



Designation: D5972 – 23



Designation: 435/22

Standard Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method)^{1,2}

This standard is issued under the fixed designation D5972; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method covers the determination of the temperature below which solid hydrocarbon crystals form in aviation turbine fuels.

1.2 This test method is designed to cover the temperature range of -80°C to 20°C ; however, 2003 Joint ASTM/IP Interlaboratory Cooperative Test Program mentioned in 12.4 has only demonstrated the test method with fuels having freezing points in the range of -42°C to -60°C .

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

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific warning statements, see 7.1, 7.3, and 7.5.

1.5 *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.*

¹ This test method is under the jurisdiction of ASTM International Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.07 on Flow Properties. The technically equivalent standard as referenced is under the jurisdiction of the Energy Institute Subcommittee SC-B-7.

Current edition approved March 1, 2023. Published March 2023. Originally approved in 1996. Last previous edition approved in 2016 as D5972 – 16. DOI: 10.1520/D5972-23.

² This test method has been developed through the cooperative effort between ASTM and the Energy Institute, London. ASTM and IP standards were approved by ASTM and EI technical committees as being technically equivalent but that does not imply both standards are identical.

2. Referenced Documents

2.1 *ASTM Standards*:³

D2386 Test Method for Freezing Point of Aviation Fuels

3. Terminology

3.1 *Definitions*:

3.1.1 *freezing point, n—in aviation fuels*, the fuel temperature at which solid hydrocarbon crystals, formed on cooling, disappear when the temperature of the fuel is allowed to rise under specified conditions of test.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *automatic phase transition method, n—in this test method*, the procedures of automatically cooling a liquid aviation fuel specimen until solid hydrocarbon crystals appear, followed by controlled warming and recording of the temperature at which the solid hydrocarbon crystals completely redissolve into the liquid phase.

3.2.2 *Peltier device, n*—a solid-state thermoelectric device constructed with dissimilar semiconductor materials, configured in such a way that it will transfer heat to and away from a test specimen dependent on the direction of electric current applied to the device.

4. Summary of Test Method

4.1 A specimen is cooled at a rate of $15^{\circ}\text{C}/\text{min} \pm 5^{\circ}\text{C}/\text{min}$ by a Peltier device while continuously being illuminated by a light source. The specimen is continuously monitored by an array of optical detectors for the first formation of solid hydrocarbon crystals. Once the hydrocarbon crystals are formed, the specimen is then warmed at a rate of $10^{\circ}\text{C}/\text{min} \pm 0.5^{\circ}\text{C}/\text{min}$ until the last hydrocarbon crystals return to the

³ 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.

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