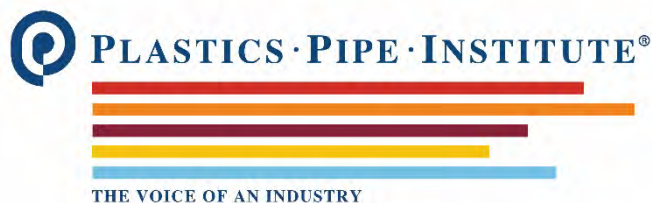


**Model Specification  
For Polyamide 11 (PA-11) Plastic Pipe,  
Tubing and Fittings for  
Fuel Gas Distribution Systems**

**MS-4**

**2017**



## Foreword

### MODEL SPECIFICATION FOR POLYAMIDE-11 (PA-11) PLASTIC PIPE, TUBING AND FITTINGS FOR FUEL GAS DISTRIBUTION SYSTEMS

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. This report has been prepared by PPI as a service of the industry. The information in this report is offered in good faith and believed to be accurate at the time of its preparation, but is offered "as is" without any express or implied warranty, including WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Any reference to or testing of a particular proprietary product should not be construed as an endorsement by PPI, which does not endorse the proprietary products or processes of any manufacturer. Industry members in fulfilling their own compliance responsibilities offer the information in this report for consideration. PPI assumes no responsibility for compliance with applicable laws and regulations.

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The Plastics Pipe Institute, Inc.

<http://www.plasticpipe.org>

This Model Specification was first issued in 2007 and revised in October 2017.

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# **MODEL SPECIFICATION FOR POLYAMIDE-11 (PA-11) PLASTIC PIPE, TUBING AND FITTINGS FOR FUEL GAS DISTRIBUTION SYSTEMS**

## **1.0 INTRODUCTION**

This Model Specification for PA-11 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:

- 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".
- ASTM D2513 - 1999 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings.
- ASTM D4066 Classification System for Nylon Injection and Extrusion Materials (PA).
- ASTM D6779 Standard Classification System for Polyamide Molding and Extrusion Materials (PA).
- ASTM F1733 Standard Specification for Butt Heat Fusion Polyamide (PA) Plastic Fitting for Polyamide(PA) Plastic Pipe and Tubing.
- ASTM F1973 Standard Specification for Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) and Polyamide 11 (PA11) Fuel Gas Distribution Systems.
- ASTM F2145 Standard Specification for Polyamide 11 (PA 11) Mechanical Fittings for Use on Outside Diameter Controlled Polyamide 11 Pipe and Tubing.
- ASTM F2600 Standard Specification for Electrofusion Type Polyamide-11 Fittings for Outside Diameter Controlled Polyamide-11 Pipe and Tubing.
- ASTM F2945 Standard Specification for Polyamide 11 Gas Pressure Pipe, Tubing, and Fittings.
- ASTM F2897 Standard Specification for Tracking and Traceability Encoding System of Natural Gas Distribution Components (Pipe, Tubing, Fittings, Valves, and Appurtenances).
- ANSI Z 221.3 / NFPA 54 National Fuel Gas Code.
- CSA-CAN B137.12-02 Polyamide Piping Systems for Gas Services.
- NFPA 58 Liquefied Petroleum Gas Code.

- PPI TR-3 - Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.
- PPI TR-4 - PPI Listing of Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.
- PPI TR-45 – Butt Fusion Joining Procedure for Field Joining of Polyamide-11 (PA-11) Pipe.

Note: The use of ASTM standard specification references without a year designation implies the most current applicable specification. ASTM D2513-99 is specifically referenced because in 2009 a major revision occurred where all thermoplastics except polyethylene were removed from the main body and annexes of the specification. US Department of Transportation Pipeline Safety Regulations, Code of Federal Regulations (CFR) Title 49, Part 192, continues to reference ASTM D2513-99 for polyamide or other thermoplastics, therefore ASTM D2513 will continue to be supplementally marked on PA-11 pipe and fittings until such time as the Code of Federal Regulations is updated. ASTM D2513-99 is still applicable for the purpose of specification of PA-11 pipe, tubing, and fittings.

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 PA-11 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 utilize these testing facilities.

Using both the appropriate Annex for In-Plant Quality Control of ASTM D2513-99 and/or ASTM F2945 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 qualification testing and acceptance testing of PA-11 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 PA-11 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 D2513-99 and ASTM F2945. In the event local standards are more stringent, appropriate modifications should be made to this model specification.

## 2.0 DISCUSSION

- 2.1. General: All PA-11 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.
- 2.2. Materials: PA-11 compounds utilized in the manufacture of products furnished under this specification shall be virgin and shall have a grade of PA32312, as defined in ASTM D4066. In conformance with ASTM D2513-99 and ASTM F2945, they shall have a PPI recommended hydrostatic design basis (HDB) as shown in the below table for the indicated temperatures:

### **PPI TR-4 HDB Values for PA-11 PA32312**

Temperature	HDB
73°F (23°C)	2500 psi
180°F (82°C)	1250 psi

- 2.3. 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 (CFR) Title 49, 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 D2513-99 and/or ASTM F2945 including applicable annexes. Pipe and Tubing may be supplied in either coils or straight lengths.

2.4. Fittings: PA-11 fittings furnished under this specification shall be manufactured using compounds complying with the requirements of Section II, above and all appropriate requirements of (CFR) Title 49, Part 192 of the Minimum Federal Safety Standards. Butt fusion fittings shall comply with ASTM F1733. Electrofusion fittings shall comply with ASTM F2600. PA-11 mechanical fittings for use on PA-11 piping shall comply with ASTM D 2145. 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.

2.5. Marking: Pipe and tubing shall be marked in accordance with ASTM D2513-99 and ASTM F2600. Marking shall be legible and shall remain legible under normal handling and installation practices. Indent marking may be utilized provided:

- a. the marking does not reduce the wall thickness to less than the minimum value for the pipe or tubing,
- b. it has been demonstrated that these marks have no effect on the long term strength of the pipe or tubing and
- c. 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 D2513-99 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 (CFR) Title 49, Part 192 of the Minimum Federal Safety Standard Section 192.63.

Pipe, tubing and fittings shall be marked with the ASTM F2897 traceability code.

- 2.6. 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.
- 2.7. Quality Control: Quality Control shall be in accordance with the requirements given in ASTM D2513-99 and/or ASTM F2945 including applicable annexes.
- 2.8. 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.
- 2.9. 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.