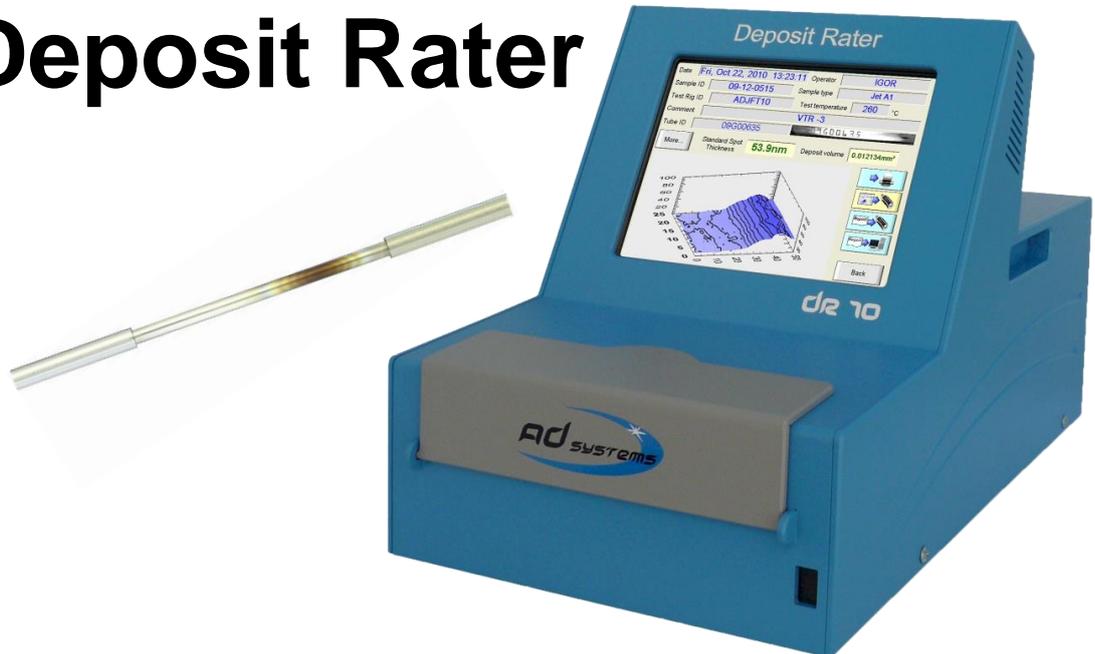




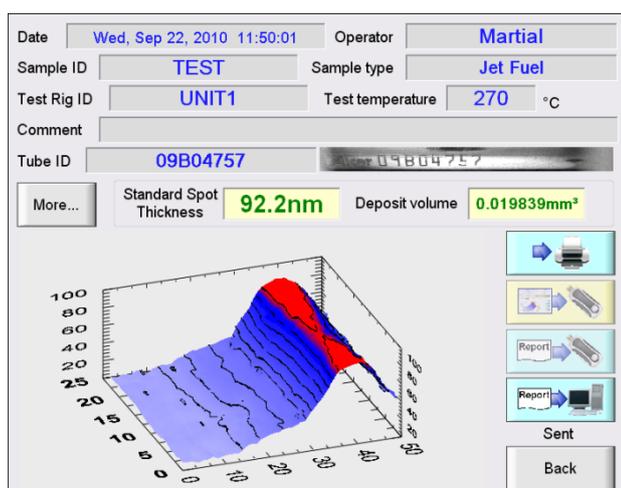
Thermal Oxidation Stability of Aviation Turbines Fuels  
ASTM D3241 - Annex 2, IP 323 - Annex C

# DR10 – ITR Heater Tube Deposit Rater



Methods:  
ASTM D3241  
IP 323, ISO 6249  
ASTM D1655,  
D7566  
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, only the visual rating method was used for specification purposes but it was suffering from the drawback of operator subjectivity. ASTM decided to use SI unit to report the result of the jet fuel thermal oxidation deposit. Following this decision, the DR10 – ITR became referee method.

The DR10 measures the deposit thickness around the surface of the tube. At the end of the test, it displays in SI units a 3D mapping of the deposit formed along and around the whole length of heater tube. In addition, the instrument reports average and maximum thicknesses and total volume deposit.

## Applications

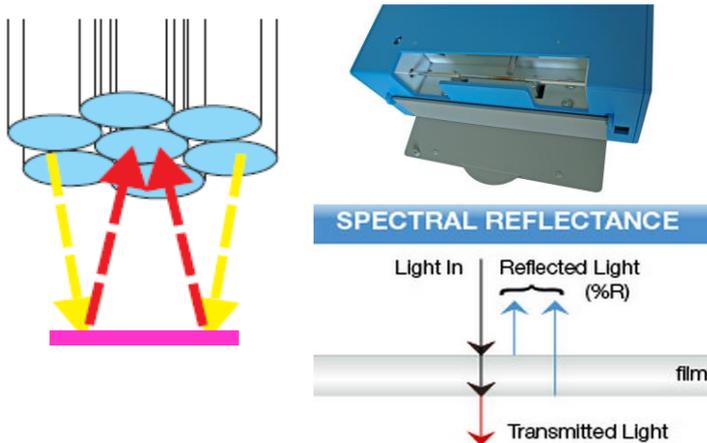
The DR10 is designed for all types of applications related to thermal oxidation testing of jet fuels including research, refining, pipeline, terminals, and mobile laboratory applications - every location where thermal oxidation of jet fuel is evaluated.



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## Principle

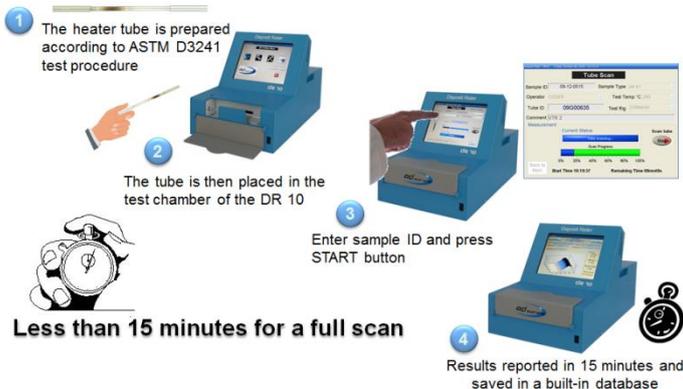
The DR10 uses an interferometry technique (Spectral Reflectance) based on a powerful light source, a fiber optic probe, and a spectrometer. Specific light is emitted on the surface of the tube.



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

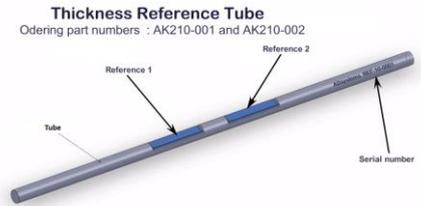


The DR10 is equipped with a touch screen. A virtual alphanumeric keypad is used to program the test. The sample types, the operator names and test temperatures are pre-programmed. Only the sample ID and the tube serial number have to be entered. The tube serial number is displayed by a camera and the technician simply enters the displayed serial number at the beginning of the test. With this minimal data entry, the 1,200 points tube scanning is initiated. The full tube scan is completed **in 12 minutes**. With the fast mode operation, the full scan is performed in **4 minutes**.

The DR10 displays a 3D image of the deposit and the average and the maximum thickness deposit values. The mean deposit thickness of the thickest 2.5 mm<sup>2</sup> area defined in the ASTM D3241 is reported in addition to the calculated total deposit volume.

When the deposit thickness over the 2.5 mm<sup>2</sup> area exceeds the 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 thin film thickness reference tubes can be used for the verification of the accuracy of the DR10 Deposit Rater. The thickness of each thin-film tag of these reference tubes is 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

|  |                          |
|--|--------------------------|
| Average thickness                            | 0 to 1200 nm             |
| Maximum thickness                            | 0 to 1200 nm             |
| Maximum thickness on 2,5mm <sup>2</sup> area | 0 to 1200 nm             |
| Deposit volume                               | 0 to 0.5 mm <sup>3</sup> |

### Measurement limits

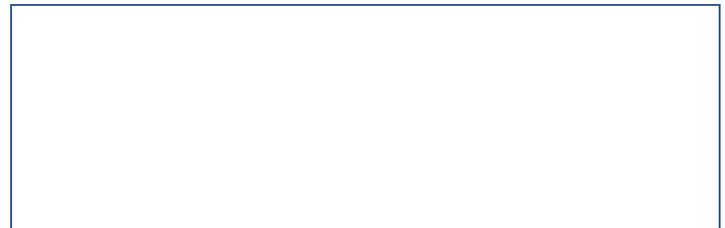
### Technical specifications

### Description

|                              |   |
|------------------------------|---|
| Test duration                | 12 minutes for 1 200 pts scan<br>4 minutes in fast mode |
| Number of measurement points | Configurable<br>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<br>(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.

Your local distributor:



For additional information:

### AD Systems

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