eraflash and ISO 24966

The world's most precise flash point tester

Introduction

The flash point of a compound is regarded as the prime safety parameter and is used for the classification of hazardous material in shipping and safety regulations. The lower the flash point, the more ignitable a compound. This parameter describes the dangers associated with storage, transport and use of flammable materials, like fuels, oils, chemicals, fragrances, paints, and waste. For diesel and aviation turbine fuels, the flash point is considered a key quality parameter, and for used oils, the flash point is an easy and accurate way to measure fuel dilution.

Due to its importance, a wide variety of flash point methods have been developed over the years. Recently, the *International Organization for Standardization* (ISO) published a new method, ISO 24966, which sets out to overcome the deficiencies of traditional flash point methods. ISO 24966 is based on the continuously closed cup principle and features inherently safe flashpoint testing with small sample volume and unmatched precision. **era**lytics spearheaded the development of this new method, confirming **era**lytic's era**flash** as the gold standard for safe and accurate flash point testing.

Development of modern flash point methods

By definition, the flash point is "*the lowest temperature at which vapors of a material will ignite, when given an external ignition source*."

The simplest technical implementation of this definition lead to the invention of the Pensky-Martens flash point tester over 150 years ago. In this method, a large amount of sample (75 mL) is kept in a container, where the temperature is ramped from ambient towards the flashpoint. In regular temperature intervals, a lid is opened, and the vapors of the sample are exposed to an open flame or ignition source. If the sample ignites, as visually detected by the eruption of a flame, the flash point has been reached at the current temperature. If no flame is detected, the lid is closed, and the sample is heated until the next ignition.

The Pensky-Martens method was later made into a standard test method known as EN ISO 2719 / ASTM D93 and this method is known as a closed cup flash point method. It is worth to note that the "closed cup" only refers to the state of the cup between the ignitions (in contrast to the "open cup" like ASTM D92); during the ignition the sample is exposed to an ignition source like an open flame. With time, various other flash point methods based on the closed cup design were developed like ASTM D56 (TAG), EN ISO 13736 (Abel) and ASTM D3828.

The combination of hot flammable materials and open flames makes closed cup flash point methods one of the prime fire hazards in testing laboratories. Well aware of these dangers, the US Navy commissioned the development of an inherently safe flash point testing method in the 1990s to be used on its fleet. The aim was to develop a superior flash point method to

overcome the deficiencies of available methods, which meant no open flame, a minimum sample size and a significantly shorter measuring time than the existing methods

Based on this premise, the modified continuously closed cup flash point method (MCCCFP), ASTM D7094, was developed with safety and efficiency in mind. In this method, 2 mL of sample is kept in a temperature-controlled chamber where two electrodes initiate an electric arc at regular temperature intervals to attempt to ignite the sample's vapors. When ignited, the flash point is detected via a sudden rise in chamber pressure. Due to the internal electrodes, the chamber with ignitable vapors remains continuously closed for the entirety of the test, eliminating the possibility of an open flame. The small sample volume reduces waste and cleaning efforts, and the smaller thermal mass of sample and cup makes ASTM D7094 twice as fast as the ISO 2719 / ASTM D93 method [1].

ISO 24966

ISO 24966 was published in 2026 and is a flash point method suitable to determine flashpoint of chemicals, lubricating oils and fuels in the range from 24.5 to 229.5 °C. ISO 24966 is technically equivalent to ASTM D7094. As such it uses a 2 ml sample size and electrical ignition of the continuously closed vapor space above the liquid at regular temperature intervals. The flash point is detected by the rise in pressure after ignition as the temperature of the sample is brought to the flash point.

During the development of ISO 24966, the most extensive inter-laboratory study (ILS) program of any flashpoint method to date was carried out, involving 20 laboratories, 25 different liquids and over 1000 measurements to establish a precision statement. A detailed research report is available from **era**lytics and EI under MCCCFP ILS 2022 and from ASTM under RR-D02-2086[2]. This research report covers all temperatures and materials encountered in flash point testing including aviation turbine fuels, diesels, renewable diesels, diesel-biodiesel blends, synthetic aviation turbine fuel, lubricating and turbine oils as well as off spec products and chemicals.

Figure 1 shows the reproducibility of the new ISO 24966 and the historical ISO 2719 (Pensky-Martens)[3] flash point method over the method's respective temperature ranges. The better reproducibility of ISO 24966 is clearly visible over the entire temperature scale and especially at higher temperatures, where lubricants are typically measured. The difference in precision at these higher temperatures is more than a factor 2.

[1] https://eralytics.com/wp-content/uploads/ERAFLASH-Efficiency-through-maximum-safety-and-measuring-speed.pdf
[2] The research report RR-D02-2086 can be requested via service@astm.org.
[3] https://store.astm.org/d0093-20.html

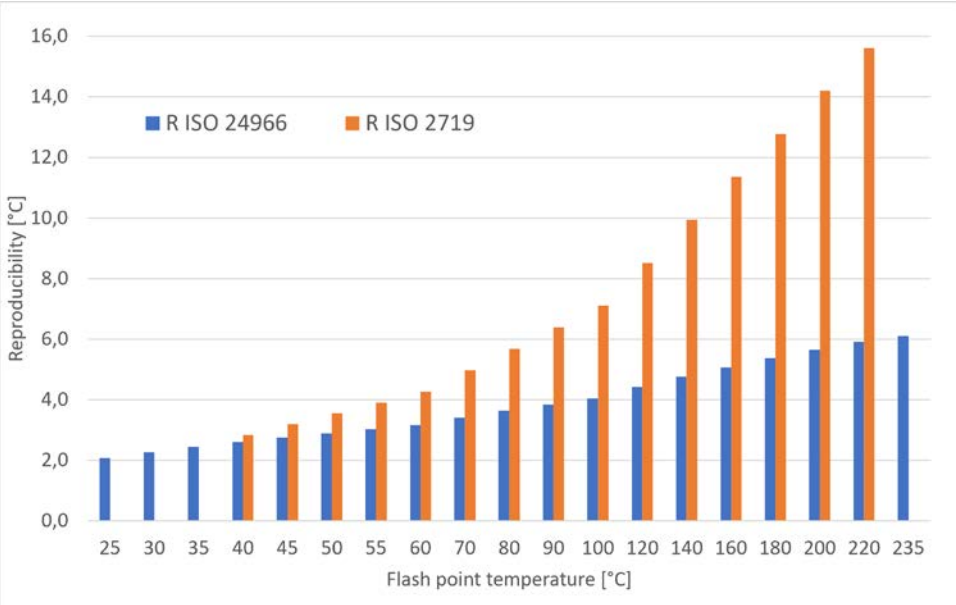

Figure 1: Reproducibility for ISO 24966:2026. The corresponding values for ISO 2719 were obtained from ASTM D93-20.

The superior performance of the closed cup methods ISO 24966/ASTM D7094 confirms the findings of other inter-laboratory studies like the Multi Method Study (MMS)[4], where several flash point methods were compared on a sample set of aviation turbine fuels. The results shown in figure 2 demonstrated that ISO 24966 / ASTM D7094 had approximately half the reproducibility of the ISO 2719 and ASTM D56 methods.

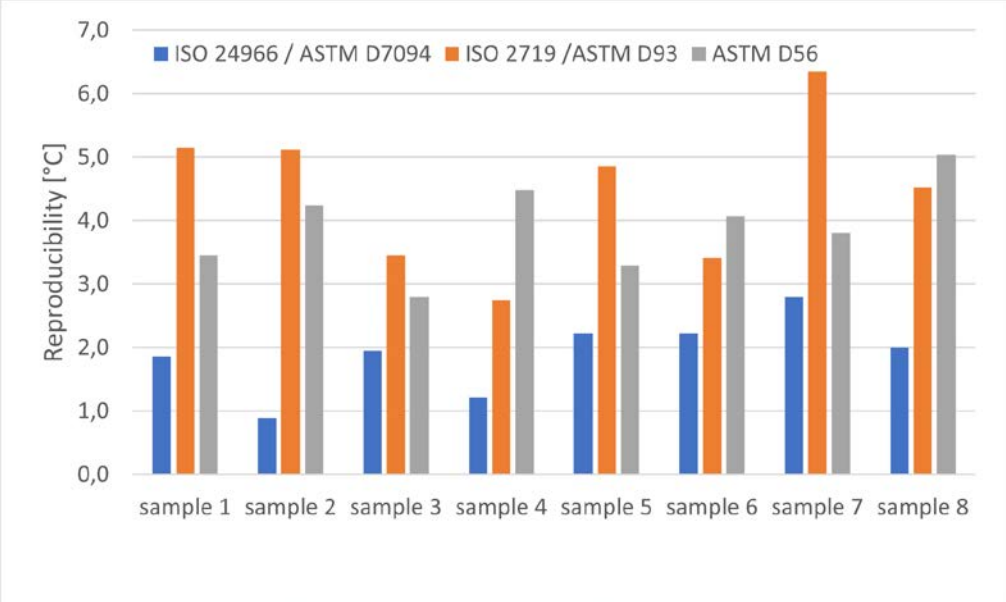

Figure 2: Reproducibility for jet fuels as reported in research report D02:2020 for ASTM D56, ISO 2719 / ASTM D93 and ISO 24966 / ASTM D7094. The reproducibility was calculated as 2.82 times the sample reproducibility standard deviation.

Although a brand-new method, ISO 24966 can lean on the over 20 years of international interlaboratory experience of ASTM D7094. Shortly after the creation of ASTM D7094, an ILS was conducted in 2004[5] to establish the precision the relative bias to ASTM D93. This program investigated both pure and contaminated fuel and oil samples and a summary of the reported

[4] The research report RR-D02:2020 can be requested via service@astm.org.

[5] The research report RR-D02-1581 can be requested via service@astm.org.

results is shown in Figure 3. Based on statistical evaluation according to ASTM D6708 of the two methods, it was concluded that "**there is no statistically significant bias between these two methods"**.

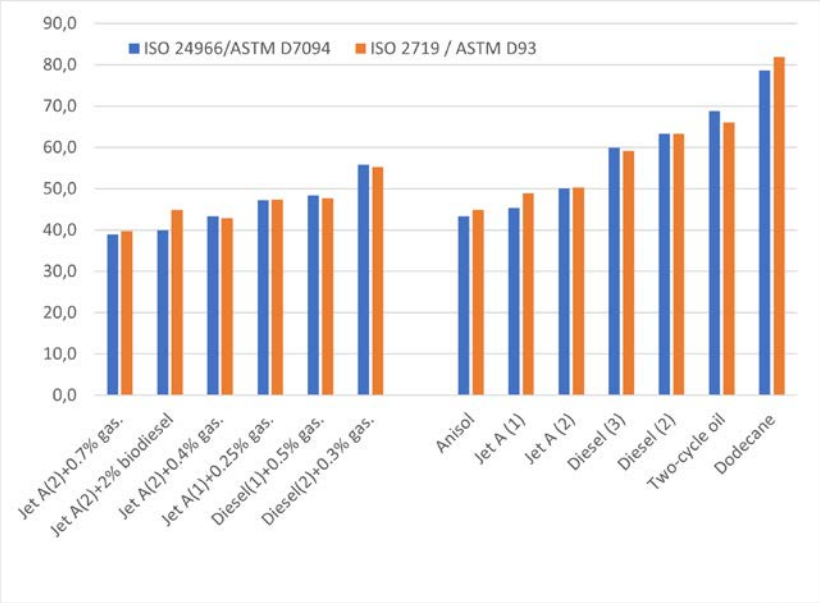

Figure 3: Average reported flash points for ISO 24966 / ASTM D7094 and ISO 2719 / ASTM D93 from RR-D02-1581.

In the last 20 years, four major ILSs have firmly demonstrated that ISO 24966 / ASTM D7094 is the most precise and reproducible flash point test method. The superior reproducibility compared to other flash point methods is summarized in figure 4, which compares the precision of various flash point methods for typical product types including fragrances, aviation turbine and diesel fuel as well as lubricants. As the traditional close cup methods generally are not able to cool the sample below ambient, it is not able to measure the low flash point of fragrances.

Material	Flash Point (°C)	ISO 24966 R (°C)	ISO 2719 R (°C)	ASTM D56 R (°C)
Flavors & Fragrances	23	2.0	N/A	N/A
Jet Fuels	40	2.6	2.8	3.1
Diesel Fuels	60	3.2	4.3	3.8
Oil	200	5.6	14.2	N/A

Figure 4: Reproducibility for selected flash point methods as published in ISO 24966:2026, ASTM D93-20 and ASTM D56-22 respectively.

Summary

Designed to overcome the deficiencies seen in traditional flash point methods, **era**lytic's era**flash** with ISO 24966 / ASTM D7094 has emerged as the best flash point tester available on the market. Its superior precision has been consistently demonstrated since its inception, and its safety features outperform any of the other dated flash point methods.

era**flash** flash point tester:

- Offers **the best precision** over **the widest temperature range** of all flash point methods.
- Listed in several **specifications** including **diesel fuel** (ASTM D975, D396) and **aviation turbine fuel** (ASTM D1655, ASTM D7566).
- **Inherently safe** – no open ignition source (gas flame or glowing wire) is used eliminating the risk of fire hazards in the laboratory.
- **Twice as fast** compared to ISO 2719/ASTM D93 with the help of **era**lytics PBT® - Peltier Boost Technology.
- Uses **only 2 mL of sample**, **minimizing waste** and significantly **speeding up** cleaning procedures and thermal regulation.