

MS-2/2000
Model Specification
For Polyethylene Plastic Pipe,
Tubing and Fittings for
Fuel Gas Distribution Systems

MODEL SPECIFICATION FOR POLYETHYLENE PLASTIC PIPE, TUBING AND FITTINGS FOR FUEL GAS DISTRIBUTION SYSTEMS

FOREWORD

The Plastics Pipe Institute (PPI) has prepared this model specification as a service to its members and the industry.

It is offered for use as a starting point and guide in developing appropriate final specifications suited to a particular project's needs.

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MODEL SPECIFICATION FOR POLYETHYLENE PLASTIC PIPE, TUBING AND FITTINGS FOR FUEL GAS DISTRIBUTION SYSTEMS

INTRODUCTION

This Model Specification for Polyethylene Plastic Pipe, Tubing and Fittings for Fuel Gas Distribution Systems has been developed by the Plastics Pipe Institute (PPI) to assist the utility user in developing his own specifications which will help to ensure that the products purchased will perform satisfactorily in the intended end-use.

It is incumbent upon the utility user to have a working familiarity with the following regulations, standard specifications, and recommendations:

- A. US Department of Transportation Pipeline Safety Regulations, Code of Federal Regulations (CFR) Title 49, Part 192, "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards".
- B. ASTM D2513 - Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings.
- C. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
- D. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
- E. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- F. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- G. ASTM F1055 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
- H. ASTM F1924 - Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing.
- I. PPI TR-3 - Policies and Procedures for Developing Hydrostatic Design Bases (HDB), Pressure Design Bases (PDB) and Minimum Required Strengths (MRS) for Thermoplastic Piping Materials or Pipe.

- J. PPI TR-4 - PPI Listing of Hydrostatic Design Bases (HDB), Pressure Design Bases (PDB) and Minimum Required Strengths (MRS) for Thermoplastic Piping Materials.
- K. PPI TR-33 - Generic Butt Fusion Joining Procedures for Polyethylene (PE) Gas Pipe.
- L. NFPA 58 - National Fire Protection Association, Storage and Handling Liquefied Petroleum Gas

In addition, it is recommended the user review the American Gas Association publication, AGA Plastic Pipe Manual for Gas Service.

Although it is difficult to incorporate in a specification, one of the most important considerations in purchasing quality materials for a polyethylene fuel gas distribution system is the selection of a quality vendor. Such a vendor will have an understanding of the necessary quality control tests and the capabilities to perform them, and will also be able to provide records showing that a quality control/quality assurance program is in effect that utilizes these testing facilities.

Using both the appropriate Annex for In-Plant Quality Control of ASTM D2513 and this document as guides the user or purchaser should evaluate an intended supplier through an on-site visit and inspection. Adequate records should be available for the user's review to demonstrate that the supplier's production of gas piping products meets the requirements of the specification.

In qualifying a supplier, the user should consider:

- A. A demonstrated commitment to the market as evidenced by facilities investment and products offered;
- B. A good reputation for product quality and service based on other user comments;
- C. Adequate in-plant inspection and quality control/quality assurance testing, either in the supplier's own facilities or in a qualified independent laboratory. Registration under a recognized quality assurance program such as ISO 9000 is a means to ensure proper /quality control/quality assurance procedures are in place.
- D. Evidence that the supplier has a qualified joining procedure in accordance with the requirements of the US Department of Transportation Pipeline Safety Regulations (CFR) Title 49, Part 192, "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards".
- E. The ability to provide sound technical support for its products.

The user should ensure that, in addition to clearly defined material purchase specifications, the manufacturer has also established procedures for both qualification testing and acceptance testing of PE pipe, tubing and fittings, and certification requirements for the materials purchased for use in their systems.

The following model specification is furnished to assist the user of polyethylene gas pipe in the procurement of materials meeting the minimum federal standards as well as some additional recommended requirements, such as those contained in ASTM D2513. In the event local standards are more stringent, appropriate modifications should be made to this model specification.

For liquefied petroleum gas (LPG) applications, a maximum operating pressure of 30 psig (206 kPa) is recommended in NFPA 58 by the members of the National Fire Protection Association. LPG has higher condensation temperature than does natural gas; this maximum pressure is recommended to ensure that plastic pipe is not subjected to excessive exposure to LPG liquids.

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I. General

All polyethylene pipe, tubing and fittings furnished under this specification shall conform to all applicable provisions and requirements of the latest revision of the US Department of Transportation Pipeline Safety Regulations (CFR) Title 49, Part 192, "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards, and, by inclusion, all appropriate standards referenced therein.

II. Materials

Polyethylene compounds utilized in the manufacture of products furnished under this specification shall have a grade of PE24 or PE34, and minimum cell classification of PE213363 or PE334464, as defined in ASTM D3350. In conformance with ASTM D2513, they shall have a PPI recommended hydrostatic design basis (HDB) of 1250 psi (PE2406) or 1600 psi (PE3408) at a temperature of 73.4°F (23°C). In addition, this HDB shall be substantiated by showing that extrapolation of the stress regression curve is linear to the 438,000 hour intercept in accordance with ASTM D2837.

When any plastic material is used for transportation of liquefied petroleum gas (LPG), it must qualify for use through testing with LPG as the test medium, and have a hydrostatic design basis category of at least 1,000-psi (6.9 MPa) at 73.4°F (23°C), as determined by ASTM D2837. Materials that qualify for natural gas service and that carry a recommended HDB at 140°F in accordance with ASTM D2513 also qualify for LPG service without the need for further testing.

Clean rework material of the same type and grade, generated from the manufacturer's own pipe and fitting production, may be used by the same manufacturer as long as the pipe, tubing or fitting produced meet all the requirements of ASTM D2513.

III. Pipe and Tubing

Pipe and Tubing furnished under this specification shall be manufactured using compounds complying with the requirements of Section II, above, and all appropriate requirements of Part 192 of the Minimum Federal Safety Standards. Dimensional characteristics (including outside diameter, wall thickness, toe-in, ovality and length) and performance characteristics

(including chemical resistance, sustained pressure, elevated temperature service, burst pressure/apparent tensile strength, joining, squeeze-off and outdoor storage stability) shall conform to the requirements of ASTM D2513 including applicable annexes. Pipe and Tubing may be supplied in either coils or straight lengths.

IV. Fittings

Polyethylene fittings furnished under this specification shall be manufactured using compounds complying with the requirements of Section II, above and all appropriate requirements of Part 192 of the Minimum Federal Safety Standards. Socket type fittings shall comply with ASTM D2683. Butt fusion fittings shall comply with ASTM D3261. Electrofusion fittings shall comply with ASTM F1055. Plastic mechanical fittings shall comply with ASTM F1924. Mechanical fittings produced from metallic or materials other than plastics listed in Section II shall be approved only after submission of appropriate test data and service histories indicating their acceptability for the intended service. In addition, all mechanical fittings shall be categorized for pullout resistance as stated in ASTM D2513 and identified as to the appropriate category. Plastic valves shall meet the requirements of ANSI Standard B16.40. In all cases, the specifications and requirements for the fittings supplied shall comply with the appropriate sections of Part 192 of the Minimum Federal Safety Standards or NFPA 58 LP Gas Code.

V. Marking

Pipe and tubing shall be marked in accordance with ASTM D2513. Marking shall be legible and shall remain legible under normal handling and installation practices. Indent marking may be utilized provided (1) the marking does not reduce the wall thickness to less than the minimum value for the pipe or tubing, (2) it has been demonstrated that these marks have no effect on the long term strength of the pipe or tubing and (3) the marking will not provide leakage channels when approved elastomeric gasket compression fittings are used to make joints.

Fusion fittings shall be marked on the body or hub. Marking shall be in accordance with ASTM D2513 or the standard to which the fitting is manufactured. Mechanical fittings shall be marked in accordance with the fitting standard to which it is manufactured or Part 192 of the Minimum Federal Safety Standard Section 192.63.

VI. Workmanship

Pipe, tubing and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, blisters, dents, or other injurious

defects. The pipe, tubing, and fittings shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

VII. Quality Control

Quality Control shall be in accordance with the requirements given in ASTM D2513 including applicable annexes.

VIII. Fusion Qualification

The manufacturer of pipe, tubing and or fittings supplied under this specification shall establish and certify heat fusion procedures for the joining of the materials supplied in accordance with the applicable section of (CFR) Title 49, Part 192 "Transportation of Natural and or Other Gases by Pipeline: Minimum Federal Safety Standards" paragraph 192.283. Qualified fusion procedures, with appropriate supporting data, shall be furnished to the purchaser upon request. Suitable generic fusion procedures are included in PPI TR-33, Generic Butt Fusion Joining Procedure for Polyethylene (PE) Gas Pipe.

IX. Resolution of Conflicts

The use of ASTM standard specification references without a year designation implies the most current applicable specification. In the event this specification conflicts with the specification referenced in (CFR) Title 49, Part 192, the requirements of (CSR) Title 49, Part 192 shall prevail.