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**** Expired ****

MATERIALS BULLETIN NO. 07-08

DCE MEMORANDUM NO. 17-08

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**TO: DISTRICT MATERIALS RESEARCH ENGINEERS
DISTRICT CONSTRUCTION ENGINEERS**

**FROM: Thomas O. Malerk, P.E., Director, Office of Materials
Brian A. Blanchard, P. E., Director, Office of Construction**

**COPIES: Rodney G. Powers, Richard Kessler, Mario Paredes,
Florida Transportation Builder's Association, Plastics Pipe Institute**

**RE: REVISION TO TESTING PROTOCOL FOR SECTION 948
CLASS II HIGH DENSITY POLYETHYLENE PIPE**

By mutual agreement with the plastic pipe industry (Plastics Pipe Institute) the product approval testing protocol for Class II HDPE pipe in the current Section 948 shall be supplemented with additional testing as described herein. This revision is applicable only to Class II HDPE pipe and does not affect any current construction contracts since there currently are no approved sources for Class II HDPE pipe. This Materials Bulletin is of particular interest to those HDPE pipe manufacturers presently seeking approval of their Class II pipes.

This supplemental testing is necessary to ensure that polymer degradation has not commenced during the incubation period when the Oxidative Induction Time (OIT) approaches lower values.

The incubation test in Section 948, Table 1 (excerpted below) shall be supplemented by Melt Index (MI) testing per ASTM D1238, Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.

Table 1(from Section 948)			
Oxidation Resistance of Pipes			
Pipe Location	Test Method	Test Conditions	Requirement
Liner and/or Crown	OIT Test (ASTM D 3895)	2 replicates (to determine initial OIT value)	25 minutes, minimum
Liner and/or Crown	Incubation test FM 5-574 and OIT test ASTM D 3895	Three samples for incubation of <u>195 days at 80°C*</u> and applied stress of 250 psi. One OIT test per each sample.	Average OIT value shall be ≥ 3 minutes (no single value shall be less than 2 minutes)

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*In the May 20th Memo, Dr. Hsuan clarified that the incubation duration of 195 days at 80°C is equivalent to 136 days at 85°C based on the Arrhenius equation using activation energy value of 75 kJ/mol.

Melt Index (MI) tests shall be conducted on both the “as-manufactured pipe and the incubated samples described in Table 1. Tests shall be replicated (two tests). 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. Within each replicate set of tests, the discrepancy range shall be within 9% which is the I_r value of the test, see Table 2, below. 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.

Table 2 – Melt Index Test Precision values for two HDPE resins included in Table 4 of ASTM D1238

Material	Condition	Average	S_r	S_R	I_r	I_R
		(g/10 min)				
HDPE-1	190/2.16	0.27	0.008 (3%)	0.022 (8%)	0.023 (9%)	0.063 (23%)
HDPE-2	190/2.16	0.40	0.012 (3%)	0.038 (10%)	0.035 (9%)	0.108 (27%)

S_r = within-lab standard deviation of the mean

S_R = between-labs standard deviation of the mean

I_r = 2.83 S_r , and

I_R = 2.83 S_R .

Note:

Repeatability – In comparing two mean values for the same materials obtained by the same operator using the same equipment on the same day, the means should be judged not equivalent if they differ by more than the I_r value for that material and condition.

Reproducibility – In comparing two mean values for the same material obtained by different operators using different equipment on different days, the means should be judged not equivalent if they differ by more than then I_R value for that material and condition. (This applies between different laboratories or between different equipment within the same laboratory.)

Samples incubated as shown in Table 1 shall have a MI value that is greater than 80% and less than 120% of the MI value of the “as-manufactured” pipe. As an alternate to the incubation time and temperature shown in Table 1, the MI tests may be run at 136 days @ 85°C.

The OIT requirement for incubated samples in Table 1 remains unchanged at this time but is subject to revision pending further research.

Questions concerning this topic should be directed to the Office of Materials, Rodney G. Powers, Telephone 352-955-6690 or Mario Paredes, Telephone 352-955-6691.

TOM/BAB/rgp