Basic Principles
for
Sizing Grease Interceptors

Grease Interceptor is an overall term. It is a product category much like "faucet". I am sure you can think of several types of faucets like, kitchen, bath room sink and tub to name a few. The same is true with" Grease interceptors".

In actual practice there are many different designs but there are two basic design principles that are used for separating the grease, FOG (fats, oils and grease) from the waste water. There has been confusion over the years in that both designs have been referred to as "Grease Interceptors".

In 2006 a consensus of the industry, specifiers and plumbing officials with the leadership of IAPMO designated new names for these two types of Grease Interceptors. Although both types accomplish the same task, correct installation and sizing are critical in both types for proper grease separation. The names given to the two types are "Hydromechanical Grease Interceptor" and "Gravity Grease Interceptor"

The Hydromechanical Grease Interceptor design type incorporates air entrapment, the buoyancy of grease in water and hydro mechanical separation with interior baffling for grease, FOG (fats, oils and grease) separation. Hydromechanical Grease interceptors *continuously* **separate the FOG (fats, oils and grease) at the velocity it enters the interceptor.**

The Gravity Grease interceptor design type incorporates two or more compartments in series, a minimum volume of 300 gallons and uses its larger volume of water to *slow the flow velocity down* **allowing the time required for simply the buoyancy of grease, FOG (fats, oils and grease) in water to cause separation. That is why the physical size of the Gravity Grease Interceptor is so much greater than the physical size of the Hydromechanical Grease Interceptor.**

With both design types the key to proper sizing is understanding the "Size" nomenclature since it is different for each type.

In plumbing valves piping and fixtures it is common to size a product by its inlet connection pipe size. This however is not true with either type of Grease Interceptor. The size of Hydromechanical Grease Interceptors is expressed in the *gallons per minute flow (GPM)* **that the grease interceptor can accept and still remove 90% plus, of the grease, FOG (fats, oils and grease) from the influent. The common sizes available today are 10,15,20,25,35,50,75,100 GPM.**

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

Ever though the designs differ in separation methods and size nomenclature the system parameter that must be known for proper sizing is the same. That

parameter is the expected maximum flow in gallons per minute (GPM) that the grease interceptor will receive.

With the flow determined Hydromechanical Grease Interceptor sizing is very straight forward. You match the calculated flow in GPM to the size on the interceptor, which is marked in GPM. Hydro mechanical Grease Interceptors like most plumbing devices are performance tested to national standards. The standards for Hydromechanical Grease Interceptors are PDI- G101 and ASME A112.14.3. The Hydromechanical Grease Interceptors are tested at their rated flow, which is their size designation i.e. a 20 GPM size is tested with a 20 GPM flow of grease laden water. With an expected maximum flow of 20 GPM you would use a 20 GPM size interceptor.

To size a Gravity Grease Interceptor with the flow determined in GPM you simply multiply the flow number by a detention time, 30 minutes (the time period normally excepted for the grease to separate by buoyancy). Again with our 20 GPM example, the size would be 20X30= 600. A 600 Gallon size interceptor would be used.

The sizing methods are rarely disputed. The difference of opinion is in determining the GPM flow that the grease interceptor should be sized to handle. When the actual grease producing fixtures are known one school of thought is to calculate the total GPM based on the total of all the volumes of the fixtures draining in one minute plus the total of other fixtures that have a designed flow rate. This would be the peak flow rate for the facility. The other school of thought is to use DFU's (drainage fixture units) assigned to each fixture by the plumbing code and use what would be an average flow rate. Sizing to potential peak flow rate will work for both types of grease interceptors. Sizing to DFU's for Hydromechanical Grease Interceptor can result in peak flows beyond the size chosen and result in extended drain down time for fixtures. But since the Hydromechanical Grease Interceptor has a vented flow control the designed flow will not be exceeded and the grease, FOG (fats, oils and grease) removal efficiency will not be compromised although increased drain down times may be unrealistic and unworkable in a busy kitchen .

Gravity Grease Interceptors sized with DFU's could see peak flow in excess of the sizing resulting in a decrease in detention time. At some point reducing detention time will effect and decrease grease separation efficiency.

The other challenge in sizing a Grease interceptor is the facilities where the actual fixtures are not know. This can happen at a build out at a mall where the square footage is designated for a restaurant but the type is not known and there is a potential to change restaurants in the future. Grease interceptors are often required to be incorporated in the basic building before occupancy is known. All that may be known at this point to size the interceptor is the drain pipe size that will discharge to the grease interceptor.

Again there are two schools of thought for determining expected flow in GPM, which is needed to size either type of grease interceptor.

The first school of thought is that the maximum flow would be a full pipe with gravity flow. Based on standard engineering calculations, full flow, ¼ pitch, by gravity would approximately be for a 2"pipe 20 GPM, 3" 60 GPM, 4"pipe 125 GPM, 5" pipe 203 GPM, and 6" pipe 375 GPM.

The second school of thought is that in a properly designed drainage system the pipe will never be more than 50% of full capacity. When using the first school of thought both types of Grease Interceptors will perform properly, i.e. neither one will be undersized. Using the second school of thought, if flows do exceed 50% the Hydromechanical Grease Interceptor will control the flow so grease separation is not compromised but fixture drain down time will be extended. If flows exceed the 50% with the Gravity Grease Interceptor retention time will be decreased reducing grease removal efficiency.

So is bigger better? Not necessarily. At one time Gravity Grease Interceptors were sized by both flow and expected retained solids which made them larger needing less frequent cleaning. Actual field experience has now shown us that over sizing can result in the generation of hydrogen sulfide gas and sulfuric acid, destroying the interceptor and drainage system.

So there is no pat answer for Grease Interceptor sizing. Sound engineering judgment should be applied to each system design.

The Plumbing and Drainage Institute, PDI

PDI **is an association of manufacturers of engineered plumbing products in a business area commonly referred to by the mechanical side of the construction industry as "the drain business." Our members and licensees make products such as: floor drains, roof drains, sanitary floor drains, cleanouts, water hammer arresters, swimming pool drains, backwater valves, grease interceptors, fixture supports, and other drainage specialties.**

Our objective is to promote the advancement of Engineered Plumbing Products through publicity, public relations, research and standardization of product requirements, as well as to prepare, edits, and publishes

Standards relating to plumbing products and to provide certified testing, rating and installation procedures for Grease Interceptors and Water Hammer Arresters in Standards PDI-G101 and PDI-WH201 respectively.

PDI **maintains testing equipment in independent testing laboratories for the purpose of testing Water Hammer Arresters for compliance with Standard PDI-WH201 and**

Grease Interceptors for compliance with Standard PDI-G101. Certified Products carry the Seal of the Plumbing & Drainage Institute as evidence that the product has met the specified requirements of the Institute's Standards.

PDI **also works to develop National Standards through the American Society of Mechanical Engineers, ASME A-112 Committee. We also participate in the development of the model plumbing codes with IAPMO, International Association of Plumbing and Mechanical Officials and ICC, International Code Council.**