



The McCandless Township Sanitary Authority

Fats, Oils and Grease (FOG) Control Device

Design Guidance

These guidelines are based upon the standards published by the Plumbing and Drainage Institute (PDI). Additional details can be found in PDI's Standard PDI-G101.

Cause for Concern

Fats, Oils and Grease (FOG) are a problem for municipal sewage collection and treatment systems because of their poor solubility in water and their tendency to separate from the liquid solution. Large amounts of FOG in the wastewater can cause trouble in the collection system pipes and the wastewater treatment plant. If it collects within pipes, it decreases pipe capacity and, therefore, requires that piping systems be cleaned more often and/ or some piping to be replaced sooner than otherwise expected or can cause backups in homes or businesses. Fats, Oils and Grease in a warm liquid may not appear harmful, however, as the liquid cools, the FOG congeals and causes nauseous mats on the surface of screening equipment, settling tanks, digesters, and other surfaces which may cause a shutdown of treatment plant units. Additionally, FOG is not readily digestible by the organisms that live within a wastewater treatment plant and can result in sewage discharges to receiving streams that can harm the environment and result in fines to the municipal sewage system.

The best way to deal with FOG is to not let it get into the sewer system! Collecting FOG and not pouring them down the drain is best, but for many businesses such as restaurants, some amounts of FOG do get introduced to the sewer system during cleaning operations. In those cases a Grease Trap, a Grease Removal Device or a Grease Interceptor may be required.

Design Considerations

There are two types of FOG Control Devices, Hydromechanical Grease Interceptor, commonly called a Grease Trap and a Gravity Grease Interceptor. A hydromechanical grease interceptor incorporates air entrapment, the buoyancy of grease in water and hydro mechanical separation with interior baffling for FOG separation. Hydromechanical grease interceptors continuously separate the FOG at the velocity it enters the device, are sized based on flow rate measured in gallons per minutes (GPM) and a typically installed inside such as an under the sink grease trap. A gravity grease interceptor incorporates two or more compartments in series, have a large volume (300 gallons or more), are sized based on volume measured in gallons, use the large volume of water to slow the velocity of the flow down allowing the

time required for the buoyancy of grease in water to achieve separation and are typically installed outside a structure.

It is critically important to recognize that the ability of a Hydromechanical Grease Interceptor (Grease Trap) and a Grease Interceptor to operate efficiently and perform its job of intercepting and collecting FOG so as to prevent the FOG from being conveyed to the municipal sewerage system is its **rated capacity**. Undersized equipment can be overloaded and bypass FOG to the municipal sewerage system.

The rated capacity of a FOG Control Device has two components, flow rate (typically measured as gallons per minutes or GPM) and FOG Capacity (typically measured in pounds). The sizing of a Hydromechanical Grease Interceptor (Grease Trap) and a Gravity Grease Interceptor are performed in different fashions.

FOG Control Device Flow Rate

Flow rate is the primary controlling factor in sizing a FOG control device (typically measured as gallons per minutes or GPM). As the actual number of fixtures draining to a FOG Control Device can vary at a specific time, a Flow Control Device corresponding to the rated flow capacity of the FOG Control Device is required so the flow does not exceed the devices rated capacity resulting in overloading and possible wash through of FOG into the municipal sewer system.

A FOG Control Device flow rate can be estimated by determining the maximum capacity of all the fixtures connected to it. It is this flow rate that is then used to size either the Hydromechanical Grease Interceptor (Grease Trap) or the Grease Interceptor.

Sizing a Hydromechanical Grease Interceptor (Grease Trap)

PDI has established a sizing symbol for Hydromechanical Grease Interceptor (Grease Trap) as follows:

Table 1 - PDI Sizing and Rating

PDI Size Symbol	4	7	10	15	20	25	35	50
Flow Rate (GPM)	4	7	10	15	20	25	35	50
FOG Capacity (Pounds)	8	14	20	30	40	50	70	100

PDI has established standards for 8 different sized FOG Control Devices that address most normal domestic, commercial and institutional installations. For installations that exceed 125 gallons, the FOG Control Device should be sized with a flow rate not less than two and a half times the capacity of fixtures connected to it.

Table 2 - PDI STANDARD FLOW RATE AND GREASE RETENTION CAPACITY RATINGS FOR HYDROMECHANICAL GREASE INTERCEPTOR (GREASE TRAP)

	Flow Rate (GPM)	FOG Retention Capacity Rating (Pounds)	Recommended Maximum Capacity of Fixtures Connected to FOG Control Devices (Gallons)
For Small Domestic Use	4	8	10.0
	7	14	17.5
For Large Domestic Commercial Institutional Use	10	20	25.0
	15	30	37.5
	20	40	50.0
	25	50	62.5
	35	70	87.5
	50	100	125.0

Dishwashers

A separate Hydromechanical Grease Interceptor (Grease Trap) is recommended for each commercial dishwasher. The flow rate of the Hydromechanical Grease Interceptor (Grease Trap) is determined by the GPM discharge rate of the dishwasher as specified by the manufacturer.

Multiple Fixtures

Where multiple fixtures are served by a single Hydromechanical Grease Interceptor (Grease Trap), calculate the total capacity of all the fixtures, establish the maximum number of fixtures that may be drained simultaneously and apply this factor to the maximum capacity of fixtures connected to the Hydromechanical Grease Interceptor (Grease Trap). Proceed with sizing the Hydromechanical Grease Interceptor (Grease Trap) using Table 2 above.

Sample Procedure for Sizing a Hydromechanical Grease Interceptor (Grease Trap)

A sample sizing calculation is given on the presented below to assist design professionals in determining the requirements of the Hydromechanical Grease Interceptor (Grease Trap).

Steps	Formula	Example
1	Determine cubic content of fixture(s) by multiplying length x width x depth.	A sink 48" long by 24" wide by 12" deep. Subic content 48 x 24 x 12 = 13,824 cubic inches.
2	Determine capacity in gallons. 1 gal = 231 cubic inches	Contents in galloons $\frac{13,824}{231} = 59.8$ gallons

3	Determine actual drainage load. The fixture is normally filled to about 75% of capacity with water. The items being washed displace about 25% of the fixture content, thus actual drainage load = 75% of fixture capacity.	Actual drainage load $.75 \times 59.8 = 44.9$ gallons
4	Determine flow rate and drainage period. In general, good practices dictate a one (1) minute drainage period; however, where conditions permit, a two (2) minute drainage period is acceptable. Drainage period is the actual time required to completely drain the fixture Flow Rate = $\frac{\text{Actual Drainage Load}}{\text{Drainage Period}}$	Calculate flow rate for 1-minute period $\frac{44.9}{1} = 44.9$ GPM Flow Rate 2-minute period $\frac{44.9}{2} = 22.5$ GPM Flow Rate
5	Select FOG Control Device. From Table 2 select PDI sizing which corresponds to the flow rate calculated. Note: Select next larger size when flow rate falls between two sizes listed.	For 1-minute period – 44.9 GPM requires PDI size “50.” For 2-minute period – 22.5 GPM requires PDI size “25.”

Sizing a Grease Interceptor

The size of a Grease Interceptor is based on the actual volume of water the interceptor will hold expressed in gallons. Common sizes are 300, 500, 750, 1000, 1250, 1500, 2000, and 3000 gallons.

To size a Grease Interceptor with the FOG Control Device flow rate determined in GPM, multiply the flow rate by a detention time. 60 minutes is the minimum detention time typically used to allow grease to separate by buoyancy.

Sample Procedure for Sizing a Grease Interceptor

A sample sizing calculation is given on the presented below to assist design professionals in determining the requirements of the Grease Interceptor.

Steps	Formula	Example
1	Determine flow rate	Flow Rate = 28 GPM
2	Select Desired Retention Time (60 Min min.)	Detention Time = 60 minutes

3	<p>Size Grease Interceptor using desired detention time. Note: Select next larger standard size when flow rate falls between two sizes.</p>	<p>Flow Rate x Det. Time = Size 28 GPM x 60 Min = 1680 Gallons Select a 2,000 Gallon Size</p>
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Design Submission

Submit the design calculations outlined above to MTSA for review and approval. Calculations should be based upon a facilities actual installed or planned fixtures for each FOG Control Device using the following form.