

**DEPARTMENT OF TRANSPORTATION**  
ENGINEERING SERVICE CENTER  
Transportation Laboratory  
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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, (Figures 1 and 2).
3. Fluorescent light box, (Figure 3).
4. Machine designed to rotate test jars at  $33 \pm 2$  rpm (Figures 4 and 5). (TL drawing No. D-618).
5. Ovens 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. Metal mixing container - approximately 100 mm diameter by 25 mm deep.
8. Leather gloves.
9. Small spatula or pointed trowel.

### C. MATERIALS

Distilled 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  $60 \pm 1$  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. Heat  $60 \pm 1$  g of aggregate in the  $110^{\circ}\text{C}$  oven for a minimum of 30min.
- c. Heat the asphalt to  $150 \pm 3^{\circ}\text{C}$ . (Stir occasionally to avoid local over heating if the hot plate is used for heating.)
- d. Calculate the asphalt quantity to use as follows:

$$(2.65 / \text{Sp. Gr. Aggregate}^1) \times 3.6 = \text{g of asphalt}$$

Note: If Kc exceeds 1.7, it may be necessary to increase the asphalt content until sufficient surface coating can be obtained.

- e. Place the container of heated aggregate on a warm hot plate ( $93$  to  $120^{\circ}\text{C}$ ), 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 and allow it to cool to room temperature. (Minimum of 1 h, maximum 2 h.)
- g. Place the sample and container in the  $60^{\circ}\text{C}$  oven. Remove it after 15 to 18 h.
- h. Remove the mix from the metal container. Place the sample in a glass jar<sup>2</sup>.
- i. Cool the sample to  $25 \pm 2^{\circ}\text{C}$  (room temperature).
- j. Add  $175 \pm 5$  mL of distilled or deionized water at  $25 \pm 2^{\circ}\text{C}$  to the sample..
- k. Place cap securely on jar.

1. 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  $60 \pm 1$  g of aggregate into the small metal container and surface dampen this aggregate with distilled or deionized 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, allow to stand for 2 or 3 min, re-stir, then drain off excess emulsion.
  - e. Immediately place the container and the mix in the  $60^{\circ}\text{C}$  oven. Remove it after 15 to 18 h.
  - f. Remove the mix from the metal container and place it in a glass jar<sup>2</sup>.
  - g. Cool the sample to room temperature ( $25 \pm 2^{\circ}\text{C}$ ).
  - h. Add 175 mL distilled or deionized water to the sample.
  - i. Place cap securely on jar.
  - j. Proceed to test.

## G. TEST PROCEDURE

1. Place the jar containing the sample in the testing apparatus (Figures 4 and 5) and rotate the jar for 15 min.

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<sup>1</sup> Determine specific gravity by use of California Test 206.

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

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<sup>3</sup> Select % residue in emulsion from Tables 1 or 2, Section 94 of the Standard Specifications.

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 to do this. Estimate on the basis of total surface of the mass. (See Figure 6).
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 leather gloves when removing the lids 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 method do so at their own risk.

#### 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 because of the possibility of settlement. Use within 30 days of sampling.
4. When latex emulsions are used, all mixing must be at 60°C (balling will occur if mixed cold)

End of Text (California Test 302 contains 6 pages)



FIGURE 1

**SAFETY BOX**  
( For removing jar caps )

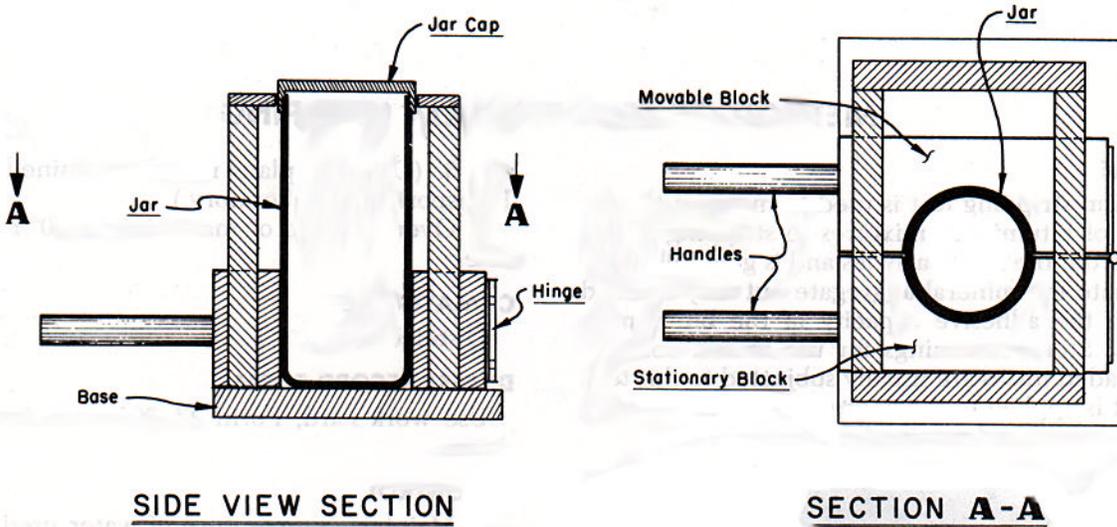


FIGURE 2

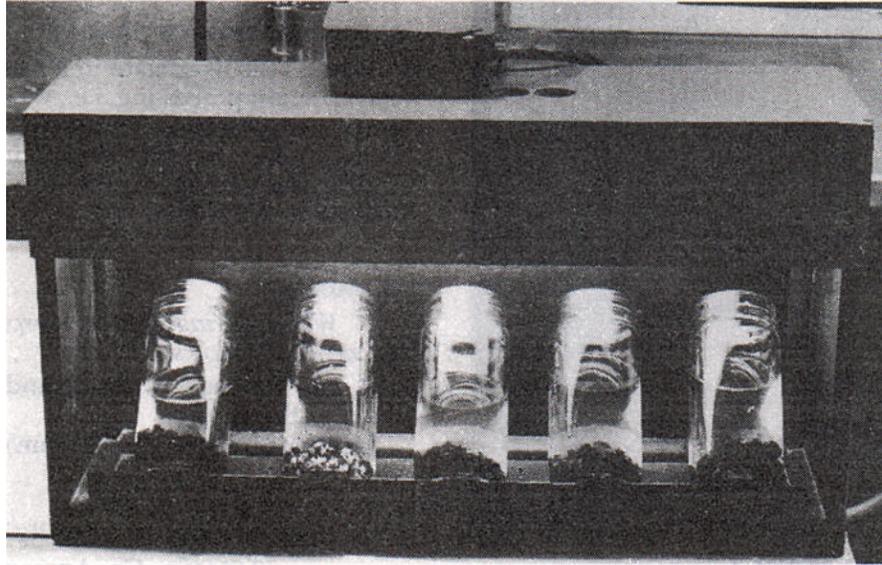


FIGURE 3

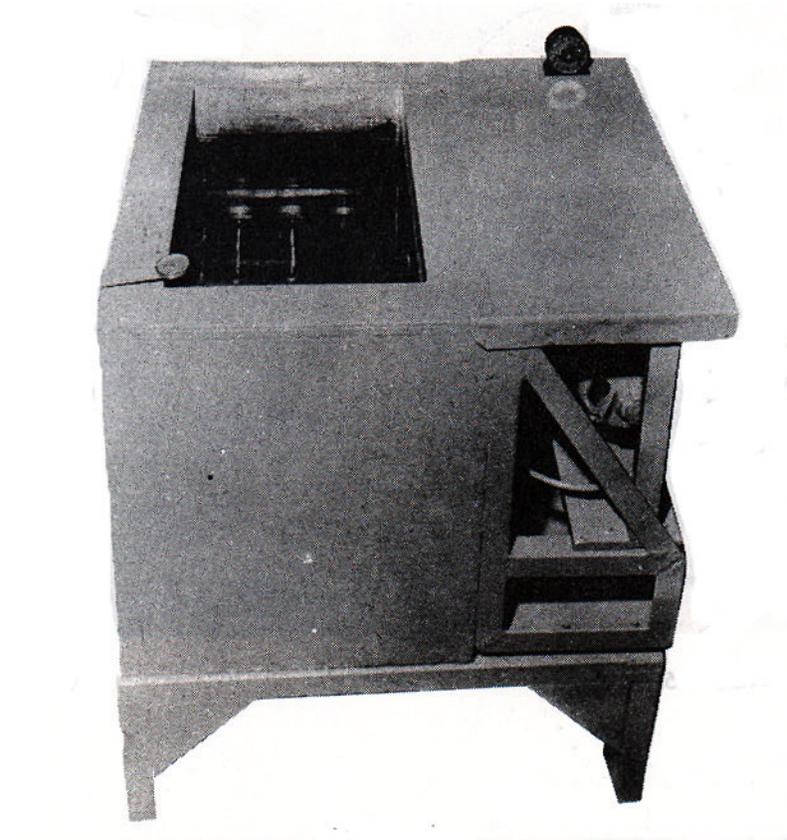


FIGURE 4

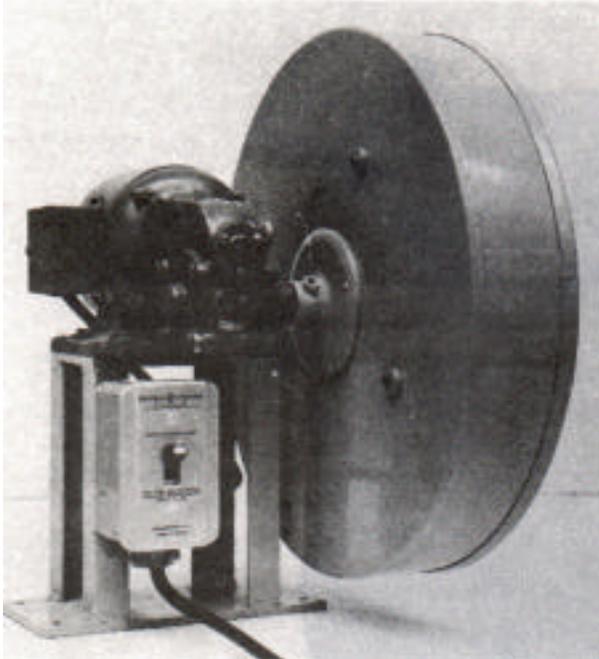


FIGURE 5

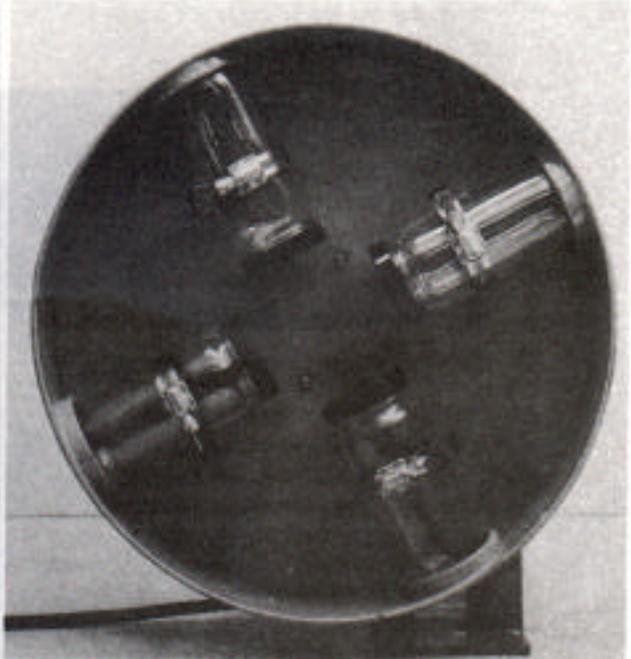


FIGURE 6

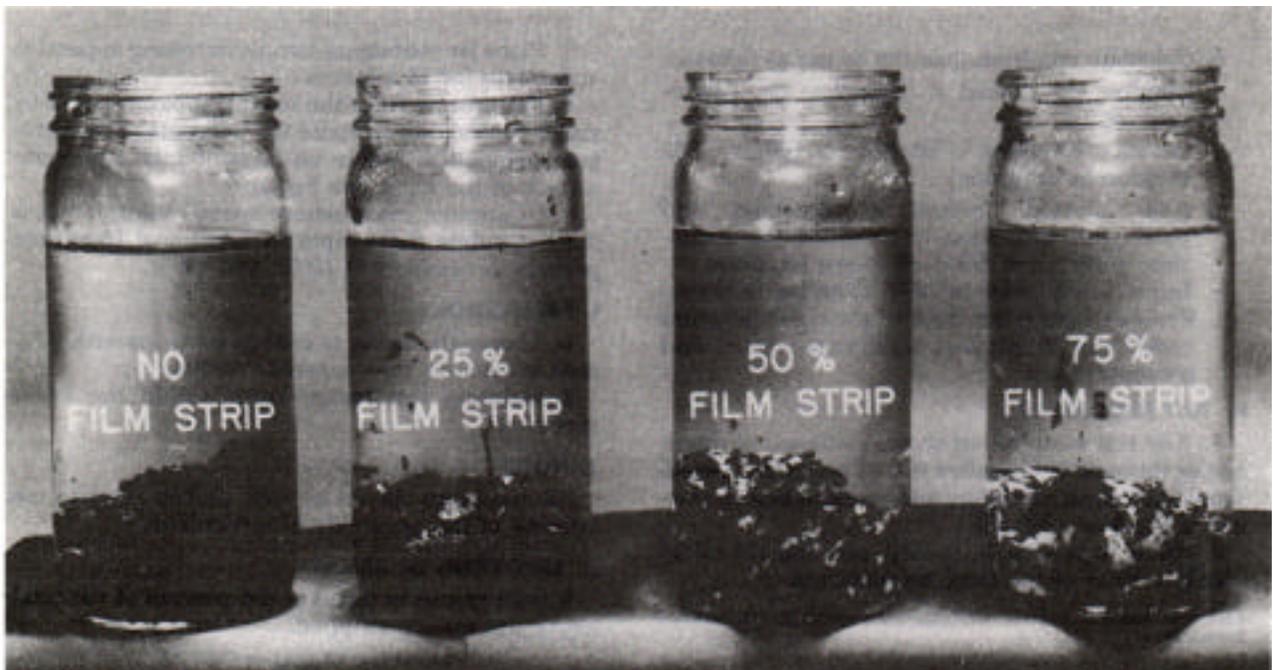


FIGURE 7