

King George County Service Authority

Technical Standards for Grease Control Devices

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Food Service Establishments (FSEs) are a significant source of Fats, Oils and Grease (FOG). FOG in the sewer system can cause Sanitary Sewer Overflows (SSOs). The Special Order of Consent has required the implementation of Management, Operations, and Maintenance (MOM) programs to reduce these overflows. Appropriate pre-treatment can be achieved with the use of kitchen Best Management Practices (BMPs) and installation of adequately sized and maintained Grease Control Devices (GCDs). While GCDs have been required since the 1940s, the guidance given in the plumbing code has been vague concerning sizing and cleaning. This document clarifies those requirements and offers uniform guidelines for the King George, VA area.

Requirements

With few exceptions, all FSEs will require a GCD. GCDs must be approved by submitting a Hydromechanical Grease Interceptor Sizing and Selection Form (Appendix A) along with the specification sheet of the GCD being submitted for approval. When project conditions may not allow for a Hydromechanical Grease Interceptor (HGI), the Alternate Grease Control Device Sizing and Selection Form (Appendix B) must be submitted for consideration.

Unless otherwise approved by the sanitary sewer system owner, all fixtures, equipment, and drain lines located in the food preparation, alcohol service, clean-up, and food service areas of an FSE shall be connected to a grease control device (GCD). Fixtures required to connect to a GCD shall include but are not limited to pot sinks, pre-rinse sinks, hand sinks, prep sinks, dishwashers, soup kettles, braising pans, wok ranges, rotisserie ovens, mop sinks, floor sinks, floor drains, and wastewater generated from exhaust fan hood cleaning operations. Food waste disposers/garbage grinders (FWD) are prohibited unless otherwise approved. When approved, FWDs shall be routed to a solid's interceptor, sized per the plumbing code, prior to discharging through a GCD.

GCDs shall not be installed in parallel. They may be installed in series if necessary to satisfy the minimum flow rate requirement, the minimum grease storage capacity or both, and to accommodate installations with limited space.

GCDs shall be certified by ASME A112.14.3, ASME A112.14.4, CSA B481, and/or PDI G101. A list of validated and approved GCDs is available upon request. If a GCD is not listed, a valid test report shall be submitted to the sanitary sewer system owner for review that includes the incremental test results. No GCD without validated efficiency and grease storage capacity will be approved. Only validated grease storage capacities may be used for sizing and selecting GCDs in accordance with this document. No substitution for an approved device shall be allowed without written approval by the sanitary sewer system owner.

For FSEs that only operate seasonally, the following shall apply: 1. During the season, the GCD shall be sized and maintained per requirements of this document; 2. Prior to closing for the off-season, the GCD shall be pumped out completely, cleaned, and refilled with clean water.

Unless otherwise approved by the sanitary sewer system owner, GCDs shall be maintained by a professional grease hauler who is certified through the HR FOG Program administered by the Hampton Roads Planning District Commission. FSEs shall submit the FSE Employee Cleaning Request Form (Appendix C) for prior approval before self-cleaning is permitted. Upon approval, the FSE shall comply with all requirements contained therein.

Hydromechanical Grease Interceptors (HGI)

The following two-step sizing methodology (Flow Rate and Grease Production) for hydromechanical grease interceptors (HGIs) shall apply regardless of whether the unit will be installed indoors or outdoors. Complete and Submit Appendix A prior to installation.

Step 1: Determine Flow Rate

The minimum flow rate may be calculated by either using fixture volume or pipe diameter.

Flow Rate by Fixture Volume

Use the following formula for sizing fixtures by volume with a 75% fill factor:

$$\left[\frac{L(in) \times W(in) \times H(in)}{231 \frac{in^3}{gal}} \right] \times 0.75 = \text{Fixture Capacity Gallons}$$

Example: Three-compartment sink with each compartment 18 x 24 x 12 inches and a one compartment pre-rinse sink with the dimensions 15 x 15 x 11.

To determine the minimum required flow rate for the HGI, calculate the capacity of each fixture that will be connected, and add the volumes together, then round up to the next commercially available size. An appropriate HGI must be certified to meet the minimum flow rate as calculated.

18" x 24" x 12" = 5,184 in³
 5,184 / 231 = 22.44 fixture capacity gals
 22.44 X 3 compartments = 67.3 total
 fixture capacity gallons
 67.3 x 0.75 = 50.4 total (75%)
 50.4 / 1 min drain time = 50gpm

15" x 15" x 11" = 2,475 in³
 2475 / 231 = 10.71 total capacity gals
 10.71 x 1 compartment = 10.71 total
 fixture capacity gallons
 10.71 x 0.75 = 8.03 total (75%)
 8.03 / 1 min drain period = 8 GPM

50gpm + 8gpm = 58 gpm, rounding up to the next commercially available size = 75gpm

Flow Rate by Pipe Diameter

Use Table 1 to determine the one-minute drainage period flow rate, by the diameter of the drainage pipe that is connecting to the inlet side of the HGI. When the HGI is installed outside, the flow rate should be determined using a 2-minute drainage period.

Table 1

Pipe Size (inches)	One-minute drainage period flow rate (GPM)	Two-minute drainage period flow rate (GPM)
2	20	10
3	75	35
4	125	75
5	250	125
6	400	200

1/4 inch per foot based on Manning's roughness coefficient of $n = 0.012$

Example: An FSE will be installing an HGI to a 3-compartment sink and a one compartment hand sink. The pipe diameter of the inlet pipe to the GCD is 3 inches. The minimum flow rate is 75gpm.

Example: An FSE will be installing an HGI outside connected to a 3-compartment sink, one compartment sink, several floor drains, a mop sink, and a hand sink. The pipe diameter of the inlet pipe to the GCD is 4 inches. Because it will be installed outside the minimum flow rate is 75gpm.

Step 2: Calculate Grease Production

Once the minimum flow rate has been established in Step 1, determine the minimum grease capacity required for the HGI for the desired pump-out frequency using the formula below. A 90-day pump-out frequency is recommended.

$$\text{Grease Factor} \times \text{Meals or Customers Served per day} \times \text{Days between pump-outs} = \text{Minimum Grease Capacity}$$

To determine the correct grease factor, use Appendix D to select the menu type, then the correct column (A through D) for whether there is a fryer and whether the establishment uses disposable or washable plates, glasses, knives, forks, and spoons (flatware).

Example: Fast Food with a fryer and disposable flatware is serving 300 meals per day. Appendix D Grease Factor Table indicates this is 17D at 0.035 pounds of grease per meal.

$$0.035 \text{ grease factor} \times 300 \text{ meals per day} \times 90\text{-day cleaning frequency} = 945 \text{ pounds of grease capacity}$$

Automatic Grease Removal Devices (AGRD)

When approved for installation (see Appendix B), automatic grease removal devices (AGRDs) must be designed and tested in accordance with ASME A112.14.4 and/or CSA B481.5. Sizing shall be in accordance with Hydromechanical Grease Interceptor Sizing Step 1: Size by Flow Rate. Step 2: Size by Grease Production shall not apply to AGRDs.

Gravity Grease Interceptors (GGI)

Unless otherwise approved, gravity grease interceptors (GGIs) shall not be installed as they are not certified to the required product standards listed in the Requirements section of this document. If approved for installation (see Appendix B), GGIs shall be certified to IAPMO/ANSI Z1001 and made from materials that are compatible with a pH of 3. GGIs made from materials that are subject to corrosion such as concrete or steel, shall be lined or coated with a durable material compatible with a pH of 3 that cannot be easily penetrated, scraped away, or removed as approved by the sanitary sewer system owner. Acid Resistant Enamel (ARE) coatings are not acceptable.

Use Table 2 to determine the peak drain (full pipe) flow into the interceptor based on the pipe diameter size of the inlet connection. The required capacity of GGIs in total liquid volume, shall be determined by using the formula:

peak drainage flow in gpm X 30 min retention time = GGI size in gallons.

Table 2

Pipe Size (inches)	Full-Pipe Flow (GPM) ¹
2	20
3	60
4	125
5	230
6	375
¹ 1/4 inch per foot based on Manning's roughness coefficient of n = 0.012	

Example: 4-inch inlet pipe size has a full pipe flow of 125 gpm.
125 gpm x 30 min retention time = 3,750 gallons.

Appendix A:

Hydromechanical Grease Interceptor Sizing and Selection Form

Applicant Name: _____
 Phone: _____ Email: _____
 Food Service Establishment (FSE): _____
 FSE Address: _____

Select all that apply: ☐ New ☐ Existing ☐ Change of Ownership ☐ Renovation
All locality permits still apply.

Step 1.

FSE Grease Production (lbs.) Use Grease Factor Table (Appendix D)

Menu Type: _____ Grease Factor: _____ Average Meals Per Day: _____

Complete the table below.

Grease Storage Capacity	Daily Loading	30 days	60 days	90 days
Grease Produced (lbs.)				

[Grease Factor x Average Meals Per Day = Daily Loading]

[Daily Loading x Number of Days (30/60/90) = Grease Produced]

Step 2.

Flow Rate (gpm) Use one of the following methods below (Fixture Volume or Pipe Diameter) to determine the minimum required flow rate.

For Fixture Volume Sizing, determine the flow rate of each fixture using the calculation below, then add together to determine the final flow rate. **Calculation sheet must be included with this form.**

$$\left[\frac{L(in) \times W(in) \times H(in)}{231 \frac{in^3}{gal}} \right] \times 0.75 = \text{Fixture Capacity Gallons}$$

For Pipe Diameter Sizing, list the size of the inlet pipe connected to HGI, then use Table 1 to determine its corresponding flow rate. Half sizes round up.

Pipe Size (inches)	One-minute drainage period flow rate (GPM)	Two-minute drainage period flow rate (GPM)
2	20	10
3	75	35
4	125	75
5	250	125
6	400	200

Pipe Diameter(in): _____ Flow Rate(gpm): _____

Calculated Grease Storage Capacity (lbs.) and Flow Rate (gpm)

(Step 1) 90-day grease storage capacity: _____ (Step 2) Flow Rate: _____

*If 90 day was not utilized, provide justification: _____

*If a two-minute drainage time was utilized, provide justification: _____

Existing GCD: ☐ Interior ☐ Exterior ☐ Not Applicable ☐ Unknown
Make Model: _____
Size: _____ gpm/ _____ lbs. or _____ gallons ☐ Unknown

Proposed HGI

The HGI must meet both minimum requirements for grease storage capacity and flow rate.

Make/Model: _____

Validated Flow Rate (gpm): _____ Validated Grease Storage Capacity (lbs.): _____

Which product standard does the HGI meet?

☐ PDI-G101 ☐ ASME A112.14.3 ☐ ASME A112.14.14 ☐ CSA B481 ☐ None

Installation location: _____

Is the material of construction compatible with a pH of 3? ☐ Yes ☐ No

If the answer above is "No", what material is the tank lined or coated with*: _____

*Must provide evidence that the liner or coating is compatible with a pH of 3 and that it cannot be easily penetrated, scraped off or removed. Acid Resistant Enamel (ARE) coatings are not allowed.

Grease Hauler:

The HGI must be cleaned/serviced by a Certified Grease Hauling Company, list the name below:

The following items must be included with this completed form: (1) an equipment schedule and plumbing/kitchen plan drawings; that includes all fixtures within the food preparation area (2) menu, (3) completed calculations for flow rate, and (4) HGI specification sheet.

Response will be sent in writing.

Signature of Applicant: _____

Date: _____

Appendix B: Alternate Grease Control Device Sizing and Selection Form

Applicant Name: _____
 Phone: _____ Email: _____
 Food Service Establishment (FSE): _____
 FSE Address: _____

Select all that apply: New Existing Change of Ownership Renovation

All locality permits still apply.

Justification for installation of alternate GCD device: _____

FSE Grease Production (lbs.) Use Grease Factor Table (Appendix D)

Menu Type: _____ Grease Factor: _____ Average Meals Per Day: _____

Complete the table below.

Grease Storage Capacity	Daily Loading	30 days	60 days	90 days
Grease Produced (lbs.)				

[Grease Factor x Average Meals Per Day = Daily Loading]

[Daily Loading x Number of Days (30/60/90) = Grease Produced]

Existing GCD: ☐ Interior ☐ Exterior ☐ Not Applicable ☐ Unknown

Make Model: _____

Size: _____ gpm/ _____ lbs. or _____ gallons ☐ Unknown

Complete the Gravity Grease Interceptor or the Automatic Grease Removal Device section of this form.

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Gravity Grease Interceptor (GGI)

See **Gravity Grease Interceptor (GGI)**, Page 4.

Table 2 (page 4)

Inlet Pipe Size (in): _____ Full Pipe Flow (gpm): _____

Calculated GGI size (gallons): _____

Full Pipe Flow(gpm) x 30 min retention = gallons

Proposed GGI:

Make and Model: _____

Does the GGI meet the product standard IAPMO/ANSI Z1001? ☐ Yes ☐ No

Installation location: _____

Is the material of construction compatible with a pH of 3? ☐ Yes ☐ No

If the answer above "No", what material is the tank lined or coated with*: _____

*Must provide evidence that the liner or coating is compatible with a pH of 3 and that it cannot be easily penetrated, scraped off or removed. Acid Resistant Enamel (ARE) coatings are not allowed.

Grease Hauler:

The GGI must be cleaned/serviced by a Certified Grease Hauling Company, list the name below:

The following items must be included with this completed form: (1) an equipment schedule and plumbing/kitchen plan drawings; that include all fixtures within the food preparation (2) menu, (3) completed calculations for flow rate, and (4) GGI specification sheet, (5) product standard validation, (6) evidence liner or coating is compatible with pH of 3.

Response will be sent in writing.

Signature of Applicant: _____ Date: _____

Automatic Grease Removal Device (AGRD)

See **Automatic Grease Removal Devices (AGRD)**, page 4.

Flow Rate (gpm)

Use one of the following methods below to determine the minimum required flow rate.

1. For Fixture Volume Sizing, determine the flow rate of each fixture, then add together to determine the final flow rate. **Calculation sheet must be included with this form.**

Calculated Flow Rate: _____

2. For Pipe Diameter Sizing, list the size of the inlet pipe connected to HGI, then use Table 1 (page 3) to determine its corresponding flow rate. Half sizes round up.

Pipe Diameter(in): _____ Flow Rate(gpm): _____

*If a two-minute drainage time was utilized, explain justification: _____

Proposed AGRD

Make/Model: _____

Flow Rate: _____

Which product standard does the AGRD meet?

☐ PDI-G101 ☐ ASME A112.14.3 ☐ ASME A112.14.14 ☐ CSA B481 ☐ None

Installation location: _____

Is the material of construction compatible with a pH of 3? ☐ Yes ☐ No

If the answer above "No", what material is the tank lined or coated with*: _____

*Must provide evidence that the liner or coating is compatible with a pH of 3 and that it cannot be easily penetrated, scraped off or removed. Acid Resistant Enamel (ARE) coatings are not allowed.

Grease Hauler:

The GGI must be cleaned/serviced by a Certified Grease Hauling Company, list the name below: _____

The following items must be included with this completed form: (1) an equipment schedule and plumbing/kitchen plan drawings; that include all fixtures within the food preparation (2) menu, (3) completed calculations for flow rate, and (4) AGRD specification sheet. (5) product standard validation

Response will be sent in writing.

Signature of Applicant: _____ Date: _____

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Appendix C: FSE Employee Cleaning Request Form

Applicant Name: _____

Phone: _____ Email: _____

Food Service Establishment (FSE): _____

FSE Address: _____

Self-cleaning by the owner and/or operator of an establishment is not allowed unless approved by the sanitary sewer system owner. Only hydromechanical grease interceptors (HGI) with a liquid volume of 25 gpm / 50 pounds or less may be considered for self-cleaning unless otherwise approved by the sanitary sewer system owner. When approved, the owner and/or operator of an establishment shall comply with the following requirements for maintenance as required by the sanitary sewer system owner:

- Remove cover(s)
- Remove all fats, oils, and grease (FOG), solids, food debris, and wastewater.
- Clean all internal surfaces from the build-up of FOG or other residual materials.
*Additives and/or degreasers are prohibited.
- Place all removed materials in garbage bag or other sealable container (not glass) along with an absorbent material and dispose of solidified contents in trash receptacle.
- Inspect all internal components, replace anything missing or broken and ensure flow control device is installed.
- Refill with clean water
- Replace cover(s)
- Enter the required information on the maintenance log.

Existing GCD: ☐ Interior ☐ Exterior

Make Model: _____ ☐ Unknown

Size: _____ gpm/ _____ lbs. or _____ gallons ☐ Unknown

Current Cleaning Frequency: _____

Last Date Cleaned: _____

Operational Hours: _____

Grease Produced (lbs.) Use Grease Production Table (Appendix D)

Menu Type: _____ Grease Factor: _____ Average Meals Per Day: _____

Complete the table below.

Grease Storage Capacity	Daily Loading	30 days	60 days	90 days
Grease Produced (lbs.)				

[Grease Factor x Average Meals Per Day = Daily FOG Loading]

[Daily FOG Loading x Number of Days (30/60/90) = Grease Produced]

Additional Documentation Required:

- Submit photo documentation of GCD empty of all contents.
- Provide a brief explanation of the reason to self-clean. _____

Submit the completed form to the sanitary sewer system owner. Response will be sent in writing.

Applicant Signature _____ Date: _____

Appendix D

Grease Factor Table

To determine the correct grease factor, use the table below, select the menu type (1 through 33), then the correct column (A through D) for whether there is a fryer, and whether the establishment uses disposable or washable plates, glasses, knives, forks, and spoons (flatware).

Type	Menu	Grease Factor ->	without Fryer w/o flatware	without fryer with flatware	with fryer w/o flatware	with fryer with flatware
			A	B	C	D
1	Bakery		0.0250	0.0325	0.0350	0.0455
2	Bar - Drinks Only		0.0050	0.0065	0.0250	0.0325
3	Bar and Grille		0.0250	0.0325	0.0350	0.0455
4	BBQ		0.0250	0.0325	0.0350	0.0455
5	Buffet		0.0250	0.0325	0.0350	0.0455
6	Cafeteria - Full Serve		0.0250	0.0325	0.0350	0.0455
7	Cafeteria - Heat & Serve		0.0050	0.0065	0.0250	0.0325
8	Chinese		0.0350	0.0455	0.0580	0.0750
9	Coffee Shop		0.0050	0.0065	0.0250	0.0325
10	Continental breakfast		0.0050	0.0065	0.0250	0.0325
11	Convenience Store		0.0050	0.0065	0.0250	0.0325
12	Deli		0.0050	0.0065	0.0250	0.0325
13	Donut Shop		0.0250	0.0325	0.0350	0.0455
14	Don't know yet		0.0250	0.0325	0.0350	0.0455
15	Family Restaurant		0.0250	0.0325	0.0350	0.0455
16	Fast Food - Pre-Cook		0.0050	0.0065	0.0250	0.0325
17	Fast Food - Full Prep		0.0250	0.0325	0.0350	0.0455
18	Fried Chicken		0.0250	0.0325	0.0350	0.0455
19	Greek		0.0250	0.0325	0.0350	0.0455
20	Grocery Store		0.0250	0.0325	0.0350	0.0455
21	Ice Cream/Yogurt/Smoothies		0.0050	0.0065	0.0250	0.0325
22	Indian		0.0250	0.0325	0.0350	0.0455
23	Italian		0.0250	0.0325	0.0350	0.0455
24	Mexican		0.0350	0.0455	0.0580	0.0750
25	Pizza Restaurant		0.0250	0.0325	0.0350	0.0455
26	Pizza Carryout		0.0050	0.0065	0.0250	0.0325
27	Multi-unit dwelling		0.0050	0.0065	0.0250	0.0325
28	Salads / Healthy Bowls		0.0050	0.0065	0.0250	0.0325
29	Sandwich Shop		0.0050	0.0065	0.0250	0.0325
30	Seafood		0.0250	0.0325	0.0350	0.0455
31	Snack Bar		0.0050	0.0065	0.0250	0.0325
32	Steak House		0.0250	0.0325	0.0350	0.0455
33	Sushi		0.0050	0.0065	0.0250	0.0325