



Designation: C478/C478M – 22

Standard Specification for Circular Precast Reinforced Concrete Manhole Sections¹

This standard is issued under the fixed designation C478/C478M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

PART I—GENERAL

1. Scope*

1.1 This specification covers the manufacture and purchase requirements of products used for the assembly and construction of circular vertical precast reinforced concrete manholes and structures used in sewer, drainage, and water works.

1.2 Part I, Sections 1 – 11, of this specification presents general requirements and requirements that are common to each precast concrete product covered by this specification.

1.3 Part II of this specification presents specific requirements for each manhole product in the following sections:

Product	Section
Grade Rings	12
Flat Slab Tops	13
Risers and Conical Tops	14
Base Sections	15
Steps and Ladders	16

NOTE 1—Future products will be included in Part II in a future revision of this specification.

1.4 The values stated in either inch pound or SI units are to be regarded separately as standard. The SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

NOTE 2—This specification is a manufacturing and purchase specification only and does not include requirements for backfill, or the relationship between field load conditions and the strength requirements of the manhole products and appurtenances. Experience has shown, however, that the successful performance of this product depends upon the proper selection of the product strength, type of foundation and backfill, and care in the field installation of the manhole products and connecting pipes. The owner of the project for which these products are specified herein is cautioned to require inspection at the construction site.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.6 *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
- C33/C33M Specification for Concrete Aggregates
- C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
- C150/C150M Specification for Portland Cement
- 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
- C497 Test Methods for Concrete Pipe, Concrete Box Sections, Manhole Sections, or Tile
- C497M Test Methods for Concrete Pipe, Concrete Box Sections, Manhole Sections, or Tile (Metric)
- C595/C595M Specification for Blended Hydraulic Cements
- C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- C822 Terminology Relating to Concrete Pipe and Related Products

¹ This specification is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.06 on Manholes and Specials.

Current edition approved Sept. 1, 2022. Published September 2022. Originally approved in 1961. Last previous edition approved in 2020 as C478/C478M – 20. DOI: 10.1520/C0478_C0478M-22.

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.

*A Summary of Changes section appears at the end of this standard



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

C1116/C1116M Specification for Fiber-Reinforced Concrete

C1602/C1602M Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

2.2 *ACI Standard*:⁴

318 Building Code, Requirements for Reinforced Concrete

3. Terminology

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

4. Materials and Manufacture

4.1 General material requirements for precast reinforced concrete manhole products are presented in **4.1.1 – 4.1.9**. Other materials or additional requirements for a product, if any, are covered in the Part II section for that specific product.

4.1.1 *Reinforced Concrete*—Reinforced concrete shall consist of cementitious materials, mineral aggregates, admixtures, if used, and water, in which steel reinforcement has been embedded in such a manner so that the steel reinforcement and concrete act together.

4.1.2 *Cementitious Materials*:

4.1.2.1 *Cement*—Cement shall conform to the requirements for portland cement of Specification **C150/C150M**, or shall be portland blast-furnace slag cement, portland-limestone cement, or portland-pozzolan cement conforming to the requirements of Specification **C595/C595M**, except that the pozzolan constituent of the Type IP portland-pozzolan cement shall be fly ash.

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

4.1.2.3 *Slag Cement*—Slag cement shall conform to the requirements of Grade 100 or 120 of Specification **C989/C989M**.

4.1.3 *Allowable Combinations of Cementitious Materials*—The combination of cementitious materials used in the concrete shall be one of the following:

- 4.1.3.1 Portland cement only,
- 4.1.3.2 Portland blast-furnace slag cement only,
- 4.1.3.3 Portland-pozzolan cement only,
- 4.1.3.4 Portland-limestone cement only,
- 4.1.3.5 A combination of portland cement or portland-limestone cement and slag cement,
- 4.1.3.6 A combination of portland cement or portland-limestone cement, and fly ash, or
- 4.1.3.7 A combination of portland cement or portland-limestone cement, slag cement, and fly ash, or
- 4.1.3.8 A combination of portland-pozzolan cement and fly ash.

4.1.4 *Aggregates*—Aggregates shall conform to Specification **C33/C33M**, except that the requirements for gradation shall not apply.

4.1.5 *Admixtures*—The following admixtures and blends are allowable:

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

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

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

4.1.5.4 Chemical admixture or blend approved by the owner.

4.1.6 *Steel Reinforcement*—Reinforcement shall consist of wire and welded wire conforming to Specification **A1064/A1064M** or of bars conforming to Specification **A615/A615M**, Grade 40 or 60, or Specification **A706/A706M**, Grade 60.

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

4.1.8 *Fiber*—Synthetic fibers and nonsynthetic fibers shall be allowed to be used, at the manufacturer's option, in concrete manholes as a nonstructural manufacturing material. Synthetic fibers (Type II and Type III) and nonsynthetic fiber (Type I) designed and manufactured specifically for use in concrete and conforming to the requirements of Specification **C1116/C1116M** shall be accepted.

4.1.9 *Other Materials*—Other materials required for a product and not covered in Section 4 will be covered in the Part II section for that specific product.

5. Design

5.1 Design requirements for a product are prescribed in the specific Part II section for that product.

5.1.1 The minimum compressive strength of concrete manhole products covered by this specification shall be 4000 psi [27.6 MPa] unless specified otherwise in Part II of this specification.

5.2 Modified or Special Design

5.2.1 Manufacturers are not prohibited from submitting to the owner, for approval prior to manufacture, designs other than those prescribed in the specific section for a product. If such approval is obtained, then the product shall meet all the tests and performance requirements specified by the owner in accordance with the appropriate sections on manufacture and physical requirements.

5.2.1.1 If a modified or special design consists of requirements other than reinforcement that is specified for the manhole components within this standard, the written submittal shall include installed and handling structural analysis, past product testing and recommended testing, and production quality control processes to provide assurances the modified or special design assumptions proposed are fully incorporated with the furnished product.

5.2.2 If permitted by the owner, the manufacturer is not prohibited from requesting approval of designs of special sections, such as reducers, tees, and bases.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.aci-int.org>.