

consideration to ducting when the proposal was developed, since insulation on air ducts is frequently different than that attached to the fuselage.

The FAA agrees that insulation on air ducts has not been addressed to the same extent as other insulation. However, the concerns with fire propagation are the same, and insulation on air ducts should meet the same standard, as noted in the NPRM. We are developing advisory material that will include discussion of insulation on air ducts, and the proper method of configuring test samples. This might require modification to some of the installation practices that are currently employed. For example, complete surface bonding of film to the batting material requires a large amount of adhesive, and adhesives have been shown to be problematic for flame propagation. However, other methods are available that will comply.

The commenter also noted that acoustic treatments are sometimes applied to the interior of ducts, and that this treatment should not be required to comply since it is not exposed.

The FAA agrees that this requirement would not apply to acoustic treatment completely enclosed by ducts. However, we are studying all materials in inaccessible areas, and intend to develop standards for such materials that are consistent with the threat level established to develop the flame propagation test. In that case, it is likely that the duct construction itself would be included.

Under the current requirements, parts too large to be considered "small parts" require testing, and the basic requirements for the test sample construction will be no different under this final rule. The major difference is the size of the test sample. Parts that are smaller than the test sample size could be addressed on a case-by-case basis. We have reduced the sample size from that in proposed paragraph VI(c)(2), based on data acquired since publication. See final paragraph VI(C)(3). We encourage use of materials and constructions that meet the radiant panel test for all such parts, no matter how small.

Part VII of Appendix F to Part 25— Flame Penetration Test

Final part VII of Appendix to Part 25 consists of a method for evaluating the burnthrough resistance characteristics of aircraft thermal/acoustic insulation materials when exposed to a high-intensity open flame. The test method we are adopting today includes specific instructions for constructing the test

apparatus, calibrating instruments, and conducting the test. It also includes the standards the insulation must meet. The test involves use of a kerosene burner apparatus that realistically simulates the thermal characteristics of a post-crash fire. The test stand and specimen are configured to simulate a small section of fuselage frame and stringers with insulation material mounted over them. Fuselage skin is not represented in this test since the delay in burnthrough afforded by the skin is not directly related to the performance of the insulation. The test is intended to measure the performance of the insulation installation itself. The test involves exposing samples of thermal/acoustic insulation blankets mounted in a test frame to a burner for four minutes. The insulation blankets must prevent flame penetration for at least four minutes and must limit the amount of heat that passes through the blanket during the test.

For new designs, the new burnthrough test method is applicable to the insulation as installed on the airplane. Thus, consistent with similar flammability testing of other installed materials, the means intended to be used for fastening the insulation to the fuselage must be accounted for when performing tests. For consistency, the test method imposes a standard methodology for fastening. In addition, we are developing advisory material concerning the installation of insulation that would enable the installer to avoid a specific test on the fasteners, etc. Although failures of fasteners or seams during this test may not exacerbate flame propagation characteristics, such failures could adversely affect the burnthrough protection capability. Since research has shown practical fastening means are available for ensuring that the insulation material remains in place, we have determined that fastening means must be considered for newly manufactured airplanes.

The test method we are adopting today is substantially the same as the one included in the NPRM. We discuss changes to the test method below in the responses to comments. We have also made minor editorial changes to the language of the test method for clarity. These editorial changes are not substantive.

Some commenters asserted the test method has not been demonstrated to be repeatable.

The FAA has sponsored three round-robin test series to date and has made refinements to the test method and apparatus as a result. One significant problem with the test equipment that has been rectified is the use of various

shapes and sizes of airflow vanes (stators) inside the burner draft tube. For reasons unknown, this inconsistency in fabrication developed and significantly contributed to the scatter of data obtained during inter-laboratory comparisons. Since all laboratories now have the identical stators installed, the inter-laboratory test correlation should be much better. All test results are currently displayed on the IAMFTWG Web site at <http://www.fire.tc.faa.gov>. The repeatability of results has improved with each successive round robin, and we are satisfied that the test is sufficiently repeatable for use in the final rule.

One commenter specifically addressed the effects of altitude as not being accounted for in the test method, and proposes that this variable among test facilities must be addressed.

Regarding the potential effects due to altitude of the test facility, the FAA agrees that this is possible. In fact, the test results seen in the round robin tests discussed above strongly suggest that the effects of altitude are responsible for much of the variation. It should be noted that the fuel and airflow prescribed in this test method are meant to reflect an actual pool fire condition in which the fuel/air ratio is typically not stoichiometric. The conditions are representative of a large pool fire with respect to the two main criteria of temperature and heat flux. Therefore, the differences in combustion using the specified airflow and fuel flow values at different altitudes would also not be expected to result in a stoichiometric process. We agree that an altitude correction factor could be implemented in order to obtain more repeatable test results from labs located at various altitudes. An applicant would be free to propose an alternative method, with supporting data. If requested, we will work with an applicant to establish the proper correction.

Several commenters addressed specific details of the test method and test apparatus. One commenter stated that the calibration parameters are too narrowly specified to permit reliable calibration. The commenter proposed tolerances on the fuel flow and air intake. One commenter advised that the combined heat flux/thermocouple calibration rig is not practical and separate rigs should be used. Another commenter requested clarification of the term "assembly processes" for sample fabrication.

The FAA has considered detailed comments on the test apparatus itself, and these have been adopted for the most part. The new apparatus details are specified in final part VII of Appendix