

INTERNATIONAL AIR CRAFT MATERIALS FIRE TEST WORKING GROUP

Hosted By CTA

July 8-9, 1999

THURSDAY, JULY 8, 1999

Burnthrough Test Development/Proposed Standard Presentation and Discussion – T. Marker

The proposed burnthrough standard was presented. Detailed information on this is available on the Fire Safety Section website (www.fire.tc.faa.gov).

Darchem Test Update – D. Dodd

Explained medium scale burnthrough apparatus at Darchem. Presented results of Phase I Criticality of Overlap/Gaps. Phase II – Criticality of Fixing Methods results was presented. Phase III – Investigation of Retrofit Options was presented.

Johns Manville Burnthrough Test Rig – B. Wulliman

Becky proposed a burnthrough test round robin with other labs setting up for proposed burnthrough standard.

CEAT Insulation Burnthrough Test Results Presentation – A. Mansuet

Ann presented the results of new insulation material tests conducted recently at CEAT.

NPRM on Thermal Acoustic Insulation

When the NPRM comes out, a summary of the cost benefit analysis will be included in it. There will be a comment period on the NPRM once it is issued. The FAA plans to include advisory material on fastening systems in the rule.

FAATC Intermediate Scale Testing – T. Marker

Tim gave background on the development of this test. He presented results of the intermediate tests conducted at the FAATC.

FAATC Full Scale Testing – T. Marker

The purpose of these tests was to see if we could work backwards and get good correlation between the test methods.

FAATC Small Scale and Other Tests – R. Hill

Some people questioned why a new test was developed when the cotton swab test already exists. We developed the new test, because we considered the scenario of a small fire from another source.

Electrical Testing – P. Cahill

Pat showed a brief video of electrical test results and discussed those results. R. Hill: There are a large variety of materials used in aircraft insulation materials: the scrim, glues, when the material was made and how it was made, and different qualities of materials may affect how the insulation materials perform in the tests. There are so many different conditions. They all cannot be looked at. In summary, metalized

mylar (of certain types) can easily be ignited. It is a common source of ignition in aircraft. If you take the metalized mylar out, you will have removed 90 percent of the ignition source in aircraft.

Presentation of Radiant Panel Standard – P. Cahill

This test was originally used to measure heat critical heat flux for flooring materials. This test chamber is used in ASTM Designation E:648. Pat showed detailed photos of the test chamber and its set up. This test is somewhat easy to run. R. Hill: We believe this is a good test because, we cannot run the thousands of materials that are out there in full scale tests because of time and costs in running full scale tests. We have looked at how the flames spread. We chose this test because unlike the OSU, it does not give erroneous results because it allows materials to pull away, etc. A large number of samples can be run in this test apparatus. The apparatus can be converted so that it can be used for the FAA radiant heat panel test and the ASTM flooring test. Instructions for the conversion will be included in the test method. S. Hasselbrack: Why do we need the scrim on the films? Manufacturers' response: It is there to prevent tears and rips when installing these materials.

Burnthrough Task Group Meeting – T. Marker

Tim asked the participants the status of their respective test equipment for the proposed burnthrough test standard, and several indicated they are functional. Some of these labs detailed the difficulties they've had with calibrating the burner, and asked what the FAA's experience had been. Tim discussed some of the most common problems encountered with this type of equipment, and offered some solutions. In light of the difficulties that exist with the calibration of the equipment, the Task Group agreed to postpone any round robin materials testing until most/all of the labs are able to resolve the calibration difficulties.

ACTION: In order to help resolve calibration difficulties, Tim will circulate a brief document prior to the next meeting detailing all of the "tricks" that should help the labs get their equipment calibrated properly. Following circulation of the document, the participating labs will calibrate their burners to see what variations they get in their equipment due to fluctuations in intake air temperature, fuel temperature, intake air velocity, and other atmospheric conditions. The results of each lab's calibration data will be made available to the Task Group, and specific tolerances will be defined in an effort to maintain consistency between the labs. Tim will formulate and distribute an Excel spreadsheet reporting system for the calibration parameters so that all data can be easily compared.

Purpose of this Task Group: To identify problems encountered during calibration of test equipment and implement necessary tolerances to ensure similarity between labs. The similarity will then be compared by conducting round robin tests using identical test samples.

FRIDAY, JULY 9, 1999

Radiant Panel Test Task Group Discussion

At least two labs are going to purchase the radiant panel test equipment before November 30, 1999.

R. Hill: Do you agree with our idea of developing an electric panel heat source instead of a gas panel heat source? Consensus: Yes!

This unit is easy to build. If we develop an electric panel, the conversion will be easy.

Pat will keep those who are interested in being involved informed regularly on the development and work going on at the FAATC with the radiant panel test. Please let Pat or April know if you would like to be on this list.

Follow Up on Burnthrough Discussion

R. Cherry: Are there companies willing to supply fasteners for the Darchem fastening system tests. Are there any non-metallic fasteners that have been developed? H. Betz: I don't believe there are any other types of fasteners out there that have been developed. This is something that needs to be developed or located. R. Hill: Maybe we should look into some of the higher temperature thermo- or dura-plastics. H.

Betz: What about the hidden materials behind the wall? Will the radiant panel test be used for these materials? R. Hill: There is a Hidden Fire Threats Task Group established to identify these materials.

Seat Sample Preparation

Samples should be prepared as they would be used in an aircraft. When testing these samples the weakest point needs to be considered. Pat will chair a Task Group to incorporate the material in the current A/C and address the questions on the newer seat materials and sample preparations. The first task of this group is to get all the questions regarding seat testing and sample preparation that are not addressed in the A/C or the Fire Test Handbook by the November Working Group meeting. A. DeRegt: Lantal will coordinate the European response. Pat will contact the U.S. manufacturer.

Fire Blocking/Washable Wool Test Results – S. Hasselbrack

Continued Airworthiness of Seat Cushions – J. Davis

There has been resistance to testing to look at continued airworthiness. After seeing the data Sally presented indicating her concerns with the washable wool cleaning methods, we may get some enthusiasm to conduct some tests.

Production Quality Assurance – C. Lewis

Claude's summary is included in these minutes.

One of the problems we have had in this Task Group is lack of participation of those involved with production quality assurance and also the numerous and various processes do not lend themselves to one all-encompassing production quality assurance document. Claude is seeking feedback from the group to find out where this Task Group should go with this information and any other information that should be included in this summary. Possibly, this material could be included in the Handbook.

Aircraft Material Fire Test Handbook – J. Gardlin

The intention is to incorporate the handbook by reference in an A/C.

Working Group Member Presentations

New Fireblocker Development for Thermal/Acoustic Insulation – H. Forsten (DuPont)

Showed a video of the performance and discussed this new material.

Next Meeting:

The next meeting will be held at Trump Marina Casino Hotel in Atlantic City, New Jersey, November 30-December 1, 1999.

PRODUCTION QUALITY ASSURANCE

Issue / Problem Definition

- Identification, by both Authorities and industry, of instances where cabin interior components, ostensibly produced to the same material/process specifications, are yielding OSU/NBS test results that are significantly higher than those obtained during certification and, in some cases, beyond compliance limits.

Background

- The FAA Technical Center was requested by the FAA Northwest Mountain Region to investigate the issue under the auspices of the International Aircraft Materials Fire Test Working Group (IAMFTWG) and, if possible / as appropriate, develop criteria which would assure that production items will be in conformity with the flammability performance of qualified interior component configurations.
- A Task Group (TG2) was formed in 1995 to address the issue (in addition to three other Task Groups to address other materials flammability issues: Continuing Airworthiness, Minor Changes to Qualified Materials, and Material Systems Renovation and Repair).
- Largely due to available participants, TG2 concentrated on the issue of OSU/NBS apparatus quality control, and successfully implemented an industry-supported annual international 'Round Robin' program to identify/correct test result variability associated with test equipment.

Discussion

Further to re-statement of the need to address the other aspects of production QA at the February 1997 IAMFTWG meeting (Orlando), and the identification of additional instances of OSU/NBS test result variances / out of compliance, and the availability of new participants, the task group was re-formed (TG2B) at the March 1998 IAMFTWG meeting (Oakland) to address those issues specifically associated with manufacturing/production.

IAMFTWG Meeting, Oakland, March 1998

First meeting of re-formed TG (TG2B)

- Brief overview:
 - Issue: identification (by Authorities & industry) of significant variability in production components OSU/NBS test results
 - 3 basic questions: Why is it occurring? What is the extent of the problem? What can/should be done to address?
 - Basic background information: AC 21-31, AC 21-26, AC 20-107A, MIL-STD-105E
- General view that problems may be more prevalent than generally thought, and though most 'systems' reliably predict level of compliance, the effect of some factors on flammability performance, specifically OSU/NBS, is often not understood and not always 'captured' in production QA systems.

- General agreement that the TG could attempt to develop basic guidelines on key manufacturing/production factors that can affect materials flammability and need to be considered in the development of production QA systems.
- Agreement that the first step is to acquire basic reference material (including ACs, MIL-STDS, etc...), together with information relative to systems presently in use in various sectors of Industry. **Action by: all ✓**
- Overview of QA process provided by major airframe manufacturer - essentially relies on a statistical confidence approach and materials/process controls to establish OSU/NBS testing frequency/reliability in production. Indication by other manufacturers of intent to supply information relative to their systems. **Action by: all mfrs.**
- Suggestion that a useful step would be to map out / characterize the production process (from design to delivery stage) to allow identification of potential critical points. **Action by: undetermined**

IAMFTWG Meeting, Linz, June 1998

Brief TG meeting - 3 participants - limited progress.

- Review of TG work plan/objective: attempt to identify/document production test result variability, and make recommendations on how to address. Discussion of manufacturing variability factors.
- Reference material acquisition on-going. Info still being sought from industry on their QA processes/systems.

IAMFTWG Meeting, Atlantic City, November 1998

No TG meeting - prime focus on International Fire and Cabin Safety Research Conference and thermal-acoustic insulation issue.

IAMFTWG Meeting, Everett, March 1999

Re-iteration of request for participation - nil response.

Status

- Production QA is an important issue inasmuch as it is the means to establish conformity with type design, and is the starting point for material systems renovation & repair and continuing airworthiness in service.
- View that problem may largely be limited to specific cases, and that existing mechanisms, when properly applied, largely offer the means to control.
- Basic applicable document:
 - FAA AC 21-31, Quality Control for the Manufacture of Non-Metallic Compartment Interior Components

Related reference documents:

- MIL-STD-105E, Sampling Procedures and Tables for Inspection by Attributes
- FAA AC 21-26, Quality Control for the Manufacture of Composite Structures
- FAA AC 20-107A, Composite Aircraft Structures
- Complexity and uniqueness of the various production processes make development of an all-encompassing QA/QC criteria largely impractical. However, basic information highlighting the sensitivity of flammability performance to various elements of the manufacturing process can be developed.

- Production QA is largely a ‘manufacturing’ (-vs- ‘certification’) issue - TG progress limited by absence of members from that area of expertise within the IAMFTWG.

- *Proposal*
 - Complete identified tasks: acquisition of QA system information from manufacturers, and mapping/characterization of production processes
 - Develop material for incorporation in the Materials Fire Test Handbook
 - Set-up core group - aim at closing by Spring/Summer 2000 meeting - achieve progress by correspondence
(Maybe combine activity with that of OSU Round Robin TG)