



Standard Practice for Effect of Water on Bituminous-Coated Aggregate Using Boiling Water¹

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1. Scope

1.1 This practice covers a rapid procedure for visually observing the loss of adhesion in uncompacted bituminous-coated aggregate mixtures due to the action of boiling water.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:²

E1 Specification for ASTM Liquid-in-Glass Thermometers
D979 Practice for Sampling Bituminous Paving Mixtures

3. Summary of Practice

3.1 A bituminous-coated aggregate mixture sample is placed in a container of boiling distilled water and boiled for 10 min. After cooling the boiled mixture, visual observation is made of retained bitumen coating on the aggregate.

4. Significance and Use

4.1 This practice is useful as an indicator of the relative susceptibility of bituminous-coated aggregate to water, but should not be used as a measure of field performance because such correlation has not been established. If loss of adhesion

due to water is indicated, testing by other procedures should be conducted to further evaluate the mixture.

4.2 This practice should not be used for acceptance/rejection by owner agencies.

5. Apparatus

5.1 *Scoop*, shovel or other implement capable of removing a representative sample from a larger mass of bituminous-coated aggregate mixture.

5.2 *Glass Beakers*, heat-resistant, 1000–2000 mL capacity or suitable metal containers of similar dimensions and capacity.

5.3 *Source of Distilled Water* (at least 500 mL (½ qt) for each test) (**Note 1**).

NOTE 1—Water that is not distilled has been shown to significantly affect results of the procedure and should not be used.

5.4 *Device for Heating Water*—gas burner with wire gauze supported on tripod or ring, hot plate, camp stove or other suitable device which will distribute heat evenly.

5.5 *Thermometers*—ASTM low-distillation thermometers graduated either in Celsius or Fahrenheit as specified, having a range from 2 to + 300C or 30 to 580F respectively, and conforming to the requirements for thermometer 7C or 7F as prescribed in Specification **E1**. Thermometric devices such as RTDs, thermistors or thermocouples with equal or better accuracy within the temperature range of thermometer 7C or 7F may be used..

6. Sample Preparation

6.1 Prepare an uncompacted bituminous-coated aggregate mixture following established laboratory procedures or obtain a sample of plant-produced mixture in accordance with Practice **D979**. The temperature of hot mixtures shall be below the boiling temperature of water, but not less than 85°C (180°F), before placing in boiling water. The temperature of mixtures that are cold mixed shall be at or above room temperature before placing in boiling water.

7. Procedure

7.1 For each sample tested pour distilled water into a clean container (as described in **5.2**) such that the container is approximately half full and heat to boiling.

¹ This practice is under the jurisdiction of ASTM Committee **D04** on Road and Paving Materials and is the direct responsibility of Subcommittee **D04.22** on Effect of Water and Other Elements on Bituminous Coated Aggregates.

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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.



7.2 With an appropriate implement (as described in 5.1) place approximately 250 g (½ lb) of the bituminous-coated aggregate mixture in the boiling water while the container is exposed to the heat source. Bring the water back to boiling and maintain boiling for 10 min ± 15 s. Avoid excessive manipulation of the bituminous-coated aggregate mixture.

7.3 At the end of 10 min, remove the container from the heat source. Skim off any free bitumen from the surface of the water to prevent recoating. Cool to room temperature, decant the water, and empty the wet mix onto a white paper towel.

NOTE 2—For comparison, a similar amount of fresh bituminous-coated aggregate mixture should be placed into a second container, covered with unheated distilled water for 10 min, the water decanted and the mixture emptied onto a white paper towel.

7.4 Visually observe the aggregate (coarse and fine) for retained bitumen coating. Any thin, brownish, translucent areas are to be considered fully coated. Visual observations shall be made immediately after the sample is placed on the white paper towel (Note 3). Examination of the sample under a light and with low magnification may aid in the visual observation of retained coating.

NOTE 3—Additional information can be obtained by repeating the visual observation 24 h after boiling when the sample has dried and the effects of moisture on the coating appearance of the sample have been eliminated.

8. Hazards

8.1 **Warning**—Mercury has been designated by EPA and many state agencies as a hazardous material that can cause central nervous system, kidney and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Material Safety Data Sheet (MSDS) for details and EPA's website (www.epa.gov/mercury/faq.htm) for additional information

Users should be aware that selling mercury or mercury containing products (or both) into your state may be prohibited by state law.

9. Keywords

9.1 bituminous paving mixtures; coating/stripping; loss of adhesion; water

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