Cargo Compartment Smoke Detector Standard
AS8036 Update

Ian Campbell, Meggitt
Background

- FAA Approached SAE to update the AS8036 Standard to include nuisance tests
- AS8036 forms the basis of TSO C1
- Aim is to provide a better standard with the intent of reducing false alarms from smoke detectors
- Current standard hasn’t been updated since 1985
- Also has no requirements for Nuisance Testing
- Working group was put together in April/May 2011 to look at updating the document
## International Participation

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Progress Since Cologne 2012
- Dust Test
- Insecticide Test
- Ambient Light Test
- Fog Test - Combined Environments
Dust Testing

- Originally suggested to be 10%/ft in Cologne
  - Based on peak values from FAATC Tests
  - Unrealistic value, based on consensus – moved to average values from FAATC testing
  - Unrealistic peak value was overly conservative and difficult to show compliance
  - Working group agreed by consensus to move to average values from FAATC testing

- Updated to the following
  - At least 7%/ft Obscuration for Alarm setpoints of ≤ 5%/ft (Obs)
  - +2%/ft (Obs) above >5%/ft alarm setpoints

- ISO 12103-1 Ultrafine or equivalent

- Calls out /provides details of suggested test apparatus
Dust Testing

- Reference measurement extinction path
- Smoke Detector
- Mean path length ~ 1800
- Fan 0.2 ... 1 m/s
- Air flow direction
- Dust inlet

Top view
Aerosol/Insecticide Testing

- At least 7%/ft Obscuration for Alarm setpoints of ≤ 5%/ft (Obs)
- +2%/ft (Obs) above >5%/ft alarm setpoints
- Callington One-Shot or equivalent
- Calls out /provides details of suggested test apparatus
Dust & Aerosol Test Levels Summary

LTPF – Light Transmission Per Foot
LTPF = 100 – Obscuration (%)
Thanks to
- Airbus / University of Duisburg
- AK Brandgas

Dust / Aerosol Test Equipment was developed as part of a European initiative for standardizing smoke detector testing for Aerospace & building applications (AK Brandgas)

Equipment designs are supplied for use in As8036
Ambient Light

- Simple Test - Primary
  - Using five (5) fluorescent circular tubes
  - Ensure there are no false alarms / faults with the lights on

- EN54 Part 7 (Dazzle Test) - Alternate
  - Same as above but measuring smoke / aerosol during the test

- Reason for the two (2) options is due to the EN54 type test not necessarily being readily available in North America
EN54 Part 7
- Actual smoke/aerosol being measured with and without lights on
- Detector is normally rotated 3 times
- No false alarms or faults with the lights on
- Output change with the lights on must be within \( M_{\text{min}}:M_{\text{max}} < 1.6 \text{ dBm}^{-1} \)
Combined Environments – Modified Mil-Std 810

Procedure

- **Bring the environment to Warm/Moist.** With the test item operating, ramp the humidity to 95 percent relative humidity (RH) at an average 6%/min. Ramp the chamber from 15000 ft pressure altitude to the test site altitude pressure at a ramp rate of 1000 ft/min. Ramp the temperature to 50°C at a rate of 5°C per minute.

- **Warm/Moist Dwell.** Maintain 50°C, site pressure, and 95 percent relative humidity for 30 minutes.

- **Ramp to Cold Altitude.** With the test item operating, ramp the temperature to 0°C at a rate of 5°C per minute. Ramp the humidity to ambient conditions at an average ramp rate of 6% RH/min. Ramp the chamber from the test site pressure to 15000 ft pressure altitude. Perform the pressure ramp at 1000 ft/min.

- **Cold Soak.** Allow the test item to soak at 0°C, 15000ft and uncontrolled humidity for 1 hour.

- **Repeat the cycle two (2) times**

- **Bring to ambient conditions**
Combined Environments

Comment from Loic:

Slide 10: in the graphic, there should be a interval between humidity/temp curves and pressure curve. Pressure always increase or decrease once Temp and Humidity step are stabilized. Otherwise this is not possible to perform. – this is based on the text of the procedure – does it need to change or verbage added to allow for above?

The graph shows:
- Temp (°C)
- Humidity (%RH)
- Pressure (PSIA)
Combined Environments

- Not yet tested
- Planned series of tests to determine suitability / effectiveness
Summary

- AS8036 committee is WebExing weekly
- Achievements so far:
  - Agreement on levels for dust and insecticide
  - Agreement on light test procedure
  - Agreement on insecticide test procedure
  - Fog Test procedure developed (untested)
  - Draft document updated - 90% complete

- To Do:
  - Fog test procedure testing
  - Complete draft and submit to SAE for formal review