



## **TECHNICAL MEMORANDUM Product 0-6741-P1**

**Product P1 Draft Test Protocols for PFC's in TxDOT Format**

**TxDOT Project 0-6741, Longer Lasting Permeable Friction Courses (PFC's).**

**PUBLISHED:** March 2016

**TO:** RTIMAIN@txdot.gov

**FROM:** Tom Scullion, Senior Research Engineer

**FOR MORE INFORMATION:**

Name: Tom Scullion  
Phone: (979) 845-9913  
Email: t-scullion@tamu.edu

The most severe performance problems found with existing PFC's is raveling as shown below in the photos taken from actual pavement projects in Houston and Pharr.



This damage is caused when moisture is trapped within the PFC matrix breaking the bond between the asphalt and the aggregate. To improve the quality of current PFC's it is important to introduce a moisture susceptibility test to be run during the mix design phase. No such test currently exists for PFC's in the current specifications. The following pages present a moisture conditioning test for PFC's, in the severe case samples fail during moisture conditioning. Other conditioned samples do very poorly in performance test such as the Cantabro Test.

According to the scheduled Product P1 is to be delivered at the end of Task 4, that will be at the end of September 2013. This following version should be viewed as tentative. It may be revised before the end of Task 4.

---

Test Procedure for

**MOISTURE SENSITIVITY TEST FOR PERMEABLE FRICTION COURSE (PFC) MIXTURES**

Draft

Date: 8/27/13

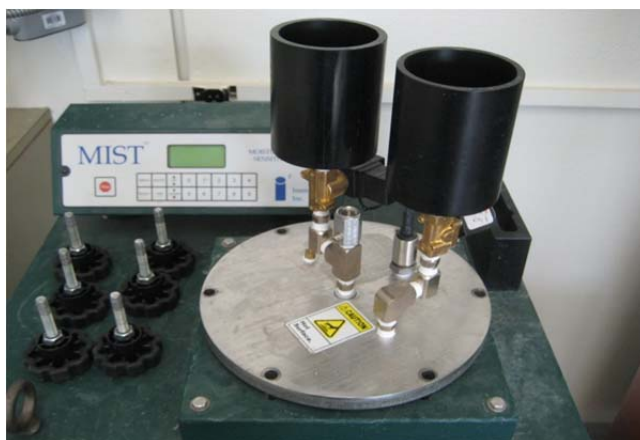
---

**1. SCOPE**

- 1.1 This test method determines the moisture sensitivity of permeable friction course (PFC) mixtures.
  - 1.2 The equipment used in this method cycles heated water at certain pressure around a lab molded PFC sample to simulate field conditions.
- 

**2. APPARATUS**

- 2.1 *Moisture Induced Sensitivity Tester (MIST) consisting of:*
  - 2.1.1 *Primary unit, with interface for changing test pressure, temperature, and number of cycles.*
  - 2.1.2 *Heating element with temperature range of 40°C to 60°C, with set points available in 1°C increments.*
  - 2.1.3 *Pressure chamber with gauge pressure range of 0 psi to 75 psi.*
  - 2.1.4 *Pressure tank lid, with automatic relief valves and overflow cups.*
  - 2.1.5 *Lid hand bolts.*

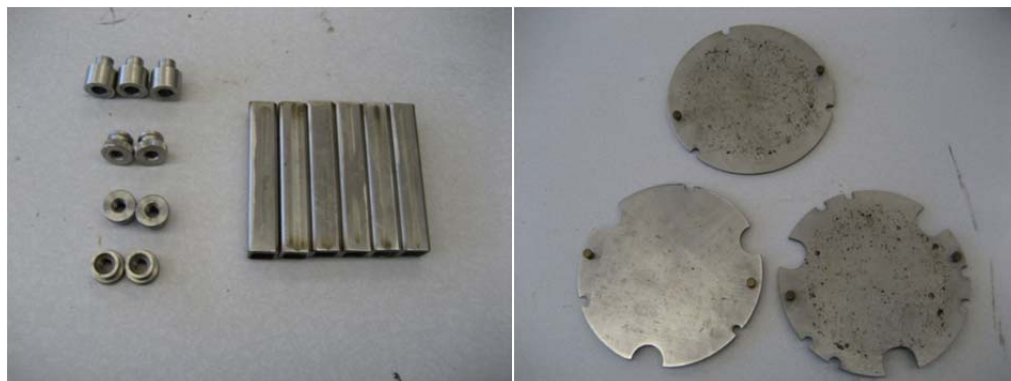


Primary unit, pressure chamber, pressure chamber lid, lid hand bolts.

2.1.6 *Bottom plate and retaining nuts.*

2.1.7 *Sample spacers.*

2.1.8 *Sample plates.*



Retaining nuts, sample spacers, bottom plate, and sample plates.

2.1.9 *Pressure chamber drain valve.*

2.1.10 *Replaceable pressurization bladders.*

2.2 *Water, at or near test temperature if available.*

2.3 *Five-gallon buckets*

---

### **3. MOISTURE INDUCED SENSITIVITY TESTER (MIST) SETUP**

3.1 Using the unit's interface, set the test device to:

3.1.1 Gauge pressure: 40 psi

3.1.2 Temperature: 60 °C

3.1.3 Number of cycles: 1000

---

### **4. PROCEDURE FOR CONDITIONING**

4.1 Prepare samples in accordance with Tex-205

4.2 Determine the density of the samples to be tested according to Tex 207-F Part VIII.

4.3 Place first sample to be tested into pressure chamber.

4.4 Place sample spacers and a sample plate over first sample.

4.5 If a second sample is to be tested, place it on the sample plate, ensuring that it fits easily in the pressure chamber.

4.6 Fill the pressure chamber completely with water until it is just overflowing.



Filled pressure chamber.

4.7 Place the pressure chamber lid on the pressure chamber and secure with lid hand bolts.

4.8 Fill overflow cups completely with water.

4.9 Initiate the test using the primary unit interface.

4.10 While the test is running, ensure that the overflow cups are always more than approximately half-full.

4.11 Upon completion of the pressurization cycles, immediately drain the pressure chamber into a five-gallon bucket.

4.12 When draining is complete, remove lid hand bolts and pressure chamber lid.

4.13 Close drain valve and fill pressure chamber with cool or room temperature water.

4.14 After 3 to 5 minutes, or when samples are cool to touch, drain the pressure chamber into a five-gallon bucket.

4.15 Remove samples from pressure chamber, and allow them to dry.

4.16 After samples are dry, determine the density according to Tex 207-F Part VIII a second time.

Note: The difference in density before and after testing is referred to as the ‘swell’ and is used as a moisture sensitivity indicator.

---

**5. ACCEPTANCE CRITERIA**

- 5.1 If visual inspection of conditioned samples show only minor stripping after conditioning.
- 5.2 Swell of less than 2%. Swell is the difference in the measured density before and after conditioning.
- 5.3 After conditioning, samples tested in accordance with Tex 245-F display a Cantabro loss of less than 20%.

The above are acceptance criteria. The mix is considered to fail if it does not meet one or more of these criteria. With some PFC's are shown below the samples do very poorly in this test.



Sample with major stripping and very high swell (left) and sample with no stripping and very low swell (right).