
Supplemental Technical Specification for

Inspection and Approval of Asphalt Mix Design Laboratories

SCDOT Designation: SC-M-405 (06/07)

1. SCOPE

- 1.1 This method covers the process for inspection and approval of asphalt mix design laboratories for use in designing asphalt mixtures for SCDOT projects. This method is not a safety inspection. The Contractor is responsible for maintaining the safety requirements for the asphalt mix design labs.

2. REFERENCED DOCUMENTS

- 2.1 SCDOT Standard Specifications
- 2.1.1 Division 300, Division 400
- 2.2 AASHTO Standards
- 2.2.1 T 245, T 312, PP 19, R 18
- 2.3 SCDOT Test Methods
- SC-T-66, SC-T-68, SC-T-70, SC-T-83

3. REQUIREMENTS FOR ALL MIX DESIGN LABORATORIES

- 3.1 Ensure that the building is made and designed for use as either a laboratory or office that has been converted to serve as a laboratory. The minimum allowable laboratory floor space is 250 square feet. Under no circumstances will a tractor trailer or any other cargo type trailer be acceptable. All laboratories must also have two working doors for safety access.
- 3.2 Provide all required mix design laboratory equipment listed on the Mix Design checklist, SCDOT Form SC-M-405A.
- 3.3 Calibrate the required mix design laboratory equipment according to **AASHTO R 18**, using SCDOT checking, verification, and calibration procedures. Make available all equipment calibration records and keep them in an organized manual in the mix design laboratory.
- 3.4 Equip the laboratory with windows, doors and ventilation systems that function properly and maintain the ambient air temperature between 65°F and 80°F
- 3.5 **Notify the Asphalt Materials Engineer, in writing, when the mix design laboratory is ready for initial inspection.**
- 3.6 A representative of the Asphalt Materials Engineer will perform an inspection and verify that the laboratory complies with current standard specifications, and the attached checklist. During the inspection, ensure that a Quality Control Manager or representative is present to certify that all equipment is present and that by signing Form SC-M-405A,

they are guarantying that all equipment will remain in the laboratory and will be calibrated or verified as required by **AASHTO R 18**.

3.7

Upon meeting all requirements for approval, a yearly approval decal will be placed at a suitable location inside the mix design laboratory. If at anytime all requirements are not met, the approval may be revoked.

Asphalt Mix Design Laboratory checklist
Attachment to SC-M-405 (06/07)

I. CONTRACTOR INFORMATION:

Asphalt Contractor: _____ Location: _____

Contractor's Representative: _____

Contractor's Signature: _____

Date Inspected: _____ Inspected by: _____

Next Inspection Due Date: _____ SCDOT Cert. # _____

II. LAB STRUCTURE

YES or NO

Size and type of structure:

Floor space _____ (min. 250 sq ft.)

Height _____ Width _____

Type of Structure _____

Is sufficient water available for all tests?

Is sufficient and satisfactory furniture for office work provided?

Are satisfactory electric lighting and electric outlets provided?

Are suitable worktables and/or benches provided?

Are locks provided for the windows and doors?

Is there sufficient ventilation from solvents and other chemicals if applicable?

Is the laboratory equipped so that the temperature inside the laboratory can be maintained between 65 – 80 ° F?

III. EQUIPMENT

1. Gyratory Compactor (meeting requirements of **AASHTO T 312**) including calibration kit (pressure / angle / height / rotation), and an extractor jack.
 - a) Four (4) Compaction Molds
 - b) Printer for printing heights of specimens
 - c) 6" ITS – Tensile Strength Head
 - d) 6" Compression Mold Breaking Head
 - e) Curing pans for specimens that meet **AASHTO PP 19** (capable of spreading the mixture at maximum of 2" deep)
 - f) Gyratory specimen protection disk – 6" diameter
 - g) Garden spade minimum 2" wide
 - h) Flat spade ¾" wide and 6" long

2. Complete Marshall Apparatus:
 - a) Automatic Compaction Hammer (meeting **AASHTO T 245**)
 - b) (12) Compaction Molds
 - c) 4" Compaction Mold Breaking Head
 - d) 4" ITS - Tensile Breaking Head
 - e) Marshall Specimen Protection Paper Disc. No. 4
 - f) Hot Plate
 - g) Sand bath for Marshall Hammer
 - h) Extractor jack assembly - hydraulic type for extruding specimens

3. Compression and Testing Machine – must have recorder to measure stability and flow-min. capacity of 10,000 lbs. – capable of testing 4" or 6" specimens.

4. Hot water bath capable of maintaining a constant temperature of 140°F ± 1.8°F (60 ± 1° C) throughout the entire volume of the bath.
Water bath meeting testing standards specified in **SC-T-66** and **SC-T-70**.

5. Cold water bath equipped with a water circulator capable of maintaining a constant temperature of 77°F ± 1.8°F (25 ± 1°C) throughout the entire volume of the bath. Water bath should meet the testing standards specified in **SC-T-68** and **SC-T-70**. Ensure that bath has a cradle or a suitable hook for weighing immersed specimens.

6. Maximum Gravity Equipment (Ref. **SC-T-83**):
 - a) Vacuum pump capable of pulling a vacuum of less than 30mm Hg from daily atmospheric pressure within 2 minutes of beginning the test.
 - b) Pycnometer or metal container having a capacity of at least 2,000 mL
 - c) Container with a cover fitted with a rubber gasket and a hose connection. Hose opening is covered with a small piece of No. 200 wire sieve mesh.
 - d) At least one (1) liter flask or desiccator to be used as a water vapor trap
 - e) Gauge and manometer (digital or mercury) installed in line to monitor vacuum.
 - f) Kraft brown paper, or equivalent, for preparation of sample approximately 3' x 3'

7. Double-walled convection laboratory oven with an inside volume of at least 2.5 cubic feet. This oven should be capable of maintaining a temperature of 230°F ± 9°F (110°C ± 4.4°C) - Drying Oven.

8. Double-walled-thermostatic-controlled-forced-air laboratory oven with a minimum inside volume of 5.0 cubic feet. Oven is capable of maintaining a temperature of 295°F ± 5°F (146°C ± 2.5°C) – Mold Oven.

9. Double-walled-thermostatic-controlled-forced-air laboratory oven with a minimum inside volume of 12.0 cubic feet. Oven is capable of maintaining a temperature of 350°F ± 5°F (176 °C ± 3°C) – Heating Oven.
10. Sample splitter with a minimum of eight chutes with minimum of (3) splitter pans. – Fine Aggregate
11. Sample splitter with a minimum of (8) chutes, each 2” wide with minimum of (3) splitter pans. – Coarse Aggregate
12. Large motor-driven shaker complete with screens of suitable sizes. (Gilson TS-1, TM-1 or equivalent)
13. Following sieves required for the large shaker: 1½”, 1”, ¾”, ½”, #4, #8 and bottom pan
14. 8” or 12” sieve shaker. (Ro-Tap design or Mary-Ann style) - Must have a tapping device
15. Following sieves required for the shaker: 1”, ¾”, ½”, 3/8”, #4, #8, #30, #100, #200 and bottom pan
16. Suitable Sieve Brushes – at least one brass or steel and one nylon
17. One (1) Wash #200 sieve with protective #16 or #8 sieve along with sampling pans / pots needed to perform washed gradations
18. Calipers capable of measuring up to 6” or 150mm and accurate to (0.001” or 0.01mm).
19. Two (2) calibrated timers
20. Two (2) 12 kg electronic balances accurate to 0.1 grams.
21. Thermometers
 - a) 140°F Mercury Thermometer (such as a ASTM 20F or ASTM 45F – NIST traceable)
 - b) 77°F Mercury Thermometer (such as a ASTM 17F or ASTM 47F – NIST traceable)
 - c) 300°F Thermometer – (Mercury or Thermocouple- NIST traceable)
22. Water Softener (i.e. Calgon without oil beads)
23. Bowls or pans for batching aggregates – minimum of 10
24. Graduated cylinder or beaker for accurately adding water to batched samples with Hydrated Lime
25. Dispensing pot for heating asphalt binder or tongs to distribute binder
26. Mechanical Mixer – 12 quarts or larger or bucket mixer
27. OGFC draindown basket – necessary for OGFC designs
28. Insulated gloves

- 29. Penetrating Oil
- 30. Cloth Towel – Water absorbent for bulk specific gravity specimens

V. CALIBRATION RECORDS

YES OR NO

- 1. Calibration records available in the lab?
- 2. Calibration records kept neat and legible and according to SC-Verification or Check procedures?
- 3. Equipment calibrations up to date?
 - a) Marshall Hammers?
 - b) Gyrotory compactor?
 - c) Molds (Marshall and Gyrotory)?
 - d) Heating Ovens?
 - e) Water Baths?
 - f) Timers?
 - g) Vacuum System?
 - h) Thermometers?
 - i) Sieves?
 - j) Sieve Shakers?
 - k) Stability Machine?

REMARKS:

Form SC-M-405A