



Designation: D8420 – 21

Standard Test Method for Wax Appearance Temperature and Wax Disappearance Temperature of Petroleum Products and Liquid Fuels¹

This standard is issued under the fixed designation D8420; 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 the determination of the wax appearance temperature and the wax disappearance temperature of petroleum products and liquid fuels by an automatic instrument using optical light scattering detection.

1.2 This test method is applicable to such materials as: crude oil, distillate fuels, residual fuels such as No. 6 Fuel Oil, marine fuels such as VLSFO, and including mixtures of these fuels and liquid biofuels.

1.3 This test method covers the range of temperatures from $-30\text{ }^{\circ}\text{C}$ to $+75\text{ }^{\circ}\text{C}$ with temperature resolution of $0.1\text{ }^{\circ}\text{C}$.

1.4 This test method contains interim precision with repeatability only; a full ILS will be completed within five years of its approval.

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

1.6 *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.*

1.7 *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

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 D02.07 on Flow Properties.

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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.

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

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

[D5773 Test Method for Cloud Point of Petroleum Products and Liquid Fuels \(Constant Cooling Rate Method\)](#)

[D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants](#)

3. Terminology

3.1 Definitions:

3.1.1 *cloud point, n*—in petroleum products and biodiesel fuels, the temperature of a liquid specimen when the smallest observable cluster of wax crystals first occurs upon cooling under prescribed conditions.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *wax appearance temperature, WAT, n*—when the appearance of wax crystals in the specimen is determined under the conditions of this test method.

3.2.1.1 *Discussion*—The wax appearance temperature in this test method is determined by an automatic instrument using an optical device for detection of the crystal formation.

3.2.2 *wax disappearance temperature, WDT, n*—when the disappearance of wax crystals is determined under the conditions of this test method.

3.2.2.1 *Discussion*—The wax disappearance temperature in this test method is determined by an automatic instrument using an optical device for detection of the crystal formation.

4. Summary of Test Method

4.1 A specimen in a chamber cooled by a Peltier device at a constant rate of $1.5\text{ }^{\circ}\text{C}/\text{min} \pm 0.5\text{ }^{\circ}\text{C}/\text{min}$ while continuously being illuminated by a near infrared (NIR) light source. The specimen is continuously monitored by an array of optical detectors for the appearance of wax crystals. The detectors are sufficient in number to ensure that any solid phase wax crystals that may form are detected. The temperature at which the appearance of wax crystals is detected in the specimen, as determined by the apparatus, is recorded to $0.1\text{ }^{\circ}\text{C}$ resolution as the wax appearance temperature. Once the wax appearance