

Oil/Water Separators Sizing Guide

For your convenience, Highland Tank's oil/water separator (OWS) sizing utilities are available on-line at <http://www.highlandtank.com/steel-storage-tank-sizing>.

This guide is intended to assist knowledgeable personnel with sizing a Highland Tank Oil/Water Separator. The information contained herein is the opinion of Highland Tank. Individual projects must be evaluated to determine the appropriate size and configuration for that site.

When sizing an OWS, there are three primary factors to consider:

1 - Treatment Flow-Rate, 2 - Spill Capacity, 3 - All applicable Codes & Regulations.

1 – Treatment Flow-Rate

Contaminated flows generally generate from two primary sources - intermittent flows from normal hose-down or industrial process operations and stormwater runoff. Stormwater runoff flows usually greatly exceed all other flows. The design flow for an OWS should be based on the maximum total flow rates projected for treatment of contaminated flow at any given time.

2 – Spill Capacity

Highland Tank recommends OWS have accumulated wastes removed when their volume reaches 20% of static vessel volume. It is important to monitor this level to determine what the spill containment capacity is on a continual basis.

Highland Tank OWS have a high-oil capacity equal to 43% of the static vessel volume. This capacity is considered the maximum operational level. Once this volume is exceeded, effluent quality may degrade.

Highland Tank OWS have a spill capacity equal to 80% of the static vessel volume. This capacity considers containment of a pure oil spill only.

After determining the largest spill potential for the project, consider selecting a larger volume OWS accordingly to accommodate for spills.

3 – Applicable Codes & Regulations

Highland Tank recommends checking with the authority having jurisdiction for your project's location to determine any affect on design, operation and sizing of the OWS. Federal and State regulatory information is available at <http://www.highlandtank.com/regulatory-links>.

To select the correct OWS volume, review the three factors above again to determine which one will have the most impact as they relate to your project. Only qualified personnel should make this determination. Contact Highland Tank for assistance with determining the controlling factor. If spill capacity or regulations dictate sizing requirements, continue to the appropriate schedule of sizes for your installation application.

To determine if stormwater runoff or service areas dictate sizing requirements, continue with the surface area calculators below to help determine OWS sizing.

Outdoor Applications: Determine Stormwater Generation by Calculating Runoff

The initial step for computing a design flow is to define the areas where contaminated flow will originate. A map and description of the facility will help identify the areas where oily water is being generated. The treatment area should include any areas where contamination by accidental spills of oils, greases, fuels or other petroleum hydrocarbon products onto the ground may occur.

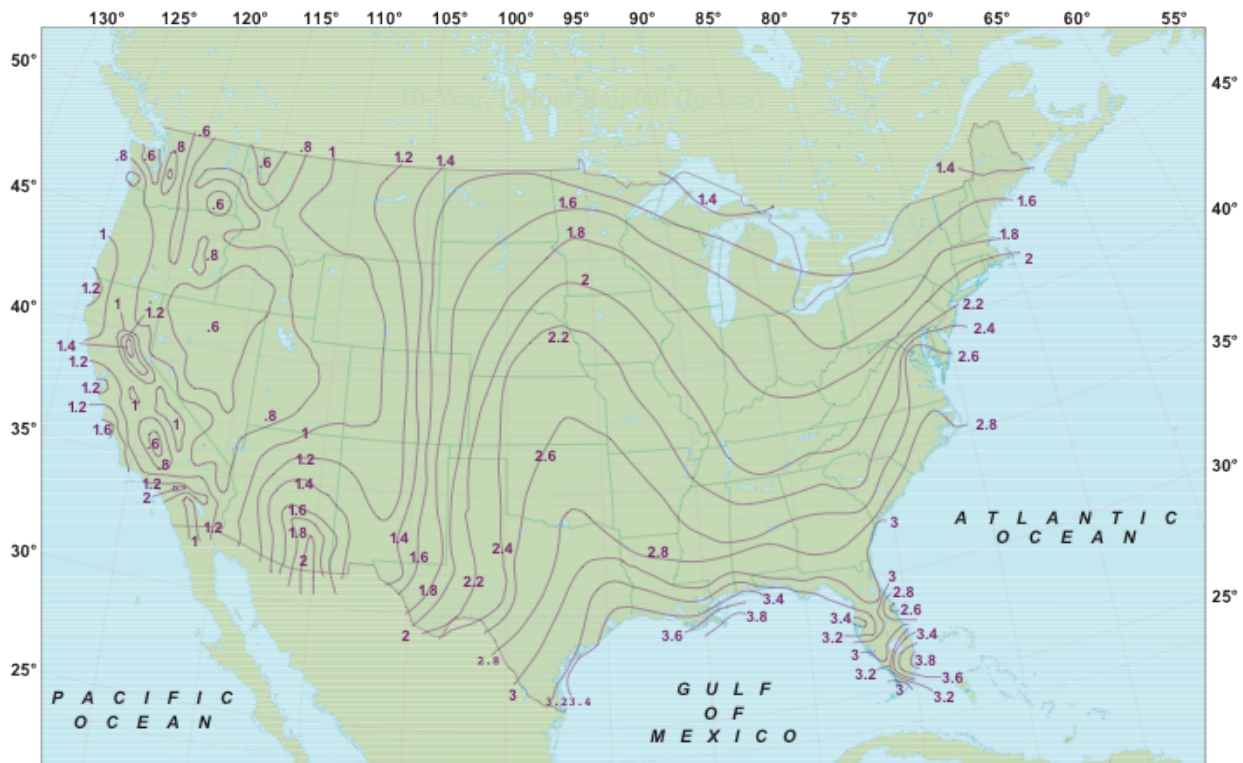
A separate drainage system to serve these affected areas should be considered. Highland Tank recommends that all other areas drain through a separate system to minimize the size of the OWS. Site elevations may require the use of multiple OWS or pumping of the stormwater for treatment. Should multiple units be selected, each separate drainage area must be reviewed.

Determine the area from which oily stormwater runoff can be expected. Calculate area in square feet from measurements or drawings and record here _____(A).

Using the rainfall chart, identify the amount of rain expected to fall in a one-hour period in the area of your facility and record it here _____(R).

NOTE: This chart is based on a 10-year, 1-hour rainfall event. The project's designer shall determine if this scenario meets the need of the project or if the application of a different storm event is appropriate.

10-Year, 1-Hour Rainfall (Inches)



Calculate treatment flow rate

The formula to determine the treatment flow rate (TFR) in gallons per minute (GPM) is:

$$A \times R \times 0.0104 = TFR$$

Example: One acre (43,560 ft²) in south-central Pennsylvania.
43,560 x 2 x 0.0104 = 906.05 GPM

OR

Indoor Applications: Vehicle Service Bay Drainage

The initial step for computing a design flow is to identify the areas where contaminated flow will originate. The treatment area should include any areas where contamination from vehicle washing operations, accidental spills of oils, greases, fuels or other petroleum hydrocarbon products onto the floor may occur, as well as any industrial processes that will feed wastewater into the OWS.

Determine the total flow from which oily runoff can be expected. All sources of water that will drain into the OWS must be considered to ensure under-sizing the OWS. Maximum flow rates from all wastewater-producing operations should be added together for determining an appropriate size OWS for your project.

When installed for wastewater treatment from indoor service or process operations, the OWS must be installed in accordance with all plumbing codes in effect for the installation location.

International Building Code, for example, requires 6 ft³ of volume for the first 100 ft² of indoor floor area and 1 ft³ of volume for each 100 ft² of floor area thereafter. In this case, the following formula can be used:

$$\left[6 + \left(\frac{\text{Total Square Feet} - 100}{100} \times 1 \right) \right] \times 7.48 = \text{Required Nominal Gallonage}$$

Example: 10,000 ft²
 $[6 + (10,000 - 100) / 100] = 15.9 \times 7.48 = 119 \text{ Gallons}$

Select OWS from Schedules

The following schedules represent capacities for Highland Tank's STANDARD OWS models. If your project dictates the use of any special treatment (e.g. flow rate, spill or storage capacity, special chambers, etc.), please contact Highland Tank for assistance with customization.

Based on the sizing method and information determined above, select the correct size OWS from the sizing charts below. To provide an additional safety margin, consider selecting the next high volume unit. Custom sizing is available.

Highland manufactures OWSs with effluent rates down to as low as the 10-ppm discharge – and filtration systems to further improve effluent discharge.

Cylindrical OWS sizing chart

Model	Flow Rate GPM	Recommended Oil Pump-out Gallons	Hi-Hi Oil Level Gallons	Emergency Spill Capacity Gallons	Diameter	Length	Inlet & Outlet Dia.
350	35	73	156	291	3'-6"	6'-0"	4"
550	55	94	202	376	3'-6"	7'-9"	4"
1,000	100	167	359	669	4'-0"	10'-9"	6"
2,000	200	355	764	1,420	5'-4"	12'-0"	6"
3,000	300	504	1,084	2,017	5'-4"	18'-0"	8"
4,000	400	672	1,445	2,689	5'-4"	24'-0"	8"
5,000	500	856	1,840	3,424	6'-0"	23'-10"	8"
6,000	600	994	2,137	3,976	6'-0"	28'-8"	10"
7,000	700	1,198	2,576	4,792	7'-0"	24'-4"	10"
8,000	800	1,379	2,964	5,514	7'-0"	28'-0"	10"
9,000	900	1,532	3,295	6,129	8'-0"	24'-0"	12"
10,000	1,000	1,703	3,661	6,810	8'-0"	26'-8"	12"
12,000	1,200	2,043	4,393	8,172	8'-0"	32'-0"	12"
15,000	1,500	2,620	5,632	10,478	10'-0"	25'-6"	14"
20,000	2,000	3,483	7,488	13,930	10'-6"	31'-0"	16"
25,000	2,500	4,272	9,185	17,089	10'-6"	38'-9"	18"
30,000	3,000	5,027	10,808	20,107	10'-6"	46'-6"	20"
40,000	4,000	6,672	14,344	26,686	12'-0"	47'-3"	24"
50,000	5,000	8,401	18,063	33,605	12'-0"	59'-6"	24"
60,000	6,000	10,160	21,844	40,641	13'-0"	60'-6"	24"

Rectangular OWS sizing chart

Model	Flow Rate Gal/Min	Recommended Oil Pump-out Gallons	Hi-Hi Oil Level Gallons	Emergency Spill Capacity Gallons	Dimensions L x W x H	Inlet & Outlet Dia.
100	5	18	36	71	5'-0" x 1'-6" x 3'-0"	1"
200	10	28	57	113	5'-0" x 2'-0" x 3'-0"	2"
300	25	41	83	166	7'-0" x 2'-0" x 3'-0"	3"
600	50	76	152	304	9'-0" x 3'-0" x 3'-0"	4"
900	75	113	226	452	10'-0" x 3'-0" x 4'-0"	6"
1,000	100	160	321	642	11'-0" x 4'-0" x 4'-0"	6"
2,000	200	271	542	1,084	12'-0" x 5'-0" x 5'-0"	8"
3,000	300	387	774	1,548	18'-0" x 5'-0" x 5'-0"	10"
4,000	400	465	929	1,858	18'-0" x 6'-0" x 5'-0"	10"
5,000	500	672	1,345	2,690	20'-0" x 6'-0" x 6'-0"	10"
6,000	600	742	1,485	2,970	19'-2" x 7'-0" x 6'-0"	10"
7,000	700	896	1,792	3,584	19'-2" x 7'-0" x 7'-0"	10"
8,000	800	1,024	2,048	4,096	19'-2" x 8'-0" x 7'-0"	10"
9,000	900	1,144	2,287	4,575	18'-10" x 8'-0" x 8'-0"	12"
10,000	1,000	1,230	2,460	4,920	20'-11" x 8'-0" x 8'-0"	12"
12,000	1,200	1,531	3,062	6,125	19'-10" x 9'-0" x 9'-0"	12"
15,000	1,500	2,039	4,078	8,155	24'-9" x 9'-0" x 9'-0"	14"
20,000	2,000	2,724	5,448	10,897	29'-9" x 10'-0" x 9'-0"	16"
25,000	2,500	3,394	6,789	13,577	33'-6" x 10'-0" x 10'-0"	18"
30,000	3,000	4,197	8,393	16,786	40'-10" x 10'-0" x 10'-0"	20"