



Florida Department of Transportation

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Tallahassee, FL 32399-0450

KEVIN J. THIBAUT, P.E.
SECRETARY

July 13, 2021

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section: **948**
Proposed Specification: **9480205 OPTIONAL DRAINAGE PRODUCTS AND
REPAIR SYSTEMS.**

Dear Mr. Nguyen:

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

The changes are proposed by Elizabeth Weber to add production, materials, and lab accreditation language to facilitate the implementation of steel reinforced polyethylene corrugated pipe into the Standard Specification.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at 850-414-4130.

Sincerely,

Signature on file

Daniel Strickland, P.E.
State Specifications Engineer

DS/dh

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

**OPTIONAL DRAINAGE PRODUCTS AND REPAIR SYSTEMS
(REV 5-18-21)**

ARTICLE 948-2 is expanded by the following new Subarticle:

948-2.5 Steel Reinforced Polyethylene Corrugated Pipe:

948-2.5.1 General: Class I (50-year design service life) steel reinforced polyethylene corrugated pipe used for side drain, storm and cross drain must meet the requirements of AASHTO MP 42 with plant certification from the National Transportation Product Evaluation Program (NTPEP), provided such certification for this category of pipe is available. Pipe resin must conform to ASTM D3350 with a minimum cell classification of 334452C or E and between 2% to 4% carbon black. Thermosetting polyurethane materials used for pipe joints must be polyester-based and meet the requirements of Table 948-2. Post-consumer and post-industrial recycled resins are not allowed. Perforations are not allowed. Mitered end sections are not to be constructed of steel reinforced polyethylene corrugated pipe.

Obtain pipe from a production facility that is listed on the Department's Production Facility Listing. Producers seeking inclusion to the listing shall meet the requirements of Section 105.

<u>Table 948-2</u> <u>Polyurethane Component Requirements</u>			
<u>Test Methods</u>	<u>Test Conditions</u>		<u>Requirement</u>
<u>ASTM D2240</u> <u>Durometer Hardness</u> <u>1-inch Thick Specimens</u>	<u>Initial</u>		<u>≥60</u>
	<u>After 6 Months Exposure to Each Condition*</u>		<u>No more than 10% reduction from measured initial value</u>
<u>ASTM D695</u> <u>Compressive Properties</u> <u>0.1 inch per minute Load Rate</u>	<u>Initial</u>		<u>≥200 psi</u>
	<u>After 6 Months Exposure to Each Condition*</u>		<u>No more than 10% reduction from measured initial value</u>
<u>ASTM D1623</u> <u>Yield Tensile Strength</u> <u>Type B Specimens</u> <u>0.1 inch per minute Load Rate</u>	<u>Initial</u>		<u>≥300 psi</u>
	<u>After 6 Months Exposure to Each Condition*</u>		<u>No more than 30% reduction from measured initial value</u>
<u>*Exposure Conditions:</u>			
<u>Solution pH</u>	<u>Resistivity (Ohm-cm), Minimum</u>	<u>Chloride Content (ppm), Maximum</u>	<u>Temperatures (°C)</u>
<u>5.5</u>	<u>1,000</u>	<u>300</u>	<u>60, 80, 90</u>
<u>7</u>	<u>1,000</u>	<u>300</u>	<u>60, 80, 90</u>
<u>12</u>	<u>1,000</u>	<u>300</u>	<u>60, 80, 90</u>

948-2.5.2 Project Material Acceptance: Prior to use, submit to the Engineer a material certification from the manufacturer confirming that the requirements of this Section are met. The certification shall conform to the requirements of Section 6.

948-2.5.3 Laboratory Accreditation: Manufacturers seeking evaluation of a product in accordance with Departmental procedures must submit test reports conducted by a laboratory qualified by the Geosynthetic Accreditation Institute-Laboratory Accreditation Program (GAI-LAP) or qualified by ISO 17025 accreditation agency using personnel with actual experience performing the test methods for steel reinforced polyethylene pipe. Submit the test reports to the State Materials Office.

SUBARTICLE 948-7.2 is deleted and the following substituted:

948-7.2 Additional Requirements for Class II (100-Year Design Service Life) PP

Pipe: Meet the requirements in Table 948-~~23~~ in addition to those in 948-7.1. Manufacturers may only use ground Class II PP for reworked plastic.

Table 948- 23 Stress Crack Resistance			
Pipe Location	Test Method	Test Conditions	Requirement
Pipe Liner	FM 5-572, Procedure A	10% Igepal solution at 50°C and 600 psi applied stress, 5 replicates	Average failure time of the pipe liner shall be ≥100 hours, no single value shall be less than 71 hours. ⁽¹⁾
Oxidation Resistance			
Pipe Location	Test Method	Test Conditions	Requirement
Pipe Liner and/or Crown ⁽²⁾	OIT Test (ASTM D3895)	2 replicates (to determine initial OIT value) on the as manufactured (not incubated) pipe.	25.0 minutes, minimum
Pipe Liner and/or Crown ⁽²⁾	Incubation test FM 5-574 and OIT test (ASTM D3895)	Three samples for incubation of 264 days at 85°C ⁽³⁾ . One OIT test per each sample	Average of 3.0 minutes ⁽⁴⁾ (no values shall be less than 2.0 minutes)
Pipe Liner and/or Crown ⁽²⁾	MI test (ASTM D1238 at 230°C/2.16Kg)	2 replicates on the as manufactured (not incubated) pipe.	< 1.5 g/10 minutes
Pipe Liner and/or Crown ⁽²⁾	Incubation test FM 5-574 and MI test (ASTM D1238 at 230°C/2.16Kg)	2 replicates on the three aged sampled after incubation of 264 days at 85°C ⁽³⁾	MI Retained Value ⁽⁴⁾⁽⁵⁾⁽⁶⁾ shall be greater than 80% and less than 120%.

Note: FM = Florida Method of Test.

(1) If due to sample size this test cannot be completed on the liner then testing shall be conducted on a molded plaque sample.

Samples can be removed if test time exceeds 100 hours without failure.

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

(3) The incubation temperature and duration can also be 192 days at 90°C or 140 days at 95°C.

(4) 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.

(5) 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.

(6) 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.

ARTICLE 948-8 is deleted and the following substituted:

948-8 Filter Fabric Sock for Use with Underdrain.

For Type I underdrain specified in Standard Plans, Index 440-001, filter sock shall be an approved strong rough porous, polyester or other approved knitted fabric which completely covers and is secured to the perforated plastic tubing underdrain in such a way as to prevent infiltration of trench backfill material.

The knitted fabric sock shall be a continuous one-piece material that fits over the tubing like a sleeve. It shall be knitted of continuous 150 denier yarn and shall be free from any chemical treatment or coating that might significantly reduce porosity and permeability.

The knitted fabric sock shall comply with the following physical properties:

Table 948-34		
Weight, applied (oz/sq. yd.)	3.5 min	ASTM D3887
Grab tensile strength (lbs.)	50 min.*	ASTM D5034
Equivalent opening size (EOS No.)	25 min.**	Corps of Engineers CW-02215-77
Burst strength (psi)	100 min.**	ASTM D3887
*Tested wet.		
**Manufacturer's certification to meet test requirement.		

The knitted fabric sock shall be applied to the tubing in the shop so as to maintain a uniform applied weight. The tubing with knitted fabric sock shall be delivered to the job site in such manner as to facilitate handling and incorporation into the work without damage. The knitted fabric sock shall be stored in UV resistant bags until just prior to installation. Torn or punctured knitted fabric sock shall not be used.

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948-2.5.1 General: Class I (50-year design service life) steel reinforced polyethylene corrugated pipe used for side drain, storm and cross drain must meet the requirements of AASHTO MP 42 with plant certification from the National Transportation Product Evaluation Program (NTPEP), provided such certification for this category of pipe is available. Pipe resin must conform to ASTM D3350 with a minimum cell classification of 334452C or E and between 2% to 4% carbon black. Thermosetting polyurethane materials used for pipe joints must be polyester-based and meet the requirements of Table 948-2. Post-consumer and post-industrial recycled resins are not allowed. Perforations are not allowed. Mitered end sections are not to be constructed of steel reinforced polyethylene corrugated pipe.

Obtain pipe from a production facility that is listed on the Department’s Production Facility Listing. Producers seeking inclusion to the listing shall meet the requirements of Section 105.

Table 948-2 Polyurethane Component Requirements			
Test Methods	Test Conditions		Requirement
ASTM D2240 Durometer Hardness 1-inch Thick Specimens	Initial		≥60
	After 6 Months Exposure to Each Condition*		No more than 10% reduction from measured initial value
ASTM D695 Compressive Properties 0.1 inch per minute Load Rate	Initial		≥200 psi
	After 6 Months Exposure to Each Condition*		No more than 10% reduction from measured initial value
ASTM D1623 Yield Tensile Strength Type B Specimens 0.1 inch per minute Load Rate	Initial		≥300 psi
	After 6 Months Exposure to Each Condition*		No more than 30% reduction from measured initial value
*Exposure Conditions:			
Solution pH	Resistivity (Ohm-cm), Minimum	Chloride Content (ppm), Maximum	Temperatures (°C)
5.5	1,000	300	60, 80, 90
7	1,000	300	60, 80, 90
12	1,000	300	60, 80, 90

948-2.5.2 Project Material Acceptance: Prior to use, submit to the Engineer a material certification from the manufacturer confirming that the requirements of this Section are met. The certification shall conform to the requirements of Section 6.

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Table 948-3 Stress Crack Resistance			
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Pipe Liner	FM 5-572, Procedure A	10% Igepal solution at 50°C and 600 psi applied stress, 5 replicates	Average failure time of the pipe liner shall be ≥100 hours, no single value shall be less than 71 hours. ⁽¹⁾
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Pipe Liner and/or Crown ⁽²⁾	MI test (ASTM D1238 at 230°C/2.16Kg)	2 replicates on the as manufactured (not incubated) pipe.	< 1.5 g/10 minutes
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