

DEPARTMENT OF TRANSPORTATION
ENGINEERING SERVICE CENTER
Transportation Laboratory
5900 Folsom Blvd.
Sacramento, California 95819-4612



STANDARD METHOD FOR DETERMINING OPTIMUM BITUMEN CONTENT (OBC) FOR OPEN GRADED ASPHALT CONCRETE

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read “**SAFETY AND HEALTH**” in Section G 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 is the procedure to be used to determine the Optimum Bitumen Content (OBC) for Open Graded Asphalt Concrete. This content should provide a mix with sufficient asphalt film thickness to avoid excessive drainage and yet provide maximum durability.

B. APPARATUS

1. 6 extraction thimbles (used in California Test (CT) 310, Figure 6).
2. 12 aluminum discs, 140 ± 1.6 mm diameter by a nominal thickness of 2 mm.
3. Mechanical AC mixer (optional – used in CT 304, Figure 2).
4. 6-4 kg \pm 5 g mass for applying load; 76 mm nominal diameter steel stock 114 mm high works well.
5. Oven capable of maintaining a temperature of $135 \pm 3^\circ\text{C}$ ($150 \pm 3^\circ\text{C}$ if the binder is asphalt rubber).
6. Balance, 5000 g capacity, 0.1 g accuracy.
7. Small pointed trowel.
8. Spatula.
9. Heat resistant gloves.

C. PREPARATION OF SAMPLE

1. Prepare nine 1500 g samples of the aggregate proposed for use.
 - a. Use the approved aggregate grading submitted by the Contractor or, in the absence of such, use a grading representing the center of the grading curve specified for the project.
2. Determine the approximate bitumen ratio (ABR) as outlined in CT 303 [ABR=(Kc \times 1.5) + 4.0].

D. TEST PROCEDURE

1. Heat the aggregate for three of the 1500 g samples and the asphalt to 135°C .
 - a. If asphalt rubber binder, heat to 150°C .
2. Place an aluminum disc in the bottom of each extraction thimble as shown in Figure 1.
3. Tare each extraction thimble with the aluminum disc in place.
4. Preheat three extraction thimbles, the top discs and the 4 kg mass for a minimum of 15 min in a 135°C (150°C if asphalt rubber binder) oven.

5. Hand mix or mechanically mix three individual samples of asphalt and aggregates at the ABR for 2 min \pm 5 s (mixing must be done over a heat source such as an infra-red lamp or a hot plate to avoid losing temperature).
6. After mixing, immediately transfer each mix into a heated extraction thimble. Use a spatula to scrape clean the insides of the mixing bowl or pan.
7. Place an aluminum disc on top of each mix (Figure 1).
8. Place a 4 kg mass on top of each disc (Figure 1).
9. Place each of the three assembled test samples into 135°C (150°C if asphalt rubber binder) oven as they are mixed and heat for 30 min \pm 15 s (organize the test samples in the oven to accommodate removal at the prescribed 30 min).
10. Remove the test sample from oven after 30 min.
11. Immediately remove the 4 kg mass and top disc and invert the thimble, dumping the contents into a pan. Tap the bottom of the thimble ten times with the spatula handle to dislodge any loose material.
12. Allow the thimble and bottom disc assembly to cool to room temperature (minimum of 20 min).
13. Re-weigh each thimble with bottom disc to determine grams of asphalt drainage. Average the results of the three samples.
14. Repeat steps 1 through 13 with test specimens prepared with asphalt contents 0.7 % less and 0.7 % more than ABR.
15. Plot the average drainage for each asphalt content on Figure 2 (Form TL-601).
16. Connect the successive points using a straight edge.
17. At the intersection of this line with 4.0 g drainage on the abscissa, read the asphalt content from the ordinate that will provide an asphalt drainage of 4.0 g. Report this asphalt content as optimum bitumen content (OBC).

E. PRECAUTIONS

Heat may cause equipment damage or induce erroneous data if hot materials are weighed on sensitive scales.

A clean thimble should be used for each test.

F. REPORTING OF RESULTS

Report OBC, as-used aggregate gradation, specific gravity of the course and fine aggregate, Kc value, estimated density (kg/m^3 - CT 308) and the asphalt source and grade on Form TL-601, Figure 2).

G. SAFETY AND HEALTH

Personnel must use heat resistant gloves when working with hot materials. Reasonable care should be exercised to avoid being burned by asphalt, aggregate or equipment.

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:

California Tests 303, 304, 308, and 310

End of Text (California Test 368 contains 4 Pages)

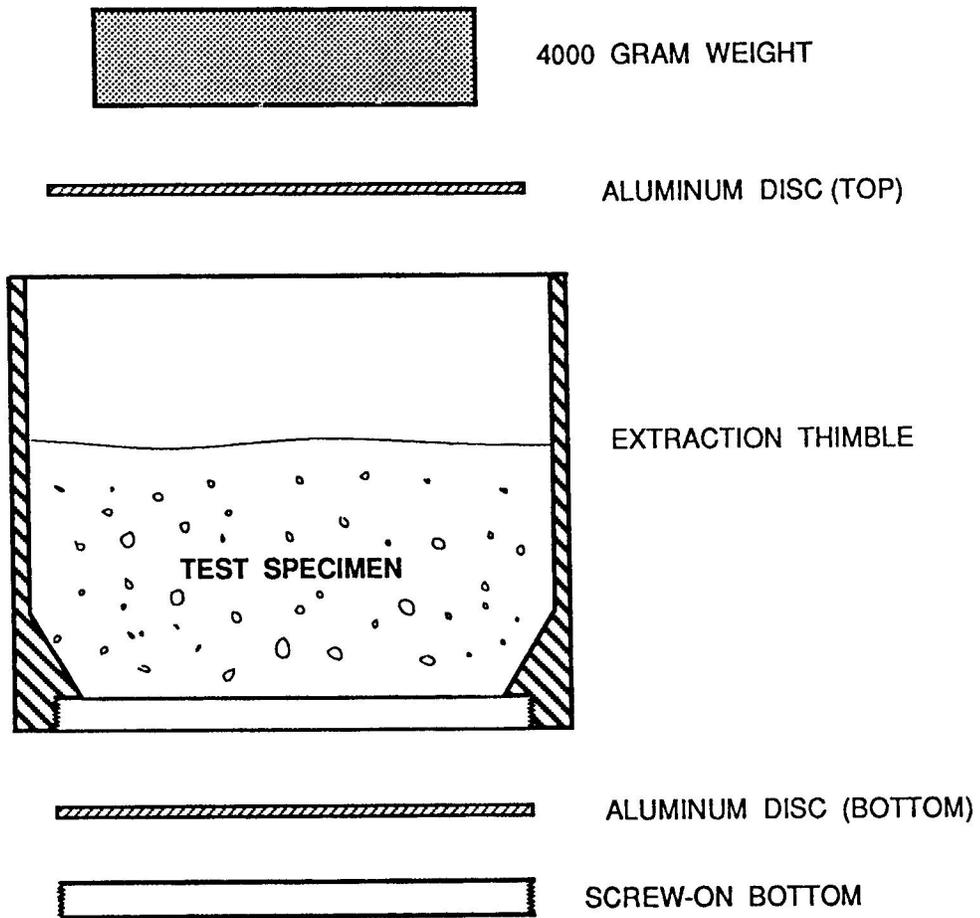
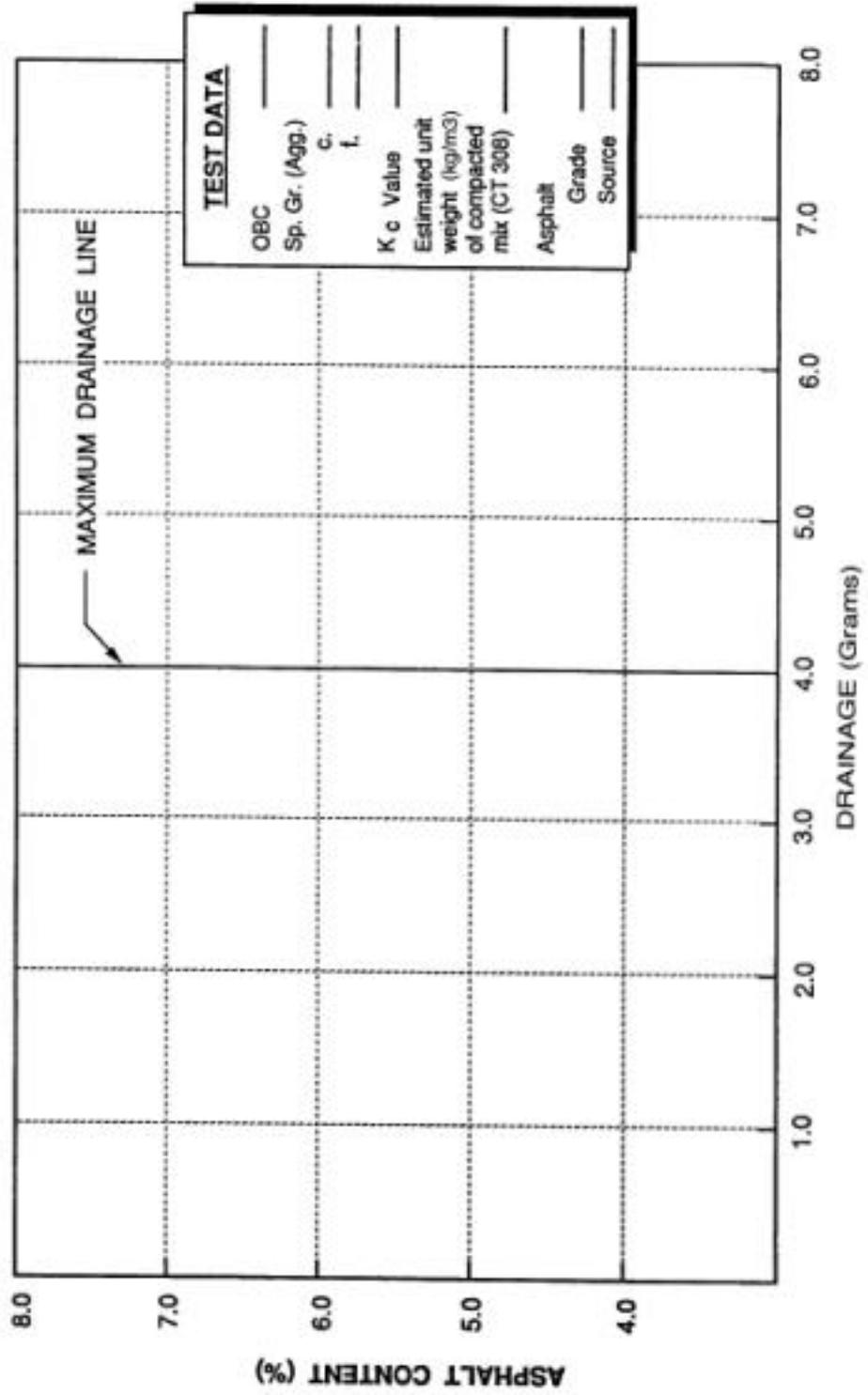


FIGURE 1

OBC CURVE FOR O.G.A.C.



TL 601

FIGURE 2