
Standard Method of Test for Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method

AASHTO Designation: T 308-24

Technically Revised: 2024

Technical Subcommittee: 2c, Asphalt–Aggregate Mixtures



**American Association of State Highway and Transportation Officials
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1. SCOPE
- 1.1.

This test method covers the determination of asphalt binder content of asphalt mixtures by ignition at temperatures that reach the flashpoint of the binder in a furnace. The means of specimen heating may be the convection method or the direct infrared (IR) irradiation method. The aggregate remaining after burning can be used for sieve analysis using T 30.
- 1.2.

The values stated in SI units are to be regarded as the standard.
- 1.3.

This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.
- 1.4.

The quality of the results produced by this standard is dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.

2. REFERENCED DOCUMENTS
- 2.1.

AASHTO Standards:
 - M 231, Weighing Devices Used in the Testing of Materials
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
 - R 47, Reducing Samples of Asphalt Mixtures to Testing Size
 - R 66, Sampling Asphalt Materials
 - R 76, Reducing Samples of Aggregate to Testing Size
 - R 90, Sampling Aggregate Products
 - R 97, Sampling Asphalt Mixtures
 - T 30, Mechanical Analysis of Extracted Aggregate
 - T 329, Moisture Content of Asphalt Mixtures by Oven Method

- 2.2. *ASTM Standards:*
- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
 - E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
 - E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
 - E2877, Standard Guide for Digital Contact Thermometer
- 2.3. *International Electrotechnical Commission Standard:*
- IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances
- 2.4. *Other Documents:*
- Manufacturer's Instruction Manual
 - NCHRP. *NCHRP Web-Only Document 71, Precision Estimates for AASHTO Test Method T308 and the Test Methods for Performance-Graded Asphalt Binder in AASHTO Specification M320*. National Cooperative Highway Research Program, Transportation Research Board, Washington, DC, 2005. Available from <https://doi.org/10.17226/21969>

3. SUMMARY OF TEST METHOD

- 3.1. The asphalt binder in the asphalt mixture is ignited using the furnace equipment applicable to the particular method. This procedure covers two methods. Method A requires an ignition furnace with an internal balance. Method B requires an ignition furnace with an external balance.
- 3.2. The asphalt binder content is calculated as the difference between the initial mass of the asphalt mixture and the mass of the residual aggregate, with adjustments for an asphalt binder correction factor and the moisture content. The asphalt binder content is expressed as a mass percent of the moisture-free mixture. This method may be affected by the type of aggregate in the mixture. Accordingly, to optimize accuracy, correction factors for asphalt binder and aggregate will be established by testing a set of correction factor specimens for each type of asphalt mixture. Correction factors must be determined before any acceptance testing is performed.

4. SIGNIFICANCE AND USE

- 4.1. This method can be used for quantitative determinations of asphalt binder content and gradation in asphalt mixture and pavement specimens for quality control, specification acceptance, and mixture evaluation studies. This method does not require the use of solvents. Aggregate obtained by this test method may be used for gradation analysis according to T 30.

5. APPARATUS

- 5.1. *Ignition Furnace*—A forced-air ignition furnace that heats the specimens by either the convection or direct IR irradiation method. The convection-type furnace must be capable of maintaining a temperature of $538 \pm 5^{\circ}\text{C}$ ($1000 \pm 9^{\circ}\text{F}$). The furnace chamber dimensions shall be adequate to accommodate a specimen size of 3500 g. The furnace door shall be equipped so that the door cannot be opened during the ignition test. A method for reducing furnace emissions shall be provided. The furnace shall be vented into a hood or to the outside and, when set up properly, shall have no noticeable odors escaping into the laboratory. The furnace shall have a fan capable of pulling air through the furnace to expedite the test and reduce the escape of smoke into the laboratory. The ignition furnace shall be capable of operation at the temperatures required,

between at least 530 and 545°C (986 and 1013°F), and have a temperature control accurate within $\pm 5^\circ\text{C}$ ($\pm 9^\circ\text{F}$) as corrected, if necessary, by standardization. More than one furnace may be used, provided each is used within its proper operating temperature range. When measuring temperature during use, the thermometer for measuring the temperature of materials shall meet the requirements of M 339M/M 339 with a temperature range of at least 530 to 545°C (986 to 1013°F) and an accuracy of $\pm 1.25^\circ\text{C}$ ($\pm 2.25^\circ\text{F}$) (Note 1).

Note 1—Thermometer types suitable for use include ASTM E1 mercury thermometers; ASTM E230/E230M thermocouple thermometer, Type J or K, Special Class; or IEC 60584 thermocouple thermometer, Type J or K, Class 1.

- 5.1.1. For Method A, the furnace shall also have an internal balance thermally isolated from the furnace chamber and accurate to 0.1 g. The balance shall be capable of weighing a 3500-g specimen in addition to the specimen baskets. A data collection system will be included so that the mass can be automatically determined and displayed during the test. The furnace shall have a built-in computer program to calculate the change in mass of the specimen baskets and provide for the input of a correction factor for aggregate loss. The furnace shall provide a printed ticket with the initial specimen mass, specimen mass loss, temperature compensation, correction factor, corrected asphalt binder content (percent), test time, and test temperature. The furnace shall provide an audible alarm and indicator light when the specimen mass loss does not exceed 0.01 percent of the total specimen mass for three consecutive minutes. The furnace shall also allow the operator to change the ending mass loss percentage to 0.02 percent.
- 5.2. *Specimen Basket Assembly*—Consisting of specimen basket(s), catch pan, and an assembly guard to secure the specimen basket(s) to the catch pan.
- 5.2.1. *Specimen Basket(s)*—Of appropriate size to allow the specimens to be thinly spread and allow air to flow through and around the specimen particles. Sets with two or more baskets shall be nested. The specimen shall be completely enclosed with screen mesh, perforated stainless steel plate, or other suitable material.
- Note 2**—Screen mesh or other suitable material with maximum and minimum openings of 2.36 mm (No. 8) and 0.600 mm (No. 30), respectively, has been found to perform well.
- 5.2.2. *Catch Pan*—Of sufficient size to hold the specimen basket(s) so that aggregate particles and melting asphalt binder falling through the screen are caught.
- 5.3. *Oven*—Capable of maintaining $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$). The oven(s) for heating shall be capable of operation at the temperatures required, between 100 and 120°C (212 and 248°F), within $\pm 5^\circ\text{C}$ ($\pm 9^\circ\text{F}$) as corrected, if necessary, by standardization. More than one oven may be used, provided each is used within its proper operating temperature range. The thermometer for measuring the oven temperature shall meet the requirements of M 339M/M 339 with a temperature range of at least 90 to 130°C (194 to 266°F) and an accuracy of $\pm 1.25^\circ\text{C}$ ($\pm 2.25^\circ\text{F}$) (Note 3).
- Note 3**—Thermometer types suitable for use include ASTM E1 mercury thermometers; ASTM E2877 digital metal stem thermometer; ASTM E230/E230M thermocouple thermometer, Type J or K, Special Class, Type T any Class; IEC 60584 thermocouple thermometer, Type J or K, Class 1, Type T any Class; or dial gauge metal stem (bi-metal) thermometer.
- 5.4. *Balance*—Of sufficient capacity and conforming to the requirements of M 231, Class G 2.
- 5.5. *Safety Equipment*—Safety glasses or face shield, dust mask, high-temperature gloves, long-sleeved jacket, a heat-resistant surface capable of withstanding 650°C (1202°F), and a protective cage capable of surrounding the specimen baskets during the cooling period.
- 5.6. *Miscellaneous Equipment*—A pan larger than the specimen basket(s) for transferring the specimen after ignition, spatulas, bowls, and wire brushes.