

# **OPERATING INSTRUCTIONS** **VOLUMETRIC AIR METER**

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## **OPERATING INSTRUCTIONS**

### **Volumetric Air Meter**

#### **Model CA-0610**

The following instructions are intended only as a guide for general operating of the meter. For complete and detailed test operating instructions, please refer to current ASTM C173/C 173M, C29/C29M and C172 specifications.

1. Wet the inside of the bowl and dry it to a damp but not shiny appearance.
2. Using a scoop, fill the bowl in two layers of equal depth with freshly mixed concrete. Rod the first layer 25 times with the tamping rod. Do not strike the bottom of the bowl when rodding the first layer. Tap the sides of the bowl 10 to 15 times with the mallet to close any voids left by the tamping rod and to release any large bubbles of air that may have been trapped.
3. Now, add the second equal layer of freshly mixed concrete to fill the bowl. Rod the second layer 25 times, penetrating into the first layer approximately 1 in. (25 mm) with the tamping rod. Tap the sides of the bowl 10 to 15 times with the mallet.

After tapping the final layer, a slight excess of concrete,  $\frac{1}{8}$  in. (3mm) or less, above the bowls rim is acceptable. Add or remove a representative sample of concrete if necessary to obtain the required amount of concrete.

4. Strike off the excess concrete with the strike-off bar until the surface is flush with the top of the bowl. Wipe the flange of the bowl clean.
5. Wet the inside of the top section of the meter, including the o-ring gasket.
6. Attach the top section of the meter to the bowl and rotate both clamp levers down so that they are at a 90° angle to the bowl and stop. Push both clamp tabs inward so the tab hooks are fully covered by the bowls flange, then simultaneously push both clamp levers down until they lock in place securing them together.
7. Insert the baffle funnel into the top section of the meter. Add at least 1 pt. (0.5 L) of water followed by the selected amount of isopropyl alcohol. Record the amount of isopropyl alcohol added.

Note: The amount of isopropyl alcohol necessary to obtain a stable reading and a minimum of foam can vary from less than 0.5 pt (200 ml) to more than 3 pt (1400 ml), depending on a number of factors in the concrete mix design. Refer to ASTM C173/C 173M for more information.

8. Continue adding water until it appears in the graduated neck of the top section. Stop and remove the funnel. Note: Refer to ASTM C173/C 173M, note 3.
9. Use the rubber syringe to adjust the liquid level until the bottom of the meniscus is level with the ZERO mark. Attach and tighten the water tight cap.
10. Invert the meter, shake the base horizontally for 5 seconds and return the meter to the upright position. Repeat the inversion and shaking process for a minimum of 45 seconds, and until the concrete has broken free and the aggregate can be heard moving in the meter as it is inverted

Note: To prevent the aggregate from lodging in the meters graduated neck, do not keep it inverted for more than 5 seconds at a time.

11. With the meter setting on the floor or the work surface, place one hand on the meters neck and the other on the flange. Tilt the meter to approximately a 45° angle and maintain this position throughout the procedure. With the hand holding the flange, vigorously roll the meter ¼ to ½ turn forward and back several times, quickly starting and stopping the roll. Rotate the base ⅓ of a turn and repeat the rolling procedure. Continue the turning and rolling procedure for approximately 1 minute. The aggregate must be heard sliding in the meter during this process.

Note: If at any time during the inversion and rolling procedures liquid is found to be leaking from the meter, the test is invalid and a new test should be started.

TABLE 1 Correction for the Effect of Isopropyl Alcohol on  
C 173/C 173M Air Meter Reading

Pints	70% Isopropyl Alcohol Used		Correction (Subtract) <sup>1</sup>
	Ounces	Liters	
0.5	8	0.2	0.0 <sup>2</sup>
1.0	16	0.5	0.0 <sup>2</sup>
1.5	24	0.7	0.0 <sup>2</sup>
2.0	32	0.9	0.0 <sup>2</sup>
3.0	45	1.4	0.3
4.0	64	1.9	0.6
5.0	80	2.4	0.9

<sup>1</sup> Subtract from final meter reading

<sup>2</sup> Corrections less than 0.125 are not significant and are to be applied only when 2.5 pt (1.2 L) or more alcohol is used. The effect occurs when the meter is inverted after being filled with an alcohol-water solution which then becomes further diluted when it is mixed with the water in the concrete. The values given are for air meters that have a bowl volume of 0.075 ft<sup>3</sup> (2.1L) and a top section that is 1.2 times the volume of the bowl.

## **DETERMINING TEST RESULTS**

Set the unit upright and loosen the top cap to allow any pressure to stabilize. Allow the meter to stand while the air rises to the top and until the liquid level stabilizes.

1. The liquid level is considered stable when it does not change more than 0.25% air within a 2 minute period.

Note: If it takes more than 6 minutes for the liquid level to stabilize or if there is more foam than that equivalent to 2 full percent air content divisions on the meters scale over the liquid level, the test is invalid and must be started over, and will require an additional amount of alcohol be used.

2. If the liquid level is stable without excessive foam, read the bottom of the meniscus to the nearest 0.25% and record the initial meter reading.
3. If the air content is greater than the 9% range of the meter, and the liquid level can not be read, add water using the calibrated cup to bring the liquid level within the graduated range of the meter. (Be sure to count the number of cups of water that have been added and record the number). Read the bottom of the meniscus to the nearest 0.25%. Record the final meter reading and the number of cups of water added.

## **CONFIRMATION OF THE INITIAL METER READING**

Record the initial reading and retighten the top cap. Repeat the 1 minute rolling procedure and the process for determining test results from the previous page.

1. When the liquid level is stable and all test procedure requirements are met, make a direct reading of the meniscus and estimate to 0.25% air. If the reading has not changed more than 0.25% from the initial meter reading, record it as the final meter reading of the sample test.
2. If the reading has changed from the initial meter reading by more than 0.25% air, record this reading as a new initial reading. Repeat the 1 minute rolling procedure and read the indicated air content. If this reading has not changed by more than 0.25% air from the “newest initial reading” record it as the final reading.

If the reading has changed by more than 0.25%, discard the test and start a new test on a new sample of concrete, using more alcohol.

3. Disassemble the meter, empty the base and examine the contents to be sure that there are no portions of undisturbed, tightly packed concrete in the base. If portions of undisturbed concrete are found, the test is invalid.

## CALIBRATION

Refer to ASTM C173/C 173 M, AASHTO T196 and all other local and state specification procedures regarding the operation and calibration of Volumetric Air Meters.

### ROLL-A-METER PARTS LIST

CA-0610-01	Cap, Graduated Tube	1
CA-0610-02	Gasket, Tube Cap	1
CA-0610-03	Graduated Tube	1
CA-0610-04	Spanner Wrench	1
CA-0610-05	Tube Clamp Ring	1
CA-0610-06	Tube O-Ring	1
CA-0610-06G	Tube Gasket, bottom	1
CA-0610-07	Plastic Sight Tube	1
CA-0610-08	Upper Chamber Body	1
CA-0610-09	O-Ring Upper Chamber	1
CA-0610-10	Measuring Bowl, Base	1
CA-0610-11	Baffle Funnel Assembly	1
CA-0610-12	Tamping Rod, 5/8" x 12" steel	1
CA-0610-13	Measuring Cup, metal	1
CA-0610-14	Measure, 16 oz. Plastic	1
CA-0610-20	10/24 x 5/8" Pan Head Screws	6
CA-0610-62	Plastic Carrying Case Assembly	1
CA-0500-26	Latch Assembly	2