Origination Form

Specifications

Name:	Alexander Lewis	**Standard Specification Section:**	948
Email:	alexander.lewis@dot.state.fl.us	**Special Provision:**	
Date:	2025-06-05T11:47:33Z	**Associated Specs:**	None

Summary:

Harmonized specific requirements for edgedrain pipe with current AASHTO M252 standard.

Justification:

The requirements for edgedrain pipe are outdated and the industry standard for pipe stiffness has changed.

Do the changes affect other types of specifications?

Neither

List Specifications Affected:

Other Affected Documents/Offices	Contacted	Yes/No
Other Standard Plans		No
Florida Design Manual		No
Structures Manual		No
Basis of Estimates Manual		No
Approved Product List		No
Construction Office		No
Maintenance Office		No
Materials Manual		No
Traffic Engineering Manual		No

Are changes in line with promoting and making progress on improving safety, enhancing mobility, inspiring innovation, and fostering talent; explain how?

Aligning with current industry standards inspires innovation by demonstrating commitment to adopting new technologies.

What financial impact does the change have; project costs, pay item structure, or consultant fees?

No financial impact.

What impact does the change have on production or construction schedules?

Little to no change on production or construction schedules.

How does this change improve efficiency or quality?

Harmonizing required classes of pipe with the current AASHTO standards will improve efficiency of the materials selection process.

Which FDOT offices does the change impact?

Materials, Drainage, Construction, Standard Plans

What is the impact to districts with this change?

There should be no impact on the districts.

Does the change shift risk and to who?

Updating requirements to match current industry standards reduces overall risk.

Provide summary and resolution of any outstanding comments from the districts or industry.

Comments and Responses are available on the Track the Status of Revisions hyperlink located on the Specifications landing page: https://www.fdot.gov/programmanagement/Specs.shtm

What is the communication plan?

Through the established specification revision process (e.g., Internal and Industry Review)

What is the schedule for implementation?

The Standard Specifications eBook and Workbook are effective July 1st every year.

OPTIONAL DRAINAGE PRODUCTS AND REPAIR SYSTEMS
(REV 6-5-2025)

ARTICLE 948-2 is deleted and the following substituted:

948-2 Corrugated Polyethylene Tubing and Pipe.

948-2.1 General: For underdrain, corrugated polyethylene tubing and fittings shall meet the requirements of AASHTO M 252. For edgedrain, corrugated polyethylene tubing and fittings shall meet the requirements of AASHTO M 252 Type S/SP pipe with Class 1 or 2 perforation~~, except as modified in 9482.2~~. For storm drain side drain, french drain and cross drain corrugated polyethylene pipe shall meet the requirements of AASHTO M 294 and 948-2.2~~3~~.

The tubing or pipe shall not be left exposed to sunlight for periods exceeding the manufacturer's recommendation.

~~**948-2.2 Edgedrain (4 Inches to 10 Inches):** The requirements for edgedrain as specified in AASHTO M 252 are modified as follows:~~

~~1. Coiling of tubing 6 inches in diameter or greater is not permitted. Tubing shall have a minimum pipe stiffness of 46 psi at 5% deflection.~~

948-2.2~~3~~ Corrugated High Density Polyethylene (HDPE) Pipe (12 Inches to 60 Inches):

948-2.2~~3~~.1 General: Class I (50-year design service life) corrugated HDPE pipe used for side drain, storm and cross drain or french drain shall meet the requirements of AASHTO M 294(V) with plant certification from the AASHTO Product Evaluation & Audit Solutions. Corrugations shall be annular. Pipe resin shall conform to ASTM D3350 with a minimum cell classification 435400C and between 2% to 4% carbon black. Post-consumer and post-industrial recycled resins are not allowed. Mitered end sections are not to be constructed of polyethylene.

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

948-2.2~~3~~.2 Additional Requirements for Class II (100-Year Design Service Life), Type S HDPE Pipe: Class II HDPE pipe shall meet the requirements in Table 948-1 in addition to those in 948-2.3. Perforations will not be allowed. Manufacturers may only use ground Class II HDPE pipe for reworked plastic.

948-2.2~~3~~.2.1 Requirements for Use in Structures with Resilient Connectors: Use gasketed corrugated pipe sleeve adapters to completely seal to and cover the pipe corrugations. Corrugated pipe sleeve adapters shall be an elongated bell with a smooth outer wall, manufactured at a minimum of 12-inches in length and inserted over the double gasketed corrugations. The sleeve adapters shall be manufactured from polypropylene resin compounds in accordance with ASTM F2881. Upon installation, the connection with the resilient connector shall meet the requirements of ASTM F2510.

Table 948-1 Stress Crack Resistance of Pipes			
Pipe Location	Test Method	Test Conditions	Requirement
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 ≥18.0 hours, no single value shall be less than 13.0 hours.
Pipe Corrugation[(1)], (molded plaque)	ASTM F2136	10% Igepal solution at 122°F and 600 psi applied stress, 5 replicates	Average failure time shall be ≥24.0 hours, no single value shall be less than 17.0 hours.
Junction	FM 5-572, Procedure B and FM 5-573	Full Test[(2)(3)] Test at 3 temperature/stress combinations: 176°F at 650 psi 176°F at 450 psi 158°F at 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[(4)] The tests for each condition can be terminated at duration equal to or greater than the following criteria: 110.0 hr at 176°F 650 psi 430.0 hr at 176°F 450 psi 500.0 hr at 158°F 650 psi
		Single Test[(5)]: Test temperature 176°F and applied stress of 650 psi.; 5 replicates	The average failure time must be equal to or greater than 110.0 hr
Longitudinal Profiles[(6)]	FM 5-572, Procedure C, and FM 5-573	Full Test[(2)(3)]: Test at 3 temperature/stress combinations: 176°F at 650 psi 176°F at 450 psi 158°F at 650 psi; 5 replicates at each test condition	Determine failure time at 500psi at 73.4°F ≥ 100 years (95% lower confidence) using 15 failure time values[(4)]. The tests for each condition can be terminated at duration equal to or greater than the following criteria: 110.0 hr at 176°F 650 psi 430.0 hr at 176°F 450 psi 500.0 hr at 158°F 650 psi
		Single Test[(5)]: Test temperature 176°F and applied stress of 650 psi.; 5 replicates	The average failure time must be equal to or greater than 110.0 hr (no value shall be less than 55.0 hours)

Table 948-1 Stress Crack Resistance of Pipes			
Oxidation Resistance of Pipes			
Pipe Location	Test Method	Test Conditions	Requirement
Liner and/or Crown(7)	OIT Test (ASTM D3895)	2 replicates (to determine initial OIT value) on the as manufactured (not incubated) pipe.	25.0 minutes, minimum
Liner and/or Crown(7)	Incubation test FM 5-574 and OIT test (ASTM D3895)	Three samples for incubation of 265 days at 176°F(8) and applied stress of 250 psi. One OIT test per each sample	Average of 3.0 minutes(9) (no values shall be less than 2.0 minutes)
Liner and/or Crown(7)	MI test (ASTM D1238 at 190ºC/2.16Kg)	2 replicates on the as manufactured (not incubated) pipe.	< 0.4 g/10 minutes
Liner and/or Crown(7)	Incubation test FM 5-574 and MI test (ASTM D1238 at 190°C/2.16Kg)	2 replicates on the three aged sampled after incubation of 265 days at 176°F(8) and applied stress of 250 psi	MI Retained Value(9)(10) 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 holes 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 196 days at 185°F.
(9) 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.
(10) 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.

948-2.23.3 Material Acceptance: Meet the requirements of 948-1.7.1.

948-2.23.4 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 running the test methods for Class II HDPE pipe. Submit the test reports to the State Materials Office.

948-2.4 Steel Reinforced Polyethylene Ribbed Pipe:

948-2.4.1 General: Steel reinforced polyethylene ribbed pipe used for side drain, storm and cross drain, or french drain shall meet the requirements of AASHTO M 335 with plant certification from the AASHTO Product Evaluation & Audit Solutions and the testing

requirements for stress crack and oxidation resistance in Table 948-1. Pipe resin shall conform to ASTM D3350 with a minimum cell classification 435400C and between 2% to 4% carbon black. Post-consumer and post-industrial recycled resins are not allowed. Mitered end sections are not to be constructed of steel reinforced polyethylene ribbed pipe.

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

948-2.4.2 Material Acceptance: Meet the requirements of 948-1.7.1.

948-2.4.3 Laboratory Accreditation: Meet the requirements of 948-2.3.4 except use personnel with actual experience running the test methods for steel reinforced polyethylene ribbed pipe.

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 AASHTO Product Evaluation & Audit Solutions, 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.

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.