
Test Procedure for

DETERMINING ASPHALT CONTENT FROM ASPHALT PAVING MIXTURES BY THE IGNITION METHOD



TxDOT Designation: Tex-236-F

Effective Dates: August 2008–April 2009.

1. SCOPE

- 1.1 Use this test method to determine the asphalt content of hot mix asphalt (HMA) paving mixtures using an ignition oven. Use the remaining aggregate for sieve analysis in accordance with Tex-200-F.
 - 1.2 Use this test method to determine aggregate gradation and asphalt content correction factors before the start of production. The type of aggregate in the mixture may affect the ignition procedure. Establish correction factors by testing a set of samples for each mix type produced to optimize accuracy.
 - 1.3 The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.
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2. APPARATUS

- 2.1 *Ignition furnace*, capable of:
 - 2.1.1 Maintaining a temperature to cause combustion with an internal balance thermally isolated from the furnace chamber accurate to 0.1 g. The balance must be capable of weighing a 3500 g sample in addition to the sample baskets.
 - 2.1.2 Providing an audible alarm and indicator light when the sample reaches constant weight.
Note 1—The furnace door must automatically lock when the test procedure begins and must remain locked until the test procedure is completed.
 - 2.1.3 Providing initial specimen weight, specimen weight loss, correction factor, corrected asphalt content (percent), and test time.
 - 2.2 *Tempered stainless steel No. 8 (2.36 mm) mesh basket*, otherwise perforated basket, or combination of baskets capable of handling at least a 1500 g sample. The basket must incorporate a design that confines the sample during testing.
 - 2.3 *Tempered stainless steel catch pan*, to fit under the basket assembly.
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- 2.4 *Oven*, capable of maintaining 250 ±5°F (121 ±3°C).
- 2.5 *Balance*, with a capacity of 17.6 lb. (8 kg) or greater, accurate to 0.1 g for weighing sample in baskets.
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3. SAFETY EQUIPMENT

- 3.1 *Safety glasses or face shield.*
- 3.2 *High temperature gloves.*
- 3.3 *Long sleeve jacket.*
- 3.4 *Heat-resistant surface*, capable of withstanding heat from the sample baskets.
- 3.5 *Protective cage*, capable of surrounding the sample baskets.
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4. MISCELLANEOUS EQUIPMENT

- 4.1 *Pan for transferring samples after ignition, spatulas, bowls, and wire brushes.*
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5. REPORT FORMAT

- 5.1 ['Correction Factor Calculation Worksheet Asphalt Content and Combined Aggregate Gradation.'](#)
- 5.2 QC/QA worksheets for the ['Ignition Oven Method.'](#) used in conjunction with the HMA specification. Refer to the 'Help' tab for detailed instructions on how to use this program.
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6. CORRECTION FACTORS

- 6.1 Determine the sample size in accordance with Section 7.3.
- 6.2 Prepare two 'blank' samples in the laboratory in accordance with Tex-205-F, Sections 5.1–5.6.
Note 2—Do not add any asphalt binder to the 'blank' samples. Do not perform the ignition oven procedure with the 'blank' samples.
- 6.3 Perform a washed sieve analysis in accordance with Tex-200-F, Part II to determine the aggregate gradation of the 'blank' samples.
- 6.4 Average the percent passing from each sieve size for the 'blank' samples.
Note 3—The average washed gradation must fall within the master gradation band of the specification used for the project.
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- 6.5 Prepare a 'butter batch mix' at the design optimum asphalt content and discard before mixing any other samples for determining correction factors.
Note 4 - A 'butter batch mix' is a trial batch of asphalt and aggregate design mixture used to coat the mixing bowl and whips with asphalt. This helps prevent a loss of asphalt due to adhesion on the bare walls of the bowl or in the mixing whips to ensure an accurate asphalt content of the samples used to determine correction factors.
- 6.6 Prepare six samples in the laboratory in accordance with Tex-205-F, Sections 5.1–5.14.
- two at the design optimum asphalt content
 - two each at $\pm 0.5\%$ of the design optimum asphalt content.
- 6.7 Perform the ignition oven procedure as described under Section 8 with the samples prepared in Section 6.6.
- 6.8 Perform a dry gradation sieve analysis in accordance with Tex-200-F, Part I on the residual aggregate for each ignited sample from Section 6.7.
- 6.9 *Determining Asphalt Content Correction Factor:*
- 6.9.1 Subtract the measured asphalt content for each ignited sample in Section 6.7 from the actual asphalt content.
- 6.9.2 Average the six measured differences to determine the asphalt content correction factor.
- 6.10 *Determining Aggregate Gradation Correction Factors:*
- 6.10.1 Subtract the gradation determined in Section 6.8 (ignited samples) for each sieve size from each corresponding sieve size of the gradation determined in Section 6.3 ('blank' samples).
- 6.10.2 Average the six measured differences for each sieve size to determine the aggregate gradation correction factor for each sieve size. Report the correction factors in percent passing.

7. PREPARING SAMPLES FROM PRODUCTION SAMPLING

- 7.1 Quarter a test sample out of a larger sample taken in accordance with Tex-222-F.
- 7.2 If the mixture is not sufficiently workable to separate with a spatula or trowel, place it in a large flat pan and warm to $250 \pm 5^\circ\text{F}$ ($121 \pm 3^\circ\text{C}$) for 30 min. Do not heat sample for more than one hour.
- 7.3 The nominal maximum aggregate size of the mixture controls the sample size and must conform to the mass requirement shown in Table 1 (See note 1 in Table 1).

Nominal Max Aggregate Size ¹	Min Weight of Sample, g
No. 4	1200
3/8 in.	1200
1/2 in.	1500
3/4 in.	2000
1 in.	3000
1-1/2 in.	4000

1. Defined as one sieve size larger than the first sieve to retain 10% or more of the total aggregate in the mixture.

7.4 Sample sizes should not be more than 400 g greater than the minimum recommended sample mass as shown in Table 1. Large samples of fine mixes tend to result in incomplete ignition of the asphalt. When the mass of the test specimen exceeds the recommended maximum capacity of the equipment used, the test specimen may be divided into suitable increments, tested, and the results appropriately combined for calculation of the asphalt content (weighted average).

7.5 Verify that the mixture contains no more than 0.2% of moisture by weight in accordance with Tex-212-F, Part II. Do not use the same specimen used for moisture determination as used for asphalt content determination.

8. IGNITION OVEN PROCEDURE

8.1 Turn ignition oven on.

8.2 Weigh and record the weight of the basket assembly to the nearest 0.1 g.

8.3 Place the freshly mixed specimens directly into the sample baskets. Reheat the specimens in a 250°F (121°C) oven for 30 min., if they have cooled. Do not preheat the sample baskets.

8.4 Evenly distribute the calibration specimen in the basket assembly taking care to keep the material away from the edges of the basket.

8.5 Weigh and record the sample and basket assembly to the nearest 0.1 g.

8.6 Calculate and record the initial weight of the sample (total weight minus the weight of the sample basket assembly).

8.7 Input the initial weight of the sample specimen into the ignition furnace controller. Verify entry of the correct weight.

- 8.8 Open the chamber door and place the sample and basket assembly in the furnace.
Note 5—Failure of the furnace scale to stabilize may indicate that the sample basket assembly is contacting the furnace wall. If this occurs, adjust the sample basket inside the furnace.
- 8.9 Close the chamber door and start the test.
Note 6—This should lock the furnace chamber for the duration of the test.
- 8.10 Allow the test to continue until the stable light and audible stable indicator indicate the test is complete.
- 8.11 Press the start/stop button.
Note 7—This should unlock the furnace chamber.
- 8.12 Open the chamber door, remove the sample, and allow it to cool to room temperature (approximately 45 min.).
Note 8—Do not use a fan to assist in cooling the sample to room temperature due to the possibility of losing fines.
- 8.13 Empty the contents of the baskets into a flat pan.
- 8.14 Use a small wire sieve brush to ensure to remove any residual fines from the basket. Add those fines to the contents in the flat pan.

9. ARCHIVED VERSIONS

- 9.1 Archived versions are available.