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

METHOD OF TEST FOR STABILOMETER VALUE

A. SCOPE

This test method provides a procedure for determining the relative stability (Stabilometer Value) of asphalt concrete by measuring the horizontal pressure developed in a compacted test specimen under a given vertical pressure at 60°C. This value indicates the ability of the pavement to resist plastic deformation under the action of traffic and, therefore, is used to determine optimum bitumen content in accordance with California Test 367. Generally the test specimens consist of briquettes fabricated using California Test 304. However, this test method can also be used to determine the stability value of 101.6 mm diameter cores.

B. REFERENCES

CT 102	Mechanics, Operation, Calibration, and Diaphragm Installation of the Stabilometer
CT 304	Method of Preparation of HMA for Test Specimens
CT 367	Method of Test for Stabilometer Value

C. APPARATUS

1. Stabilometer (California) and stage (Figure 1).
2. Oven, thermostatically controlled to 60 ± 3˚C
3. Metal follower, 101.2 ± 0.13 mm diameter, 140 ± 6 mm high, 4000 g (max)
4. Standard metal specimen, 101.6 ± 0.13 mm diameter 140 ± 6 mm high
5. Rubber bulb air pump (for introducing air into the Stabilometer)
6. Test press, 220 kN capacity (min) with a spherically seated and free-acting head
7. Heat resistant gloves

D. STABILOMETER ADJUSTMENT

1. Refer to California Test 102 for details on the mechanics of the Stabilometer, including its operation, calibration, and installation of the neoprene diaphragm.
2. Calibrate the displacement of the Stabilometer by the following procedure:
    a. Adjust the bronze nut on the Stabilometer stage base (if the base is of the adjustable type) so that the top of the stage is 89 mm below the bottom of the upper tapered ring. Perform all tests at this stage setting.
    b. Adjust the testing machine so that:
        (1) The platen or head moves at a rate of 1.3 ± 0.1 mm/min when no load is being applied. This adjustment is performed with the Stabilometer and stage base on the platen if the testing machine applies the load from the lower platen. Hydraulic testing machines must be run several minutes before the oil warms sufficiently to maintain a constant speed.
        (2) The spherically seated head is free acting. (Such heads must be used for the Stabilometer test but are shimmed immobile during "pressing" such as in the application of static leveling loads.)
    c. Place the standard metal specimen (preheated to 60 ± 3˚C) in the Stabilometer. Seat it firmly on the stage, hold it in place with either the hand or a confining load of 440 N in the testing machine (head may be free acting or shimmed), and apply a horizontal pressure to exactly 34.5 kPa. Adjust the turns indicator dial to zero. Turn the pump handle at an approximate rate of two turns per second until the Stabilometer dial reads 689.5 kPa. The turns indicator dial must read 2.00 ± .05 turns. If it does not, the air in the cell must be adjusted. Remove or add air by means of the valve and the rubber bulb, and repeat the displacement measurement after each air change until the proper number of turns is obtained. Release the horizontal pressure, and remove the standard metal specimen.

E. TEST PROCEDURE AND CALCULATIONS

1. Test Procedure:
   a. Test specimens at 60 ± 3˚C. If it is desirable to test with moisture present in the mixture, however, test at room temperature.
   b. Check the head of the press to be certain it is free acting without locking shims.
   c. Transfer the test specimen from the mold to the Stabilometer by placing the mold containing the specimen on top of the Stabilometer; then, using the plunger, hand lever, and special fulcrum attached to the testing machine, force the specimen out of the mold into the Stabilometer. Make sure that the specimen goes into the Stabilometer straight, with the tamped end up, and is firmly seated level on the base. This operation is shown in Figure 2.
   d. Place the follower on top of the specimen, and apply a horizontal pressure of 34.5 kPa. (The 34.5 kPa pressure should be exact as a deviation of as little as 7 kPa has considerable effect on the final value.)
   e. Begin applying a vertical load with the testing machine at a platen or head speed of 1.3 mm/min. Record the horizontal pressures (Stabilometer gauge readings) when the vertical loads are 2.22 kN, 4.45 kN, 8.9 kN, 13.3 kN, 17.8 Kn, 22.2 kN, and 26.7 kN. (During this operation the rate of load after starting will vary depending on the physical properties of each test specimen. This is a normal part of the test and no attempt to maintain
      a rate of loading of 1.3 mm/min throughout the test should be made.)
   f. Stop the vertical loading exactly at 26.7 kN and immediately reduce the load to 4.45 ± 0.4 kN. Using the displacement pump, reduce the horizontal pressure to 34.5 kPa. This will result in a further reduction
      in the vertical load which is normal and for which no compensation is necessary. Raise the pressure
      to 34.5 kPa and set the turns displacement indicator dial to zero. Turn the pump handle at approximately two turns per second until the Stabilometer gauge reads 689.5 kPa. (During this operation the vertical load registered on the testing machine will increase and, in some cases, exceed the initial 4.45 N load. As before, these changes in testing machine loading are characteristic and no adjustment or compensation is required.)

g. Record the number of turns indicated on the dial as the displacement of the specimen. Round to the nearest 0.01 revolution.

2. Calculation of Stabilometer values.

$$S = \frac{22.2}{[\frac{P_h \times D}{(P_v - P_h)}] + 0.222}$$

Where:

S = Stabilometer value

P_h = horizontal pressure for corresponding Pv (kPa)

D = displacement of specimen, (turns)

P_v = vertical pressure (typically 2758 kPa)

G. PRECAUTIONS

1. Every effort should be made to fabricate test specimens having an overall height between 61.0 and 66.0 mm; however, if for some reason this is not possible, the Stabilometer value should be corrected as indicated on the attached chart, Figure 3.
2. Adhere strictly to the temperature control requirements.
3. Frequent calibration of the Stabilometer should be made during the day as temperature change has considerable effect upon the pressure exerted within the hydraulic system. This is especially true when changing from R-value testing to bituminous testing.
4. Close adherence to the 34.5 kPa initial horizontal pressure is necessary for accurate test results.
5. When setting the 34.5 kPa horizontal pressure, always drop below 34.5 kPa, and then bring the pressure back up to 34.5 kPa, and gently tap the dial to remove any slack in the dial indicator gear.
6. The head of the press must be free acting and spherically-seated with the ability to conform to the surface plane of the test specimen.
7. After each test, use a clean, dry cloth to wipe the diaphragm prior to proceeding with another test. If the diaphragm feels sticky after wiping, dust it lightly with a fine powder such as talcum powder or equivalent.

H. REPORTING OF RESULTS

Report the results of the Stabilometer test as the numerical value obtained as shown under "Calculations.

This value represents the relative resistance to lateral deformation at the test temperature on a scale ranging from 0 to 100.

I. HEALTH AND SAFETY

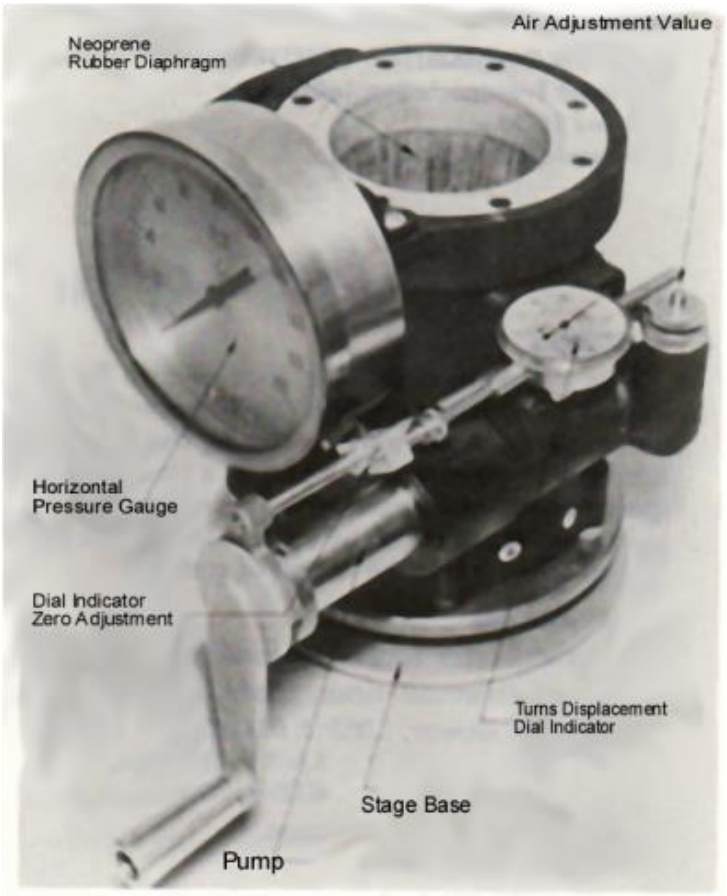
Personnel shall use heat resistant gloves when working with hot materials. Use proper lifting techniques and use care to avoid being burned by hot material or equipment.

Caution should be exercised in the operation of the press to keep any objects other than the sample and testing apparatus clear of the loading head during the testing operation. When moving or lifting the Stabilometer, make sure to grasp the base to prevent the base from falling.

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 and the Materials Safety Data Sheets (MSDS) for all materials used. Requirements for proper safety equipment and disposal of solvents are discussed in the above-noted references. Users of this method do so at their own risk.

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

End of Text
(California Test 366 contains 8 pages)



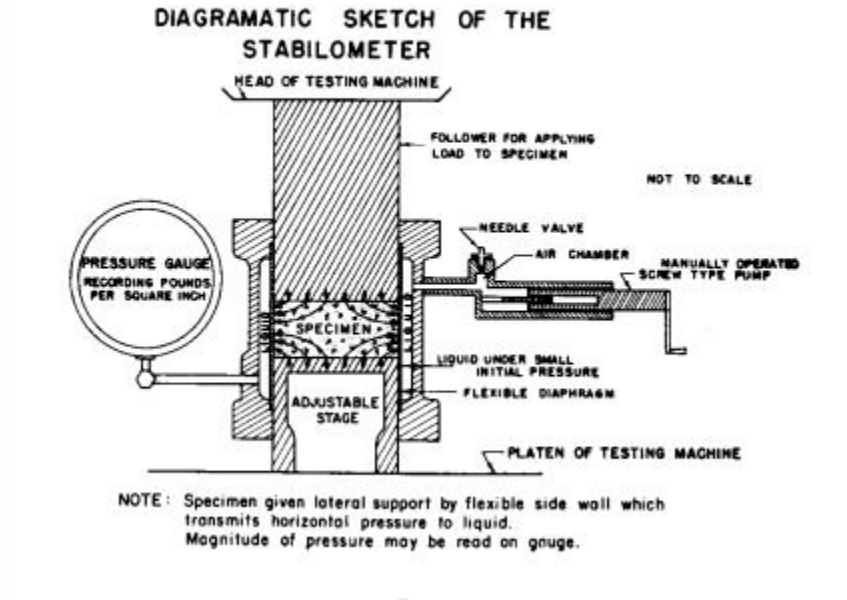


FIGURE 1. Stabilometer

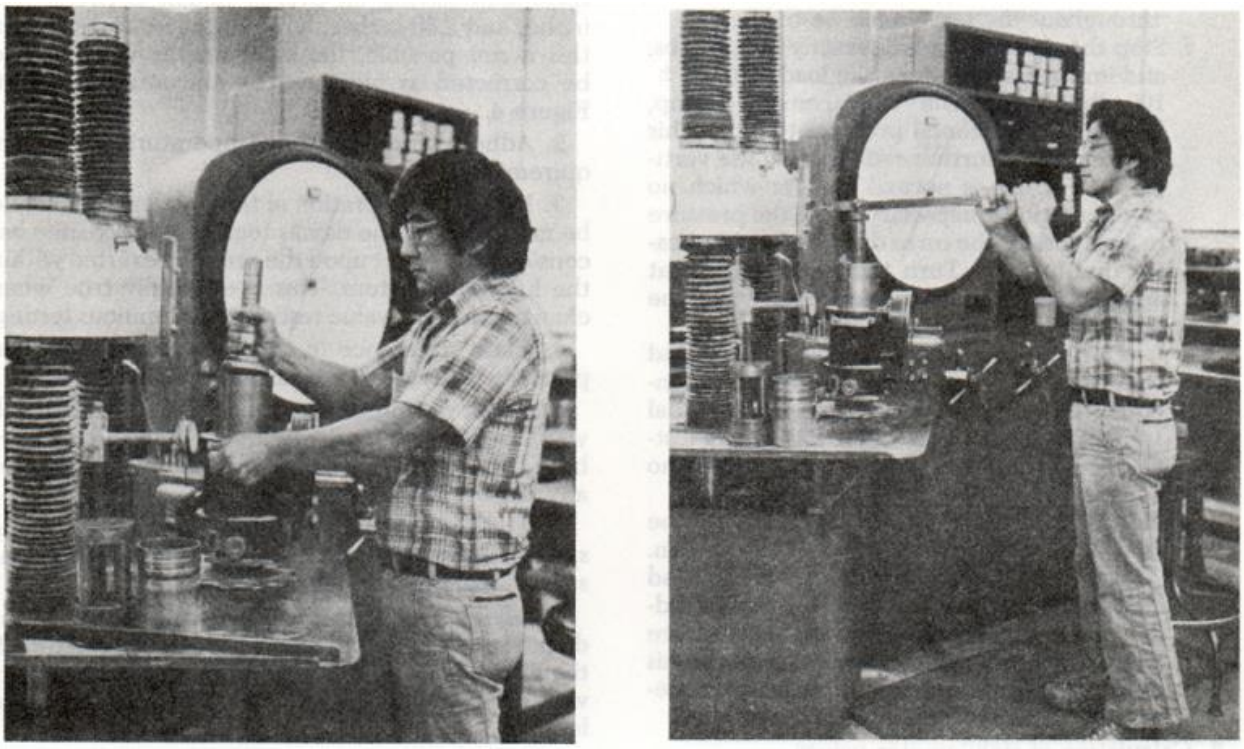


FIGURE 2. Transferring of the test specimen from the mold to the Stabilometer

CHART FOR CORRECTING STABILOMETER VALUES TO SPECIMEN HEIGHT OF 63.5 mm

Height correction should be made using the table and chart below.

Example: Overall height of 69.6 mm, select correction curve "B".
Stabilometer value uncorrected = 35
Stabilometer value corrected = 38

Overall Specimen Height mm	Correction Curve
71.1 - 76.2	A
66.0 - 71.0	B
61.0 - 65.9	C
55.9 - 60.9	D
50.8 - 55.8	E

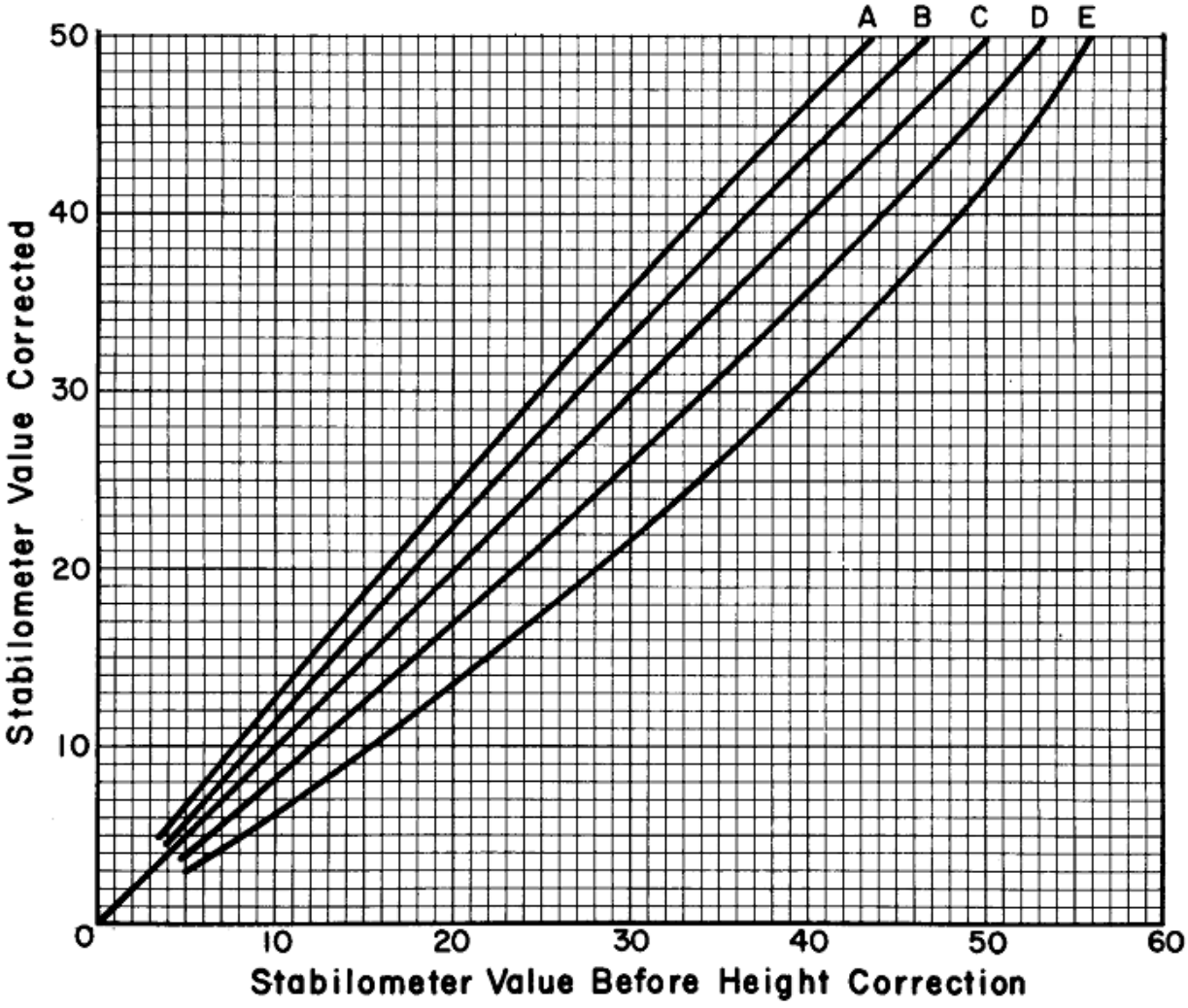


FIGURE 3. Stabilometer Value Correction