

PRECAST CONCRETE GREASE INTERCEPTORS

PURPOSE

- Provide design information that is often difficult to locate.
- Provide a forum for discussion of common design issues.
- Provide information on various codes and standards.

TOPICS

- Why are grease interceptors necessary?
- How do grease interceptors work?
- Grease Interceptor best practices
- Key factors affecting FOG removal
- Codes and Standards

TOPICS

- Configuration Considerations
- Structural Considerations
- Interceptor Sizing
- Other Issues



WHY GREASE INTERCEPTORS

Sewer Overflows and Backups

- Grease blockages in sewer lines account for a significant percentage of sewer overflows.
- Blockages and sanitary sewer backups are costly to locate, clean out and clean up.
- Interceptors are the last line of defense.

HOW DO THEY WORK?

FOG Separation and Retention

- Separation occurs when the FOG floats to the top of the water in the interceptor (Stokes Law often cited).
- Baffles prevent the FOG from exiting the interceptor.
- Effluent exiting the interceptor is drawn from the clear zone.

BEST PRACTICES

Interceptors should:

- Provide easy access for maintenance.
- Be large enough to hold large quantities of grease.
- Be outdoors to facilitate inspection and eliminate the possibility of food contamination.

KEY FACTORS

Retention Time

- Most important factor in grease separation and retention.
- Metcalf & Eddy recommend 30 minutes minimum.
- Depends on the size and the influent flow rate.
- Baffles increase retention time and prevent short-circuiting.

KEY FACTORS

- FOG particle separation time depends on particle size, specific gravity, turbulence, etc.
- Temperature is not as big of a factor as some may think.
- Soaps and other emulsifying agents have a significant impact on separation time.

CODES & STANDARDS

ASTM International

- ASTM Specification C1613.
- Design loading - ASTM C890.
- Resilient connectors – ASTM C923

CODES & STANDARDS

International Association of Plumbing and Mechanical Officials (IAPMO)

- IAPMO/ANSI Z1001 (formerly PS-80).
- 2009 & 2006 UPC Chapter 10 (formerly in non-mandatory Appendix H).

CODES & STANDARDS

Plumbing & Drainage Institute

- PDI G101, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
- This specification is **NOT** for large, outdoor interceptors.
- Testing protocol does not take soaps into account.

CONFIGURATION

- The design of the interceptor should promote flow patterns that act to prevent eddy currents in the interceptor.
- An inlet baffle or diverter is necessary to increase the retention time and avoid short-circuiting.
- An outlet baffle or tee is necessary.
- A rectangular interceptor is believed to be the optimum shape.

CONFIGURATION

- There should be clear space above the water level to allow for venting.
- A space is needed at the bottom for sludge accumulation.
- A sample port allows easy sampling.

CONFIGURATION

The following two facts help determine placement of an interceptor:

1. Grease interceptors are large, heavy and contain a wide variety of contaminants.
 - Consequently, interceptors should be located outdoors of an establishment, especially food preparation establishments.

CONFIGURATION

The following two facts help determine placement of an interceptor:

2. Grease-laden water should flow to the interceptor driven by gravity.
 - Consequently, the interceptor should be placed at a lower elevation than the establishment.

STRUCTURAL DESIGN

Traffic Loading

- All interceptors should be designed for traffic loading.
- At a minimum, use loads from ASTM C890 A-16 (AASHTO HS20-44)
- Lids and covers should also be load rated.



INTERCEPTOR SIZING

- Provide adequate retention time for all types of FOG.
- Longer retention times equals larger interceptor.
- Emulsified oils require the longest retention times.
- Vegetable oils require longer retention times than animal fats.

INTERCEPTOR SIZING

- Provide enough grease storage capacity to meet cleaning requirements.
- Promote longer time between cleaning to reduce maintenance costs.
- Higher FOG concentrations require longer retention times.

INTERCEPTOR SIZING

Factors Affecting Sizing:

- **Retention Time:** Retention time is the amount of time it takes one particle of influent to travel through the system and discharge out of the interceptor.
- **Flow rates:** Wastewater flow rates and retention times are inversely proportional.
- **Concentration:** An effective interceptor should be large enough to accumulate a significant amount of grease without affecting the retention effectiveness.

INTERCEPTOR SIZING

Factors Affecting Sizing:

- **Pumping Frequency:** The size shall be sufficient to optimize cleaning and pump-outs.
- **Chemistry:** Wastewater temperatures and emulsifying chemicals affect the rate at which greases and oils will separate from the wastewater.

INTERCEPTOR SIZING

Grease Interceptors may be sized in accordance with Appendix H of the 2003 Uniform Plumbing Code (UPC) or Chapter 10 of the 2006 and 2009 UPC.

Additional sizing methods can be found in the Appendix of ASTM C1613 'Standard Specification for Precast Concrete Grease Interceptor Tanks.'

INTERCEPTOR SIZING

UPC – Appendix H (pre-2006)

$$\left(\frac{\# \text{ Meals}}{\text{peak.hour}} \right) * (\text{flow.rate}) * (\text{retention.time}) * (\text{storage.factor})$$

Where:

meals/peak hr. = total number of seats

Flow rate (with dishwasher) = 6 gallons

Retention time (with dishwasher) = 2.5

Storage factor (16 hours of operation) = 2

INTERCEPTOR SIZING

U.S. E.P.A.

$$(\# \text{ seats}) * \left(\frac{\text{gal}}{\text{meal}} \right) * (\text{storage.factor}) * \left(\frac{\text{hours.open}}{2} \right) * (\text{loading.factor})$$

Where:

gal / meal = 5

Storage Factor = 1.7

Hours Open = 8

Loading factor = 1

OTHER ISSUES

Odors

- Extended time periods between pump-outs.
- Poor ventilation.
- Sporadic use.
- Hydrogen Sulfide generation.

OTHER ISSUES

Other Design Considerations

- Sanitary waste should not be routed into a grease interceptor.
- Alternatives to monolithic inlet baffles should be carefully considered.
- NPCA Plant Certification Program.