**Oklahoma Highway Construction Materials Technician Program**

***Guide to Key Elements of Performance Examination***

# Contents



## Introduction

This guide is designed to help applicants prepare for Oklahoma Highway Construction Materials Technician Program certification modules. The certification process requires applicants to perform specified sampling and/or testing procedures in the presence of an evaluator who determines whether or not the applicant has the skills and knowledge required to obtain consistent results that will compare closely with those obtained by other competent technicians. A critical feature of this process is an evaluation of the applicant's ability to properly perform certain elements of the procedure that are considered to be essential for obtaining consistent, accurate, and repeatable results. Below are lists of the types of physical and procedural "key elements" which an applicant is expected to know before attempting certification. It is important to understand that ***an applicant is expected to know quantities*** that are associated with these elements. For example, if a procedure specifies a temperature range, the applicant is expected to know the value of that range by memory without the aid of reference materials. In other words, if an evaluator asks for the required temperature of a water bath, the answer "About 71 degrees," would be incorrect. The correct answer might be "71 plus or minus one-degree Fahrenheit." Verbal questions about temperatures, times, and other criteria are included in all performance examinations.

## Material Sampling Methods

Many procedures describe a variety of methods for sampling materials depending on where in the production/construction process the material is sampled. Applicants are expected to know all methods described in a procedure. (For example, a technician seeking certification in Asphalt or Materials Sampling & Testing may have sampled asphalt only from a truck transport and from the roadway before compaction. Such a technician will still be required to know the proper procedure for sampling from a windrow, funnel device, and ***all other locations*** described in AASHTO T 168.)

Some key elements for sampling procedures are:

- method for selecting sample locations
- minimum sample size for tests anticipated

- method for reducing sample to testing size
- proper equipment required for collecting and reducing samples (A few examples: Fine aggregate sampling tubes must have what dimensions? Splitter must have how many chutes per side for coarse aggregate? For fine aggregate? What kind of container for liquid AC or emulsions? Release agent properties?)
- number and locations of sample increments
- method for assuring representative nature of sample (Examples: Sample taken for what depth? Top layer removed or included? Devices used to create barrier?)

**Material Testing Methods**

Materials test standards are generally divided into three sections - apparatus, procedure, and calculations. Applicants must be familiar with each of these areas.

Some key elements for testing procedures are:

- times
- temperatures
- tolerances ( ± °F, ± kg, ± mL, ± min or sec)
- equipment specifications (thermometer temperature range, scale accuracy, etc.)
- equipment inspection (Sieves cleaned? Correct container size and shape?)
- sequence of elements (steps in proper order)
- conditioning of sample prior to test (Sieve? Dry? Temperature?)
- response to special conditions (Absorption > 2%? Excessive moisture?)
- device calibration and settings
- calculations

During performance examinations, most tests are to be performed and completed just as they would be under actual field/lab conditions. Applicants are required to properly perform a procedure and to know all of its key elements in order to successfully certify as an RHCMT.

**Pass/Fail criteria and the "Fourth Strike" rule.**

**Two chances to perform a procedure** - If an applicant misses one or more key elements on a procedure, it is considered a strike. If the applicant misses fewer than three key elements, the evaluator shall tell the applicant which key elements were missed. If the applicant misses three or more key elements, the evaluator shall tell the applicant only that the attempt was failed and how many key elements were missed but not which ones were missed. After being informed that the attempt was unsuccessful, the applicant will be given an opportunity to review the standard and make a second attempt to perform the procedure. If a key element is missed on the second attempt, the applicant has failed to meet the requirement for that procedure.

**One retest permitted for performance evaluations** - If an applicant fails to meet the requirement for a procedure during the evaluation process (two attempts failed), a retest for that procedure is scheduled for a later date (neither less than 7 nor more than 60 days later) and the applicant continues the process with two strikes from that procedure. If a second procedure is failed (two attempts), the applicant has failed the module and must re-enroll at a later date. For the retest, the applicant gets only one opportunity to perform the procedure. If a key element is missed, the applicant has failed the module and must re-enroll.

**The "Fourth Strike" rule** - Missing one or more key elements on a procedure results in a strike. A successful second attempt means the applicant continues but now with "one strike."

A failed second attempt means failure of that procedure (retest scheduled) and the applicant continues but now with “two strikes.” Once an applicant receives a third strike, missing another key element in any procedure is considered the “fourth strike” and the applicant has failed the module and must re- enroll. For re-enrollments, the entire module must be repeated regardless of where in the process an applicant was when the module was failed.

More rules concerning the certification process are available in the official Board Rules which can be accessed via hyperlink from the home page of our web site at http://oktechcert.org.

# HCMT AGGREGATES CERTIFICATION KEY

# ELEMENTS LIST

Release Date:  October 2024

**PERFORMANCE CHECKLIST**

**AASHTO R 90 Sampling Aggregate Products**

**Sampling Coarse Aggregate**

**Procedure**

1 Determine the time or location using?

2 Ensure equipment and containers are ___?

3 Field Sample Size - Coarse Aggregate - #57 (1in. Nom. Max.)

Show the evaluator the proper table
and determine the minimum size field
sample for the requested gradation.

**Sampling From A Conveyor Belt**

1 Isolate sample increment using . . . ?

2 If one increment is not sufficient?

3 Collect how much material from between templates?

**Sampling From Conveyor Belt Discharge**

1 Avoid sampling from ___?

2 Sampling device must pass through ___?

3 Material adhering to the sampling device is ___?

**Sampling From Roadway - In Place**

1 Sample after ___?

2 Sample before ___?

3 Increments of what depth?

4 Do what with underlying material?

**PERFORMANCE CHECKLIST**

**AASHTO R 90 Sampling Aggregate Products**

**Sampling From Stockpiles**

**Power Pile**

1 Direct operator to enterstockpile with bucket at least ___?

2 Do what with first bucketful?

3 Have operator back drag to make a ___?

4 Minimum number of increments?

5 Stay at least _____from the edge.

6 Be sure to _____underlying material.

**Stockpile Face**

1 Create horizontal surfaces with _____faces.

2 Prevent sloughing by using ____.

3 Obtain at least one increment from ____?

**Sampling Fine Aggregate**

1 Minimum diameter of sampling tube?

2 Do what with outer layer?

3 Minimum number of increments?

## PERFORMANCE CHECKLIST

## AASHTO R 76 Reducing Field Samples of Aggregate to Testing Size

**Coarse Aggregate**

**Size of Test Sample**

Determine mass of sample needed
to run T 255, T 27, and T 11.

**Mechanical Splitter**

1 Was splitter set up with proper size and number of chutes?

2 Sample properly distributed in pan or hopper?

3 Sample introduced to chutes at proper rate?

4 Sample properly reduced to specified size?

**Quartering**

1 Show evaluator where an alternate method is specified for quartering in the field if no level surface is available?

**PERFORMANCE CHECKLIST**

**AASHTO R 76 Reducing Field Samples of Aggregate to Testing Size**

**Fine Aggregate**

1 Determine mass of sample needed to run T 255, T 27, and T 11.

**Mechanical Splitter**

1 Specified number of chutes.

2 Minimum and maximum chute size.

3 Moisture condition of sample required to use splitter?

**Quartering**

1 Surface conditions?

2 Mixing procedure?

3 Flatten pile so each quarter contains the material originally in it.

4 Relative dimensions of resulting pile?

5 Divide pile into . . . ?

6 Retain what portions?

7 Treatment of fines?

**Miniature Stockpile**

1 Surface conditions?

2 Turn pile specified number of times.

3 Combine proper number of increments.

4 Brush spoon/sampling device each time.

**PERFORMANCE CHECKLIST**

**AASHTO T-255 Total Moisture Content of Coarse and Fine Aggregates By Drying**

**Coarse Aggregate**

1 Have applicant show examiner the proper table in T - 255 for test sample size.

2 Describe the sources of heat permitted to properly dry the sample.

3 Using the provided sample determine the mass of the oven dry sample within the specified tolerance.

4 Record required data promptly.

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**Fine Aggregate**

1 Have applicant show examiner the proper table in T - 255 for test sample size.

2 Using the provided sample determine the mass of the oven dry sample within the specified tolerance.

3 Record required data promptly.

**PERFORMANCE CHECKLIST**

**AASHTO T-11 Material Finer Than No 200 Sieve in Mineral Aggregates by Washing**

**Coarse Aggregate**

1 Determine mass of sample within specified tolerance.

2 Ample amount of water added?

3 Wash sample until . . . ?

4 Pour wash water over what sieves?

5 Return material to sample as specified.

6 Dry washed sample to constant mass at what temperature?

7 Determine mass to specified tolerance.

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**Fine Aggregate**

1 Determine mass of sample within specified tolerance.

2 Ample amount of water added?

3 Wash sample until . . . ?

4 Pour wash water over what sieves?

5 Return material to sample as specified.

6 Dry washed sample to constant mass at what temperature?

7 Determine mass to specified tolerance.

PERFORMANCE CHECKLIST

**AASHTO T-27 Sieve Analysis of Fine and Coarse Aggregates**

**Coarse Aggregate**

1 Assemble specified nest of sieves.

2 Describe the method for determining sufficiency of sieving.

2a. Use what equipment?

2b. Hold sieve in what position?

2c. Hand bump sieve at what rate?

2d. Turn sieve how far at what interval?

2e. Hand bump for how long before checking?

2f. For sieves larger than No. 4?

2g. Sieve until?

3 Did applicant check each sieve for blinding?

3a. Calculations for determining blinded sieve.

3b. Methods for prevention of blinding.

4 Determine the mass of material retained on each sieve.
to the specified tolerance.

**PERFORMANCE CHECKLIST**

**AASHTO T-27 Sieve Analysis of Fine and Coarse Aggregates**

**Fine Aggregate**

1 Assemble specified nest of sieves.

2 Determine the mass of material retained on each sieve.
to the specified tolerance.

# HCMT ASPHALT CERTIFICATION KEY

# ELEMENTS LIST

Release Date:  March 10, 2025

**PERFORMANCE CHECKLIST**

**OHD L-65 Sampling Asphalt Mixtures**

**L-65**

ODOT Standard Method for Sampling Asphalt Mixtures

1 Determine un-compacted sample locations according to?

2 Oklahoma Sampling location preference

3 The distance between two or more cores at a location must be between?

4 In filling core holes, the main difference between R 97 and OHD L-65 is the use of?

**R 67**

Obtaining Cores

1 Coring bit must be cooled by _____.

2 Keep core bit _____to the surface.

3 Continue drilling to _____.

4 Remove core without _____or _____the sample.

**R 97**

**Sampling from truck transport.**

5 Select sampling locations.

6 Top surface removed to specified depth.

7 Obtain sample from truck bed. (Simulated.)

**PERFORMANCE CHECKLIST**

**AASHTO R 47**

**CHOOSE TYPE A or B**

1 Splitter cleaned and lubed.

2 Unacceptable release agent properties. (Verbal)

**Mechanical Splitter Type A (Quartermaster)**

3 Position receptacles to receive portions.

4 Make sure release handle is in position.

5 Fill hopper, avoiding segregation.

6 Release sample through chutes.

7 Reintroduce proper portions.

8 Compose test sample.

**Mechanical Splitter Type B (Riffle)**

3 Entire sample through splitter.

4 Minimum number of chutes? (Verbal)

5 Minimum width of each chute? (Verbal)

6 Controlled rate to flow smoothly without restriction or loss of material. (Dust pan not required.)

7 Correct weight for required test.

Containers (Verbal)

1 Type of container used for AC.

2 Type of container used for emulsions.

3 **Sample Care (Verbal)**

3a Take care that samples are not _____.

3b Container must be perfectly _____and ____.

3c Emulsions must be protected from _____.

3d Mark for identification on _____or ____.

3e Clean outside of container with only _____.

Sampling Locations (Verbal)

4 Truck transport.

4a Valve located in the _____or ____.

4b Sample taken from what part of load?

5 Mixing Plant Valve Location

6 Storage Tank (Circulating)

Continued on next page.

7 Storage Tank (Not Circulating)

7a Obtain sample by means of _____.

7b Lower to near _____.

7c Withdraw at rate so that _____.

7d Sampling device should be _____and _____ before taking the sample.

Sampling Procedure (Performance)

Tell applicant - Gloves, heavy long sleeves, and face shield must be used.

8 Treatment of first portion of material from valve.

9 Container filled to appropriate level.

10 Container properly sealed and cleaned.

**PERFORMANCE CHECKLIST**

**OHD L 26 Ignition oven (part 18**

1 If not tested for moisture & volatiles, sample should be dried to a constant weight at what temperature?

2 Verify that the oven is at the correct temperature.

3 Enter correction factor of mix to be tested.

4 Weigh and record weight of sample baskets and pans.

5 Properly prepare sample and place in sample baskets and pan.

6 Weigh and record weights of sample, basket and pans. Calculate initial weight of sample.

7 Enter initial sample weight into ignition oven.

**PERFORMANCE CHECKLIST**

**OHD L 26 Ignition oven (part 19**

1 Place baskets in furnace and verify sample weights (including basket). Check furnace scales for proper reading. Start test.

2 Weight on furnace scale must match recorded weight of sample, baskets, and catch pan within ____.

3 Remove sample baskets and allow to cool to room temperature. (Approximately 30 minutes)

4 Transfer entire sample to flat pan

5 Minimum dimensions of flat pan?

**PERFORMANCE CHECKLIST**

**AASHTO T-209 Maximum Specific Gravity of Bituminous Paving Mixtures**

1 Determine sample size from Table 1

2 Separate the particles of the sample by hand, taking care not to fracture mineral particles so that particles of fine aggregate are not larger than 6.5 mm (1/4 inch).

3 Cool the sample to room temperature.

**Calibrate flask. (Verbal only)**

a Fill with water at specified temperature.

b Cap top of flask.

c Dry outside and weigh.

5 Tare flask at room temperature.

6 Pour mixture in flask using scoop and funnel. Weigh and record.

7 Fill flask containing mixture with enough water to cover sample completely.

8 Initiate vacuum at specified mm Hg and for specified time.

9 Release vacuum by increasing pressure at specified rate.

10 Remove flask from vacuum and fill with water.

11 Bring water in flask to 77 +/- 2°F.

12 When test temperature is achieved, cap off, dry flask and lid.

13 Weigh flask, lid, mixture, and water within 10 ± 1 minutes after completing vacuum process.

14 Record weight.

## PERFORMANCE CHECKLIST

## AASHTO T-30 Mechanical Analysis of Extracted Aggregate

1 Determine mass of sample within specified tolerance.

2 Ample amount of water added?

3 Wetting agent used?

4 Wash sample until . . . ?

5 Pour wash water over what sieves?

6 Return material to sample as specified.

7 Dry washed sample to constant mass at what temperature?

8 Determine mass to specified tolerance.

1 Assemble specified nest of sieves.

2 Describe the method for determining sufficiency of sieving.

2a. Use what equipment?

2b. Hold sieve in what position?

2c. Hand bump sieve at what rate?

2d. Turn sieve how far at what interval?

2e. For sieves larger than No. 4?

2f. Sieve until?

3 Did applicant check each sieve for blinding?

3a. Calculations for determining blinded sieve.

3b. Methods for prevention of blinding.

4 Determine the mass of material retained on each sieve.
to the specified tolerance. (Get all material from sieve.)

AASHTO T-176 Plastic Fines in Graded Aggregates and Soils by Use of Sand Equivalent Alternate Method 2 − Pre-Wet

Part one - Sample Preparation

1 Shake material over specified sieve.

2 What should be done with lumps of fine grained material?

3 Clean all fines from the particles retained on the sieve and include in the passing material.

4 Split or quarter enough of the sample to yield 500 to 750 g of material.

5 Perform Fragile Cast Test for proper moisture content. Moisten, if necessary, to obtain the fragile cast, and place in covered pan for specified tempering period.

6 Mix sample with splitting cloth as specified.

7 Fill tin as specified.

8 Remix sample.

9 Fill a second tin as specified.

10 Place tins in oven at what temperature? (Verbal)

**AASHTO T-176 Plastic Fines in Graded Aggregates and Soils by Use and Soils by Use of Sand Equivalent**

**Part two - Running Sand Equivalent**

1 Cool to what temperature? (Verbal)

2 Siphon specified amount of working solution into graduated cylinder.

3 Pour prepared test sample from tin into cylinder using funnel to avoid spillage.

4 Tap bottom of cylinder to remove air and thoroughly wet material.

5 Allow to stand for specified soaking period.

6 Loosen material in cylinder before shaking.

7 Shake cylinders and contents for specified time.

8 Set cylinder upright and remove stopper. Rinse materials from stopper into cylinder.

9 Place irrigation tube into material, rinsing fines from walls. Apply proper action until all fines are flushed from bottom and cylinder is filled to specified level.

10 Allow to stand undisturbed for the specified sedimentation period.

11 Read and record sand and clay readings.

**PERFORMANCE CHECKLIST**

**OHD L 14 \ T 166**

**ROADWAY CORES**

1 Cool specimen to what temperature? (Verbal)

2 Tare hook and string.

3 Bring water to specified temperature.

4 Submerge specimen in water and take reading after specified time.

5 Record weight within specified tolerance.

6 Surface dry specimen with damp towel immediately and weigh within specified tolerance. Record weight.

7 Place specimen in dry pan of known weight and dry to constant weight at specified temperature.

8 Cool specimen and drying pan to room temperature weigh within specified tolerance. Record weight.

9 What if absorption > 2.0%? (Verbal)

10 Calculate specific gravity.

**PERFORMANCE CHECKLIST**

**OHD L 14 \ T 166**

**LAB MOLDED SPECIMENS**

1 Cool specimen to what temperature? (Verbal)

2 Weigh in air to the specified tolerance. Record weight.

3 Tare hook and string

4 Bring water to specified temperature.

5 Submerge specimen in water and take reading after specified time.

6 Record weight to the specified tolerance.

7 Surface dry specimen with damp towel immediately and weigh to the specified tolerance. Record weight.

8 What if % Absorption exceeds 2.0?

9 Calculate specific gravity.

PERFORMANCE CHECKLIST

OHD L-14 Method 2 (Nuc Gauge)

1 When gauge is first turned on, before using, allow it to _____.

2 Place gauge on standard block correctly.

3 Take standard count. (Verbal)

4 Set instrument for specified count.

5 Proper depth set.

6 Properly position gauge on surface.

7 Set gauge to backscatter.

8 Take and record specified number of counts.

9 Number of test locations required for correlation? (Verbal)

1 Dry specimen to constant mass at what temperature? (Verbal)

2 Bring specimen to what temperature? (Verbal)

3 Record initial weight of specimen.

4 Weigh bag and record mass.

5 Place bag in machine as specified.

6 Place specimen in bag properly.

Smooth side down. Min 1 inch overlap. No wrinkles.

7 Close lid to begin vacuum process.

8 Remove sample from chamber and check for leaks.

9 Combine weights of specimen and bag.

10 Immerse sample in water within specified time limit after sealing. (Verbal)

11 Immerse specimen in water at specified temperature. (Verb)

12 Record weight to specified tolerance when reading stabilizes.

13 Test sample for validity. (Permissible gain or loss of mass.)

14 Place specimen in dry pan of known weight and dry to constant weight at specified temperature.

15 Cool specimen and drying pan to room temperature, weigh and record mass.

**AASHTO T 312 Superpave Gyratory**

**Key Elements 1 - 4 are verbal questions.**

1 Sample conditioned at what temperature?

2 Sample conditioned for how long?

3 Does machine ever require calibration?

4 Where is the calibration information found?

5 Verify machine is set for specified number of gyrations.

6 Place paper gasket over base plate.

7 Fill mold with sample as specified.

8 Level material in mold.

9 Place paper gasket and top plate (if required) on top of material and slide mold into compactor.

10 Start SGC.

1 Samples are prepared according to:

2 Samples can be stored either:

3 What temperature should the sample be stored at?

4 How long should the sample be stored at this temperature?

5 Before testing, what should be checked on equipment?

6 Samples should be tested within how many minutes?

7 Load sample into frame as specified

8 What is the rate of load line displacement (LLD)?

9 During testing, what should be recorded?

10 How many data points should be recorded to obtain a smooth LLD curve?

11 When to stop testing?

12 How is the CT Index calculated?

# HCMT CONCRETE CERTIFICATION KEY

# ELEMENTS LIST

**Release Date: October 2024**

**PERFORMANCE CHECKLIST**

**AASHTO R 60 Sampling Freshly Mixed Concrete**

**Global Constraints**

1 Total elapsed time allowable between obtaining first and final portions of the composite sample.

2 Before starting tests, individual samples must be _____& ____.

3 Temperature, air, and slump tests should be started within how long after obtaining the final portion of the composite sample?

4 Protect the sample from sources of _____& ____.

5 What is the minimum sample size for strength tests?

6 After fabricating composite sample, samples for strength tests should be molded within _____minutes.

**Sampling from Revolving Drum Truck Mixers or Agitators**

1 Collect how many portions?

2 Specimens for temperature, air, and slump may be taken after at least _____has been discharged.

3 For strength test specimens, avoid sampling what parts of the batch discharge?

4 Describe the two methods for obtaining a sample from a revolving drum mixer or agitator.

5 Should a sample be taken before or after water is added to mix?

6 What is the correct method for regulating rate of discharge out of a drum?

PERFORMANCE CHECKLIST

**AASHTO T 309 Temperature of Freshly Mixed Concrete**

1 Sample must be large enough to provide how much cover around sensor?

2 Tolerance (accuracy) of approved thermometer?

3 Place thermometer in sample as specified.

4 Gently press concrete around sensor.

5 Read temperature within time constraints.

6 Record temperature to within specified tolerance.

# PERFORMANCE CHECKLIST

**AASHTO T-119 Slump of Hydraulic Concrete**

1 Describe proper conditions for base and prepare cone and base.

2 Stabilize apparatus as specified.

3 Ensure sample is representative.

4 Introduce layer of material to specified depth.

5 Rod layer specified number, distribution, and depth of strokes using proper rod.

6 Repeat steps 4 & 5 for specified number of layers.

7 Level of concrete in mold for last layer.

8 Strike off excess concrete with proper tool.

9 Lift cone as specified.

10 Measure slump to specified tolerance.

# PERFORMANCE CHECKLIST

**AASHTO R-100 Making and Curing Concrete Test Specimens in the Field**

1 Place mold on surface meeting specification.

2 Select a representative sample.

3 Place layer in mold as specified.

4 Rod layers as specified.

5 Consolidate as specified.

6 Strike off the surface with a tamping rod or, if necessary, finish with a trowel or float. Use the minimum amount of manipulation necessary to produce a flat even surface.

7 Cover specimens with a non absorptive, non reactive sheet, cap, or plate.

8 If specimen will be used for acceptance testing, quality control, or trial batching mix designs, which curing method should be used?

9 If specimen will be used to determine when a structure can be put into service or when shoring can be removed, which curing method should be used?

10 Which three tests must always be performed when making test specimens?

PERFORMANCE CHECKLIST

**AASHTO T-121 Weight per Cubic Foot, Yield, And Air Content of Concrete**

1 Determine the weight of the empty 0.5 $ft^3$ measure.

2 Introduce layer of material to specified depth.

3 Rod layer specified number, distribution, and depth of strokes using proper rod.

4 Consolidate layer properly.

5 Repeat steps 2, 3, & 4 for specified number of layers.

6 Last layer filled to proper height?

7 Strike off the concrete to a smooth surface with a flat strike off plate.

8 Clean off all excess concrete and determine the weight of the full measure.

9 Calculate net weight.

10 Calculate the unit weight in $lbs/ft^3$

PERFORMANCE CHECKLIST

**AASHTO T-152 Air Content of Freshly Mixed Concrete by Pressure Method**

1 Prepare measuring bowl.

2 Introduce layer of material to specified depth.

3 Rod layer specified number, distribution, and depth of strokes using proper rod.

4 Consolidate layer properly.

5 Repeat steps 2, 3, & 4 for specified number of layers.

6 Last layer filled to proper height?

7 Strike off excess concrete with proper tool and prepare bowl for cover.

8 Prepare cover and clamp to base.

9 Petcocks open or closed?

10 Fill with water and remove air as specified.

11 Pump up to specified pressure.

12 Allow a few seconds for the compressed air to stabilize and adjust the gauge to specified pressure line.

**Performance Checklist Continued**
**AASHTO T-152 Air Content of Freshly Mixed Concrete by Pressure Method**

13 Close both petcocks.

14 Open air valve between chamber and bowl.

15 Releive local constraints.

16 Stabilize the gauge hand.

17 Read the air percentage.

18 Release pressure as specified and remove cover.

19 Calculate air content correctly:

PERFORMANCE CHECKLIST

**AASHTO T-196 Air Content of Freshly Mixed Concrete by Volumetric Method**

1 Prepare measuring bowl.

2 Introduce layer of material to specified depth.

3 Rod layer specified number, distribution, and depth of strokes using proper rod.

4 Consolidate layer properly.

5 Repeat steps 2, 3, & 4 for specified number of layers.

6 Last layer filled to proper height?

7 Strike off excess concrete with proper tool and prepare bowl for cover.

8 Clamp the top section into position and add water and alcohol using the funnel.

9 Adjust the liquid level using rubber syringe.

10 Attach cap as specified.

PERFORMANCE CHECKLIST

**AASHTO T-196 Air Content of Freshly Mixed Concrete by Volumetric Method**

11 Invert and agitate for specified minimum time.

12 Tilt, turn, and roll as specified.

13 Stabilize liquid level as specified.

14 Repeat step 12 and 13 until two consecutive readings do not change by more than specified amount.

15 Take reading to specified tolerance.

16 Do what if liquid level does not reach window? (Verbal)

17 Calculate the air content.

# PERFORMANCE CHECKLIST

**Type B Air Meter Calibration**

1 Insert specified tube into proper opening.

2 Prepare cover and introduce water.

3 Open petcocks and add water through specified opening.

4 Pump up to initial pressure.

5 Introduce air as specified.

6 Verify initial pressure line and adjust if necessary.

7 Adjust gauge if? How? (Verbal)

8 Insert specified tube and fill vessel to top.

9 Bring air to specified %.

10 Bring gauge to initial pressure reading.

11 Take pressure reading.

12 Verify correct reading within specified tolerance.

13 If 2 or more determinations show the same variation from the correct air content?

**PERFORMANCE CHECKLIST**

**AASHTO T-22 Compressive Strength of Cylindrical Concrete Specimens**

1 Check the ends of the cylinder and verify they do not depart from perpendicularity by more than tolerance.

2 Check the ends of the cylinder for depressions outside tolerance.

3 Measure diameter of specimen at 2 right angles at mid height of cylinder.

4 Individual diameters cannot differ by more than _____?

5 Examine the pads for splits or cracks.

6 Pads may be reused how many times?

7 All lab cured cylinders shall be tested in the _____condition.

8 Concrete cylinder, caps, bearing surfaces of extrusion controllers, and bearing blocks of the test machine must be free of _____?

9 Align the axis of the cylinder with the center of thrust of the testing machine by centering the upper retaining ring on the spherically seated bearing block.

10 Turn on the testing machine and allow it to warm up. When the machine has warmed up, zero reading before applying load to specimen.

11 Rotate movable upper bearing block to attain uniform seating on top of specimen.

12 Apply load at Full Advance until one-half of the anti-cipated maximum load is attained, then slow to a rate of movement corresponding to a stress rate of _____?

13 Apply the compressive load until _____?

14 Record the maximum load and compressive strength to the specified accuracy.

15 Note the type of failure and the appearance of the concrete.

# HCMT MATERIALS SAMPLING &

# TESTING PERFORMANCE CHECKLIST

**Reviewed Date: March 12, 2025**

**Performance Checklist**
**AASHTO R 90 Sampling Aggregate Products**

**Sampling Coarse Aggregate**

**Procedure**

1 Determine the time or location using?

2 Ensure equipment and containers are ___?

3 Field Sample Size - Coarse Aggregate - #57 (1in. Nom. Max.

Show the evaluator the proper table
and determine the minimum size field
sample for the requested gradation.

**Sampling From A Conveyor Belt**

1 Isolate sample increment using ___.

2 If one increment is not sufficient?

3 Collect how much material from between templates?

**Sampling From Conveyor Belt Discharge**

1 Avoid sampling from ___.

2 Sampling device must pass through ___.

3 Material adhering to the sampling device is ___.

**Sampling From Roadway - In Place**

1 Sample after ___.

2 Sample before ___.

3 Increments of what depth?

4 Do what with underlying material?

**Performance Checklist**
**AASHTO R 90 Sampling Aggregate Products**

**Sampling From Stockpiles**

**Power Pile**

1 Direct operator to enterstockpile with bucket at least ___.

2 Do what with first bucketful?

3 Have operator back drag to make a ___.

4 Minimum number of increments?

5 Stay at least ____ from the edge.

6 Be sure to _____ underlying material.

**Stockpile Face**

1 Create horizontal surfaces with _____ faces.

2 Prevent sloughing by using ____.

3 Obtain at least one increment from ____.

**Sampling Fine Aggregate**

1 Minimum diameter of sampling tube?

2 Do what with outer layer?

3 Minimum number of increments?

**PERFORMANCE CHECKLIST**

**AASHTO R 60 Sampling Freshly Mixed Concrete**

**Global Constraints**

1 Total elapsed time allowable between obtaining first and final portions of the composite sample.

2 Before starting tests, individual samples must be _____ & _____.

3 Temperature, air, and slump tests should be started within how long after obtaining the final portion of the composite sample?

4 Protect the sample from sources of _____ & _____.

5 Make samples for strength tests what minimum size?

6 Start molding specimens for strength within _____ after fabricating composite sample.

**Sampling from Revolving Drum Truck Mixers or Agitators**

1 Collect how many portions?

2 Specimens for temperature, air, and slump may be taken after at least _____ has been discharged.

3 For strength test specimens, avoid sampling what parts of the batch discharge?

4 Two methods for obtaining sample.

5 Take sample before or after water is added to mix?

6 Method for regulating rate of discharge.

## PERFORMANCE CHECKLIST

### Type B Air Meter Calibration

1 Insert specified tube into proper opening.

2 Prepare cover and introduce water.

3 Open petcocks and add water through specified opening.

4 Pump up to initial pressure.

5 Introduce air as specified.

6 Verify initial pressure line and adjust if necessary.

7 Adjust gauge if? How? (Verbal)

8 Insert specified tube and fill vessel to top.

9 Bring air to specified %.
Open opposite petcock (both open) to drain curved tube.

10 Bring gauge to initial pressure reading.

11 Take pressure reading.
wait for hand to sabilize.

12 Verify correct reading within specified tolerance.

13 If 2 or more determiniations show the same variation
from the correct air content?

## PERFORMANCE CHECKLIST

## AASHTO T-152 Air Content of Freshly Mixed Concrete by Pressure Method

1 Prepare measuring bowl.

2 Introduce layer of material to specified depth.

3 Rod layer specified number, distribution, and depth of strokes using proper rod.

4 Consolidate layer properly.

5 Repeat steps 2, 3, & 4 for specified number of layers.

6 Last layer filled to proper height?

7 Strike off excess concrete with proper tool and prepare bowl for cover.

8 Prepare cover and clamp to base.

9 Petcocks open or closed?

10 Fill with water and remove air as specified.
Continue injecting water into petcock while jarring and tapping the meter to insure all air is expelled

11 Pump up to specified pressure.

12 Allow a few seconds for the compressed air to stabilize and adjust the gauge to specified pressure line.

pg 1

13 Close both petcocks.

14 Open air valve between chamber and bowl.

15 Releive local constraints.

16 Stabilize the gauge hand.

17 Read the air percentage.

18 Release pressure as specified and remove cover.
pressure before removing the cover.

19 Calculate air content correctly:

## PERFORMANCE CHECKLIST

## AASHTO T-196 Air Content of Freshly Mixed Concrete by Volumetric Method

1 Prepare measuring bowl.

2 Introduce layer of material to specified depth.

3 Rod layer specified number, distribution, and depth of strokes using proper rod.

4 Consolidate layer properly.

5 Repeat steps 2, 3, & 4 for specified number of layers.

6 Last layer filled to proper height?

7 Strike off excess concrete with proper tool and prepare bowl for cover.

8 Clamp the top section into position and add water and alcohol using the funnel.

9 Adjust the liquid level using rubber syringe.

10 Attach cap as specified.

pg 1

**PERFORMANCE CHECKLIST**

**AASHTO T-196 Air Content of Freshly Mixed Concrete by Volumetric Method**

11 Invert and agitate for specified minimum time.

12 Tilt, turn, and roll as specified.

13 Stabilize liquid level as specified.

14 Repeat step 12 and 13 until two consecutive readings do not change by more than specified amount.

15 Take reading to specified tolerance.

16 Do what if liquid level does not reach window? (Verbal)

17 Calculate the air content.

**PERFORMANCE CHECKLIST**

**AASHTO T-119 Slump of Hydraulic Concrete**

1 Describe proper conditions for base and prepare cone and base.

2 Stabilize apparatus as specified.

3 Ensure sample is representative.

4 Introduce layer of material to specified depth.

5 Rod layer specified number, distribution, and depth of strokes using proper rod.

6 Repeat steps 4 & 5 for specified number of layers.

7 Level of concrete in mold for last layer.

8 Strike off excess concrete with proper tool.

9 Lift cone as specified.

10 Measure slump to specified tolerance.

## PERFORMANCE CHECKLIST

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

1 Place mold on surface meeting specification.

2 Select a representative sample.

3 Place layer in mold as specified.

4 Rod layers as specified.

5 Consolidate as specified.

6 Strike off the surface with a tamping rod or, if necessary, finish with a trowel or float. Use the minimum amount of manipulation necessary to produce a flat even surface.

7 Cover specimens with a non absorptive, non reactive sheet, cap, or plate.

8 If specimen will be used for acceptance testing, quality control, or trial batching mix designs, which curing method should be used?

9 If specimen will be used to determine when a structure can be put into service or when shoring can be removed, which curing method should be used?

10 Which three tests must always be performed when making test specimens?

## PERFORMANCE CHECKLIST

## ASTM C1064 Temperature of Freshly Mixed Concrete

1 Sample must be large enough to
provide how much cover around sensor?

2 Tolerance (accuracy) of approved thermometer?

3 Place thermometer in sample as specified.

4 Gently press concrete around sensor.

5 Read temperature within time constraints.

6 Record temperature to within specified tolerance.

**PERFORMANCE CHECKLIST**

**AASHTO T-121 Weight per Cubic Foot, Yield, And Air Content of Concrete**

1 Determine the weight of the empty 0.5 $ft^3$ measure.

2 Introduce layer of material to specified depth.

3 Rod layer specified number, distribution, and depth of strokes using proper rod.

4 Consolidate layer properly.

5 Repeat steps 2, 3, & 4 for specified number of layers.

6 Last layer filled to proper height?

7 Strike off the concrete to a smooth surface with a flat strike off plate.

8 Clean off all excess concrete and determine the weight of the full measure.

9 Calculate net weight.

10 Calculate the unit weight in $lbs/ft^3$

**PERFORMANCE CHECKLIST**

**AASHTO T-22 Compressive Strength of Cylindrical Concrete Specimens**

1 Check the ends of the cylinder and verify they do not depart from perpendicularity by more than tolerance.

2 Check the ends of the cylinder for depressions ouside tolerance.

3 Measure diameter of specimen at 2 right angles at mid height of cylinder.

4 Individual diameters cannot differ by more than _____?

5 Examine the pads for splits or cracks.

6 Pads may be reused how many times?

7 All lab cured cylinders shall be tested in the _____ condition.

8 Concrete cylinder, caps, bearing surfaces of extrusion controllers, and bearing blocks of the test machine must be free of _____?

9 Align the axis of the cylinder with the center of thrust of the testing machine by centering the upper retaining ring on the spherically seated bearing block.

10 Turn on the testing machine and allow it to warm up. When the machine has warmed up, zero reading before applying load to specimen.

11 Rotate movable upper bearing block to attain uniform seating on top of specimen.

12 Apply load at Full Advance until one-half of the anti-cipated maximum load is attained, then slow to a rate of movement corresponding to a stress rate of _____?

13 Apply the compressive load until _____?

14 Record the maximum load and compressive strength to the specified accuracy.

15 Note the type of failure and the appearance of the concrete.

**PERFORMANCE CHECKLIST**

**OHD L-65 Sampling Asphalt Mixtures**

**L-65**

ODOT Standard Method for Sampling Asphalt Mixtures

1 Determine un-compacted sample locations according to?

2 Oklahoma Sampling location preference

3 The distance between two or more cores at a location must be between?

4 In filling core holes, the main difference between R 97 and OHD L-65 is the use of?

**R 67**

Obtaining Cores

1 Coring bit must be cooled by, ____, ____, ____, or ____.

2 Keep core bit _____to the surface.

3 Continue drilling to _____.

4 Remove core without _____or _____the sample.

**R 97**

**Sampling from truck transport.**

5 Select sampling locations.

6 Top surface removed to specified depth.

7 Obtain sample from truck bed. (Simulated.)

**PERFORMANCE CHECKLIST OHD**

**L-14 Method 2 (Nuc Gauge)**

1 When gauge is first turned on, before using, allow it to _____.

2 Place gauge on standard block correctly.

3 Take standard count. (Verbal)

4 Set instrument for specified count.

5 Proper depth set.

6 Properly position gauge on surface.

7 Set gauge to backscatter.

8 Take and record specified number of counts.

9 Number of test locations required for correlation? (Verbal)

**PERFORMANCE CHECKLIST**

**OHD L 5 Liquid AC**

**Containers (Verbal)**

1 Type of container used for AC.

2 Type of container used for emulsions.

3 **Sample Care (Verbal)**

3a Take care that samples are not _____.

3b Container must be perfectly ____ and ____.

3c Emulsions must be protected from _____.

3d Mark for identification on ____ or ____.

3e Clean outside of container with only _____.

**Sampling Locations (Verbal)**

4 Truck transport.

4a Valve located in the ____ or ____.

4b Sample taken from what part of load?

5 Mixing Plant Valve Location

6 Storage Tank (Circulating)

Continued on next page.



**OHD L 5 Liquid AC**

7 Storage Tank (Not Circulating)

7a Obtain sample by means of _____.

7b Lower to near _____.

7c Withdraw at rate so that _____.

7d Sampling device should be _____ and _____ before taking the sample.

**Sampling Procedure (Performance)**

**Tell applicant - Gloves, heavy long sleeves, and face shield must be used**

8 Treatment of first portion of material from valve.

9 Container filled to appropriate level.

10 Container properly sealed and cleaned.

**PERFORMANCE CHECKLIST**

**AASHTO T-310 In Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Method (Shallow Method)**

1 Turn on Unit.

2 Warm up unit for specified time (Ram Test) (Verbal)

3 Place standard block on material with minimum density of __?

4 Take Standard Count

5 If standard count fails? (Verbal)

6 Enter Standard Density (Proctor)

7 How to correct for surface voids. (Verbal)

8 Make hole and set unit to proper depth

9 Make intimate contact between source rod and edge of hole in measurement path.

10 Take readings for specified time.

11 Read and record results.

# HCMT SOILS CERTIFICATION TECHNICIAN

# EVALUATION FORM

ODOT

SOILS CERTIFICATION

'TECHNICIAN EVALUATION FORM

## AASHTO R 58

Pass/Fail

Confirmed soil sample was properly dried
(Air-dried or dried in oven with temperature of 60°C or 140°F or less) _____

Selected appropriate pulverizing equipment (Mortar with rubber-tipped pestle or mull grinder)

_____

Processed and prepared five soil samples:

Coarse-Grained

1. Particle Size Analysis, T88 (separate over 2.00 mm [No. 1O])
   a. +2.00 mm for dry sieve analysis
   b. -2.00 mm for % - 0.075 mm [No. 200] by washing and dry sieve analysis using - 2.00 mm to +0.075 mm

Fine-Grained _____

2. Percent minus #200, T11 (100.0 g of whole LUPL sample]) _____
3. Liquid limit, T 89 (100 g of processed minus 0.425 mm [No. 40]) _____
4. Plastic limit, T 90 (20 g of processed minus 0.425 mm [No. 40]) _____

Results _____

ODOT

SOILS CERTIFICATION

TECHNICIAN EVALUATION FORM

## AASHTO T 88

Pass/Fail

Prepared test specimen _____

(500 g or more of air dried (60°C [140°F]) plus 2.00 mm [No. 10] material)

(100 g or more of air dried (60°C [140°F]) minus 2.00 mm [No. 10] material, soaked)

Ran dry sieve analysis on plus 2.00 mm [No. 10] portion _____

Weighed and recorded each retained soil mass on each sieve _____

Determined hygroscopic moisture content of minus 2.00 mm [No. 10] portion and corrected weight _____

Mixed and washed minus 2.00 mm [No. 10] material over 0.075 mm [No. 200] sieve

_____

Retained and dried minus 2.00 mm [No. 10] to plus 0.075 mm [No. 200) portion _____

Ran dry sieve analysis on minus 2.00 mm [No. 10] to plus 0.075 mm [No. 200] portion

(Minimum--use 0.425 mm [No. 40] sieve) _____

Weighed and recorded each retained soil mass on each sieve _____

Calculated accumulated weight data and percent minus 200 _____

Results _____

**ODOT**

**SOILS CERTIFICATION**

TECHNICIAN EVALUATION FORM

**ASTMD 1140**

Pass/Fail

Prepared test specimen _____

(≈100 g of whole LUPL sample oven dried (110 ± 5°C [230 ± 9°F]) in bowl with distilled water or dispersing agent)

Mixed/agitated test specimen

_____

Washed and retained + 0.075 mm (No. 200) material

_____

Dried and weighed retained material

Calculated percent minus 0.075 mm (No. 200)

$$\frac{\text{Initial Sample Weight - Retained Soil Weight}}{\text{Initial Sample Weight}} \times 100$$ _____

_____

Results _____

ODOT

SOILS CERTIFICATION

TECHNICIAN EVALUATION FORM

AASHTO T 89 & T 90

Pass/Fail

Liquid Limit, T 89

Checked and adjusted liquid limit device (Condition, pins, screws, height of fall) _____

Prepared/mixed test specimen Test technique _____

and procedure _____

(Soil in cup, grooving, turning/counting, water content specimen, point distribution)

Dried and weighed water content test specimen Plotted/calculated liquid _____

limit (3-point and 1-point) Plastic Limit. T 90 _____

Prepared/mixed test specimen _____

Test technique and procedure _____

(Glass plate, rolling of thread, water content specimen, duplication)

Dried and weighed water content test specimen _____

Calculated plastic limit _____

Plasticity Index

Calculated plasticity index _____

Results _____

**ODOT**
**SOILS CERTIFICATION**

**TECHNICIAN EVALUATION FORM**

| **AASHTO T 99, T 180, T 224** | **Pass/Fail** |
|---|---|
| Checked mold and rammer for compliance with Standard (Measured mold, mold factor, weighed rammer, checked for wear) | _____ |
| Processed soil sample (Method A - 3000 g or more of air-dried minus 4.75 mm [No.4] material) | _____ |
| Prepared/mixed test specimen | _____ |
| Test technique and procedure (Loose lift, mold support, rammer drops, ±. height of specimen, extruded, cut specimen, water content specimen, break-up, water content increments) | _____ |
| Dried and weighed water content test specimens | _____ |
| Calculated water contents and dry densities | _____ |
| Plotted/calculated optimum moisture content and maximum dry density | _____ |
| Determined percent of oversize particles (plus 4.75 mm [No. 4] material, dry weight basis) | _____ |
| Calculated corrected optimum moisture content and maximum dry density for oversize particles | _____ |

Results _____

**ODOT**
**SOILS CERTIFICATION**

**TECHNICIAN EVALUATION FORM**

| **AASHTO T 85** | **Pass/Fail** |
|---|---|
| Described basic procedure (sample handling, minimum sample size, weighing, washing, drying, soaking, weighing in water) | _____ |
| Checked minimum sample size requirement | _____ |
| Properly weighed oven-dried sample | _____ |
| Properly prepared Saturated Surface Dry (SSD) sample | _____ |
| Properly weighed SSD sample | _____ |
| Properly weighed sample submerged in water | _____ |
| Properly calculated specific gravity (Bulk, SSD, Apparent) | _____ |
| Properly calculated absorption | _____ |

Results _____

**ODOT**

**SOILS CERTIFICATION**

TECHNICIAN EVALUATION FORM

**AASHTO T 310**

Pass/Fail

Described random test site selection process _____

Conducted equipment check and standard readings Prepared test site
(Leveled, template, hole) _____

Test technique and procedure
(Set device, cleared area, took readings) _____

Assessed results
(w, *y*, % compaction) _____

_____

Results _____

ODOT
SOILSCERTIFICATION

TECHNICIAN EVALUATION FORM

**AASHTO M 145**

Pass/ Fail

Classified Atterberg Limit (T89, T90) soil sample by AASHTO _____ (± 0.075 mm [No. 200], soil group, group index)

Classified Particle Size Analysis (T88) soil sample by AASHTO _____ (± 0.075 mm [No. 200], grain size distribution, soil group)

Results _____