



Standard Specification for Precast Concrete Grease Interceptor Tanks¹

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1. Scope

1.1 This specification covers design requirements, manufacturing practices, and performance requirements for monolithic or sectional precast concrete grease interceptor tanks.

1.2 This specification describes precast concrete tanks installed to separate fats, oils, grease, soap scum, and other typical kitchen wastes associated with the food service industry.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- A 82/A 82M Specification for Steel Wire, Plain, for Concrete Reinforcement
- A 184/A 184M Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
- A 185/A 185M Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
- A 496/A 496M Specification for Steel Wire, Deformed, for Concrete Reinforcement
- A 497/A 497M Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
- A 615/A 615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- A 706/A 706M Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- C 33 Specification for Concrete Aggregates

- C 39/C 39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - C 94/C 94M Specification for Ready-Mixed Concrete
 - C 125 Terminology Relating to Concrete and Concrete Aggregates
 - C 150 Specification for Portland Cement
 - C 260 Specification for Air-Entraining Admixtures for Concrete
 - C 330 Specification for Lightweight Aggregates for Structural Concrete
 - C 494/C 494M Specification for Chemical Admixtures for Concrete
 - C 595 Specification for Blended Hydraulic Cements
 - C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 - C 685/C 685M Specification for Concrete Made by Volumetric Batching and Continuous Mixing
 - C 890 Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
 - C 923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
 - C 990 Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 - C 1116 Specification for Fiber-Reinforced Concrete and Shotcrete
 - C 1602/C 1602M Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- 2.2 *ACI Standard:*³
- ACI 318 Building Code Requirements for Reinforced Concrete
- 2.3 *IAPMO Documents:*⁴
- Uniform Plumbing Code
 - IAPMO PS-80 Grease Interceptors and Clarifiers
- 2.4 *AASHTO Standard:*⁵
- Standard Specifications for Highway Bridges

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.concrete.org>.

⁴ Available from International Association of Plumbing and Mechanical Officials (IAPMO), 5001 E. Philadelphia St., Ontario, CA 91761.

⁵ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

3. Terminology

3.1 For definitions of terms relating to concrete, see Terminology C 125.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *access opening, n*—a hole in the top slab used to gain access to the inside of the tank for the purpose of cleaning and removing grease, floating scum and sludge without a person actually having to enter the tank.

3.2.2 *air scum volume, n*—the number of cubic inches (centimeters) in the space between the liquid surface and the underside of the top slab.

3.2.3 *baffle, n*—a device, such as a sanitary tee or other deflector, used to direct the flow of influent down below the separated layer or prevent the floating layer of fats, oil, or grease from exiting the tank through the outlet.

3.2.4 *grease interceptor capacity, n*—the volume of liquid the tank is designed to hold.

3.2.5 *grease interceptor tank system, n*—a single tank or series of tanks in which wastes from a kitchen or food service establishment containing no sanitary discharges from toilets, urinals and other similar fixtures are received and retained, and from which the liquid effluent, which is comparatively free from fats, oils, greases and settleable and/or floating solids, is then discharged to a public sewer, septic or other approved treatment system.

3.2.6 *inspection opening, n*—a hole in the top slab used for the purpose of observing conditions inside the tank.

3.2.7 *joint, n*—a physical separation where two pieces of precast concrete are in contact.

3.2.8 *non-sealed joint, n*—a joint where sealant is not used but where a machined fit will minimize the movement of liquid from one side of a precast concrete wall to the opposite side.

3.2.9 *owner, n*—is by definition end user, customer, or purchaser.

3.2.10 *sealed joint, n*—a joint that is sealed to prevent liquid passing from one side of a precast concrete wall to the opposite side.

3.2.11 *tank dividing wall, n*—a partition across the width of the tank that extends partially between the top and bottom intended to deflect influent downward and increase the length of the flow path of the liquid as it travels through the tank.

4. Ordering Information

4.1 The purchaser shall include the following information in bidding documents and on the purchase order, as applicable to the units being ordered:

4.1.1 Reference to this specification, and date of issue.

4.1.2 Quantity, that is, number of units ordered.

4.1.3 Capacity of tank in gallons or litres.

4.1.4 Special cement requirements including moderate sulfate-resisting cement, Specification C 150 Type II, or highly sulfate-resisting cement, Specification C 150, Type V. If the purchaser does not stipulate, the manufacturer shall use any cement meeting the requirements of Specification C 150 or C 595 (Type IS or Type IP only).

4.1.5 Acceptance will be based on a review of the calculations or on proof tests.

4.1.6 Design requirements such as depth of earth cover, live load applied at the surface, and ground water level.

4.1.7 Testing for water leakage shall not be required at the job site unless specifically required by the owner at the time of ordering.

4.1.8 Manufacturer is permitted to require testing at the job site prior to backfill in accordance with section 9.1.2.

5. Materials and Manufacture

5.1 *Cement*—Portland cement shall conform to the requirements of Specification C 150 or shall be portland blast-furnace slag cement (Type IS) or portland-pozzolan cement (Type IP) conforming to the requirements of Specification C 595.

5.2 *Aggregates*—Aggregates shall conform to Specification C 33 and lightweight aggregates shall conform to Specification C 330, except that the requirements for grading shall not apply.

5.3 *Water*—Water used in mixing concrete shall meet the requirements of Specification C 1602/C 1602M.

5.4 *Admixtures*—Admixtures, when used, shall conform to Specification C 494/C 494M, Specification C 618, or Specification C 260 and shall not be detrimental to other products used in the concrete.

5.5 *Steel Reinforcement*—Steel reinforcement shall conform to Specification A 82/A 82M or A 496/A 496M for wire; Specification A 185/A 185M or A 497/A 497M for wire fabric; or Specification A 184/A 184M, A 615/A 615M, or A 706/A 706M for bars.

5.5.1 *Locating Reinforcement*—Reinforcement shall be placed in the forms as required by the design.

5.5.2 *Holding Reinforcement in Position During Pouring Placement*—Reinforcement must be securely tied in place to maintain position during concrete placing operations. Chairs, bolsters, braces, and spacers in contact with forms shall have a corrosion-resistant surface.

5.6 *Concrete Mixtures*—The aggregates, cement, and water shall be proportioned and mixed to produce a homogeneous concrete meeting the requirements of this specification, and in accordance with Specification C 94/C 94M or Specification C 685/C 685M.

5.7 *Forms*—The forms used in manufacture shall be sufficiently rigid and accurate to maintain the dimensions of the grease interceptor tank within the stated tolerances. All casting surfaces shall be of smooth nonporous material. Form releasing agents used shall not be injurious to the concrete.

5.8 *Concrete Placement*—Concrete shall be placed in the forms and consolidated such that all reinforcement steel and fixtures are embedded without segregation of materials or voids in the concrete.

5.9 *Curing*—The precast concrete sections shall be cured by any method or combination of methods that will develop the specified compressive strength at 28 days or less.

5.10 *Concrete Quality*—The quality of the concrete shall be in accordance with the chapter on concrete quality in ACI 318, except for frequency of tests, which shall be specified by the purchaser. Concrete compressive strength tests shall be conducted in accordance with Test Method C 39/C 39M.

5.11 *Fibers*—Polypropylene or polyolefin fibers are only permitted as a secondary reinforcing material, at the manufacturer's option, in precast concrete grease interceptor tanks. For

the purposes of this standard, secondary reinforcing material is only used to resist temperature and shrinkage effects. Only Type III conforming to the requirements of Specification C 1116 shall be accepted.

5.12 *Pipe Connections*—Pipe-to-tank connections shall employ flexible connectors conforming to the requirements of Specification C 923. Materials for the connectors shall have demonstrated resistance to the effects of fats, oils, grease, and fluid temperatures of at least 160°F (70°C).

5.13 *Sealants*—Flexible sealants employed in the manufacture or installation of tanks shall conform to Specification C 990. Rigid (mortar) sealing of tank sections is not permitted.

6. Structural Design Requirements

6.1 Structural design of grease interceptor tanks shall be by calculation or by performance.

6.1.1 Design by calculation shall be completed using the Strength Design Method (ultimate strength theory) or the Alternate Design Method (working stress theory) outlined in ACI 318.

6.1.2 Design by performance requires the manufacturer to demonstrate that failure will not occur by physically applying loads to the product. The load applied shall be 2.2 times the design live load or 1.5 times the design dead load, whichever is greater. Such testing shall be witnessed and certified by a registered professional engineer.

NOTE 1—When synthetic fibers are used to replace some or all of the secondary steel reinforcement in the grease interceptor, equivalent performance criteria can be found in section 5.4 of IAPMO PS-80.

NOTE 2—Vacuum testing may be used to simulate uniform loads. It is not possible to simulate concentrated loads, such as wheel loads, using vacuum testing.

6.1.3 Tanks shall be designed so that they will not collapse or rupture when subjected to anticipated earth and hydrostatic pressures when the tanks are either full or empty.

6.1.4 At a minimum, loads from Practice C 890 designation A-16 (AASHTO HS20-44) shall be used for design.

6.1.5 The live loads imposed at lifting points shall be considered in the design of the grease interceptor tank.

6.1.6 Inserts embedded in the concrete (including embedded lifting devices) shall be designed and used according to all federal, state, and local regulations.

NOTE 3—Lift inserts are typically manufactured with an integral factor of safety of 4, which is already accounted for in their rated load.

6.2 *Concrete Strength*—The minimum compressive strength (f'c) for designs shall be 4000 psi (28 MPa) at 28 days of age.

6.3 *Reinforcing Steel Placement*—The concrete cover for reinforcing bars, mats, or fabric shall not be less than 1 in. (25 mm).

6.4 *Openings*—The structural design shall take into consideration the number, placement, and size of all openings.

6.5 *Lift Equipment*—All equipment used to handle the precast concrete tank shall be designed and used according to all federal, state, and local regulations.

7. Physical Design Requirements

7.1 *Capacity*—Sizes are generally specified by local regulations and they shall supersede the following requirements.

When local regulations are not available, grease interceptor capacity may be determined by use of one of the sizing criteria provided in the Appendix.

7.2 *Shape*—Grease interceptor shapes are generally specified by local regulations and they shall supersede the following requirements.

7.2.1 The air scum volume above the liquid shall be at least 12.5 % of the volume of liquid but not less than 9 in. (230 mm) high for entire surface above liquid.

7.2.2 Minimum liquid depth shall be 30 in. (760 mm) unless otherwise approved by local regulations or the authority having jurisdiction.

7.2.3 Maximum liquid depth shall be 72 in. (1800 mm) unless otherwise approved or required by local regulations, the authority having jurisdiction, or the design engineer.

7.2.4 Tank length shall be greater than the width.

7.3 *Compartments*:

7.3.1 Grease interceptor tank systems shall include single and multi-compartment units unless otherwise approved by local codes or jurisdiction. In multi-compartment tanks the dividing walls shall be monolithically cast or placed secondarily utilizing a non-sealed joint with the tank body, or any combination thereof.

7.3.2 Multiple units installed in series are acceptable.

7.3.3 The transfer port between compartments shall be sized to maintain a low velocity as liquid moves between compartments. A minimum of 50 in.² (320 cm²) shall be used where local codes do not specify otherwise.

7.3.4 The transfer port between compartments shall be in the middle 25 % of the distance from the bottom of the tank to the water line.

7.3.5 No tee, outlet filter unit, or tank-dividing wall shall extend to the interior roof without providing for venting. The cross-sectional area of a vent shall be at least equivalent to a 4 in. (100 mm) diameter pipe. Poured-in-place inlet and/or outlet baffles are not permitted.

7.4 *Inlet and Outlet Pipes*:

7.4.1 The inlet pipe shall be no less than 4 in. (100 mm) in diameter.

7.4.2 The difference between the invert of the inlet pipe and the invert of the outlet pipe shall be a minimum of 2 in. (50 mm) and a maximum of 4 in. (100 mm).

7.5 *Baffles and Outlet Devices*:

7.5.1 Baffles or tees shall be placed at the inlet pipe. Baffles, tees or outlet filters shall be placed at the outlet pipe.

7.5.2 Baffles, tees or outlet filters shall be made of noncorrosive materials and be permanently connected with noncorrosive fasteners to either the inside of the tank or the outlet pipe.

7.5.3 The inlet baffle or tee shall be submerged to a depth located in the middle 25 % of the distance from the bottom of the tank to the water line and at least 5 in. (125 mm) above the liquid level.

7.5.4 The outlet baffle, tee or filter shall be submerged to a depth 6 in. (150 mm) to 12 in. (300 mm) above the tank floor. It shall extend a minimum of 5 in. (125 mm) above the liquid level.

7.5.5 Outlet filter, when used, shall be maintained in accordance with manufacturer's recommendations or requirements of regulating agencies, or both.

7.5.5.1 Outlet filters, when used, shall be sized using the estimated daily sewage flow through the tank and the rated capacity of the filter, per the filter manufacturer's specifications.

7.5.5.2 When used, the manufacturer of the outlet filter must specify suitability for grease, oil, scum and solids removal for this type of waste.

7.5.5.3 When used, the minimum required filtration surface of an outlet filter shall be based upon the estimated daily waste water volume from the kitchen or food service establishment and the recommendations of the unit manufacturer or regulating agencies, or both.

7.6 *Openings in Top Slab:*

7.6.1 All access openings and inspection openings shall be brought to grade using risers or other assemblies.

7.6.2 An access opening shall be located over the inlet baffle or tee and the outlet baffle or tee.

7.6.3 An access opening or openings 20 in. or greater shall be provided to permit pumping of all compartments and for each 10-ft increment of tank length for tanks longer than 20 ft.

7.6.4 An access opening or inspection opening located over the tank-dividing wall shall not be prohibited.

7.6.5 All access opening covers and inspection opening covers shall have a permanent means to permit authorized access. Handles, when used, shall be made of corrosion-resistant material and be capable of supporting the weight of the cover.

7.6.6 Handles are not required when the access opening cover sits on top of the slab. The cover must be prevented from moving laterally if sitting on top of the slab.

7.6.7 Each access opening and inspection opening shall be provided with a cover. The cover shall be provided with a means to prevent unauthorized entrance.

7.6.8 All openings, joints, risers, and covers shall be watertight.

8. Quality Control and Sampling

8.1 The manufacturer shall certify that the product meets three criteria: (1) watertightness, (2) physical dimensions, and (3) strength of grease interceptor tank.

8.2 Installation shall be in accordance with manufacturer's instructions.

9. Watertightness Test Methods

9.1 Testing for watertightness shall be performed using either vacuum testing or hydrostatic testing.

9.1.1 *Vacuum Testing*—Seal the empty tank and apply a vacuum to 4 in. (100 mm) of mercury. Hold the vacuum for 5 minutes. During this initial 5 minute period, the vacuum shall not drop more than ½ in. (13 mm) of mercury, which allows for a pressure equalization loss from equipment seating, and so forth. If the vacuum drops, it shall be brought back up to 4 in. (100 mm) of mercury and held for a further 5 minutes with no vacuum loss. If the tank fails the test, it shall be repaired and retested.

9.1.2 *Hydrostatic Testing*—Seal the tank, fill with water to its operational level, and let stand for 8 to 10 h. If there is a measurable drop in the water surface elevation, refill the tank and let stand for another 8 to 10 h. There shall be no further measurable drop in the water surface elevation. Tanks shall not be rejected for damp spots on the exterior concrete surface. If water is dripping in a steady stream, the tank shall be repaired and retested.

10. Dimensions and Permissible Variations

10.1 *Dimensional Tolerances*—The length, width, height, or diameter measurements of the grease interceptor tank when measured on the inside surface shall not deviate from the design dimensions more than the following:

Dimension	Tolerance
0 to less than 5 ft (0 to 1.5 m)	±¼ in. (±6 mm)
5 to less than 10 ft (1.5 to 3.0 m)	±⅜ in. (±10 mm)
10 to less than 20 ft (3.0 to 6.1 m)	±½ in. (±13 mm)
20 ft (6.1 m) and over	±¾ in. (±19 mm)

10.2 *Squareness Tolerance*—The inside of the rectangular precast concrete component shall be square as determined by diagonal measurements. The difference between such measurements shall not exceed:

Measured Length	Allowance Difference
0 to less than 5 ft (0 to 1.5 m)	±½ in. (±13 mm)
5 to less than 10 ft (1.5 to 3.0 m)	±¾ in. (±19 mm)
10 ft to less than 20 ft (3.0 m to 6.1 m)	±1 in. (±25 mm)
20 ft (6.1 m) and over	±1½ in. (±38 mm)

10.3 *Joint Surfaces*—The joint tolerances for sealed joint gap between two mating joint surfaces shall not exceed ⅜ in. (10 mm) before the joint sealant is applied.

10.4 *Reinforcement Location*—With reference to thickness of wall or slab, reinforcement shall be within ±¼ in. (6 mm) of the design location, but in no case shall the cover be less than 1 in. (25 mm). The variation in reinforcement spacing shall not be more than one tenth of the designed bar spacing nor exceed 1½ in. (38 mm). The total number of bars shall not be less than that computed using the design spacing.

11. Repairs

11.1 Repairs of precast concrete grease interceptors, when required shall be performed by the manufacturer in a manner ensuring that the repaired grease interceptor tank will conform to the requirements of this specification.

12. Rejection

12.1 Precast concrete grease interceptor tanks or sections of grease interceptor tanks shall be subject to rejection because of failure to conform after repairs to any of the requirements contained in this specification.

13. Product Marking

13.1 Each grease interceptor tank shall be clearly marked within 2 ft (6 m) of the inlet to the tank by indentation or other approved means with (1) date manufactured, (2) name or trademark of the manufacturer, (3) tank capacity, (4) minimum and maximum amount of earth cover in feet (or meters), unless required otherwise by local codes.

13.2 Each grease interceptor tank cover shall be clearly marked by indentation, or other approved means with (1) date

of manufacture, (2) name or trademark of the manufacturer, and (3) indication of external loads for which the grease interceptor tank is designed to resist, including the minimum and maximum amount of earth cover in feet (or meters) above top slab and surface load from Practice **C 890** (A-16), unless required otherwise by local codes.

13.2.1 When all the requirements of this specification are met, the product shall be so stamped.

NOTE 4—Where an access opening or an inspection opening has a dimension greater than 8 in. (200 mm) a confined space warning label should be placed in a prominent place.

14. Keywords

14.1 fats, oils and greases; grease interceptor tank; liquid kitchen waste; precast concrete; wastewater pretreatment

APPENDIX

(Nonmandatory Information)

X1. OPTIONAL PRECAST CONCRETE GREASE INTERCEPTOR SIZING CRITERIA

X1.1 The grease interceptor tank may be sized in accordance with Appendix H of the 2003 **Uniform Plumbing Code** or Chapter 10 of the 2006 Uniform Plumbing Code.

X1.2 The grease interceptor tank may be sized for an existing facility by using the actual average daily-metered water-use figures from the facility multiplied by a safety factor

of 1.5. A minimum retention time of 30 minutes shall be used to size the grease interceptor tank.

X1.3 The grease interceptor tank may be sized by using the peak design flow rates for all fixtures leading to the grease interceptor. A minimum retention time of 30 minutes shall be used to size the grease interceptor tank.

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