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Standard Specification for Precast Concrete Grease Interceptor Tanks[1]

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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]

A82/A82M Specification for Steel Wire, Plain, for Concrete Reinforcement
A184/A184M Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
A185/A185M Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
A496/A496M Specification for Steel Wire, Deformed, for Concrete Reinforcement
A497/A497M Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
A615/A615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
A706/A706M Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
C33 Specification for Concrete Aggregates
C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
C94/C94M Specification for Ready-Mixed Concrete
C125 Terminology Relating to Concrete and Concrete Aggregates
C150 Specification for Portland Cement
C260 Specification for Air-Entraining Admixtures for Concrete
C330 Specification for Lightweight Aggregates for Structural Concrete
C494/C494M Specification for Chemical Admixtures for Concrete
C595 Specification for Blended Hydraulic Cements
C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
C685/C685M Specification for Concrete Made by Volumetric Batching and Continuous Mixing
C890 Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
C923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
C990 Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
C1116 Specification for Fiber-Reinforced Concrete and Shotcrete
C1602/C1602M 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

[1] This specification is under the jurisdiction of ASTM Committee C27 on Precast Concrete Products and is the direct responsibility of Subcommittee C27.30 on Water and Wastewater Containers.

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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.

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

3. Terminology

3.1 For definitions of terms relating to concrete, see Terminology C125.
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~~and prevent ~~the~~ floating layer of fats, oils, 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 C150 Type II, or highly sulfate-resisting cement, Specification C150, Type V. If the purchaser does not stipulate, the manufacturer shall use any cement meeting the requirements of Specification C150 or C595 (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 C150 or shall be portland blast-furnace slag cement (Type IS) or portland-pozzolan cement (Type IP) conforming to the requirements of Specification C595.
5.2 *Aggregates*—Aggregates shall conform to Specification C33 and lightweight aggregates shall conform to Specification C330, except that the requirements for grading shall not apply.
5.3 *Water*—Water used in mixing concrete shall meet the requirements of Specification C1602/C1602M.
5.4 *Admixtures*—Admixtures, when used, shall conform to Specification C494/C494M, Specification C618, or Specification C260 and shall not be detrimental to other products used in the concrete.
5.5 *Steel Reinforcement*—Steel reinforcement shall conform to Specification A82/A82M or A496/A496M for wire; Specification A185/A185M or A497/A497M for wire fabric; or Specification A184/A184M, A615/A615M, or A706/A706M for bars.

[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.

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 C94/C94M or Specification C685/C685M.

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 C39/C39M.

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 C1116 shall be accepted.

5.12 *Pipe Connections*—Pipe-to-tank connections shall employ flexible connectors conforming to the requirements of Specification C923. 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 C990. 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 C890 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.