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Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Tubing¹

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1. Scope

1.1 This specification covers poly(vinyl chloride) (PVC) tubing pressure rated for water (Appendix). Included are criteria for classifying PVC plastic tubing materials and PVC plastic tubing, and requirements and test methods for materials, workmanship, dimensions, sustained pressure, burst pressure, flattening, and extrusion quality. Methods of marking are also given.

1.2 The values in parentheses are for information purposes only.

1.3 The following safety hazards caveat pertains only to the test method portion, Section 7, of this specification. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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:

- D 618 Methods of Conditioning Plastics and Electrical Insulating Materials for Testing²
- D 883 Definitions of Terms Relating to Plastics^{2,3}
- D 1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure³
- D 1599 Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings³
- D 1600 Abbreviations of Terms Relating to Plastics^{2,3}
- D 1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds³
- D 2122 Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings³
- D 2152 Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion³
- D 2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials³

F 412 Definitions of Terms Relating to Plastic Piping Systems³

2.2 NSF Standard:

Standard No. 14 for Plastic Piping Components and Related Materials⁴

3. Definitions

3.1 *General*—Definitions are in accordance with Definitions D 883 or F 412 and abbreviations are in accordance with Abbreviations D 1600, unless otherwise indicated. The abbreviation for poly(vinyl chloride) plastic is PVC.

3.2 *hydrostatic design stress*—the estimated maximum tensile stress in the wall of the tubing in the circumferential orientation due to internal hydrostatic water pressure that can be applied continuously with a high degree of certainty that failure of the tubing will not occur.

3.3 *pressure rating (PR)*—the estimated maximum pressure that water in the tubing can exert continuously with a high degree of certainty that failure of the tubing will not occur.

3.4 *relation between dimensions, hydrostatic design stress, and pressure rating*—the following expression, commonly known as the ISO equation,⁵ is used in this specification to relate dimensions, hydrostatic design stress, and pressure rating:

$$2S/P = (D_0/t) - 1 \text{ or } 2S/P = R - 1$$

where:

- S = hydrostatic design stress, MPa (or psi),
- P = pressure rating, MPa (or psi),
- D_0 = average outside diameter, mm (or in.),
- t = minimum wall thickness, mm (or in.), and
- R = standard thermoplastic pipe dimension ratio ($\bar{D}_0/t$ for PVC tubing).

3.5 *standard dimension ratio (SDR)*—the average outside diameter in inches divided by the minimum wall thickness in inches, rounded to the nearest 0.5

3.6 *standard thermoplastic tubing materials designation code*—the tubing materials designation code shall consist of the abbreviation PVC for the type of plastic, followed by the ASTM type and grade in Arabic numerals and the hydrostatic design stress in units of 100 psi with any decimal figures dropped. Where the hydrostatic design code contains less than two figures, a cipher shall be used before the number. Thus a complete material code consists of three

¹ This specification is under the jurisdiction of ASTM Committee F-17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.25 on (Vinyl Based) Pipe.

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² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 08.04.

⁴ Available from the National Sanitation Foundation, P.O. Box 1468, Ann Arbor, MI 48106.

⁵ See ISO R161-1960, Pipes of Plastics Materials for the Transport of Fluids (Outside Diameters and Nominal Pressures) Part 1, Metric Series.