or tripod to lift the cartridge above its Connector Pipe.
- Ensure each Underdrain Manifold Connection Port has a 2-inch diameter Sch. 40 PVC Connector Pipe is inserted and sticking up, and is ready to accept the bottom of each cartridge via a slip fit. The bottom of each cartridge is designed to slip onto the connector with ease. Take care not to damage connections, and replace PVC connectors if required.
- Once a cartridge is suitably placed over its PVC Connector Pipe, slip the bottom of the cartridge onto the PVC Connector. If needed to facilitate an easier slip connection, apply a light coating of FDA approved silicone grease to the PVC Connector Pipe.

What is required for proper disposal?

- Disposal requirements for recovered pollutants primarily consisting of accumulated sediment and spent SorbtiveMEDIA must be handled in accordance with local, regional and federal guidelines.
- In most areas the sediment and spent filter media, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment or spent media would be classified as hazardous waste. Sediments can contain measureable concentrations of pollutants such as metals and hydrocarbons. Areas with the highest potential for elevated pollutant loadings are generally industrial sites.

What about oil spills?

- Petroleum-based pollutants (oil/chemical/fuel spills) should be removed and disposed of by a licensed liquid waste hauler.

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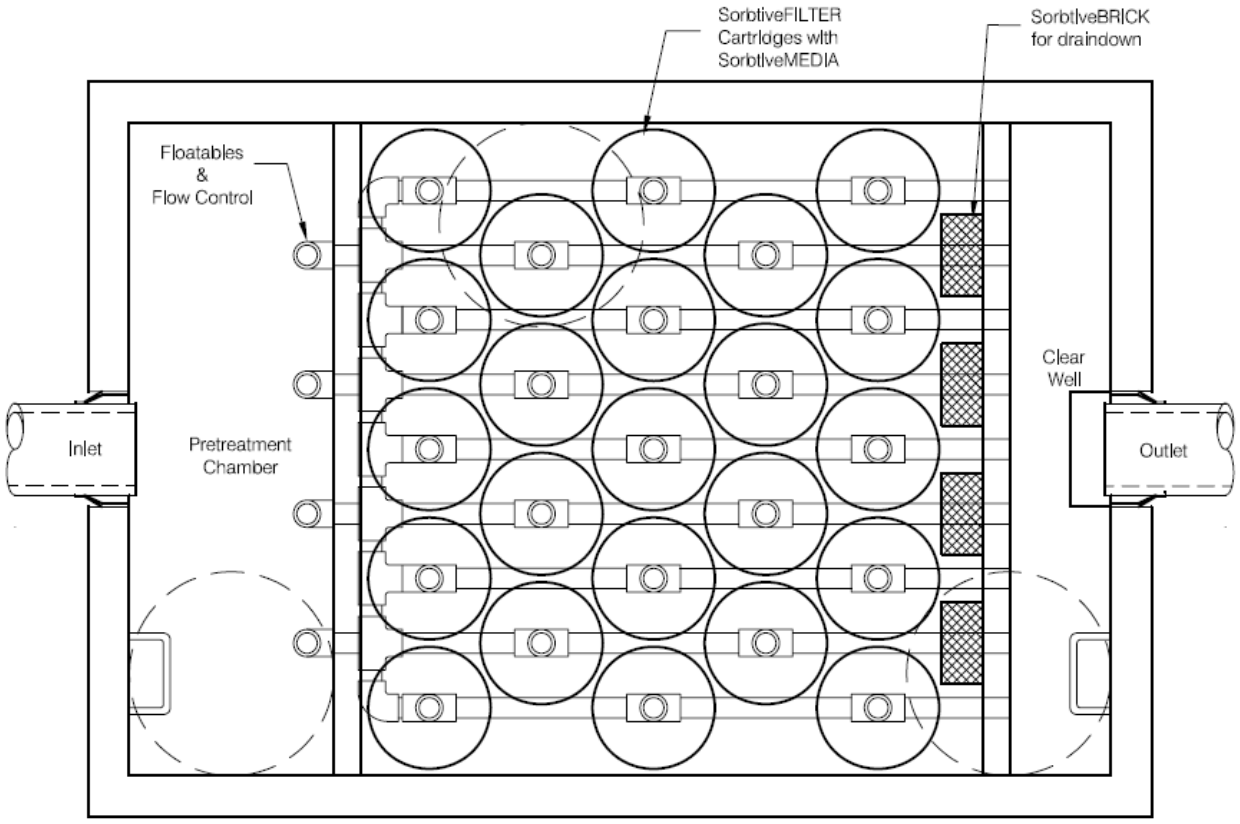
What factors affect the costs involved with inspection/maintenance?

- Inspection and maintenance costs are based on unit size, cartridge count, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations.
- Overall maintenance costs are anticipated to be lower in instances where;
    - Scheduled inspections are performed and logged to better anticipate required frequency.
    - Suitable upstream BMPs or additional pre-treatment applications are utilized within the stormwater conveyance network working to extend the required maintenance period from the resulting reduction in sediment pollutant load.

SorbtiveFILTER vault schematic and component functions

Below is a schematic of the SorbtiveFILTER vault structure with key components identified.



PLAN VIEW

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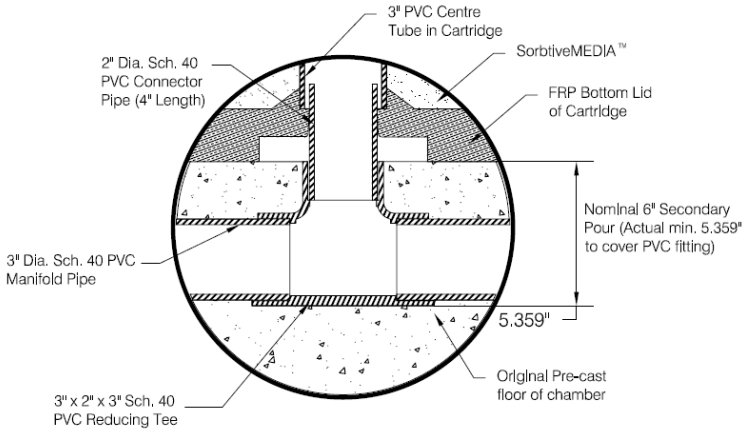
SorbtiveFILTER cartridges are easily slipped onto the 2-inch Sch. 40 PVC Connector Pipe, which connects to the Underdrain Manifold Connection Port as illustrated in the image below.



CARTRIDGE CONNECTION DETAIL
(NOT TO SCALE)

The depth of sediment, oil and any standing water can be measured easily from the surface by using a sediment probe or dipstick tube equipped with a ball check valve. The probe is inserted through access manhole or doors into the structure's Pretreatment Bay or Cartridge Bay. A maintenance worker stationed at the surface uses a vacuum hose to evacuate water, sediment, and debris from the Pretreatment Bay.

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency and to keeping maintenance costs low, to the continued protection of natural waterways. A regular inspection and maintenance program provides the basis for SorbtiveFILTER's long and effective service life.

Support

- Drawings, Specifications and additional Technical information are available at; www.imbriumsystems.com

- Please contact Imbrium Systems for site-specific design support.

- Ordering the following replacement components or material:
    - SorbtiveFILTER cartridges
    - SorbtiveMEDIA
    - SorbtiveBRICK

  Please contact Imbrium Systems at:

United States	Canada & International
(888) 279-8826	(800) 565-4801
www.imbriumsystems.com	www.imbriumsystems.com