

installation schemes for which the flame propagation test is not well suited. However, up to now, all currently used and prospective materials that we have tested have been accommodated by the flame propagation test, with no obvious incompatibilities. If an applicant identifies an instance where this is not the case, the applicant is free to propose an alternative method of compliance that shows equivalent level of safety. However, based on the experience gathered to date, this would not seem necessary.

Several commenters addressed specific details of the test apparatus, or the test method itself, that are intended to simplify and improve the reliability of the tests. These range from correcting conversion of measurement units to test sample size to the type of radiant panel used.

The FAA has reviewed the commenters suggested improvements and adopted several of the suggested changes as appropriate; those that are not adopted verbatim are addressed in principle. Since publication of the NPRM, the FAA Technical Center has been working to improve the test methods for determining the flammability and flame propagation characteristics of thermal/acoustic insulation materials. We have revised the test methods in Appendix VI to include these improvements. A copy of the Technical Center's report, which includes a summary of the improvements, is included in the public docket for this rulemaking.

We received several comments on proposed paragraph VI(h)(1), which would have allowed no flaming beyond two inches to the left of the centerline of the point of pilot flame application to the specimen tested. One commenter noted that the designation "to the left" was not clear, and should specify a frame of reference. Other commenters noted that the two-inch limit was not specified as an average, or a not-to-exceed value for a sample. One commenter proposed that it must be an average to be viable. This commenter noted that virtually any material will eventually exhibit a burn length greater than two inches if enough samples are tested.

The FAA does not agree that the flame propagation length should be adjusted. The intent of the proposal (and this final rule) is to require materials that will not propagate a fire. The requirement that the flame not propagate more than two inches along the sample is intended to account for the damage that occurs as a result of the pilot burner, but not to allow any additional flame propagation. We have conducted hundreds of tests

since issuance of the NPRM, and determination of propagation distance has not been a problem. The requirement of this rule is not the same as the traditional Bunsen burner requirements for "burn length." For a burn-length determination, no distinction is made between burning caused by the burner itself and self-sustained combustion of the material. The Bunsen burner is oriented in the same (vertical) direction as the burn length determination, and making a distinction would be difficult at best.

For this rule, the issue is propagation of a flame beyond the damage caused by the pilot burner. The pilot burner is oriented at a right angle to the direction of measured flame propagation, making the distinction much clearer. A two-inch limit will adequately account for the damage caused by the burner, and materials that exceed this limit exhibit some tendency to propagate flame. Determination of the extent of propagation requires that a person actually watch the test, however. An after-the-fact determination is not reliable, and would probably result in failure determinations of materials that were, in fact, acceptable. Based on all of the data gathered to date, we are satisfied that the criteria are readily achievable, and that samples that exceed two inches indicate the need for corrective action. Therefore, we are adopting the burn-length standard as proposed.

We received several comments on proposed paragraph VI(h)(2), which would have allowed one of three specimens tested to have an after flame, which could not have exceeded three seconds in duration. One commenter believed that no sample should be permitted to flame after removal of the pilot burner. Several other commenters stated that the presence of such an "after flame" is highly dependent on the ability of the person conducting the test to remove the pilot flame at precisely 15 seconds, and that slight variation can influence whether there is a short after flame. Several commenters recommended an average after flame for three samples. Some suggested a maximum total after flame time for all samples, with a maximum for any one sample. One commenter stated that an average must be allowed, since a single sample can effectively prohibit a material from use, regardless of how many other samples are tested with satisfactory results.

The FAA agrees that we should adjust the pass/fail standard. We also believe we can adjust the standard without affecting the intent of the requirement, which is to prevent insulation materials

from spreading a fire. Based on the comments and a review of the test data acquired to date, we agree that materials that meet the intent of the requirement can sometimes fail the test, as proposed. (The proposed test standard would have required two of the three test samples to have no after flame whatsoever). As noted by commenters, this could be due to operator variations in detailed test procedures, material variability, or a combination of the two. While we have made every effort to remove operator variables from the test method, the stringency of the requirement tends to magnify whatever slight variations exist. Similarly, slight material variations are inevitable, even with the best materials. In light of the above, we have determined that we should adjust the pass/fail standard for after-flame time to account for slight variations. Therefore, we have revised final paragraph VI(h)(2) of appendix F to Part 25 to permit after flame on any sample, but require that none of the three samples have an after flame time of greater than three seconds. This change allows small variability in all of the samples, but retains the intent of the requirement that the material not continue to burn after the pilot flame is removed.

Several commenters addressed the fact that insulation materials frequently consist of more than a film-covered batting material. These commenters point out that tapes and hook-and-loop fastening systems are often used on insulation to perform various functions. Some commenters state that these additional features must be included in the requirement, while others only question how they would be tested if they were to be included.

Final part VI of Appendix F to Part 25 applies to the thermal/acoustic insulation assembly, which includes tapes or hook-and-loop fasteners that are affixed to the film. In addition, research testing has shown that these details can have a pronounced effect on the flame propagation characteristics of the insulation. We are developing advisory material that will explain an acceptable test sample configuration to address those details. We recognize that the use of tapes, for example, is quite variable, and it may not be possible to address each production configuration with a single test sample configuration. We hope to be able to establish a critical case that may be used to qualify other configurations, and plan to outline this approach in the advisory material.

One commenter noted that, for air ducts in particular, the test criteria do not provide sufficient detail as to how they should be tested. The commenter contends that we did not give adequate