



Florida Department of Transportation

JEB BUSH
GOVERNOR

State Materials Office • Materials Research Park
5007 NE 39th Avenue • Gainesville, FL 32609
Phone (352) 955-6600 • Fax (352) 955-6613

JOSÉ ABREU
SECRETARY

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This Memo Has Expired

MATERIALS BULLETIN NO. 06-05
DCE MEMORANDUM NO. 11-05

TO: DISTRICT MATERIALS ENGINEERS
DISTRICT CONSTRUCTION ENGINEERS

FROM: Thomas O. Malerk, P.E., Director, Office of Materials
Ananth Prasad, P.E., Director, Office of Construction

COPIES: Florida Transportation Builders' Association, Plastics Pipe Institute

SUBJECT: **Class II High Density Polyethylene (HDPE) Corrugated Pipe
Procedures for Initial Product Approval and Manufacturer Quality
Control/Quality Assurance**

Effective July 1, 2005, Section 948 of the Standard Specifications is expanded to include Class II High Density Polyethylene Corrugated Pipe for use in most highway applications. Restrictions to use of Class II HDPE pipe presently include 1) installation under interstate highway pavement, and 2) all portions of the Florida Keys situated within Monroe County accessible by U.S. Highway 1. This new class of pipe has testing and performance requirements that include, but go beyond those specified in AASHTO M294. These additional requirements are reflected in the July 1, 2005 revision to Section 948.

Initial product approvals for this new class of pipe will be handled by the State Materials Office. As products are approved, they will be listed on an SMO website posting. Products will be listed by manufacturer, plant location and pipe sizes. Initial product approval testing is not expected to be completed until the last quarter of this year.

The introduction of Class II pipe will require significant changes in manufacturers' Quality Control/Quality Assurance systems. The majority of these changes come from industry developed standards for Quality Control, Quality Assurance procedures described in k., below.

For purposes of initial product approval and manufacturer's Quality Control, Quality Assurance activities, we have implemented the following requirements for manufacturers of high density polyethylene corrugated pipe:

- a. **Laboratory Accreditation:** All test results for initial product approval must be conducted by either an accredited independent laboratory or accredited pipe or resin manufacturer's laboratory deemed appropriately qualified by the Plastics Pipe Institute. The laboratory accreditation program shall be in accordance with Geosynthetic Accreditation Institute (GAI) or other accreditation program meeting the requirements of International Standards Organization (ISO) 17025. Quality Control, Quality Assurance tests conducted by pipe manufacturers shall be performed by personnel meeting the requirements of the accreditation agency. Test results obtained via multiple laboratory participation in round-robin testing programs sponsored on behalf of FDOT may be used to satisfy applicable parts of the specification requirements for initial product approval if the test results can be validated to the satisfaction of the Director, State Materials Office.
- b. **Compliance With Specifications:** All test results must indicate full compliance with the properties specified in Table 1 of Section 948 except as may be modified in c. below.
- c. **Initial Product Approval:** Test results must be submitted for each diameter of pipe proposed for use. Single point (index) tests for the junction and longitudinal profile may be used on alternating pipe sizes within a manufacturing process if the single point test is validated to the satisfaction of the Director, State Materials Office. Single point index tests may not be used on maximum and minimum pipe sizes within a manufacturing process as defined and described by the manufacturer and approved by the Director, State Materials Office. Other temperatures in the incubation for OIT evaluation may be employed if such temperatures can be scientifically validated to the satisfaction of the Director, State Materials Office.
- d. **Submittals:** Requests from manufacturers for initial source approval of Class II HDPE pipe shall be submitted to the Director, State Materials Office.
- e. **Sample Authentication:** For initial product approval, the manufacturer shall coordinate the sample selection with the Director, State Materials Office and provide a representative sample (seven corrugations in length) for evaluation purposes.

- f. **Materials Identity:** For initial and continuing manufacturer/product approval purposes, the pipe manufacturer shall identify in their QC/QA plan (or other proprietary documentation) each formulation of resin proposed for use. The listing shall include the identity of resin, antioxidant inhibitor, carbon black and blend ratios for each resin formulation. Each formulation shall be given a numerical designation and this designation must be included in the product certifications for the pipe. Proprietary components and proportioning may be identified by coding.
- g. **Melt Index Variation:** Pipe shall meet the Junction Test requirements described in Table 1 of Section 948 in accordance with Item c. above, at any time there is a substantial change in resin class or source. A substantial change in resin is defined as a variation in resin melt index of more than 30% of the pipe manufacturer's targeted value for a specific resin or blend.
- h. **Antioxidant Variation:** The oxidation resistance test requirements described in Table 1 shall be met on at least one pipe diameter from each manufacturing process at any time there is a change in antioxidant or carrier resin composition, grade or volume.
- i. **Carbon Black Variation:** Pipe shall meet the Pipe Liner test requirements described in Table 1 of Section 948 at any time there is a change in the grade or volume of carbon black or color concentrate.
- j. **Full Protocol Testing:** Prior to the issuance of manufacturer approval, the pipe manufacturer shall produce evidence satisfactory to the Director, State Materials Office substantiating that the full series of tests for Class II HDPE pipe as outlined in FDOT Research Report, "Protocol for Estimating the Service Life of Corrugated High Density Polyethylene Pipe," or amendments thereto, have been initiated or scheduled, including a schedule for completion of the full protocol testing. Failure on behalf of the pipe manufacturer to continuously pursue full protocol testing could result in denial or suspension from Class II HDPE pipe approval status.
- k. **Quality Control, Quality Assurance Plans:** The manufacturers shall modify their QC/QA Plans to address each of the requirements of Section 948, this Materials Bulletin and the minimum requirements set forth in Plastic Pipe Institute, "Recommended Quality Control / Quality Assurance Procedures for Manufacturers of Corrugated High Density Polyethylene Pipe." Minimum Quality Assurance testing is shown in Table 2.
- l. **Index Testing:** Single point index tests may be used for quality assurance testing purposes if the single point value can be validated to the satisfaction of the Director, Office of Materials.

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- m. **OIT Test Requirements:** The required test value for the incubation test using Florida Method of Test, FM 5-574 and ASTM D 3895 shall be ≥ 3 minutes with no single value less than 2 minutes.
- n. **Pipe Corrugation Test, ASTM F 2136:** The required value for the pipe corrugation test shall be based on NCHRP Report 426 and as may be modified by round-robin testing.
- o. **Pipe Liner, FM 5-572, Procedure A:** The required value shall be based on NCHRP Report 426 and as may be modified by round-robin testing.
- p. **Raw Material NCLS Test, ASTM F 2136:** The average failure time shall be based on NCHRP Report 426 and as may be modified by round-robin testing.

Over the coming months, the State Materials Office will be carrying out the following activities in conjunction with the implementation of Class II HDPE pipe:

1. Provide sample authentication of manufacturer's pipes for purposes of initial product approval testing.
2. Conduct audits of product approval testing. Provide random independent verification testing.
3. Establish test target values for product approval and pipe production based on product and testing variability.
4. Determine acceptability of product test data; determine specification compliance.
5. Maintain database of approved manufacturers and pipe sizes approved.
6. Assist the District Materials Engineers in determining whether manufacturer's Quality Control/Quality Assurance Plan meets all requirements.
7. Identify training needs and participate with the State Construction Office, State Drainage Office in the development and delivery of training materials.
8. Provide orientation to District Materials Office staff on administration of new Section 948 specification requirements.
9. Verify that the pipe manufacturer has complied with the requirement of item j. above relative to full protocol testing.

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10. Provide independent verification of full protocol testing.
11. Provide periodic quality system reviews.
12. Update Section 6 of the Materials Manual to reflect current specifications and this Materials Bulletin.
13. Update the Culvert Service Life Estimator to reflect acceptability of Class II HDPE pipe.

The activities listed above are intended to ensure successful implementation of this new class of pipe and to assist the Districts in the administration of associated new specification requirements.

The overall responsibilities of the District Materials Office's outlined in Section 6.1 of the Materials Manual are unchanged.

If you have any questions, please contact Rod Powers, 352-955-6690.

TOM/rp