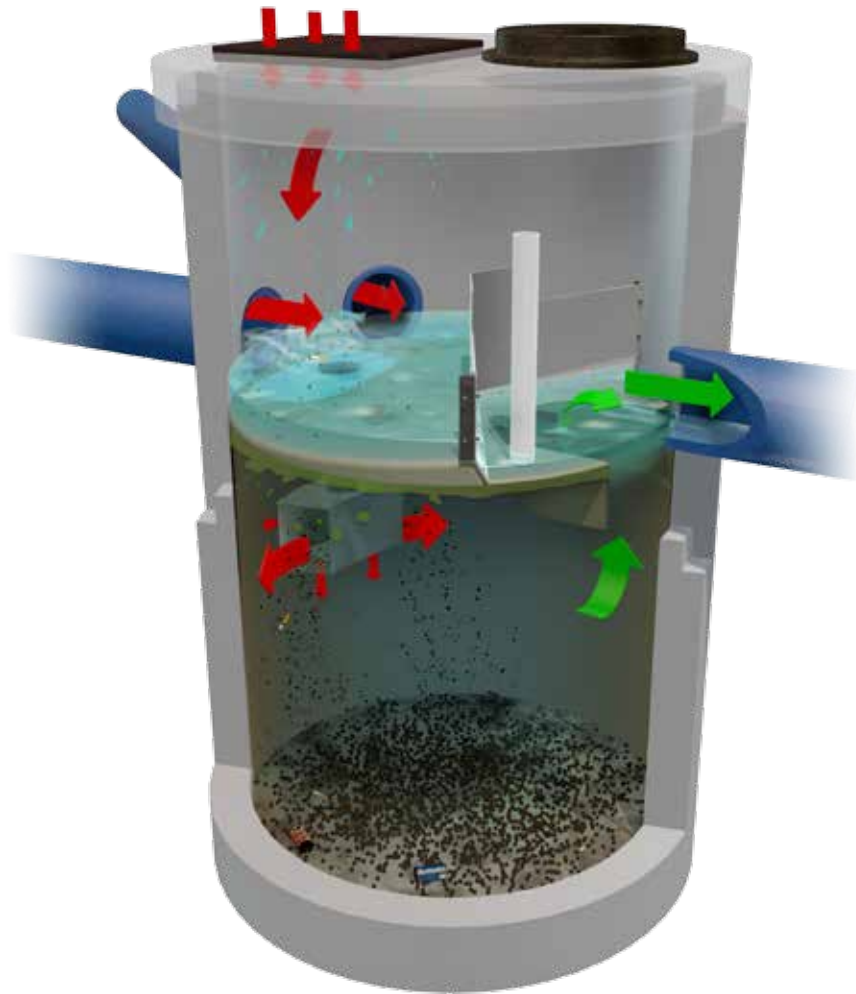


Stormceptor[®] **EF**

Technical Manual



OVERVIEW

Stormceptor® EF is a continuation and evolution of the most globally recognized oil-grit separator (OGS) stormwater treatment technology - **Stormceptor®**. Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil-grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at higher flow rates as compared to the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention technology and internal bypass ensures sediment is retained during all rainfall events..

Stormceptor EF offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe, multiple inlet pipes, and/or from the surface through an inlet grate. Stormceptor EF can also serve as a junction structure, accommodate a 90-degree inlet to outlet bend angle, and be modified to ensure performance in submerged conditions. With its scour prevention technology and internal bypass, Stormceptor EF can be installed online, eliminating the need for costly additional bypass structures.

OPERATION

- Stormwater enters the Stormceptor upper chamber through the inlet pipe(s) or a surface inlet grate. A specially designed insert reduces the influent velocity by creating a pond upstream of the insert's weir. Sediment particles immediately begin to settle. Swirling flow sweeps water, sediment, and floatables across the sloped surface of the insert to the inlet opening of the drop pipe, where a strong vortex draws water, sediment, oil, and debris down the drop pipe cone.
- Influent exits the cone into the drop pipe duct. The duct has two large rectangular outlet openings as well as perforations in the backside and floor of the duct. Influent is diffused through these various opening in multiple directions and at low velocity into the lower chamber.
- Free oils and other floatables rise up and are trapped beneath the insert, while sediment settles to the sump. Pollutants are retained for later removal during maintenance cleaning.
- Treated effluent enters the outlet riser, moves upward, and discharges to the top side of the insert downstream of the weir, where it flows out the outlet pipe.
- During intense storm events with very high influent flow rates, the pond height on the upstream side of the weir may exceed the height of the weir, and the excess flow passes over the top of the weir to the downstream side of the insert, and exits through the outlet pipe. This internal bypass feature allows for online installation, avoiding the cost of additional bypass structures. During bypass, the pond separates sediment from all incoming flows, while full treatment in the lower chamber continues at the maximum flow rate.
- Stormceptor EF's patent-pending enhanced flow and scour prevention technology ensures pollutants are captured and retained, allowing excess flows to bypass during infrequent, high intensity storms.
- **Refer to components identified in Figures 1 and 2 to understand the Stormceptor EF operation.**

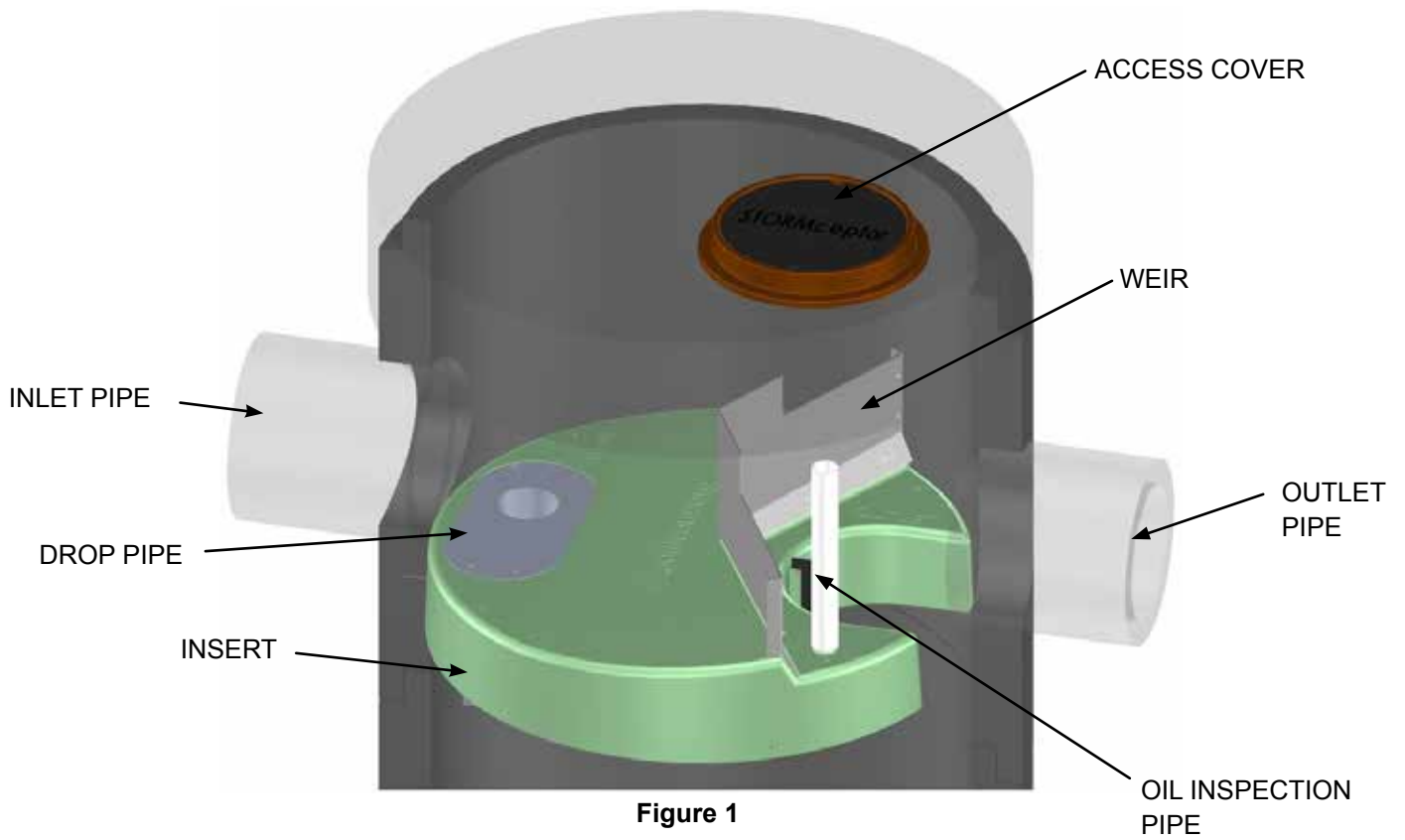


Figure 1

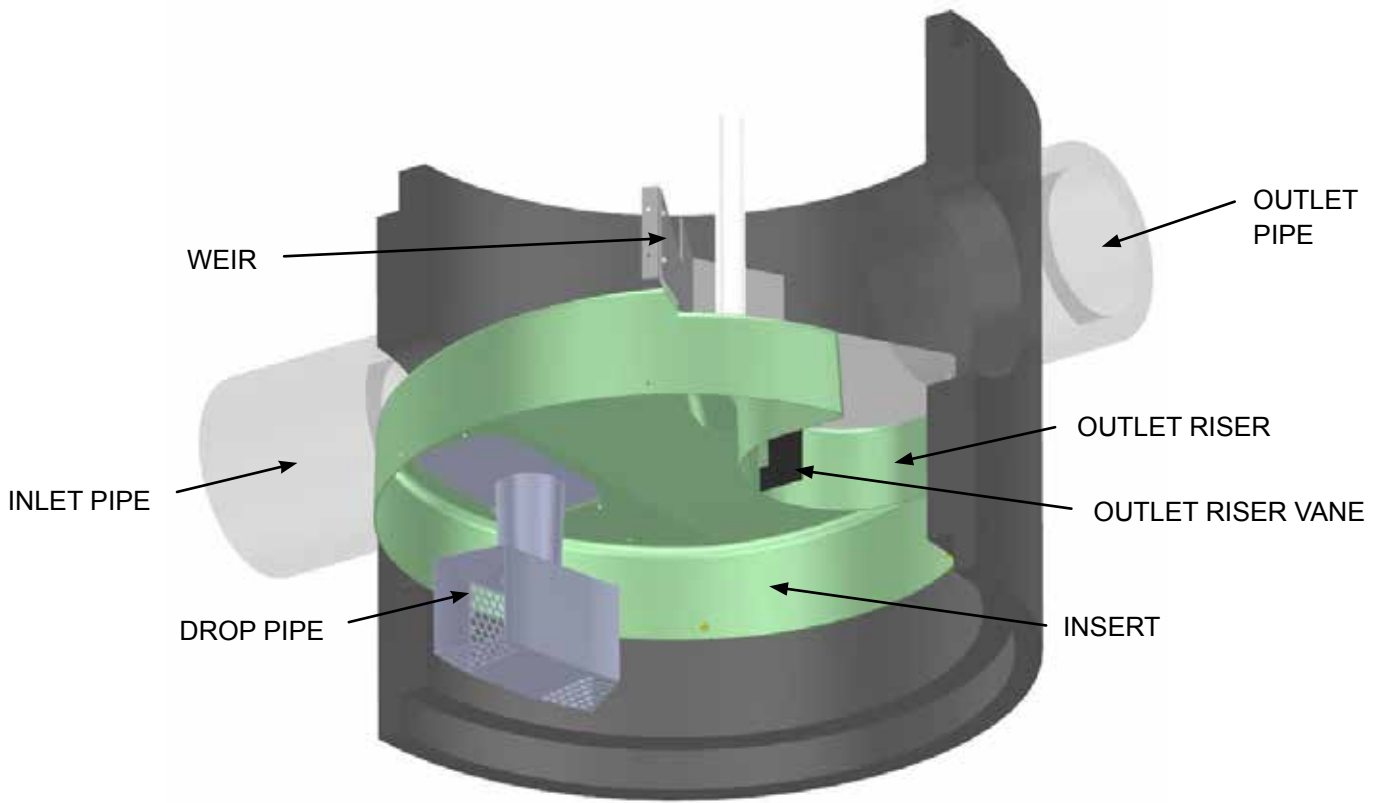


Figure 2

FEATURES AND BENEFITS

FEATURE	BENEFITS
Patent-pending enhanced flow, TSS treatment technology	Superior, verified third-party performance
Scour prevention with an internal bypass	Validated online installation and cost savings
Third-party verified light liquid capture (oil) and retention (Stormceptor EFO)	Proven performance for fuel/oil hotspot locations
Functions as bend, junction or inlet structure	Cost savings & design flexibility
Minimal drop between inlet and outlet	Site installation ease
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade

APPLICATIONS

Stormceptor EF is designed as an 'at source' solution for commercial and industrial sites, urban environments, and residential developments. Stormceptor EF is ideal for:

- Pretreatment of wet ponds, filters, infiltration systems, bioretention, and other Low Impact Development (LID) applications
- Commercial sites
- Manufacturing/Industrial sites
- Residential developments
- Fueling stations, convenience stores, fast food restaurants
- Roads and highways
- Airports, seaports, and military bases
- Hydrocarbon spill, high pollutant load hotspots (Stormceptor EFO)

PRODUCT DETAILS

METRIC DIMENSIONS AND CAPACITIES								
Stormceptor Model	Inside Diameter	Minimum Surface to Outlet Invert Depth	Depth Below Outlet Pipe Invert	Wet Volume	Sediment Capacity ¹	Hydrocarbon Storage Capacity ²	Maximum Flow Rate into Lower Chamber ³	Peak Conveyance Flow Rate ⁴
	(m)	(mm)	(mm)	(L)	(m ³)	(L)	(L/s)	(L/s)
EF4 / EFO4	1.22	915	1524	1780	1.19	265	22.1 / 10.4	425
EF6 / EFO6	1.83	915	1930	5070	3.47	610	49.6 / 23.4	990
EF8 / EFO8	2.44	1219	2591	12090	8.78	1070	88.3 / 41.6	1700
EF10 / EFO10	3.05	1219	3251	23700	17.79	1670	138 / 65	2830
EF12 / EFO12	3.66	1524	3886	40800	31.22	2475	198.7 / 93.7	2830

U.S. DIMENSIONS AND CAPACITIES								
Stormceptor Model	Inside Diameter	Minimum Surface to Outlet Invert Depth	Depth Below Outlet Pipe Invert	Wet Volume	Sediment Capacity ¹	Hydrocarbon Storage Capacity ²	Maximum Flow Rate into Lower Chamber ³	Peak Conveyance Flow Rate ⁴
	(ft)	(in)	(in)	(gal)	(ft ³)	(gal)	(cfs)	(cfs)
EF4 / EFO4	4	36	60	471	42	70	0.78 / 0.37	15
EF6 / EFO6	6	36	76	1339	123	160	1.75 / 0.83	35
EF8 / EFO8	8	48	102	3194	310	280	3.12 / 1.47	60
EF10 / EFO10	10	48	128	6261	628	440	4.87 / 2.30	100
EF12 / EFO12	12	60	153	10779	1103	655	7.02 / 3.31	100

1. Sediment Capacity is measured from the floor to the bottom of the drop pipe cone. Sediment Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
2. Hydrocarbon Storage Capacity is measured from the bottom of the outlet riser to the underside of the insert. Hydrocarbon Storage Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
3. EF Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 1135 L/min/m² (27.9 gpm/ft²). EFO Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 535 L/min/m² (13.1 gpm/ft²).
4. Peak Conveyance Flow Rate is limited by a maximum velocity of 1.5 m/s (5 fps).

UNIT DESIGN

Sizing Methodology

Stormceptor® EF and Stormceptor® EFO are sized using local historical rainfall data for the site of interest, specific site parameters, and a performance curve for TSS removal derived from third-party testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's ***Procedure for Laboratory Testing of Oil-Grit Separators***. Every Stormceptor unit is designed to achieve the specified target TSS removal, however, for sites where oil/fuel capture and retention is an additional specified water quality objective Stormceptor EFO is the proper selection. The sizing methodology includes various considerations, including:

- Site parameters
- Local historical rainfall data
- Capture of the Canadian ETV particle size distribution
- Requirements for oil/fuel capture and retention
- Performance results from third-party testing and verification

State, provincial, and local regulatory agencies and municipalities may have specific sizing and design criteria for stormwater treatment systems such as OGS devices. To ensure proper sizing and design, contact your local Stormceptor representative for sizing and design assistance or visit www.imbriumsystems.com for more information.

ONLINE APPLICATION

Stormceptor EF's internal bypass and patent-pending scour prevention technology has demonstrated very effective retention of pollutants in third-party testing and verification following the Canadian ETV's ***Procedure for Laboratory Testing of Oil-Grit Separators***. Sediment scour prevention demonstrated an effluent concentration of less than 10 mg/L for sediment particles ranging from 1 to 1,000 microns, even during peak influent flow rates associated with infrequent high intensity storm events. While Stormceptor EF will capture oil, only the Stormceptor EFO configuration has been third-party tested and verified to retain greater than 99% of captured oil.

Based on these verified performance attributes, the most efficient and widely accepted application of Stormceptor EF is an online configuration, which allows all upstream conveyance flows to enter and exit the unit. The online application eliminates the need for costly additional bypass structures, piping and installation expense.

FLOW ENTRANCE OPTIONS

Single Inlet Pipe – A common design which includes one inlet pipe and one outlet pipe. A 90-degree (maximum) bend is also accepted with this configuration. **Example seen in Figure 3.**

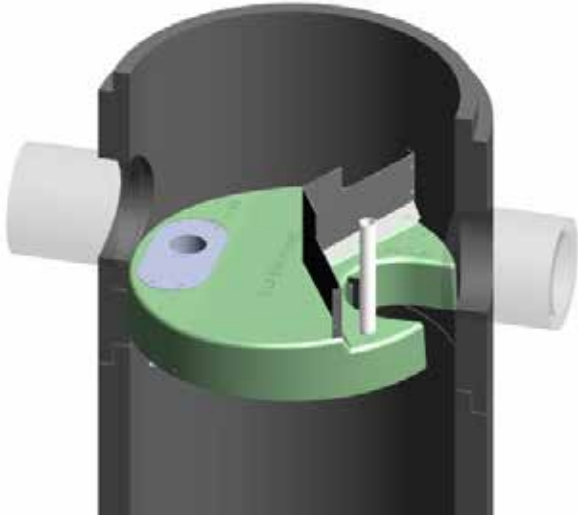


Figure 3

MAXIMUM PIPE DIAMETER		
MODEL	INLET	OUTLET
	(in / mm)	(in / mm)
EF4 / EFO4	24 / 610	24 / 610
EF6 / EFO6	36 / 915	36 / 915
EF8 / EFO8	48 / 1220	48 / 1220
EF10 / EFO10	72 / 1828	72 / 1828
EF12 / EFO12	72 / 1828	72 / 1828

Multiple Inlet Pipes – Allows for multiple inlet pipes of various diameters to enter the unit. **Example seen in Figure 4.**

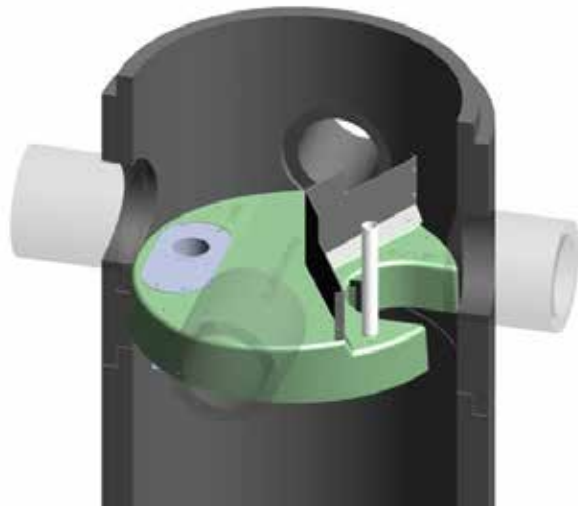


Figure 4

MAXIMUM PIPE DIAMETER		
MODEL	INLET	OUTLET
	(in / mm)	(in / mm)
EF4 / EFO4	18 / 457	24 / 610
EF6 / EFO6	30 / 762	36 / 915
EF8 / EFO8	42 / 1067	48 / 1220
EF10 / EFO10	60 / 1524	72 / 1828
EF12 / EFO12	60 / 1524	72 / 1828

Inlet Grate – Allows surface runoff to enter the unit from grade. The inlet grate option can also be used in conjunction with one inlet pipe or multiple inlet pipes. A removable flow deflector is added in the Stormceptor EF4/EFO4. **Example seen in Figure 5.**

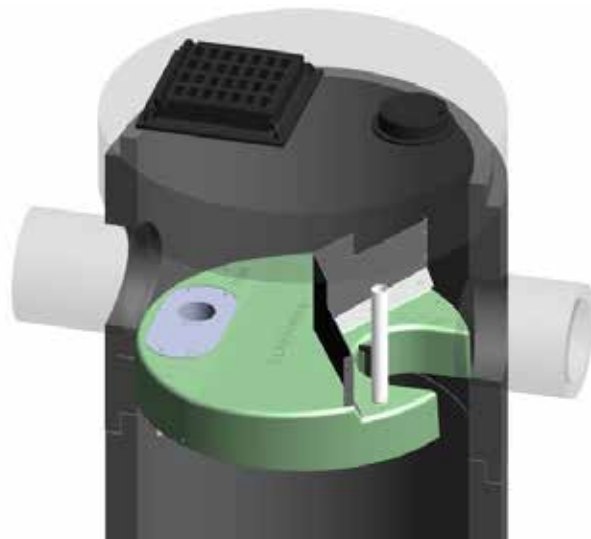


Figure 5

MAXIMUM PIPE DIAMETER		
MODEL	INLET	OUTLET
	(in / mm)	(in / mm)
EF4 / EFO4	24 / 610	24 / 610
EF6 / EFO6	36 / 915	36 / 915
EF8 / EFO8	48 / 1220	48 / 1220
EF10 / EFO10	72 / 1828	72 / 1828
EF12 / EFO12	72 / 1828	72 / 1828

INLET-TO-OUTLET DROP

Elevation differential between the inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit (**illustration seen in Figure 6**).

0° – 45°: The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° – 90°: The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

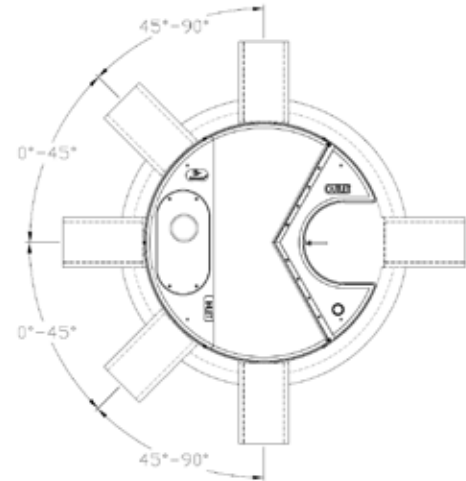


Figure 6

SUBMERGED (TAILWATER) DESIGN

Submerged or tailwater conditions are defined as standing water above the insert elevation during zero-runoff conditions. A weir height modification allows Stormceptor EF to operate under submerged conditions. The following information is necessary to properly design Stormceptor EF for the submerged condition:

- Stormceptor top of grade elevation
- Stormceptor outlet pipe invert elevation
- Standing water elevation

NOTE: The maximum weir height for Stormceptor EF is 48 inches (1200 mm). Contact your local Stormceptor representative for design assistance.

LIVE LOAD

Stormceptor EF is typically designed for local highway truck loading. In instances where other live loads are required, Stormceptor EF can be customized to meet the necessary structural requirements. Contact your local Stormceptor representative for design assistance.

SHALLOW COVER

Stormceptor EF is typically designed with a minimum depth of burial to the outlet invert based on the diameter of the inlet and outlet pipes. A common minimum burial depth to the outlet invert is 48 inches (1.2 meters). In instances where there may be site constraints to the depth of burial contact your local Stormceptor representative for design assistance.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

ABOVE-GROUND INSTALLATIONS

Stormceptor EF can be designed as a free-standing above-ground unit, constructed of fiberglass as illustrated in **Figure 7**. These customized units are lightweight and can be installed within a building footprint, providing structural support and installation advantages. Contact your local Stormceptor representative for design assistance.

PERFORMANCE VERIFICATION TESTING

Stormceptor EF has been third-party performance tested according to the Canadian Environmental Technical Verification (ETV) Procedure for **Laboratory Testing of Oil-Grit Separators**, and has received ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

For more information, please visit www.imbriumsystems.com or contact your local Stormceptor representative.

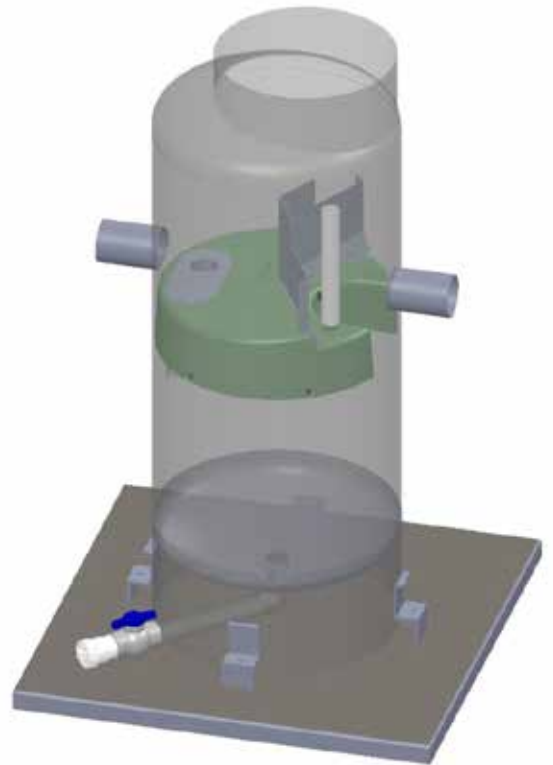


Figure 7

INSTALLATION

For installation details, please visit www.imbriumsystems.com and refer to the Stormceptor EF Installation Guideline or contact your local Stormceptor representative.

INSPECTION AND MAINTENANCE

As with any stormwater treatment device, periodic inspection and maintenance of Stormceptor EF is required for long-term performance.

Inspection and maintenance is performed from grade without entering the unit. Sediment depth inspections are performed through the outlet riser, and oil presence can be determined through the oil inspection pipe. Oil presence and sediment depth are determined by inserting a Sludge Judge® or measuring stick to quantify the pollutant depths. Visual inspections of the insert can be performed to ensure there is no damage or blockages. A beneficial feature of Stormceptor EF in comparison to many other treatment practices is that once it is maintained, Stormceptor EF is functionally restored to its original condition.

When maintenance is required, a standard vacuum truck is used to remove the pollutants (sediment and floatables) from the lower chamber of the unit through the outlet riser. When an appreciable amount of oil or other hydrocarbons is present, these floatable pollutants can be removed by hydrovac from the water surface. Should an oil/fuel spill occur, or presence of oil/fuel be identified within the unit, it should be cleaned immediately by a licensed liquid waste hauler.

RECOMMENDED SEDIMENT DEPTHS FOR MAINTENANCE SERVICE*

MODEL	Sediment Depth
	(in/mm)
EF4 / EFO4	8 / 203
EF6 / EFO6	12 / 305
EF8 / EFO8	24 / 610
EF10 / EFO10	24 / 610
EF12 / EFO12	24 / 610

* Based on a minimum distance of 40 inches (1,016 mm) from bottom of outlet riser to top of sediment bed.

The frequency of inspection and maintenance may need to be adjusted based on site conditions to ensure the unit is operating and performing as intended. Maintenance costs will vary based on the size of the unit, site conditions, local requirements, location, and transportation distance(s).

For more details on inspection and maintenance refer to the Stormceptor EF Owner's Manual at www.imbriumsystems.com.

HYDROCARBON CAPTURE AND RETENTION

Stormceptor EFO

Stormceptor is often installed on high-traffic pollutant hotspots where hydrocarbon spill potential exists.

The technology platform of Stormceptor EFO is the same as Stormceptor EF, however the maximum surface loading rate into the lower chamber is restricted to a lower value with Stormceptor EFO, thereby ensuring excellent oil retention. Third-party testing in accordance with the Light Liquid Re-entrainment testing provisions within the Canadian ETV protocol *Procedure for Laboratory Testing of Oil-Grit Separators* demonstrated greater than 99% oil retention. Stormceptor EFO is engineered to capture and retain free floating oil/chemical/fuel spills, not emulsified hydrocarbons.

Oil Sheen

When oil is present in stormwater runoff, a sheen may be noticeable at the Stormceptor outlet. An oil rainbow or sheen can be noticeable at very low oil concentrations (< 10 mg/L). Despite the appearance of a sheen, Stormceptor EFO may still be functioning as intended.

Disposal

Maintenance providers are to follow all federal, state/provincial, and local requirements for disposal of hydrocarbons.

Oil Level Alarm

As an added safeguard, an oil level alarm is available as an optional feature for Stormceptor EFO. This is an electronic monitoring system designed to trigger a visual and audible alarm when a preset level of oil is captured in the lower chamber. The oil level alarm is installed as illustrated in **Figure 8**.

Optional Oil Alarm



OIL ALARM PROBE INSTALLED ON DOWNSTREAM SIDE OF WEIR

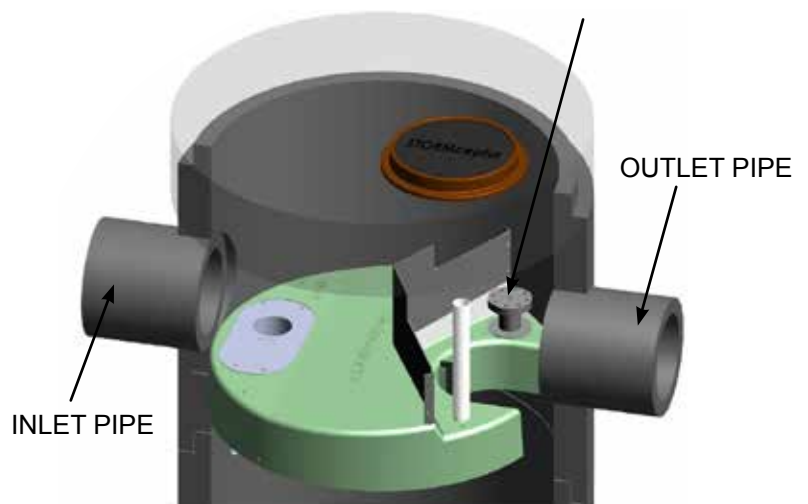


Figure 8

ADDITIONAL POLLUTANT STORAGE CAPACITY

Stormceptor EF/EFO can be easily modified to increase sediment storage capacity by extending the depth of the lower chamber. Stormceptor EFO can be modified to increase hydrocarbon storage capacity by extending the outlet riser, thereby providing the storage volumes depicted in the table below.

STORMCEPTOR EFO STORAGE VOLUME		
Stormceptor EFO Model	Standard Hydrocarbon Storage Capacity ¹	Extended Hydrocarbon Storage Capacity ^{1,2}
	(L / gal)	(L / gal)
EFO4	265 / 70	395 / 105
EFO6	610 / 160	1615 / 425
EFO8	1070 / 280	4340 / 1145
EFO10	1670 / 440	NA
EFO12	2475 / 655	NA

1. Hydrocarbon Storage Capacity is measured from the bottom of the outlet riser to the underside of the insert.
2. Distance from bottom of the extended outlet riser to top of the sediment maintenance depth is 914 mm (36 in).
NA –Not available in these model sizes

Additional hydrocarbon storage capacity can be added with a draw off tank.

Contact your local Stormceptor representative for additional information and design assistance.

HEALTH AND SAFETY

For all aspects of installation and inspection/maintenance, OSHA and appropriate local regulations should be followed to ensure safe practice.

Contact

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