Destructive Fuel Cell Testing

International Aircraft Systems Fire Protection Working Group
Dresden, Germany
May 12 - 13, 2015

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http://www.fire.tc.faa.gov
Background

- Aviation industry is pursuing efforts to install Hydrogen Fuel Cells on aircraft for a number of potential operations, such as the main battery, ram air turbine, APU, galley power, etc.

- In addition, the byproducts of a Fuel Cell System are being looked at to supply water onboard as well as Oxygen Depleted Air for fuel tank inerting or cargo fire suppression.
Background

• FAATC is working with industry partner to conduct initial destructive testing of H2 fuel cell stacks

• Objective is to better understand failure modes and consequences

• Tests are planned for early June, 2015
Test Setup

• Tests are to be conducted in our 10 m³ Pressure Fire Modeling Facility

• 3 test units supplied by industry partner will be evaluated
  – Loss of Cooling Test
  – Short Circuit Test
  – Third unit available for repeat testing if needed
Gas sensors used in chamber will include:

- THC
- H2
- O2
- CO2
- CO
Loss of Cooling Test

- Unit will be started up with Reactant and Coolant gases flowing normally
- Relays will be closed, producing an approximate 500A load on the system
- The coolant pump will be stopped
- Recording of video and data will be continued until a failure event occurs.
Short Circuit Test

• Load resistors will be configured in parallel with bleed resistor
• Unit will be started up with Reactant and Coolant gases flowing normally
• Load resistors will be used to create currents in excess of 1000A
• Recording of video and data will be continued until a failure event occurs.
Questions

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