RTCA Update

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Background

- New advisory circular (AC21-16F) identifies RTCA Doc. No. (RTCA/DO)-160F as an acceptable means of environmental qualifications for showing compliance with airworthiness requirements.
- The AC excludes Section 26, “Fire and Flammability” as it is not as stringent as FAA accepted methods.
- The AC will be issued this summer.

Progress To Date

- First Task Group meeting was held in Naples, Florida in March 2009
- The purpose of this group is to draft a new Section 26 for inclusion into RTCA DO-160 document.
- Section 26 deals with flammability.
- Members agree the development of a test or tests for an “electronic” box will take longer than one year.
  - “Electronic” refers to avionics equipment, communication equipment, operating components, etc.
- Thus, the group initially has focused on testing specified in FAR 25.853, Appendix F:
  - Vertical Bunsen burner test
  - Horizontal Bunsen burner test
  - The 60 degree wire test
  - The 45 degree test

Progress To Date (continued)

- In order to select the appropriate test method:
  - Define the product.
  - Define what needs testing (such as covers, internal components, printed circuit boards, etc.)
  - Determine what a small part is and does it fall under the small parts exclusion.
  - Determine configurations or parts of the product that may be exempt from testing.
  - Determine which test to conduct.

Progress To Date (continued)

- As an exercise, the task group was asked to perform a flammability analysis on two electronic units manufactured by Thrane and Thrane Company.
- Thrane and Thrane provided the drawings and description of these units. These were sent to each task group member.
- The two units are …

Progress To Date (continued)

- The SBU (Swift Broadband Unit) which is used to send and receive RF signals to the HLD Diplexer:

SBU, Metal unit with cooling/vent holes

Progress To Date (continued)

- The HLD (HPA/LNA/Diplexer which is a high power, low noise amplifier

HLD, metal construction with no cooling/vent holes

Progress To Date (continued)

- An example of an analysis sheet:

Component	Satisfactory	Reason	Material assessment	Test Procedure
Ref. 100. Aero-BGAN Mainboard PCB TT 38-124429-B				
Ref H1. SBU internal Master OSC. Cable TT 37-127721-A				

  - The satisfactory column – does the part require testing –yes or no
  - The reason column - if no testing is required, why?
  - The material assessment column – describes material, no input needed
  - The test procedure column – what test method would be used
- From this input, we hope to omit certain test methods such as the 45 degree test and/or the horizontal test.

Results From exercise (Four responses) HLD

Our instructions stated the HLD would be located in the aircraft somewhere nearby the antenna and this can vary from behind the ceiling to inside the tail for use with tail mounted antennas.

- 1 response stated no testing required as it is located in a non-pressurized area
- 2 responded that no testing required as it is an all metal box with no venting (except placard may need testing)
- 1 responded to test all components using either 12 second vertical or 60 degree for cable and wire

Results From exercise

SBU

- Our instructions stated the SBU would be located inside a temperature controlled area of the aircraft, typically in the avionics bay.
- 1 response stated that it has venting and would be located in an EE bay. Because of its location they would not normally perform any 12 second vertical tests on anything All wire and cable inside the box would be subject to the 60 degree test. If the SBU had been located in a cabin area it would have been subject to more testing (12 second vertical) on non-metallic non-small parts.

Results From exercise

SBU

- 2 responses stated to test all parts (except metallic) and cable/wire to 12 second vertical or 60 degree. Also stated size of parts are not compatible with regulatory size of test samples and difficult to mount specimen to holder.
- 1 response stated to test all parts (except metallic) and cable/wire to 12 second vertical and 60 degree. They also used a criteria of “dimensions shorter than 50mm” for both non-metallic components and cables/wire to satisfy “small part exclusion”

Conclusions

- The information gathered showed that considerable variations to flammability testing of electronic enclosures is possible with current interpretation of regulatory standards
- We can use this information to offer specific guidance in RTCA DO 160, section 26 to help reduce variability by specifying:

- -- How to handle small (actual) parts
  - Better define the small parts exclusion.
  - Define what needs testing (such as covers, internal components, printed circuit boards, etc.)
  - Determine configurations that may be exempt from testing based on construction or location in aircraft
  - Determine which test to conduct.