



Designation: A979/A979M – 03 (Reapproved 2019)

Standard Specification for Concrete Pavements and Linings Installed in Corrugated Steel Structures in the Field¹

This standard is issued under the fixed designation A979/A979M; 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.

1. Scope

1.1 This specification covers the minimum material requirements and describes the procedures for installing concrete pavements and linings in corrugated steel pipes and structural plate structures in the field. Specific designs with additional or greater requirements shall be detailed in the contract documents. This specification is applicable to paving or lining new pipes and for rehabilitating existing structures. The pipe to be paved or lined is described in Specifications [A760/A760M](#), [A761/A761M](#), and [A762/A762M](#).

1.2 This specification covers pipes 48 in. [1200 mm] and larger for pavements and 24 in. [600 mm] and larger for full linings.

1.3 New pipes are to be designed in accordance with Practice [A796/A796M](#) and installed in accordance with Practice [A798/A798M](#) for factory-made pipes and Practice [A807/A807M](#) for structural plate structures. Structures to be rehabilitated shall be structurally stable.

1.4 Pipes with plant installed concrete pavements and linings are covered under Specification [A849](#).

1.5 This specification is applicable to product in either inch/pound units as A979 or in SI units as A979M. Inch/pound units and SI units are not necessarily equivalent. SI units are shown in brackets in the text for clarity, but they are the applicable values when materials are ordered to A979M.

1.6 *This standard may involve hazardous materials, operations and equipment. The 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.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization 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

- [A1064/A1064M](#) Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- [A615/A615M](#) Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- [A760/A760M](#) Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
- [A761/A761M](#) Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
- [A762/A762M](#) Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
- [A796/A796M](#) Practice for Structural Design of Corrugated Steel Pipe, Pipe-Arches, and Arches for Storm and Sanitary Sewers and Other Buried Applications
- [A798/A798M](#) Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
- [A807/A807M](#) Practice for Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
- [A849](#) Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
- [A902](#) Terminology Relating to Metallic Coated Steel Products
- [C31/C31M](#) Practice for Making and Curing Concrete Test Specimens in the Field
- [C33](#) Specification for Concrete Aggregates
- [C39/C39M](#) Test Method for Compressive Strength of Cylindrical Concrete Specimens
- [C150](#) Specification for Portland Cement
- [C309](#) Specification for Liquid Membrane-Forming Compounds for Curing Concrete

¹ This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.17 on Corrugated Steel Pipe Specifications.

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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.

C595 Specification for Blended Hydraulic Cements
C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
D6690 Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
2.2 *American Water Works Association Standards*:³
AWWA C602 Standards for Cement-Mortar Lining of Water Pipelines—4 in. (100 mm) and larger-in place

3. Terminology

3.1 *Definitions*—For definitions of general terms used in this specification, see Terminology **A902**.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *contractor, n*—the installer or applicator of the concrete pavement of lining.

3.2.2 *engineer, n*—the designer of the work and its details.

3.2.3 *fabricator, n*—the producer of the pipe.

3.2.4 *lining, n*—for corrugated metal pipe, a layer of non-metallic material applied uniformly to the interior of a fabricated pipe, of sufficient thickness to fill and cover the corrugations.

3.2.5 *pavement, n*—for corrugated metal pipe, a lining applied only to a portion of the interior circumference, usually located in the lower portion (as the pipe is installed).

3.2.6 *purchaser, n*—the person or agency purchasing the finished product.

4. Requirements

4.1 *Concrete Pavements*—Concrete pavements shall be placed after the pipe has been installed. For new pipes, pavements shall be placed after the pipe is backfilled to final grade. If the depth of fill exceeds four feet, the pavement may be placed after four feet of backfill over the pipe has been placed. If the paving is placed prior to completion of the entire fill, any gaps between the pipe and pavement shall be filled with heated joint sealer conforming to Specification **D6690**. Special pavement designs, which exceed the minimum requirements of this specification, shall be detailed in the job plans and specifications. In lieu of special designs, pavements shall extend over the area to be protected or rehabilitated. Invert pavements shall cover a minimum of the bottom 25 % of a round pipe's circumference and 40 % of the circumference of a pipe-arch (the invert of the pipe-arch), unless a special design is detailed in the plans and specifications.

4.1.1 The concrete for pavements shall have a minimum 28-day compressive strength of 3250 psi [22.4 MPa] when tested in accordance with Specification **C31/C31M** and Test Method **C39/C39M**. The pavement shall have a minimum 3 in. [75-mm] thickness above the crests of the corrugations or structural plate bolts or nuts as applicable.

4.1.2 A minimum pavement thickness of 1-1/2 in. [38 mm] above the crests of the corrugations or structural plate bolts or nuts as applicable is required if concrete with a 28-day

minimum compressive strength of 5000 psi [34.5 MPa] when tested in accordance with Specification **C31/C31M** and Test Method **C39/C39M**, is used.

NOTE 1—For rehabilitation applications, greater concrete pavement thicknesses may be required to replace necessary pipe ring compression strength lost due to service conditions.

4.2 *Concrete Linings*—Concrete linings shall be placed after the pipe has been installed and backfilled to final grade. Concrete linings shall cover 100 % of the circumference of round pipes.

4.2.1 The concrete for linings shall have a minimum 28-day compressive strength of 5000 psi [34.5 MPa] when tested in accordance with Specification **C31/C31M** and Test Method **C39/C39M**. The lining shall have a minimum thickness of 1/8 in. [3.2 mm] above the crests of the corrugations or structural plate bolts or nuts as applicable.

4.3 *Concrete Materials*—Concrete materials for pavements and linings shall consist of portland cement, fly ash (when used), aggregates and water. Special additives for air entrainment, sulfate resistance, etc., may be included as part of a specific mix design that meets or exceeds the requirements of this specification.

4.3.1 The cement for pavements shall be Type II portland cement conforming to Specification **C150** with an alkali content not more than 0.60 % expressed as Na₂O.

4.3.2 The cement used for linings shall conform to the requirements of Specification **C150** for Type I or Type II.

4.3.3 Type IP portland Pozzolan cement conforming to Specification **C595** shall be permitted in concrete for pavements or linings, in lieu of the requirements of 4.3.1 or 4.3.2, if no fly ash is used in the mix.

4.3.4 Aggregates shall be clean, hard, and durable conforming to the requirements of Specification **C33** except that for concrete linings, the requirements for grading do not apply. For linings, the aggregates shall be well graded with 100 % passing the No. 16 [1.18 mm] sieve with no more than 5 % passing the No. 100 [150-μm] sieve.

4.3.5 Fly ash shall conform to the requirements of Specification **C618** for Class C or Class F. When used for pavements or linings, fly ash shall not exceed 20 % weight of the total cementitious materials in the mix.

4.3.6 Potable water shall be used.

4.3.7 Steel reinforcement, when required for pavements, shall be billet-steel bars conforming to Specification **A615/A615M**, Grade 40 minimum or welded wire fabric reinforcement conforming to Specification **A1064/A1064M**.

4.4 *Concrete Mix*—The concrete mix shall be uniform and homogeneous. The water content shall be the minimum quantity that produces a workable mixture with full allowance made for condensation forming on the interior of the pipe. The water-cement ratio of the mix shall not exceed 0.50 by weight.

NOTE 2—Guidance as to concrete mix consistency requirements for various types of equipment used to place full concrete linings is provided in the American Water Works Association (**AWWA**).

4.5 *Surface Finish*:

4.5.1 Pavements shall have a troweled or untroweled surface finish as specified in the contract documents. Full linings shall have a troweled surface finish.

³ Available from American Water Works Association (AWWA), 6666 W. Quincy Ave., Denver, CO 80235, <http://www.awwa.org>.