



Designation: F3308/F3308M – 19

# Standard Practice for Sampling and Testing Frequency for Recycled Materials in Polyethylene (PE) Pipe for Non-Pressure Applications<sup>1</sup>

This standard is issued under the fixed designation F3308/F3308M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This practice covers requirements and sampling frequency for the use of post-consumer and post-industrial recycled plastic materials in polyethylene (PE) pipe used in storm drainage, storm sewer and sanitary sewer applications.

1.2 The requirements of this practice provide definitions, requirements and test protocols for recycled plastic materials to be used in the production of polyethylene (PE) pipe for gravity flow applications.

NOTE 1—Non-pressure applications pertain principally to any municipal or private facilities for land drainage, storm drainage, storm sewer, culvert and sanitary sewer applications. The products utilizing the criteria under this practice are not intended for any pressure pipe applications, such as water or gas pipelines.

1.3 *Units*—The values stated in either inch-pound units or SI units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independent of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4 *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.*

1.5 *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.*

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.62 on Sewer. Current edition approved Aug. 1, 2019. Published September 2019. Originally approved in 2018. Last previous edition approved in 2018 as F3308/F3308M–18. DOI: 10.1520/F3308\_F3308M–19

## 2. Referenced Documents

- 2.1 *ASTM Standards*:<sup>2</sup>
  - D1600 Terminology for Abbreviated Terms Relating to Plastics
  - F412 Terminology Relating to Plastic Piping Systems
- 2.2 *ISO Standard*:<sup>3</sup>
  - ISO 15270 Guidelines for the Recovery and Recycling of Plastic Waste
- 2.3 *Federal Standard*:<sup>4</sup>
  - Fed. Stds. No. 123 Marking for Shipment (Civil Agencies)
- 2.4 *Military Standard*:<sup>4</sup>
  - MIL-STD-129 Marking for Shipment and Storage
- 2.5 *Natural Resources Conservation Service Conservation Practice Standard*:<sup>5</sup>
  - Code 606 Subsurface Drain

## 3. Terminology

3.1 Definitions are in accordance with Terminology F412 and abbreviations are in accordance with Terminology D1600, unless otherwise specified. The abbreviation for polyethylene is PE.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *post-consumer materials, n*—PE materials from discarded products that have served a previous intended purpose and have been recovered prior to becoming waste.

3.2.2 *post-industrial materials, n*—PE materials diverted from the waste stream during a manufacturing process that have never reached the end user.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

<sup>4</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

<sup>5</sup> Available from USDA U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 <https://www.usda.gov/>

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

3.2.2.1 *Discussion*—Post-industrial materials do not include rework materials generated from the manufacturer’s own production of pipe and fittings.

3.2.3 *reprocessed materials, n*—PE compound that has been prepared by melt processing into a cylindrical or spherical pellet or disc. It can be single or multi component blend consisting of post-consumer and/or post-industrial recycled materials. Reprocessed compounds may include virgin PE, colorants, UV additives, processing aids, or other property enhancing additives.

3.2.4 *recycled flake, n*—Post-consumer or post industrial material that has been mechanically size-reduced (chopped, shredded or ground) plastic items, typically rigid packaging with to maximum dimensions of less than approximately 1 in. [2.5 cm].

3.2.4.1 *Discussion*—Recycled materials are typically transported in gaylord boxes via truck transport in approximately 45 000 lb [18 150 kg] lots or by rail transport in approximately 190 000 lb [86 180 kg] lots.

## 4. Significance and Use

4.1 The utilization of recycled materials in non-pressure thermoplastic pipe presents a potentially large outlet for this what is typically classified “waste” material. The proper use and qualification of this material is critical in assuring its long-term performance from both a structural and durability standpoint.

4.2 This practice defines minimum requirements and testing protocols and frequencies for these recycled materials with respect to their utilization in final thermoplastic pipe products. Each specific pipe standard has unique criteria that must be met in addition to the items described in this practice.

4.3 The purpose of this specification is for characterization of recycled plastics only and does not establish performance guidelines for such materials. Product specifications may be used in conjunction with this specification to establish performance specifications for a defined end-use and specific material type.

## 5. Materials and Manufacture

5.1 *Post-Consumer and Post-Industrial Recycled Resin Pipe Products:*

5.1.1 The pipe and fittings shall be made of PE recycled plastic compound as defined in Guide ISO 15270 meeting the requirements of the product specification.

5.1.1.1 Material sampled from finished PE pipe shall be tested for physical and mechanical properties as specified in the appropriate product pipe or fitting specification.

## 6. Raw Material Sampling Frequency

6.1 *Raw Material Sampling frequency*—Incoming raw material samples shall be collected for each shipment. The frequency and sample size shall correspond to the classification of incoming material stream and size of shipment. The samples shall be tested to characterize the material properties of the lot.

6.1.1 *Reprocessed materials:*

6.1.1.1 For truckload sized lots collect a minimum of 0.5 lb [225 g] sample from a minimum of 8 random boxes within the

truckload. The eight random samples shall be combined and hand mixed in a suitably sized container to ensure sample homogeneity. Truckload lot sizes shall not exceed 45 000 lbs [18 150 kg] of raw material.

6.1.1.2 For railcar sized lots, collect a minimum of 1.0 lb [450 g] sample from each compartment of the railcar. Each railcar compartment shall be considered a lot. In no case shall the railcar compartment lots be greater than 65 000 lbs [29 480 kg] of raw material.

6.1.2 *Post-consumer recycled flake:*

6.1.2.1 For truckload sized lots collect a minimum of 0.5 lb [225 g] sample from a minimum of 8 random boxes within the truckload. The eight random samples shall be combined and melt blended with a small lab extruder or a roll mill to ensure sample homogeneity. Lot sizes shall not exceed 45 000 lbs [18 150 kg] of raw material.

6.1.2.2 For railcar sized lots, collect a minimum of 1.0 lb [450 g] sample from each compartment of the railcar. Each material sample and railcar compartment shall be considered a lot. In no case shall the railcar compartment lots be greater than 65 000 lbs [29 480 kg] of raw material.

6.1.3 *Post-industrial recycled flake:*

6.1.3.1 For truckload sized lots collect a minimum of 0.5 lb [225 g] sample from minimum of 8 random boxes within the truckload. The eight random samples shall be combined and melt blended with a small lab extruder or a roll mill to ensure sample homogeneity. Truckload lot sizes shall not exceed 45 000 lbs [18 150 kg] of raw material.

6.1.3.2 For railcar sized lots, collect a minimum of 1.0 lb [450 g] sample from each compartment of the railcar. Each material sample and railcar compartment shall be considered a lot. In no case shall the railcar compartment lots be greater than 65 000 lbs [29 480 kg] of raw material.

## 7. Finished Product Sampling Frequency

7.1 *Finished Product Sampling Frequency*—The selection of the sample or samples of the pipe and fittings shall be as agreed upon between the owner and the seller. In case of no prior agreement, any samples selected by the testing laboratory shall be permitted.

7.1.1 *Finished Product Material Validation Test Frequency:*

7.1.1.1 A minimum of one finished product sample shall be collected for every 45 000 lb [18 150 kg] of product produced or every 24 h, whichever comes first. Pipe and material compounds from finished product samples shall be tested to demonstrate pipe properties and capture changes in material blends. The final material formulation shall meet the material and manufacturing requirements of the product specification.

## 8. Inspection

8.1 *General*—Inspection of the recycled material shall be as agreed upon between the owner and the manufacturer as part of the purchase contract. Unless otherwise specified in the contract or purchase agreement, the manufacturer is responsible for the performance of all inspection and test requirements specified herein.

8.2 *Notification*—If inspection is specified by the owner, the manufacturer shall notify the owner in advance of the date,