JM 120679
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To: U.S. Department of Transportation Dockets
Docket No. FAA-2000-7909
400 Seventh Street SW
Room Plaza 401
Washington, D.C. 20590

Date: January 15, 2001

Subject: Comments to Docket No. FAA-2000-7909 – 17

We have carefully reviewed Department of Transportation Federal Aviation Administration 14 CFR Parts 25, 91, 121, 125, and 135 [Docket No. FAA-2000-7909; Notice No. 00-09] RIN 2120-AG91, "Improved Flammability Standards for Thermal/Acoustic Insulation Materials Used in Transport Category Airplanes" (issued September 20, 2000) and have several comments. These comments deal primarily with the burnthrough portion of the NPRM. They are summarized below, and explained in more detail in the discussion section of this letter.

Summary:

1. The test method and calibration of the burnthrough test apparatus does not currently take into account environmental differences that exist between laboratories performing the test. Based on results from our participation in the Round Robin test program for this method, we believe it will be necessary at a minimum to account for altitude, and perhaps for humidity differences by some appropriate modification of the test method. **Our strong opinion is that the precision of the test method has not been established.**
2. The test method presented includes only a material test, with "advisory material" on fastening systems to be added at a later date. Current insulation bag and attachment combinations have been designed specifically to provide acoustical (primarily) and thermal protection to passengers. **To separate blanket design from attachment method design does not encompass a real world solution with respect to either of these properties and does not meet the overall objective of enhancing passenger safety.**
3. The basis of the cost/benefit analysis for the rule was replacement of one layer of fiber glass with one layer of Curlon®. Although this may provide added burnthrough resistance to the system, the Curlon® product does not provide equivalent acoustical performance when compared to fiber glass. Curlon® is a trade name that refers to a family of products. **Not all of these products provide burnthrough benefit as cited in the NPRM.**

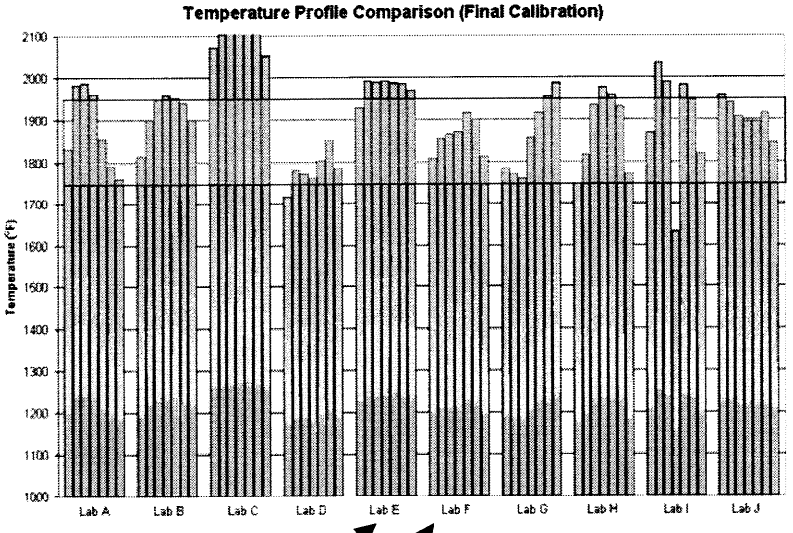
Please see the attached pages for further detail and data regarding these comments.

Discussion

Comment 1:

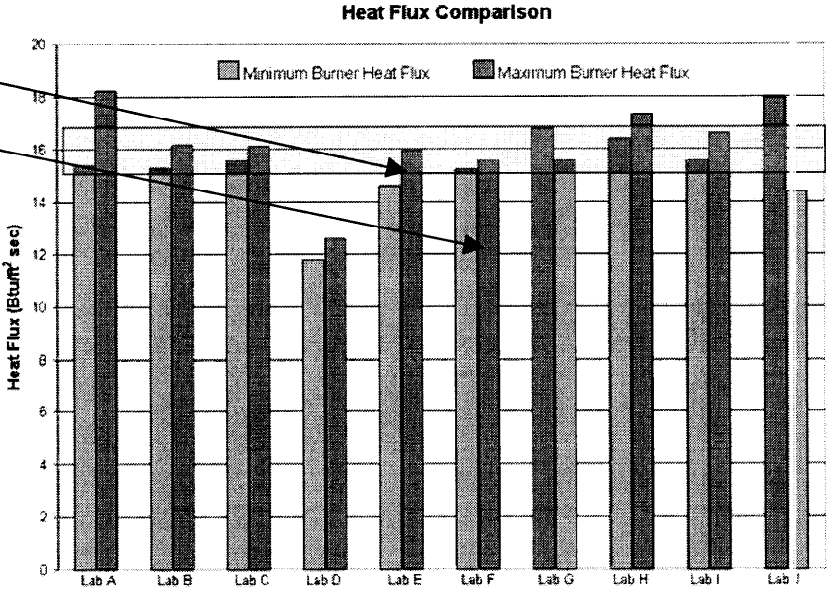
Johns Manville has been an active participant in the development and round robin testing program for the burnthrough test method being proposed by this NPRM. We were one of the first laboratories to build a test apparatus to FAA recommended design and have a great deal of experience in performing the burnthrough test. We also have long-standing expertise in a wide range of flammability tests for the aerospace and building materials industries.

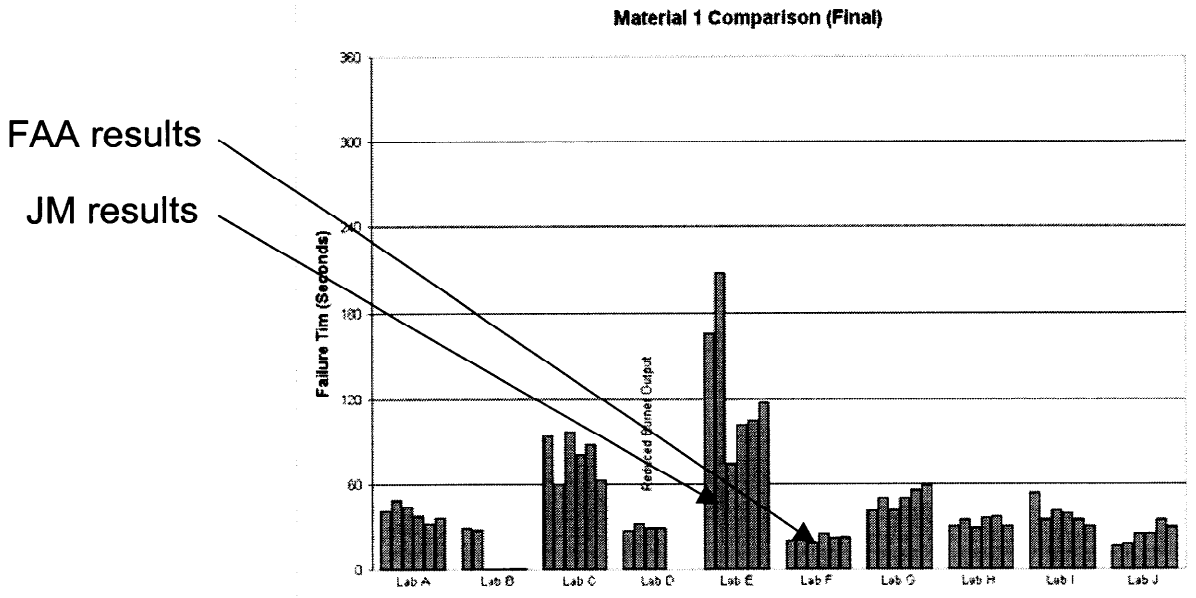
It became apparent during the first Round Robin conducted in early 2000 that despite following the calibration procedure recommended, and despite obtaining temperature profiles and burner heat flux values comparable to those at the FAA Technical Center, our burnthrough test results were vastly different. The graphs below and on the next page show the calibration and test values as they were posted on the FAA website; Johns Manville is Lab E and the FAA is Lab F.



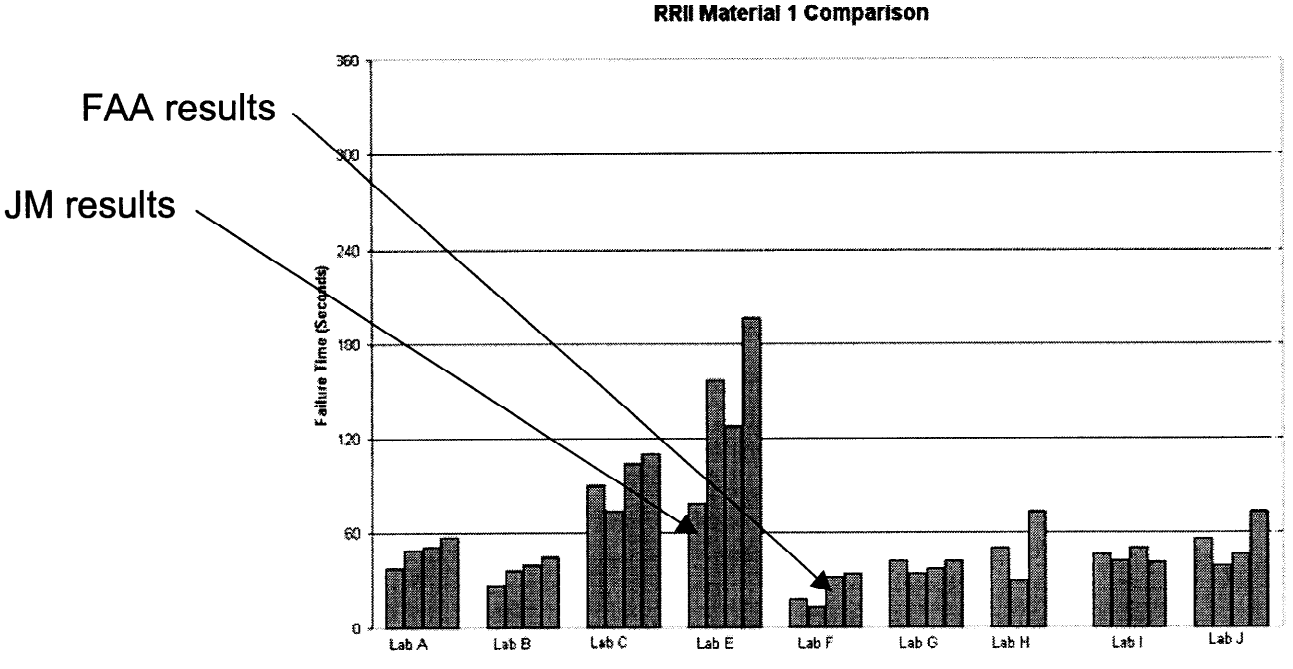
JM results

FAA results





Obviously though the equipment, set-up and calibration was similar, there is a large variation in the test results. Despite efforts to correct this variation with the help and advice of FAA Tech Center personnel, burnthrough results from the Johns Manville Technical Center continued in this manner during Round Robin II:



Further changes to the test calibration and apparatus set-up were made following analysis of the results of Round Robin II. Round Robin III results have not yet been reported. However, JM test results on fiber

glass without burnthrough enhancement look to be closer to expected results, but are still not in the 20 to 30 second range predicted by the FAA.

Based on the data generated, there appears to be some other parameter that affects the burnthrough test result that has not been identified. The obvious difference between our fire laboratory and the others involved in this program is the altitude of the respective fire laboratories. The fuel and air flow levels prescribed for use in this test method are, by FAA design, out of stoichiometric balance. The 6 gallons per hour fuel flow with 2150 fpm air flow is operating at 39% air deficiency for perfect combustion at standard sea level conditioned air. Due to the lower oxygen content in the air at 5,280 feet above sea level, this deficiency of combustion air becomes 49%, which results in a reduction of available heat from Jet A fuel of over 15%.

One would anticipate seeing this difference translate into lower temperatures and heat flux values during calibration. This was not the case during earlier testing as shown in the graphs above, where calibration yielded comparable heat flux and temperature output higher than specified. Conversely, during the current round of testing, even when operating on the upper end of the airflow tolerance (2200fpm), calibration burner heat flux was approximately 12BTU/ft^{2}sec, not the 16 targeted by the FAA. Thermocouple rake averages were about 1830°F, within the specified range of 1900±100°F. In addition to this anomaly, this lower heat flux and temperature combination yielded more severe results on the burnthrough samples than the earlier testing.

We believe that some added evaluation of combustion conditions and the potential effect of altitude on test results needs to be done to assure test method reliability for the burnthrough test method. Failure to define these effects could result in skewed qualification of burnthrough materials based on the location of the testing laboratory.

Comment 2:

The burnthrough test method is designed to be a "materials-only" test as it is written, with "advisory material" on fastening systems to be added at a later date. Our concern is that this will not necessarily result in a practical improvement in fire safety without impact on other insulation blanket properties.

The current insulation bag design and attachment combinations were developed by airframe manufacturers to provide the maximum acoustical protection to the passenger at the lowest possible weight. If one layer of the existing fiber glass batting were replaced with Curlon®, blanket designs currently in use would **not** provide acceptable fire-hardening in compliance with the proposed improved flammability standards. A new blanket configuration and fastening method would have to be designed before any passenger safety enhancement is realized. Even though the advisory materials to be issued by the FAA may address the fire hardening portion of the blanket installation and design, these recommendations may prove detrimental to the other properties of the blanket, especially the acoustical transmission loss characteristics. In other words, the design impact could go beyond burnthrough protection if it is advised that the current configurations and attachment methods be changed. There are available burnthrough solutions that do not require blanket configuration and attachment changes, but the one cited in the NPRM, i.e. Curlon®, would require significant attachment changes. Without addressing these issues as an integral part of the burnthrough test method, the regulation will not result in practical real-world fire protection without impact on other blanket properties.

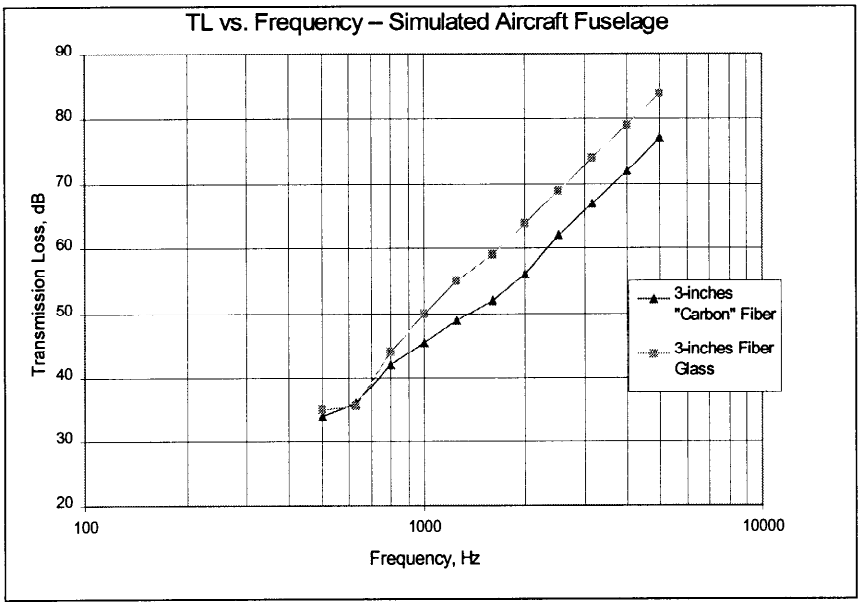
Comment 3:

Curlon® insulation, cited in the NPRM, is actually a family of products which utilizes a partially oxidized fiber in a variety of configurations. Curlon products have been produced for many years in felted as well as lofted form. The material evaluated in full scale burnthrough testing at the FAA, however, is not

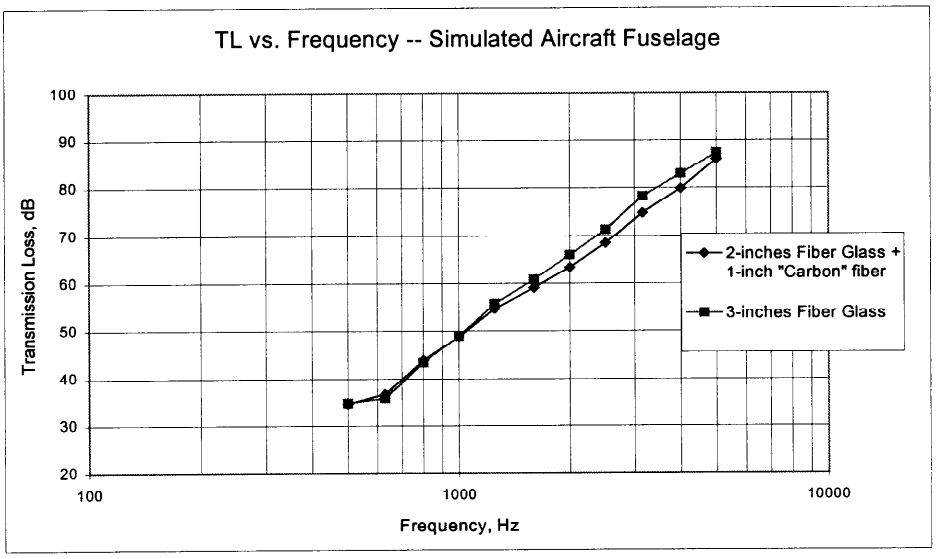
necessarily the same formulation being produced today. In fact, based on the burnthrough results from the FAA test rig, one layer of the Curlon batting currently provided for evaluation will not meet the NPRM's 240 second burnthrough rule. Since some of the basic assumptions for the cost benefit analysis for this rule are based on using 1-inch of this product in replacement of fiber glass, it is necessary to determine whether the current Curlon product does indeed meet the improved flammability standard for burnthrough as well as propagation resistance.

In addition, the NPRM states that "Because Curlon® and fiberglass are comparable in weight, there would be no weight penalty associated with Curlon's® use." (see page 56998). This statement does not take into account the acoustical requirements of the insulation blanket, which is the primary reason for its presence in airplanes.

Acoustical test data is graphed below, showing the transmission loss performance of three 1-inch layers of 0.42pcf AA fiber glass in a simulated aircraft fuselage, vs. the performance of three 1-inch layers of "carbon" fiber similar to the lofted Curlon product at 0.35pcf . **Note that higher transmission loss values result in lower interior cabin noise.** Transmission loss differences of 1dB are considered significant in the design of an airplane's acoustical package.



The graph below shows transmission loss data when just one layer of Premium AA fiber glass is replaced with a layer of the larger diameter "carbon" fibers. Again, 1 dB is significant; at some frequencies critical to speech interference, 2000Hz for example, the difference is more than 2.5dB.



Although the Curlon material tested acoustically is not the exact same material being produced currently, the fiber diameters and airflow resistance of the current product are comparable. Acoustically they would be expected to perform in a similar manner. In order for the system utilizing this product to provide an equivalent level of acoustical protection to current blanket designs, further insulation and weight would have to be added.

Thank you for the opportunity to comment on this Proposed Rulemaking. We look forward to your reply.

Respectfully submitted,

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