

Oil/Water Separators

Courtesy of the Environmental Protection Agency

DESCRIPTION

Oil/water separators (O/WSs) are devices used to remove oils and greases (and sometimes solids) from storm water. A variety of methods to separate oil from water are involved, including gravity separation, filters, coagulation/flocculation, and flotation. Gravity separation is not always the most successful at oil removal to meet regulatory discharge requirements. In these cases, **coalescing oil/water separators**, which are essentially enhanced gravity-type O/WSs, are needed to achieve greater separation efficiency.

¹ Minton, Gary. "Gravity Separation." Stormwater Treatment. P. 199-120. 2002

APPLICABILITY

The primary use of oil/water separators is where oil spills are a concern. Their inclusion in these guidelines is merely to provide a wide range of possible stormwater BMP choices. If an oil/water separator is to be used for treatment it should be located off-line from the primary conveyance/detention system. The contributing drainage area should be completely impervious and as small as necessary to contain the sources of oil. Under no circumstances should any portion of the contributing drainage area contain disturbed pervious areas which can be sources of sediment.

LIMITATIONS

Oil/Water Separators have limited application in stormwater treatment because their treatment mechanisms are not well suited to the characteristics of stormwater runoff (i.e., highly variable flow with high discharge rates, turbulent flow regime, low oil concentration, high suspended solids concentration). In addition, separators can require intensive maintenance, further restricting their desirability as a stormwater treatment BMP.

SITING & DESIGN

While the use of oil/water separators may be appropriate for high traffic areas or areas where oil is more prevalent (parking lots, gas stations, etc.), the decision to use an oil/ water separator should be made on a case-by-case basis.

1. Separators should precede all other stormwater treatment.
2. They should be provided with adequate access for observation and maintenance.
3. Stormwater from building rooftops and other impervious surfaces are not likely to be contaminated by oil and should not be discharged to the separator.
4. Any pump mechanism should be installed downstream of the separator to prevent oil emulsification.

Absorbent pillows may be used in separators. For API and CPS-type separators should be placed in an afterbay. With the SC-separator, absorbent materials should be placed in the manhole/vault. Used absorbent pillows will need to be properly disposed of.

Sizing Procedure

Stokes Law is a basis for sizing oil/water separators. According to Gary Minton's book on Stormwater Treatment, "as the specific gravity is less than one, the settling velocity is negative and is therefore referred to as the rise rate. The rise rate is analogous to the hydraulic loading rate. To size an oil/water separator, the droplet size is selected such that removing it and all larger droplets provides the desired removal efficiency." Oil droplets exist in water in a wide

distribution of sizes. The separator therefore is sized to remove all droplets of particular size and greater which will ensure that sufficient oil is removed to achieve the effluent standard. The temperature of water and the specific gravity impact the sizing as well.¹

There are no data on the size distribution of dispersed oil in stormwater from commercial or industrial land uses with the exception of petroleum projects storage terminals. This data indicates that by volume, about 80 percent of the droplets are greater than 90 micron and less than 30 percent are greater than 150 microns.

¹ Minton, Gary. "Gravity Separation." Stormwater Treatment. P. 120. 2002

MAINTENANCE

Oil/water separators must be cleaned frequently to keep accumulated oil from escaping during storms. As a rule of thumb, the following should be done. Be aware that climate conditions, such as dry/wet seasons, will affect the maintenance procedures.

1. The facility should be inspected weekly by the owner.
2. Oil absorbent pads are to be replaced as needed but should always be replaced in the fall prior to the wet season and in the spring.
3. The effluent shutoff valve is to be closed during cleaning operations.
4. Waste oil and residuals should be disposed in accordance with current local government health department requirements.
5. Any standing water removed during the maintenance operation must be disposed to a sanitary sewer at a discharge location approved by the local government.
6. Any standing water removed should be replaced with clean water to prevent oil carry-over through the outlet weir or orifice.

COST

Oil/water separators range in price varies according to the flow rate and level of treatment required, in addition to the climate and regional requirements. Costs may range from \$4,000 to \$20,000. Oil/coalescing vaults range from \$5,000 to \$50,000. Additional costs are required to maintain, especially replacing the media packs inside the units. Media pack costs depend on the frequency of maintenance and the type of media used.

- [Courtesy of Vortech, Inc.](#)