



Designation: F 2418 – 04

Standard Specification for Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers¹

This standard is issued under the fixed designation F 2418; 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 requirements, test methods, materials, and marking for polypropylene (PP), open bottom, buried chambers of corrugated wall construction used for collection, detention, and retention of stormwater runoff. Applications include commercial, residential, agricultural, and highway drainage, including installation under parking lots and roadways.

1.2 Chambers are produced in arch shapes with dimensions based on chamber rise, chamber span, and wall stiffness. Chambers are manufactured with integral feet that provide base support. Chambers may include perforations to enhance water flow. Chambers must meet test requirements for arch stiffness, flattening, and accelerated weathering.

1.3 Analysis and experience have shown that the successful performance of this product depends upon the type and depth of bedding and backfill, and care in installation. This specification includes requirements for the manufacturer to provide chamber installation instructions to the purchaser.

1.4 The values stated in inch-pounds are to be regarded as the standard. The SI units in parentheses are given for information only.

1.5 *This standard does not purport to address water quality issues or hydraulic performance requirements associated with its use. It is the responsibility of the user to ensure that appropriate engineering analysis is performed to evaluate the water quality issues and hydraulic performance requirements for each installation.*

1.6 The following safety hazards caveat pertains only to the test method portion, Section 6, of this specification: *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

- D 256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
 - D 618 Practice for Conditioning Plastics for Testing
 - D 638 Test Method for Tensile Properties of Plastics
 - D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - D 1600 Terminology for Abbreviated Terms Relating to Plastics
 - D 2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
 - D 2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
 - D 2990 Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
 - D 4101 Specification for Polypropylene Plastic Injection and Extrusion Materials
 - D 4329 Practice for Fluorescent UV Exposure of Plastics
 - D 6992 Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method.
 - F 412 Terminology Relating to Plastic Piping Systems
- #### 2.2 AASHTO Specification:
- Section 12 Buried Structures and Tunnel Liners, 12.12 Thermoplastic Pipes³

3. Terminology

3.1 **Definitions:** Definitions used in this specification are in accordance with the definitions in Terminology F 412, and abbreviations are in accordance with Terminology D 1600, unless otherwise indicated.

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 AASHTO LRFD Bridge Design Specifications-Dual Units, Third Edition, 2004. Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001.

¹ This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping and is the direct responsibility of Subcommittee F17.65 on Land Drainage. Current edition approved Oct. 1, 2004. Published October 2004.

3.1.1 *chamber*—an arch-shaped structure manufactured of thermoplastic with an open-bottom that is supported on feet and may be joined into rows that begin with, and are terminated by, end caps (see Fig. 1).

3.1.2 *corrugated wall*—a wall profile consisting of a regular pattern of alternating crests and valleys (see Fig. 2).

3.1.3 *crest*—the element of a corrugation located at the exterior surface of the chamber wall, spanning between two web elements (see Fig. 2).

3.1.4 *crown*—the center section of a chamber typically located at the highest point as the chamber is traversed circumferentially.

3.1.5 *end cap*—a bulkhead provided to begin and terminate a chamber, or row of chambers, and prevent intrusion of surrounding embedment materials.

3.1.6 *foot*—a flat, turned out section that is manufactured with the chamber to provide a bearing surface for transfer of vertical loads to the bedding (see Fig. 1).

3.1.7 *inspection port*—an opening in the chamber wall that allows access to the chamber interior.

3.1.8 *nominal height*—a designation describing the approximate vertical dimension of the chamber at its crown (see Fig. 1).

3.1.9 *nominal width*—a designation describing the approximate outside horizontal dimension of the chamber at its feet (see Fig. 1).

3.1.10 *period*—the length of a single repetition of the repeated corrugation, defined as the distance from the centerline of a valley element to the centerline of the next valley element (see Fig. 2).

3.1.11 *rise*—the vertical distance from the chamber base (bottom of the chamber foot) to the inside of a chamber wall valley element at the crown as depicted in Fig. 1.

3.1.12 *span*—the horizontal distance from the interior of one sidewall valley element to the interior of the other sidewall valley element as depicted in Fig. 1.

3.1.13 *valley*—the element of a corrugated wall located at the interior surface of the chamber wall, spanning between two webs (see Fig. 2).

3.1.14 *web*—the element of a corrugated wall that connects a crest element to a valley element (see Fig. 2).

4. Materials and Manufacture

4.1 This specification covers chambers made from virgin and rework PP plastic materials as defined by material mechanical requirements and chamber performance requirements.

4.2 Polypropylene materials may be combined with copolymers, pigments, and impact modifiers which together are suitable for manufacture. Manufactured chamber and end cap material shall meet or exceed the requirements of designation PP0330B99945, Specification D 4101. The minimum amount of polypropylene plastic in the material shall be 95 % by weight. The minimum tensile stress at yield, Test Method D 638, shall not be less than 3 100 psi (21 MPa). The minimum flexural modulus (1 % secant), Test Method D 790, Procedure A, shall not be less than 135 000 psi (931 MPa). The minimum Izod Impact Resistance at 73 °F (23 °C), Method A in Test Method D 256, shall not be less than 4 ft-lb/in. (215 J/m). Materials shall meet the creep requirements in 5.3.5 and 5.3.6 of this standard.

NOTE 1—The polypropylene melt flow rate is specified for chamber manufacture by injection molding. The melt flow rate may be less than 10 if the manufactured chamber meets all other requirements in this standard. This cell class will be re-evaluated when new chamber classifications are added to Table 1.

NOTE 2—Polypropylene plastic is prepared by the polymerization of propylene or propylene with other alpha olefins as described in Specification D 4101.

4.3 *Rework Material*—Clean rework material generated from the manufacturer's own chambers may be used by the same manufacturer, using the same type and grade resin, provided that the chambers produced meet all the requirements of this specification.

5. Requirements

5.1 Chamber Description

5.1.1 Chambers shall be produced in arch shapes symmetric about the crown with corrugated wall and integral feet for base support (see Fig. 1). Any arch shape is acceptable provided all the requirements of this specification are met.

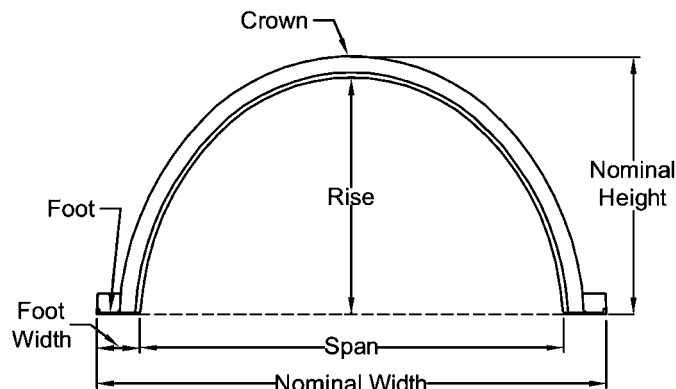
NOTE 3—For purposes of structural optimization, the wall geometry (e.g. corrugation height, crest width, valley width, and web pitch) may vary around the chamber circumference.

5.1.2 Chambers shall be produced with maximum span at the base of the chamber (bottom of the chamber foot).

5.1.3 Chambers may include access ports for inspection or cleanout. Chambers with access ports shall meet the requirements of this standard with access ports open and closed.

5.1.4 Chambers may include perforations. Perforations shall be cleanly fabricated in a size, shape, and pattern determined by the manufacturer. Chambers with perforations shall meet the requirements of this standard.

5.1.5 Chamber sections shall be manufactured to connect at the ends to provide rows of various lengths. Joints shall be configured to prevent intrusion of the surrounding embedment material and shall be capable of carrying the full load for which the chamber is designed.



NOTE—The model chamber shown in this standard is intended only as a general illustration. Any chamber configuration is permitted, as long as it meets all the specified requirements of this standard.

FIG. 1 Model Chamber