

Municipal Advisory Board

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MAB Model Specifications for PE 4710 Buried Potable Water Service, Distribution and Transmission Pipes and Fittings (MAB-3-2017)

First edition approved by MAB at the Milwaukee Metropolitan Sewerage District, WI
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FOREWORD

This model specification was developed by the Municipal Advisory Board (MAB) and published with the help of the members of the Plastics Pipe Institute, Inc. (PPI).

This model specification is intended as a guide for engineers, users, contractors, code officials, and other interested parties for use in the design, construction, and installation of high density polyethylene (HDPE) pressure water piping systems. The local utility or engineer may need to modify this model specification to adapt the document to local conditions, operations, and practices.

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The MAB serves as an independent, non-commercial adviser to the Municipal & Industrial (M & I) Division of the PPI. Once adopted, MAB will consider revising this specification from time to time, in response to comments and suggestions from users of the model specification. Please send suggestions of improvements to Camille George Rubeiz, PE, F.ASCE, at crubeiz@plasticpipe.org.

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MAB Model Specifications for PE 4710

Buried Potable Water Service, Distribution and Transmission Pipes and Fittings

PART 1 – GENERAL

1.1 The scope of this model specification is for HDPE water piping systems that conform to AWWA standards. This model specification can be adopted in full, or modified by the specifier to fit the project. This model specification provides minimum requirements for PE 4710 pipe and fittings to be used in the design and construction of pressure water piping systems.

1.2 DESCRIPTION

- A. Scope – This section specifies high-density polyethylene pipe (HDPE) and fittings for water utility use as indicated on the drawings, and as specified herein.
- Furnish, install, and test HDPE piping system as indicated and specified in this section, as referred to in related sections, and as shown in the Drawings.
 - The primary installation method is direct burial. The means and methods, including the testing for acceptance shall conform to all applicable standards as noted herein with the intention of providing a leak-free system to the owner.

1.3 REFERENCES

- A. To the extent referenced in this specification section, the standards and documents listed in Appendix A are included and are made part of this specification.
- B. In the event of a conflict, the requirements of this specification section prevail.
- C. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the bid date of the project.

1.4 SYSTEM DESIGN PARAMETERS

- A. Per AWWA C901, C906 and M55, the Allowable Total Pressure during Recurring Surge conditions equals 1.5 times the pipe's pressure class. Allowable Total Pressure during Occasional Surge conditions equals 2.0 times the pipe's pressure class.
- B. Table 1 lists the preferred pressure classes, Allowable Total Pressure during Recurring and Occasional Surges for PE4710. **Note:** AWWA defines pressure class (PC) differently for different pipe materials, i.e., PC for ductile iron and PVC is different from that for HDPE. For further information on the proper selection of pressure class, visit [PPI PACE](#) and Tables 1 and 2.
- C. Water Hammer
- Fatigue: Use minimum 55 cycles per day for 100-year fatigue design life.
 - Flow Velocity: Use minimum 4 fps for recurring surge design and minimum 8 fps for occasional surge design.

Table 1: PE4710 Preferred Pressure Classes per AWWA C906 and C901 (up to 80°F)

Pipe Dimension Ratio (DR)	Pressure Class / Rating (psi)	Allowable Total Pressure during Recurring Surge (psi)	Allowable Total Pressure during Occasional Surge (psi)	AWWA C906	AWWA C901	Allowable Hydrotest Pressure (psi)
DR 17	125	188	250	Yes	No	188
DR 13.5	160	240	320		No	240
DR 11	200	300	400		No	300
DR 9	250	375	500		Yes	375

Table 2: Required Pressure Class (PC) and Dimension Ratio (DR) for PE4710, PVC and DI*

Working Pressure	PE4710 PC (DR)	PVC PC (DR)	Ductile Iron PC
75 psi	PC125 (DR17)	PC305 (DR14)	PC350

***Example:** In accordance with AWWA standards and manuals and per PPI PACE: Calculate the required PC for 8" DIPS PE4710, PVC and Ductile Iron pipes operating at 75 psi working pressure, with 4 fps recurring surge, 8 fps occasional surge, 55 cycles per day for 100 years and at 73°F temperature.

1.5 SUBMITTALS

A. Quality Assurance / Control Submittals

- i. Affirmation that product shipped meets or exceeds the standards set forth in this specification. This shall be in the form of a written document from the manufacturer attesting to the manufacturing process meeting the standards. *[The specifier can also ask for various test results to be supplied that are done according to the standards]*
- ii. Manufacturers recommended fusion procedures for the products.

1.6 DELIVERY – STORAGE – HANDLING

- A. Handle the pipe in accordance with the PPI *Handbook of Polyethylene Pipe, Chapter 2* using approved strapping and equipment rated for the loads encountered. Do not use chains, wire rope, forklifts or other methods or equipment that may gouge or damage the pipe or endanger persons or property. Field storage is to be in compliance with AWWA Manual M55, Chapter 7.
- B. Shipped with optional, recyclable, end-caps (suggested)
- C. If any gouges, scrapes, or other damage to the pipe results in wall loss 10% or greater (of the pipe wall thickness), cut out that gouged section and do not use.

PART 2 – HDPE PRODUCTS FOR 4 INCH AND LARGER PIPE PER AWWA C906

2.1 – PIPE

- A. HDPE pipe with 4" to 65" diameter shall be PE4710 conforming to the latest edition of ANSI/AWWA C906 and ANSI/NSF Standard 61. For potable water applications, PE4710 compound shall conform to ASTM D3350 minimum Cell classification 445574C-CC2 or CC3. Refer to PPI TN-44 for CC2 and CC3 calculations to determine which classification is required.
 - i. HDPE pipes shall be extruded by a PPI member and shall meet the requirements of AWWA C906. Sample list of sizes is shown in Appendix B.1.
 - ii. Dimensions and tolerances for HDPE pipe and fittings shall meet the requirements of AWWA C906.
- B. HDPE pipe shall be rated for use at a pressure class of _____ *[User specified]* psi. *[The specifier chooses the pressure class from Table 1].* The outside diameter of the pipe shall be based upon the IPS or DIPS sizing system. *[User to specify the appropriate sizing system on the plans.]*
- C. Pipe marking in accordance with Section 2.3.
- D. Approved manufacturers are: *[The specifier is referred to the list of manufacturers as shown on the PPI website http://plasticpipe.org/municipal_pipe/mid-members.php].*

2.2 FITTINGS

- A. Butt Fusion Fittings – HDPE Fittings shall be made of PE4710 and with a minimum Cell Classification as shown in Section 2.1.A. HDPE molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All HDPE fittings shall meet the requirements of AWWA C906 and shall have a pressure rating equal to the pressure rating of the pipe to which the fitting is joined.
 - i. Molded fittings shall be manufactured, tested and marked per ASTM D3261.
 - ii. Fabricated fittings shall be manufactured, tested and marked per ASTM F2206, or individual fittings standards.
 - iii. Socket fittings shall meet ASTM D2683.
- B. Electrofusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE 4710 and with a minimum Cell Classification as noted in 2.1.A. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits and shall be pressure rated equal to the pressure rating of the pipe to which it is joined. Markings shall be according to ASTM F1055.
- C. Flanges and Mechanical Joint adapters (MJ adapters) – Flanges and MJ adapters shall have a material designation code of PE4710 with a minimum Cell Classification as noted in 2.1.A. Flanges shall be made in accordance with ASTM F2880. MJ adapters shall be made to ASTM D3261. Flanges and MJ adapters shall have a pressure rating equal to the pipe to which it is joined unless otherwise specified on the plans. Markings for molded or machined flange adapters or MJ adapters shall be per ASTM D3261. MJ adapters are the preferred connection method over mechanical fittings. Flanges and MJ adapters should be double checked for butterfly valve clearance to allow full disc rotation and movement prior to installation in the trench.
- D. Mechanical Fittings for pipes - Three primary mechanical fittings or connections that can be used are Stab or insert type; compression type; and clamp ring. Some mechanical fittings are designed to be used without stiffeners and other mechanical fittings may require the use of stiffeners. Consult the fittings manufacturer for recommendations on whether a stiffener is required. Mechanical fittings shall be engineered to prevent sliding or rotation movement.

2.3 PIPE AND FITTING IDENTIFICATION

- A. The pipe shall be marked in accordance with the standards to which it is manufactured. *[or alternative as above]*.

Markings shall include the following items: Nominal size (such as 12”), outside diameter base (such as DIPS), dimension ratio (such as DR 17), manufacturer’s name or trademark, standard materials designation code (PE 4710), cell classification (e.g. PE 445574C), PE compound oxidative resistance for potable water (such as CC2), pressure class (such as PC 125), standard’s designation (AWWA C906), manufacturer’s production code, date of manufacture, mark of the certifying agency for potable water (such as NSF).
- B. Color identification by the use of stripes on pipe to identify pipe service is recommended. If used, stripes or colored exterior pipe product shall be blue for potable water. Fittings are typically not striped.
- C. Marking tape shall be approved by the engineer and placed between 6 and 12 inches above the crown of pipe.