



Designation: D8125 – 18 (Reapproved 2023)

# Standard Specification for Re-Refined Engine Oil Bottoms (REOB)/Vacuum Tower Asphalt Extender (VTAE)<sup>1</sup>

This standard is issued under the fixed designation D8125; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers re-refined engine oil bottoms, also known as vacuum tower asphalt extender, that may be used in formulating asphalt for pavement construction and roofing. This specification has been developed specifically for these two categories of product and is not intended for other uses. **Table 1** is to be used for pavement construction and **Table 2** for roofing. “Re-refined engine oil bottoms” (REOB) is the prevailing name used by many state highway agencies and FHWA, while “vacuum tower asphalt extender” (VTAE) is the preferred name used by the manufacturers of the product. Since each name provides an important descriptor of production elements (“re-refined” and “vacuum tower”) for the specific product this specification addresses, this specification uses the term “REOB/VTAE.”

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

1.4 *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.*

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.40 on Asphalt Specifications.

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## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

- D92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation
- D140/D140M Practice for Sampling Asphalt Materials
- D2042 Test Method for Solubility of Asphalt Materials in Trichloroethylene or Toluene
- D2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt Binder (Rolling Thin-Film Oven Test)
- D4402/D4402M Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer
- D7553 Test Method for Solubility of Asphalt Materials in N-Propyl Bromide
- D8078 Test Method for Ash Content of Asphalt and Emulsified Asphalt Residues
- E1131 Test Method for Compositional Analysis by Thermogravimetry

## 3. Materials and Manufacture

3.1 REOB/VTAE shall be the product of processing used engine oil using atmospheric distillation followed by vacuum distillation to produce a vacuum residuum meeting the specifications outlined in **Table 1** or **Table 2**.

## 4. Physical Requirements

4.1 The REOB/VTAE shall be homogenous, free from water, and not foam when heated to 232 °C (450 °F).

4.2 The REOB/VTAE shall conform to the requirements given in **Table 1** or **Table 2** based on the intended end use.

<sup>2</sup> 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.

**TABLE 1 Requirements for REOB/VTAE Used in Pavement Construction**

Test	
Flash Point, Cleveland Open Cup, min, °C (°F)	>232 (450)
Mass Change, RTFOT, % w/w max	1.0
Solubility, min, %	98.0 <sup>A</sup>
Viscosity, 60 °C (140 °F), cP	200–5000 <sup>B</sup>
Ash Content, max, %	7.0 <sup>CD</sup>

<sup>A</sup> The 98 % solubility requirement applies to the REOB/VTAE component only. This requirement may be waived by the purchaser if the final blended asphalt binder meets the requirements of the asphalt binder specification.

<sup>B</sup> The referee method shall be Test Method **D4402/D4402M** using a #21 spindle at 20 r/min; however, alternate methods may be used for routine testing and quality assurance. The spindle size and shear rate shall be reported.

<sup>C</sup> Ash content may be performed by either Test Method **D8078** or **E1131**.

<sup>D</sup> Precision and bias statement for Test Method **D8078** is currently under development. A precision and bias statement for Test Method **E1131** is listed in the standard.

**TABLE 2 Requirements for REOB/VTAE Used in Roofing**

Test	
Flash Point, Cleveland Open Cup, min, °C (°F)	>274 (525)
Flash Point, Pensky Martin Closed Cup, min, °C (°F)	>232 (450)
Mass Change, RTFOT, % w/w max	1.0
Solubility, min, %	98.0 <sup>A</sup>
Viscosity, 60 °C (140 °F), cP	200–5000 <sup>B</sup>
Ash Content, max, %	7.0 <sup>CD</sup>

<sup>A</sup> The 98 % solubility requirement applies to the REOB/VTAE component only. This requirement may be waived by the purchaser if the final blended asphalt binder meets the requirements of the asphalt binder specification.

<sup>B</sup> The referee method shall be Test Method **D4402/D4402M** using a #21 spindle at 20 r/min; however, alternate methods may be used for routine testing and quality assurance. The spindle size and shear rate shall be reported.

<sup>C</sup> Ash content may be performed by either Test Method **D8078** or **E1131**.

<sup>D</sup> Precision and bias statement for Test Method **D8078** is currently under development. A precision and bias statement for Test Method **E1131** is listed in the standard.

## 5. Methods of Sampling and Testing

5.1 Sample and test the REOB/VTAE in accordance with the following methods:

5.1.1 *Sampling*—Practice **D140/D140M**.

5.1.2 *Water*—Test Method **D95**.

5.1.3 *Flash Point, Cleveland Open Cup*—Test Method **D92**.

5.1.4 *Flash Point, Pensky Martin Closed Cup*—Test Method **D93**.

5.1.5 *Rolling Thin Film Oven Test*—Test Method **D2872**.

5.1.6 *Solubility*—Test Method **D2042** or **D7553**.

5.1.7 *Rotational Viscosity at 60 °C (140 °F)*—Test Method **D4402/D4402M**.

5.1.8 *Ash Content*—Test Method **D8078** or **E1131**.

## 6. Keywords

6.1 asphalt; pavement; re-refined engine oil bottoms; roofing; vacuum tower asphalt extender

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