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METHOD OF TEST FOR MEASURING THE PERMEABILITY OF BITUMINOUS PAVEMENTS AND SEAL COATS

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Section I of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

This method describes the procedure for determining the permeability of bituminous pavements and seal coats.

B. APPARATUS

1. One 250-mL special plastic graduated cylinder with valve and flexible tubing.
2. One 500-mL special plastic graduated cylinder with valve and flexible tubing.
3. One 250-mL polyethylene graduated cylinder.
4. One 500-mL polyethylene graduated cylinder.
5. One caulking gun with a piece of 6-mm copper tubing (with cap) approximately 127 mm long.
6. One 4-L polyethylene bottle with handle and pouring spout.
7. Two 4-L friction top cans, one containing medium weight chassis grease.
8. One polyethylene funnel with a top diameter of approximately 115-mm.
9. One stop watch with 60-second dial.
10. One 152 mm diameter aluminum template with handle.
11. Yellow lumber crayon.
12. One 1.8 m folding ruler.
13. One trowel.
14. One spatula.
15. One 100-mL glass graduated cylinder.
16. One 1-L polyethylene bottle for aerosol concentrate.

The above items are furnished in a kit box.

17. One 4 L polyethylene container for storage of test solution.
18. One 1 kg hammer.
19. One 25-mm wide steel chisel.
20. One face shield.

C. MATERIALS

1. Medium weight chassis grease (3.8 L is furnished with kit). A grease cartridge is acceptable.
2. Wetting agent known as aerosol OT 75 % liquid (1 L is furnished with kit).
3. Distilled water.
4. Asphaltic premix patching material.

D. PREPARATION OF TEST SOLUTION

Prepare the test solution by mixing 95 mL of Aerosol OT 75 % liquid per 19 L of distilled water.

E. METHOD FOR FILLING CAULKING GUN WITH GREASE

1. Remove the front cover of the caulking gun. If a grease cartridge is used, cut the tip to provide an extrusion of approximately 6-mm diameter and proceed to F.

2. Turn handle of the caulking gun one half turn so that the notched teeth on the rod are in an upward position and pull the handle all the way out.

3. Fill the gun with grease using a spatula. Work as many air bubbles out of the grease as possible with the spatula.

4. Replace the front cover and turn the rear handle so that the notched teeth are in a downward position.

5. Pump the caulking gun handle until grease extrudes from the copper tubing.

6. Always store the caulking gun in the test kit with the notches in an upward position and the cap on the copper tubing tip; this will prevent grease from being extruded from the gun during storage.

F. TEST PROCEDURE

1. The procedure for Dense Graded Asphalt Concrete pavements and various types of Seal Coats is as follows:

    a. With the crayon and template, draw a 152-mm diameter circle on the pavement.

    b. Extrude grease from the caulking gun on the circle. The diameter of the grease on the ring should be about 6 mm (see Figure 1).

    c. Run finger around the outside edge of the grease-ring, pushing a small amount of grease into the pavement. This will form a sealed reservoir for the test solution.

    d. Fill the special plastic graduated cylinder and polyethylene graduated cylinder with the test solution. The polyethylene cylinder is used for refilling the special cylinder when more solution is needed during the test.

    NOTE: In areas where the permeability of the pavement is below 250 mL/min, the 250 mL graduated cylinders shall be used. The 500 mL graduated cylinders are used in areas where the permeability of the pavement is greater than 250 mL/min.

    e. Release the valve at the base of the special plastic graduated cylinder, start the stop watch and run solution from the special plastic graduated cylinder onto the area within the grease ring, keeping this area constantly covered with about a 1.6 mm film of the solution for two minutes; see Figure 2. Refill the special plastic cylinder from the polyethylene graduate if more solution is needed during the test.

    NOTE: At the end of the test, the pavement inside the grease ring should have an unflooded wet appearance.

    f. At the end of the 2-minute test period, determine the total amount of solution used.

    g. Remove the grease with the trowel and place it in the designated can. Do not mix used grease with the new grease furnished with kit.

2. The procedure for pavements surfaced with Open Graded Asphalt Concrete is as follows:

    a. With the crayon and template, draw a 152-mm diameter circle on the pavement.

    b. Put on the face shield.

    c. Use the hammer and chisel to chip away the open graded surfacing from around the 152 mm diameter circle forming a trough around the permeability test area; see Figure 3. The trough around the ring shall be about 25 mm wide and shall extend into the dense graded pavement about 6 mm.

    d. Use the trowel to apply the grease in the trough. The grease shall extend above the surface of the test area about 6 mm; see Figure 4. This will form a sealed reservoir for the test solution.

e. The test is then performed in the normal manner as previously described; see Figure 5.

f. After the test is completed, remove the grease, fill the trough with the premix patching material, and compact the material with the hammer; see Figure 6.

G. CALCULATIONS

Divide the total quantity of solution used during the test period by two and record the result as the relative permeability in mL/min. When the test is performed on an open graded surface, about 25 mL/min of solution will be held by the open graded mix, even though no solution is entering the dense graded mixture. Subtract this amount from final result to obtain the true value for the dense graded surface.

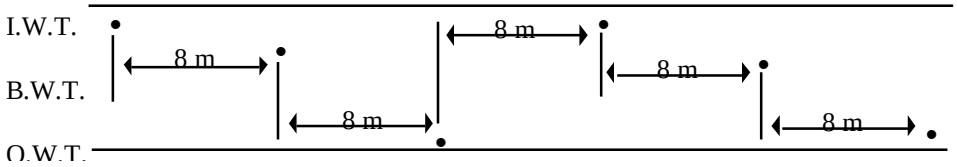
H. PROCEDURE FOR NEW PAVEMENTS

1. The following procedure is recommended to obtain the average permeability of a new pavement. In any travel lane, determine the permeability at 8 m intervals in the outer wheel track (OWT), inner wheel track (IWT), and between the wheel tracks (BWT), for a total of six readings. A diagram is shown below. The six readings should be averaged to obtain the reading for the test area. This procedure should then be repeated at intervals of approximately 300 m.

2. In mountainous areas, the above noted plan may have to be modified in order to provide a relatively flat area for testing.

3. When permeability studies are required after traffic action, it is advisable to test the passing lane in order to obtain the best indication of the initial permeability of the pavement.

LAYOUT FOR TESTING NEW



I. SAFETY AND HEALTH

The operator should always wear a suitable face shield when chipping open graded mix in preparation for the test.

Prior to handling, testing or disposing of any waste materials, testers are required to read: Part A (Section 5.0), Part B (Sections: 5.0, 6.0 and 10.0) and Part C (Section 1.0) of Caltrans Laboratory Safety Manual. Users of this method do so at their own risk.

REFERENCES

End of Text (California Test 341 contains 5 pages)

PROCEDURE FOR DENSE GRADED ASPHALT CONCRETE PAVEMENTS
AND VARIOUS TYPES OF SEAL COATS

FIGURE 1
Forming Grease Ring

FIGURE 2
Applying Test Solution to Pavement Surface

PROCEDURE FOR PAVEMENTS SURFACED WITH AN OPEN GRADED MIXTURE

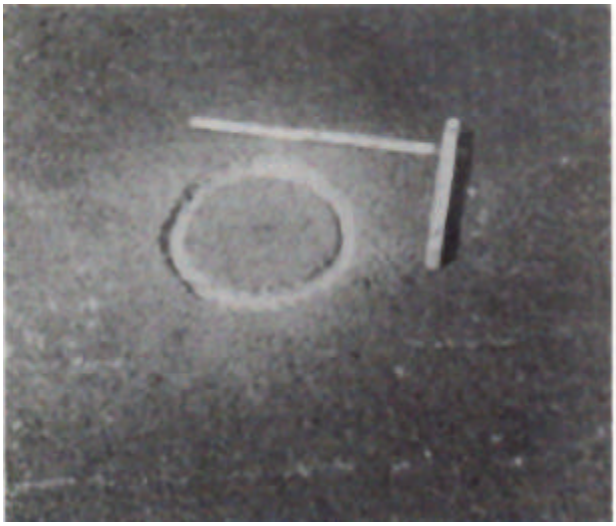


FIGURE 3
Trough Formed by Removal of Open Graded Mix.
Note: Intact Open Graded Mix Within
152 mm Diameter Test Area

FIGURE 4
Grease Ring Formed Around Test Area

FIGURE 5
Applying Test Solution to Open Graded Surface
Within 152 mm Diameter Test Are

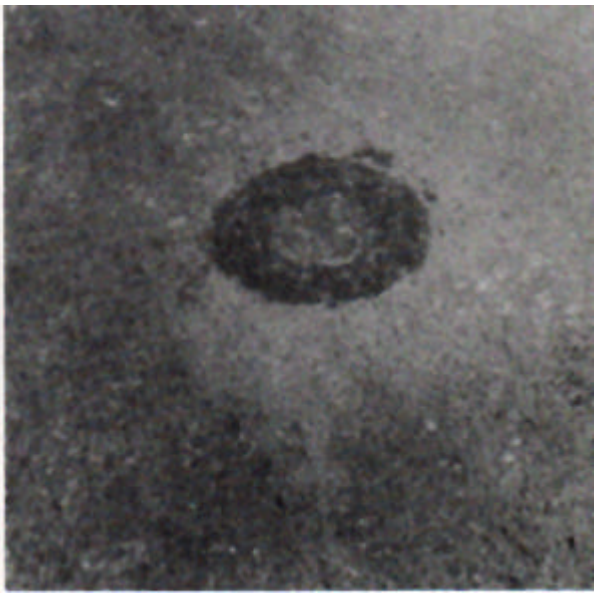


FIGURE 6
Trough Area Filled with Premix Patching Material