

AMERICAN CUBE MOLD

ACM TYPE A PRESSURE METER

Product Description

The ACM-5 Air Meter is a Type A Meter conforming to the requirements of ASTM C231-97 (4.1.1) for measurement of the air content of freshly mixed concrete by the pressure method. The meter must be calibrated according to the procedures set forth in ASTM C231-97. (Encircled capital letters refer to parts and accessories shown in the paragraph.)

Operating Instructions

- A. Basic calibration of standardization vessel and measuring bowl: (refer to ASTM C231-97, Appendix A1.1 through A1.4.1): Determination of constant "R," (effective volume of calibration vessel as a percentage of measuring bowl volume):
1. Measure the weight of water, w , (to an accuracy of 0.1%) required to fill the standardization vessel "X".
 2. Measure the weight of water, W , (to an accuracy of 0.1%) required to fill the measuring bowl "V".
 3. Calculate the volume ratio constant, $R=w/W$ (ACM-5 pressure meters are designed to have nominal $R=0.05$: for accurate air content measurements, the nominal value should not be relied on, but R should be determined as above).
- B. Determination of the expansion factor D :
1. Fill the air meter with water (without the standardization vessel) to the 0% mark on the graduated scale after allowing all air bubbles to escape. Pressurize the vessel to nominal operating pressure (approximately 6#) and read the expansion factor as a percentage on the graduated cylinder.
- C. Determination of Calibration factor K :
1. $K=H \times R + D$, where H =ratio of volume of air in the standardization vessel after inundation, to the air volume before inundation.
- H varies with altitude:
- | | |
|---------------|-----------|
| Sea Level, | $H=0.97$ |
| +5,000 feet, | $H=0.965$ |
| +13,000 feet, | $H=0.960$ |
2. The resulting value of K for a given bowl and vessel and for the altitude at which the tests will be performed, is the corrected percent air contained in the standardization vessel to be used for determining the Operating Pressure "P" of the meter.
- D. Determine the Operating Pressure of the meter by the following steps:
1. Fill the measuring bowl "V" with water.
 2. Place the standardization vessel "X" in the water-filled bowl, carefully lowering it to set evenly on the bottom without disturbing the air content.
 3. Set the lid "W" on the bowl and tighten clamps "N". Flange and gasket surfaces must be clean and smooth for good pressure seal.
 4. Open air vent "T" and fill valve "R"; add water through the funnel "I" until the water level in the graduated cylinder "L" rises above the 0% mark near the top. Tap the meter lightly to break air bubbles loose and allow them to escape.
 5. Open the drain valve "S", allowing water to drain until the water level in the cylinder is exactly at the 0% level.
 6. Close all valves except the air inlet valve "U" below the air pressure pump "B". Pump air into the meter until the water level is lowered to the value corresponding to K (previously determined: see paragraph A, B and C).

Meter may be tipped slightly in a rolling movement to assure escape of trapped air bubbles. This should not be done without air pressure or the standardization vessel will lose some of its air.

7. Gradually release pressure by slowly opening air vent valve "T". Add sufficient water through the funnel, with fill valve "R" open, to restore the water level to the 0% mark.
 8. Pressurize the meter again to the value of K and record the pressure which displaces the water column to that level. This is the Operating Pressure. Slowly release pressure. If the water level does not return exactly to 0%, there has been either a water leak or air leak from the meter. After checking the seals, repeat step #8.
 9. Release pressure, open the vessel, empty out the water, clean and dry the measuring bowl and standardization vessel. The standardization vessel may be stored as it is not needed for measurement of air content in concrete.
- E. Procedure for Measurement of Air Content in Concrete.
1. Place a representative sample of concrete in the measuring bowl to 1/3 of the volume. Consolidate the concrete by tamping with 25 evenly distributed strokes of the tamping rod "Y". Tap the sides of the bowl with a mallet of a size specified by ASTM C231-97, 4.10, in order to fill the voids. Add a second layer of concrete to 2/3 of the volume and repeat the tamping with 25 strokes of the rod, taking care to penetrate the first layer about 1". Tape the sides of the bowl as before. Over-fill the bowl with the final layer of concrete, tamping the concrete and tapping the bowl as before. Remove the excess concrete from the top by sliding the strike-off bar "Z" across the top flange with a sawing motion so that the bowl is exactly level full of concrete.
 2. Clean the flanges of the bowl so that a good seal may be made when the top lid is firmly sealed to the base.
 3. Add water through the funnel "I" with valves "R" and "T" open, until the level is above the 0% mark. Tap and tilt the meter slightly to allow air bubbles to escape. Should foam on the surface of the water column prevent accurate measurement of the meniscus level, a small quantity of alcohol may be introduced with the water when filling through the funnel, or the allen-head plug may be removed from the top assembly so that alcohol may be sprayed into the graduated cylinder with a syringe. Foam on the water surface is seldom a problem in using the ACM-5 Pressure Meter. Adjust the water level to 0% by opening the drain valve "S".
 4. Close all valves except the air inlet valve "U", and pump the air pressure up to the operating pressure, "P" determined in the calibration procedure. Tap the air pressure gauge "A" to allow accurate indication of pressure. Read the percent of air content on the graduated cylinder.
 5. Release air pressure through valve "T" and read the water level on the graduated cylinder. The % air content with operating pressure, minus the % air content without pressure, equals the true air content of the concrete under test.
 6. Repeat the measurement as many times as necessary to obtain consistent results.
- F. An aggregate correction factor can be determined by the procedure outlined in ASTM C231-97, paragraph 6.
- G. Wash the entire meter thoroughly, clean and dry all parts before storing it in the carrying case provided.
- H. Measurement of air contents greater than 15%: The scale of the air meter may be doubled to span 0 to 30% if the operating pressure is reduced by a factor of 0.3714. Follow the instructions in Section D, using the lower operating pressure ($P \times 0.37$) and multiply the graduated cylinder reading by 2.