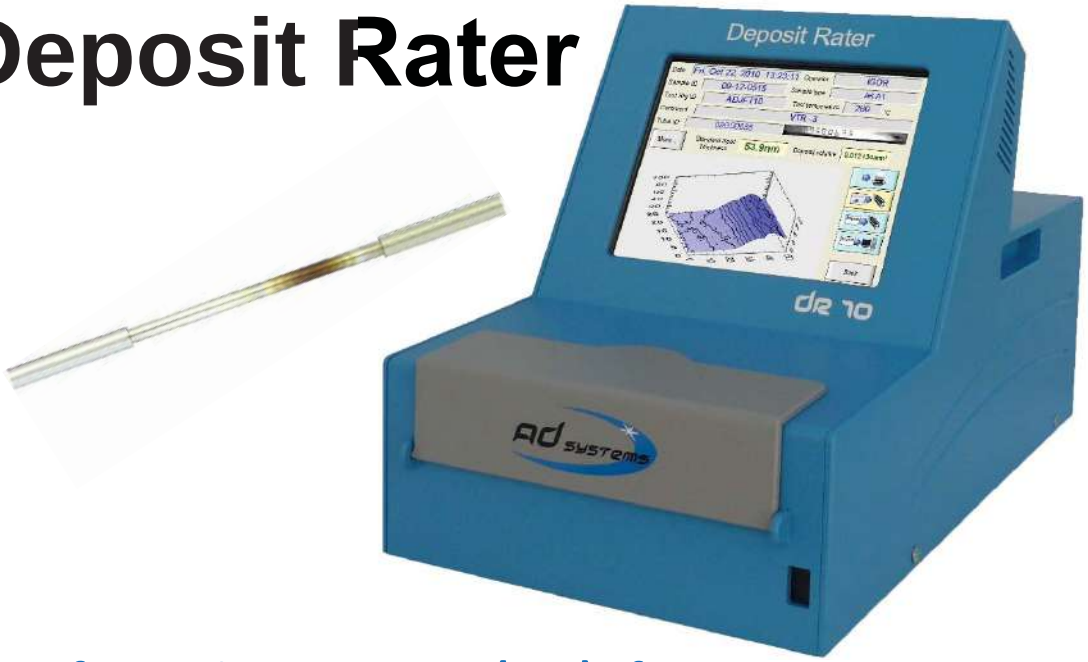
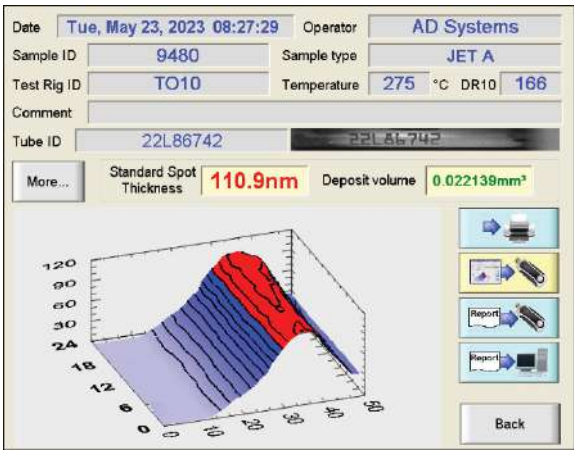
Thermal Oxidation Stability of Aviation Turbines Fuels
ASTM D3241 - Annex A2, IP 323 - Annex C

DR10 – ITR Heater Tube Deposit Rater



Methods:
ASTM D3241
IP 323, ISO 6249
ASTM D1655,
D7566, D4054
DEF STAN 91-091

- **Referee instrument (ITR) for measurement of deposit thickness on heater tubes**
- **Quick, easy, very compact design**
- **Automatic result transmission to TO10**
- **Ideal tool for QC and research**
- **Rigid construction, no optical adjustment required**



Until 2014, to qualify jet fuel thermal oxidation stability the only visual rating method of heating tubes was used for specification purposes, but it was suffering from the drawback of operator subjectivity. ASTM decided to use objective metrological technique to measure and report the thickness of the deposit instead of its color. With proven performance, the DR10 – ITR became referee method in jet fuels specification.

The automated tube rater DR10 measures deposit thickness around the total surface of the tube in less than 10 minutes. It displays in SI units (nanometers) a 3D mapping of the deposit, reports average and maximum thicknesses, and calculate total volume of deposit.

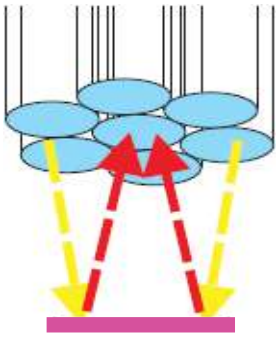
Applications

With its robust design and ease of use, the DR10 is well suited for testing labs, research, refining, pipeline, terminals, and mobile laboratories - every location where thermal oxidation stability of aviation fuel is evaluated.

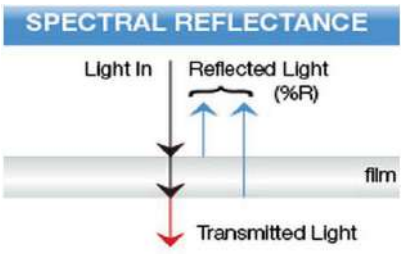
AD systems
POWERED by INNOVATION

Principle

The DR10 uses an interferometry technique (Spectral Reflectance) based on a powerful light source, a fiber optic probe, and a spectrometer. Incident light of a specific spectra is emitted on the surface of the tube.



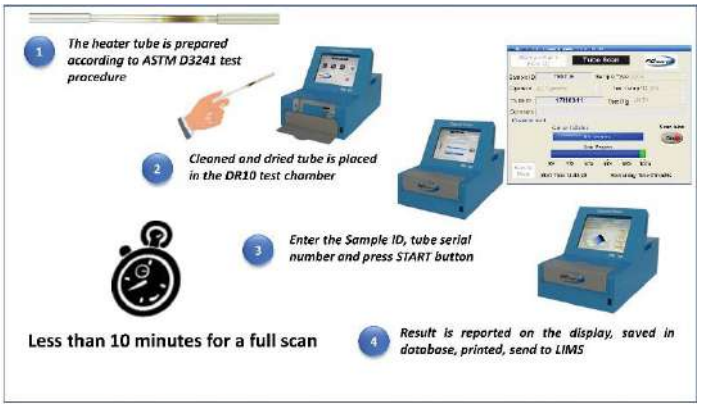




The reflected light is collected and processed by a spectrometer. The software analyzes the interference fringes created by the deposit and calculates the deposit thickness.

Operation

The heater tube is prepared according to ASTM D3241 procedure and is placed in the test chamber of the DR 10.



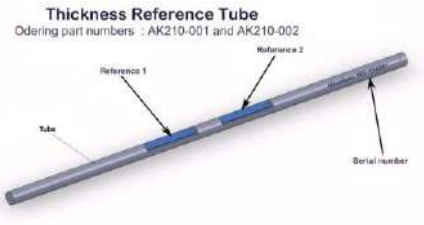
The DR10 is equipped with a color touch screen. A virtual alphanumeric keypad is used to enter the sample ID. For complete traceability the sample type, operator name and test temperature are selected from pre-programmed lists, and the tube serial number is captured by a built-in camera. The standard tube scan at 1,200 measurement points is completed **in about 10 minutes.**

In conformity with ASTM D3241 and similar methods, the DR10 reports the mean deposit thickness of the thickest 2.5mm^2 area (**Standard Spot Thickness**). In addition, the total deposit volume, average and maximum thickness values are reported along with 3D mapping of the deposit.

This data can be stored on USB, printed, or sent to LIMS. Then **DR10 is linked to TO10 oxidation rig**, the complete D3241 test report can be compiled including tube rating.

When measured Standard Spot Thickness value exceeds 85 nm limit specified in ASTM D1655 / D7566 and DEF STAN 91-091, the result is displayed in red color to warn the laboratory technician.

AD Systems thickness reference tubes are available for the verification of the DR10 Deposit Rater accuracy. Each tube contains 2 thickness references certified by a national metrology laboratory. These tubes are therefore traceable and meet the requirements for calibration and testing laboratories as defined in the EN ISO/IEC 17025.



Reported results	Measurement limits
Average thickness	0 to 1200 nm
Maximum thickness	0 to 1200 nm
Max mean thickness of 2,5mm^2 area (SST)	0 to 1200 nm
Deposit volume	0 to 0.5 mm^3
Technical specifications	**Description**
Test duration	10 minutes for 1 200 pts scan 4 minutes in fast mode
Number of measurement points	Configurable By default: 1,200 points
Results storage	Limited only to capacity of external device
LAN connectivity	Ethernet port RJ45
Printer output	USB (printer is optional)
Data output	USB (2), Ethernet
Dimensions (mm)	250 x 410 x 290 (10"x 16"x 12")
Weight	10 kg (22 lb)
Electrical	100 to 240V - 2 A - 50/60 Hz

We reserve the right to alter specifications without notification.

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