DMS-4710
Thermoplastic Pipes, Joints, and Fittings

Effective Date: November 2022

1. DESCRIPTION

This Specification governs for the product evaluation, manufacturer, and material requirements for thermoplastic materials. Thermoplastic pipes, joints, and, fittings including High Density Polyethylene (HDPE) and Polypropylene (PE) materials, are intended for use as pipe culverts and drains up to 48 in. in diameter with up to 20 ft. of fill.

2. MATERIAL PRODUCER LIST

The Department maintains a Material Producer List (MPL) of thermoplastic pipes, joints, and fittings manufacturing plants and materials conforming to the requirements of this Specification. Thermoplastic materials used on Department projects must be produced by manufacturing plants listed on the approved MPL. Thermoplastic materials listed on the approved MPL, for listed manufacturers, will be considered for use subject to the conditions of each project.

3. QUALIFICATION PROCEDURE

3.1. **Qualification Request.** Thermoplastic materials will be evaluated based on the material type, design, durability and service life methodology, test results, and construction and installation methods. Submit a request for evaluation under DMS-4710 to DMS_Prequal@txdot.gov.

Include the following material information in the request:

- company name,
- physical and mailing addresses,
- contact person, phone number, and email address,
- an overview of the system including system theory and development history,
- durability (corrosion, construction damage, environmental) design procedures and service life for each thermoplastic material type,
- detailed construction and installation manual,
- maximum fill height,
- case histories of the use of the pipe on highway projects, and
- copy of manufacturer's current certificate of compliance for AASHTO's National Transportation Product Evaluation Program (NTPEP) Committee Work Plan for Evaluation of Manufacturers of the submitted thermoplastic drainage materials.

3.2. **Evaluation.** The Department will review the submittal and request clarification or additional information as necessary.

3.2.1. **Qualification.** If approved for Department use, the Department will add the material to the MPL for consideration of use subject to the project conditions.

Report any changes in the composition or manufacturing process of any material to AASHTO-NTPEP and the Department. Changes in composition or manufacturing process may require a re-evaluation of the performance and resubmittal of a NTPEP certificate of compliance before use on Department projects. The

Department representatives reserves the right to conduct whatever tests it deems necessary to identify a qualified material and determine if there has been a change in the composition, manufacturing process, or quality that may affect the qualified material's durability or performance. In case of variance, the Department representatives' tests will govern.

3.2.2. **Failure.** Manufacturers not qualified under this Specification may not furnish materials for use on Department projects.

Manufacturers failing to qualify may submit a request for re-evaluation after 6 mo. have elapsed from the date of the original request. The Department may modify this time limit at its discretion. In the request for re-evaluation, document the cause of the failure issue and corrective action taken.

3.3. **Periodic Evaluation.** The Department representatives reserves the right to conduct random sampling and testing of material or product to verify performance and Specification compliance and to perform random audits of the manufacturing plant including all documentation. Department representatives may sample material from the manufacturing plant and the project site.

Failure of materials to comply with the requirements of this Specification as a result of periodic evaluation may be cause for removal of those materials from the MPL. In case of variance, the Department's representatives' tests will govern.

3.4. **Disqualification.** Causes for disqualification and removal from the MPL may include, but are not limited to:

- failure to maintain the applicable AASHTO-NTPEP certificate of compliance,
- failure to report any change in material composition or manufacturing process to AASHTO-NTPEP,
- repetitive poor quality and workmanship of the material or repetitive poor installation,
- failure to provide safe access or allow Department representatives to perform any unannounced inspections or audit of any manufacturing process, documentation, or material produced,
- falsification of or incomplete documentation, or
- furnishing material to Department projects that fails to meet specifications.

The Department will remove disqualified producers from the MPL and will not allow submission of material for re-qualification for 6 mo., at the discretion of the Department.

All previously produced material assigned to the Department will be subject to review and removal from Department assigned inventory. For the remaining material needed on active projects, the Contractor or the disqualified manufacturer must choose another Department-approved manufacturer currently listed on the MPL for the specific material specified to supply the material. The Contractor is responsible for any delays, product price increases, or other costs related to the manufacture disqualification.

Re-Qualification. Once the disqualification period established by the Department has elapsed, producers disqualified and removed from the MPL may begin the re-qualification process by submitting a request in accordance with Section 3.1., "Qualification Request," including additional documentation identifying the cause of the problem and corrective action taken. The re-qualification process will then follow all subsequent Sections of Article 3, "Qualification Procedure."

4. MATERIAL REQUIREMENTS

4.1. **High Density Polyethylene (HDPE) Pipe, Joints, and Fittings.**

4.1.1. **Manufacturer.** Manufacturers of HDPE drainage pipe must comply with the AASHTO-NTPEP Committee Work Plan for Evaluation of HDPE Thermoplastic Drainage Pipe Manufacturers. Qualified manufacturers must also maintain and submit a current AASHTO-NTPEP certificate of compliance.

4.1.2. **General.** Provide HDPE materials meeting the requirements of AASHTO M 294.

4.1.3. **Raw Materials.** Provide HDPE materials manufactured from virgin polyethylene (PE) resin compounds, conforming to the requirements of cell class 435400C as defined and described in ASTM D3350, except that the maximum allowable carbon black content is 4%. Use PE resin compound meeting the slow-crack-growth resistance according to the NCLS test set forth in AASHTO M 294.

4.1.4. **Designation Type.** For HDPE pipe used in gravity flow drainage applications, provide Type S (outer corrugated wall with smooth inner liner).

4.1.5. **Section Properties.** Provide the minimum wall thickness of the inner walls of Type S pipe as specified in AASHTO M 294, Section 7.2.2. Meet the pipe stiffness at 5% deflection requirement as specified in AASHTO M 294, Section 7.4. The minimum section properties must meet the 75-yr. design life requirements in the AASHTO LRFD Bridge Design Specifications, Section 12.

4.2. **Polypropylene Pipe, Joints, and Fittings.**

4.2.1. **Manufacturer.** Manufacturers of polypropylene drainage materials must comply with the AASHTO-NTPEP Committee Work Plan for Evaluation of Polypropylene Drainage Pipe Manufacturers. Qualified manufacturers must also maintain and submit a current AASHTO-NTPEP certificate of compliance.

4.2.2. **General.** Provide polypropylene materials meeting the requirements of AASHTO M 330.

4.2.3. **Raw Materials.** Provide polypropylene compounds used to manufacture the materials that meet the minimum properties of AASHTO M 330, Section 6.1.1.

4.2.4. **Designation Type.** For polypropylene pipe used in gravity flow drainage applications, provide Type S (outer corrugated wall with smooth inner liner).

4.2.5. **Section Properties.** Provide the minimum wall thickness of the inner walls for Type S pipe as specified in AASHTO M 330, Section 7.2.2. Meet the pipe stiffness at 5% deflection requirement as specified in AASHTO M 330, Section 7.4. The minimum section properties must meet the 75-yr. design life requirements in the AASHTO LRFD Bridge Design Specifications, Section 12.

4.3. **Joints and Fittings.**

4.3.1. **General. Provide joints and fittings meeting the following requirements:**

- **Integral Bell and Spigot**. Ensure the bell overlaps a minimum of two corrugations of the spigot end when fully engaged. Provide the spigot end with an O-ring gasket in accordance with ASTM F477.
- **Exterior Bell and Spigot**. Fully weld the bell to the exterior of the pipe and overlap the spigot end so that the flow lines and ends match when fully engaged. Provide the spigot end with an O-ring gasket in accordance with ASTM F477.
- **Split Couplers.** For soil-tight joint connections only. Join pipe with coupling bands covering at least two full corrugations on the ends of each pipe being joined.

4.3.2. **Definitions.** Joint and fitting type definitions are the following:

- **Soil-tight Joints**. Joints meeting the definition in AASHTO *Standard Specifications for Highway Bridges*, Section 26.4.2.4.
- **Watertight Joints**. Joints meeting the requirements of ASTM D3212.

4.4. **Marking.** Furnish pipe clearly marked at maximum 10 ft. intervals and clearly mark all fittings and couplings with:

- manufacturer's name or trademark,
- nominal size,
- specification designation (i.e., AASHTO M 294 or AASHTO M 330),

- manufacturing plant's designation code, and
- date manufactured.

4.5. **Documentation.** Include a certificate of compliance with each shipment. Provide a certificate including the following information: manufacturing plant, date manufactured, pipe dimensions, pipe stiffness, pipe flattening, brittleness, ASTM resin cell classification, and workmanship.