# IA CONCRETE VOLUMETRIC METHOD EVALUATION
# PERFORMANCE EVALUATION

**SiteManager ID:** _____ **PHONE #:** _____

**Technician:** _____ **E-Mail:** _____

**DATE:** _____ **Level:** _____

| | PASS | FAIL |
|---|---|---|
| AASHTO R-60 | | |
| AASHTO T-119 | | |
| ASTM- C1064 (T-309) | | |
| AASHTO T-152 (VOLUMETRICMETHOD) | | |
| AASHTO T-22 | | |
| AASHTO R-100 | | |

| **OVERALL RATING:** | **PASS** | **FAIL** |
|---|---|---|

**OHCMTB#:**

Technician (Signature): _____

**OHCMTB#:**

IA Observer(Signature): _____

# IA Checklist
# ASTM C1064 (T 309)
# Temperature of Freshly Mixed Hydraulic-Cement Concrete

| **Procedure** | | **P** | **F** | **NA** |
|---|---|---|---|---|
| 1 | Place Thermometer in sample with a minimum of 3” [75 mm] cover around sensor. | | | |
| 2 | Close the air void by gently pressing the concrete around the measuring device. | | | |
| 3 | Leave the temperature measuring device in the freshly mixed concrete for at least 2 minutes but not more than 5 minutes. | | | |
| 4 | Read and record the temperature to the nearest 1 º F [0.5 º C]. | | | |
| 5 | Do not remove the thermometer from the concrete when reading the temperature. | | | |

| **Equipment** | | **P** | **F** | **NA** |
|---|---|---|---|---|
| **Container** | | | | |
| 1 | Verify the container is large enough to provide at least 3” [75 mm] of concrete in all directions around the sensor of the temperature measuring device. | | | |
| **Temperature Measuring Device** | | | | |
| 2 | Verify the temperature measuring device is accurate to ± 1º F [± 0.5º C] throughout a range of 30º F to 120º F [0º C to 50º C]. | | | |
| 3 | Verify the design of the temperature measuring device is such that it allows 3” [75 mm] or more of immersion during operation. | | | |
| 4 | Verify temperature measuring devices are calibrated/verified annually by comparing the readings of the temperature measuring device at 2 temperatures at least 30º F [15º C] apart. | | | |

**Remarks:**

# IA Checklist
# R 60 Sampling Freshly Mixed Concrete

| Procedure | | P | F | NA |
|---|---|---|---|---|
| 1 | Obtain a representative sample (i.e. from a revolving drum truck mixer pump hose). | | | |
| 2 | Sample the concrete at two or more regularly spaced intervals during discharge of the middle portion of the batch. | | | |
| 3 | Repeatedly pass receptacle through entire discharge stream or completely divert discharge stream into sampling container. | | | |
| 4 | Transport samples to place of testing. | | | |
| 5 | Combine samples and remix to form composite sample. | | | |
| 6 | Obtaining the first and final portion of the composite sample shall not exceed 15 minutes. | | | |
| 7 | Minimum size of sample used for strength tests shall be 1 $ft^3$ [28 L]. | | | |
| 8 | Start tests for slump, temperature, and air within 5 minutes after obtaining the final portion of composite sample. | | | |
| 9 | Start molding cylinders within 15 minutes after fabricating the composite sample. | | | |
| 10 | Protect sample against rapid evaporation and contamination | | | |
| 11 | Did Inspector verify that plant has been certified within the last 6 months, and is on the P/S list in Sitemanager? | | | |
| 12 | P/S number of plant: | | | |

**Remarks:**

# IA Checklist
# T 119 Slump of Hydraulic-Cement Concrete

| Procedure | | P | F | NA |
|---|---|---|---|---|
| 1 | Obtain a sample of freshly mixed concrete in accordance with R 60. | | | |
| 2 | Dampen the mold and the floor or base plate. | | | |
| 3 | Hold the mold firmly against the base by standing on the two foot pieces. Do not allow it to move in any way during filing. | | | |
| 4 | Fill mold in three approximately equal layers (by volume), the first to a depth of 2 3/4" [70 mm], the second to a depth of 6 1/2" [165 mm], and the third to just over the top of the mold. | | | |
| 5 | Rod each layer throughout its depth 25 times, distributing the strokes uniformly over the cross section of each layer. | | | |
| 6 | Rod the second and third layers to just penetrate into the underlying layer. | | | |
| 7 | When rodding the top layer, keep excess concrete above the mold at all times. | | | |
| 8 | Strike off concrete level with top of mold using the tamping rod. | | | |
| 9 | Remove concrete from the area surrounding base of the mold. | | | |
| 10 | Lift the mold upward 12" [300 mm] in one smooth motion, without twisting the mold, in 5 ± 2 seconds. | | | |
| 11 | Measure to the nearest 1/4" [5 mm] the slump from the top of mold to the displaced original center of the top surface of the specimen. | | | |
| 12 | Perform the test from start to finish within 2 1/2 minutes. | | | |

| Equipment | | P | F | NA |
|---|---|---|---|---|
| **Mold** | | | | |
| 1 | Mold is made of metal not readily attacked by the cement paste and is in the form of the lateral surface of the frustum of a cone. | | | |
| 2 | Mold has a base that is 8 ± 1/8" [200 ± 3 mm] in diameter. | | | |
| 3 | Mold has a top that is 4 ± 1/8" [100 ± 3 mm] in diameter. | | | |
| 4 | Mold has a height that is 12 ± 1/8" [300 ± 3 mm]. | | | |
| 5 | Mold is constructed without a seam and has both foot pieces and handles. | | | |
| 6 | Interior of the mold is relatively smooth and free from projections and free from dents, deformations and adhered mortar. | | | |
| **Tamping Rod** | | | | |
| 7 | Tamping rod is a round straight steel rod 5/8" [16 mm] in diameter and approximately 24" [600 mm] in length. | | | |
| 8 | Tamping rod has the tamping end rounded or both ends rounded to a hemispherical tip, the diameter of which is 5/8" [16 mm] | | | |
| **Measuring Device** | | | | |
| 9 | Measuring device is a ruler, metal roll-up measuring tape or similar rigid length measuring instrument marked in increments of ¼" [5 mm] or smaller. | | | |
| 10 | Length of measuring device is at least 12" [300 mm] | | | |

**Remarks:**

# IA Checklist
# R 100 Making and Curing Concrete Test Specimens in the Field

| **Procedure** | | **P** | **F** | **NA** |
|---|---|---|---|---|
| 1 | Place molds on a level, rigid, horizontal surface free of vibration. | | | |
| 2 | Select a representative sample in accordance with R 60. | | | |
| 3 | Place concrete in the mold, moving the small placement tool around top edge of the mold as the concrete is discharged. | | | |
| 4a | For 6 x 12" [150 x 300 mm] cylinders: Fill mold in three layers of equal volume. | | | |
| 4b | For 4 x 8" [100 x 200 mm] cylinders: Fill mold in two layers of equal volume. | | | |
| 5a | For 6 x 12" [150 x 300 mm] cylinders: Rod each layer 25 times with rounded end of rod, uniformly distributing strokes. | | | |
| 5b | For 4 x 8" [100 x 200 mm] cylinders: Rod each layer 25 times with rounded end of 3/8 x 12" [ 10 x 300 mm] rod, uniformly distributing strokes. | | | |
| 6 | Rod bottom layer throughout its depth. | | | |
| 7a | For 6 x 12" [150 x 300 mm] cylinders: Rod the middle and top layers to a depth of 1" [25 mm] into the underlying layers. | | | |
| 7b | For 4 x 8" [100 x 200 mm] cylinders: Rod the top layer to a depth of 1" [25 mm] into the underlying layers. | | | |
| 8 | Tap the sides of the mold lightly 10-15 times with a mallet, or open hand (light-gauge, single-use molds only), after rodding each layer. | | | |
| 9 | On the final layer, add an amount that will fill the mold after consolidation. Adjust underfilled or overfilled molds with representative concrete and complete the required strokes. | | | |
| 10 | Strike off excess concrete from the surface with a tamping rod, float or trowel as required. Use the minimum amount of manipulation necessary to produce a flat, even surface. | | | |
| 11 | Mark specimens with positive identification, not on removable caps, using a method that does not alter the top surface of the concrete. | | | |
| 12 | Employ appropriate method of maintaining specified moisture and temperature conditions. | | | |
| **Equipment** | | **P** | **F** | **NA** |
| **Single-Use Molds** | | | | |
| 1 | Molds are constructed in the form of right circular cylinders which stand with the cylindrical axes vertical and the tops open to receive the concrete. | | | |
| 2 | Molds are made of materials that do not react with concrete containing Portland or other hydraulic cements. | | | |
| 3 | Molds are watertight and sufficiently strong and tough to permit their use without tearing, crushing or deforming. | | | |
| **Tamping Rod** | | | | |
| 4 | Tamping rod is a round, straight steel rod. | | | |
| 5a | For cylinders with diameters less than 6" [150 mm]: rod length is 12 ± 4" [300 ± 100 mm] and has a diameter of 3/8 ± 1/16" [10 ± 2 mm] | | | |
| 5b | For cylinders with diameters of 6" [150 mm] and larger: rod length is 20 ± 4" [500 ± 100 mm] and has a diameter of 5/8 ± 1/16" [16 ± 2 mm] | | | |
| 6 | Tamping rod has the tamping end or both ends rounded to a hemispherical tip of the same diameter as the rod. | | | |
| **Mallet** | | | | |
| 7 | A mallet with a rubber or rawhide head weighing 1.25 ± 0.50 lb shall be used. | | | |

**Remarks:**

# IA Checklist
# T 196 Air Content of Freshly Mixed Concrete by the Volumetric Method

| Procedure | | P | F | NA |
|---|---|---|---|---|
| 1 | Obtain a sample of freshly mixed concrete in accordance with R 60. | | | |
| 2 | Dampen the inside of the bowl. Fill the bowl in 2 equal layers. | | | |
| 3 | Rod each layer 25 times. When rodding the second layer, penetrate the prior layer approximately 1". | | | |
| 4 | Tap the sides of the measure 10 to 15 times with the mallet after each layer is rodded. | | | |
| 5 | Strike off a slight excess of concrete flush with top of the bowl using the strike-off bar and wipe the flange clean. | | | |
| 6 | Wet the inside of the top section and the gasket. | | | |
| 7 | Attach the top section to the bowl, insert funnel, ad at least 1 pint [0.5 L] of water, add the selected amount of alcohol, and then add water until it appears in the neck of the top section. | | | |
| 8 | Remove the funnel and adjust the liquid level until the bottom of meniscus is level with zero mark. | | | |
| 9 | Attach and tighten the watertight cap. | | | |
| 10 | Repeatedly invert and agitate the air meter, for no more than 5 seconds at a time and for a minimum of 45 seconds in total, to free concrete from the base. | | | |
| 11 | Vigorously roll the air meter, in 1/4 to 1/2 turns, for a minimum of 1 minute. Occasionally turn the base about 1/3 of a turn during the rolling process. | | | |
| 12 | If the meter leaks while inverting or rolling, start a new test on a new sample. | | | |
| 13 | Place the meter upright, loosen the cap, and allow the liquid level to stabilize. | | | |
| 14 | If it takes more than 6 minutes for the liquid level to stabilize or there is more than 2% (in air division) of foam above the liquid, discard the sample and start a new test; increase the amount of alcohol used. | | | |
| 15 | When rolling has occurred once, read the liquid level in the neck to the nearest 0.25%. Record the initial meter reading. Retighten the cap and repeat steps 11 through 14. | | | |
| 16 | When rolling has occurred twice, read the liquid level in the neck to the nearest 0.25%. If the second reading has changed from the initial reading by more than 0.25%, record this reading as the new initial reading. Repeat 11 through 14. If the second reading has not changed from the initial reading by more than 0.25%, record this as the final meter reading. | | | |
| 17 | If/when rolling has occurred three times, read the liquid level in the neck to the nearest 0.25%. If the third reading has changed from the initial reading by more than 0.25%, discard the sample and start a new test; increase the amount of alcohol used. If the third reading has not changed from the initial reading by more than 0.25%, record this reading as the final meter reading. | | | |
| 18 | Disassemble the apparatus 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. | | | |
| 19 | Calculate the air content.<br>Air content = meter reading minus (-) alcohol correction, if needed, plus (+) number of cups of water, if used. | | | |
| 20 | Report air content to the nearest 0.25%. | | | |

# T 196 Air Content of Freshly Mixed Concrete by the Volumetric Method contd.

| Equipment | | P | F | NA |
|---|---|---|---|---|
| **Air Meter** | | | | |
| 1 | Bowl and top sections have a sufficient thickness and rigidity to withstand rough field use. | | | |
| 2 | Material is impervious to attack by high PH cement paste and will not deform when stored at high temperatures in closed spaces and will not become brittle or crack at low temperatures. | | | |
| 3 | A watertight seal is obtained when the top section is attached to the bowl. | | | |
| 4 | Bowl has a diameter equal to 1 to 1.25 times the height and is constructed with a flange at or near the top surface. | | | |
| 5 | Top section is equipped with a flexible gasket and a device to attach the top section to the bowl. | | | |
| 6 | Top section is 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. Graduations are accurate to plus or minus 0.1% by volume of the bowl. | | | |
| 7 | Upper end of the neck has a watertight cap that will maintain a watertight seal when the meter is inverted and rolled. | | | |
| 8 | Meter is calibrated initially and at 3 year intervals or whenever there is a reason to suspect damage. | | | |
| **Funnel** | | | | |
| 9 | Funnel has 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. | | | |
| 10 | Discharge end to the spout is constructed so that when water is added to the container there will be a minimum disturbance of the concrete. | | | |
| **Tamping Rod** | | | | |
| 11 | Tamping rod is round, smooth, straight, 5/8 ± 1/16” [16 ± 2 mm] in diameter, at least 12” [300 mm] long with both ends rounded to a hemispherical tip of the same diameter. | | | |
| 12 | Rod is made of steel, high-density polyethylene or other plastic of equal or greater absorption resistance. | | | |
| **Strike-Off Bar** | | | | |
| 13 | Bar is a flat straight steel bar at least 1/8 x 3/4 x 12” [3 x 20 x 300 mm] or a flat straight high-density polyethylene or other plastic of equal or greater abrasion resistance bar at least 1/4 x 3/4 x 12” [6 x 20 x 300 mm]. | | | |
| **Calibration Cup** | | | | |
| 14 | Metal or plastic cup has a capacity of or is graduated in increments equal to 1.00 ± 0.04% of the volume of the bowl and is calibrated. | | | |
| **Syringe** | | | | |
| 15 | Syringe has a capacity of at least 2 oz [50 mL] | | | |
| **Isopropyl Alcohol** | | | | |
| 16 | Isopropyl alcohol is 70% by volume (approximately 65% by weight) | | | |
| **Mallet** | | | | |
| 17 | Mallet has a rubber or rawhide head with a mass of approximately 1.25 ± 0.5 lb [600 ± 200 g]. | | | |

**Remarks:**

# IA Checklist
# T 121 Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete

| Procedure | | P | F | NA |
|---|---|---|---|---|
| 1 | Obtain a sample of freshly mixed in accordance with R 60. | | | |
| 2 | Determine mass of empty measure (lb[kg]). | | | |
| 3 | Place concrete in measure in three equal layers of approximately equal volume (for consolidation by rodding). | | | |
| 4 | Rod each layer with the tamping rod 25 times for 0.5ft³ [14L] or smaller containers or 50 times for 1ft³ [28L] containers | | | |
| 5 | Rod the bottom layer throughout its depth, without forcibly striking the bottom of the measure. | | | |
| 6 | Rod the middle and top layers, each throughout its depth, so that the strokes penetrate the previous layer by about 1 in. [25mm] | | | |
| 7 | Distribute the strokes uniformly over the cross section of the measure for each layer. | | | |
| 8 | After rodding each layer, tap the sides of the measure smartly 10 to 15 times with a mallet. | | | |
| 9 | Remove any excess concrete using a trowel or a scoop or add a small quantity of concrete to correct a deficiency after consolidation of final layer. | | | |
| 10 | Cover about 2/3 of the surface with a flat strike off plate and withdraw the plate in a sawing motion to finish the concrete surface. | | | |
| 11 | Cover the original 2/3 of the surface and advance it with vertical pressure and a sawing motion. Advance plate until it slides completely off the measure. | | | |
| 12 | Smooth surface with inclined edge of the plate. | | | |
| 13 | Clean off all excess concrete and determine the mass of the full measure. | | | |
| 14 | Calculate net mass (lb [kg]). | | | |
| 15 | Calculate density (lb/ft³ [kg/m³]). | | | |

| Equipment | | P | F | NA |
|---|---|---|---|---|
| **Balance** | | | | |
| 1 | A balance or scale accurate to 0.1 lb (45g) or to within 0.3% of the test load whichever is greater at any point within the range of use. | | | |
| 2 | The range of use shall be considered to extend from the mass of the measure empty to the mass of the measure plus its contents at 160 lb/ft³ (2600 kg/m³) | | | |
| | | | | |
| **Tamping Rod** | | | | |
| 3 | Tamping rod is a round straight steel rod 5/8” (±1/16”) [16 mm ± 2mm] in diameter and at least 4” [100mm] greater than the depth of the measure, but not more than 24” (600mm) in overall length. | | | |
| 4 | Tamping rod has the tamping end or both ends rounded to a hemispherical tip, the diameter of which is 5/8” [16 mm]. | | | |

# IA Checklist
# T 121 Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete

| Equipment (continued) | | P | F | NA |
|---|---|---|---|---|
| **Mallet** | | | | |
| 5 | Mallet has a rubber or rawhide head and weighs approximately 1.25 ± 0.50 lb [0.57 ± 0.23 kg] for use with measures of 0.5 ft³ [14 L] or smaller or 2.25 ± 0.50 lb [1.02 ± 0.23 kg] for use with measures larger than 0.5 ft³ [14 L]. | | | |
| **Strike-Off Plate** | | | | |
| 6 | Strike-off plate is a flat rectangular metal plate at least 1/4" [12 mm] thick or a glass or acrylic plate at least 1/2" [12 mm] thick with a length and width at least 2" [50 mm] greater than the diameter of the measure with which it is to be used. | | | |
| 7 | Edges of the plate are straight and smooth within a tolerance of 1/16" [2.0 mm] | | | |
| **Measure** | | | | |
| 8 | A cylindrical container made of steel or other suitable material. | | | |
| 9 | Minimum capacity of the measure conforms to nominal maximum size of coarse aggregate in the concrete mix. | | | |
| 10 | Verify the measure is calibrated at least once a year or whenever there is a reason to question the accuracy of the calibration. | | | |
| 11 | Verify the top rim of the measure is smooth and plane within 0.01" [0.3mm] | | | |

**Remarks:**

# IA Checklist
# T 22 Compressive Strength of Cylindrical Concrete Specimens

| No. | Item | P | F | NA |
|---|---|---|---|---|
| 1 | Check the ends of the cylinder to verify that they do not depart from perpendicularity by more than 1/16” in 6” (0.5 degrees) | | | |
| 2 | Check the ends of the specimen for depressions > 0.20”. | | | |
| 3 | Examined pads for splits or cracks. | | | |
| 4 | Have the pads been used more than 100 times (50 and 60 durometer pads)? | | | |
| 5 | If specimens are lab cured, are they being tested in moist condition? | | | |
| 6 | Are the cylinders, caps, bearing surfaces or extrusion controllers, and bearing blocks of the test machine free of loose particles? | | | |
| 7 | Was the cylinder properly aligned in the breaker? | | | |
| 8 | Was machine allowed to warm up before use, and zeroed? All settings correct for testing? | | | |
| 9 | Apply load at full advance until one half of the anticipated maximum load is attained, then slow to a rate of movement corresponding to a stress rate of 35psi/sec. | | | |
| 10 | Apply the compressive load until the specimen displays a well-defined fracture pattern. | | | |
| 11 | Record the maximum load and compressive strength to the specified accuracy. Express result to the nearest 10 psi | | | |
| 12 | Note the type of failure and appearance of the concrete. | | | |
| 13 | Has compression machine been calibrated within the last year? | | | |

**Remarks:**