

fires occurred that involved thermal or acoustic insulation. The flammability tests and criteria adopted today represent the outcome of research conducted by our technical center in cooperation with acknowledged experts in the field. We believe these tests and criteria are the minimum necessary for future designs to provide an adequate level of civil aviation safety.

This final rule enhances safety while at the same time considering the impact on the aviation industry. For example, we are adopting regulations that become effective for existing type designs after a phase-in period. This phase-in period gives manufacturers time to plan for changes in designs, manufacturing processes, and sources of supply. The flammability test criteria we are adopting are reasonable, as shown by research and development and the availability of materials that meet the new standards. The flammability test requirements we are adopting are flexible. Both the flame propagation test and the burnthrough test requirements allow for the development and use of approved equivalent tests.

We acknowledge that this final rule has cost implications for airplane manufacturers. There are costs associated with testing, obtaining, and installing upgraded insulation. Our analysis of the costs and benefits of this final rule shows that the benefits (in the form of reduced property damage, injury, and loss of life) outweigh the costs. For more information on costs and benefits, see the "Economic Evaluation" section of this preamble and the Regulatory Evaluation for this final rule, which we have placed in the docket for this rulemaking. Based on our analysis of the issues involved, taking into account our responsibility for civil aviation safety, and the administrative record for this rulemaking, including the comments we received on the NPRM, this final rule is a proper and reasonable means of carrying out our responsibility to enhance civil aviation safety.

#### Discussion of the Final Rule

This part of the preamble describes in general terms some of the major features of the final rule. A reader who is interested in a quick overview of the final rule may find this part useful. If you are looking for a detailed description of the final rule, you should look at the section-by-section analysis, which appears later in this preamble, or the regulatory text itself, which appears at the end of this document.

This final rule requires thermal/acoustic insulation material installed in the fuselage of transport category

airplanes to pass a flame propagation test. The test involves exposing samples of thermal/acoustic insulation to a radiant heat source and a propane burner flame for 15 seconds. The tested insulation must not propagate flame more than 2 inches away from the burner. The flame time after removal of the burner must not exceed 3 seconds on any specimen. See final part VI of Appendix F to Part 25 for more details.

For airplanes with a passenger capacity of 20 or greater, this final rule also requires insulation materials installed in the lower half of the airplane to pass a test of resistance to flame penetration. 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. See final part VII of Appendix F to Part 25 for more details.

This final rule requires all transport category airplanes manufactured more than two years after the effective date of this final rule to comply with the new flame propagation test. This applies to airplanes operating under parts 91, 121, 125, and 135. This means that manufacturers have two years after the effective date of the final rule to begin installing more flame resistant insulation materials in new airplanes. This final rule requires all transport category airplanes with a passenger capacity of 20 or greater manufactured more than four years after the effective date of this final rule to comply with the new test of resistance to flame penetration. This applies to airplanes operating under part 121.

Airplanes must also comply with the new flame propagation test when thermal/acoustic insulation materials installed in the fuselage are replaced more than two years after the effective date of this final rule. This requirement applies only to the materials that are replaced.

Both service history and laboratory testing demonstrate that the current flammability requirements applicable to thermal/acoustic insulation materials may not be providing the intended protection against the spread of fires. Additionally, we consider that increased protection against external fire penetrating the fuselage can be provided by proper selection of the same material. We consider that the new test methods described earlier will not only provide for increased in-flight fire safety, by reducing the flammability of thermal/acoustic insulation blankets, but will also provide increased time for

evacuation during externally fed, post-crash fires by increasing fuselage burnthrough resistance.

#### Section-by-Section Analysis

##### *Proposed §§ 25.853(a) and 25.855(d)*

Existing § 25.853(a) requires that materials in airplane compartment interiors meet the flammability test prescribed in part I of Appendix F to Part 25. Existing § 25.855(d) requires materials used in construction of cargo or baggage compartments meet the same test. In the NPRM, we proposed to add specific exceptions to these provisions for "thermal/acoustic insulation materials." The intent of this proposal was to make it clear that thermal acoustic insulation was not required to meet the requirements of Appendix F, part I, in addition to the requirements of Appendix F, parts VI and VII. However, as discussed below, this action might have confused the issue of whether or not "small parts" required testing. We have therefore decided not to adopt these proposed changes. As proposed in the NPRM, we are deleting language from part I of Appendix F to Part 25 that addresses thermal/acoustic insulation materials. This action has the same effect as the two proposed additions would have had.

##### *Section 25.856 Thermal/Acoustic Insulation Materials*

Final § 25.856(a) requires thermal/acoustic insulation material installed in the fuselage to meet the flame propagation test requirements of part VI of Appendix F to Part 25, or other approved equivalent test requirements. This requirement does not apply to "small parts," as defined in part I of Appendix F to Part 25.

The current flammability requirements focus almost exclusively on materials located in occupied compartments (§ 25.853) and cargo compartments (§ 25.855). The potential for an in-flight fire is not limited to those specific compartments. Thermal/acoustic insulation is installed throughout the fuselage in other areas, such as electrical/electronic compartments or surrounding air ducts, where the potential exists for materials to spread fire as well. The final rule accounts for insulation installed in areas that might not otherwise be considered within a specific compartment. Final § 25.856(a) is applicable to all transport category airplanes, regardless of size or passenger capacity, since the consequences of an in-flight fire are not related to these factors. We are developing advisory material to describe test sample configurations to address