



Standard Test Method for Determining Stability and Compatibility of Heavy Fuel Oils and Crude Oils by Heavy Fuel Oil Stability Analyzer (Optical Detection)¹

This standard is issued under the fixed designation D7112; 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 covers an automated procedure involving titration and optical detection of precipitated asphaltenes for determining the stability and compatibility parameters of refinery residual streams, residual fuel oils, and crude oils. Stability in this context is the ability to maintain asphaltenes in a peptized or dissolved state and not undergo flocculation or precipitation. Similarly, compatibility relates to the property of mixing two or more oils without precipitation or flocculation of asphaltenes.

1.2 This test method is applicable to residual products from atmospheric and vacuum distillation, from thermal, catalytic, and hydrocracking processes, to products typical of Specifications [D396](#), Grades No. 5L, 5H, and 6, and [D2880](#), Grades No. 3-GT and 4-GT, and to crude oils, providing these products contain 0.05 mass % or greater concentration of asphaltenes.

1.3 This test method is not relevant to oils that contain less than 0.05 % asphaltenes, and would be pointless to apply to unstable oils that already contain flocculated asphaltenes.

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

1.5 *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

[D396](#) Specification for Fuel Oils

¹ This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee [D02.14](#) on Stability and Cleanliness of Liquid Fuels.

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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.

[D2880](#) Specification for Gas Turbine Fuel Oils

[D4057](#) Practice for Manual Sampling of Petroleum and Petroleum Products

[D4175](#) Terminology Relating to Petroleum, Petroleum Products, and Lubricants

[D4177](#) Practice for Automatic Sampling of Petroleum and Petroleum Products

[D6299](#) Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

[D6560](#) Test Method for Determination of Asphaltenes (Heptane Insolubles) in Crude Petroleum and Petroleum Products

3. Terminology

3.1 Definitions:

3.1.1 For definitions of some terms used in this test method, such as crude oil, repeatability, reproducibility, and residual fuel oil, refer to Terminology [D4175](#).

3.1.2 *asphaltenes, n*—(rarely used in the singular), *in petroleum technology*, represent an oil fraction that is soluble in a specified aromatic solvent but separates upon addition of an excess of a specified paraffinic solvent.

3.1.2.1 *Discussion*—In this test method, the aromatic solvent is xylene and the paraffinic solvent is n-heptane.

3.1.3 *compatibility, n*—of crude oils and of heavy fuel oils, the ability of two or more crude oils or fuel oils to be blended together within specified ratios without evidence of separation, such as flocculation or separation of asphaltenes.

3.1.4 *flocculation, n*—of asphaltenes in crude oils or heavy fuel oils, the aggregation of colloiddally dispersed asphaltenes into larger, visible masses that may or may not settle.

3.1.5 *stability reserve, n*—of crude oils, heavy fuel oils, and residual streams containing asphaltenes, the property of an oil to maintain asphaltenes in a peptized (colloiddally dispersed) state and prevent their flocculation when stored or when blended with other oils.

3.1.5.1 *Discussion*—An oil with a high stability reserve can be stored for a long period of time or blended with a range of other oils without flocculation of asphaltenes.

*A Summary of Changes section appears at the end of this standard