ANSI WORKSHOP
Standards and Codes for
Electric Drive Vehicles

ANSI
American National Standards Institute

Battery Abuse Fire Testing to SAE J2464

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Agenda

- Background/purpose of High Temperature Hazard Test
- Test requirements and parameters
- Issues and common perceptions
- Alternate method for performing test
- Example test configuration and data

Battery Abuse Test Background

- Current SAE Standard: SAE J2464, revised Nov 2009
- "Electric and Hybrid Electric Vehicle Rechargeable Energy Storage System (RESS) Safety and Abuse Testing"
- Commonly referred to as "EV Battery Abuse Testing", per initial release in March 1999.

Battery Abuse Test Background

- 4.4.1 High Temperature Hazard Test
- Previously Titled: “Radiant Heat Test”
  - SAE J2464, Issued March 1999
  - SAND99-0497: Test Report by Sandia National Laboratories, Issued July 1999
- AKA: “Fuel Fire Test”, “890C Test”

Battery Abuse Test Background

- Purpose of High Temperature Hazard Test

Simulate exposure temperatures potentially experienced in a fuel fire. Example: Hybrid Electric Vehicle crash involving gasoline fire.

Evaluate the explosion risk of a battery module or pack when exposed to such an event.

Test Parameters

- DUT Placed in “radiant heating” fixture
  - No direct contact to heat source
  - DUT not touching walls of radiant heating fixture
- Sample at 100% SOC
- Increase temperature of radiant heating fixture from ambient to +890C (+/-5%) within 90 seconds
- Maintain temperature for 10 minutes, or until another condition occurs preventing continuation (i.e.: sample reaction)

Common Perceptions

- Test can only be performed at SNL (Sandia National Laboratories)

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- While Sandia National Laboratories conducted much of the test method development over the past decade, any laboratory capable of creating the parameters noted can potentially perform this test.

Common Perceptions

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- Test can only be performed with Quartz Lamp array
- While a Quartz Lamp Array provides an excellent radiant source and controls, it is not the only way to create the temperature rise required by the standard.

Common Perceptions

- How can we sample the off gas from the sample?

Common Perceptions

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- The requirement for gas sampling has been removed in the 2009 version, as the purpose of the test was clearly defined as “evaluate the risk of explosion hazard”
  - Actual explosion and magnitude
  - Additional flammability of vented gases

Common Perceptions

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- If alternative methods of producing the temperature rise are utilized, with standardized fire test equipment, the test setup can be achieved in a relatively short time, allowing for higher test throughput and lower test costs.

Alternate Methods Allowed

- Per SAE J2464, section 4.4.1:
  - "…arrays of quartz lamps (or other heat sources)."
  - "… this test can be conducted using some other means… that would expose the DUT to non contact heat from a radiating surface at 890C +/-5%."

Proposed Alternate Method

- "Disposable" Furnace
- Modular furnace sizing
  - Allows for small module through full pack testing
  - Utilizing "standard" fire test laboratory equipment

- Note: **THIS IS NOT A PROPOSAL TO CHANGE THE STANDARD, BUT MERELY AN ALTERNATE METHOD TO MEET THE STANDARD**

Proposed Alternate Method

- Following examples are from an actual module test.
- Performed at Intertek's building products laboratory near San Antonio Texas
- Equipment is typically used for testing/evaluating building products such as fire-rated doors or insulating/fire suppression systems

“Disposable” Furnace

“Disposable” Furnace

- Propane Fuel Furnace Burners utilized (4 burners in this example)

“Disposable” Furnace

- Simple furnace housing and ceramic insulation

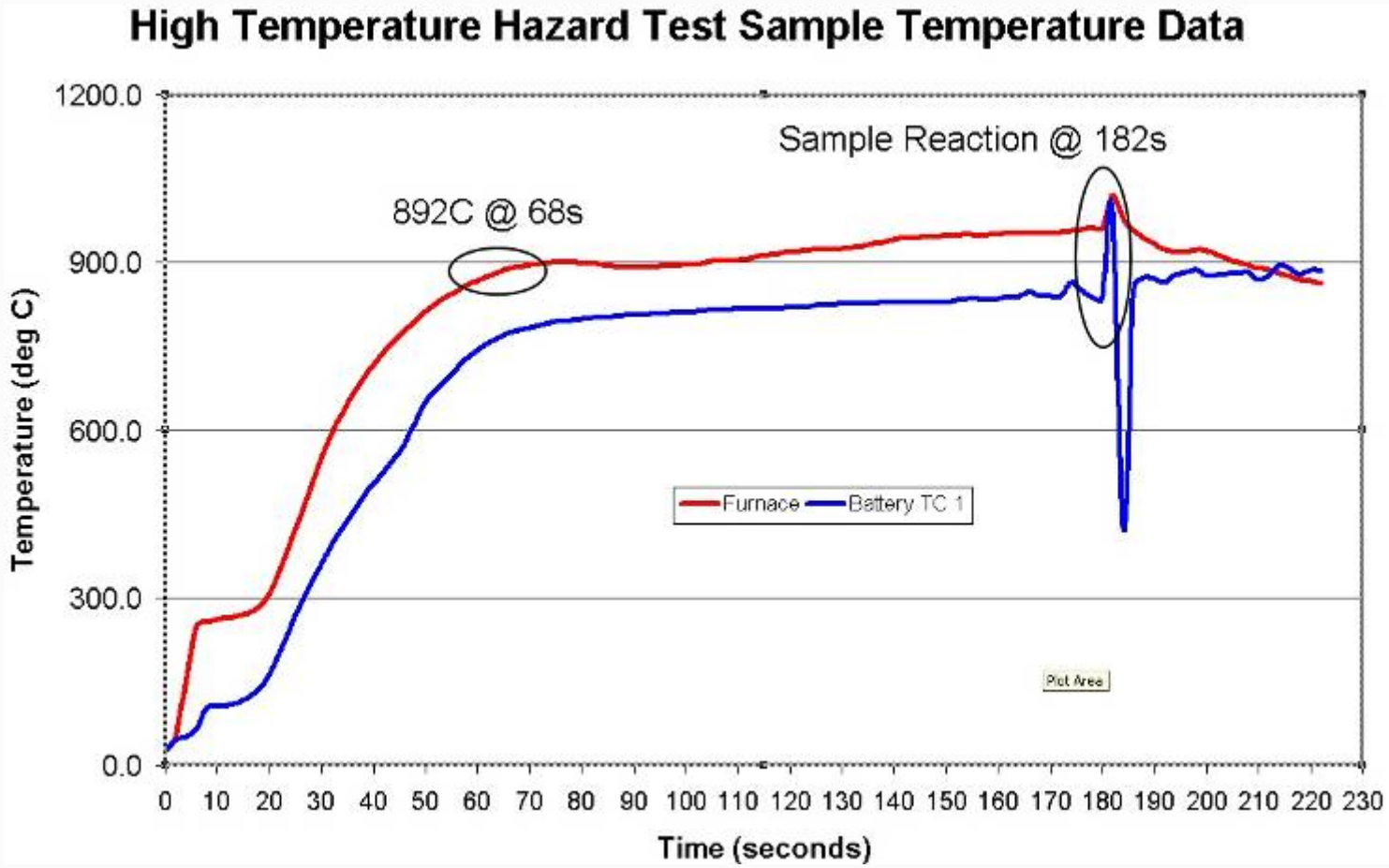
“Disposable” Furnace

- Sample and radiant heat fixture in place
- Note: Sample is a non-automotive, cylindrical cell module.

“Disposable” Furnace

- Complete test setup

Actual Test Data



Post Test

Post Test

- Furnace Burners can be re-used
- Main furnace body may be re-used
- Retest possible within 4 hours

Additional Notes

- Facility, Pressure Relief, Scrubber
- Hazardous material handling/disposal

Thank you

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