Designation: D7404 – 07 (Reapproved 2016)

Standard Test Method for Determination of Emulsified Asphalt Residue by Moisture Analyzer[1]

This standard is issued under the fixed designation D7404; 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 1.1 This test method covers a rapid and quantitative determination of the residue in emulsified asphalts using a moisture analyzer. It is applicable to all nonsolvent-containing emulsion types.

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

1.3 A precision and bias statement for this test method has not been completed at this time. Therefore, this test method should not be used for acceptance or rejection of a material for purchasing purposes.

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D977 Specification for Emulsified Asphalt

D2397 Specification for Cationic Emulsified Asphalt

D6934 Test Method for Residue by Evaporation of Emulsified Asphalt

D6997 Test Method for Distillation of Emulsified Asphalt

3. Summary of Test Method

3.1 A sample of emulsified asphalt is placed in an open sample tray with an appropriate liquid transfer device capable of handling 1- to 3-mL sample sizes. The sample is heated to a preset temperature as required by emulsion type but never exceeding 163°C to determine the percentage of asphalt residue.

4. Significance and Use

4.1 This test is used to indicate the compositional characteristics of emulsified asphalt and is applicable to anionic emulsified asphalts as described in Table 1 of Specification D977 and cationic emulsified asphalt as described in Table 1 of Specification D2397 except solvent-containing emulsions. The residue obtained from this test method may also be subjected to rheological characterizations.

5. Apparatus

5.1 *Glass Rods,* with flame-polished ends used for stirring the emulsion as described in Test Method D6934.

5.2 *Moisture Balance Analyzer,* equipped with a heating element and capable of running either isothermally or in a programmable temperature-gradient mode.[3]

6. Sample Conditioning for Testing

6.1 All emulsified asphalts shall be properly stirred to achieve homogeneity before testing as described in Test Method D6934.

6.2 A minimum of 1 g and up to 3 g is used to determine the emulsified asphalt residue.

7. Calibration and Standardization

7.1 Follow the manufacturer's guidelines for calibration and standardization.

8. Procedure

8.1 *Polymer-Modified Emulsified Asphalts*

8.1.1 Program the moisture analyzer for an isothermal run set for an end temperature of 100°C with a switch-off criterion of 1 mg for 140 s or higher times for the highest accuracy. For lower accuracy, set the instrument at 1 mg for 50 s or lower times for a faster run. The automatic switch-off criterion is used to set the instrument's sensitivity for higher accuracy (1 mg for 140 s or longer times) or for lower accuracy (1 mg for 50 s or lower times).

[1] This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.42 on Emulsified Asphalt Test.

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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.

[3] The moisture balance analyzer is available commercially from different manufacturers.

8.1.2 Monitor the residue continuously and print a record at the end of the run if a documented report is required.

8.2 *Nonpolymer Emulsified Asphalts and Temperature-Gradient Run*—Program the moisture analyzer for an isothermal run set for an end temperature of 163°C with a switch-off criterion of 1 mg for 140 s or longer times for the highest accuracy. Set the instrument at 1 mg for 50 s or shorter times for a faster run and a lower accuracy. Use the switch-off criterion to set the instrument's sensitivity as described above to stop the test automatically when the change in weight is within 1 mg for 140 s or longer times (higher accuracy) or 1 mg for 50 s or shorter times (lower accuracy).

NOTE 1—Although this test method is not for solvent-containing emulsions, some guidance is given for practitioners who desire to obtain residue for emulsions of that type. Program the moisture analyzer to run in the temperature-gradient mode by setting the start temperature at 50°C and setting the ramp temperature at 10°/min and the end temperature to 100°C if the emulsion also contains polymer. Set the end temperature to 163°C if the solvent-containing emulsion does not contain polymer. In both cases, set the switch-off criterion to 1 mg for 140 s (see Appendix Appendix X1) or longer times for higher accuracy and to 1 mg for 50 s or shorter times if a lower accuracy is desired.

9. Calculation

9.1 The instrument calculates the residue automatically at the end of the run. This report can be attached to any other final report that is desired. In some cases, a plot of the rate of water moisture loss can be done.

10. Report

10.1 Report the residue to the nearest 0.1 %.

11. Precision and Bias

11.1 *Precision*—The following criteria should be used for judging the acceptability of results (95 % probability); duplicate results by the same operator should not be considered suspect unless they differ by more than the following amount:

Residue by Evaporation Weight, %	Repeatability, Weight %
50 to 75	0.1

11.2 *Bias*—The bias for this test method cannot be determined because no suitable material with an accepted reference value is available.

12. Keywords

12.1 asphalt; emulsified asphalt; emulsified asphalt; isothermal run; moisture balance analyzer; residue; temperature gradient

APPENDIX

(Nonmandatory Information)

X1. COMPARISON RESIDUE BY EVAPORATION (D6934) VERSUS MOISTURE ANALYZER (Fig. X1.2)

X1.1 Data for the moisture analyzer was obtained by setting the switch-off criterion of 1 mg for 140 s for all runs and running in the isothermal mode as follows: for unmodified asphalt emulsions, the temperature was set at 163°C, and for

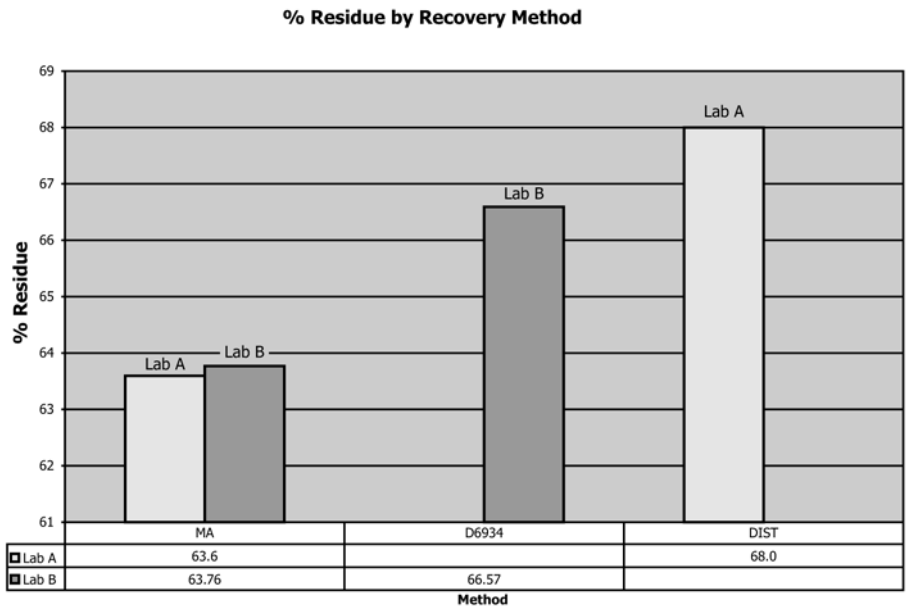

FIG. X1.1 Comparison of % Residue by Different Procedures: Moisture Analyzer (MA), Evaporation (D6934), and Distillation (D6997) as Performed by Two Different Laboratories

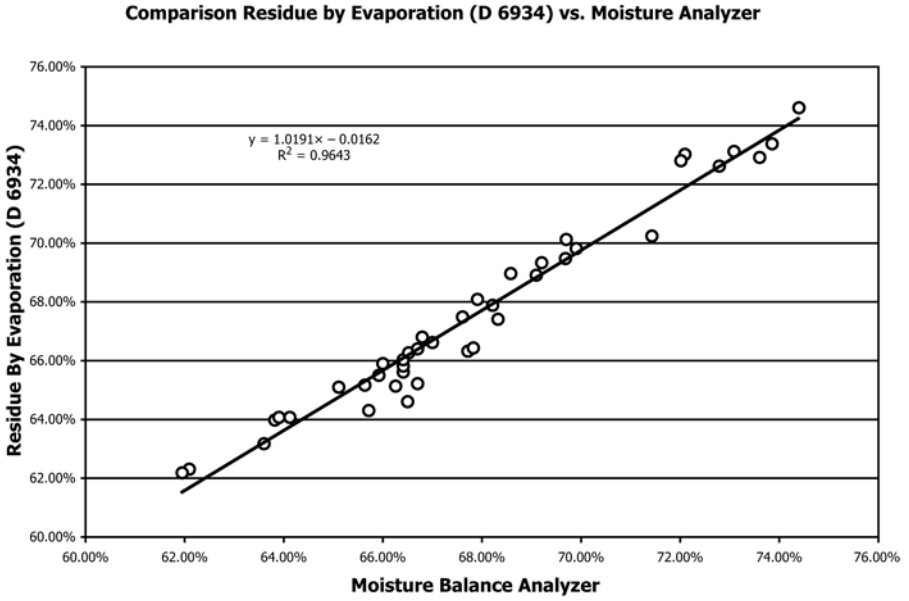

FIG. X1.2 Comparison Residue by Evaporation (D6934) Versus Moisture Analyzer

polymer modified asphalt emulsions, the temperature was set at 100°C. Emulsion types tested were cationics and anionics at slow, medium, and rapid settings.