

AGILENT 4100 EXOSCAN FOR ANALYSIS OF COMPOSITES USED IN BOEING AIRCRAFT

The Measure of Confidence

Data Sheet



Composites have become popular materials to use in a variety of applications; this includes their usage in the Aerospace and Aviation marketplaces. The 4100 Exoscan FTIR has been shown to be an effective, non-destructive technology for measuring heat exposure in composite materials (“Composite Heat Damage measurement using the handheld Agilent 4100 ExoScan FTIR” by J. Seelenbinder).

Calibrated methods are now available for the 4100 ExoScan FTIR, outfitted with a dedicated diffuse reflectance sampling interface, to analyze composite material that has been exposed to extreme conditions. A typical example is the determination of heat exposure in the composite of an aircraft as a result of a lightning strike, fire or other heat source.

The Exoscan system identifies changes in the chemical structure of the epoxy polymer component of the composite matrix. The extent of exposure is established by using the ExoScan with pre-developed methods. The system is then used as a non-destructive analyzer to determine the depth and breadth of damage. This is particularly valuable in support of sanding and patching repair processes.

In cooperation with Boeing, and as cited in the 787 NDT Repair Manual, methods are available for the 4100 Exoscan system to measure thermal exposure to the 787 aircraft. Methods for un-sanded and sanded composite are available that use modeling to correlate the heat exposure to the chemical changes identified in the exposed composite materials. These methods have been fully validated and vetted by Agilent and Boeing, with the thresholds within the methods being set by Boeing for unacceptable limits of exposure.

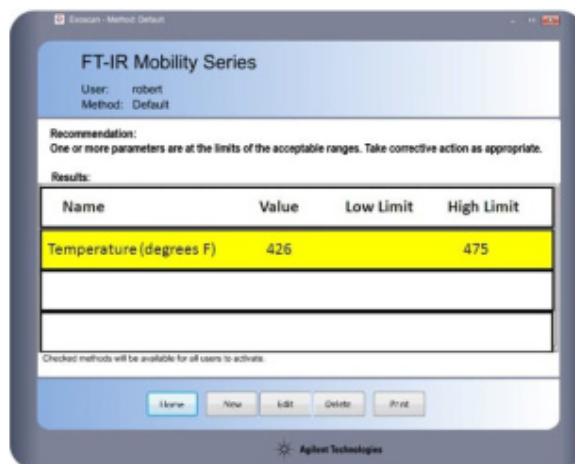


Agilent Technologies

The 4100 Exoscan FTIR for Boeing 787 Aircraft (P/N G8036A) package contains the following hardware:

4100 Exoscan FTIR with Dedicated Diffuse Reflectance sampling interface, background and polystyrene reference caps, Socket Somo 650 PDA, power cables, power supply and battery charges for the PDA and Exoscan (where applicable), hardware and software manuals, MicroLab PC and MicroLab Mobile (preloaded on the PDA).

In addition to the hardware the following methods and check standards are provided:



Method	Low Check Std Included	High Check Std Included
BMS 8-256 Fabric Sanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BMS 8-256 Fabric Unsanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BMS 8-276 Fabric Sanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BMS 8-276 Fabric Unsanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BMS 8-276 Tape Sanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BMS 8-276 Tape Unsanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BMS 8-331 Unsanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
BMS 8-341 Surface Master 905 Unsanded	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

The methods display marginal and critical values that allow the user to visually see whether the sampling area is within or outside of specifications. Each method is sent with 2 check standards, for a total of 16 standards covering all 8 methods. These standards are provided by Boeing's Technical Services, and are used to confirm both instrument and method performance at levels both above and below the acceptable threshold limits. This makes it possible for even the novice user to determine the extent of damage.

For more information on the use of the 4100 Exoscan on the Boeing 787 refer to the following publications:

1. Arnaud, C. H. (2011). Handheld IR in the Hangar. Chemical and Engineering News, Vol 89 (34), 43-45.
2. Boeing (2011) Boeing 787 NDT Manual Part 9, 51-00-03.
3. Seelenbinder, J. (2009). Composite heat damage measurement using the handheld Agilent 4100 ExoScan FTIR. Agilent Technologies.

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