



Smoke Point of Kerosene and Aviation Turbine Fuel ASTM D1322

SP10 - Automated Smoke Point



Methods:

ASTM D 1322, D 1655
IP 598,
DEF STAN 91/91
FTM 791-2107
JIS K2537

- ▶ ASTM and IP referee method
- ▶ Quick, easy, and precise
- ▶ Increases safety
- ▶ Reduces labor
- ▶ Very compact design

The smoke point test method is one of the oldest standards in petroleum industry. It is one of the last manual methods that has never been automated before. Performing the smoke point test manually requires highly skilled technicians with years of experience. Additionally, the manual test is time consuming.

The current visual rating method used for specification purposes suffers from the drawback of operator subjectivity. The visual measurement of an open flame is a challenging exercise and dangerous for lab personnel. The visual rating of the flame varies from one operator to another.

The SP 10 revolutionizes the smoke point testing.

It uses a system that adjusts the size of the flame associated to a video camera that observes the flame. When the flame attains the shape described in the test method, the SP 10 memorizes and reports the height of the flame.

Every **test is fully documented and traceable** which is important for aviation industry quality procedures.

The SP10 has been made the referee method in D1322:

§6.2.2 of ASTM D1322: *“Due to the vastly superior resolution of the digital camera compared to the human eye, smoke point shall be measured by the automated unit when available. In case of dispute between results from manual and automated methods, **the referee shall be considered the automated method.**”*



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Significance and Use

This test method provides an indication of the relative smoke producing properties of kerosene and aviation turbine fuels in a diffusion flame. The smoke point is related to the hydrocarbon type composition of such fuels. Generally the more aromatic the fuel the smokier the flame. A high smoke point indicates a fuel of low smoke producing tendency.

The smoke point is quantitatively related to the potential radiant heat transfer from the combustion products of the fuel. Because radiant heat transfer exerts a strong influence on the metal temperature of combustor liners and other hot section parts of gas turbines, the smoke point provides a basis for correlation of fuel characteristics with the life of these components.

Principle

The SP 10 uses a patented system (License TOTAL RM) based on a video camera that observes the flame and an actuator that adjusts the size of the flame. The flame image is digitalized and the dedicated software determines the height of the flame when its shape corresponds to the one described in the test method. This specific flame is the one with the maximum height without smoke generation.



Operation

The smoke point test with the SP 10 is as simple as is a flash point test with an automated instrument. The operator prepares the candle according to the test method instructions (**phase 1**).

The candle is then positioned on a conveyor (**phase 2**). The operator keys in all sample details and then initiates the test (**phase 3**).

Then all the procedure is automated. The candle is automatically lit, the five minutes stabilization time is followed by the three determinations of the flame height. At the end of test, the SP 10 instrument calculates the mean value of the three flame heights measured and reports the result.

The result is saved in a built-in data base. It can be printed, transferred on a USB memory stick and/or send to a LIMS when the SP 10 is connected to a LAN.

Benefits

The SP 10 is an automated instrument that strictly follows the test method with an **improved precision**. It **eliminates the subjectivity** inherent to the manual test where the visual rating of the flame varies from one operator to another. Thanks to the digital imaging technology of SP10, the shape of the flame described in the test method is automatically repeatedly determined and corresponding flame height is precisely recorded in the same conditions.

In addition, the SP 10 **eliminates all safety risks** linked to the visual observation of an open flame.

The test is carried unattended which **drastically reduces labor**. Every **test is fully documented and traceable** which is important for aviation industry quality procedures.

Ordering information

Description

AA220-001	SP 10 – Automated Smoke Point Apparatus Delivered ready for operation
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Reported results

Measurement limits

Height of the flame in mm	According to the test method 0 up to 50.0 mm
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Technical specifications

Description

Test duration	Less than 10 minutes
Resolution	0.1 mm
Results storage	Limited only to capacity of external device
LAN connectivity	Ethernet port RJ45
Printer output	Serial port (printer is optional)
Data output	USB (2), Ethernet
Dimensions (mm)	W x D x H 330 x 390 x 413 (13" x 15" x 16")
Weight	10 kg (22 lb)
Electrical	115 to 230V - 2 A - 50/60 Hz

We reserve the right to alter specifications without notification

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