

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
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METHOD OF CALIBRATION OF PRESSURE TYPE AIR METERS

A. SCOPE

This test method describes the procedure for calibrating two brands of modified Washington-type pressure air meters. The method for determining the air content of fresh concrete using these meters is described in California Test 504.

This test method is divided into the following parts:

- I. Calibration of Base Unit.
- II. Calibration of Press-Ur Meter (Brand Name) Using the Built-In Calibration System.
- III. Calibration of Techkote-White (Brand Name) Using the Built-In Calibration System.

B. REFERENCES

California Test 504 - Determining Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C231/C231M - Air Content of Freshly Mixed Concrete by the Pressure Method

C. APPARATUS

Use the apparatus and materials specified in California Test 504.

D. PROCEDURE

PART I. CALIBRATION OF BASE UNIT

1. To determine the volume of the air meter base, begin by filling it with water at 70°F.
2. Place the glass plate on top of the base and remove all excess water near the top of the base. The container must be filled completely with water and air bubbles should not be visible under the glass.
3. When this is done, remove all surface water clinging to the outside of the base and glass plate.
4. Record the weight of the base, glass plate, and water in lb.
5. From this value, subtract the weight of the dry base and dry glass plate to determine the weight of the water.
6. The water, in lb, divided by 62.3 lb/cu ft, produces the volume of the base in cubic feet.

PART II. CALIBRATION OF PRESS-UR METER (BRAND NAME) USING THE BUILT-IN CALIBRATION SYSTEM

1. Place the base of the meter on a level surface and fill it with water.
2. Screw the short piece of straight tubing, supplied with the meter, into the threaded petcock hole on underside of cover. Clamp the cover on the base with a tube extending down into the water. Leave both petcocks open.
3. Add water with the syringe through the petcock (with short pipe extension) until all air is forced through the opposite petcock. Jar the meter slightly and tilt it toward the petcock (with the short pipe extension) to remove all air trapped under the lid.
4. Pump the air pressure in the sealed chamber a little beyond the designated initial pressure line (see NOTE). Wait a few seconds, then stabilize the gage hand at the initial pressure line by pumping or by bleeding off air as needed.

NOTE: The initial pressure line is designated by the manufacturer when the meter is new. With proper care, this pressure line should not need replacing.

5. Close both petcocks and immediately press down the thumb lever, releasing air into the base. Wait a few seconds until the gage hand stabilizes. If all air was eliminated and the initial pressure line was correctly selected, the gage should read 0 %. (If two or more tests show a consistent variation from 0 %, change the initial pressure line to compensate for the variation. Use the newly established initial pressure line for subsequent tests.)
6. Screw the curved tube, supplied with the meter, into the outer end of the petcock (with short pipe extension). By pressing the thumb lever and controlling the flow with the petcock lever, fill the 5 % calibrating vessel level full of water from the base through the added tubing.
7. Release the air at the free petcock. Open both petcocks and let the water in the curved tube run back into the base. This should result in 5 % air in the system.
8. With the petcocks open, pump air into the system as outlined in Step 4. Close the petcocks and immediately press the thumb lever, releasing air into the base. Wait a few seconds for the gage hand to stabilize. The dial should now read 5 %.
9. If two or more tests show that the gage reads other than 5 ± 0.2 %, remove the gage glass while pressure is still on the gage and reset the dial hand to read 5 % by turning the recalibration screw. This adjustment screw is located below and to the right of the dial midpoint.
10. When the gage hand reads 5 % air, additional water may be withdrawn in the same manner as in Steps 7 and 8 to check results at higher air contents.

NOTE: It is not necessary to remove water in exact increments of 5 % if other accurate measuring containers are available.

PART III. CALIBRATION OF TECHKOTE-WHITE (BRAND NAME) USING THE BUILT-IN CALIBRATION SYSTEM

1. Place the base of the meter on a level surface and fill it with water.
2. Remove the short standpipe from the center petcock (on the top of the lid) and screw it into the underside of the lid into the funnel petcock opening.
3. With both petcocks open and the main air valve closed, place the lid on top of the base and secure it with the four toggle clamps.
4. Pour water into the funnel until water comes out the center petcock. Jar the meter slightly and tilt it toward the funnel petcock to remove all air trapped under the lid. Close both petcocks.
5. Pump air into the sealed chamber until the gage hand comes to the red line. (Exact matching with the red line is not necessary so long as the initial starting mark is passed.)
6. While tapping the gage gently with one hand, open the bleeder valve at the end of the air receiver until the gage hand rests exactly on the initial starting mark. Close the bleeder valve.
7. Remove all remaining water from the funnel with the syringe.
8. Slowly crack the main air valve and open the petcock under the funnel to allow water to rise inside the funnel. When the water reaches the scribed line inside the funnel, close the petcock.
9. Open the main air valve about one-half turn and gently tap the gage to stabilize gage hand. If the meter is working correctly, the gage should read 1 %. Repeat steps 5 through 9 to check the calibration at higher air contents.

NOTE: If the gage hand does not read 1 % after this procedure, adjust the initial starting mark as follows: If the gage hand falls below 1 %, move the starting mark counterclockwise the same distance the hand falls below 1 %. If the gage hand exceeds 1 %, move the starting mark clockwise the same distance the gage hand exceeds 1 %.

E. PRECAUTIONS

1. Dial gages on the Techkote-White meters are nonadjustable, except for the 1 % calibration. Also, the readings are usually not linear. Calibrate the meters at various air percentages and establish a separate calibration curve for each meter.
2. If the dial gage indicates more than 1.5 % difference from the actual air content at any percentage, the gage should be replaced. If extra calibration help is needed, each manufacturer can usually readjust its device to within acceptable ranges.

F. HEALTH AND SAFETY

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Prior to handling, testing, or disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards, and exposure, chemical procurement and storage, and personal protective apparel and equipment.

Caltrans Laboratory Safety Manual is available at:

http://www.dot.ca.gov/hq/esc/ctms/pdf/lab_safety_manual.pdf

Users of this method do so at their own risk.

**End of Text
(California Test 115 contains 4 pages)**