

**948 MISCELLANEOUS TYPES OF PIPE.**  
**(REV 1-15-09) (FA 1-27-09) (7-09)**

SUBARTICLE 948-1.7 (Pages 844 and 845) is deleted and the following substituted:

**948-1.7 Polyvinyl Chloride (PVC) Pipe (12 to 36 Inches):** Polyvinyl Chloride (PVC) Pipe for side drain, cross drain, storm drain and other specified applications shall conform to AASHTO M 278 for smooth wall PVC pipe or ASTM F 949 for PVC ribbed pipe. Mitered end sections are not to be constructed of polyvinyl chloride. Use only concrete or metal mitered end sections as indicated in the Design Standards.

Provide certification of the actual mean diameter of pipe shipped to the project. Include in the certification the minimum and maximum diameters used to certify the actual mean diameter. The certification shall be attested to by a person having legal authority to bind the manufacturing company.

Ensure that the pipe joints have been tested at the plant hydrostatically at the specified pressure using test methods in ASTM D 3212 and witnessed by the Engineer.

SUBARTICLE 948-2.3.1 (Pages 845 and 846) is deleted and the following substituted:

**948-2.3.1 General:** Class I corrugated Polyethylene Pipe used for side drain, storm and cross drain or french drain shall meet the requirements of AASHTO M 294. Class II Corrugated Pipe shall meet the requirements of AASHTO M 294 and the additional requirements as specified herein. Corrugations may only be annular. Ensure that pipe resin conforms to ASTM D3350 minimum cell classification 435400C except that cell class 435400E may be used if the combination of color and UV stabilizer provides the same or better UV protection than that of resin cell class 435400C. Mitered end sections are not to be constructed of polyethylene. Use only concrete or metal mitered end sections as indicated in the Design Standards.

Provide certification of the actual mean diameter of pipe shipped to the project. Include in the certification the minimum and maximum diameters used to certify the actual mean diameter. The certification shall be attested to by a person having legal authority to bind the manufacturing company.

Ensure that the pipe joints have been tested at the plant hydrostatically at the specified pressure using test methods in ASTM D 3212 and witnessed by the Engineer.

Ensure that each shipment of products to the job site includes a list of products and each product has an affixed legible stamp mark of the plant, indicating its compliance with the requirements of the plant's Department approved Quality Control Plan and Contract Documents.

SUBARTICLE 948-2.3.2 (Pages 846 and 847) is deleted and the following substituted:

**948-2.3.2 Additional Requirements for Class II Polyethylene Pipe:** Meet the following requirements:

Table 1			
Stress Crack Resistance of Pipes			
Pipe Location	Test Method	Test Conditions	Requirement

Table 1			
Pipe Liner	FM 5-572, Procedure A	10% Igepal solution at 122°F and 600 psi applied stress, 5 replicates	Average failure time of the pipe liner shall be $\geq 18$ hours, no single value shall be less than 13 hours.
Pipe Corrugation <sup>1</sup> , (molded plaque)	ASTM F 2136	10% Igepal solution at 122°F and 600 psi applied stress, 5 replicates	Average failure time shall be $\geq 24$ hours, no single value shall be less than 17 hours.
Junction	FM 5-572, Procedure B and FM 5-573	Full Test <sup>2,3</sup> : Test temperature 176°F and applied stresses of 650 and 450 psi. Test temperature 158°F and applied stress of 650 psi; 5 replicates at each test condition	Determine failure time at 500 psi at 73.4°F $\geq 100$ years (95% lower confidence) using 15 failure time values <sup>4</sup> . The tests for each condition can be terminated at duration equal to or greater than the following criteria: 110 hr at 176°F 650psi 430 hr at 176°F 450 psi 500 hr at 158°F 650 psi
		Single Test <sup>5</sup> : Test temperature 176°F and applied stress of 650 psi.; 5 replicates	The average failure time must be equal to or greater than 110 hr
Longitudinal Profiles <sup>6</sup>	FM 5-572, Procedure C, and FM 5-573	Full Test <sup>2,3</sup> : Test temperature 176°F and applied stresses of 650 and 450 psi. Test temperature 158°F at applied stress of 650 psi; 5 replicates at each test condition	Determine failure time at 500 psi at 73.4°F $\geq 100$ years (95% lower confidence) using 15 failure time values <sup>4</sup> . The tests for each condition can be terminated at duration equal to or greater than the following criteria: 110 hr at 176°F 650psi 430 hr at 176°F 450 psi 500 hr at 158°F 650 psi
		Single Test <sup>5</sup> : Test temperature 176°F and applied stress of 650 psi.; 5 replicates	The average failure time must be equal to or greater than 110 hr
Oxidation Resistance of Pipes			
Pipe Location	Test Method	Test Conditions	Requirement

Liner and/or Crown <sup>7</sup>	OIT Test (ASTM D 3895)	2 replicates (to determine initial OIT value) on the as manufactured (not incubated) pipe.	25 minutes, minimum
Liner and/or Crown <sup>7</sup>	Incubation test FM 5-574 and OIT test (ASTM D 3895)	Three samples for incubation of 195 days at 176°F <sup>8</sup> and applied stress of 250 psi. One OIT test per each sample	Average of 3 minutes <sup>9, 10</sup> (no values shall be less than 2 minutes)
Liner and/or Crown <sup>7</sup>	MI test (ASTM D1238 at 190°C/2.16 Kg)	2 replicates on the as manufactured (not incubated) pipe.	< 0.4 g/10 minutes
Liner and/or Crown <sup>7</sup>	Incubation test FM 5-574 and MI test (ASTM D1238 at 190°C/2.16 Kg)	2 replicates on the three aged sampled after incubation of 195 days at 176°F <sup>8</sup> and applied stress of 250 psi	MI Retained Value <sup>10, 11, 12</sup> shall be greater than 80% and less than 120%.

Note: FM = Florida Method of Test. 1 Required only when the resin used in the corrugation is different than that of the liner.

2 A higher test temperature (194° F) may be used if supporting test data acceptable to the State Materials Engineer is submitted and approved in writing.

3 Full test shall be performed on alternative pipe diameter of pipe based on wall profile design, raw material cell classification, and manufacturing process. Full test must be performed on maximum and minimum pipe diameters within a manufacturing process.

4 Computer program to predict the 100 year SCR with 95% lower confidence can be obtained from FDOT.

5 Single test for the junction and longitudinal profile may be used on alternating pipe sizes within a manufacturing process. Single point tests may not be used on maximum and minimum pipe sizes within a manufacturing process except by approval of the Engineer. Single point tests may be used for quality assurance testing purposes.

6 Longitudinal profiles include vent hole and molded lines.

7 OIT and MI tests on the crown are required when resin used in the corrugation is different than that of the liner.

8 The incubation temperature and duration can also be 136 days at 185°F.

9 Within each replicate set of tests, the discrepancy range shall be within 6%. If an out-of-range discrepancy occurs, repeat the three OIT tests.

10 The tests for incubated and “as-manufactured” pipe samples shall be performed by the same lab, same operator, the same testing device, and in the same day.

11 Within each replicate set of tests, the discrepancy range shall be within 9%. If an out-of-range discrepancy occurs, repeat the two MI tests on the same pipe sample. If insufficient material is available, a repeat of one test is acceptable.

12 The MI retained value is determined using the average MI value of incubated sample divided by the average MI value of as-manufactured pipe sample.

SUBARTICLE 948-2.3.3 (Page 847) is deleted and the following substituted:

**948-2.3.3 Certification:** Furnish to the Engineer certification from the manufacturer for each pipe diameter manufacturers LOT to be incorporated into the project that the pipe meets the requirements of these Specifications.

Manufacturers seeking evaluation of a product in accordance with Departmental procedures must submit test reports conducted by a laboratory deemed to be appropriately qualified by the Plastics Pipe Institute and acceptable to the State Materials Engineer. Submit this information to the Director, State Materials Office.

**948-2.3.4 Verification Samples:** Furnish verification samples as directed by the Engineer.