



Designation: D8078 – 24

Standard Test Method for Ash Content of Asphalt Binder and Emulsified Asphalt Residues¹

This standard is issued under the fixed designation D8078; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method measures the ash content of an asphalt binder or emulsified asphalt residue.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D6934 Test Method for Residue by Evaporation of Emulsified Asphalt

D6997 Test Method for Distillation of Emulsified Asphalt

D7497 Practice for Recovering Residue from Emulsified Asphalt Using Low-Temperature Evaporative Technique

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.47 on Miscellaneous Asphalt Tests.

Current edition approved May 15, 2024. Published May 2024. Originally approved in 2016. Last previous edition approved in 2018 as D8078 – 18. DOI: 10.1520/D8078-24.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 *AASHTO Standard*.³

AASHTO R 78 Recovering Residue from Emulsified Asphalt using Low-Temperature Evaporative Techniques

3. Summary of Test Method

3.1 A known amount of asphalt binder or emulsified asphalt residue is put into a crucible, which is then placed into a muffle furnace for a period of time to incinerate any organic materials present and allow gravimetric calculation of the ash content of the specimen.

4. Significance and Use

4.1 This test is used for determining the amount of inorganic or non-organic materials in an asphalt binder or emulsified asphalt residue. The emulsified asphalt residue can be obtained by methods such as Test Methods **D6934** and **D6997**, Practice **D7497**, AASHTO R 78, or other agency-specified methods. This test may be useful as an alternative to solubility tests when a confounding material creates an interference to the solubility test being performed acceptably. An example of an interfering material is a polymer which may be incompatible with the solubility test solvent and plug the filter.

NOTE 1—The quality of the results produced by this standard are 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 Specification **D3666** are generally considered capable of competent and objective testing, sampling, inspection, etc. Users of this standard are cautioned that compliance with Specification **D3666** alone does not completely ensure reliable results. Reliable results depend on many factors; following the suggestions of Specification **D3666** or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.

5. Apparatus

5.1 *Crucible*—Porcelain or quartz-fiber, of sufficient size (normally 30 to 100 cm³ capacity) and suitability for muffle furnace, may be used.

³ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

5.2 *Crucible Tongs*—Sufficient size to transfer the crucible to and from the muffle furnace safely.

5.3 *Balance*, capable of weighing a minimum of 200 g to within 0.001 g.

5.4 *Muffle Furnace*—Electric resistance heated or microwave heated furnace, capable of maintaining a temperature of $900 \pm 25^\circ\text{C}$.

5.5 *Desiccator*, of suitable size to hold the crucibles during the cooling process.

5.6 *Desiccant*—Activated silica gel treated or anhydrous calcium sulfate have been found to be satisfactory desiccants.

NOTE 2—It is recommended to have a desiccant that contains an indicator. (The indicator makes it visually obvious when the desiccant has been saturated with moisture.)

6. Procedure

6.1 Preheat the muffle furnace to a temperature of $600 \pm 10^\circ\text{C}$ prior to moving on to the next step in the procedure.

6.2 Heat an empty crucible at $600 \pm 10^\circ\text{C}$ for 10 to 15 min. Cool the crucible to room temperature in the desiccator.

6.3 Place the empty crucible on the balance and record the weight (W_c) to the nearest 0.001 g. Tare the balance prior to placing the sample in the crucible.

6.4 Place approximately 2 to 3 g of the emulsified asphalt residue or asphalt binder to be tested into the crucible and record the sample weight (W_s) to the nearest 0.001 g. If the sample is hot when put into the crucible, place the crucible with the sample into the desiccator to cool for 15 min prior to recording the sample weight (W_s) to the nearest 0.001 g.

NOTE 3—A pre-ashing procedure may be used prior to placing the sample into the muffle furnace, if deemed necessary by the muffle furnace manufacturer or prior testing of the sample. This requires placing the crucible onto an acceptable stand above a bunsen burner. Adjust the height of the flame until it is just high enough to touch the crucible. Heat the sample until the sample flames, and discontinue when the flaming of the sample subsides. Using tongs, remove the crucible from the stand and place it into the muffle furnace.

6.5 Place the crucible with the sample into the muffle furnace and incinerate the contents of the crucible for a minimum of 2 h, but no longer than 3 h.

6.6 Remove the crucible from the oven and allow to cool in a desiccator at room temperature for a minimum of 30 min.

6.7 Record the crucible and ash sample weight (W_{c+a}) to the nearest 0.001 g. Return the crucible to the muffle furnace for an additional 30 ± 5 min.

6.8 Remove the crucible from the oven and allow to cool in a desiccator at room temperature for a minimum of 30 min.

6.9 Record the crucible and ash sample weight (W_{c+a}) to the nearest 0.001 g, and if the weight is within 0.002 g of that recorded in 6.7, it may be considered to be at constant weight.

6.10 If a constant weight has not been achieved, repeat steps 6.7 – 6.9 until a constant weight is reached.

7. Calculation

7.1 This equation is used to determine the percent ash content (A_c) from the asphalt binder or emulsified asphalt residue sample. The ash content is calculated as follows:

$$\%A_c = \frac{W_{c+a} - W_c}{W_s} \times 100 \quad (1)$$

where:

A_c = ash content,
 W_{c+a} = weight of crucible and ash sample,
 W_c = weight of crucible, and
 W_s = weight of sample (prior to testing).

Report the ash content (A_c) to the nearest 0.01 %.

8. Precision and Bias⁴

8.1 The following criteria should be used for judging the acceptability of results (95 %) probability based on Practice E691 calculations:

8.1.1 Duplicate results by the same operator should not be considered suspect unless they differ by more than the following amount:

Ash Content, mass %	Repeatability, mass %
0–3	0.13

8.1.2 The results submitted by each of two laboratories should not be considered suspect unless they differ by more than the following amount:

Ash Content, mass %	Reproducibility, mass %
0–3	0.16

8.2 The bias of this test method cannot be determined because no material having an accepted reference value is available.

9. Keywords

9.1 ash content; asphalt binder; emulsified asphalt

⁴ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D04-1042. Contact ASTM Customer Service at service@astm.org.