# Fuel Conductivity and more precise additive control

**ASTM D2624** - *Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels*

A primary test method for these fuels and often the first undertaken at point of loading/delivery to determine the "safe-guarded" nature of a fuel batch. This test method is called up in ASTM D1655 (Standard specification for Aviation Turbine Fuels), **DEFSTAN 91-91**, **IATA** and most other international ATF specifications.

## The significance of testing fuel's conductivity levels

The velocity of aviation turbine fuel (ATF) through a pipeline will impart an electrical charge, dependent on the conductivity of the fuel and the flow velocity, the charge may dissipate, increase, or simply remain static. ATF is very pure, often highly refined, and has the potential to accumulate a high static electrical charge which can lead to spark discharge and ignition of the explosive vapours; as a result great attention is given to the electrical conductivity of jet fuel.

The use of static dissipater additives (SDA) are mandated within Airline regulations to ensure that jet fuel which is distributed, pumped, and transferred to the aircraft will not become charged. These materials are also known as antistatic additives or conductivity improver additives. The SDA material approved for aviation jet A-1 use is STADIS 450 or STADIS 425.

An acceptable range of electrical conductivity limits was determined by observations and measurements of many sample fuels of differing heritages under different storage and handling conditions and introduced under ASTM D2624 and equivalent Jet fuel conductivity specifications.

*Note: Gasolines have vapour concentrations too rich to ignite whilst Diesel fuels are too lean, however Kerosene (jet fuel) is often not merely ignitable but potentially explosive. If a fuels electrical conductivity is too low this can lead to it having a high level of static electrical charge. If conductivity is too high this might indicate poor quality fuel due to conductive contaminants such as rust, water, organic acids, copper, etc which raises other concerns. High electrical conductivity does not necessarily mean the fuel is poor, but does indicate that it is not of normally observed (known good) composition and therefore should not be used in aircraft where it may cause engine damage or worse).*

## Blending SDA and testing fuel conductivity

Initial dosing of ATF with SDA is undertaken at Refinery, typically additive being diluted one part additive to nine parts jet fuel. Further volumes of additive may be blended subject to resulting conductivity levels measured from fuel samples taken downstream. Testing procedures vary from supplier to supplier and location to location but traditionally rely upon a sample being drawn from a distribution pipeline or storage tank and manually tested using an approved conductivity instrument in conformity to test method ASTM D2624. Automatic measuring and dosing systems are available but the traditional "manual" test method remains in extensive use and has significant limitations.

Note: STADIS additive is costly - typically US $30,000 per $1m^3$

## Benefits of In-line conductivity measurements

- 24/7 real time high accuracy conductivity measurements
- Improves safety and eliminates hand sampling and testing of fuel
- Allows precise additive volumes to be calculated
- Instantly alerts if levels of conductivity goes out-of-spec
- Allows automated additive dosing (when used as part of an automatic dosing system)

Stanhope-Seta, London Street, Chertsey, Surrey, KT16 8AP, UK

t: +44 (0) 1932 564391 | e: sales@stanhope-seta.co.uk | www.stanhope-seta.co.uk