Designation: PS 129 – 01

Standard Provisional Test Method for Measurement of Permeability of Bituminous Paving Mixtures Using a Flexible Wall Permeameter[1]

This provisional standard is issued under the fixed designation PS 129; the number immediately following the designation indicates the year of original adoption.

1. Scope

1.1 This provisional test method covers procedures for determining the relative permeability (also referred to as *coefficient of permeability*) of water saturated laboratory compacted specimens or field cores of compacted bituminous paving mixtures using a flexible wall permeameter.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 Provisional standards[2] achieve limited consensus through approval of the sponsoring subcommittee.

1.4 This standard is being developed as a provisional standard because the subcommittee feels that the issuance and subsequent usage of this standard method will be critical in the refinement of the standard in the future.

1.5 *This provisional standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 8 Terminology Relating to Materials for Roads and Pavements[3]

D 1188 Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples[3]

D 2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures[3]

D 2726 Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures[3]

D 4867/D 4867M Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures[3]

2.2 *AASHTO Standards:*

TP 4 Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor[4]

T 283 Resistance of Compacted Bituminous Mixture to Moisture Induced Damage[4]

3. Terminology

3.1 *Definitions*:

3.1.1 Refer to Terminology D 8D 8 for definitions of terms used in this provisional test method.

4. Summary of Test Method

4.1 A falling head permeability test is used to determine the rate of flow of water through a saturated specimen. Water from a graduated standpipe is allowed to flow through the saturated bituminous paving mixture specimen and the time interval to reach a known change in head is recorded. The coefficient of water permeability of the compacted paving mixture is then determined based on Darcy's Law.

5. Significance and Use

5.1 This provisional test method provides an indication of the water permeability of water-saturated samples. It applies to one-dimensional, laminar flow of water.

5.2 It is assumed that Darcy's Law is valid and that the permeability is essentially unaffected by hydraulic gradient. The validity of Darcy's Law may be evaluated by measuring the hydraulic conductivity of the specimen at three hydraulic gradients. If all measured values are similar (that is, within approximately 25 %), then Darcy's Law may be taken as valid.

6. Apparatus

6.1 *Permeameter*—See Fig. 1. The device shall meet the following requirements:

6.1.1 A graduated cylinder, having an inner diameter of 31.75 ± 0.50 mm (1.25 ± 0.02 in.), graduated in millimeters and capable of dispensing 500 ml of water.

[1] This provisional test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.23 on Plant-Mixed Bituminous Surfaces and Bases.

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[2] Provisional standards exist for two years subsequent to the approval date.

[3] *Annual Book of ASTM Standards*, Vol 04.03.

[4] Available from American Association of State Highway and Transportation Officials, 444 N. Capitol St., NW, Washington, DC 20001.

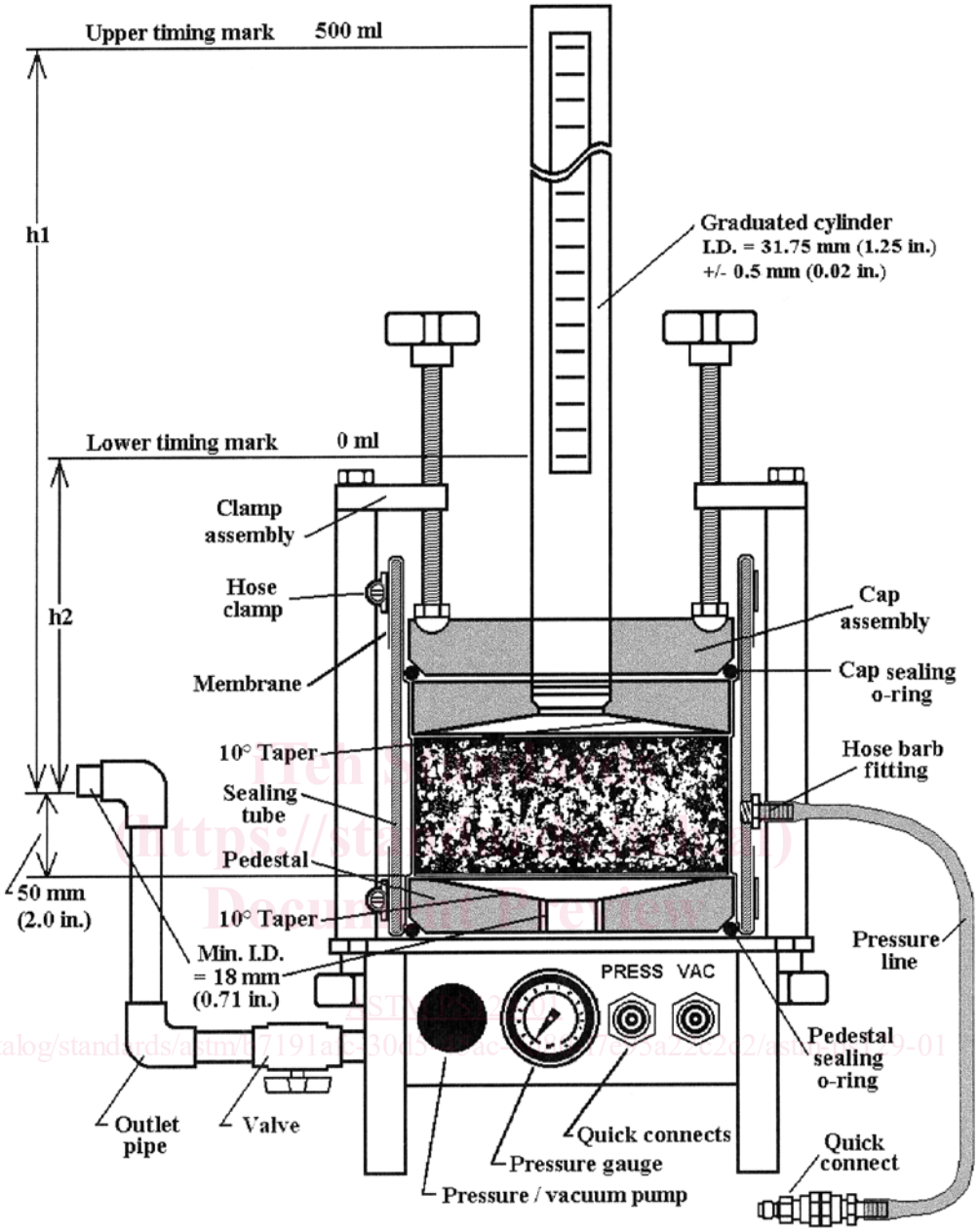

FIG. 1 Water Permeability Testing Apparatus (not to scale)

6.1.2 A sealing tube using a flexible latex membrane 0.635 mm (0.025 in.) thick and capable of confining asphalt concrete specimens up to 152.4 mm (6.000 in.) in diameter and 80.0 mm (3.15 in.) in height.

6.1.3 A cap assembly for supporting the graduated cylinder and expanding an o-ring against the sealing tube. The opening in the cap shall be of the same diameter as the outer diameter of the graduated cylinder mentioned previously in 6.1.1. The underside of the cap assembly should be tapered at an angle of 10 ± 1° (see Fig. 1).

6.1.4 A pedestal plate for supporting the asphalt concrete specimen and expanding an o-ring against the sealing tube. The opening in the pedestal plate should have a minimum diameter of 18 mm (0.71 in.). The top side of the lower cap should be tapered at an angle of 10 ± 1° (see Fig. 1).

6.1.5 O-rings of sufficient diameter and thickness for maintaining a seal against the sealing tube.

6.1.6 A frame and clamp assembly for supplying a compressive force to the cap assembly and pedestal plate necessary to expand the o-rings.

6.1.7 An air pump capable of applying 103 kPa (15 psi) pressure to the specimen as well as vacuum to evacuate the air from the sealing tube/membrane cavity.

6.1.8 A pressure gage with range 0 to 103 kPa (15 psi) with ± 2 % accuracy.

6.1.9 Quick connects for both vacuum and pressure lines.

6.1.10 An outlet pipe, 50.8 mm (2.0 in.) long with an inside diameter of 18 mm (0.71 in.).

6.1.11 Valve positioned upstream of the outlet pipe.