



NSF International
Special Engineered Specification
NSF SE 12857

Metric-Sized Polyethylene (PE) Pipe

The Public
Health and Safety
Company.™



Specifications for a Special Engineered (SE) Product
NSF SE 12857
Metric-Sized Polyethylene (PE) Pipe

1. Purpose:

This specification defines the minimum product-specific requirements for metric-sized polyethylene (PE) pipe in dimension ratios based on controlled outside diameter and controlled inside diameter.

2. Scope of Specification:

This specification identifies the application, reference documents, material requirements, testing requirements, product marking, and in-plant quality control testing for metric-sized polyethylene (PE) potable water pipe in dimension ratios based on controlled outside diameter and controlled inside diameter. Pipe may be manufactured in dimension ratios other than those included in the standards and/or test methods referenced in this specification.

3. Application:

Pipe meeting the requirements of this specification is for use in potable water pressure applications.

4. Reference Documents:

ASTM Standards:

ASTM D618 – Practice for Conditioning Plastics for Testing

ASTM D1598 – Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

ASTM D1599 – Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing and Fittings

ASTM D1603 – Standard Test Method for Carbon Black Content in Olefin Plastics

ASTM D2122 – Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM D2290 – Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method

ASTM D2239 – Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter

ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter

ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

DIN Standards:

DIN 8074 – Polyethylene (PE) Pipes Dimensions

ISO Standards:

ISO 4427-2 – Plastics Piping Systems – Polyethylene (PE) Pipes and Fittings for Water Supply, Part 2: Pipes

NSF Standards:

NSF/ANSI Standard 14 – Plastic Piping System Components and Related Materials

NSF/ANSI Standard 61 – Drinking Water Systems Components – Health Effects

Plastic Pipe Institute (PPI) Technical Report

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

5. Materials:

5.1 Polyethylene compounds used in pipe meeting this specification shall meet a material designation code of PE3608 or PE4710.

5.2 Physical Properties:

5.2.1. Cell Classification

5.2.1.1 PE3608 compounds shall meet a minimum cell classification of 345461 per ASTM D3350.

5.2.1.2 PE4710 compounds shall meet a minimum cell classification of 445572 per ASTM D3350.



5.2.2 The compound shall meet the following requirements of ASTM D3350: thermal stability (Section 6.3), brittleness temperature (Section 6.4) and elongation at break (Section 6.7).

5.3 Polyethylene compounds that are black in color shall have a 2 to 3 percent carbon black content when tested in accordance with ASTM D1603.

5.4 Products shall meet the health effects requirements of NSF/ANSI Standard 61.

5.5 Clean rework material may be used provided it is from the same formulation and from the same facility, the rework material meets 5.1 through 5.4, and pipe produced from the rework material meets all requirements of this specification.

6. Testing Requirements:

6.1 Conditioning – Samples shall be conditioned per Procedure A of ASTM D618, unless otherwise specified by the test method.

6.2 Test Conditions – Samples shall be tested at $73 \pm 3.6^{\circ}\text{F}$ ($23 \pm 2^{\circ}\text{C}$) unless otherwise specified by the test method.

6.3 Dimensions and Tolerances* – Pipe produced against this specification shall meet the dimensional requirements of ISO 4427-2 or DIN 8074 when measured in accordance with Test Method ASTM D2122.

**Note: Refer to DIN 8074-1999 for dimensions of 20 mm SDR 13.6 PE pipe.*

6.4 Short Term Properties – The pipe shall be evaluated to either Section 6.4.1 or Section 6.4.2.

6.4.1 Burst Pressure – Testing shall be performed in accordance with Test Method ASTM D1599. The minimum burst pressure for PE pipe shall meet the requirements of either Table 4 of ASTM D3035 or Table 4 of ASTM D2239, depending on whether the pipe dimension ratio is based on controlled outside diameter or controlled inside diameter.

6.4.2 Ring Tensile Strength – Testing shall be performed in accordance with Test Method ASTM D2290, Procedure B. The apparent ring tensile strength at yield shall meet the requirements of Table 1. The failure shall be ductile in nature.

Table 1 - Ring Tensile Strength		
Material	MPa	psi
PE3608, PE4710	17.37	2520

6.5 Elevated Temperature Sustained Pressure – Testing shall be performed in accordance with Test Method ASTM D1598. The elevated temperature sustained pressure for PE pipe shall meet the requirements of ASTM D3035 Section 6.5 and Table 7 or ASTM D2239 Section 6.7 and Table 5, depending on whether the pipe dimension ratio is based on controlled outside diameter or controlled inside diameter.

7. Product Marking:

Each 5 ft. pipe length shall be marked with the following at a minimum.

- Manufacturer name, trademark, or trade designation
- Nominal pipe size
- Material designation (for example, PE4710)
- Pipe dimension ratio (for example, DR 9)
- NSF® pw-SE
- Product identifier, date code, or lot code



8. In-Plant Quality Control Requirements:

At a minimum, the plant must perform the tests outlined in Table 5 at the frequencies noted.

Table 5 - In-Plant Quality Control Requirements	
Test	Frequency
Dimensions	
Pipe OD or ID	2 hr
Wall thickness	2 hr
Burst Pressure	24 hr
Elevated Temperature Sustained Pressure	Twice per year