Concrete Field

2027

Proficiency Pack

Date: _____

Name: _____

Employer: _____

MoDOT TM20: Measurement of Air, Surface and Asphalt Mixture Temperature
PROFICIENCY CHECKLIST

Applicant: _____

Employer: _____

Trial #	1	2
Certificates or Report of Verification of Accuracy (Annual calibration) available?		
AIR		
1. Pick correct thermometer		
2. Location - *Mercury, Digital, Max-Min thermometers* - shade, no direct sunlight - position 4.5 feet above surface - safe location		
3. Document to nearest 2° F		
SURFACE		
4. Pick correct thermometer		
5. Procedure - *Spot Check Disc*; place on surface until needle stops moving - *Infrared*; follow manufacturer recommendations - *Mercury or Max-Min*; place under wooden box wait 5 minutes - *Digital* ; follow manufacturer recommendations		
6. Document to nearest 2° F		
ASPHALT MIXTURE		
7. Pick correct thermometer		
8. Procedure - *Infrared*; follow manufacturer recommendations - *Armored , BI-Therm Dial, or Digital*; place stem into mixture and wait until thermometer reading has stabilized		
9. Document to nearest 5° F		
	PASS	PASS
	FAIL	FAIL

Examiner:_____Date:_____

AASHTO R60/ASTM C172: Sampling Freshly Mixed Concrete
PROFICIENCY CHECKLIST

Applicant: _____

Employer: _____

	Trial# 1	2
Checked for required equipment: square nose shovel, scoop, sample container, testing equipment for Slump, Air-Content, Temperature, Strength tests, safety equipment, PPE, tags, molds.		
1. Communicate with the contractor to coordinate sampling and for safety purposes.		
2. Set-up a testing area with all testing equipment		
3. Collected ticket information on the load, name of concrete plant, job#, etc.		
4. Waited until all additives and water were added and mixed into the load		
5. After final additions, wait a minimum of 30 revolutions		
5. Collected the fresh sample(s) within 15 minutes from one of the following sources: -**Truck Mixed- Revolving Drum per MoDOT Method** *Discharged a minimum of 1 cubic yard *Passed a receptacle completely through the discharge stream or by diverting the discharge chute into a sample container *Collected enough fresh concrete to do all tests *Did not restrict the flow of concrete **-Stationary Mixers** *Sampled at the middle of the batch *Obtained 2 or more portions at regular spaced intervals (combined to make composite sample) *Did not restrict flow *Collected enough fresh concrete to do all tests -**Continuous Mixers** *Sampled middle portion of the batch *Discharge $5ft^3$ of concrete *Obtain 2 or more portions regularly spaced intervals during discharge *Combine into one composite sample to do all tests *Wait 2 to 5 min. before testing -**Paving Mixers** at a paving operation *After the contents of the mixer have been discharged *Obtained samples from at least 5 locations (combined to make composite sample) *Collected enough fresh concrete to do all tests *Avoided contamination from subgrade		
7. Performed Wet-Sieving as needed (Except for concrete used for unit weight)		
8. Transported the composite sample to the testing area and remixed with a square nose shovel		
9. Within 5 minutes of mixing the composite sample started tests for Temperature, Air-Content, and Slump		
10. Started molding specimens for strength tests and completed all tests within 15 minutes of mixing the composite sample.		
	PASS	PASS
Examiner: _____ Date: _____	Fail	Fail

AASHTO T309/ASTM C1064: Temperature of Freshly Mixed Hydraulic-Cement Concrete
PROFICIENCY CHECKLIST

Applicant: _____

Employer: _____

	Trial#	1	2
1.	Thermometer verified annually to an NIST traceable thermometer		
2.	Sensing portion of thermometer submerged a minimum of 3 inches into concrete		
3.	Concrete gently pressed around thermometer at surface of concrete		
4.	Thermometer left in concrete for at least 2 minutes but not more than 5 minutes		
5.	Read and reported the temperature to the nearest 1°F (0.5°C)		

PASS PASS

FAIL FAIL

Examiner: _____Date:_____

AASHTO T119/ASTM C143: Slump of Hydraulic Cement Concrete

PROFICIENCY CHECKLIST

Applicant: _____

Employer: _____

Trial#	1	2
1. A Clean Slump Cone damped and placed on a moist, flat, level, nonabsorbent rigid surface		
2. Cone secured by clamps or by standing on foot pieces while filling the cone in three equal layers and while rodding		
3. Each layer approximately ⅓ the volume of the mold		
4. Each layer rodded 25 times		
5. Layers rodded properly a. First layer rodded through entire depth while inclining the rod & spiraling toward center b. Second layer rodded approximately 1" into underlying layer c. Third layer was kept heaped above the cone while rodding approximately 1" into the underlying layer		
6. Used a tamping rod to strike off level with the top of the mold		
7. Cone filled and removed within 2 ½ minutes		
8. Excess concrete cleaned away from the bottom of the mold and plate		
9. Movement/vibration of cone restricted until lift was performed		
10. Cone was lifted vertically without twisting, within 5 ± 2 seconds		
11. Immediately placed the mold upside-down next to the slumped concrete		
12. Placed the tamping rod on top of the cone, measured the vertical distance of the displaced original center of the slump to the rod		
13. Slump measured and recorded to the nearest ¼ inch		
	PASS	PASS
	FAIL	FAIL

Examiner: _____Date:_____

AASHTO T152/ASTM C231: Air content of freshly Mixed Concrete by Pressure Method

PROFICIENCY CHECKLIST

Applicant:_____

Employer:_____

Trial#	1	2
General		
1. Bowl dampened		
2. Bowl filled in three equal layers		
3. Each layer rodded 25 times		
4. After rodding each layer, bowl tapped 10 to 15 times with a mallet		
5. Excess concrete removed with sawing motion of strike-off bar		
Type "B" Meter		
1. flanges of bowl cleaned and unit assembled		
2. Air valve between air chamber and bowl closed		
3. Using rubber syringe water injected through one petcock until water emerged from opposite petcock		
4. Meter jarred gently until all air was expelled		
5. Air pumped into chamber until gauge hand is on initial pressure line		
6. Waited a few seconds to allow for the gauge to stabilize at the initial pressure line.		
7. Initial pressure stabilized while tapping gauge lightly		
8. Petcocks closed. (Not before filling of air chamber, Step 5)		
9. Air valve between air chamber and measuring bowl opened		
10. Sides of measuring bowl tapped sharply		
11. Pressure gauge tapped lightly and percentage of air read		
12. Air content of sample calculated as follows: Air content (%) = Apparent Air Content – Aggregate Correction Factor		
13. Aggregate correction factor determined for different aggregates		

PASS PASS

FAIL FAIL

Examiner: _____Date:_____

AASHTO R100/ ASTM C31: Making and Curing of Concrete Cylinder Specimens in the Field PROFICIENCY CHECKLIST

Applicant: _____

Employer: _____

Trial#	1	2
Sampled concrete per AASHTO R60		
Conducted Slump, Air Content, and Temperature Tests a. Reported results.		
Molding Cylinders		
1. Each layer properly consolidated per results of Slump, AASHTO T119		
2. 4" x 8" Mold filled in 2 approx. equal layers (Vibrated = 2 layers)		
6" x 12" Mold filled in 3 approx. equal layers (Vibrated = 2 layers)		
3. Rod each layer 25 times a. 4" x 8", vibrator, one location per layer b. 6" x 12", vibrator, two locations per layer		
4. Mold tapped lightly 10 to 15 times after each layer		
5. Mold tapped with **open hand** for light gauge single use molds		
6. Cylinder finished using either a tamping rod (if consistency of concrete permits) or with a handheld float, or a trowel so that the specimen is level with the rim of the mold.		
7. Mold properly cleaned and sealed with cap		
8. Identification information written on the container side and duct tape closed		
9. Set up initial cure per AASHTO R100 at 60-80°F		
10. Reported all core information, temperatures, and curing information		
	PASS	PASS
	FAIL	FAIL

Examiner: _____Date:_____

AASHTO R100/ ASTM C31: Making and Curing of Concrete BEAM Specimens In the Field PROFICIENCY CHECKLIST

Applicant: _____

Employer: _____

Trial#	1	2
Sample concrete per AASHTO R60		
Conducted Slump, Air Content, and Temperature Procedures a. Reported all results of these tests		
Molding Beams – 6" x 6" Standard Size		
1. Each layer properly consolidated per results of slump, AASHTO T 119		
2. Mold filled in 2 approximately equal layers (Vibrated = 1 layer)		
3. Rodded each layer every 2 square inches of surface area, into 1 inch of the layer below it. Spade each layer on the ends and sides. a. If vibrator used, 1 insertion per layer, insert full depth at intervals of approximately 6 inches along the center line of the length of the mold alternating insertions between 2 lines. Do not spade when consolidating by vibration.		
4. Mold tapped lightly 10 to 15 times after each layer was rodded		
5. Beam finished using either a tamping rod if consistency of concrete permits) or handheld float, or a trowel so that the specimen was level with the rim of the mold		
6. Identification, information written on the mold		
7. Beams cured the same as cylinders, except they are stored in water saturated with calcium hydroxide at 73.5±3.5°F at least 20 hours prior to testing		
8. Reported all beam information, temperatures, and curing information		
Transportation		
1. Waited at least 8 hours after final set to transport, protected specimens from the cold, moisture maintained, and did not exceed 4 hours of transport time		
	PASS	PASS
	FAIL	FAIL

Examiner: _____Date:_____

AASHTO T121M/ASTM C138: Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

PROFICIENCY CHECKLIST

Applicant_____

Employer_____

Trial #	1	2
Standardize		
Mass and volume of empty measure determined in yearly standardization.		
Sample		
Obtained sample in accordance with AASHTO R60.		
Procedure – Rodding – Rod 25 or (50) times according to size of the measure		
1. Determined which consolidation method to use from the slump. 2. Determine which size measure and size mallet to use from the nominal maximum size of the aggregate. (Use chart)		
3. Dampened the measure, weigh to 0.1 lbs., and place on a flat, level, firm surface.		
4. Weigh and record empty measure to nearest 0.1 lbs.		
5. Scooped representative sample of concrete into the measure, moving the scoop around the perimeter to fill the measure in 3 equal layers.		
6. - **Bottom layer,** fill 1/3 full, rod 25 (50) times through without striking the bottom of the measure, tap 10-15 times with a mallet. - **2nd layer**, fill 2/3 full, rod 25 (50) times 1 inch into the bottom layer, tap 10-15 times with a mallet. - **3rd layer**, overfill by ⅛ inch and rod 25 (50) times 1 inch into the 2nd layer, tap 10-15 times with a mallet.		
7. Ensure proper consolidation has been achieved.		
8. If needed adjust the concrete by adding or removing concrete to be ⅛ inch overfill.		
9. Ensure proper consolidation has been achieved.		
Procedure - Vibration		
10. **For internal vibration**, measure filled in **2** equal layers.		
11. Vibrated each layer at **3** different points.		
12. Ensured proper consolidation has been achieved.		
Finishing		
13. Use a glass plate for strike off method, ending with a smooth finish.		
14. Clean the outside of the measure and the rim		
15. Weigh and record the full measure to the nearest 0.1 lbs.		
16. Calculate Density (unit weight), report to nearest 0.1 lb./ft^3		
17. When requested, report: Yield, Relative Yield, Cement Content, and Gravimetric Air Content.		
	PASS	PASS
	FAIL	FAIL

Examiner: _____ Date: _____

AASHTO T196M/ASTM C173: Air Content of Freshly Mixed Concrete by the Volumetric Method

PROFICIENCY CHECKLIST

Applicant_____

Employer_____

Trial #	1	2
Sample		
1. Obtained sample in accordance with AASHTO R60		
Procedure		
2. Bowl filled in 2 layers		
3. Each layer rodded 25 times		
4. Bowl tapped (sharply) 10-15 times after rodding each layer		
5. Used funnel, water added, then alcohol added, then final water added until liquid level close to zero		
6. Funnel removed, adjusted the water to where the bottom of the meniscus is on zero		
7. Screw cap attached and tightened		
Initial Reading		
1. Unit inverted and agitated at 5 second intervals for a minimum of 45 seconds and until concrete is free from the base		
2. Unit vigorously rolled ¼ to ½ turn forward and back several times with base at a 45° angle, then turn base about ⅓ turn and rolling process resumed		
3. Meter checked for leaks; if leaking, test started over with a new sample		
4. Apparatus placed upright, cap loosened and allowed to stand until air rises to the top a. Less than 0.25% change in 2 minutes (without excessive foam), initial reading recorded to the nearest 0.25% b. More than 6 minutes to stabilize or observed excessive foam, test discarded and new test ran		
Confirmation of Initial Meter Reading		
1. One-minute rolling repeated, and liquid level checked		
2. Confirmation reading is greater than 0.25% of initial, new meter reading recorded as new initial reading, repeat 1-minute rolling		
3. Level of liquid read less than 0.25% change, final meter reading recorded to nearest 0.25%		
4. Apparatus disassembled and checked for undisturbed concrete		
Calculations		
1. Correction factor from Table 1 subtracted for use of 2.5 pints or more of alcohol		
2. If required, number of calibration cups of water added to air content		
3. Air content reported to the nearest 0.25% air		
	PASS	PASS
	FAIL	FAIL

Examiner: _____Date:_____