AIR CONTENT
OF FRESHLY MIXED CONCRETE
BY THE
PRESSURE METHOD (TYPE B)
AASHTO T 152

APPARATUS

[ ] Air Meter, Type B, calibrated in accordance with AASHTO T 152
[ ] Basic function check of air meter by IAT
[ ] Air chamber can be pressurized to stabilized maximum IPL mark
[ ] Pressure loss no more than 1/2 IPL mark in 90 seconds

[ ] Balance
[ ] Class G 20, in accordance with AASHTO M 231
[ ] Range extends from mass of measure empty to mass of measure plus contents at 160 lb/ft³

[ ] Tamping Rod
[ ] Round straight steel rod 5/8 ± 1/16 inch diameter
[ ] At least 4 inches longer than the measure used
[ ] Maximum length of 24 inches
[ ] Tamping end rounded to hemispherical tip with same diameter as the rod

[ ] Internal Vibrator
[ ] Rigid or flexible shaft powered by electric motor
[ ] Minimum frequency of vibration of 7000 vibrations per minute
[ ] Outside diameter or side dimension at least 3/4 in. and not greater than 1 1/2 in.
[ ] Combined length of shaft and vibrating element exceeds maximum depth of bowl by at least 3 in.

[ ] Mallet
[ ] Rubber or rawhide head
[ ] Weight of 1.25 ± 0.50 lb for use with bowls 0.5 ft³ or smaller
[ ] Weight of 2.25 ± 0.50 lb for use with measure larger than 0.5 ft³

[ ] Strike-Off Bar
[ ] Flat straight bar of steel or other suitable metal
[ ] At least 1/8 in. thick by 3/4 in. wide by 12 in. long

[ ] Strike-Off Plate
[ ] Flat rectangular metal plate at least 1/4 in. thick or a glass or acrylic plate at least 1/2 in. thick
[ ] Length and width at least 2 in. greater than diameter of measure
[ ] Edges straight and smooth within a tolerance of 1/16 in.

[ ] Calibration Vessel
[ ] Vessel marked with serial number that matches air meter apparatus
[ ] Vessel marked with representative percent air content for air meter apparatus

[ ] Tubes, one short straight piece and one J-shaped piece, each threaded at one end

[ ] Scoop, a size large enough that the amount of concrete obtained from the sampling receptacle is representative and a size small enough that the concrete is not spilled during placement into the measuring bowl
PROCEDURE -- AGGREGATE CORRECTION FACTOR

Aggregates are relatively dense. Procedure not applicable to light-weight aggregate, air-cooled blast furnace slag or aggregates of high porosity. In such cases, AASHTO T 196 shall be used.

Weight of fine and coarse aggregate 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.
- \( S \) = volume of measuring bowl, ft\(^3\)
- \( B \) = volume of concrete produced per batch, ft\(^3\)
- \( F_b \) = total weight of fine aggregate in the moisture condition used in batch, lb
- \( C_s \) = weight of coarse aggregate in concrete sample under test, lb
- \( C_b \) = total weight of coarse aggregate in the moisture condition used in batch, lb

Aggregates in same moisture condition as aggregates used in the concrete
Representative samples of fine and coarse aggregate are mixed together
Measuring bowl filled one-third full with water
Mixed aggregates placed in small amounts into the measuring bowl in manner that would entrap as little air as possible, and accumulated foam removed immediately, if present
After each addition of aggregate, sample stirred, the upper 1 in. of aggregate lightly rodded 8-12 times, and sides of bowl tapped
Aggregate in bowl covered with water at all times
When all the aggregate is placed, excess foam removed and aggregate inundated for a period of time approximately equal to the time between introduction of the water into the mixer and the time of performing the test for air content
Cover assembly placed on bowl
Air valve between air chamber and measuring bowl closed, and both petcocks opened
Water injected through one petcock until water emerges from opposite petcock
All entrapped air has been removed
Air pumped into air chamber to a stabilized initial pressure line which is correct for meter
Both petcocks closed and pressurized air released into bowl containing sample
Water removed from meter into the calibration vessel which represents % air
Aggregate correction factor determined as follows:

\[ \text{Aggregate correction factor} = \text{reading on gage} - \% \text{ of air removed} \]
PROCEDURE -- AIR CONTENT

Compaction method of concrete is according to following table (for PCCP, the compaction method for beams shall be by vibration)

<table>
<thead>
<tr>
<th>Slump</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 3 in.</td>
<td>Rodding</td>
</tr>
<tr>
<td>1 to 3 in.</td>
<td>Rodding or Vibration (Note 1)</td>
</tr>
<tr>
<td>&lt; 1 in.</td>
<td>Vibration</td>
</tr>
</tbody>
</table>

Note 1 -- Overvibration may cause segregation and loss of intentionally entrained air. Usually, sufficient vibration has been applied as soon as the surface of the concrete becomes relatively smooth and has a glazed appearance.

Placement and Consolidation -- Rodding Method

Interior of measuring bowl dampened, and bowl placed on a flat, level surface
Bowl filled in three layers of approximately equal volume using the scoop
Each layer rodded 25 strokes with tamping rod, evenly distributed over cross section
Bottom layer rodded throughout its depth without rod forcibly striking the bottom of the bowl
Second and top layer rodded throughout its depth so that the strokes penetrate about 1in. into the underlying layer
Bowl tapped smartly 10 to 15 times with mallet after each layer is rodded
An excess of concrete is protruding approximately 1/8 in. above the top of the bowl after rodding and tapping (Note 2)
Top surface struck off with bar and finished smooth
Top surface struck off with plate and finished smooth
Plate pressed on top surface of measure covering two-thirds of surface and plate withdrawn with sawing motion
Plate again placed over original two-thirds of surface and advanced with vertical pressure and sawing motion
Several final strokes are made with the inclined edge of the plate to produce smooth finished surface

Note 2 -- A small quantity of representative concrete may be added to correct a deficiency. If the measure contains great excess, remove a representative portion of the concrete with a trowel or scoop before the measure is struck off.
Placement and Considation -- Vibration Method

- Interior of measuring bowl dampened, and bowl placed on a flat, level surface
- Bowl filled in two layers of approximately equal volume
- All of concrete for each layer placed in measure before starting vibration
- Vibrator inserted at three different points of each layer
- Vibrator not resting on or touching the bottom or sides of bowl when compacting bottom layer
- Vibrator withdrawn in such a manner that no air pockets are left in the concrete
- Duration of vibration is such that the surface of the concrete is relatively smooth and proper consolidation is achieved (overvibration may cause segregation and loss of intentionally entrained air).
- An excess of concrete is protruding approximately 1/8 in. above the top of the bowl after vibration
- Top surface struck off with bar and finished smooth
- Top surface struck off with plate and finished smooth
  - Plate pressed on top surface of measure covering two-thirds of surface and plate withdrawn with sawing motion
  - Plate again placed over original two-thirds of surface and advanced with vertical pressure and sawing motion
  - Several final strokes are made with the inclined edge of the plate to produce smooth finished surface

Air Content Method

- Flanges of bowl and cover assembly thoroughly cleaned, and air meter assembled to obtain a pressure tight seal
- Air valve between air chamber and bowl closed, and both petcocks opened
- Using a rubber syringe, water injected through one petcock until water emerges from opposite petcock
- Meter jarred gently until all air is expelled from this same petcock
- Air bleeder valve on air chamber closed and air pumped into air chamber until gage hand is on the initial pressure line
- A few seconds allowed for compressed air to cool
- Gage hand at the initial pressure line stabilized by pumping or bleeding-off air as necessary while tapping gage lightly
- Both petcocks closed
- Air valve between air chamber and measuring bowl opened
- Sides of measuring bowl tapped smartly with mallet to relieve local restraints
- Pressure gage tapped lightly with hand to stabilize reading while air valve is open and percentage of air on the dial of pressure gage read
Air content of sample calculated as follows:

\[ A_S = A_1 - G \]

where:

- \( A_S \) = air content of sample tested, percent
- \( A_1 \) = apparent air content of the sample tested, percent
- \( G \) = aggregate correction factor, percent

If comparison readings are not within the required agreement tolerance and the calibration of the air meter is suspect, a check on the air meter in the field according to the calibration procedure will be conducted.

NA - Not Applicable
X - Requires Corrective Action
√ - Satisfactory

Acceptance Technician

________________________________________________________________________

INDOT Date

Comments: __________________________________________________________________
______________________________________________________________________________