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.

Designation: D3035 – 22

An American National Standard

Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter[1]

This standard is issued under the fixed designation D3035; 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 polyethylene (PE) pipe made in thermoplastic pipe dimension ratios based on outside diameter IPS ½ to 3, for both non-pressure and pressure rated water (see Appendix X1). Included are requirements for polyethylene compounds and PE plastic pipe, a system of nomenclature for PE plastic pipe, and requirements and test methods for materials, workmanship, dimensions, sustained pressure, and burst pressure. Methods of marking are also given.

NOTE 1—Significant changes have been made to this specification to remedy duplication of sizes with other specifications, for DIPS sizes and larger sizes refer to the appropriate standard specification such as Specification F714 or AWWA C906.

1.2 For pipes produced under this specification that are intended for use in the distribution and transmission of potable water without oxidizing disinfectants, potable and non-potable water, grey water, reclaimed water, wastewater, force main and gravity municipal sewage, etc, the user should consult the manufacturer to determine whether the fluid being transported is compatible with polyethylene pipe and will not affect the service life beyond limits acceptable to the user.

1.3 For pipes produced under this specification that are intended for use in the distribution and transmission of potable water or other fluids containing oxidizing disinfectants (for example, Hypochlorous acid or chloramines), special requirements for PE compounds are specified in 5.2 and 5.3, and DR limitations are specified in 6.2.1.1 and 6.2.2.1.

NOTE 2—Refer to specification AWWA C901 for other suitable potable water options.

1.4 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.

1.5 The following safety hazards caveat pertains only to the test methods portion, Section 7, 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, 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]

D618 Practice for Conditioning Plastics for Testing
D1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
D1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
D1599 Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings
D1600 Terminology for Abbreviated Terms Relating to Plastics
D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
D2290 Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe
D2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials
F412 Terminology Relating to Plastic Piping Systems
F714 Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
F2263 Test Method for Evaluating the Oxidative Resistance of Polyethylene (PE) Pipe to Chlorinated Water

[1] This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.26 on Olefin Based 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.

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

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TABLE 1 Polyethylene Compound Requirements

	Material Designation				
	PE1404	PE2708	PE3608	PE4608	PE4710
Requirement	Required Value				
HDB at 140 ºF (60 ºC), psi (MPa), in accordance with ASTM D2837 and PPI TR-3	[A]	800 (5.5)[B]	800 (5.5)[B]	800 (5.5)[B]	1000 (6.9)[B]
HDS for water at 73°F (23°C) psi (MPa), in accordance with ASTM D2837 and PPI TR-3[C]	400 (2.76)	800 (5.5)	800 (5.5)	800 (5.5)	1000 (6.9)
Melt flow rate in accordance with ASTM D1238	1.0 to 0.4 g/10 min Cond. 190/2.16	≤0.40 g/10 min Cond. 190/2.16 or ≤20 g/10 min Cond. 190/21.6	≤0.15 g/10 min Cond. 190/2.16 or ≤20 g/10 min Cond. 190/21.6	≤0.15 g/10 min Cond. 190/2.16 or ≤20 g/10 min Cond. 190/21.6	≤0.15 g/10 min Cond. 190/2.16 or ≤20 g/10 min Cond. 190/21.6
Specification D3350 Cell Classification Property	Required Value				
Density (natural base resin)	1	2	3	4	4
SCG Resistance	4	7	6	6	7
Color and UV Stabilizer Code[D]	C	C, D, or E	C, D, or E	C, D, or E	C, D, or E
Oxidative Resistance Classification in accordance with Test Method F2263[E]	E	E	E	E	E

[A] HDB at 140 °F (60 °C) not required. Contact manufacturer about pipe use at temperatures other than 73 °F (23 °C).
[B] Minimum value.
[C] Contact manufacturer or see PPI TR-4 for listed value.
[D] See 5.1.1.
[E] See 5.3 for when CC3 classification is required. Oxidative Resistance Classification (CC# rating) information is available from NSF International.

2.2 *NSF International Standards:*[3]

NSF/ANSI Standard 14 for Plastic Piping Components and Related Materials

NSF/ANSI/CAN Standard 61 for Drinking Water System Components—Health Effects

2.3 *Other Documents:*

TR-3 Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB), Strength Design Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe[4]

TR-4 Listing of Hydrostatic Design Bases (HDB), Strength Design Bases (SDB), Pressure Design Bases (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe[4]

TN-49 Recommendations for AWWA C901 Service Tubes in Potable Water Applications

APWA Uniform Color Code[5]

AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ¾ in. (19 mm) through 3 in. (76 mm), for Water Service

AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) through 65 in. (1650 mm), for Water Works

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F412, and abbreviations are in accordance with Terminology D1600, unless otherwise specified.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *relation between dimension ratio, hydrostatic design stress, and pressure rating*—the following expression, commonly known as the ISO equation,[6] is used in this specification to relate dimension ratio, hydrostatic design stress, and pressure rating:

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

where:

S = hydrostatic design stress for water at 73 °F (23 °C), psi (MPa),
P = pressure rating, psi (MPa),
D_0 = average outside diameter, in. (mm)
t = minimum wall thickness, in. (mm), and,
DR = thermoplastic pipe dimension ratio (D_0 /t for PE pipe).

[3] Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140, http://www.nsf.org.
[4] .Available from Plastics Pipe Institute (PPI), 105 Decker Court, Suite 825, Irving, TX 75062, http://www.plasticpipe.org.
[5] APWA, 2345 Grand Boulevard, Suite 500, Kansas City, MO 64018-2641, http://www.apwa.net.
[6] ISO R 161-1960, Pipes of Plastics Materials for the Transport of Fluids (Outside Diameters and Nominal Pressure), Part 1, Metric Series.