



# Florida Department of Transportation

**CHARLIE CRIST**  
GOVERNOR

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**STEPHANIE KOPELOUSOS**  
SECRETARY

January 15, 2009

Monica Gourdine  
Program Operations Engineer  
Federal Highway Administration  
545 John Knox Road, Suite 200  
Tallahassee, Florida 32303

Re: Office of Design, Specifications  
Section 948  
Proposed Specification: 9480203 Miscellaneous Types of Pipe

Dear Ms. Gourdine:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

This change was proposed by Tom Malerk of the State Materials Office to provide necessary changes in testing protocols and test results.

If you have any questions relating to this specification change, please call Rudy Powell, State Specifications Engineer at 414-4110.

Sincerely,

Signature on File

Rudy Powell, Jr., P.E.  
State Specifications Engineer

RP/ft

Attachment

cc: Gregory Jones, Chief Civil Litigation  
Florida Transportation Builders' Assoc.  
State Construction Engineer

**MISCELLANEOUS TYPES OF PIPE.****(REV ~~4-8-08~~ ~~10-21-08~~ ~~1-15-09~~) (FA ~~7-24-08~~) (1-09)**

SUBARTICLE 948-2.3.2 (of the Supplemental Specifications) 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
Pipe Liner	FM 5-572, Procedure A	10% Igepal solution at <del>50</del> <b>122</b> ° <b>CF</b> and 600 psi applied stress, 5 replicates	Average failure time of the pipe liner shall be ≥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 <del>50</del> <b>122</b> ° <b>CF</b> and 600 psi applied stress, 5 replicates	Average failure time shall be ≥24 hours, no single value shall be less than 17 hours.
Junction	FM 5-572, Procedure B and FM 5-573- <del>ASTM D</del> 2837	<i>Full Test</i> <sup>2,3</sup> : Test temperature <del>80</del> <b>176</b> ° <b>FC</b> and applied stresses of 650 and 450 psi. Test temperature <del>70</del> <b>158</b> ° <b>CF</b> and applied stress of 650 psi; 5 replicates at each test condition	<del>Condition A:</del> Determine failure time at 500 psi at <del>273.4</del> <b>73.4</b> ° <b>CF</b> ≥ 100 years (95% lower confidence) using 15 failure time values <sup>4</sup> . <del>values.</del> <del>Condition B:</del> The <i>tests for each condition can</i> average failure times must be terminated at duration equal to or greater than the following <del>criteria:</del> criteria: 110 hr at <del>80</del> <b>176</b> ° <b>CF</b> 650psi 430 hr at <del>176</del> <b>80</b> ° <b>CF</b> 450 psi 500 hr at <del>70</del> <b>158</b> ° <b>CF</b> 650 psi

Table 1			
		Single Test <sup>5</sup> : Test temperature <del>80</del> 176°F and applied stress of 650 psi.; 5 replicates	The average failure time must be equal to or greater than 110 hr
Longitudinal <del>Profiles</del> <sup>6</sup> Profile *	FM 5-572, Procedure C, and FM 5-573 ASTM 2837	<del>Full Test</del> <sup>2,3</sup> : Test temperature <del>80</del> 176°F and applied stresses of 650 and 450 psi. Test temperature <del>70</del> 158°F at applied stress of 650 psi; 5 replicates at each test condition	<del>Condition A:</del> Determine failure time at 500 psi at <del>2</del> 73.4°F ≥ 100 years (95% lower confidence) using 15 failure time <del>values</del> <sup>4</sup> . values. <del>Condition B:</del> The <del>tests for each</del> <del>condition can</del> average <del>failure times must be</del> <del>terminated at duration</del> equal to or greater than the following <del>criteria:</del> criteria; 110 hr at <del>80</del> 176°F 650psi 430 hr at <del>80</del> 176°F 450 psi 500 hr at <del>70</del> 158°F 650 psi
		Single Test <sup>5</sup> <del>for</del> <del>Verification</del> : Test temperature <del>80</del> 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) <i>on the as manufactured (not incubated) pipe. on the unaged as manufactured pipe</i>	25 minutes, minimum
Liner and/or Crown <sup>7s</sup>	Incubation test FM 5--574 and OIT test (ASTM D 3895)	Three samples for incubation of 195 days at <del>80</del> 176°F <sup>8</sup> and applied stress of 250 psi. One OIT test per each sample	Average of 3 <i>minutes</i> <sup>9</sup> , <del>± 1 minutes</del> <sup>10</sup> (no values shall be less than 2 minutes)

Liner and/or Crown <sup>7</sup>	MI test (ASTM D1238 at 190°C/2.162.16 kgKg)	2 replicates on the as manufactured (not incubated) pipe. <del>on the unaged as manufactured pipe.</del>	< 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/2.162.16 Kg-kg)	2 replicates on the three aged sampled after incubation of 195 days at 176°C <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. <sup>‡</sup> Required only when corrugation resin is different than liner resin. <sup>\*</sup> A higher test temperature (90°C) may be used if supporting test data acceptable to the State Materials Engineer is submitted and approved in writing.*

*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.*

**MISCELLANEOUS TYPES OF PIPE.****(REV 1-15-09)**

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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

Table 1			
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 ≥ 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
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Table 1

<p>Note: FM = Florida Method of Test. 1 Required only when the resin used in the corrugation is different than that of the liner.</p> <p>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.</p> <p>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.</p> <p>4 Computer program to predict the 100 year SCR with 95% lower confidence can be obtained from FDOT.</p> <p>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.</p> <p>6 Longitudinal profiles include vent hole and molded lines.</p> <p>7 OIT and MI tests on the crown are required when resin used in the corrugation is different than that of the liner.</p> <p>8 The incubation temperature and duration can also be 136 days at 185°F.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
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