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DIVISION OF ENGINEERING SERVICES
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METHOD OF TEST FOR FILM STRIPPING

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Section J 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

The film stripping test is used to measure the resistance of bituminous material to stripping from the rock particles and is generally used to evaluate the mineral aggregate, but may be used to judge the adhesive capacity of the bituminous material. Stone screenings for use in seal coats or open-graded mixes are usually subjected to this test. The test is applied to the aggregate fraction passing the 9.5 mm sieve and retained on the 2.36 mm sieve.

B. APPARATUS

1. Screw cap glass jars, approximately 240 mL capacity.
2. Safety holding device for removing jar caps (see Figures 1 and 2).
3. Fluorescent light box - Optional (see Figure 3).
4. Machine designed to rotate test jars at 43 ± 2 rpm (see Figures 4 and 5 - TL drawing No. D-618).
5. Oven(s) capable of maintaining temperatures of $60 \pm 3^\circ\text{C}$, $110 \pm 3^\circ\text{C}$, and $150 \pm 3^\circ\text{C}$.
6. Hot plate.

7. Thermometer: surface thermometer, capable of measuring temperatures between 50° and 150°C .
8. Thermometer: metal or glass stemmed, capable of measuring temperatures between 0° and 100°C .
9. Balance: A balance with adequate capacity, accurate to ± 0.1 g.
10. Graduated cylinder, approximately 250 mL capacity and accurate to ± 2 mL.
11. Metal mixing container, approximately 100 mm diameter by 25 mm deep.
12. Heat resistant gloves.
13. Small spatula or pointed trowel.

C. MATERIALS

Distilled or de-ionized water.

D. TEST RECORD FORM

Use work card, Form TL-302, for recording test data.

E. PREPARATION OF AGGREGATE SAMPLE

Process the aggregate in a manner comparable to construction processing (i.e., wash if washing is to be employed); otherwise, test as received. Prepare a 60 ± 1 g test sample using both the 9.5 by 4.75 mm and the 4.75 by 2.36 mm fractions of aggregate, proportioned and combined to be representative of the mix.

F. MIXING

1. When paving grades of asphalt are being used, proceed as follows:

- a. Use the asphalt (grade and source) to be used on the project.
- b. Place 60 ± 1 g of aggregate into the metal mixing container and heat in a 110°C oven for a minimum of 30 minutes.
- c. Heat the asphalt to $150 \pm 3^{\circ}\text{C}$.
- d. Calculate the asphalt quantity to use as follows:
$$(2.65 / \text{Sp. Gr. Aggregate}^1) \times 3.6 = \text{g of asphalt}$$
- e. Place the container of heated aggregate on a hot plate (93 to 120°C), add the calculated amount of asphalt and mix until the aggregate is thoroughly coated.
- f. After mixing, immediately remove the sample and container from the hot plate. Separate the particles of the sample of paving mixture by hand so that the particles are not larger than 9.5 mm. Let the sample cool to room temperature for 1 to 2 hours.
- g. Place the sample and container in the oven at 60°C for 15 to 18 hours.

¹ Determine specific gravity by use of California Test 206.

- h. Remove the mix from the container. Place the sample in a glass jar².
- i. Cool the sample to room temperature ($25 \pm 2^{\circ}\text{C}$).
- j. Add 175 ± 5 mL of distilled or de-ionized water at room temperature ($25 \pm 2^{\circ}\text{C}$) to the sample.
- k. Place the cap securely on the jar.
- l. Proceed to test.

2. When emulsified asphalt is being used, proceed as follows:

- a. Use the grade and type of emulsion to be used on the job.
- b. Place 60 ± 1 g of aggregate into the metal mixing container and surface dampen this aggregate with distilled or de-ionized water.
- c. Calculate the emulsion quantity to use as follows:
$$\text{Residue} = 3.6 \times (2.65 / \text{Sp. Gr. Aggregate}^1).$$
$$\text{Emulsion} = (\text{Residue} \times 100) / \text{\% Residue in Emulsion}^3.$$
- d. Add the calculated amount of emulsion and thoroughly mix, let stand for 2 to 3 minutes, re-stir, and then drain off excess emulsion.
- e. Immediately place the container and the mix in the oven at 60°C for 15 to 18 hours.
- f. Remove the mix from the container and place it in a glass jar².

² Any test sample that shows evidence of drainage and thinness of film after the 15 to 18 hour curing period should be reheated slightly and re-mixed before placing it in the glass jar.

³ Select % Residue in Emulsion from Tables 1 or 2 in Section 94 of the Standard Specifications.

- g. Cool the sample to room temperature ($25 \pm 2^\circ\text{C}$).
 - h. Add 175 mL distilled or de-ionized water to the sample.
 - i. Place the cap securely on the jar.
 - j. Proceed to test.
- 5. When rapid set emulsion is used, dry the sample after the emulsion is added, then treat as if paving asphalt is used.

I. REPORTING OF RESULTS

Report results in terms of the percent of the total aggregate surface stripped.

J. SAFETY AND HEALTH

Personnel should use heat resistant gloves/mitts when working with hot material. Use the safety box and heat resistant gloves when removing the caps from the jars. Use proper lifting techniques when handling bags of aggregate. Reasonable care should be exercised to avoid being burned by hot asphalt, aggregate or equipment.

Prior to sampling, handling materials or testing, Caltrans personnel are required to read Part A (Section 5.0), Part B (5.0,6.0 and 10.0) and Part C (Section 1.0) of Caltrans Laboratory Safety Manual and the Materials Safety Data Sheets (MSDS) for all materials used. Users of this test method do so at their own risk.

G. TEST PROCEDURE

- 1. Place the jar containing the sample in the testing apparatus (see Figures 4 and 5) and rotate the jar for 15 minutes.
- 2. Remove the jar from the testing apparatus.
- 3. Remove the jar cap.
- 4. By visual observation, estimate the percentage of aggregate stripped when the jar is viewed beneath fluorescent light (the optional light box may be used for this purpose). Estimate on the basis of total surface of the mass.

H. PRECAUTIONS

- 1. Thorough mixing to coat all particles with bitumen is essential for consistent results.
- 2. Maintain test temperature within the limits specified.
- 3. Use job emulsion when possible. All emulsions should be well stirred prior to use due to the possibility of settlement. Use within 30 days of sampling.
- 4. When latex emulsions are used, all mixing must be done at 60°C (balling will occur if mixed cold).

End of Text
(California Test 302 contains 6 pages)

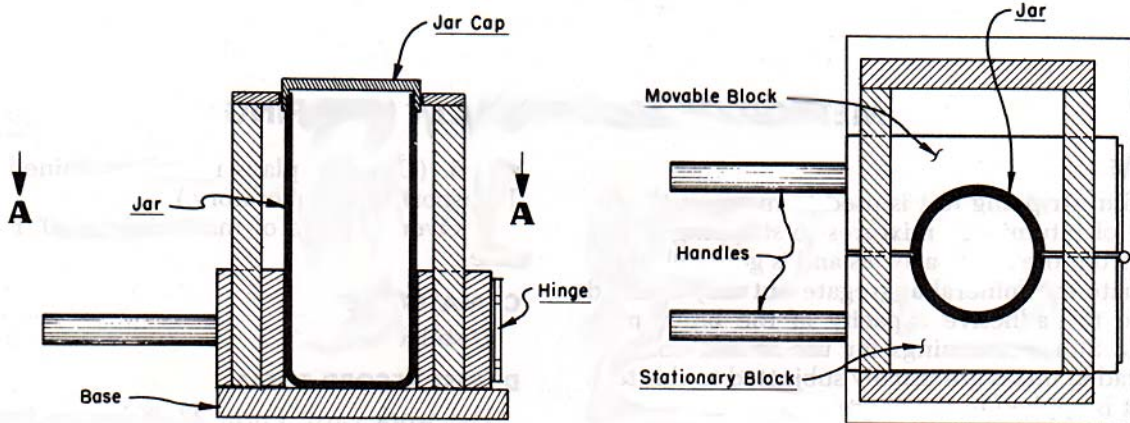


FIGURE 1

*Figure 1 is for illustration purposes only.
Heat resistant gloves must be worn when removing caps from jars (see Section J).

SAFETY BOX

(For removing jar caps)



SIDE VIEW SECTION

SECTION A-A

FIGURE 2

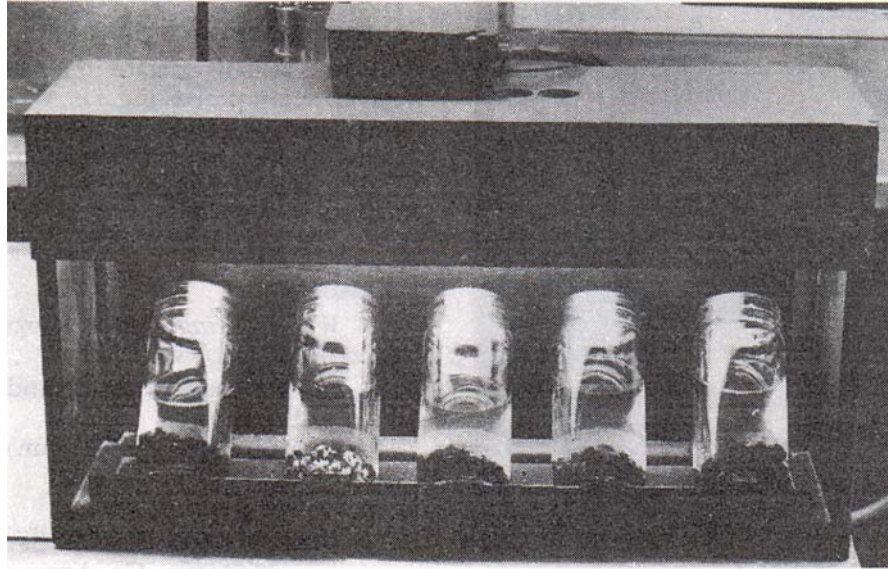


FIGURE 3

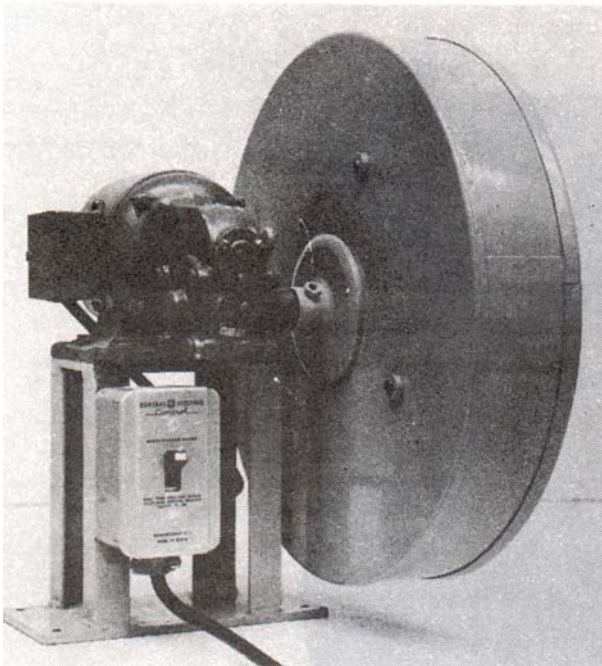


FIGURE 4

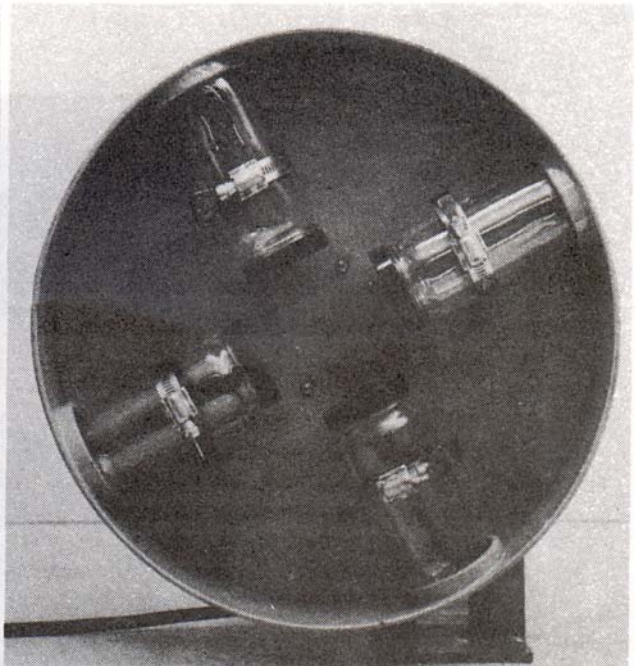


FIGURE 5



FIGURE 6