Method of Test for
AIR CONTENT OF FRESHLY MIXED CONCRETE
DOTD Designation: TR 202-08

METHOD A - VOLUMETRIC METHOD

I. Scope

A. This method of test covers the procedure for determining the air content of freshly mixed concrete with a slump of 1 in. (25 mm) or greater by determining the volumetric displacement of air with water after thorough agitation. This method should not be used with aggregates greater than 1.5 inch. This is the appropriate method to use when the concrete contains lightweight or highly porous aggregates. This is the only method allowed for concrete with aggregate absorption of 4.0% or greater.

Note A-1: *When the concrete contains aggregates larger than 1.5 inch, wet sieve over the 1in. sieve, discard the larger aggregates, and then proceed with the slump test.*

B. Reference Documents
1. DOTD S301 - Sampling Fresh Concrete
2. DOTD TR 640 – Calibration of Measures Used to Determine Unit Weights
3. ASTM C 173-07 – Air Content of Freshly Mixed Concrete by the Volumetric Method

Note A-2: *ASTM C173-07 may be used in lieu of this method.*

II. Apparatus

A. **Air meter –** consisting of a bowl and a top section conforming to the following requirements. (Figure 1)

1. The bowl and top sections shall be of sufficient thickness and rigidity to withstand rough field use. The material shall not be attacked by high pH cement paste, deform when stored at high temperatures in closed spaces, or become brittle or crack at low temperatures. A watertight seal must be obtained when the top section is attached to the bowl.
2. **Bowl** - shall have a diameter equal to 1 to 1.25 times the height and be constructed with a flange at or near the top surface. Bowls shall not have a capacity of less than 0.075 ft^3 (0.002 m^3).
3. **Top section** - shall have a capacity at least 20% larger than the bowl and shall be equipped with a flexible gasket and a device to attach the top section to the bowl. The top section shall be equipped with a transparent scale, graduated in increments (not greater than 0.5%) from 0 at the top to 9% or more, of the volume of the bowl. The upper end of the neck shall have a watertight cap that will maintain a watertight seal when the meter is inverted and rolled.

Figure 1

B. **Funnel** - with a spout of a size permitting it to be inserted through the neck of the top section and long enough to extend to a point just above the bottom of the top section. The discharge end of the spout shall be so constructed that when water is added to the container there will be a minimum disturbance of the concrete.

C. **Tamping rod** - a round, smooth straight ⅝ ± 1/16 in. [16 ± 2 mm] diameter rod at least 12 in [300 mm] long with both ends rounded to a hemispherical tip of the same diameter. The rod shall be made of steel, high-density polyethylene, or other plastic of equal or greater abrasion resistance.

D. **Strike-off Bar** - a flat, straight steel bar at least ⅛x¾x12 in. [3x20x300 mm] or a flat, straight high-density polyethylene bar, or other plastic of equal or greater abrasion resistance, at least ¼x¾x12 in. [6x20x300 mm].

E. **Calibrated cup** - a metal or plastic cup either having a capacity of or being graduated in increments equal to 1.00 ± 0.04% of the volume of the bowl of the air meter.

F. **Syringe** - a small rubber bulb syringe having a capacity of at least that of the calibrated cup.

G. **Pouring vessel (for water)** - a container having a capacity of approximately 1 qt (1 L).

H. **Scoop** - a small metal scoop

I. **Isopropyl alcohol** - 70% by volume isopropyl alcohol (approximately 65% by weight).

Note A-3: *70% isopropyl alcohol is commonly available as rubbing alcohol. More concentrated grades can be diluted with water to obtain the required concentration.*

J. **Glass plate** - at least ½ in. (13 mm) thick with a length and width at least 2 in. (50 mm) greater than the diameter of the bowl.

K. **Mallet** – (with a rubber or rawhide head) with a mass approximately 1.25±0.5 lb. (600 ±200 g).

L. **Paper Towel**

M. **Applicable Documentation**

1. Batch Certification for Portland Cement Concrete (DOTD 03-22-4028)
2. Structural Concrete Tests (DOTD 03-22-0740, Figure 2)
3. Portland Cement Concrete Report (DOTD 03-22-4035)
4. Approved computer generated forms or spreadsheets.

III. Health Precautions

A. Protect against potential injury by avoiding skin contact with fresh concrete by wearing appropriate protective clothing and eye wear.

B. If the freshly mixed concrete should contact skin or eyes, immediately flush with water for a minimum of 5 minutes. If symptoms continue, consult a physician immediately.

C. Observe all precautions as specified by the manufacturer before handling fresh concrete.

IV. Calibration of Apparatus

A. Calibrate the meter and calibrated cup initially and annually or whenever there is reason to suspect damage or deformation of the meter or calibrated cup.

B. Determine the volume of the bowl with an accuracy of at least 0.1%. Follow the calibration procedure in accordance with DOTD TR 640.

C. Determine the volume of the calibrated cup using water in accordance with DOTD TR 640. A quick check can be made by adding one or more calibrated cups of water to the assembled apparatus and observing the increase in the height of the water column after filling to a given level.
D. Determine the accuracy of the graduations on the neck of the top section of the air meter by filling the assembled measuring bowl and top section with water to the level of the mark for highest air content graduation.
E. Add water in increments of 1.0% of the volume of the bowl to check accuracy throughout the graduated range of air content. The error at any point throughout the graduated range shall not exceed 0.1% of air.

V. Sample

Obtain the sample of mixed concrete in accordance with DOTD S301 of the Materials Sampling Manual and meet the minimum sample quantity of 0.25 cu. ft. (0.01 cu. meters).

VI. Procedure

A. Wet the inside of the bowl and dry it to a damp, but not shiny appearance.
B. Using the scoop, fill the bowl with mixed concrete in two equal layers of equal depth.
C. Rod after each layer 25 times with the tamping rod. Do not forcibly strike the bottom of the bowl when rodding the first layer.
D. When rodding the second layer, penetrate the prior layer approximately 1 in. (25mm).
E. After each layer is rodded, 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.

Note A-4: *After tapping the final layer, a slight excess of concrete, ⅛ in. (3 mm) or less, above the rim is acceptable. Add or remove a representative sample of concrete if necessary to obtain the required amount of concrete.*

F. Strike off excess concrete with the strike-off bar until the surface is flush with the top of the bowl and free of voids. Wipe the flange of the bowl clean.
G. Wet the inside of the top section of the meter, including the gasket, and attach the top section to the bowl.
H. Insert the funnel and add water until it appears in the neck.
I. Remove the funnel and adjust the water level, using the rubber syringe, until the bottom of the meniscus is level with zero mark.
J. Attach and tighten the cap.
K. Invert the meter, shake the base horizontally, and return the meter to the upright position.

Note A-5: *To prevent the aggregate from lodging in the neck of the unit, do not keep it inverted for more than 5 seconds at a time.*

L. 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.
M. Place one hand on the neck of the meter and the other on the flange. Using the hand on the neck, tilt the top of the meter approximately 45° from the vertical position with the bottom edge of the base of the meter resting on the floor or on the work surface. Maintain this position through the procedures described in this section.
N. Using the hand on the flange to rotate the meter; vigorously roll the meter ¼ to ½ turn forward and back several times, quickly starting and stopping the roll.

O. Turn the base of the meter about ⅓ turn and repeat the rolling procedure as stated previously.
P. Continue the turning and rolling procedures for approximately 1 minute.

Note A-6: *The aggregate must be heard sliding in the meter during this process.*

Note A-7: *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 shall be started as in Section V.*

Q. Set the unit upright and allow the meter to stand while the air rises to the top and until the liquid level stabilizes. The liquid level is considered stable when no further drop in the water column is observed.
R. When all the air has been removed from the concrete and allowed to rise to the top of the apparatus, remove the screw cap.
S. Using the syringe, add sufficient isopropyl alcohol in calibrated cup increments to dispel the foamy mass on the surface of the water. Record the number of calibrated cups used on the back of DOTD Form 03-22-0740 (Figure 2).
T. Make a direct reading of the liquid in the neck, reading to the bottom of the meniscus and estimate to the nearest (0.25%) of air.

VII. Calculations

Calculate the total air content (TA) of the concrete in the measuring bowl to the nearest 0.25 percent by using the following formula.

$$TA = R_1 + R_2$$

where:

R_1 = reading directly in the neck, after the alcohol was added.
R_2 = number of cups filled with alcohol used.

example:

$R_1 = 4.25\%$
$R_2 = 2.0$

$$TA = 4.25 + 2.0$$
$$= 6.25\%$$

VIII. Report

Round and report air content to the nearest 0.1%.

IX. Normal Test Reporting Time

The normal test reporting time is 15 minutes.

MATT MENU SELECTION - 17

DOTD 03-22-0740
Metric / English
Rev. 7/98

Louisiana Department of Transportation and Development

STRUCTURAL CONCRETE TESTS

(DOTD TR 226, TR230 & ASTM C 39)

Metric / English E (M or E) *Located on MATT Menu*

Project No. 222-22-2222 **Material Code** 601 **Lot No.** 001

Date Sampled 03-25-08 **Submitted By** 0607 **Quantity** 2010 CY

Purpose Code 3 **Plant Code** C7010 **Spec Code** 1

1. Qual. Cont. 4. Check 7. Design
2. Verification 5. Resample 8. Indep. Assur.
3. Acceptance 6. Source Appr. 9. Pre. Source Test

Mix Design No. 001 Date Rec'd.(lab) 3-27-08

Admixture: Y = Yes N = No **Air** ☐ **WR-NS** ☐ **WR-SR** ☐

Remarks 1

Item No. 8105 (03)

Cylinders Made By Signature Acceptance Tests By Signature

Batch Number 001

Date Tested 03-31-08

Acceptance Tests

Slump (TR 207), mm (in) ☐ Air Content (TR 202) ,% 6.3

Sample No.	Laboratory No.	Cond.	Break	Age Days	Diam. mm (in)	Area mm^2 (in^2)	Max. Load kN(lb)	Strength MPa (PSI)

Time Made: _____ Critical Strength: Low _____ High _____ Batch Avg. _____

Batch Number _____

Date Tested ☐-☐-☐

Acceptance Tests

Slump (TR 207), mm (in) ☐ Air Content (TR 202) ,% ☐

Sample No.	Laboratory No.	Cond.	Break	Age Days	Diam. mm (in)	Area mm^2 (in^2)	Max. Load kN(lb)	Strength MPa (PSI)

Time Made: _____ Critical Strength: Low _____ High _____ Batch Avg. _____

Break Codes:
1 = Satisfactory 2 = Unsatisfactory

Cond. Codes:
1 = Good
2 = Improperly Made
3 = Damaged
4 = Frozen

Average Strength for Lot _____

Tested By: Signature

Checked By: Signature

% Pay ☐

Remarks 2

Approved By Signature

Figure 2

DOTD Designation: TR 202-08

METHOD B – PRESSURE METHOD

I. Scope

A. This method of test covers the determination the air content of freshly mixed concrete for all ranges of slump but not for nonplastic concrete such as is commonly used in the manufacture of pipe and concrete masonry units. This is the only method allowed for concrete containing aggregates greater than 1.5 inch. This method shall only be used for concrete containing aggregates with absorption less than 4.0%. If aggregate absorption is 4.0% or greater, use Method A. This method is not applicable to concrete made with lightweight aggregates or air-cooled blast furnace slag.

B. Reference Documents
1. DOTD TR 201 - Mass Per Cubic Meter, Yield, and Air Content (Gravimetric) of Concrete
2. DOTD S301 - Sampling Fresh Concrete
3. DOTD TR 640 – Calibration of Measures Used to Determine Unit Weights
4. ASTM C192-06 – Standard Practice for making and Curing Concrete Test Specimens for the Laboratory
5. ASTM C 231-04 – Air Content of Freshly Mixed Concrete by the Pressure Method

II. Apparatus

A. **Air meter -** consisting of a measuring bowl and cover assembly conforming to the requirements shown below. The operating principle of this meter consists of equalizing a known volume of air at a known pressure in a sealed air chamber with the unknown volume of air in the concrete sample. The dial on the pressure gage shall be calibrated in terms of percent air for the observed pressure at which equalization takes place. (Figure 3)

1. **Measuring bowl** - a flanged or otherwise constructed cylindrical bowl, made of hard metal not readily attacked by cement paste, having a diameter equal to 0.75 to 1.25 times the height and a capacity of at least 0.20 ft^3 (0.006 m^3).
2. **Cover assembly** - shall be made of hard metal or other hard material not readily attacked by the cement paste. It shall have smoothly machined interior surfaces contoured to provide an air space above the level of the top of the measuring bowl. It shall be flanged or otherwise constructed such that the cover and the measuring bowl can be fitted together into a pressure-tight assembly. The cover shall be fitted with a gage for obtaining a direct reading of air content. The graduations for a suitable range in air content shall be within 0.1%. The cover shall be fitted with an air bleeder valve for venting of the air chamber, a main air valve, and petcocks for bleeding off water as required. Suitable means of clamping the cover to the bowl shall be provided to make a pressure-tight seal without entrapping air at the joint between the flanges of the cover and bowl. A suitable hand pump shall be provided with the cover, either as an attachment or as an accessory.

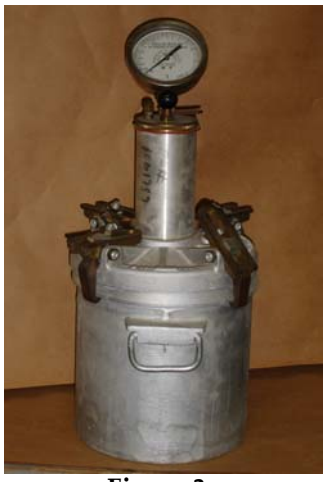

Figure 3

B. **Calibration Vessel** - a measure having an internal volume equal to an even (whole) percentage of the volume of the measuring bowl corresponding to the approximate percent of air in the concrete to be tested; or, if smaller, it shall be possible to check calibration of the meter indicator at the approximate percent of air in the concrete to be tested by repeated filling of the measure.

C. **Syringe** – a small rubber bulb syringe

D. **Calibration Tubes** - auxiliary calibration tubes of approximate diameters provided either as an integral part of the cover assembly or separately, shall be constructed to assist in adding and removing water from the container during the aggregate correction factor determination.

E. **Tamping Rod** – shall be a round, straight steel rod, ⅝ in. (16 mm) in diameter and not less than 16 in. (400 mm) in length, having the tamping end rounded to a hemispherical tip the diameter ⅝ in. (16 mm).

F. **Mallet** - with a rubber or rawhide head, weighing 1.25± 0.50 lb. (0.57 ± 0.23 kg) for use with measures of 0.5 ft^3 (14 m^3) or smaller, and a mallet weighing approximately 2.25 ± 0.50 lb (1.02 ± 0.23 kg) for use with measures larger than 0.5 ft^3 (14 m^3).

G. **Strike-off Bar** - a flat, straight steel bar at least ⅛x¾x12 in. [3x20x300 mm] or a flat, straight high-density polyethylene bar, or other plastic of equal or greater abrasion resistance, at least ¼x¾x12 in. [6x20x300 mm].

H. **Strike-off Plate** – a flat, rectangular metal plate at least ¼ in. (6 mm) thick or a glass or acrylic plate at least ½ in. (12 mm) thick with a length and width at least 2 in. (50 mm) greater than the diameter of the measure with which it is to be used. The edges of the plate shall be straight and smooth within a tolerance of 1/16 in. (1.5 mm).

I. **Vibrator with Power Source** – (when required) as described in ASTM C192-06.

J. **Container** - having a ½ or 1 gal. (2 or 4 L) capacity as required shall be provided to fill the assembled air meter with water from the top of the concrete to overflow at the petcock.

K. **Scoop -** a small metal scoop

L. **Scale** - of sufficient capacity to determine the weights of fine and coarse aggregates required for the determination of the aggregate correction factor in Step IV.O.

M. **Paper Towel, Towel or Sponge**

N. **Personal protective equipment**- rubber boots, gloves, eye and ear protection, etc.

O. **Applicable Documentation**
   1. Batch Certification for Portland Cement Concrete (DOTD 03-22-4028)
   2. Structural Concrete Tests (DOTD 03-22-0740)
   3. Portland Cement Concrete Report (DOTD 03-22-4035)
   4. Approved computer generated forms or spreadsheets

III. Health Precautions

A. Protect against potential injury by avoiding skin contact with fresh concrete

by wearing appropriate protective clothing and eye wear.

B. If the freshly mixed concrete should contact skin or eye(s), immediately flush with water for a minimum of 5 minutes. If symptoms continue, consult a physician immediately.

C. Observe all precautions as specified by the manufacturer before handling fresh concrete.

IV. Calibration

Note B-1: *Rough handling will affect the calibration of pressure-type apparatus for the determination of air content. Should the accuracy of the air meter be questioned, it should be returned to the Materials and Testing Section for a calibration check.*

A. *Calibration Vessel* – Determine the weight of water, T, required to fill the calibration vessel in accordance with DOTD TR 640 Steps III(a) to III(c).

B. *Measuring Bowl* – Determine the weight of water, W, required to fill the measuring bowl, in accordance with DOTD TR 640 Steps III(a) to III(c).

C. *Effective Volume of the Calibration Vessel* – The constant R, represents the effective volume of the calibration vessel expressed as a percentage of the volume of the measuring bowl:

$$R, \% = 100 \ x \ (\omega / W)$$

where,

T = weight of water required to fill calibration vessel

W = weight of water required to fill measuring bowl

D. *Initial Pressure Line Calibration* – Follow the manufacturer's recommendations for obtaining the initial pressure line.

E. *Calibration Test to Check the Air Content Graduations on the Pressure Gage* – Fill the measuring bowl with water. Screw the short piece of tubing or pipe furnished with the apparatus into the threaded petcock hole on the underside of the cover assembly. Assemble the apparatus. Close the air valve between the air chamber and the measuring bowl and open the two petcocks on holes through the cover assembly. Add water through the petcock on the cover assembly having the extension below until all air is expelled from the second petcock.

F. Pump air into the air chamber until the pressure reaches the indicated initial pressure line.

G. Allow a few seconds for the compressed air to cool to normal temperature. Stabilize the gage hand at the initial pressure line by pumping or bleeding off air as necessary tapping the gage lightly. Close the petcock opposite the tube or pipe extension on the under side of the cover.

H. Remove water from the assembly to the calibrating vessel controlling the flow.

Note B-2: *Depending on the particular meter design, by opening the petcock provided with the tube or pipe extension and opening the air valve between the air chamber and the measuring bowl, or by opening the air valve and using the petcock to control flow.*

I. Perform the calibration at an air content which is within the normal range of use.

Note B-3: *If the calibration vessel has a capacity within the normal range of use, remove exactly that amount of water.*

J. With some meters, the calibrating vessel is quite small and it will be necessary to remove several times that volume to obtain air content within the norm range of use. In this instance, carefully collect the water in an auxiliary container and determine the amount removed by

weighing to the nearest 0.1%. Calculate the correct air content, R.

K. Release the air from the apparatus at the petcock not used for filling the calibration vessel.

Note B-4: *If the apparatus employs an auxiliary tube for filling the calibration container, open the petcock to which the tube is connected to drain the tube back into the measuring bowl.*

Note B-5: *At this point, the measuring bowl contains the percentage of air determined by the calibration test of the calibrating vessel.*

K. Pump air into the air chamber until the pressure reaches the initial pressure line marked on the pressure gage, close both petcocks in the cover assembly, and then open the valve between the air chamber and the measuring bowl.

Note B-6: *Refer to manufacturer's directives to determine and verify the initial pressure line.*

L. If two or more determinations show the same variation from the correct air content, reset the dial hand to the correct air content and repeat the test until the gage reading corresponds to the calibrated air content within 0.1%.

M. If the dial hand was reset to obtain the correct air content, recheck the initial pressure mark.

N. If a new initial pressure reading is required, repeat the calibration to check the accuracy of the graduation on the pressure gage described earlier in Step IV.D.

Note B-7: *If difficulty is encountered in obtaining consistent readings, check for leaks, for the presence of water inside the air chamber, or the presence of air bubbles clinging to the inside surfaces of the meter from the use of cool aerated water. In this latter instance, use de-aerated water which can be obtained by cooling hot water to room temperature.*

O. Determine the *aggregate correction factor, G,* on a combined sample of fine and coarse aggregated as follows:

1. Mix representative samples of fine aggregate of weight, F_s, and coarse aggregate of weight, C_s, and place in the measuring bowl.
2. Fill the bowl ⅓ full of water.
3. Add the mixed aggregate a small amount at a time until all of the aggregate is covered with water.
4. Add each scoopful in a manner that will entrap as little air as possible and remove accumulations of foam promptly.
5. Tap the sides of the bowl and lightly rod the upper inch (25mm) of the aggregate about 10 times and stir after each addition of aggregate to eliminate entrapped air.
6. When all aggregate has been placed in the bowl and allowed to soak for at least 5 minutes, strike off all foam and excess water.
7. Thoroughly clean the flanges of both the bowl and conical cover so that when the cover is clamped in place, a pressure-tight seal will be obtained.
8. Attach the cover assembly to the measuring bowl.
9. With both petcocks open, pump air into the air chamber until the predetermined initial pressure line is reached.
10. Close both petcocks and open the main air valve between the air chamber and measuring bowl.
11. Read the air content scale and record as the aggregate correction factor, G.
12. See Steps VII.A. for calculations for determination of F_s and C_s.

Note B-8: *Ensure all petcocks and bleeder valves are closed to prevent water from entering pump chamber.*

Note B-9: *The aggregate correction factor must be determined for each portland cement concrete mix design, at the beginning of each project, or whenever there is a change in the aggregate properties.*

V. Sample

Obtain a representative sample of the concrete to be tested in accordance with DOTD S 301 and meet the minimum sample quantity of 0.50 cu. ft. (0.01 cu. meters).

VI. Procedure

A. Place the concrete in the measuring bowl in three layers of approximately equal volume. Consolidate each layer of concrete by 25 strokes of the tamping rod evenly distributed over the cross section.
B. After each layer is rodded, strike the sides of the measure 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.
C. Rod the bottom layer throughout its depth, taking care not to allow the rod to forcibly strike the bottom of the measure. In rodding the second and final layers, use only enough force to cause the rod to penetrate the surface of the previous layer about 1 in. (25 mm). When adding the final layer of concrete, be careful not to overfill the measure.
D. After consolidating the concrete, 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.
E. Assemble the apparatus, close the main air valve between the air chamber and the measuring bowl and open both petcocks.
F. Using a syringe, inject water through one petcock until water emerges from the opposite petcock.
G. Place a thumb over one petcock and tilt slightly to expel air bubbles from this same petcock. Turn to original position and readjust water.

Note B-10: *If water level changes, there is a leak.*

H. Close the air bleeder valve on the air chamber and pump air into the air chamber until the gage hand is on the initial pressure line. Allow a few seconds for the compressed air to cool to normal temperature.
I. Stabilize the gage hand at the initial pressure line by pumping or bleeding-off air as necessary, taping the gage lightly.
J. Close both petcocks and open the main air valve between the air chamber and the measuring bowl. Tap the sides of the measuring bowl sharply to relieve local restraints. Lightly tap the pressure gage to stabilize the gage and read the percentage of air, A_1, on the dial of the pressure gage.
K. Make sure the main air valve is closed and release the pressure by opening both petcocks before removing the cover.
L. Determine air content, A, in accordance with Step VII.B.

VII. Calculations

A. Determination of Aggregate Correction Factor

1. Calculate the weights of fine and coarse aggregate present in the volume, S, of the sample of fresh concrete whose air content is to be determined, as follows:

$$F_s = \frac{S}{B} \times F_b$$

$$C_s = \frac{S}{B} \times C_b$$

where:

F_s = weight of fine aggregate in concrete sample under test, lb (kg)
S = volume of concrete sample (same as volume of measuring bowl of apparatus), ft^3 (m^3)
B = volume of concrete produced per batch (Note B-9), ft^3 (m^3)
F_b = total weight of fine aggregate in batch, lb (kg)
C_s = weight of coarse aggregate in concrete sample under test, lb (kg)
C_b = total weight of coarse aggregate in batch, lb (kg)

Note B-11: *The volume of concrete produced per batch can be determined in accordance with DOTD TR 201 part 6(b).*

example:

$S = 0.25\ ft^3$
$B = 217.8\ ft^3$
$F_b = 10{,}848$ lb
$C_b = 13{,}627$ lb

$$F_s = \frac{0.25}{217.8} \times 10848$$

$$= 12.45 \text{ lb}$$

$$C_s = \frac{0.25}{217.8} \times 13627$$

$$= 15.64 \text{ lb}$$

B. Calculate the air content, A, of the concrete to the nearest 0.1 % by using the following formula:

$$A = A_1 - G$$

where:

A = air content, percentage by volume of concrete
A_1 = apparent air content of the sample, percentage by volume of concrete
G = aggregate correction factor, percentage by volume of concrete, (see Step IV. O.)

example:

$A_1 = 7.2\%$
$G = 0.2\%$

$$A = 7.2 - 0.2$$
$$= 7.0\%$$

VIII. Report

Report the air content to the nearest 0.1%.

IX. Normal Test Reporting Time

The normal test reporting time is 15 minutes.