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Standard Specification for Precast Concrete Duct Bank¹

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1. Scope

1.1 This specification includes the manufacturing requirements and installation guidelines of a precast duct bank system including polyvinyl chloride (PVC) duct enclosed in a concrete envelope. This specification also includes information relating to trenching, backfilling, plugging, and other incidentals necessary for a complete installation.

1.2 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.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- A615/A615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- A706/A706M Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
- A1064/A1064M Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- C31/C31M Practice for Making and Curing Concrete Test Specimens in the Field
- C33/C33M Specification for Concrete Aggregates
- C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
- C42/C42M Test Method for Obtaining and Testing Drilled

- Cores and Sawed Beams of Concrete
- C138/C138M Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- C143/C143M Test Method for Slump of Hydraulic-Cement Concrete
- C150/C150M Specification for Portland Cement
- C231/C231M Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- C260/C260M Specification for Air-Entraining Admixtures for Concrete
- C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- C494/C494M Specification for Chemical Admixtures for Concrete
- C595/C595M Specification for Blended Hydraulic Cements
- C618 Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- C805/C805M Test Method for Rebound Number of Hardened Concrete
- C822 Terminology Relating to Concrete Pipe and Related Products
- C979/C979M Specification for Pigments for Integrally Colored Concrete
- C989/C989M Specification for Slag Cement for Use in Concrete and Mortars
- C1017/C1017M Specification for Chemical Admixtures for Use in Producing Flowing Concrete (Withdrawn 2022)³
- C1064/C1064M Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
- C1116/C1116M Specification for Fiber-Reinforced Concrete
- C1157/C1157M Performance Specification for Hydraulic Cement
- C1602/C1602M Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- C1609/C1609M Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading)
- C1611/C1611M Test Method for Slump Flow of Self-Consolidating Concrete
- C1619 Specification for Elastomeric Seals for Joining Concrete Structures

¹ This test method is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.01 on Non-Reinforced Concrete Sewer, Drain and Irrigation Pipe.

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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 The last approved version of this historical standard is referenced on www.astm.org.

C1812/C1812M Practice for Design of Journal Bearing Supports to be Used in Fiber Reinforced Concrete Beam Tests
D5334 Test Method for Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe Procedure

D7957/D7957M Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement

F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

2.2 Other Standards:

NEMA TC-2 Standard for Electrical Polyvinyl Chloride (PVC) Conduit⁴

NEMA TC-6&8 Standard for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installations⁴

NECA/NEMA 605 Standard for Installing Underground Nonmetallic Utility Duct⁴

UL 651 Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings⁵

IEEE 442 Guide for Thermal Resistivity Measurements of Soils and Backfill Materials⁶

AASHTO LRFD Bridge Design Specifications⁷

3. Terminology

3.1 Definitions—For definitions of terms relating to precast concrete duct bank, see Terminology **C822**.

4. Basis of Acceptance

4.1 Acceptance on the Basis of Proof of Design Tests, Material Tests, and Inspection of Manufactured Precast Duct Bank Sections for Visual Defects and Imperfections—Acceptability of precast duct bank sections shall be determined by such material tests as are required in Section 5 and Section 6; and by visual inspection of the finished sections to determine conformance with the accepted design and its freedom from defects in accordance with Section 10.

4.2 Thermal Resistance (Rho)—When required by project specifications, Precast Duct Bank Sections shall be verified to have a thermal resistivity (Rho) value no greater than specified as tested in accordance with Test Method **D5334** or IEEE 442. Test to be completed at least annually or whenever concrete mixture proportions or materials change.

4.3 Age for Acceptance—Precast duct bank sections shall be considered ready for acceptance when it conforms to the requirements as indicated by the specified tests, but not before design strength has been met.

5. Materials

5.1 Cementitious Materials:

5.1.1 Cement—Cement shall conform to the requirements of Specification **C150/C150M** or **C1157/C1157M**, or shall be blended cement conforming to the requirements of Specification **C595/C595M**.

5.1.2 Slag Cement—Slag cement shall conform to the requirements of Specification **C989/C989M**.

5.1.3 Fly Ash—Fly ash shall conform to the requirements of Class F or Class C of Specification **C618**.

5.2 Allowable Combinations of Cementitious Materials—Any combination of cementitious materials shall be acceptable for use in the concrete if the mix meets the testing requirements of Section 9 in this specification.

5.3 Aggregates—Aggregates shall conform to Specification **C33/C33M** except that the requirement for gradation shall not apply.

5.4 Admixtures—The following admixtures and blends are acceptable:

5.4.1 Air-entraining admixture conforming to Specification **C260/C260M**;

5.4.2 Chemical admixture conforming to Specification **C494/C494M**;

5.4.3 Chemical admixture for use in producing flowing concrete conforming to Specification **C1017/C1017M**; and

5.4.4 Chemical admixture or blend meeting requirements of this standard.

5.5 Fibers—The use of fiber-reinforced concrete (FRC) conforming to the requirements of Specification **C1116/C1116M** Type I (steel FRC), Type II (glass FRC), and Type III (synthetic FRC) shall be permitted in precast duct bank sections.

5.6 Integral Color—Concrete incorporated into precast duct bank sections to be mixed with integral red color to indicate electrical encasement shall meet the requirements of Specification **C979/C979M**.

5.7 Water—Water used in the production of concrete shall be potable, or non-potable water that meets the requirements of Specification **C1602/C1602M**.

5.8 Reinforcement—When required by manufacturer's design, reinforcement shall meet the requirements of Specification **A615/A615M**, **A706/A706M**, **A1064/A1064M**, or **D7957/D7957M**.

NOTE 1—Typical manufacturing procedures do not require reinforcement.

5.9 Conduit—Conduit cast into precast duct bank sections shall be sized according to project requirements and meet all material and dimensional requirements UL 651, TC-6 & 8 Schedule 40 or Type EB, except as modified below:

5.9.1 It shall be permissible to modify the bottom socket dimension to match entrance dimension to allow for field fit of precast sections.

5.9.2 Conduit with modified socket dimensions shall be marked "Precast-EB" for use in precast concrete duct bank sections built to the requirements of this specification.

⁴ Available from National Electrical Manufacturers Association (NEMA), 1300 N. 17th St., Suite 900, Arlington, VA 22209, <http://www.nema.org>.

⁵ Available from Underwriters Laboratories (UL), UL Headquarters, 333 Pfingsten Road, Northbrook, IL, 60062, <http://www.ul.com>.

⁶ Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., Piscataway, NJ 08854-4141, <http://www.ieee.org>.

⁷ 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>.